

Distribution, Sampling Effort, and Species Richness of Scarabaeinae (Coleoptera: Scarabaeidae) in Chiapas, Mexico

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Based on a comprehensive literature review, we present an analysis of the richness of the subfamily Scarabaeinae and its distribution in Mexico's Chiapas state. The reviewed works provided information from 185 localities where 134 species belonging to 24 genera were recorded. Fourteen species (10.4%) are endemic to Chiapas, mainly restricted to montane forests. The number of species places Chiapas as one of the regions with the highest species richness in Mexico, representing 39.2% of the Scarabaeinae diversity known in the country. Although the sampling effort is relatively high compared to other regions, there is a strong sampling bias, with localities unevenly distributed in the state territory, most of them concentrated in easily accessible areas, with extensive regions with little or no representativeness, including mountainous areas and several natural protected areas. This information may constitute a valuable contribution to future projects on the taxonomy and biodiversity of dung beetles, so considering poorly explored regions constitutes a niche of opportunities that would allow expanding the knowledge on Scarabaeinae at a regional level.

Key words: Dung beetles, Endemicity, Sampling bias, Spatial Distribution, Species list

BACKGROUND

Dung beetles of the subfamily Scarabaeinae (Coleoptera: Scarabaeidae) are often used to assess the impact of human activities on biodiversity (Nichols et al. 2007). Their importance in ecological research is largely due to their sensitivity and rapid response to habitat fragmentation and alteration. They are also an easy and inexpensive taxon to sample, with a relatively resolved and accessible taxonomy (Spector 2006). The way dung beetles use their resources facilitates ecological services with consequences in secondary functions such as bioturbation, secondary seed dispersal, and nutrient cycling, among others (Nichols et al. 2008).

Scarabaeinae comprises more than 6,900 species representing about 19% of the richness of the family Scarabaeidae. Its species are grouped into 284 genera, of which *Onthophagus* Latreille, 1802 (S = 2,244), *Copris* Geoffroy, 1762 (S = 282), and *Dichotomius* Hope, 1838 (S = 210) are the most diverse and account for about 40% of the total richness of the subfamily (Schoolmeesters 2025; Solís and Kohlmann 2025). The subfamily is globally distributed, but its higher diversity is concentrated in tropical and subtropical regions. It gradually decreases towards the poles, with species inhabiting different biome types and altitudes ranging from sea level to 5,000 m elevation (Scholtz et al. 2009). Despite its wide distribution, the Afrotropical

biogeographic region is notable for the highest diversity of Scarabaeinae, but the Neotropics presents a similar situation, with about 1,800 species and the highest proportion of endemism at the generic level (Scholtz et al. 2009; Cupello et al. 2023).

The Mexican fauna of Scarabaeinae is one of the most diverse and studied in the Americas (Moctezuma 2021; Cupello et al. 2023). The most recent efforts to synthesize the available information on the subfamily in Mexico are presented in a monograph by Morón (2003a) more than two decades ago, in which 228 species were recorded for the country. Since then, the study of the Scarabaeinae of Mexico has received special attention, highlighting several taxonomic changes and the description of numerous new species (e.g., Kohlmann and Solís 2006; Delgado and Kohlmann 2007; Moctezuma and Halffter 2020 2021a b; Moctezuma et al. 2021a). Ecological-faunistic studies have also had a substantial increase during the last decades. However, the number of misidentifications or doubtful records has also increased, with reports of species that were not critically evaluated concerning their biogeography or due to the lack of taxonomic works that would allow them to be properly identified (Sánchez-Hernández et al. 2020; Moctezuma 2021).

Some recent attempts have updated faunal knowledge at the state level within Mexico, nevertheless, lists including Scarabaeinae species have only been published for nine of the 32 states in the country: Veracruz (Deloya 2011, Scarabaeidae), Puebla (Morón et al. 2013, Scarabaeoidea), Guerrero (Deloya and Covarrubias-Melgar 2014, Scarabaeoidea), Michoacán (Deloya et al. 2016, Scarabaeidae), Hidalgo (Delgado and Márquez 2006; Scarabaeoidea; Márquez et al. 2017, Scarabaeidae), Morelos (Zaragoza-Caballero et al. 2019, Coleoptera), Aguascalientes (Márquez et al. 2022, Scarabaeoidea), Quintana Roo (Sánchez-Hernández et al. 2022a, Scarabaeinae), and Oaxaca (Kohlmann et al. 2023, Scarabaeidae).

