

SPIXIANA	41	1	33–76	München, Oktober 2018	ISSN 0341–8391
----------	----	---	-------	-----------------------	----------------

## The type specimens of South American dung beetles. Part I: On the species described in the genus *Canthon* Hoffmannsegg, 1817 by the German entomologist Adolf Schmidt (1856–1923)

(Coleoptera, Scarabaeidae, Scarabaeinae)

**Fernando Z. Vaz-de-Mello & Mario Cupello**

Vaz-de-Mello, F. Z. & Cupello, M. 2018. The type specimens of South American dung beetles. Part I: On the species described in the genus *Canthon* Hoffmannsegg, 1817 by the German entomologist Adolf Schmidt (1856–1923) (Coleoptera, Scarabaeidae, Scarabaeinae). *Spixiana* 41 (1): 33–76.

The present work represents the first part of a series of papers studying the type material of the New World Scarabaeinae deposited in all major museums of the world. The main goals of this series are to locate the whereabouts of those types, designate, when appropriate, lectotypes and neotypes, and illustrate those specimens and their labels so that it will be possible for anyone interested to identify species already described and recognize new ones. As a start to this series, we present information on and illustrate the type material of the nominal species-group taxa proposed by the German entomologist Adolf Schmidt in the genus *Canthon* Hoffmannsegg, 1817, in two papers published in 1920 and 1922. Deposited in five European museums (Berlin, Dresden, Müncheberg, Brussels, and Stockholm), we were able to find the type specimens of all but one of the 51 names firstly established as new species or new varieties by Schmidt. Of these 50 names, we designate lectotypes for 38. Schmidt also proposed three nominal species in *Canthon* as replacement names – *C. obliquatus* Schmidt, 1920, *C. dromedarius* Schmidt, 1922, and *C. punctatus* Schmidt, 1922 – and we discuss nomenclatural issues related to these names.

Fernando Z. Vaz-de-Mello & Mario Cupello, Universidade Federal de Mato Grosso, Instituto de Biociências, Departamento de Biologia e Zoologia, Av. Fernando Corrêa da Costa, 2367, Boa Esperança, 78060-900 Cuiabá, MT, Brazil; e-mail: vazdemello@gmail.com

Mario Cupello (corresponding author), Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, UFRJ, Quinta da Boa Vista, São Cristóvão, CEP 20940-040, Rio de Janeiro, RJ, Brazil; current address: Departamento de Zoologia, Universidade Federal do Paraná, UFPR, Centro Politécnico, Jardim das Américas, 81531-980 Curitiba, PR, Brazil; e-mail: mcupello@hotmail.com

### Introduction

The dung beetles of the subfamily Scarabaeinae, despite being less speciose than other hyperdiverse Coleoptera, are today one of the most intensely studied groups in entomology, encompassing aspects as

diverse as community and population ecology (e. g. Hanski & Cambefort 1991, Simmons & Ridsdill-Smith 2011), conservation (Kryger 2009, Herzog et al. 2013), biogeography (Davis 2009, Morrone 2015, Tarasov & Génier 2015, Gunter et al. 2016), sociobiology (Wilson 1971, Tallamy & Wood 1986),

development (Emlen 2000, Emlen et al. 2006), cytogenetics (Wilson & Angus 2005), ethology (Halffter & Edmonds 1982, Otronen 1988, Vulinec 1997, Emlen 1997), functional biology (Werner & Simmons 2008, Scholtz 2009), comparative morphology and anatomy (Edmonds 1972, 1974, Edmonds & Halffter 1978, Emlen 2001, Emlen et al. 2005, Medina et al. 2003, 2013, Zunino 2012), palaeontology (Krell 2006, Zunino 2013, Tarasov et al. 2016), and systematics (Tarasov & Génier 2015, Tarasov & Dimitrov 2016; and extensive list of papers in Table 1). To some extent, the intense interest in this group is due to the key roles played

**Table 1.** List of the major taxonomic revisions published over the last 25 years for the New World dung beetle taxa. Tribal classification following Tarasov & Dimitrov (2016).

Tribe / Subtribe/Genus	Subgenus and group of species	Last major revisions	Species treated in those works
<b>Ateuchini</b>			
<i>Aphengium</i> Harold, 1868		Silva & Vaz-de-Mello 2015	4
<i>Bdelyrus</i> Harold, 1869		Cook 1998, 2000	27
<i>Deltorhinum</i> Harold, 1869		Génier 2010	7
<i>Scatimus</i> Erichson, 1847		Génier & Kohlmann 2003	12
<i>Scatrichus</i> Génier & Kohlmann, 2003		Génier & Kohlmann 2003	3
<i>Scatimina</i> Vaz-de-Mello, 2008		Vaz-de-Mello 2008	63
<b>Coprini</b>			
<i>Copris</i> Geoffroy, 1762	<i>minutus</i> group: <i>incertus</i> complex	Darling & Génier 2018	6
<b>Deltochilini</b>			
<i>Anomiopus</i> Westwood, 1842		Canhedo 2004a, 2004b, 2006 (see also Edmonds & Figueroa 2013 and Figueroa & Edmonds 2015)	58
<i>Canthon</i> Hoffmannsegg, 1817	<i>Glaphyrocantion</i> Martínez, 1948 (Mexican species)	Rivera-Cervantes & Halffter 1999	20
	<i>Goniocantion</i> Pereira & Martínez, 1956	Nunes et al. 2018	3
<i>Deltochilum</i> Eschscholtz, 1822	<i>Deltochilum</i> s. str.	Génier 2012	7
	<i>Aganhyboma</i> Kolbe, 1893	Silva et al. 2015, 2018	27
	<i>Hybomidium</i> Shipp, 1897	González-Alvarado & Vaz-de-Mello 2014	13
<i>Hansreia</i> Halffter & Martínez, 1977		Valois et al. 2015, 2017b	6
<i>Scybalocantion</i> Martínez, 1948	Non-Amazonian South American species	Vaz-de-Mello & Silva 2017	4
<i>Sylvocantion</i> Halffter & Martínez, 1977		Cupello & Vaz-de-Mello in press	15
<b>Dichotomiini</b>			
<i>Chalcocopris</i> Burmeister, 1846		Rossini & Vaz-de-Mello 2015 (see also Cupello et al. 2016)	2
<i>Holocephalus</i> Hope, 1838		Smith & Génier, 2001 (see also Nunes & Vaz-de-Mello 2016)	5
<i>Dichotomius</i> Hope, 1838	Subgenus <i>Homocantionides</i> Luederwaldt, 1929	Maldaner et al. in press	1
	The <i>assifer</i> group of <i>Luederwaldtinia</i> Martínez, 1951	Nunes et al. 2016	5
	The <i>sericeus</i> group of <i>Luederwaldtinia</i>	Valois et al. 2017a	8
	The <i>speciosus</i> group of <i>Luederwaldtinia</i>	Maldaner et al. 2015	4
<i>Isocopris</i> Pereira & Martínez, 1960		Rossini & Vaz-de-Mello 2017	7

by these beetles in land environment, especially in tropical regions, where they are one of the main groups of scavengers and thus, by consuming all sort of organic matter (e. g. dung, carrion, rotten fruits and eggs), are essential to the nutrient cycle. They

are also important for other biological processes in tropical forests, as, for example, the secondary dispersion of seeds (Vulínek 2002). Dung beetles are also well suited for evolutionary studies. Since they are k-strategists (in relation to other beetles) and there-

**Table 1.** (continued).

Tribe / Subtribe/Genus	Subgenus and group of species	Last major revisions	Species treated in those works
<b>Eucraniini</b>			
<i>Anomiopsoides</i> Blackwelder, 1944		Ocampo 2005, 2007	4
<i>Ennearabdus</i> van Lansberge, 1874		Ocampo 2010a	1
<i>Eucranium</i> Brullé, 1837		Ocampo 2010b	6
<i>Glyphoderus</i> Westwood, 1838		Ocampo 2004	3
<b>Eurysternini</b>			
<i>Eurysternus</i> Dalman, 1824		Génier 2009	53
<b>Onthophagini</b>			
<i>Digitonthophagus</i> Balthasar, 1959 (one introduced species)		Génier & Moretto 2017; Génier & Krell 2017	16
<i>Hamonthophagus</i> Roggero et al., 2016 (one introduced species)		Roggero et al. 2016	5
<i>Onthophagus</i> Latreille, 1802	<i>hircus</i> group: <i>osculatii</i> complex	Rossini et al. 2018	8
<b>Phanaeini</b>			
<i>Coprophanaeus</i> d'Olsoufieff, 1924		Edmonds & Zidek 2010 (see also Kohlmann & Solís 2012, Cupello & Vaz-de-Mello 2013a, 2014b, Maldaner et al. 2018, and Arnaud 2018)	44
<i>Dendropaemon</i> Perty, 1830		Génier & Arnaud 2016 (see also Cupello & Génier 2017)	41
<i>Gromphas</i> Brullé, 1838		Cupello & Vaz-de-Mello 2013b, 2014a, 2016	6
<i>Megatharsis</i> Waterhouse, 1891		Gillett et al. 2009	1
<i>Oxysternon</i> Castelnau, 1840		Edmonds & Zidek 2004	11
<i>Phanaeus</i> MacLeay, 1819		Edmonds 1994; Edmonds & Zidek 2012 (see also Moctezuma & Halfpter 2017, Moctezuma et al. 2017, Arnaud 2018 and Kohlmann et al. 2018)	59
<i>Sulcophanaeus</i> d'Olsoufieff, 1924		Edmonds 2000	14
<b>Incertae sedis</b>			
<i>Canthidium</i> Erichson, 1847 (North American species)		Kohlmann & Solís 2006 (see also Cupello 2018)	13
<i>Cryptocanthon</i> Balthasar, 1942		Cook 2002 (see also Arias & Medina 2014)	38
<i>Ontherus</i> Erichson, 1847		Génier 1996, 1998 (see also González & Medina 2015)	60
<i>Paracryptocanthon</i> Howden & Cook, 2002		Pacheco & Vaz-de-Mello 2017	2
<i>Tesserodoniella</i> Vaz-de-Mello & Halfpter, 2006		Vaz-de-Mello & Halfpter 2006	2
<i>Zonocopris</i> Arrow, 1932		Vaz-de-Mello 2007	2

fore spend a great amount of parental investment in their offspring (in particular, the nesting behaviour) and have low fecundity (Halffter & Edmonds 1982), sexual selection tends to be prominent in this group, which has led to the evolution of an amazing variety of horns and other armament and complex agonistic behaviour. Consequently, Scarabaeinae have become a classic example and a model of studies involving sexual selection and breeding behaviour, including the evolution of subsociality (e.g. Darwin 1871, Halffter & Matthews 1966, Halffter & Edmonds 1982, Otronen 1988, Rasmussen 1994, Emlen 1997, 2000, Emlen et al. 2005, 2006). Dung beetles are also very interesting biogeographically, because the group as a whole has a relatively recent origin (Cretaceous or early Tertiary) and distribution that reflect more directly relatively recent geological events (for example, after the split of Gondwana) and long- or medium-distance dispersals. Besides, because dung beetles have a close ecological association with large mammals, research involving the development of this coevolutionary history have been attracting wide attention from coleopterists (Scholtz & Chown 1995, Ahrens et al. 2014, Gunter et al. 2016). Finally, the Scarabaeinae are also ideal for ecological studies, since various techniques (especially, baited pitfall traps and flight interception traps) allow collection of large samples in a rather controlled and standardized fashion. In essence, dung beetle studies are currently one of most exciting subfields of coleopterology and, indeed, of zoology as a whole.

Yet, serious gaps in our knowledge of dung beetles persist. Fundamental for all the disciplines listed above are the alpha and beta taxonomy, i.e. research in species delimitation, description, and naming and their classification in an evolutionary scheme, respectively (Mayr et al. 1953). Nonetheless, today, the taxonomy of most groups of dung beetles is still poorly understood and in many cases chaotic. In several works dealing with faunistic inventories and ecology, for instance, it is virtually impossible to identify with confidence a significant proportion of the collected specimens and thus the authors are forced to arrange them very loosely into groups of superficially similar individuals. Without scientific and universal names, comparison between works of different authors is impeded and reliability of almost all information is consequently greatly diminished.

In the same way, with such a large number of unidentifiable species, it is difficult to contemplate the real richness in morphology and behaviour presented by the Scarabaeinae, resulting in a serious weakness to the definition of supraspecific taxa (especially tribal classification) and to phylogenetic and biogeographic analyses. Even for those species already named, the lack of modern revisions means

that only inadequate descriptions are available and that the geographic distribution known for those species are only a fraction of the real one. Therefore, it is not surprising that great part of the Scarabaeinae collections are composed of miscellaneous unidentified or misidentified specimens. Almost two decades ago, Vaz-de-Mello (2000), for example, showed that in a major dung beetle collection in Brazil (former Vaz-de-Mello's personal collection, which is now the basis of the entomological collection at the Universidade Federal do Mato Grosso, Cuiabá, Brazil, one of the largest collection of Neotropical Scarabaeinae in the world), only 41 % of the delimited species could be identified and named with confidence, while the remainder consisted of putative new species (8 %) and species belonging to groups in which the taxonomy was in need of a thorough revision (51 %).

Nonetheless, in the past 25 years or so, studies on the taxonomy of the New World dung beetles have undergone a period of intense activity, as previously observed by Edmonds & Zidek (2012). A landmark work of this period is the multilingual key to the American genera presented by Vaz-de-Mello et al. (2011). In parallel, modern and comprehensive taxonomic revisions were published for several groups (see Table 1). One important step in any taxonomic revision is the search for the type specimens of nominal species established in the last two and half centuries of dung beetle taxonomic history since Linnaeus (1758). A great proportion of the New World species have their type material deposited in European museums, and in many cases, this material is not adequately described nor labelled as type specimens, which leads to confusion and uncertainty about the correct application of species names. Several of those works cited in Table 1 were successful in their quest for type specimens (e.g. Edmonds 1994, Génier 1996, 2009, Cupello & Vaz-de-Mello 2013b, 2014b, Silva et al. 2015) and some others have dealt specifically with this problem (e.g. Scherer 1983, Génier & Vaz-de-Mello 2002, Vaz-de-Mello & Génier 2005, Maldaner et al 2017), but several others were unable to examine, for one reason or another, the necessary type specimens (Edmonds & Zidek 2010, for instance, openly discussed this issue).

The present work is the first part of a series concerned with the study of type material of the New World Scarabaeinae – with special focus on the South American species – deposited in major museums of the world. Our main goal is to locate the whereabouts of those types, recognize their status as legitimate type specimens (and rule out possible “pseudotypes”), designate, when appropriate, lectotypes and neotypes, and, finally, illustrate those specimens and their attached labels so that it will be possible for anyone interested in working on

any group of Neotropical dung beetles to identify species already described and recognize new ones.

With those goals in mind, the first author spent a year between 2013 and 2014 at the Muséum national d'Histoire naturelle, Paris, studying its vast Scarabaeinae collection, one of the largest in the world and home for a great number of dung beetle type specimens. From there he visited several other museums in Europe, including The Natural History Museum, London, the Oxford University Museum of Natural History, Oxford, the Naturhistoriska riksmuseet, Stockholm, the Museum für Naturkunde der Humboldt-Universität, Berlin, the Zoologische Staatssammlung München, Munich, and the Institut Royal des Sciences Naturelles de Belgique, Brussels. In addition, while in Paris, he received type material from other more distant institutions, such as the Russian Academy of Sciences, St. Petersburg, and the Naturhistorisches Museum Wien, Vienna. The second author, besides spending two months at The Natural History Museum, London, and visiting some other European collections (Oxford, Paris, Berlin, Müncheberg, and Prague) between 2014 and 2016, was able to visit also a very important South American collection: the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, where type material of some species described by the German entomologist Hermann Burmeister (1807–1892) and the Argentinian Antonio Martínez (1922–1993) are housed. Here we begin to present the results of this project.

This series will include two kinds of papers: those dealing with all the species described by a specific author, and those dealing with species described in a specific genus (or a group of closely related genera) by a certain author. Naturally, the first case will include only authors who described just a few species, albeit in distantly related genera, while the second case will apply to entomologists who have described a greater number of species (typically in more than one genus), especially when their types are scattered in various museums. To open this series, we chose an author who lies between the two cases: The German entomologist Adolf Schmidt (1856–1923), who described a relatively large number of dung beetle species in just one genus, *Canthon* Hoffmannsegg, 1817.

We know very little about the life of Adolf Schmidt (Fig. 1). He was primarily an Aphodiinae specialist, having published several papers on this group between 1906 and his death, including the Aphodiinae volume of Junk's *Coleopterorum Catalogus* (Schmidt 1910). His only works on Scarabaeinae, however, were two papers on *Canthon*. The first one, from 1920, described 24 new species and varieties, while in 1922, besides presenting 26 other new dung



**Fig. 1.** The German entomologist Adolf Schmidt (1856–1923). Having published only two works on the taxonomy of dung beetles, Schmidt established 54 new species names for the genus *Canthon* Hoffmannsegg, 1817, in 1920 and 1922. Courtesy of Editha Schubert and the Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany, portrait collection.

beetle names, he published a identification key to the species of *Canthon* known to him; this key was an updated version of that presented in Harold's (1868) revision of *Canthon* and was later modified by Balthasar (1939) to include some additional new species. Since then, no other complete key to the species of *Canthon*, a taxon that contains more than 130 species (Vaz-de-Mello 2000) and is one of the largest dung beetle genera of the New World, has been published.

In the introduction to his 1920 paper, Schmidt stated that he had received material from a number of German collections, namely the museums in Berlin (i. e. the Museum für Naturkunde der Humboldt-Universität), Dahlem (currently Senckenberg Deutsches Entomologisches Institut, Müncheberg, Brandenburg), Hamburg (the Zoologisches Institut und Zoologisches Museum, Universität von Hamburg), and the firm Bang-Haas of insect dealers from

Blasewitz, Dresden (“*In letzter Zeit wurde mir freundlichst das zahlreiche Material des Museums in Dahlem und Hamburg, das der Firma Bang-Haas in Blasewitz und eine kleine Auslese aus dem Berliner Zool. Museum zur Verfügung gestellt [...]*”). In the second work (1922), in contrast, he gave no indication about the origin or deposition of the specimens examined. After his death, Schmidt’s personal collection of Aphodiinae was in 1924 transferred to the Naturhistoriska riksmuseet, Stockholm (Horn & Kahle 1936), and certainly his *Canthon* specimens went with it. In the present work, it was our main goal to find and study those specimens.

### Material and methods

We were able to locate type specimens described by Adolf Schmidt in the following five collections (names of respective curators in parentheses):

ISNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (Alain Drumont)
NHRS	Naturhistoriska riksmuseet, Stockholm, Sweden (Johannes Bergsten)
SDEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany (Stephan Blank)
SMTD	Senckenberg Naturhistorische Sammlungen Dresden, Museum für Tierkunde, Dresden, Germany (Klaus-Dieter Klass and Olaf Jäger)
ZMHB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (Joachim Willers and Johannes Frisch)

The collection of the Senckenberg Deutsches Entomologisches Institut was cited by Schmidt (1920) as the “Dahlem” museum. Indeed, this collection had a very dynamic past, having been moved several times throughout its history (Gaedike 1995). When Schmidt studied its specimens, the collection was based in Dahlem, a section of Berlin. During the Second World War, however, it was transferred out the capital, where it would be protected from bombardments. When the war was finally over, the collection returned to Berlin, but then, with the formation of the Iron Curtain, it ended up in the eastern sector of the city and could not be returned to Dahlem (Gaedilke 1995). After other subsequent moves, it resides since 2004 in Müncheberg, in the German state of Brandenburg, and still preserves much of its pre-WWII holdings. In contrast, the type material described by Schmidt (1920, 1922) deposited at the Hamburg museum is lost, since much of its collection was destroyed by Allied bombing in 1943 (Klapperich 1948, Weidner 1976, Martin Husemann, curator at the Hamburg museum, personal communication to MC in May 2018). Finally, the specimens deposited in Dresden (SMTD) came to be there via the deposition of the Staudinger & Bang-Hass collection in that museum (Horn et al. 1990).

Schmidt’s original labels are easily recognized as such. Most NHRS specimens have labels made of small

pieces of white paper with the new specific or subspecific (i.e., variety) name handwritten in pencil or ink followed by the words “*Type m.*” (Fig. 13 shows an example). The SDEI, SMTD, and ZMHB specimens also have labels made of small pieces of white or green paper (the latter colour only in the SDEI) with the complete species name handwritten in ink (i.e., the generic name *Canthon* plus the specific and, when that is the case, the subspecific [i.e., variety] names) followed by “*n. sp. A. Schmidt*” (e.g. Figs. 24 and 30) or just “*A. Schmidt*” (e.g. Fig. 18). Finally, ISNB specimens bear small labels of white paper with the specific or subspecific name handwritten in ink followed by the letter “*m.*” (Fig. 6). Here we transcribe label data verbatim: information belonging to different labels are separated by quotation marks, while single slash (“/”) indicates different lines in the same label; italics indicate handwritten data.