Regarding faunal knowledge in Chiapas, Gómez (2013) notes that the state record of Scarabaeinae includes approximately 107 species, but recent counts consider that estimate to be even higher (Sánchez-Hernández and Gómez 2018; Sánchez-Hernández et al. 2019a 2020; Kohlmann et al. 2023). None of these works includes an exhaustive search of available information on the subfamily and, accordingly, to date, there is no updated list of all the dung beetle species reported in the state. In this sense, updating regional taxonomic and faunistic knowledge is necessary as a starting point for future systematic reviews that could deserve special attention from a biogeographical or ecological point of view.

For these reasons, the present study aims to list

the Scarabaeinae species recorded in Mexico's Chiapas state, thus offering a current state of knowledge of this subfamily, emphasizing gaps and biases in its study. It also seeks to provide information on areas of potential interest where it would be convenient to intensify, complete, or initiate sampling of this ecologically important taxon. For this purpose, a comprehensive compilation of studies developed in Chiapas was carried out to consolidate the first list of Scarabaeinae species.

MATERIALS AND METHODS

Data on Scarabaeinae species from Chiapas were obtained from a comprehensive search of published literature. The compilation included 84 works, with taxonomic revisions and descriptions, geographic distribution records, biology, ecological studies, and biodiversity inventories, published from 1961 to 2024 (Table S1). The search for information did not include digital databases such as the Global Biodiversity Information Facility (www.gbif.org) and the National Biodiversity Information System (www.snib.org.mx). The information available in these platforms presents several problems, mainly in the taxonomy and geographic distribution of most of the taxa listed (Moctezuma 2021; Sánchez-Hernández et al. 2022a), so they were excluded from this work. Assignments labeled “*aff.*” are not included, nor are morphospecies designated with a number. Also, the records of 24 species were excluded from this work (Table S2), which correspond to taxonomic misidentifications, and in some cases, they are doubtful records, so their presence in Chiapas must be properly corroborated (see the works of Kohlmann and Solís 2006; Génier 2009; Mora-Aguilar and Delgado 2015; Cupello 2018; Sánchez-Hernández et al. 2020; Moctezuma 2021).

To map the distribution of the sampling sites, the records obtained were reviewed and georeferenced with ArcGIS 10.3 software (ESRI 2014). All localities were checked and all those that were doubtful, had inaccurate data, or could not be corroborated were eliminated. A taxonomic list of the Scarabaeinae species found was compiled and phylogenetically arranged by tribes and subtribes following the work of Cupello et al. (2023). Generic and subgeneric names were updated according to the latest available systematic reviews. The taxonomic history (synonymies or original combinations) of the genera and species of Scarabaeinae is included.

The list includes a brief description of each genus as additional information about the species, such as their distribution, type of sampling, and habitat where they have been collected in Chiapas. State distribution in

Mexico is presented in abbreviated form in parentheses, as follows: Aguascalientes-AGU; Baja California-BCN; Baja California Sur-BCS; Campeche-CAM; Chiapas-CHP; Chihuahua-CHH; Mexico City-CMX; Coahuila-COA; Colima-COL; Durango-DUR; Estado de México-MEX; Guanajuato-GUA; Guerrero-GRO; Hidalgo-HID; Jalisco-JAL; Michoacán-MIC; Morelos-MOR; Nayarit-NAY; Nuevo León-NLE; Oaxaca-OAX; Puebla-PUE; Querétaro-QUE; Quintana Roo-ROO; San Luis Potosí-SLP; Sinaloa-SIN; Sonora-SON; Tabasco-TAB; Tamaulipas-TAM; Tlaxcala-TLA; Veracruz-VER; Yucatán-YUC; Zacatecas-ZAC.

In addition, species accumulation curves were constructed based on species occurrence, considering localities as the sampling units. We conducted extrapolation of species diversity (Hill numbers) using the iNEXT package (Hsieh et al. 2016), with the endpoint parameter as the double localities sampled.

The analyses were performed with a 95% confidence interval and 100 permutations.