Some general nomenclatural considerations and principles followed by us are important to note here: firstly, following Recommendation 73F of the International Code of Zoological Nomenclature (ICZN, 1999; hereafter, “the Code”), we assume that Schmidt (1920, 1922) examined more than one specimen of each of his new species, unless he explicitly stated or the text indicates otherwise. We thus designate lectotypes even if just one syntype was found by us. Secondly, under Article 46.6.4, variety names established by Schmidt must be deemed of subspecific category and thus available species-group names. Therefore, lectotypes are designated for those names as well. Finally, when we cite the type locality of a nominal species, we mean the place of origin of the new lectotype: in accordance with Article 76.2, when a syntype is chosen to be designated as the lectotype, “the place of origin of the lectotype becomes the type locality of the nominal species-group taxon”. The main source of this information are the labels attached to the specimens, but, in some cases, additional information provided by Schmidt himself and by other authors was used to give a more precise locality.

### Results

Of the 54 dung beetle nominal species established by Schmidt (1920, 1922), only the type material of *Canthon mutabilis signatus* Schmidt, 1922 was not found by us. With just 16 additional exceptions, we designate lectotypes for all Schmidt’s nominal species in order to stabilize the nomenclature and avoid any future disturbance by fixing the name-bearing type to one specimen in accordance with Article 74 of the Code. The exceptions are *Canthon granulifer* Schmidt, 1920, of which we do not have detailed label information from all the three known syntypes; *Canthon affinis* var. *coriaceus*, *C. speculifer* var. *subviridis*, and the nominal species currently placed in *Syloicanthon* Halfpeter & Martínez, 1977 (viz., *C. foveiventris*, *C. furvus*, *C. obscurus*, and *C. securus*) for which Valois et al. (2015), Nunes et al. (2018) and

Cupello & Vaz-de-Mello (in press), respectively, have already designated lectotypes; the six nominal species currently classified in *Scybalocanthon* Martínez, 1948 (namely, *C. aereus*, *C. maculatus*, *C. nigellus*, *C. pygidialis*, *C. trimaculatus*, and *C. uniplagiatus*), which are under revision by Fernando Silva (Universidade Federal de Pará, Brazil); and *Canthon obliquatus* Schmidt, 1920, *C. dromedarius* Schmidt, 1922, and *C. punctatus* Schmidt, 1922, all presented by Schmidt as replacement names, and which, therefore, have the same name-bearing types as their senior objective synonyms (Article 72.7 of the Code; see more information in the respective sections). Below, we present data for all the species-group names established by Schmidt (1920, 1922) in the genus *Canthon*.

### Species described by Adolf Schmidt in 1920

#### 1. *Canthon 5-maculatus* var. *pauper* Schmidt, 1920: 117. (Figs 2–3)

**Type locality:** Peru: Junín, Chanchamayo. Type locality not cited by Schmidt.

**Type material:** **Lectotype:** here designated, male (“LECTOTYPE ♂ / *Canthon quinque- / maculatus* var. / *pauper* Schm. / des. F.Z.Vaz-de-Mello, 2013”, “*var. pauper / A. Schm.*”, “3098 / E92 +”, “*Type*”, “Chanchamayo / Peru”), **NHRS.** – **Paralectotypes:** 1. Male (“PARALECTOTYPE / *Canthon quinquema / culatus* var. / *pauper* Schm. ♂ / des. F.Z.Vaz-de-Mello, 2013”, “Ocobambe / Peru”, “3099 / E92 +”), **NHRS.** 2. Female (“3101 / E92 +”, “PARALECTOTYPE / *Canthon quinquema / culatus* var. / *pauper* Schm. ♀ / des. F.Z.Vaz-de-Mello, 2013”, “*quinquemaculatus* C.”, “Yungas / Bolivien”, “*var. pauper*”), **NHRS.** 3. Female (“Yungas / Bolivien”, “*Type*”, “*var. pauper / m.*”, “PARALECTOTYPE / *Canthon quinque- / maculatus* var. / *pauper* Schm. ♀ / des. F.Z.Vaz-de-Mello, 2013”, “*Typus*”, “3100 / E92+”), **NHRS.** 4. Male (“A. Schmidt det.”, “Coll. Kraatz”, “Vilcanota / Peru”, “PARATYP.”, “PARALECTOTYPE ♂ / *Canthon 5-maculatus / var. pauper* Schmidt / Vaz-de-Mello and / Cupello des. 2016”), **SDEI.** 5. Male (“A. Schmidt det.”, “Coll. Kraatz”, “Vilcanota / Peru”, “PARATYP.”, “PARALECTOTYPE ♂ / *Canthon 5-maculatus / var. pauper* Schmidt / des. Vaz-de-Mello and / Cupello, 2016”), **SDEI.** 6. Female (“5-maculatus / *var. pauper / n. var. A. Schmidt*”, “PARALECTOTYPE ♀ / *Canthon 5-maculatus / var. pauper* Schmidt / des. Vaz-de-Mello and / Cupello, 2016”, “TYPUS”, “A. Schmidt det.”, “Coll. Kraatz”, “Vilcanota / Peru”), **SDEI.**

**Current status:** Junior subjective synonym of *Canthon quinquemaculatus* Castelnau, 1840 (synonymized by Vulcano & Pereira 1964: 627).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

#### 2. *Canthon 7-maculatus* var. *linearis* Schmidt, 1920: 115. (Figs 4–5)

**Type locality:** Colombia. Type locality not cited by Schmidt.

**Type material:** **Lectotype:** here designated, male (“LECTOTYPE ♂ / *Canthon septem- / maculatus* var. / *linearis* Schmidt / des. F.Z.Vaz-de-Mello, 2013”, “Columbia”, “3200 / E92 +”, “*v. lineatus*”), **NHRS.** – **Paralectotypes:** 1. Female (“PARALECTOTYPE / *Canthon septemmaculatus* var. / *linearis* Schmidt ♀ / des. F.Z.Vaz-de-Mello, 2013”, “Columbien”, “3201 / E92 +”, “*v. lineatus*”), **NHRS.** 2. Female (“PARALECTOTYPE / *Canthon septemmaculatus* var. / *linearis* Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “C. 7-maculatus / *var. lineatus / Type A. Schmidt*”, “7-maculat. / *var. lin. / Bahia*”, “26332”), **ZMHB.**

**Current status:** Junior subjective synonym of *Canthon septemmaculatus* (Latreille, 1807) (synonymized by Vulcano & Pereira 1964: 628–630).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

#### 3. *Canthon 7-maculatus* var. *maculicollis* Schmidt, 1920: 115. (Figs 6–7)

**Type locality:** Peru. Type locality not cited by Schmidt.

**Type material:** **Lectotype:** here designated, male (“LECTOTYPE ♂ / *Canthon septemmaculatus* var. / *maculicollis* Schm. / des. F.Z.Vaz-de-Mello, 2013”, “Hoch- / Peru”, “3194 / E92 +”, “*maculicoll. / A. Schm.*”), **NHRS.** – **Paralectotypes:** 1. Female (“Surinam”, “*septemmac. / v. maculicollis / m.*”, “J. J. Gillet det., vend.: / *Canthon / septemmaculatus / v. maculicollis / R.M.H.N. Belg.* 10.640”, “PARALECTOTYPE / ♀ / *Canthon septemmaculatus / maculicollis* Schm. / des. F.Z.Vaz-de-Mello, 2014”), **ISNB.** 2. Male (“PARALECTOTYPE / *Canthon septemmaculatus / maculicollis* / Schmidt ♂ / des. F.Z.Vaz-de-Mello, 2013”, “*maculicoll / A. Schmidt*”, “3195 / E92 +”, “Tarapota”), **NHRS.** 3. Male (“PARALECTOTYPE / *Canthon septemmaculatus / maculicollis / Schmidt* ♂ / des. F.Z.Vaz-de-Mello, 2013”, “Pozuzu / Peru”, “3191 / E92 +”, “*maculicoll / 2 [illegible]*”), **NHRS.** 4. Male (“Pozuzu / Peru”, “*Typ.*”, “PARALECTOTYPE / *Canthon septemmaculatus / maculicollis / Schmidt* ♂ / des. F.Z.Vaz-de-Mello, 2013”, “*var. maculicollis / [illegible] Type*”, “3190 / E92 +”, “*var. maculicoll- / lis A. Schm.*”), **NHRS.** 5. Female (“*maculicoll / 3 [illegible]*”, “Pozuzu / Peru”, “3193 / E92 +”, “PARALECTOTYPE / *Canthon septemmaculatus / maculicollis / Schmidt* ♀ / des. F.Z.Vaz-de-Mello, 2013”), **NHRS.** 6. Female (“PARALECTOTYPE / *Canthon septemmaculatus / maculicollis / Schmidt* ♀ / des. F.Z.Vaz-de-Mello, 20”, “Surinam”, “3192 / E92 +”, “*maculicoll / 4 [illegible]*”), **NHRS.** 7. Male (“PARALECTOTYPE / ♂ / *Canthon septem- / maculatus* var. *maculicollis / Schm.* / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Surinam”), **SMTD.** 8. Male (“PARA-



**Figs 2-3.** *Canthon 5-maculatus* var. *pauper* Schmidt, 1920. 2. Lectotype. 3. Labels of the type specimens. Clockwise from top left: lectotype, paralectotype 2, paralectotype 3, paralectotype 1.

**Figs 4-5.** *Canthon 7-maculatus* var. *linearis* Schmidt, 1920. 4. Lectotype. 5. Labels of the type specimens. From left: lectotype, paralectotype 1, paralectotype 2.

**Figs 6-7.** *Canthon 7-maculatus* var. *maculicollis* Schmidt, 1920. 6. Lectotype. 7. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 4, paralectotype 6, paralectotype 10, paralectotype 1, paralectotype 11.



LECTOTYPE / ♂ / *Canthon septem- / maculatus var. / maculicollis* Schm. / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Surinam"), **SMTD**. 9. Male ("PARALECTOTYPE / ♂ / *Canthon septem- / maculatus var. maculicollis* / Schm. / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Surinam"), **SMTD**. 10. Female ("PARALECTOTYPE / ♀ / *Canthon septem- / maculatus var. / maculicollis* Schm. / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Surinam"), **SMTD**. 11. Female ("PARALECTOTYPE / ♀ / *Canthon septem- / maculatus var. / maculicollis* Schm. / des. F.Z.Vaz-de-Mello, 2014", "Typus", "C. 7-maculatus / var. *maculicollis* / A. Schmidt", "Coll. C. Felsche / Kauf 20, 1918", "Columbia"), **SMTD**.

**Current status:** Junior subjective synonym of *Canthon septemmaculatus* (Latreille, 1807) (synonymized by Vulcano & Pereira 1964: 628–630).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

#### 4. *Canthon 7-maculatus var. maculipennis*

**Schmidt, 1920:** 115. (Figs 8–9)

**Type locality:** Bolivia: Yungas. Type locality not cited by Schmidt.

**Type material:** **Lectotype:** here designated, male ("Yungas / Bolivien", "3185 / E92 +", "Typus", "Typ.", "LECTOTYPE ♂ / *Canthon septem / maculatus var. / maculipennis* Sch. / des. F.Z.Vaz-de-Mello, 2013", "var. *maculipennis* / [illegible] / type"), **NHRS**. – **Paralectotypes:** 1. Female ("PARALECTOTYPE / *Canthon septem- / maculatus var. / maculipennis* Sch. / des. F.Z.Vaz-de-Mello, 2013", "Yungas / Bolivien", "3187 / E92 +", "var. *maculipennis* / 2. Type. [illegible]"), **NHRS**. 2. Female ("PARALECTOTYPE / ♀ / *Canthon septem- / maculatus var. / maculipennis* Sch. / des. F.Z.Vaz-de-Mello, 2013", "Mapiri / Bolivia", "3186 / E92 +"), **NHRS**. 3. Male ("PARALECTOTYPE / ♂ / *Canthon / septemmaculatus / maculipennis* Sch. / des. F.Z.Vaz-de-Mello, 2014", "Gehr. W. Müller / Vermächt. 1909", "Peru"), **SMTD**. 4. Female ("PARALECTOTYPE / ♀ / *Canthon septem- / maculatus var. / maculipennis* / Sch. / des. F.Z.Vaz-de-Mello, 2014", "Typus", "var. / *maculipennis* / m.", "Coll. C. Felsche / Kauf 20, 1918", "Sao Paulo"), **SMTD**. 5. Female ("PARALECTOTYPE / ♀ / *Canthon septem- / maculatus var. / maculipennis* Schm. / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Bolivia / Yungasweg"), **SMTD**. 6. Female ("PARALECTOTYPE / ♀ / *Canthon septem- / maculatus var. / maculipennis* / Schmidt / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Bolivia / Yungasweg"), **SMTD**.

**Current status:** Junior subjective synonym of *Canthon septemmaculatus* (Latreille, 1807) (synonymized by Vulcano & Pereira 1964: 628–630).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

#### 5. *Canthon 7-maculatus var. niger* Schmidt, 1920: 116. (Figs 10–11)

**Type locality:** Surinam. Type locality not cited by Schmidt.

**Type material:** **Lectotype:** here designated, male ("LECTOTYPE ♂ / *Canthon septem- / maculatus var. / niger* Schmidt / des. F.Z.Vaz-de-Mello, 2013", "Surinam", "var. / *niger* / A. Schm.", "3203 / E92 +", "var. *nigra* / er"), **NHRS**. – **Paralectotypes:** 1. Female ("Surinam", "septemmac. / v. *niger* / m.", "J. J. Gillet det., vend.: / *Canthon / septemmaculatus* / v. *niger* / R.M.H.N. Belg. 10.640", "PARALECTOTYPE / ♀ / *Canthon / septemmaculatus / niger* / Schmidt / des. F.Z.Vaz-de-Mello, 2014"), **ISNB**. 2. Female ("septemmaculatus Ltr.", "3204 / E92 +", "Surinam", "PARALECTOTYPE / ♀ / *Canthon septem- / maculatus var. / niger* Schm. / des. F.Z.Vaz-de-Mello, 2013"), **NHRS**. 3. Female ("PARALECTOTYPE / ♀ / *Canthon septem / maculatus var. / niger* Schmidt / des. F.Z.Vaz-de-Mello, 2014", "C. 7-maculatus / var. *niger* / A. Schmidt", "Coll. C. Felsche / Kauf 20, 1918", "II.97. / (Dr. Rendall)", "Caparo valley, / Pt. of Spain"), **SMTD**. 4. Female ("PARALECTOTYPE / ♀ / *Canthon septem / maculatus var. / niger* Schmidt / des. F.Z.Vaz-de-Mello, 2014", "Typus", "Coll. C. Felsche / Kauf 20, 1918", "Columbia"), **SMTD**.

**Current status:** Junior subjective synonym of *Canthon septemmaculatus* (Latreille, 1807) (synonymized by Vulcano & Pereira 1964: 628–630).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

#### 6. *Canthon columbianus* Schmidt, 1920: 125. (Figs 12–13)

**Type locality:** Colombia. Type locality cited by Schmidt as "Columbia".

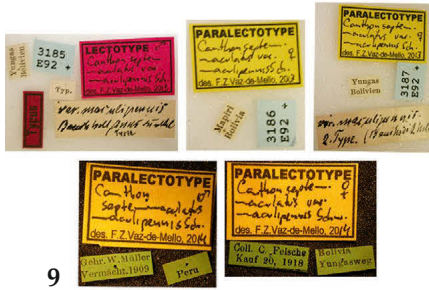
**Type material:** **Lectotype:** here designated, male ("Typ.", "Typus", "LECTOTYPE ♂ / *Canthon / columbianus / Schmidt* / des. F.Z.Vaz-de-Mello, 2013", "columbianus / Type m.", "Columbia / Coll. [illegible]", "9500 / E92 +"), **NHRS**. – **Paralectotypes:** 1. Female ("PARALECTOTYPE / ♀ / *Canthon / columbianus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "J. J. Gillet det., vend.: / *Canthon / columbianus* / R.M.H.N. Belg. 10.640", "Canthon / femoralis / Chev / Colombia", "columbianus / m."), **ISNB**. 2. Female ("PARALECTOTYPE / ♀ / *Canthon / columbianus / Schmidt* / des. F.Z.Vaz-de-Mello, 2013", "Geocanthon / columbianus / (Schm.) / P. Pereira det. 60", "columb. / Type ♀", "9499 / E92 +", "17 / 56", "Typ.", "Columbia"), **NHRS**. 3. Female ("PARALECTOTYPE / ♂ / *Canthon / columbianus / Schmidt* / des. F.Z.Vaz-de-Mello, 2013", "columbianus / Schm.", "columb / m.", "Columbia / Coll. [illegible]"), **NHRS**.



8



10



9



11



13



12

**Figs 8–9.** *Canthon 7-maculatus* var. *maculipennis* Schmidt, 1920. 8. Lectotype. 9. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 2, paralectotype 1, paralectotype 3, paralectotype 5.  
**Figs 10–11.** *Canthon 7-maculatus* var. *niger* Schmidt, 1920. 10. Lectotype. 11. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 2, paralectotype 1, paralectotype 4, paralectotype 3.  
**Figs 12–13.** *Canthon columbianus* Schmidt, 1920. 12. Lectotype. 13. Labels of the type specimens. Clockwise from top left: lectotype, paralectotype 2, paralectotype 3, paralectotype 1.

**Current status:** Valid species as *Canthon (Glaphyrocanton) columbianus* Schmidt, 1920.

**Last taxonomic treatment:** Pereira & Martínez (1960), Halffter & Martínez (1977). Under revision by MC.

**7. *Canthon curvodilatatus* Schmidt, 1920:** 128. (Figs 14–16)

**Type locality:** Paraguay: Concepción, Rio Paraguai, Puerto Max, Estancia Postillon. Type locality cited by Schmidt as “Nord-Paraguay”.

**Type material: Lectotype:** male (“Estancia Postillon / Puerto Max a. Rio Pa- raguay, N. Paraguay, / Louis Des Arts jr. leg. / ded. 9.III.1905”, “Typ.”, “*curvodilatatus* / *type m.*”, “18 / 56”, “9576 / E92 +”, “HOLOTYPE ♂”, “NHRS-JLKB / 000021103”), NHRS.

**Current status:** Valid species as *Canthon (C.) curvodilatatus* Schmidt, 1920.

**Last taxonomic treatment:** Halffter & Martínez (1977).

**8. *Canthon foveiventris* Schmidt, 1920:** 132. (Figs 17–18)

**Type locality:** Brazil: Espírito Santo. Type locality cited by Schmidt as “Espírito Santo”.

**Type material: Lectotype:** designated by Cupello & Vaz-de-Mello (in press), male (“9652 / E92 +”, “24 / 56”, “LECTOTYPE ♂ / *Canthon / foveiventris / Schmidt / des. F. Z. Vaz-de-Mello, 2013*”, “*Glaphyrocanton / foveiventris / (Schm.) / P. Pereira det. 66*”, “*foveiventris*”, “Esp. Santo”), NHRS. – **Paralectotypes:** 1. Female (“foveiventris / *Schm.*”, “9653 / E92 +”, “Espir. / Santo”, “foveiventris”, “foveiventris / *A. Schm.*”, “PARALECTOTYPE / ♀ / *Canthon / foveiventris / Schmidt / des. F. Z. Vaz-de-Mello, 2013*”), NHRS. 2. Male (“PARALECTOTYPE / ♂ / *Canthon / foveiventris / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Esp. Santo”), SMTD. 3. Male (“PARALECTOTYPE / ♂ / *Canthon / foveiventris / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Esp. Santo”), SMTD. 4. Male (“PARALECTOTYPE / ♂ / *Canthon / foveiventris / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Esp. Santo”), SMTD. 5. Female (“PARALECTOTYPE / ♀ / *Canthon / foveiventris / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Esp. Santo”), SMTD. 6. Female (“Typus”, “Esp. Santo”, “Coll. C. Felsche / Kauf 20, 1918”, “*Canthon / foveiventris / A. Schmidt*”, “PARALECTOTYPE / ♀ / *Canthon / foveiventris / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”), SMTD.

**Current status:** Valid species as *Sylvicanthon foveiventris* (Schmidt, 1920) (firstly cited in combination with *Sylvicanthon* Halffter & Martínez, 1977 by Vaz-de-Mello & Louzada 1997).

**Last taxonomic treatment:** Cupello & Vaz-de-Mello (in press).

**9. *Canthon furvus* Schmidt, 1920:** 130. (Figs 19–20)

**Type locality:** Peru: Cusco, Quispicanchi, Marcapata. Type locality cited by Schmidt as “Peru, Bolivien”.

**Type material: Lectotype:** designated by Cupello & Vaz-de-Mello (in press), male (“Typ.”, “Marcapata / Peru”, “Typus”, “*furvus / Type m.*”, “*furvus / A. Schm.*”, “*Glaphyrocanton / furvus / (Schm.) / P. Pereira det. 60*”, “9663 / E92 +”, “NHRS-JLKB / 000021102”, “LECTOTYPE ♂ / *Canthon / furvus Schm. / des. F. Z. Vaz-de-Mello, 2013*”), NHRS. – **Paralectotypes:** 1. Male (“9662 / E92 +”, “PARALECTOTYPE / ♂ / *Canthon / furvus Schm. / des. F. Z. Vaz-de-Mello, 2013*” “Bolivia”, “*furvus*”), NHRS. 2. Female (“*furvus / Schmidt*”, “Marcapata / Peru”, “9664 / E92 +”, “PARALECTOTYPE / ♀ / *Canthon / furvus Schm. / des. F. Z. Vaz-de-Mello, 2013*”), NHRS. 3. Female (“PARALECTOTYPE / ♀ / *Canthon / furvus Schm. / des. F. Z. Vaz-de-Mello, 2013*”, “*Glaphyrocanton / furvus / (Schm.) / P. Pereira det. 60*”, “Marcapata / Peru”, “9661 / E92 +”), NHRS. 4. Male (“PARALECTOTYPE / ♂ / *Canthon / furvus / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “*Canthon / furvus / A. Schmidt*”, “Typus”, “Coll. C. Felsche / Kauf 20, 1918”, “Bolivia”), SMTD. 5. Male (“PARALECTOTYPE / ♂ / *Canthon / furvus / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Bolivia”), SMTD. 6. Male (“PARALECTOTYPE / ♂ / *Canthon / furvus / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “*Canthon / furvus / A. Schmidt*”, “Peru”, “Gehr. W. Müller / Vermächt. 1909”), SMTD. 7. Female (“PARALECTOTYPE / ♀ / *Canthon / furvus / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Bolivia”), SMTD. 8. Female (“PARALECTOTYPE / ♀ / *Canthon / furvus / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Bolivia”), SMTD. 9. Female (“PARALECTOTYPE / ♀ / *Canthon / furvus / Schmidt / des. F. Z. Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Bolivia”), SMTD.

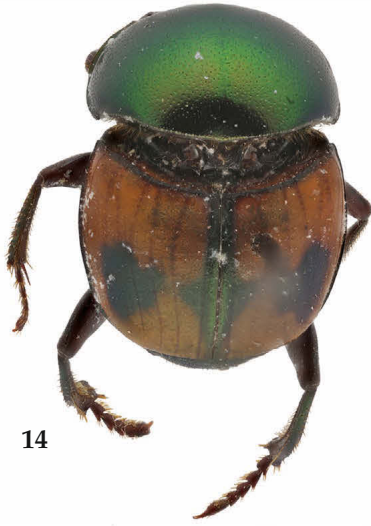
**Current status:** Valid species as *Sylvicanthon furvus* (Schmidt, 1920) (transferred to *Sylvicanthon* by Halffter & Martínez 1977).

**Last taxonomic treatment:** Cupello & Vaz-de-Mello (in press).

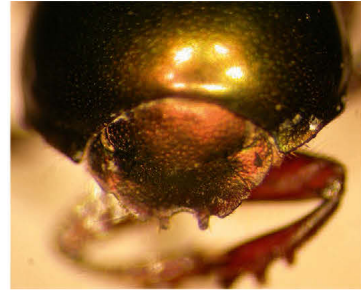
**10. *Canthon granulifer* Schmidt, 1920:** 125. (Figs 21–24)

**Type locality:** United States: Texas. Type locality cited by Schmidt as “Texas”.

**Type material: Syntypes:** 1. Male (“Syntypus”, “*Canthon / granulifer / n. sp. A. Schmidt*”, “DEI MÜNCHENBERG / Col – 07658”, “TEXAS / Rivers”, “A. Schmidt det.”, “Coll. Kraatz”), SDEI. Two other syntypes deposited at NHRS.



14



15



16



17



19



18



20

Figs 14–16. *Canthon curvodilatatus* Schmidt, 1920. 14. Lectotype. 15. Frontal view of head. 16. Lectotype labels.  
 Figs 17–18. *Canthon foveiventris* Schmidt, 1920. 17. Lectotype. 18. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 6, paralectotype 1.  
 Figs 19–20. *Canthon furvus* Schmidt, 1920. 19. Lectotype. 20. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 4, paralectotype 1, paralectotype 3, paralectotype 6.



21



22



23



24

**Figs 21–24.** *Canthon granulifer* Schmidt, 1920. 21. SDEI syntype. 22–23. Genital capsule extracted from it, dorsal (22) and lateral (23) views. 24. Labels.

**Current status:** Valid species as *Melanocanthon granulifer* (Schmidt, 1920) (transferred to *Melanocanthon* by Halffter 1958: 211).

**Last taxonomic treatment:** Halffter (1958), Halffter & Martínez (1977).

**11. *Canthon lituratus* var. *bifasciatus* Schmidt, 1920:** 120. (Figs 25–26)

**Type locality:** Colombia: Tolima, Magdalena, Honda (Río Magdalena). Type locality not cited by Schmidt.

**Type material:** **Lectotype:** here designated, male (“LECTOTYPE ♂ / *Canthon lituratus* / var *bifasciatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2013”, “*bifasciat.*”, “9777 / E92 +”, “var. / *bifasciatus* / A. Schm.”, “Columbien / Honda a Magdalena / O. Thieme S.”), NHRS.

**Current status:** Junior subjective synonym of *Canthon (C.) lituratus* (Germar, 1813) (synonymized by Balthasar 1939: 218).

**Last taxonomic treatment:** Halffter & Martínez (1977).

**12. *Canthon lituratus* var. *solutus* Schmidt, 1920:** 120. (Figs 27–28)

**Type locality:** Colombia. Type locality not cited by Schmidt.

**Type material:** **Lectotype:** here designated, female (“LECTOTYPE ♀ / *Canthon lituratus* / var. *solutus* /

Schmidt / des. F.Z.Vaz-de-Mello, 2013”, “var. / *solutus* / m.”, “var. / *solutus* / A. Schm.”, “9776 / E92 +”, “Columbia”, “Vid. Harold”), NHRS.

**Current status:** Junior subjective synonym of *Canthon (C.) lituratus* (Germar, 1813) (synonymized by Balthasar 1939: 218).

**Last taxonomic treatment:** Halffter & Martínez (1977).

**13. *Canthon maculatus* Schmidt, 1920:** 127. (Figs 29–30)

**Type locality:** Ecuador: unknown province, “Santa Inéz”. Type locality cited by Schmidt as “Santa Inéz (Ecuador)”.

**Type material:** **Syntypes:** 1. Male (“LECTOTYPE ♂ / *Canthon* / *maculatus* Schm. / des. F.Z.Vaz-de-Mello, 2013”, “*maculatus* / Type m.”, “9846 / E92 +”, “Typus”, “Typ.”, “Santa Inéz / (Ecuad.) / R. Haensch S.”), NHRS. 2. Male (“PARALECTOTYPE / ♂ / *Canthon* / *maculatus* Schm. / des. F.Z.Vaz-de-Mello, 2013”, “Santa Inéz / (Ecuad.) / R. Haensch S.”, “*Scybalocanthon* / *maculatus* / (Schm) / P. Pereira det. 60”, “9843 / E92 +”), NHRS. 3. Male (“PARALECTOTYPE / ♂ / *Canthon* / *maculatus* Schm. / des. F.Z.Vaz-de-Mello, 2013”, “Santa Inéz / (Ecuad.) / R. Haensch S.”, “*Scybalocanthon* / *maculatus* / (Schm) / P. Pereira det. 60”, “9842 / E92 +”), NHRS. 4. Male (“PARALECTOTYPE / ♀ / *Canthon* / *maculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2013”, “Santa Inéz



Figs 25–26. *Canthon lituratus* var. *bifasciatus* Schmidt, 1920. 25. Lectotype. 26. Its labels.  
 Figs 27–28. *Canthon lituratus* var. *solutus* Schmidt, 1920. 27. Lectotype. 28. Its labels.  
 Figs 29–30. *Canthon maculatus* Schmidt, 1920. 29. Syntype 1. 30. Labels of some syntypes. Clockwise from top left: syntype 1, syntype 5, syntype 14, syntype 12, syntype 1.

/ (Ecuad.) / R. Haensch S.", "9845 / E92 +"), **NHRS.** 5. Female ("PARALECTOTYPE / ♀ / *Canthon / maculatus / Schm.* / des. F.Z.Vaz-de-Mello, 2013", "Santa Inéz / (Ecuad.) / R. Haensch S.", "26 / 56", "9844 / E92 +"), **NHRS.** 6. Male ("PARALECTOTYPE / ♂ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Ecuador / Baron"), **SMTD.** 7. Male ("PARALECTOTYPE / ♂ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Santa Inéz / (Ecuad.) / R. Haensch S."), **SMTD.** 8. Male ("PARALECTOTYPE / ♂ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Ecuador / Baron"), **SMTD.** 9. Male ("PARALECTOTYPE / ♂ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Ecuador / Baron"), **SMTD.** 10. Male ("PARALECTOTYPE / ♂ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Ecuador / Baron"), **SMTD.** 11. Female ("PARALECTOTYPE / ♀ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Santa Inéz / (Ecuad.) / R. Haensch S."), **SMTD.** 12. Female ("PARALECTOTYPE / ♀ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Ecuador / Baron"), **SMTD.** 13. Female ("PARALECTOTYPE / ♀ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Typus" "*Canthon / maculatus / A. Schmidt*", "Coll. C. Felsche / Kauf 20, 1918", "Santa Inéz / (Ecuad.) / R. Haensch S."), **SMTD.** 14. Male ("PARALECTOTYPE / ♂ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Santa Inéz / (Ecuad.) / R. Haensch S.", "106947"), **ZMHB.** 15. Male ("PARALECTOTYPE / ♂ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Santa Inéz / (Ecuad.) / R. Haensch S.", "106947"), **ZMHB.** 16. Male ("PARALECTOTYPE / ♂ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Santa Inéz / (Ecuad.) / R. Haensch S."), **ZMHB.** 17. Female ("PARALECTOTYPE / ♀ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "*Canthon / maculatus / n.sp. A. Schmidt*", "106947", "Santa Inéz / (Ecuad.) / R. Haensch S."), **ZMHB.** 18. Female ("PARALECTOTYPE / ♀ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "106947", "Santa Inéz / (Ecuad.) / R. Haensch S."), **ZMHB.** 19. Female ("PARALECTOTYPE / ♀ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "106947", "Santa Inéz / (Ecuad.) / R. Haensch S."), **ZMHB.** 20. Female ("PARALECTOTYPE / ♀ / *Canthon / maculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Santa Inéz / (Ecuad.) / R. Haensch S."), **ZMHB.**

**Current status:** Valid species as *Scybalocanthon maculatus* (Schmidt, 1920) (transferred to *Scybalocanthon* Martínez, 1948 by Pereira & Martínez 1956: 119).

**Last taxonomic treatment:** Pereira & Martínez (1956), Halffter & Martínez (1977), Molano & Medina (2010). Under revision by Fernando Silva (Universidade Federal do Pará, Brazil).

**14. *Canthon mutabilis* var. *basalis* Schmidt, 1920:** 118. (Figs 31–32)

**Type locality:** Brazil: Santa Catarina, Joinville. Type locality not cited by Schmidt.

**Type material: Lectotype: here designated,** male ("Joinville / Bresil", "Typ.", "Typus", "*var. basalis / 1-Form Type m.*", "9892 / E92 +", "NHRS-JLKB / 000021099", "LECTOTYPE ♂ / *Canthon / mutabilis var. / basalis Schm.* / des. F.Z.Vaz-de-Mello, 2013"), **NHRS.** – **Paralectotypes:** 1. Male ("Venez", "Typus", "PARALECTOTYPE / ♂ / *Canthon / mutabilis var. / basalis Schm.* / des. F.Z.Vaz-de-Mello, 2013", "Typ.", "*var. basalis* / [illegible] *Type m.*", "9894 / E92 +"), **NHRS.** 2. Female ("Brasil", "PARALECTOTYPE / ♀ / *Canthon / mutabilis var. / basalis Schm.* / des. F.Z.Vaz-de-Mello, 2013", "♀", "*v. basalis* / [illegible]", "9895 / E92 +"), **NHRS.** 3. Female ("PARALECTOTYPE / ♀ / *Canthon / mutabilis var. / basalis Schm.* / des. F.Z.Vaz-de-Mello, 2013", "*v. basalis* / [illegible]", "9893 / E92 +", "Chanchamayo, / Heyne, Berlin", "Peru / Wilm."), **NHRS.** 4. Male ("PARALECTOTYPE / ♂ / *Canthon / mutabilis var. / basalis Schm.* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "St. Catharina"), **SMTD.** 5. Female ("PARALECTOTYPE / ♀ / *Canthon / mutabilis var. / basalis Schm.* / des. F.Z.Vaz-de-Mello, 2014", "Typus", "C. mutabilis / var. bascolus", "Coll. C. Felsche / Kauf 20, 1918", "R.Gr. do Sul"), **SMTD.**

**Current status:** Junior subjective synonym of *Canthon* (C.) *mutabilis* Lucas, 1859 (synonymized by Vulcano & Pereira 1964: 620–621).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

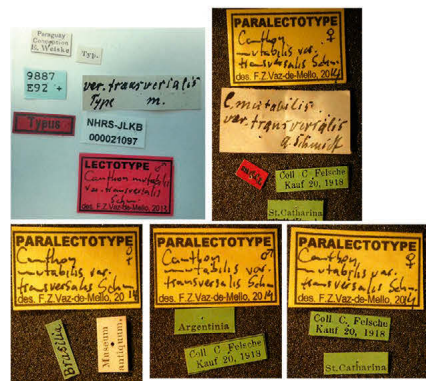
**15. *Canthon mutabilis* var. *nigrinus* Schmidt, 1920:** 118. (Figs 33–34)

**Type locality:** Peru: Junín, Chanchamayo. Type locality not cited by Schmidt.

**Type material: Lectotype: here designated,** male ("Peru / Wilm", "Chanchamayo, / Heyne, Berlin", "*var. nigrinus / m.*", "9899 / E92 +", "LECTOTYPE ♂ / *Canthon mutabilis / var. nigrinus / Schm.* / des. F.Z.Vaz-de-Mello, 2013", "NHRS-JLKB / 000021098"), **NHRS.** – **Paralectotype:** Female ("P. Alegre / Brasil.", "PARALECTOTYPE / *Canthon mutabilis / var. nigrinus* ♀ / *Schm.* / des. F.Z.Vaz-de-Mello, 2013"), **NHRS.**

**Current status:** Junior subjective synonym of *Canthon* (C.) *mutabilis* Lucas, 1859 (synonymized by Vulcano & Pereira 1964: 620–621).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.



Figs 31–32. *Canthon mutabilis* var. *basalis* Schmidt, 1920. 31. Lectotype. 32. Labels of type specimens. Clockwise from top left: lectotype, paralectotype 2, paralectotype 1, paralectotype 5, paralectotype 3, paralectotype 4.  
 Figs 33–34. *Canthon mutabilis* var. *nigrinus* Schmidt, 1920. 33. Lectotype. 34. Labels of type specimens. From left: lectotype and paralectotype.  
 Figs 35–36. *Canthon mutabilis* var. *transversalis* Schmidt, 1920. 35. Lectotype. 36. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 7, paralectotype 1, paralectotype 3.



**16. *Canthon mutabilis* var. *signatus* Schmidt, 1920: 118.**

**Type locality:** Unknown to us.

**Type material:** Unknown; not found in any of the museums searched by us.

**Current status:** Junior subjective synonym of *Canthon* (C.) *mutabilis* Lucas, 1859 (synonymized by Vulcano & Pereira 1964: 620–621).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

**17. *Canthon mutabilis* var. *transversalis* Schmidt, 1920: 117. (Figs 35–36)**

**Type locality:** Paraguay: Concepcion. Type locality not cited by Schmidt.

**Type material: Lectotype:** here designated, male (“Paraguay / Concepcion / E. Welske”, “Typ.”, “9887 / E92 +”, “var. *transversalis* / Type m.”, “Typus”, “NHRS-JLKB / 000021097”, “LECTOTYPE ♂ / *Canthon mutabilis* / var. *transversalis* / Schm. / des. F.Z.Vaz-de-Mello, 2013”), **NHRS.** – **Paralectotypes:** 1. Male (“PARALECTOTYPE / ♂ / *Canthon* / *mutabilis* var. / *transversalis* Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Argentina”, “Coll. C. Felsche / Kauf 20, 1918”), **SMTD.** 2. Male (“PARALECTOTYPE / ♂ / *Canthon* / *mutabilis* var. / *transversalis* Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “St. Catharina”), **SMTD.** 3. Female (“PARALECTOTYPE / ♀ / *Canthon* / *mutabilis* var. / *transversalis* Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Brasília”, “Museum antiquum”), **SMTD.** 4. Female (“PARALECTOTYPE / ♀ / *Canthon* / *mutabilis* var. / *transversalis* Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “St. Catharina”), **SMTD.** 5. Female (“PARALECTOTYPE / ♀ / *Canthon* *mutabilis* var. *transversalis* / *lis* Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “St. Catharina”), **SMTD.** 6. Female (“PARALECTOTYPE / ♀ / *Canthon* / *mutabilis* var. / *transversalis* Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “St. Catharina”), **SMTD.** 7. Female (“PARALECTOTYPE / ♀ / *Canthon* / *mutabilis* var. / *transversalis* Schm. / des. F.Z.Vaz-de-Mello, 2014”, “C. *mutabilis* / var. *transversalis* / A. Schmidt”, “Typus”, “Coll. C. Felsche / Kauf 20, 1918”, “St. Catharina”), **SMTD.**

**Current status:** Junior subjective synonym of *Canthon* (C.) *mutabilis* Lucas, 1859 (synonymized by Vulcano & Pereira 1964: 620–621).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

**18. *Canthon mutabilis* var. *variomaculatus* Schmidt, 1920: 118. (Figs 37–38)**

**Type locality:** Brazil. Type locality not cited by Schmidt.

**Type material: Lectotype:** here designated, female (“Brasil”, “Typus”, “var. *variomacul.* / [illegible] Type m.”, “9898 / E92 +”, “NHRS-JLKB / 000021100”, “LECTOTYPE ♀ / *Canthon mutabilis* / var. *variomaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2013”), **NHRS.** – **Paralectotype:** Female (“var. *variomaculatus* / 1. Form. Type m.”, “PARALECTOTYPE / ♀ / *Canthon mutabilis* / var. *variomaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2013”, “9896 / E92 +”, “Typ.”, “Typus”, “P. Alegre / Brasil.”), **NHRS.**

**Current status:** Junior subjective synonym of *Canthon* (C.) *mutabilis* Lucas, 1859 (synonymized by Vulcano & Pereira 1964: 620–621).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

**19. *Canthon obliquatus* Schmidt, 1920: 125.**

**Current status:** Junior objective synonym of *Glaphyrocantion quadriguttatus* (Olivier, 1789) (original combination: *Scarabaeus quadriguttatus*). Schmidt (1920) argued that, given the Principle of Priority, the name *Canthon quadriguttatus* (Olivier, 1789) should be deemed invalid in preference of “*Canthon obliquatus* Voet, 1769” (“Nach dem Prioritätsgesetze müssen folgende Namen geändert werden: [...] C. quadriuttatus Ol. [...] in obliquatus Voet [...]”). Nonetheless, Voet’s name is not available, since it was described in a work – Voet (1766–1778) – where binominal nomenclature was not consistently applied (Sherborn 1902, Krell 2012, Botero & Cupello 2015) and consequently all new names published in it are unavailable (Article 11.4 of the Code). Schmidt’s act is here interpreted as an unjustified emendation and *Canthon obliquatus* is an unjustified replacement name for *Scarabaeus quadriguttatus* – being available with Schmidt’s (1920) authorship – and so a junior objective synonym of the latter name (Articles 33.2.3 and 50.5).

**Last taxonomic treatment:** Martínez et al. (1964). Under revision by Xiomara Villalba, Claudia Medina (Instituto Alexander von Humboldt, Colombia) and MC.