RESULTS

Our compilation of Scarabaeinae from Chiapas generated an updated list of 134 species belonging to 24 genera, six subtribes, and nine tribes; five genera are considered *incertae sedis*, without any assignment at the tribal level (Table 1). The species composition is dominated by *Onthophagus* Latreille 1802 (32 species), *Canthon* Hoffmannsegg, 1817 (15), and *Phanaeus* MacLeay, 1819 (13). These three genera account for 44.8% of the species recorded in the state. In contrast, 10 genera are represented by only one species (Fig. 1). Of the species reported, 24.6% have a restricted geographic distribution, where 19 species are endemic

Table 1. Tribes, subtribes, genera and number of species of Scarabaeinae with known distribution in Chiapas and Mexico

Tribes	Subtribes	Genera	Number of species	
			Mexico	Chiapas
ATEUCHINI	ATEUCHINA	<i>Ateuchus</i> Weber, 1801	14	7
	SCATIMINA	<i>Martinezidium</i> Vaz-de-Mello, 2008	1	1
		<i>Scatimus</i> Erichson, 1847	1	1
	INCERTAE SEDIS	<i>Agamopus</i> Bates, 1887	1	1
COPRINI		<i>Copris</i> Geoffroy, 1762	23	5
DELTOCHILINI		<i>Anomiopus</i> Westwood, 1842	1	1
		<i>Canthon</i> Hoffmannsegg, 1817	47	15
		<i>Deltochilum</i> Eschscholtz, 1822	9	8
		<i>Malagoniella</i> Martínez, 1961	1	1
		<i>Megathoposoma</i> Balthasar, 1939	1	1
		<i>Melanocanthon</i> Halffter, 1958	1	0
DICHOTOMIINI		<i>Dichotomius</i> Hope, 1938	9	8
EURYSTERNINI		<i>Eurysternus</i> Dalman, 1824	8	6
ONITICELLINI	ATTAVICINA	<i>Attavicinus</i> Philips & Bell, 2008	1	0
	LIATONGINA	<i>Liatongus</i> Reitter, 1892	1	0
	ONITICELLINA	<i>Euoniticellus</i> Janssens, 1953	1	1
ONTHOPHAGINI		<i>Digitonthophagus</i> Balthasar, 1959	1	1
		<i>Onthophagus</i> Latreille, 1802	128	32
PHANAEINI	PHANAEINA	<i>Coprophanaeus</i> Olsoufieff, 1924	4	4
		<i>Phanaeus</i> MacLeay, 1819	46	13
		<i>Sulcophanaeus</i> Olsoufieff, 1924	1	1
		<i>Sisyphus</i> Latreille, 1807	2	1
SISYPHINI		<i>Bdelyropsis</i> Pereira, Vulcano & Martínez, 1960	2	2
INCERTAE SEDIS		<i>Canthidium</i> Erichson, 1847	18	8
		<i>Cryptocanthon</i> Balthasar, 1942	10	8
		<i>Ontherus</i> Erichson, 1847	2	2
		<i>Uroxys</i> Westwood, 1842	8	6
Total		27	342	134

The total for Mexico was obtained from the synthesis of each genus and for the genera *Attavicinus* from Phillips and Bell (2008), *Liatongus* from Morón (2003b), and *Melanocanthon* from Edmonds (2023).

to Mexico and 14 others have a restricted range to Chiapas, most of them limited to mountain cloud forests (Table 2).

When evaluating the evolution of the studies through time, it was found that until the 2000s the knowledge of the Scarabaeinae of Chiapas was scarce, but their study has increased significantly over the successive years, especially during the last decade (Fig. 2). A total of 185 geographical localities with records of one or more species of Scarabaeinae were obtained. Most of these localities are concentrated in easily

accessible areas, near major communication routes (highways and paved roads), and associated with large population centers (Fig. 3A). Instead, most protected areas are under-sampled, with few localities within their limits (Fig. 3B). Likewise, most of the mountainous regions, as well as the Pacific coastal plain and the north of the state, have few localities with species records.