**20. *Canthon obscurus* Schmidt, 1920: 131. (Figs 39–40)**

**Type locality:** Brazil: Espírito Santo. Type locality cited by Schmidt as “Espírito Santo”.

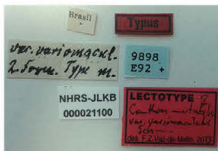
**Type material: Lectotype:** designated by Cupello & Vaz-de-Mello (in press), male (“Esp. Santo”, “Coll. C.



37



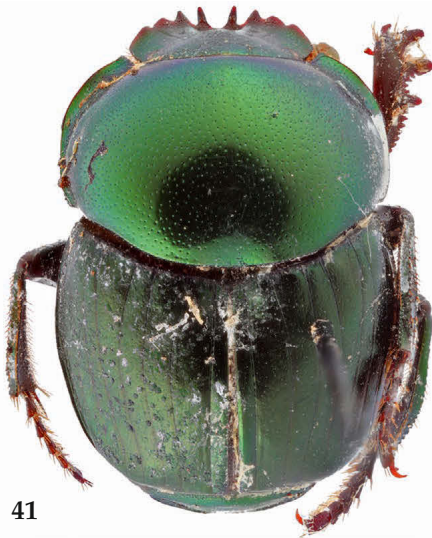
39



38



40



41

42



Figs 37–38. *Canthon mutabilis* var. *variomaculatus* Schmidt, 1920. 37. Lectotype. 38. Labels of type specimens. From left: lectotype and paralectotype.

Figs 39–40. *Canthon obscurus* Schmidt, 1920. 39. Lectotype. 40. Labels of some type specimens. From left: lectotype, paralectotype 3, paralectotype 9.

Figs 41–42. *Canthon octodentatus* Schmidt, 1920. 41. Lectotype. 42. Its labels.

Felsche / Kauf 20, 1918", "Typus", "Canthon / obscurus / A. Schmidt", "LECTOTYPE ♂ / Canthon / obscurus / Schmidt / des. F. Z. Vaz-de-Mello, 2014"), **SMTD**. – **Paralectotypes**: 1. Male ("LECTOTYPE ♂ / Canthon / obscurus / A. Schmidt / des. F. Z. Vaz-de-Mello, 2014", "PARALECTOTYPE / ♂ / Canthon / obscurus Schm. / des. F. Z. Vaz-de-Mello, 2013", "Glaphyrocanton / obscurus / (Schm.) / P. Pereira det. 60", "obscurus / A. Schm.", "9933 / E92 +", "obscurus", "Espir. / Santo"), **NHRS**. 2. Male ("PARALECTOTYPE / ♂ / Canthon / obscurus Schmidt / des. F. Z. Vaz-de-Mello, 2013", "obscurus", "Espir. / Santo", "9935 / E92 +"), **NHRS**. 3. Female ("PARALECTOTYPE / ♀ / Canthon / obscurus Schmidt / des. F. Z. Vaz-de-Mello, 2013", "29 / 56", "9936 / E92 +", "obscurus", "Esp. Santo", "obscurus / Schmidt"), **NHRS**. 4. Female ("Glaphyrocanton / obscurus / (Schm.) / P. Pereira et. 60", "Espir. Santo", "9934 E92 +", "PARALECTOTYPE / ♀ / Canthon / obscurus Schmidt / des. F. Z. Vaz-de-Mello, 2013"), **NHRS**. 5. Male ("PARALECTOTYPE / ♂ / Canthon / obscurus / Schmidt / des. F. Z. Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Coll. C. Felsche / Kauf 20, 1918"), **SMTD**. 6. Male ("PARALECTOTYPE / ♂ / Canthon / obscurus / Schmidt / des. F. Z. Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Esp. Santo"), **SMTD**. 7. Male ("PARALECTOTYPE / ♂ / Canthon / obscurus / Schmidt / des. F. Z. Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Esp. Santo"), **SMTD**. 8. Male ("PARALECTOTYPE / ♂ / Canthon / obscurus / Schmidt / des. F. Z. Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Esp. Santo"), **SMTD**. 9. Female ("PARALECTOTYPE / ♀ / Canthon / obscurus / Schmidt / des. F. Z. Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Esp. Santo"), **SMTD**. 10. Female ("PARALECTOTYPE / ♀ / Canthon / obscurus / Schmidt / des. F. Z. Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Esp. Santo"), **SMTD**. 11. Male ("S. Amerika / W. Meier / Hamburg", "Ypilissus spec?", "Canthon / obscurus / A. Schmidt", "SYNTYPUS / Canthon / obscurus Schmidt, 1920 / labelled by MNHUB 2014"), **ZMHB**.

**Current status**: Valid species as *Sylvicanthon obscurus* (Schmidt, 1920) (firstly cited in combination with *Sylvicanthon* by Vaz-de-Mello 2000).

**Last taxonomic treatment**: Cupello & Vaz-de-Mello (in press).

**21. Canthon octodentatus Schmidt, 1920**: 129. (Figs 41–42)

**Type locality**: Paraguay. Type locality cited by Schmidt as "Paraguay".

**Type material**: **Lectotype**: here designated, female ("TYP", "Para- / guay", "30 / 56", "[illegible]", "8 Dentat.", "Canthon / 8-dentatus / Schm. / P. Pereira det. 60", "LECTOTYPE ♀ / Canthon / octodentatus / Schm. / des. F.Z.Vaz-de-Mello, 2013", "9954 / E92 +"), **NHRS**.

**Current status**: Valid species as *Canthon* (C.) *octodentatus* (Schmidt, 1920).

**Last taxonomic treatment**: Halffter & Martínez (1977).

**22. Canthon sallei var. gutticollis Schmidt, 1920**: 124. (Figs 43–44)

**Type locality**: Colombia. Type locality cited by Schmidt as "Columbien".

**Type material**: **Lectotype**: here designated, male ("Columbien / La Garita (Gebirge / W. Fritsche", "LECTOTYPE ♂ / Canthon / sallei var. / gutticollis Schmidt / des. F.Z.Vaz-de-Mello, 2013", "var. / gutticollis / A. Schm.", "leg. 1912 / vend. 26.IX.1912"), **NHRS**. – **Paralectotypes**: 1. Female ("PARALECTOTYPE / ♀ / Canthon sallei / var. gutticollis / Schmidt / des. F.Z.Vaz-de-Mello, 2013", "9598 / E92 +", "leg. 1912 / vend. 26.IX.1912", "Columbien / La Garita (Gebirge / W. Fritsche)", **NHRS**. 2. Female ("PARALECTOTYPE / ♀ / Canthon / sallei var. gutticollis / Schmidt / des. F.Z.Vaz-de-Mello, 2014", "Typus", "C. cyanellus / var. gutticollis / A. Schmidt", "Coll. C. Felsche / Kauf 20, 1918", "Columbia"), **SMTD**.

**Current status**: Junior subjective synonym of *Canthon* (C.) *cyanellus* LeConte, 1859 (synonymized by Vulcano & Pereira 1964: 609–610).

**Last taxonomic treatment**: Halffter (1961), Halffter & Martínez (1977).

**23. Canthon sallei var. triangulatus Schmidt, 1920**: 124. (Figs 45–46)

**Type locality**: Colombia: unknown department (Norte de Santander, Atlántico, or Bolívar), "La Garita Mountains" (see Botero & Monné [2012, p. 21] for a discussion of this Colombian locality). Type locality cited by Schmidt as "Costa Rica, Columbien, Honduras".

**Type material**: **Lectotype**: here designated, female ("LECTOTYPE ♀ / Canthon sallei / var. triangulatus / Schmidt / des. F.Z.Vaz-de-Mello, 2013", "Typus", "9600 / E92 +", "♀", "Typ.", "var. triangulatus / Type m.", "Columbien / La Garita (Gebirge / W. Fritsche", "leg. 1912 / vend. 26.IX.1992"), **NHRS**.

**Current status**: Junior subjective synonym of *Canthon* (C.) *cyanellus* LeConte, 1859 (synonymized by Vulcano & Pereira 1964: 609–610).

**Last taxonomic treatment**: Halffter (1961), Halffter & Martínez (1977).

**24. Canthon securus Schmidt, 1920**: 131. (Figs 47–48)

**Type locality**: Surinam. Type locality cited by Schmidt as "Surinam".

**Type material**: **Lectotype**: here designated, male ("Surinam", "securus", "securus / A. Schm.", "Glaphyrocanton / securus / (Schm.) / P. Pereira det. 60", "3205 / E92



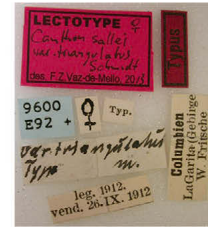
43



45



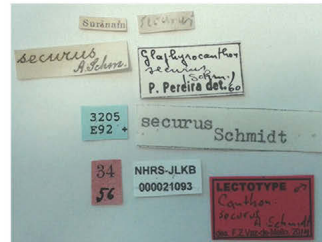
44



46



47



48

Figs 43-44. *Canthon sallei* var. *gutticollis* Schmidt, 1920. 43. Lectotype. 44. Labels of type specimens. From left: lectotype, paralectotype 1, paralectotype 2.

Figs 45-46. *Canthon sallei* var. *triangulatus* Schmidt, 1920. 45. Lectotype. 46. Its labels.

Figs 47-48. *Canthon securus* Schmidt, 1920. 47. Lectotype. 48. Its labels.

+", "securus / Schmidt", "34 / 56", "NHRS-JLKB / 000021093" "LECTOTYPE ♂ / *Canthon / securus* / A. Schmidt / des. F. Z. Vaz-de-Mello, 2014"), NHRS.

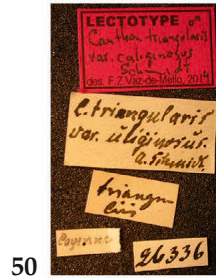
**Current status:** Valid species *Sylvicanthon securus* (Schmidt, 1920) (transferred to *Sylvicanthon* by Cupello & Vaz-de-Mello (in press)).

**Last taxonomic treatment:** Cupello & Vaz-de-Mello (in press).

**25. *Canthon triangularis* var. *caliginosus*****Schmidt, 1920:** 122. (Figs 49–50)**Type locality:** French Guiana: Cayenne. Type locality not cited by Schmidt.**Type material: Lectotype:** here designated, male (“LECTOTYPE ♂ / *Canthon triangularis* / var. *caliginosus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*C. triangularis* / var. *uliginosus* / A. Schmidt”, “*triangulus*”, “*Cayenne*”, “26336”), **ZMHB**. – **Paralectotype:** Female (“var. *caliginosus* / A. Schm.”, “LECTOTYPE ♀ / *Canthon triangularis* / var. *caliginosus* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “PARALECTOTYPE / *Canthon triangularis* / var. *caliginosus* / Schmidt ♀ / des. F.Z.Vaz-de-Mello, 2013”, “Typ.”, “Brasil”, “3367 / E92 +”, “*caliginosus* / Type m.”), **NHRS**.**Current status:** Junior subjective synonym of *Canthon triangularis* (Drury, 1773) (synonymized by Vulcano & Pereira 1964: 632–633).**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.**26. *Canthon triangularis* var. *flavipellis* Schmidt, 1920:** 123. (Figs 51–52)**Type locality:** Surinam. Type locality not cited by Schmidt.**Type material: Lectotype:** here designated, male (“*triangularis* Drur”, “v. *flavipellis*”, “3387 / E92 +”, “Surinam, / Oberer Pará, / J. Michaelis / vend. 20.VII.1901”, “PARALECTOTYPE / ♂ / *Canthon triangularis* / var. *flavipellis* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “LECTOTYPE ♂ / *Canthon triangularis* / var. *flavipellis* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **NHRS**. – **Paralectotype:** Female (“PARALECTOTYPE / ♂ / *Canthon triangularis* var. / *flavipellis* Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*C. triangularis* / var. *flavipellis* / Voet”, “Coll. C. Felsche / Kauf 20, 1918”, “Amazonas”), **SMTD**.**Current status:** Junior synonym of *Canthon triangularis* (Drury, 1773) (synonymized by Vulcano & Pereira, 1964: 632–633).**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.**Nomenclatural considerations:** Schmidt (1922) credited “var. *flavipellis*” to Voet. Nevertheless, as said above for *Canthon obliquatus*, Voet’s (1766–1778) work is not consistently binominal and consequently names firstly published in it are unavailable under Article 11.4 of the Code. The first author to use the name “*flavipellis*” for a valid taxon was Schmidt (1920), who therefore has its authorship.**Species described by Adolf Schmidt 1922****27. *Canthon acutoides* Schmidt, 1922:** 68, 82. (Figs 53–54)**Type locality:** Colombia. Type locality cited by Schmidt as “Columbien, Venezuela”.**Type material: Lectotype:** here designated, male (“*Columb*”, “*type / acutoides*”, “Typ.”, “Typus”, “11 / 56”, “*Glaphyrocannon / acutoides* / (Schm.) / P. Pereira det. 60”, “9211 / E92 +”, “NHRS-JLKB / 000021106”, “786 // *acutoides* A. Schm.”, “*Canthon Hoffsg*”, “LECTOTYPE ♂ / *Canthon / acutoides* Schm. / des. F.Z. Vaz-de-Mello, 2013”), **NHRS**. – **Paralectotypes:** 1. Female (“PARALECTOTYPE / ♀ / *Canthon / acutoides* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*Canthon / acutoides* / n. sp. A. Schmidt”, “Columbia”, “Coll. C. Felsche / Kauf 20, 1918”), **SMTD**. 2. Female (“PARALECTOTYPE / ♀ / *Canthon / acutoides* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*Canthon / acutoides* / n. sp. A. Schmidt”, “Columbia / Wagner”), **ZMHB**.**Current status:** Valid species as *Canthon (Glaphyrocannon) acutoides* (Schmidt, 1922).**Last taxonomic treatment:** Pereira & Martínez (1960), Martínez et al. (1964), Halffter & Martínez (1977). Under revision by Xiomara Villalba, Claudia Medina (Instituto Alexander von Humboldt, Colombia) and MC.**28. *Canthon aereus* Schmidt, 1922:** 65, 95. (Figs 55–57)**Type locality:** Peru: Amazonas. Type locality cited by Schmidt and “Peru, Prov. Sara in Bolivien, Amazonas”.**Type material: Syntypes:** 1. Female (“*aereus* / type m.”, “*Type*”, “12 / 56”, “9226 / E92 +”, “*Scybalocannon / aereus* / Schm. / P. Pereira det.”, “*aereus* A. Schm.”, “PARALECTOTYPE / ♀ / *Canthon / aereus* Schmidt / des. F.Z.Vaz-de-Mello, 2013”, “LECTOTYPE ♀ / *Canthon / aereus* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Typ.” “Typus”), **NHRS**. 2. Male (“Amazonas”, “Coll. C. Felsche / Kauf 90, 1918”, “*Canthon / aereus* / n. sp. A. Schmidt”, “LECTOTYPE ♂ / *Canthon / aereus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **SMTD**. 3. Female (“PARALECTOTYPE / ♀ / *Canthon / aereus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Typus”, “1910 / 8”, “Peru / W. Schnuse / 1.12.03”), **SMTD**. 4. Male (“PARALECTOTYPE / ♂ / *Canthon / aereus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*Canthon / aereus* / n. sp. A. Schmidt”, “117091”, “[illegible]”, “O. Bolivien / Prov. Sara / J. Steinbach S.V.”), **ZMHB**. 5. Male (“PARALECTOTYPE / ♂ / *Canthon / aereus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “117091”, “Ost Bolivien / Steinbach S.V.”), **ZMHB**. 6. Female (“PARALECTOTYPE / ♀ / *Canthon / aereus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “117091”, “O. Bolivien / Prov. Sara 600 = / 700m: IX-1906-HF: / 07 J. Steinbach S.V.”), **ZMHB**.



49



50



51



53



52



54

Figs 49–50. *Canthon triangularis* var. *caliginosus* Schmidt, 1920. 49. Lectotype. 50. Labels of lectotype.  
 Figs 51–52. *Canthon triangularis* var. *flavipellis* Schmidt, 1920. 51. Lectotype. 52. Labels of type specimens. From left: lectotype and paralectotype.  
 Figs 53–54. *Canthon acutoides* Schmidt, 1922. 53. Lectotype. 54. Labels of type specimens. From top to down, left to right: lectotype, paralectotype 1, paralectotype 2.



55



56



57



58



59



60



61

Figs 55–57. *Canthon aereus* Schmidt, 1922. 55. Syntype 2. 56. Genital capsule extracted from syntype 2. 57. Labels of some syntypes. Clockwise from top left: syntype 2, syntype 4, syntype 3, syntype 7.

Figs 58–59. *Canthon affinis* var. *coriaceus* Schmidt, 1922. 58. Lectotype. 59. Its labels.

Figs 60–61. *Canthon bimaculatus* Schmidt, 1922. 60. Lectotype. 61. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 2, paralectotype 6, paralectotype 1.

**Current status:** Valid species as *Scybalocanthon aereus* (Schmidt, 1922) (transferred to *Scybalocanthon* by Pereira & Martínez 1956: 115).

**Last taxonomic treatment:** Pereira & Martínez (1956), Halffter & Martínez (1977), Molano & Medina (2010). Under revision by Fernando Silva (Universidade Federal do Pará, Brazil).

**29. *Canthon affinis* var. *coriaceus* Schmidt, 1922:** 97. (Figs 58–59)

**Type locality:** Ambiguous “Amazonas” (Venezuela, Colombia, Brazil, or Peru?). Type locality cited by Schmidt as “Amazonas”.

**Type material: Lectotype:** designated by Valois et al. (2015, p. 210), male (“Amazonas”, “Coll. C. Felsche / Kauf 20, 1918”, “Typus”, “*C. affinis* / var. *coriaceus* / n.v. A. Schmidt”, “LECTOTYPE ♂ / *Canthon affinis* / var. *coriaceus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), SMTD.

**Current status:** Valid species as *Hansreia coriacea* (Schmidt, 1922) (firstly cited in combination with *Hansreia* by Vaz-de-Mello 2000: 193).

**Last taxonomic treatment:** Valois et al. (2015).

**30. *Canthon bimaculatus* Schmidt, 1922:** 70, 83. (Figs 60–61)

**Type locality:** Colombia: Amazonas. Type locality cited by Schmidt as “Amazonas, Columbien”.

**Type material: Lectotype:** here designated, male (“Typus”, “LECTOTYPE ♂ / *Canthon / bimaculatus* Sch. / des. F.Z.Vaz-de-Mello, 2013”, “9285 / E92 +”, “*bimaculatus* / *Type m.*”, “Amazonas”, “Typ.”, “Coll. C. Felsche / Kauf 20, 1918”), NHRS. – **Paralectotypes:** 1. Female (“PARALECTOTYPE / ♀ / *Canthon / bimaculatus* Schm. / des. F.Z.Vaz-de-Mello, 2013”, “13 / 56”, “9284 / E92 +”, “*bimaculatus*”, “Amazonas”), NHRS. 2. Male (“Typus”, “Amazonas”, “Coll. C. Felsche / Kauf 20, 1918”, “*Canthon / bimaculatus* / n. sp. A. Schmidt”, “PARALECTOTYPE / ♂ / *Canthon / bimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2014”), SMTD. 3. Male (“PARALECTOTYPE / ♂ / *Canthon / bimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Amazonas”), SMTD. 4. Male (“PARALECTOTYPE / ♂ / *Canthon / bimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Amazonas”), SMTD. 5. Male (“PARALECTOTYPE / ♂ / *Canthon / bimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Amazonas”), SMTD. 6. Male (“PARALECTOTYPE ♂ / *Canthon / bimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Columbia”), SMTD. 7. Male (“PARALECTOTYPE / ♂ / *Canthon / bimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Columbia”), SMTD.

**Current status:** Valid species as *Canthon (Glaphyrocanthon) bimaculatus* Schmidt, 1922.

**Last taxonomic treatment:** Pereira & Martínez (1956), Halffter & Martínez (1977), Solís & Kohlmann (2002). Under revision by MC.

**31. *Canthon brunneus* Schmidt, 1922:** 64, 84. (Figs 62–63)

**Type locality:** Bolivia. Type locality cited by Schmidt as “Bolivien”.

**Type material: Lectotype:** here designated, male (“Bolivien / W. Schnuse / 03”, “1910 / 8”, “*brunneus*”, “LECTOTYPE ♂ / *Canthon / brunneus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), SMTD. – **Paralectotype:** Female (“PARALECTOTYPE / ♀ / *Canthon / brunneus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*Canthon / brunneus* / n. sp. A. Schmidt”, “1910 / 8”, “Bolivia / W. Schnuse / 03”), SMTD.

**Current status:** Valid species as *Canthon (Glaphyrocanthon) brunneus* Schmidt, 1922.

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by MC.

**32. *Canthon brunnipennis* Schmidt, 1922:** 69, 84. (Fig. 64–65)

**Type locality:** Ambiguous “Amazonas” (Venezuela, Colombia, Brazil, or Peru?). Type locality cited by Schmidt as “Amazonas”.

**Type material: Lectotype:** here designated, male (“Amazonas”, “Coll. C. Felsche / Kauf 20, 1918”, “*brunnipennis* / *Type m.*”, “*Glaphyrocanthon / brunnipennis* / (Schm) / P. Pereira det. 60”, “*brunnipennis* A. Schm” “14 / 56”, “Typus”, “9294 / E92 +”, “Typ.” “NHRS-JLKB / 000021104”, “LECTOTYPE ♂ / *Canthon / brunnipennis* / Schmidt / des. F.Z.Vaz-de-Mello, 2013”), NHRS. – **Paralectotypes:** 1. Female (“PARALECTOTYPE / ♀ / *Canthon / brunnipennis* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*Canthon / brunnipennis* / n. sp. A. Schmidt”, “Coll. C. Felsche / Kauf 20, 1918”, “Amazonas”), SMTD. 2. Female (“PARALECTOTYPE / ♀ / *Canthon / brunnipennis* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Amazonas”), SMTD. 3. Female (“PARALECTOTYPE / ♀ / *Canthon / brunnipennis* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Amazonas”), SMTD.

**Current status:** Valid species as *Canthon (Glaphyrocanthon) brunnipennis* Schmidt, 1922.

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by MC.





**33. *Canthon coerulescens* Schmidt, 1922:** 66, 85.  
(Figs 66–67)

**Type locality:** Argentina: Buenos Aires, Tornquist, Sierra de la Ventana. Type locality cited by Schmidt as “Sierra Ventana, P. Allegre, San Leopoldo”.

**Type material: Lectotype:** here designated, male (“LECTOTYPE ♂ / *Canthon / coerulescens / Schmidt / des. F.Z.Vaz-de-Mello, 2013*”, “*coerulescens / type m.*”, “*Sierra / Ventana*”, “Typ.” “9542 / E92 +”, “Typus”, “16 / 56”), **NHRS.** – **Paralectotypes:** 1. Female (“PARALECTOTYPE ♀ / *Canthon / coerulescens / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “*Canthon / coerulescens / n. sp. A. Schmidt*”, “Coll. C. Felsche / Kauf 20, 1918”, “*Brasilia / San Leopoldo*”), **SMTD.** 2. Female (“PARALECTOTYPE ♀ / *Canthon / coerulescens / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “*Brasilia / San Leopoldo*”), **SMTD.** 3. Male (“26339”, “*Allegre. Yellow*”, “*Canthon / coerulescens / n.sp. A. Schmidt*”), **ZMHB.**

**Current status:** Valid species as *Canthon* (*C.*) *coerulescens* Schmidt, 1922.

**Last taxonomic treatment:** Halffter & Martínez (1977).

**34. *Canthon coloratus* Schmidt, 1922:** 70, 86.  
(Figs 68–69)

**Type locality:** Brazil: Goiás, Jataí. Type locality cited by Schmidt as “Itahy Goyas, Junimazuas (Peru), Cayenne, Brasilien”.

**Type material: Lectotype:** here designated, male (“Jatay / Goyas”, “Coll. C. Felsche / Kauf 20, 1918”, “*coloratus*”, “LECTOTYPE ♂ / *Canthon / coloratus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **SMTD.** – **Paralectotypes:** 1. Male (“Peru”, “*yunima / zuas*”, “Coll. C. Felsche / Kauf 20, 1918”, “Typus”, “*Canthon / coloratus / n. sp. A. Schmidt*”, “PARALECTOTYPE ♂ / *Canthon / coloratus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **SMTD.** 2. Female (“PARALECTOTYPE ♀ / *Canthon / coloratus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “*Cayenne*”), **SMTD.** 3. Female (“PARALECTOTYPE ♀ / *Canthon / coloratus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “*Canthon / coloratus / n. sp. A. Schmidt*”, “*Mont / Yin [?]*”, “*coloratus n.*”, “26366”), **ZMHB.**

**Current status:** Valid species as *Canthon* (*Glaphyrocanton*) *coloratus* Schmidt, 1922.

**Last taxonomic treatment:** Pereira & Martínez (1956), Halffter & Martínez (1977). Under revision by MC.

**35. *Canthon denticulatus* Schmidt, 1922:** 66, 87.  
(Figs 70–71)

**Type locality:** Bolivia: Santa Cruz, Sara. Type locality cited by Schmidt as “Prov. Sara in Bolivien”.

**Type material: Lectotype:** here designated, male (“19 / 56”, “*HOLOTYPE ♂*”, “*denticulatus Schm.*”, “9608 / E92 +”, “*denticulatus / A. Schim.*”, “O. Bolivien / Prov. Sara / J. Steinbach S.V.”, “Typ.”, “*denticulate. / type*”, “Typus”), **NHRS.** – **Paralectotypes:** 1. Male (“PARALECTOTYPE ♂ / *Canthon / denticulatus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “112004”, “O. Bolivien / Prov. Sara / J. Steinbach S.V.”), **ZMHB.** 2. Female (“PARALECTOTYPE ♀ / *Canthon / denticulatus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “*Canthon / denticulatus / n.sp. A. Schmidt*”, “112004”, “O. Bolivien / Prov. Sara / J. Steinbach S.V.”), **ZMHB.** 3. Female (“PARALECTOTYPE ♀ / *Canthon / denticulatus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “112004”, “O. Bolivien / Prov. Sara / J. Steinbach S.V.”), **ZMHB.**

**Current status:** Valid species as *Canthon denticulatus* Schmidt, 1922.

**Last taxonomic treatment:** Pereira & Martínez (1960), Halffter & Martínez (1977).

**36. *Canthon dromedarius* Schmidt, 1922:** 63, 98.

**Current status:** Junior objective synonym of *Anisocanthon pygmaeus* (Gillet, 1911). Proposed as a replacement name for *Deltotichilum pygmaeum* Gillet, 1911 when this species was transferred to *Canthon* by Schmidt (1922) and so was in secondary homonymy with *Canthon pygmaeus* Harold, 1869. Later, Harold’s species was transferred to *Canthonella* Chapin, 1930 as its type species (Chapin 1930) and thus the secondary homonymy with Harold’s name was undone. Subsequent authors (e.g., Paulian 1939, Pereira & d’Andretta 1955) recovered the valid status of *D. pygmaeus* Gillet, 1911 (and in combination with the genus *Anisocanthon* Martínez & Pereira, 1956 since the description of this latter taxon), in turn, *C. dromedarius* became invalid, being a junior objective synonym of *D. pygmaeus*.

**Last taxonomic treatment:** Martínez & Pereira (1956), Halffter & Martínez (1977). Under revision by us.

**37. *Canthon helleri* Schmidt, 1922:** 70, 87.  
(Figs 72–73)

**Type locality:** Bolivia: La Paz. Type locality cited by Schmidt as “Chanchamayo in Peru, La Paz in Bolivien”.

**Type material: Lectotype:** here designated, male (“Bolivia / La Paz”, “*Helleri*”, “*Helleri / A. Schm.*”, “23 / 56”, “9682 / E92 +”, “*helleri Schmidt*”, “NHRS-JLKB / 000021101”, “LECTOTYPE ♂ / *Canthon / helleri Schmidt / des. F.Z.Vaz-de-Mello, 2013*”), **NHRS.** – **Paralectotypes:** 1. Male (“PARALECTOTYPE ♂ / *Canthon / helleri Schmidt / des. F.Z.Vaz-de-Mello, 2013*”, “*Geocanthon / helleri / (Schm.) / P. Pereira det. 60*”, “9680 / E92 +”, “Yungas de La Paz, / Bolivia, 1000m. / H. Rolle /



Berlin, S.W.N.", "*Helleri*"), **NHRS**. 2. Female ("PARALECTOTYPE / ♀ / *Canthon / helleri Schmidt* / des. F.Z.Vaz-de-Mello, 2013", "*Geocanthon / helleri (Schm)* / P. Pereira det. 60", "*Helleri*", "9681 / E92 +", "Yungas de La Paz, / Bolivia, 1000m / H. Rolle / Berlin, S.W.N."), **NHRS**. 3. Male ("PARALECTOTYPE / ♂ / *Canthon / helleri Schm.* / des. F.Z.Vaz-de-Mello, 2014", "Typus", "*Canthon / Helleri / n.sp. A. Schmidt*", "Coll. C. Felsche / Kauf 20, 1918", "Peru / Chanchamayo"), **SMTD**. 4. Female ("PARALECTOTYPE / ♀ / *Canthon / helleri / Schm.* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Bolivia / La Paz / 3700 m"), **SMTD**. 5. Female ("PARALECTOTYPE / ♀ / *Canthon / helleri / Schm.* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Peru / Chanchamayo"), **SMTD**.

**Current status:** Valid species as *Canthon (Glaphyrocantion) helleri* Schmidt, 1922.

**Last taxonomic treatment:** Pereira & Martínez (1960), Halffter & Martínez (1977). Under revision by MC.

**38. *Canthon janthinus* var. *immaculatus* Schmidt, 1922: 76. (Figs 74–75)**

**Type locality:** Argentina: Chaco, Santiago del Estero. Type locality cited by Schmidt as "Argentinien (Cordoba, Prov. Salta, Chaco de Santiago del Estero am Rio Salado)".

**Type material: Lectotype:** here designated, male ("LECTOTYPE ♂ / *Canthon janthinus / var. immaculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2013", "Typus", "9731 / E92 +", "*var. immaculatus / m.*", "N. Argent. / Wagner", "Chaco de / Santiago", "Type"), **NHRS**. – **Paralectotypes:** 1. Male ("PARALECTOTYPE / ♂ / *Canthon janthinus / immaculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "*C. janthinus / var. immaculatus / A. Schmidt*", "Typus", "Coll. C. Felsche / Kauf 20, 1918", "Cardoba"), **SMTD**. 2. Male ("PARALECTOTYPE / ♂ / *Canthon janthinus / immaculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "*immaculatus*", "Coll. C. Felsche / Kauf 20, 1918", "Cardoba"), **SMTD**. 3. Male ("PARALECTOTYPE / ♂ / *Canthon janthinus / immaculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Cardoba"), **SMTD**. 4. Female ("PARALECTOTYPE / ♀ / *Canthon janthinus / immaculatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "*Rio / Salado*"), **SMTD**. Four more syntypes (two males and two females) with FZMV lectotype labels at **NHRS**.

**Current status:** Junior subjective synonym of *Canthon janthinus* Blanchard, 1846 (synonymized by Vulcano & Pereira 1964: 622–663).

**Last taxonomic treatment:** Halffter & Martínez (1977).

**39. *Canthon lunatus* Schmidt, 1922: 62, 95. (Figs 76–77)**

**Type locality:** Argentina: Mendoza. Type locality cited by Schmidt as "Mendoza und Cordoba in Argentinien, Brasilien".

**Type material: Lectotype:** here designated, male ("LECTOTYPE ♂ / *Canthon / lunatus Schm.* / des. F.Z.Vaz-de-Mello, 2013", "9797 / E92 +", "Typus", "*lunatus / A. Schm.*", "*lunatus / Type m.*", "Typ.", "*Mendoza / Argentin.*"), **NHRS**. – **Paralectotypes:** 1. Male ("PARALECTOTYPE / ♀ / *Canthon / lunatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "J. J. Gillet det., vend.: / *Canthon / lunatus Gillet / R.M.H.N. Belg. 10.640*", "*lunatus m.*", "*Argentina [?]*"), **ISNB**. 2. Male ("*lunatus Schmidt*", "9799 / E92 +", "*lunatus*", "PARALECTOTYPE / ♀ / *Canthon / lunatus Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Cardoba", "Argentina"), **NHRS**. 3. Male ("PARALECTOTYPE / ♂ / *Canthon / lunatus Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Mendoza"), **SMTD**. 4. Male ("PARALECTOTYPE / ♂ / *Canthon / lunatus Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Typus", "*Canthon / lunatus / n. sp. A. Sch.*", "Coll. C. Felsche / Kauf 20, 1918", "Argentina", "Cardoba"), **SMTD**. 5. Male ("PARALECTOTYPE / ♂ / *Canthon / lunatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Uruguay", "Montevideo"), **SMTD**. 6. Male ("PARALECTOTYPE / ♂ / *Canthon / lunatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Argentina", "Cardoba"), **SMTD**. 7. Female ("PARALECTOTYPE / ♀ / *Canthon / lunatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Argentina", "Cardoba"), **SMTD**. 8. Female ("PARALECTOTYPE / ♀ / *Canthon / lunatus / Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "Coll. C. Felsche / Kauf 20, 1918", "Argentina", "Cardoba [sic]"), **SMTD**. 9. Female ("PARALECTOTYPE / ♀ / *Canthon / lunatus Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "*Canthon / lunatus / n. sp. A. Schmidt*", "*muticus / Har. / Bras.*", "26354"), **ZMHB**. 10. Female ("PARALECTOTYPE / ♀ / *Canthon / lunatus Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "26354"), **ZMHB**.

**Current status:** Valid species as *Canthon (Pseudopilis) lunatus* Schmidt, 1922.

**Last taxonomic treatment:** Martínez (1954b), Halffter & Martínez (1968, 1977). Under revision by Marcelli Krul Vieira, Fernando Silva and FZMV.

**40. *Canthon nigellus* Schmidt, 1922: 70, 88. (Figs 78–79)**

**Type locality:** "Oriba" (unknown locality; Venezuela?). Type locality cited by Schmidt as "Oriba (Venezuela), Pará (Brasilien)".

**Type material: Syntype:** Female ("LECTOTYPE ♀ / *Canthon / nigellus / A. Schmidt* / des. F.Z.Vaz-de-Mello, 2014", "PARALECTOTYPE ♀ / *Canthon / nigellus Schmidt* / des. F.Z.Vaz-de-Mello, 2013", "nigellus /





Figs 80–82. *Canthon obscuriellus* Schmidt, 1922. 80. Lectotype. 81. Frontal view of head. 82. Labels of the type specimens. Clockwise from top left: lectotype, paralectotype 1, paralectotype 2.

Figs 83–84. *Canthon pallidus* Schmidt, 1922. 83. Lectotype. 84. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 10, paralectotype 6, paralectotype 5, paralectotype 3, paralectotype 2, paralectotype 1, paralectotype 7.

Schmidt”, “9929 / E92 +”, “*Scybalocanthon / nigellus / (Schm.) / P. Pereira det. 60*”, “27 / 56”, “*nigellus*”, “*Oriba / Amazon*”, “*nigellus / A. Schm.*”, “[illegible]”, NHRS.

**Current status:** Valid species as *Scybalocanthon nigellus* (Schmidt, 1922) (transferred to *Scybalocanthon* by Pereira & Martínez, 1960: 44).

**Last taxonomic treatment:** Pereira & Martínez (1960), Halffter & Martínez (1977). Under revision by Fernando Silva (Universidade Federal do Pará, Brazil).

**41. *Canthon obscuriellus* Schmidt, 1922:** 70, 89. (Figs 80–82)

**Type locality:** Ecuador: Imbabura, Paramba. Type locality cited by Schmidt as “Columbien, Paramba”.

**Type material:** **Lectotype:** here designated, male (“Coll. C. Felsche / Kauf 20, 1918”, “dry season / (Rosenberg).”, “Paramba / 3500'.IV.97”, “*Canthon / obscurus* / n.sp. A. Schmidt”, “LECTOTYPE ♂ / *Canthon / obscuriellus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014), **SMTD.** – **Paralectotypes:** 1. Female (“Colombie”, “♀”, “*obscuriellus* / Type A. Schm.”, “9956 / E92 +”, “NHRS-JLKB / 000021095”, “Typ.”, “Typus”, “28 / 56”, “Holtype ♀”), **NHRS.** 2. Female (“PARALECTOTYPE / ♀ / *Canthon / obscuriellus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “dry season / (Rosenberg).”, “Paramba / 3500'.III.97”), **SMTD.**

**Current status:** Valid species as *Canthon* (*C.*) *obscuriellus* Schmidt, 1922.

**Last taxonomic treatment:** Halffter & Martínez (1977).

**42. *Canthon pallidus* Schmidt, 1922:** 69, 90. (Figs 83–84)

**Type locality:** Colombia. Type locality cited by Schmidt as “Columbien, Yungas de la Paz in Bolivien, 1000 m Höhe, Chanchamayo in Peru, Santa Inéz in Ecuador, Chaco in Bolivien”.

**Type material:** **Lectotype:** here designated, male (“PARALECTOTYPE / ♂ / *Canthon / pallidus* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “LECTOTYPE ♂ / *Canthon / pallidus* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*pallidus* / A. Schmidt”, “9971 / E92 +”, “Columbia”), **NHRS.** – **Paralectotypes:** 1. Female (“*pallidus* / Schmidt”, “PARALECTOTYPE / ♀ / *Canthon / pallidus* Schm. / des. F.Z.Vaz-de-Mello, 2013”, “9972 / E92 +”, “31 / 56”, “Yungas / Bolivien”, “*pallidus* / m.”), **NHRS.** 2. Female (“*Geocanthon / pallidus* / (Schm.) / P. Pereira det.60”, “Chaquimayo / Peru”, “9969 / E92 +”, “PARALECTOTYPE / ♀ / *Canthon / pallidus* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **NHRS.** 3. Female (“PARALECTOTYPE / ♀ / *Canthon / pallidus* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “9970 / E92 +”, “N. Holmgr...”, “*Geocanthon / pallidus* / (Schm.) / P. Pereira det.60”, “*pallidus*”, “Yungas de la Paz / Bolivo. [illegible]”), **NHRS.** 4. Male (“Bolivia / Yungas de la Paz”, “PARALECTOTYPE / ♂ / *Canthon / pallidus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **ZMHB.** 5. Male (“Yungas de La Paz / Bolivia, 1000m / H. Rolle / Berlin, S.W.n”, “C. lafar- / guei Drap / H.”, “PARALECTOTYPE / ♂ / *Canthon / pallidus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **ZMHB.** 6. Female (“PARALECTOTYPE / ♀ / *Canthon / pallidus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*Canthon / pallidus* / n.sp. A. Schmidt”, “*Canthon / lafargei* Drap”, “Chanchamayo”), **ZMHB.** 7. Female (“Bolivia / Yungas de la Paz”, “PARALECTOTYPE / ♀ / *Canthon / pallidus* Schmidt / des. F.Z.Vaz-de-Mello,

2014”), **ZMHB.** 8. Female (“Santa Inéz / (Ecuad.) / H. Haensch S.”, “PARALECTOTYPE / ♀ / *Canthon / pallidus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **ZMHB.** 9. Female (“Yungas de la Paz, / Bolivia, 1000m / H. Rolle, / Berlin, S. W. n.”, “PARALECTOTYPE / ♀ / *Canthon / pallidus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **ZMHB.** 10. (“Yungas de la Paz, / Bolivia, 1000m / H. Rolle, / Berlin, S. W. n.”, “*Lafargei* / Drap”, “PARALECTOTYPE / ♀ / *Canthon / pallidus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **ZMHB.**

**Current status:** Valid species as *Canthon* (*Glaphyrocanthon*) *pallidus* Schmidt, 1922.

**Last taxonomic treatment:** Pereira & Martínez (1960), Halffter & Martínez (1977). Under revision by MC.

**43. *Canthon punctatus* Schmidt, 1922:** 72, 79, 103.

**Current status:** Valid species as *Canthidium punctatum* (Schmidt, 1922). Without knowing the identity of the species, Schmidt (1922) proposed *Canthon punctatus* as a new replacement name for *Canthon puncticollis* Redtenbacher, 1868, which was preoccupied by *Canthon puncticollis* LeConte, 1866. Then, Vaz-de-Mello & Cupello (2018), after reexamining the then-syntypes of Redtenbacher, proposed the transfer of *Canthon punctatus* to the nominotypical subgenus of *Canthidium* Erichson, 1847, being later transferred to *Canthidium* (*Neocanthidium*) by Cupello (2018).

**Last taxonomic treatment:** Vaz-de-Mello & Cupello (2018), Cupello (2018). Under revision by François Génier (Canadian Museum of Nature, Canada).

**44. *Canthon pygidialis* Schmidt, 1922:** 65, 90. (Figs 85–88)

**Type locality:** Amazon (“Amazonas”: Brazil or Venezuela?). Type locality cited by Schmidt as “Surinam, Amazonas”.

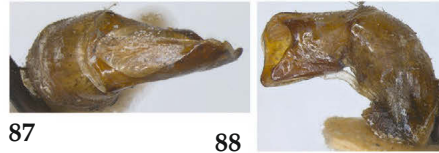
**Type material:** **Syntypes:** 1. Male (“LECTOTYPE ♂ / *Canthon / pygidialis* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “PARALECTOTYPE / ♂ / *Canthon / pygidialis* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “32 / 56”, “3056 / E92 +”, “Surinam”, “*pygidialis*”), **NHRS.** 2. Female (“PARALECTOTYPE / ♀ / *Canthon / pygidialis* Schm. / des. F.Z.Vaz-de-Mello, 2013”, “*pygidial*”, “Surinam”, “3054 / E92 +”, “*Scybalocanthon / pygidialis* / (Schm.) / P. Pereira det.60”), **NHRS.** 3. Female (“PARALECTOTYPE / ♀ / *Canthon / pygidialis* Schm. / des. F.Z.Vaz-de-Mello, 2014”, “Surinam”, “3055 / E92 +”, “*Scybalocanthon / pygidialis* / (Schm.) / P. Pereira det. 60”, “*pygidialis* / A. Schm.”), **NHRS.** 4. Male (“PARALECTOTYPE / ♂ / *Canthon / pygidialis* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Surinam”, “Coll. C. Felsche / Kauf 20, 1918”), **SMTD.** 5. Male (“Amazonas”, “Coll. C. Felsche / Kauf 20, 1918”, “Can-



85



86



87

88



89



90

**Figs 85–88.** *Canthon pygidialis* Schmidt, 1922. 85. Syntype 5. 86. Labels of some syntypes. From top down, left to right: syntype 5, syntype 6, syntype 11, syntype 12, syntype 2, syntype 3. 87–88. Genital capsule extracted from syntype 5, dorsal (87) and lateral (88) views.

**Figs 89–90.** *Canthon quadrimaculatus* Schmidt, 1922. 89. Lectotype. 90. Labels of some type specimens. Clockwise from top left: lectotype, paralectotype 3, paralectotype 1, paralectotype 4.

*thon / pygidialis / n.sp. A. Schmidt*”, “LECTOTYPE ♂ / *Canthon / pygidialis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), SMTD. 6. Female (“PARALECTOTYPE / ♀ / *Canthon / pygidialis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Surinam”), SMTD. 7. Female (“PARALECTOTYPE / ♀ / *Canthon / pygidialis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”), SMTD. 8. Female

(“PARALECTOTYPE / ♀ / *Canthon / pygidialis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Surinam”), SMTD. 9. Female (“PARALECTOTYPE / ♀ / *Canthon / pygidialis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Surinam”), SMTD. 10. Female (“PARALECTOTYPE / ♀ / *Canthon / pygidialis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf



20, 1918", "Surinam"), **SMTD**. 11. Male ("coll. L. W. / Schaufuß", "Columb?", "=117089", "117089", "PARALECTOTYPE / ♂ / *Canthon / pygidialis* / Schmidt / des. F.Z.Vaz-de-Mello, 2014"), **ZMHB**. 12. Female ("S. Amerika / Surinam / Bezirk Paramaribo / C. Heller S.V.", "117088", "rufulus?", "*Canthon / pygidialis* / n.sp. A. Schmidt", "PARALECTOTYPE / ♀ / *Canthon / pygidialis* / Schmidt / des. F.Z.Vaz-de-Mello, 2014"), **ZMHB**. 13. Female ("*Canthon / nigriceps* / Har.", "Surinam / ex. coll. Fruhstorfer", "Syntypus", "*Canthon / pygidialis* / A. Schmidt", "PARALECTOTYPE / ♀ / *Canthon pygidialis* / Schmidt, 1922 / det. Vaz-de-Mello / and Cupello, 2016", "Coll. Kraatz", "Felsche det.", "A. Schmidt det."), **SDEI**.

**Current status:** Valid species as *Scybalocanthon pygidialis* (Schmidt, 1922) (transferred to *Scybalocanthon* by Pereira & Martínez 1956: 114).

**Last taxonomic treatment:** Pereira & Martínez (1956), Halffter & Martínez (1977). Under revision by Fernando Silva (Universidade Federal do Pará, Brazil).

**45. *Canthon quadrimaculatus* Schmidt, 1922:** 69, 91. (Figs 89–90)

**Type locality:** Bolívia: Yungas. Type locality cited by Schmidt as "Yungas in Bolivien, Macrapata in Peru, Pará".

**Type material: Lectotype:** here designated, male ("LECTOTYPE ♂ / *Canthon / quadrimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2013", "Typus", "3067 / E92 +", "*Glaphyrocantion / 4-maculatus* / (Schm.) / P. Pereira det. 60", "Typ.", "Yungas / Bolivien", "4-macul. / Type m."), **NHRS**. – **Paralectotypes:** 1. Male ("PARALECTOTYPE / ♂ / *Canthon / quadrimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2013", "*quadrimaculatus* / *latus* A. Schm.", "Yungas / Bolivien", "3069 / E92 +"), **NHRS**. 2. Male ("PARALECTOTYPE / ♂ / *Canthon / quadrimaculatus* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014", "3068 / E92 +", "NHRS-JLKB / 000021094", "Marcapata / Peru", "*Glaphyrocantion / 4-maculatus* / (Schm.) / P. Pereira det. 60"), **NHRS**. 3. Female ("PARALECTOTYPE / ♀ / *Canthon / quadrimaculatus* / Schm. / des. F.Z.Vaz-de-Mello, 2013", "4-maculat.", "Yungas / Bolivien", "33 / 56", "3065 / E92 +", "*Glaphyrocantion / 4-maculatus* / (Schm.) / P. Pereira det. 60"), **NHRS**. 4. Female ("limbatus / N.", "Parà / Sieber", "26343", "*Canthon / 4-maculatus* / n.sp. A. Schmidt", "PARALECTOTYPE / ♀ / *Canthon / quadrimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014"), **ZMHB**. 5. Female ("26343", "PARALECTOTYPE / ♀ / *Canthon / quadrimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014"), **ZMHB**.

**Current status:** Valid species as *Canthon (Glaphyrocantion) quadrimaculatus* Schmidt, 1922.

**Last taxonomic treatment:** Pereira & Martínez (1956), Martínez et al. (1964), Halffter & Martínez (1977). Under revision by Xiomara Villalba, Claudia Medina (Instituto Alexander von Humboldt, Colombia) and MC.

**46. *Canthon quadripunctatus* var. *tuberculatus* Schmidt, 1922:** 97. (Figs 91–92)

**Type locality:** Peru: Junín, Chanchamayo. Type locality cited by Schmidt as "Chanchomayo, Matto Grosso".

**Type material: Lectotype:** here designated, male ("Chanchomayo", "C. 4-punctatus / var. *tuberculatus* / n.v. A. Schmidt", "LECTOTYPE ♂ / *Canthon quadri-punctatus* var. / *tuberculatus* Schm. / des. F.Z.Vaz-de-Mello, 2014"), **SMTD**. – **Paralectotype:** Female ("PARALECTOTYPE / ♀ / *Canthon quadri-punctatus* var. / *tuberculatus* Schm. / des. F.Z.Vaz-de-Mello, 2014", "C. 4-punctatus / var. *tuberculatus* / n.var. A. Schmidt", "Matto Grosso / Rohde", "106922", "Matto Grosso / Rohde S."), **ZMHB**.

**Current status:** Junior subjective synonym of *Canthon (C.) quadripunctatus* Redtenbacher, 1868 (synonymized by Vulcano & Pereira 1964: 626).

**Last taxonomic treatment:** Halffter & Martínez (1977), Vaz-de-Mello & Cupello (2018).

**47. *Canthon quinquemaculatus* var. *completus* Schmidt, 1922:** 97. (Figs 93–94)

**Type locality:** Paraguay. Type locality cited by Schmidt as "Paraguay, Prov. Sara, Dep. St. Cruz de la Sierra in Bolivien".

**Type material: Lectotype:** here designated, male ("Paraguay", "Coll. C. Felsche / Kauf 20, 1918", "C. 5-maculatus / var. *completus* / n.v. A. Schmidt", "LECTOTYPE ♂ / *Canthon quin-quemaculatus* / var. *completus* / Sch. / des. F.Z.Vaz-de-Mello, 2014"), **SMTD**.

**Current status:** Junior subjective synonym of *Canthon quinquemaculatus* Castelnau, 1840 (synonymized by Balthasar 1939: 210).

**Last taxonomic treatment:** Halffter & Martínez (1977). Under revision by Gabriel Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

**48. *Canthon sericans* Schmidt, 1922:** 63, 92. (Figs 95–96)

**Type locality:** Brazil: Ambiguous: São Paulo, Caçapava or Rio Grande do Sul, Caçapava do Sul. Type locality cited by Schmidt as "Südbrasilien".

**Type material: Lectotype:** here designated, female ("35 / 56", "3160 / E92 +", "HOLOTYPE / ♀", "sericans / Schmidt", "*Canthon sericans* / Type / n. sp. A. Schmidt", "Caçapava / Brasil", "*Xenocantion / sericans* / (Schm.) / P. Pereira det. 60", "Typ.", "Typus"), **NHRS**.

**Current status:** Valid species as *Xenocantion sericans* (Schmidt, 1922) (transferred to *Xenocantion* by Martínez 1954a).



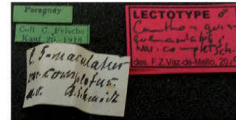
91



93



92



94



96



95

**Figs 91–92.** *Canthon quadripunctatus* var. *tuberculatus* Schmidt, 1922. 91. Lectotype. 92. Labels of type specimens. From left: lectotype and paralectotype.

**Figs 93–94.** *Canthon quinque maculatus* var. *completus* Schmidt, 1922. 93. Lectotype. 94. Its labels.

**Figs 95–96.** *Canthon sericans* Schmidt, 1922. 95. Lectotype. 96. Its labels.

**Last taxonomic treatment:** Martínez (1954a), Halffter & Martínez (1977). Under revision by us.



97



99



98



100



101



102

Figs 97–98. *Canthon sericatus* Schmidt, 1922. 97. Lectotype. 98. Labels of some type specimens. From left: lectotype and paralectotype 1.

Figs 99–100. *Canthon speculifer* var. *subviridis* Schmidt, 1922. 99. Lectotype. 100. Its labels.

Figs 101–102. *Canthon splendidus* Schmidt, 1922. 101. Lectotype. 102. Labels of type specimens. From left: lectotype and paralectotype 1.

49. *Canthon sericatus* Schmidt, 1922: 63, 92.  
(Figs 97–98)

**Type locality:** Bolivia: Beni. Type locality cited by Schmidt as “Argentinien, Salinas”.

**Type material:** **Lectotype:** here designated, male (“Salinas / Beni 8.vii.95 / M. Stuart”, “Coll. C. Felsche / Kauf 20, 1918”, “Typus”, “*Canthon / sericatus / n. sp. A. Schmidt*”, “LECTOTYPE ♂ / *Canthon / sericatus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **SMTD.** –

**Paralectotypes:** 1. Female (“PARALECTOTYPE / ♀ / *Canthon / sericatus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “*sericatus*”, “Coll. C. Felsche / Kauf 20, 1918”, “Argentina”), **SMTD**. 2. Female (“PARALECTOTYPE / ♀ / *Canthon / sericatus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Argentina”), **SMTD**. 3. Female (“PARALECTOTYPE / ♀ / *Canthon / sericatus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Argentina”), **SMTD**.

**Current status:** Valid species as *Canthon sericatus* Schmidt, 1922.

**Last taxonomic treatment:** Halffter & Martínez (1977).

**50. *Canthon speculifer* var. *subviridis* Schmidt, 1922:** 81. (Figs 99–100)

**Type locality:** Brazil: Espírito Santo. Type locality cited by Schmidt as “Brasilien (Espírito Santo), Cayenne”.

**Type material: Lectotype:** designated by Nunes et al. (2018, p. 10), male (“LECTOTYPE ♂ / *Canthon speculifer / var. subviridis / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “PARALECTOTYPE / ♂ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Espir. / Santo”, “3271 / E92 +”), **NHRS**. – **Paralectotypes:** 1. Male (“3268 / E92 +”, “Espir. / Santo”, “PARALECTOTYPE / ♂ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **NHRS**. 2. Male (“Espir. / Santo”, “3269 / E92 +”, “PARALECTOTYPE / ♂ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **NHRS**. 3. Male (“Espir. / Santo”, “3270 / E92 +”, “PARALECTOTYPE / ♂ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **NHRS**. 4. Male (“PARALECTOTYPE / ♂ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “3285 / E92 +”, “Espir. / Santo”), **NHRS**. 5. Female (“PARALECTOTYPE / ♀ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Espir. / Santo”, “3277 / E92 +”), **NHRS**. 6. (“Espir. / Santo”, “3287 / E92 +”, “PARALECTOTYPE / ♀ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **NHRS**. 7. (“Espir. / Santo”, “3286 / E92 +”, “PARALECTOTYPE / ♀ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **NHRS**. 8. (“Espir. / Santo”, “3288 / E92 +”, “PARALECTOTYPE / ♀ / *Canthon speculifer / var. subviridis / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **NHRS**.

**Current status:** Valid subspecies as *Canthon (Goniocanthon) smaragdulus subviridis* (Fabricius, 1781).

**Last taxonomic treatment:** Nunes et al. (2018).

**51. *Canthon splendidus* Schmidt, 1922:** 68, 93. (Figs 101–102)

**Type locality:** Brazil: Espírito Santo. Type locality cited by Schmidt as “Esp. Santo”.

**Type material: Lectotype:** here designated, male (“Esp. Santo”, “Coll. C. Felsche / Kauf 20, 1918”, “Typus”, “*Canthon / splendidus / A. Schmidt / n. sp.*”, “LECTOTYPE ♂ / *Canthon splendidus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **SMTD**. – **Paralectotypes:** 1. Male (“PARALECTOTYPE / ♂ / *Canthon / splendidus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Esp. Santo”), **SMTD**. 2. Male (“PARALECTOTYPE / ♂ / *Canthon / splendidus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Esp. Santo”), **SMTD**. 3. Male (“PARALECTOTYPE / ♂ / *Canthon / splendidus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Esp. Santo”), **SMTD**. 4. Male (“PARALECTOTYPE / ♂ / *Canthon / splendidus / Schmidt / des. F.Z.Vaz-de-Mello, 2014*”, “Coll. C. Felsche / Kauf 20, 1918”, “Esp. Santo”), **SMTD**.

**Current status:** Valid species as *Canthon (Peltecanthon) splendidus* Schmidt, 1922 (synonymized by with *Canthon auricollis* Redtenbacher, 1868 by Halffter & Martínez (1977: pp. 75–76), but revalidated and firstly treated as a valid species in *Peltecanthon* by Vaz-de-Mello & Cupello (2018: p. 45–46).

**Last taxonomic treatment:** Vaz-de-Mello & Cupello (2018). Under revision by Gabriel Nunes, Rafael Nunes (Universidade Federal de Mato Grosso, Brazil) and FZVM.

**52. *Canthon tibialis* Schmidt, 1922:** 62, 96. (Figs 103–104)

**Type locality:** Argentina: Buenos Aires, Bahía Blanca. Type locality cited by Schmidt as “Bahia Blanca (Patagonien), Sierra de Cordoba in Argentinien, Buenos Aires, Brasilien, St. Thomé”.

**Type material: Lectotype:** here designated, male (“tibialis / Schmidt”, “LECTOTYPE ♂ / *Canthon / tibialis / Schmidt / des. F.Z.Vaz-de-Mello, 2013*”, “3339 / E92 +”, “*tibialis / A. Schm*”, “Patagonien / Bahia Blanca / E. Welske”, “*tibialis*”), **NHRS**. – **Paralectotypes:** 1. Male (“Brasil [illegible]”, “*muticus / Harold*”, “*Canthon / tibialis / n.sp. A. Schmidt*”, “26354”, “PARALECTOTYPE / ♂ / *Canthon / tibialis Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **ZMHB**. 2. Male (“*Buen Ayr / Reich*”, “*H. rid.*”, “*muticus / Harold / Buen. Ayr.*”, “PARALECTOTYPE / ♂ / *Canthon / tibialis Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **ZMHB**. 3. Female (“Argentinien / Sierra de Cordoba / Capella del Monte / 2000: I–II.1888 / J. Frenzel S.”, “112017”, “PARALECTOTYPE / ♀ / *Canthon / tibialis Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **ZMHB**. 4. Female (“*St. Thomé / Para.*”, “PARALECTOTYPE / ♀ / *Canthon / tibialis Schmidt / des. F.Z.Vaz-de-Mello, 2014*”), **ZMHB**.

**Current status:** Valid subspecies as *Canthon (Pseudepilisus) lunatus tibialis* Schmidt, 1922 (subspecies status given by Halffter & Martínez 1968: 285).



103



105



104



106



107



108

Figs 103–104. *Canthon tibialis* Schmidt, 1922. 103. Lectotype. 104. Labels of type specimens. From left: lectotype (above), paralectotype 3, paralectotype 4, paralectotype 2, paralectotype 1.

Figs 105–106. *Canthon trimaculatus* Schmidt, 1922. 105. Syntype 2. 106. Labels of some syntypes. First line: syntype 5; second line: syntype 4, syntype 7, syntype 3, syntype 6, syntype 1.

Figs 107–108. *Canthon uniplagiatus* Schmidt, 1922. 107. Syntype 3. 108. Labels of syntypes. Clockwise from top left: syntype 3, syntype 1, syntype 2, syntype 4, syntype 5.

**Last taxonomic treatment:** Halffter & Martínez (1968, 1977). Under revision by Marcelli Krul Vieira, Fernando Silva (Universidade Federal do Pará, Brazil) and FZVM.

**53. *Canthon trimaculatus* Schmidt, 1922: 65, 94.**  
(Figs 105–106)

**Type locality:** Ecuador: Esmeraldas, San Javier de Cachabi (see Dupérré [2014] for a discussion on the locality “Cachabé”). Type locality cited by Schmidt as “Cachabé, Columbien, Paramba, Surinam”.

**Type material: Syntypes:** 1. Female (?) (“COLOMBIE”, “*trimaculatus* / m.”, “J. J. Gillet det., vend.: / *Canthon* / *trimaculatus* Gillet / R.M.H.N. Belg.10.640”, “PARALECTOTYPE / ♀ ? / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **ISNB**. 2. Female (“LECTOTYPE ♀ / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “*trimaculatus* / Schm”, “*Scybalocanthon* / 3-maculatus / (Schm.) / P. Pereira det. 60”, “PARALECTOTYPE / *Canthon* / *trimaculatus* / Schmidt / ♀ / des. F.Z.Vaz-de-Mello, 2013”), **NHRS**. 3. Male (“PARALECTOTYPE / ♂ / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “R. Dagua, / Colombia / W. Rosenberg”), **SMTD**. 4. Male (“PARALECTOTYPE / ♂ / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Cachabé to / Paramba, / II. 97”), **SMTD**. 5. Male (“Cachabé / low c. I.97. / (Rosenberg)”, “Coll. C. Felsche / Kauf 20, 1918”, “Typus”, “*Canthon* / *trimaculatus* / n.sp. A. Schmidt”, “LECTOTYPE ♂ / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **SMTD**. 6. Female (“PARALECTOTYPE / ♀ / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “R. Dagua / Colombia / W. Rosenberg”), **SMTD**. 7. Female (“PARALECTOTYPE / ♀ / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Surinam”), **SMTD**. 8. Female (“PARALECTOTYPE / ♀ / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “Cachabé, / low c., XII.96. / (Rosenberg)”), **SMTD**. 9. Female (“PARALECTOTYPE / ♀ / *Canthon* / *trimaculatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Coll. C. Felsche / Kauf 20, 1918”, “R. Dagua, / Colombia / W. Rosenberg”), **SMTD**.

**Current status:** Valid species as *Scybalocanthon trimaculatus* (Schmidt, 1922) (transferred to *Scybalocanthon* by Halffter & Martínez 1977: 68).

**Last taxonomic treatment:** Halffter & Martínez (1977), Molano & Medina (2010). Under revision by Fernando Silva (Universidade Federal do Pará, Brazil).

**54. *Canthon uniplagiatus* Schmidt, 1922: 65, 94.**  
(Figs 107–108)

**Type locality:** Amazon (Brazil: Amazonas?). Type locality cited by Schmidt as “Olivenza am oberen Amazonstrom”.

**Type material: Syntypes:** 1. Male (“uniplagiatus / Schm”, “LECTOTYPE ♂ / *Canthon* / *uniplagiatus* / A. Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “PARALECTOTYPE / *Canthon* / *uniplagiatus* / Schmidt / ♂ / des. F.Z.Vaz-de-Mello, 2013”, “3405 / E92 +”, “Amazonas”, “*uniplagiatus*”, “*Scybalocanthon* / *uniplagiatus* / (Schm) / P. Pereira et. 60”, “38 / 56”, “*uniplagia* / tus A. Schm.”), **NHRS**. 2. Male (“PARALECTOTYPE / ♂ / *Canthon* / *uniplagiatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “Typus”, “Coll. C. Felsche / Kauf 20, 1918”, “Amazonas”), **SMTD**. 3. Male (“Amazonas”, “Coll. C. Felsche / Kauf 20, 1918”, “*Canthon* / *uniplagiatus* / n. sp. A. Schmidt”, “LECTOTYPE ♂ / *Canthon* / *uniplagiatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **SMTD**. 4. Male (“Olivenza / Ob. Amaz.”, “*nigriceps* / Har.”, “PARALECTOTYPE / ♂ / *Canthon* / *uniplagiatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”, “**ZMHB**”), 5. Female (“Olivenza / Ob. Amazon. / O. Thieme V.”, “*Canthon* / *uniplagiatus* / n. sp. A. Schmidt”, “PARALECTOTYPE / ♀ / *Canthon* / *uniplagiatus* / Schmidt / des. F.Z.Vaz-de-Mello, 2014”), **ZMHB**.

**Current status:** Junior subjective synonym of *Scybalocanthon pygidialis* (Schmidt, 1922) (synonymized by Pereira & Martínez, 1956: 119).

**Last taxonomic treatment:** Pereira & Martínez (1956), Halffter & Martínez (1977). Under revision by Fernando Silva (Universidade Federal do Pará, Brazil).

## Acknowledgements

We are very grateful to all the curators who, with great hospitality and help, received us in their institutions during the course of this project and were fundamental to its completion. Concerning this particular paper, we are especially grateful to Alain Drumont (ISNB), Johannes Bergsten (NHRS), Klaus-Dieter Klass and Olaf Jäger (SMTD), Stephan Blank (SDEI), and Joachim Willers and Johannes Frisch (ZMHB). We also thank Editha Schubert (SDEI) for sending, among other photographs, an image of Adolf Schmidt from the very impressive portrait collection of her institution, and W. D. Edmonds (Portland, Oregon, USA) and Jiří Zídek (Prague, Czech Republic) for their careful and critical review of the manuscript. FZVM is a CNPq fellow and, during the course of this project, he was funded several times by the Brazilian Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq 302997/2013-0, 304925/2010-1, 484035/2013-4, 440604/2015-0, 248299/2012-3, 306745/2016-0) and also by the Programa de Pesquisa em Biodiversidade (PPBio), Synthesys BE-TAF-3985,

and the Institut de Systématique, Evolution, Biodiversité -UMR 7205, Centre national de la recherche scientifique/Muséum national d'Histoire naturelle, France. MC was supported through Master's scholarships offered by the CNPq and the Programa Nota 10, Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ), and is currently supported by a PhD scholarship granted by CNPq.

## References

- Ahrens, D., Schwarzer, J. & Vogler, A. P. 2014. The evolution of scarab beetles tracks the sequential rise of angiosperms and mammals. *Proceedings of the Royal Society of London (B)* 281: 1–9.
- Arias, J. A. & Medina, C. A. 2014. Three new species of *Cryptocanthon* Balthasar, 1942 (Coleoptera: Scarabaeidae: Scarabaeinae) from Colombia. *Caldasia* 36(1): 165–180.
- Arnaud, P. 2018. Description d'une nouvelle espèce de *Phanaeus* d'Équateur et revalidation de l'espèce *Coprophanaeus* (C.) *edmondsi* Arnaud (Coleoptera: Scarabaeidae, Scarabaeinae). *Besoiro* 26: 3–7.
- Balthasar, V. 1939. Eine Vorstudie zur Monographie der Gattung *Canthon* Hffsg. *Folia Zoologica et Hydrobiologica* 9(2): 179–238.
- Botero, J. P. & Cupello, M. 2015. Case 3656. *Cerambyx striatus* Goeze, 1777 (currently *Dorcadion glycyrrhizae striatum*) and *Cerambyx striatus* Fabricius, 1787 (currently *Chydarteres striatus*) (Insecta, Coleoptera, Cerambycidae): proposed conservation of the specific names. *Bulletin of Zoological Nomenclature* 72(2): 122–128.
- & Monné, M. L. 2012. Revision of the genus *Andraegoidus* Aurivillius (Insecta: Coleoptera: Cerambycidae). *Zootaxa* 3169: 1–60.
- Canhedo, V. L. 2004a. Novas espécies do gênero *Anomiopus*, grupo *smaragdinus* (Coleoptera, Scarabaeidae). *Iheringia, Série Zoologia* 94(2): 187–204.
- 2004b. *Anomiopus* Westwood (Coleoptera, Scarabaeidae): novas espécies do grupo *virescens*. *Revista Brasileira de Entomologia* 48(4): 449–458.
- 2006. Revisão taxonômica do gênero *Anomiopus* Westwood, 1842 (Coleoptera, Scarabaeidae, Scarabaeinae). *Arquivos Zoologia, Museu de Zoologia da Universidade de São Paulo* 37(4): 349–502.
- Chapin, E. A. 1930. *Canthonella*, a new genus of Scarabaeidae (Coleoptera). *American Museum Novitates* 409: 1–2.
- Cook, J. 1998. A revision of the Neotropical genus *Bdelyrus* Harold (Coleoptera, Scarabaeidae). *The Canadian Entomologist* 130: 631–689.
- 2000. Four new species of *Bdelyrus* (Coleoptera: Scarabaeidae: Scarabaeinae) and a redescription of *Bdelyrus lagopus*. *The Canadian Entomologist* 132: 551–565.
- 2002. A revision of the Neotropical genus *Cryptocanthon* Balthasar (Coleoptera: Scarabaeidae: Scarabaeinae). *Coleopterists Society Monograph* 1: 3–96.
- Cupello, M. 2018. On the type species of the New World dung beetle genus *Canthidium* Erichson, 1847 (Coleoptera: Scarabaeidae: Scarabaeinae), with an annotated checklist of species. *Zootaxa* 4388(4): 451–486.
- & Génier, F. 2017. *Dendropaemon* Perty, 1830 nomenclature revisited: on the unavailability of “*Onthoecus* Lacordaire, 1856” (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini). *The Coleopterists Bulletin* 71(4): 821–824.
- & Vaz-de-Mello, F. Z. 2013a. New evidence for the validity of *Coprophanaeus* (C.) *terrali* Arnaud, 2002 (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini), a dung beetle from Brazil. *Zootaxa* 3717(3): 359–368.
- & Vaz-de-Mello, F. Z. 2013b. Taxonomic revision of the South American dung beetle genus *Gromphas* Brullé, 1837 (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini: Gromphadina). *Zootaxa* 3722(4): 439–482.
- & Vaz-de-Mello, F. Z. 2014a. Correction to the type species of the South American genus *Gromphas* Brullé, 1837 (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini). *Zootaxa* 3790(2): 399–400.
- & Vaz-de-Mello, F. Z. 2014b. Revalidation of the Brazilian Atlantic Forest dung beetle species *Coprophanaeus* (*Metallophanaeus*) *machadoi* (Pereira & d'Andretta, 1955) (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini) based on morphological and distributional evidence. *Zootaxa* 3869(4): 435–451.
- & Vaz-de-Mello, F. Z. 2016. A new species and the phylogeny of the South American genus *Gromphas* Brullé, 1837 (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini). *Journal of Natural History* 50: 943–969 [there has been a wide controversy on whether early electronic versions of works which are later reissued (exclusively electronic or not) with volume and final pagination content inserted should be treated as available publications or not – and, consequently, be the source of availability for new names and nomenclatural acts (e. g., Krell 2015, Dubois et al. 2013, 2015a,b). Having agreed with the arguments exposed by Dubois et al. (2013, 2015a,b) that early versions without final pagination and volume are not the final version of a work for not having “fixed content and layout” as demanded by Code's Article 8.1.3.2, we decided to consider only the final, paginated version of any work published electronically as the one where new names and nomenclatural acts are given availability. This is particularly relevant in relation to Cupello & Vaz-de-Mello's 2016 paper because its preprint version was posted on the journal's website in 2015, whereas its final version with definitive pagination and volume information was published only in 2016, affecting, therefore, the citation of the new species published in that work from “*Gromphas jardim* Cupello & Vaz-de-Mello, 2015” to *G. jardim* Cupello & Vaz-de-Mello, 2016, the latter being the correct citation].

- & Vaz-de-Mello, F. Z. in press. A monographic revision of the Neotropical dung beetle genus *Sylvicanthon* Halffter & Martínez, 1977 (Coleoptera: Scarabaeidae: Scarabaeinae: Deltochilini), including a reappraisal of the taxonomic history of "*Canthon sensu lato*". European Journal of Taxonomy.
- , Rossini, M. & Vaz-de-Mello, F. Z. 2016. On the type species of the South American dung beetle genus *Chalcoecopris* Burmeister, 1846 (Coleoptera: Scarabaeidae: Scarabaeinae), with some comments on the type locality of *C. hesperus* (Olivier, 1789). Zootaxa 4061 (3): 274–276.
- Darling, J. D. G. & Génier, F. 2018. Revision of the taxonomy and distribution of the Neotropical *Copris incertus* species complex (Coleoptera: Scarabaeidae: Scarabaeinae). The Canadian Entomologist (online edition), 39 pp.
- Darwin, C. 1871. The descent of man, and selection in relation to sex. In two volumes: Vol. 1, 423 pp.; Vol. 2, 475 pp., London (John Murray).
- Davis, A. L. V. 2009. Historical biogeography of the Scarabaeinae and its physical and biotic drivers. Pp. 329–385 in: Scholtz, C. H., Davis, A. L. V. & Kryger, U. (eds). Evolutionary biology and conservation of dung beetles. Sofia (Pensoft Publishers).
- Dubois, A., Bour, R. & Ohler, A. 2015a. What is an online 'preliminary version' of a publication in the meaning of Article 9.9 of the Code? – One more step on the trail of the Asian elephant. Bulletin of Zoological Nomenclature 72(1): 6–18.
- , Bour, R. & Ohler, A. 2015b. Nomenclatural availability of preliminary electronic versions of taxonomic papers: in need of a clear definition. Bulletin of Zoological Nomenclature 72(3): 252–265.
- , Crochet, P.-A., Dickinson, E. C., Nemésio, A., Aesch, E., Bauer, A. M., Blagoderov, V., Bour, R., de Carvalho, M. R., Desutter-Grandcolas, L., Frétey, T., Jäger, P., Koyamba, V., Lavilla, E. O., Löbl, I., Louchart, A., Malécot, V., Schatz, H. & Ohler, A. 2013. Nomenclatural and taxonomic problems related to the electronic publication of new nomina and nomenclatural acts in zoology, with brief comments on optical discs and on the situation in botany. Zootaxa 3735: 1–94.
- Dupérré, N. 2014. Demystifying three species of Ctenidae (Arachnida: Araneae) described by Embrik Strand. Part I, Ecuador. Zootaxa 3784(1): 67–73.
- Edmonds, W. D. 1972. Comparative skeletal morphology, systematics and evolution of the phanaeine dung beetles (Coleoptera: Scarabaeidae). The University of Kansas Science Bulletin 49: 731–874.
- 1974. Internal anatomy of *Coprophanaeus lancifer* (L.) (Coleoptera: Scarabaeidae). International Journal of Insect Morphology and Embriology 3(2): 257–272.
- 1994. Revision of *Phanaeus* MacLeay, a New World genus of Scarabaeinae dung beetles (Coleoptera: Scarabaeidae, Scarabaeinae). Natural History Museum of Los Angeles County Contributions in Science 443: 1–105.
- 2000. Revision of the Neotropical dung beetle genus *Sulcophanaeus* (Coleoptera: Scarabaeidae: Scarabaeinae). Folia Heyrovskyana, Supplementum 6: 1–60.
- & Figueroa, L. 2013. A remarkable new *Anomiopus* Westwood from Peru (Coleoptera: Scarabaeidae: Scarabaeinae). Insecta Mundi 313: 1–4.
- & Halffter, G. 1978. Taxonomic review of immature dung beetles of the subfamily Scarabaeinae (Coleoptera: Scarabaeidae). Systematic Entomology 3: 307–331.
- & Zidek, J. 2004. Revision of the Neotropical dung beetle genus *Oxysternon* (Scarabaeidae: Scarabaeinae: Phanaeini). Folia Heyrovskyana 11: 1–58.
- & Zidek, J. 2010. A taxonomic review of the Neotropical genus *Coprophanaeus* Olsoufieff, 1924 (Coleoptera: Scarabaeidae, Scarabaeinae). Insecta Mundi 129: 1–111.
- & Zidek, J. 2012. Taxonomy of *Phanaeus* revisited: revised keys to and comments on species of the New World dung beetle genus *Phanaeus* MacLeay, 1819 (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini). Insecta Mundi 274: 1–108.
- Emlen, D. J. 1997. Alternative reproductive tactics and male-dimorphism in the horned beetle *Onthophagus acuminatus* (Coleoptera: Scarabaeidae). Behavioral Ecology and Sociobiology 41: 335–341.
- 2000. Integrating development with evolution: a case study with beetle horns. BioScience 50(5): 403–418.
- 2001. Costs and the diversification of exaggerated animal structures. Science 291: 1534–1536.
- , Marangelo, J., Ball, B. & Cunningham, C. W. 2005. Diversity in the weapons of sexual selection: horn evolution in the beetle genus *Onthophagus* (Coleoptera: Scarabaeidae). Evolution 59(5): 1060–1084.
- , Szafran, Q., Corley, L. S. & Dworkin, I. 2006. Insulin signaling and limb-patterning: candidate pathways for the origin and evolutionary diversification of beetle 'horns'. Heredity 97: 179–191.
- Figueroa, L. & Edmonds, W. D. 2015. A new *Anomiopus* Westwood from Peru (Coleoptera: Scarabaeidae: Scarabaeinae). Insecta Mundi 402: 1–7.
- Gaedike, R. 1995. Deutsches Entomologisches Institut: origin, history and present. Holarctic Lepidoptera 2(2): 51–56.
- Génier, F. 1996. A revision of the Neotropical genus *Ontherus* Erichson (Coleoptera: Scarabaeidae: Scarabaeinae). Memoirs of the Entomological Society of Canada 170: 1–169.
- 1998. A revision of the Neotropical genus *Ontherus* Erichson (Coleoptera: Scarabaeidae: Scarabaeinae), supplement 1. The Coleopterists Bulletin 52(3): 270–274.
- 2009. Le genre *Eurysternus* Dalman, 1824 (Scarabaeidae: Scarabaeinae: Oniticellini), révision taxonomique et clés de détermination illustrées. 430 pp., Sofia (Pensoft Publishers).
- 2010. A review of the Neotropical dung beetle genera *Deltorhinum* Harold, 1869, and *Lobidion* gen. nov. (Coleoptera: Scarabaeidae: Scarabaeinae). Zootaxa 2693: 35–48.



- 2012. A new species and notes on the subgenus *Deltochilum* (*Deltochilum*) Eschscholtz, 1822 (Coleoptera: Scarabaeidae: Scarabaeinae: Deltochilini). *Zootaxa* 3357: 25–36.
- & Arnaud, P. 2016. *Dedropaemon* Perty, 1830: taxonomy, systematics and phylogeny of the morphologically most derived phanaeine genus (Coleoptera: Scarabaeidae, Scarabaeinae, Phanaeini). *Zootaxa* 4099(1): 1–125.
- & Kohlmann, B. 2003. Revision of the Neotropical dung beetle genera *Scatimus* Erichson and *Scatrichus* gen. nov. (Coleoptera: Scarabaeidae: Scarabaeinae). *Faberies* 28(2): 57–111.
- & Krell, F.-T. 2017. Case 3722 – *Scarabaeus gazella* Fabricius, 1787 (currently *Digitonthophagus gazella* or *Onthophagus gazella*; Insecta, Coleoptera, Scarabaeidae): proposed conservation of usage of the specific name by designation of a neotype. *Bulletin of Zoological Nomenclature* 74: 78–87.
- & Moretto, P. 2017. *Digitonthophagus* Balthasar, 1959: taxonomy, systematics, and morphological phylogeny of the genus revealing an African species complex (Coleoptera: Scarabaeidae: Scarabaeinae). *Zootaxa* 4248(1): 1–110.
- & Vaz-de-Mello, F. Z. 2002. A review of Arrow's types of *Trichillum* and *Pedaridium* with description of two new species of *Pedaridium* (Coleoptera: Scarabaeinae, Ateuchini). *Acta Zoologica Cracoviensia* 45(3): 185–196.
- Gillett, C. P. D. T., Edmonds, W. D. & Villamarin, S. 2009. Distribution and biology of the rare scarab beetle *Megatharsis buckleyi* Waterhouse, 1891 (Coleoptera: Scarabaeinae: Phanaeini). *Insecta Mundi* 80: 1–8.
- González, F. A. & Medina, C. A. 2015. The genus *Ontherus* Erichson 1847 (Coleoptera: Scarabaeidae: Scarabaeinae): description of a new species, and notes on the genus in Colombia. *Zootaxa* 3949(1): 82–90.
- González-Alvarado, A. & Vaz-de-Mello, F. Z. 2014. Taxonomic review of the subgenus *Hybomidium* Shipp 1897 (Coleoptera: Scarabaeidae: *Deltochilum*). *Annales de la Société Entomologique de France* (N.S.) 50(3–4): 431–476.
- Gunter, N. L., Weir, T. A., Slipinksi, A., Bocak, L. & Cameron, S. L. 2016. If dung beetles (Scarabaeidae: Scarabaeinae) arose in association with dinosaurs, did they also suffer a mass co-extinction at the K-Pg boundary? *PloS One* 11(5): 1–47.
- Halffter, G. 1958. Dos nuevos géneros de *Canthonini* (Col. Scarabaeidae). *Ciencia, Revista Hispano-Americana de Ciencias Puras y Aplicadas* 17(10–12): 207–212.
- 1961. Monografía de las especies norteamericanas del género *Canthon* Hoffsg. (Coleopt., Scarab.). *Ciencia, Revista Hispano-Americana de Ciencias Puras y Aplicadas* 20(9–12): 225–320.
- & Edmonds, W. D. 1982. The nesting behavior of dung beetles (Scarabaeinae). An ecological and evolutive approach. 176 pp., México, D.F. (Instituto de Ecología).
- & Martínez, A. 1968. Revisión monográfica de los *Canthonina americanos* (Coleoptera, Scarabaeidae) (3ª Parte). *Revista de la Sociedad Mexicana de Historia Natural* 29: 209–290+9 pls.
- & Martínez, A. 1977. Revisión monográfica de los *Canthonina americanos*, IV parte. Clave para géneros y subgéneros. *Folia Entomológica Mexicana* 38: 29–107.
- & Matthews, E. G. 1966. The natural history of dung beetles of the subfamily Scarabaeinae (Coleoptera: Scarabaeidae). *Folia Entomológica Mexicana* 12–14: 1–312.
- Hanski, I. & Cambefort, Y. 1991. *Dung beetle ecology*. 481 pp., Princeton (Princeton University Press).
- Herzog, S. K., Hamel-Leigue, A. C., Larsen, T. H., Mann, D. J., Soria-Auza, R. W., Gill, B. D., Edmonds, W. D. & Spector, S. 2013. Elevational distribution and conservation biogeography of phanaeine dung beetles (Coleoptera: Scarabaeinae) in Bolivia. *PloS ONE* 8(5): 1–11.
- Horn, W. & Kahle, I. 1936. Über entomologische Sammlungen (ein Beitrag zur Geschichte der Entomomuseologie). *Entomologische Beihefte aus Berlin-Dahlem* 3: 161–296, pls XVII–XXVI.
- , Kahle, I., Friese, G. & Gaedike, R. 1990. *Colecciones entomológicas. Ein Kompendium über den Verbleib entomologischer Sammlungen der Welt bis 1960. Teil II: L bis Z*. Berlin (Akademie der Landwirtschaftswissenschaften der Deutschen Demokratischen Republik).
- Howden, H. F. & Cook, J. 2002. *Paracryptocanthon*, a new *Canthonine* genus from Brazil (Coleoptera: Scarabaeidae: Scarabaeinae). *The Coleopterists Bulletin* 56(4): 585–588.
- Harold, E. 1868. Monographie der Gattung *Canthon*. *Berliner Entomologische Zeitschrift* 12: 1–144.
- ICZN (International Commission on Zoological Nomenclature) 1999. *International code of zoological nomenclature*. Fourth edition adopted by the International Union of Biological Sciences. 306 pp., London (International Trust for Zoological Nomenclature).
- Klapperich, H. 1948. Notes about German and Austrian coleopterists and collections. *The Coleopterists Bulletin* 2: 67.
- Kohlmann, B. & Solís, Á. 2006. El género *Canthidium* (Coleoptera: Scarabaeidae) en Norteamérica. *Giornale Italiano di Entomologia* 11: 235–295.
- & Solís, Á. 2012. New species and revalidations of scarab beetles (Coleoptera: Geotrupidae: Athyreini and Coleoptera: Scarabaeidae: Scarabaeinae) from Costa Rica and Panama. *Zootaxa* 3193: 28–52.
- , Arriga-Jiménez, A. & Rös, M. 2018. Dung beetle vicariant speciation in the mountains of Oaxaca, Mexico, with a description of a new species of *Phanaeus* (Coleoptera, Geotrupidae, Scarabaeidae). *Zookeys* 743: 67–93.
- Krell, F.-T. 2006. Fossil record and evolution of Scarabaeoidea (Coleoptera: Polyphaga). *Coleopterists Society Monograph* 5: 120–143.

- 2012. On nomenclature and synonymy of *Trichius rosaceus*, *T. gallicus*, and *T. zonatus* (Coleoptera: Scarabaeidae: Cetoniinae: Trichiini). *Zootaxa* 3278: 61–68.
- 2015. A mixed bag: when are early online publications available for nomenclatural purposes? *Bulletin of Zoological Nomenclature* 72(1): 19–32.
- Kryger, U. 2009. Conservation of dung beetles. Pp. 387–483 in: Scholtz, C. H., Davis, A. L. V. & Kryger, U. (eds). *Evolutionary biology and conservation of dung beetles*. Sofia (Pensoft Publishers).
- Linnaeus, C. 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Tomus I. Editio decima, reformata. Cum Privilegio Siae Riae Mitis Sveciae. Stockholm [“Holmiæ”] (Lauréntii Salvii).
- Maldaner, M. E., Cupello, M., Ferreira, D. C. & Vaz-de-Mello, F. Z. 2017. Type specimens and names assigned to *Coprophanaeus* (*Megaphanaeus*) d’Olsoufieff, 1924, the largest New World dung beetles (Coleoptera: Scarabaeidae: Phanaeini). *Zootaxa* 4272(1): 83–102.
- , Nunes, R. V. & Vaz-de-Mello, F. Z. 2015. Taxonomic revision of the *Dichotomius speciosus* (Waterhouse, 1891) species group (Coleoptera: Scarabaeidae: Scarabaeinae). *Zootaxa* 3986: 549–560.
- , Vaz-de-Mello, F. Z., Takiya, D. M. & Ferreira, D. C. 2018. Molecular phylogeny of *Coprophanaeus* (*Megaphanaeus*) d’Olsoufieff, 1924 (Coleoptera: Scarabaeidae: Scarabaeinae) and the position of *C. bellicosus*. *Insect Systematics & Evolution* (online edition), 15 pp.
- , Valois, M. C. & Vaz-de-Mello, F. Z. in press. A revision of *Dichotomius* (Homocanthonides) Luederwaldt, 1929 (Coleoptera: Scarabaeidae: Scarabaeinae). *Revista Brasileira de Entomologia*.
- Martínez, A. 1954a. Algunas notas entomológicas. *Natura* 1(1): 59–74.
- 1954b. Scarabaeoidea Neotropica I. *Natura* 1(2): 27–28.
- , Halffter, G. & Halffter, V. 1964. Notas sobre el género *Glaphyrocantthon* (Coleopt., Scarab., Canthonina). *Acta Zoologica Mexicana* 7(3): 1–42.
- Mayr, E., Linsley, E. G. & Usinger, R. L. 1953. *Methods and principles of systematic zoology*. 328 pp., New York, Toronto and London (McGraw-Hill Book Company).
- Medina, C. A., Molano, F. & Scholtz, C. H. 2013. Morphology and terminology of dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) male genitalia. *Zootaxa* 3626(4): 455–476.
- , Scholtz, C. H. & Gill, B. D. 2003. Morphological variation and systematics of *Canthon* Hoffmansegg, 1817 and related genera of New World Canthonini dung beetles (Coleoptera, Scarabaeinae). *Deutsche Entomologische Zeitschrift* 50(1): 23–68.
- Moctezuma, V. & Halffter, G. 2017. A new species of *Phanaeus* MacLeay (Coleoptera: Scarabaeidae: Scarabaeinae) from Los Chimalapas, Oaxaca, Mexico. *The Coleopterists Bulletin* 71(1): 47–56.
- , Sánchez-Huerta, J. L. & Halffter, G. 2017. Two new species of the *Phanaeus endymion* species group (Coleoptera, Scarabaeidae, Scarabaeinae). *Zookeys* 702: 113–135.
- Molano, F. & Medina, C. A. 2010. Especie nueva de *Scybalocantthon* (Coleoptera: Scarabaeinae: Canthonini) y descripción de la variación del órgano genital masculino. *Revista Mexicana de Biodiversidad* 81: 689–699.
- Morrone, J. J. 2015. Halffter’s Mexican transition zone (1962–2014), cenocrons and evolutionary biogeography. *Journal of Zoological Systematics and Evolutionary Research* 53(3): 249–257.
- Nunes, L. G. O. A., Nunes, R. V. & Vaz-de-Mello, F. Z. 2018. Taxonomic revision of the South American subgenus *Canthon* (*Goniocantthon*) Pereira & Martínez, 1956 (Coleoptera: Scarabaeidae: Scarabaeinae: Deltocilini). *European Journal of Taxonomy* 437: 1–31.
- Nunes, R. V. & Vaz-de-Mello, F. Z. 2016. A new species of *Holocephalus* Hope from Paraguay (Coleoptera: Scarabaeidae: Scarabaeinae: Dichotomiini s. str.). *Zootaxa* 4136(2): 397–400.
- , Carvalho, M. S. G. & Vaz-de-Mello, F. Z. 2016. Taxonomic review of the *Dichotomius* (*Luederwaldtinia*) *assifer* (Eschscholtz) species-group (Coleoptera: Scarabaeidae). *Zootaxa* 4078(1): 230–244.
- Ocampo, F. C. 2004. Food relocation behavior and synopsis of the southern South American genus *Glyphoderus* Westwood (Scarabaeidae: Scarabaeinae: Eucraniini). *The Coleopterists Bulletin* 58(2): 295–305.
- 2005. Revision of the southern South American endemic genus *Anomiopsoides* Blackwelder, 1944 (Coleoptera: Scarabaeidae: Scarabaeinae: Eucraniini) and description of its food relocation behavior. *Journal of Natural History* 39(27): 2537–2557.
- 2007. The Argentinean dung beetle genus *Anomiopsoides* (Scarabaeidae: Scarabaeinae: Eucraniini): description of a new species, and new synonymies for *A. heteroclyta*. *Revista de la Sociedad Entomológica Argentina* 66(3–4): 159–168.
- 2010a. The South American dung beetle genus *Ennearabdus* Lansberge (Coleoptera: Scarabaeidae: Scarabaeinae: Eucraniini). *Journal of Insect Science* 10: Article 93, 1–12.
- 2010b. A revision of the Argentinean endemic genus *Eucranium* Brullé (Coleoptera: Scarabaeidae: Scarabaeinae) with description of one new species and new synonymies. *Journal of Insect Science* 10(19): 1–25.
- Otronen, M. 1988. Intra- and intersexual interactions at breeding burrows in the horned beetle, *Coprophanaeus ensifer*. *Animal Behavior* 36: 741–748.
- Pacheco, T. L. & Vaz-de-Mello, F. Z. 2017. Rediscovery of the Neotropical genus *Paracryptocantthon* Howden & Cook, 2012 (Coleoptera: Scarabaeidae: Scarabaeinae) in the Brazilian Atlantic Forest. *Anales de la Société Entomologique de France (N.S.)* 53(2): 99–105.

- Paulian, R. 1939. Contribution à l'étude des Canthonides américains [Coleopt. Lamellic.] (suite et fin). Annales de la Société Entomologique de France 108: 1–40.
- Pereira, F. S. & d'Andretta, M. A. V. 1955. The species of *Deltochilum* of the subgenus *Calhyboma* Kolbe (Coleoptera, Scarabaeidae). Revista Brasileira de Entomologia 4: 7–50.
- & Martínez, A. 1956. Os gêneros de Canthonini americanos (Col. Scarabaeidae). Revista Brasileira de Entomologia 6: 91–192.
- & Martínez, A. 1960. Notas escarabeidológicas – II. Revista Brasileira de Entomologia 9: 37–55.
- Rasmussen, J. L. 1994. The influence of horn and body size on the reproductive behavior of the horned rainbow scarab beetle *Phanaeus difformis* (Coleoptera: Scarabaeidae). Journal of Insect Behavior 7(1): 67–82.
- Rivera-Cervantes, L. E. & Halffter, G. 1999. Monografía de las especies mexicanas de *Canthon* del subgénero *Glaphyrocanton* (Coleoptera: Scarabaeidae: Scarabaeinae). Acta Zoológica Mexicana (N.S.) 77: 23–150.
- Roggero, A., Dierkens, M., Barbero, E. & Palestini, C. 2016. Combined phylogenetic analysis of two new Afrotropical genera of Onthophagini (Coleoptera, Scarabaeidae). Zoological Journal of the Linnean Society, online edition: 1–23 [no final version with definitive volume and pagination content was found by us either on the journal's website or anywhere on the internet].
- Rossini, M. & Vaz-de-Mello, F. Z. 2015. A review of the genus *Chalcocopris* Burmeister, 1846 (Coleoptera: Scarabaeidae: Scarabaeinae), with description of a new species. Zootaxa 3920: 291–300.
- & Vaz-de-Mello, F. Z. 2017. A taxonomic review of the genus *Isocopris* Pereira and Martínez, 1960 (Coleoptera: Scarabaeidae: Scarabaeinae), with description of a new Brazilian species. Journal of Natural History 51(19–20): 1091–1117.
- , Vaz-de-Mello, F. Z. & Zunino, M. 2018. A taxonomic revision of the New World *Onthophagus* Latreille, 1802 (Coleoptera: Scarabaeidae: Scarabaeinae) of the *osculatii* species-complex, with description of two new species from South America. Journal of Natural History 52(9–10): 541–586.
- Scherer, G. 1983. Die von J. B. v. Spix und C. F. Ph. v. Martius in Südamerika gesammelten Coleopteren (Coleoptera – Scarabaeidae, Lucanidae und Passalidae). Spixiana, Supplement 9: 295–305.
- Schmidt, A. 1910. Coleopterorum catalogus. Pars 20: Aphodiinae. 111 pp., Berlin (W. Junk).
- 1920. Beitrag zur Kenntnis der Gattungen *Canthon* Hfsg., *Sybx* Boh., *Aphodius* Ill., *Simogenius* Har., *Ataenius* Har. Archiv für Naturgeschichte, Abteilung A 86(9): 114–147.
- 1922. 1. Bestimmungstabelle der mir bekannten *Canthon*-Arten. 2. Verbreitungsgebiete der *Canthon*-Arten. 3. Neubeschreibungen von *Canthon*, *Sapro-sitis*, *Mendidius*, *Euparia* und *Ataenius*. Archiv für Naturgeschichte, Abteilung A 88(3): 61–103.
- Scholtz, C. H. 2009. Physiological and behavioural ecology. Pp. 119–224 in: Scholtz, C. H., Davis, A. L. V. & Kryger, U. (eds). Evolutionary biology and conservation of dung beetles. Sofia (Pensoft Publishers).
- & Chown, S. L. 1995. The evolution of habitat use and diet in the Scarabaeoidea: a phylogenetic approach. Pp. 355–374 in: Pakaluk, J. & Ślipiński, S. A. (eds). Biology, phylogeny, and classification of Coleoptera: papers celebrating the 80th birthday of Roy A. Crowson. Warsaw (Muzeum i Instytut Zoologii PAN).
- Silva, F. A. B. & Vaz-de-Mello, F. Z. 2015. A revision of the genus *Aphengium* Harold, 1868 (Coleoptera: Scarabaeidae: Scarabaeinae: Ateuchini). Zootaxa 3955(4): 505–520.
- , Louzada, J. & Vaz-de-Mello, F. Z. 2015. A revision of the *Deltochilum* subgenus *Aganhyboma* Kolbe, 1893 (Coleoptera: Scarabaeidae: Scarabaeinae). Zootaxa 3925(4): 451–504.
- , Vaz-de-Mello, F. Z. & Barclay, M. V. L. 2018. An updated key to the millipede-hunting subgenus *Aganhyboma* Kolbe, 1893 of the genus *Deltochilum* Eschscholtz, 1822 (Coleoptera: Scarabaeidae: Scarabaeinae), with description of a new species from Bolivia and Peru. Insect Systematics & Evolution 49(3): 231–240 [see comments under the Cupello & Vaz-de-Mello 2016 reference above for our choice to cite the 2018 version of Silva et al.'s work instead of its 2017 preprint as the version nomenclaturally available].
- Sherborn, C. D. 1902. Index animalium sive index nominum quae ab A.D. MDCCLVIII generibus et speciebus animalium imposita sunt, societatibus eruditorum adiuvantibus. V–LIX. 1195 pp., Cambridge [Cantabrigiae] (Cambridge University Press [Typographico Academico]).
- Simmons, L. W. & Ridsdill-Smith, T. J. 2011. Ecology and evolution of dung beetles. 368 pp., Oxford (Wiley-Blackwell).
- Smith, A. B. T. & Génier, F. 2001. Revision of the genus *Holocephalus* (Coleoptera: Scarabaeidae: Scarabaeinae: Copriini). The Canadian Entomologist 133: 777–791.
- Solís, A. & Kohlmann, B. 2002. El género *Canthon* (Coleoptera: Scarabaeidae) en Costa Rica. Giornale Italiano di Entomologia 10: 1–68.
- Tallamy, D. W. & Wood, T. K. 1986. Convergence patterns in subsocial insect. Annual Review of Entomology 31: 369–390.
- Tarasov, S. & Dimitrov, D. 2016. Multigene phylogenetic analysis redefines dung beetles relationships and classification (Coleoptera: Scarabaeidae: Scarabaeinae). BMC Evolutionary Biology 16(257): 1–19.
- & Génier, F. 2015. Innovative bayesian and parsimony phylogeny of dung beetles (Coleoptera, Scarabaeidae, Scarabaeinae) enhanced by ontology-based partitioning of morphological characters. PLoS One 10(3): 1–86.
- , Vaz-de-Mello, F. Z., Krell, F.-T. & Dimitrov, D. 2016. A review and phylogeny of Scarabaeinae dung beetle fossils (Coleoptera: Scarabaeidae: Scarabaei-

- nae), with the description of two *Canthochilum* species from Dominican amber. PeerJ 4: e1988.
- Valois, M., Vaz-de-Mello, F. Z. & Silva, F. A. B. 2015. A taxonomic review of the Neotropical genus *Hansreia* Halffter & Martínez, 1977 (Coleoptera: Scarabaeidae: Scarabaeinae). Zootaxa 4027 (2): 205–226.
- , Vaz-de-Mello, F. Z. & Silva, F. A. B. 2017a. Taxonomic revision of the *Dichotomius sericeus* (Harold, 1867) species group (Coleoptera: Scarabaeidae: Scarabaeinae). Zootaxa 4277 (4): 503–530.
- , Vaz-de-Mello, F. Z. & Silva, F. A. B. 2017b. Erratum. A taxonomic review of the Neotropical genus *Hansreia* Halffter & Martínez, 1977 (Coleoptera: Scarabaeidae: Scarabaeinae). Zootaxa 4319 (3): 600.
- Vaz-de-Mello, F. Z. 2000. Estado atual de conhecimentos dos Scarabaeidae s. str. (Coleoptera: Scarabaeoidea) do Brasil. Pp. 183–195 in: Martín-Piera, F., Morrone, J. J. & Melic, A. (eds). Hacia un proyecto CYTED para el inventario y estimación de la diversidad entomológica en Iberoamérica: PRIBES-2000. m3m: Monografías Tercer Milenio, vol. 1. Zaragoza (Sociedad Entomológica Aragonesa [SEA]).
- 2007. Revision and phylogeny of the dung beetle genus *Zonocopriss* Arrow, 1932 (Coleoptera: Scarabaeidae: Scarabaeinae), a phoretic of land snails. Annales de la Société Entomologique de France (N.S.) 43 (2): 231–239.
- 2008. Synopsis of the new subtribe *Scatimina* (Coleoptera: Scarabaeidae: Scarabaeinae: Ateuchini), with descriptions of twelve new genera and review of *Genieridium*, new genus. Zootaxa 1955: 1–75.
- & Cupello, M. 2018. The type specimens of South American dung beetles, Part II: On the species described by the Austrian coleopterist Ludwig Redtenbacher (1814–1876) in the 1868 part of the Reise der österreichischen Fregatte Novara um die Erde (Insecta: Coleoptera: Scarabaeidae: Scarabaeinae). Annalen des Naturhistorischen Museums in Wien, Serie B 120: 41–58.
- & Génier, F. 2005. Lectotype designations, new synonymies, and new species in the genera *Trichilium* Harold and *Pedaridium* Harold (Coleoptera: Scarabaeidae: Scarabaeinae). Zootaxa 1038: 41–52.
- & Halffter, G. 2006. A new dung beetle genus with two new species from Chile (Coleoptera: Scarabaeidae: Scarabaeinae). Zootaxa 1193: 59–68.
- & Louzada, J. N. C. 1997. Considerações sobre forrageio arbóreo por Scarabaeidae (Coleoptera, Scarabaeoidea), e dados sobre sua ocorrência em floresta tropical do Brasil. Acta Zoológica Mexicana (N.S.) 72: 55–61.
- & Silva, F. A. B. 2017. A new species of the genus *Scybalocanthion* (Coleoptera, Scarabaeidae, Scarabaeinae) from the Atlantic rainforest, with an identification key to the species from South America south of the Amazon basin. Zootaxa 4300 (1): 142–146.
- , Edmonds, W. D., Ocampo, F. C. & Schoolmeesters, P. 2011. A multilingual key to the genera and subgenera of the subfamily Scarabaeinae of the New World (Coleoptera: Scarabaeidae). Zootaxa 2854: 1–73.
- Vulinec, K. 1997. Iridescent dung beetles: a different angle. Florida Entomologist 80 (2): 132–141.
- 2002. Dung beetle communities and seed dispersal in primary forest and disturbed land in Amazonia. Biotropica 34 (2): 297–309.
- Weidner, H. 1976. Die Entomologischen Sammlungen des Zoologischen Instituts und des Zoologischen Museums der Universität Hamburg. IX Teil. Insecta VI. 31. Ordnung: Coleoptera. Mitteilungen aus dem Hamburgischen Zoologischen Museum 73: 87–264.
- Werner, M. & Simmons, L. W. 2008. The evolution of male genitalia: functional integration of genital sclerites in the dung beetle *Onthophagus taurus*. Biological Journal of the Linnean Society 93: 257–266.
- Wilson, C. J. & Angus, R. B. 2005. A chromosomal analysis of 21 species of Oniticellini and Onthophagini (Coleoptera: Scarabaeidae). Tijdschrift voor Entomologie 148: 63–76.
- Wilson, E. O. 1971. The Insect Societies. 562 pp., Cambridge, Massachusetts (Harvard University Press).
- Zunino, M. 2012. Cuarenta años de anatomía de las piezas genitales en la taxonomía de los escarabajos (Coleoptera: Scarabaeoidea): el estado del arte. Dugesiana 18 (2): 197–206.
- 2013. The first dung beetle retrieved from Coprinisphaeridae ichnofossils: *Phanaeus violetae* n. sp. (Coleoptera: Scarabaeinae) from Ecuadorian Cangahua balls. Acta Zoológica Mexicana (Nueva Serie) 29 (1): 219–226.

# ZOBODAT - [www.zobodat.at](http://www.zobodat.at)

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Spixiana, Zeitschrift für Zoologie](#)

Jahr/Year: 2018

Band/Volume: [041](#)

Autor(en)/Author(s): Vaz-De-Mello Fernando Z., Cupello Mario

Artikel/Article: [The type specimens of South American dung beetles. Part I: On the species described in the genus \*Canthon\* Hoffmannsegg, 1817 by the German entomologist Adolf Schmidt \(1856-1923\) 33-76](#)