Analysis by the sample coverage method indicates a high percentage of completeness ($C_m = 98.9\%$, Fig. 4A), yet the accumulation curve does not tend to stability (Fig. 4B), and the estimate suggests that the

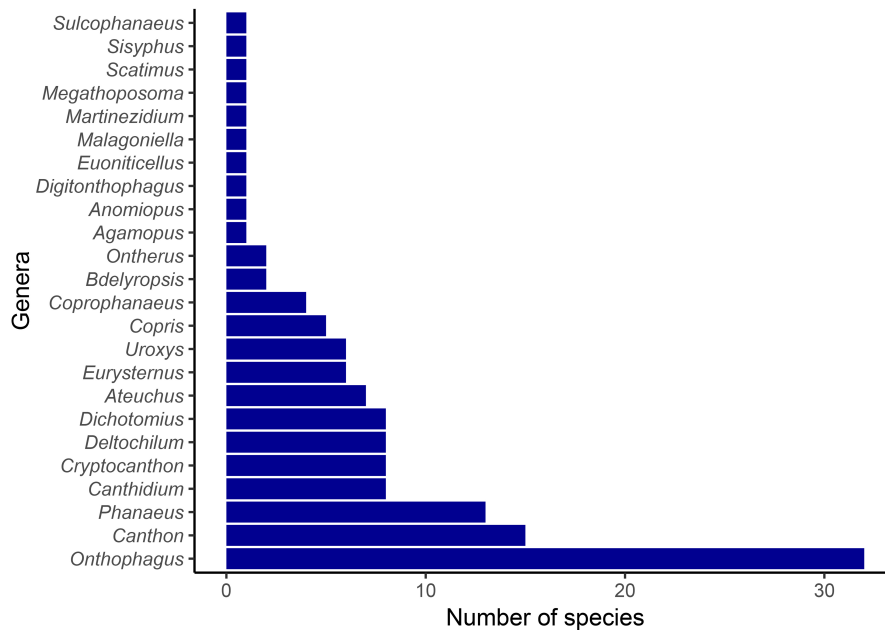


Fig. 1. Number of species for each genus of Scarabaeinae recorded in Chiapas.

Table 2. Endemic species from Chiapas

Species	Altitudinal range (m)	Vegetation
<i>Ateuchus gershensoni</i> Kohlmann, 2000	1200–1400	CF
<i>Canthidium andersoni</i> Kohlmann & Solís, 2006	2000	CF
<i>Canthon lucreciae</i> Halffter & Halffter, 2009	600–1100	TDF, TRF
<i>Cryptocanthon bochilae</i> Cook, 2002	1930	POLF
<i>Cryptocanthon cristobalensis</i> Howden, 1973	2450	CF
<i>Cryptocanthon howdeni</i> Cook, 2002	2100	CF, LF
<i>Cryptocanthon montebello</i> Cook, 2002	1500	LF, POLF
<i>Cryptocanthon newtoni</i> Howden, 1976	1500–2100	CF
<i>Cryptocanthon ocosingo</i> Cook, 2002	1400	POF
<i>Cryptocanthon rayonensis</i> Cook, 2002	1475–1500	CF
<i>Onthophagus sancristobalensis</i> Moctezuma & Halffter, 2020	2200–2300	PF
<i>Onthophagus tacanensis</i> Chamé-Vázquez & Sánchez-Hernández, 2022	1370–1720	CF
<i>Phanaeus chiapanecus</i> Moctezuma & Halffter, 2021	984–1200	TDF, POF
<i>Uroxys tacanensis</i> Delgado & Kohlmann, 2007	2000	CF

TDF: tropical deciduous forest; CF: mountain cloud forest; PF: pine forest; POF: pine-oak forest; LF: liquidambar forest; POLF: pine-oak-liquidambar Forest; TRF: tropical rain forest.

observed richness could increase by at least 36% ($S = 181 \pm 39.5$).

Annotated list of Scarabaeinae species recorded from the state of Chiapas, Mexico

Species endemic to Mexico are indicated with an asterisk (*) and species with restricted range in Chiapas are shown with two asterisks (**).

Family SCARABAEIDAE Latreille, 1802
Subfamily SCARABAEINAE Latreille, 1802
Tribe ATEUCHINI Perty, 1830
Subtribe ATEUCHINA Perty, 1830

***Ateuchus* Weber, 1801**
 = *Choeridium* Serville, 1828

Ateuchus is a genus of small beetles widely distributed in the Americas. It includes an estimated 102 species that congregate among the subgenera *Ateuchus* (100 spp.) and *Lobidion* (2 spp.) (Schoolmeesters 2025). Its greatest diversity is concentrated in South America, while only 14 species are distributed in Mexico (Moctezuma et al. 2018; Schoolmeesters 2025).

1. *Ateuchus candezei* (Harold, 1868)
 = *Choeridium candezei* Harold, 1868
 = *Ateuchus poropyge* (Bates, 1887)
 = *Choeridium poropyge* Bates, 1887

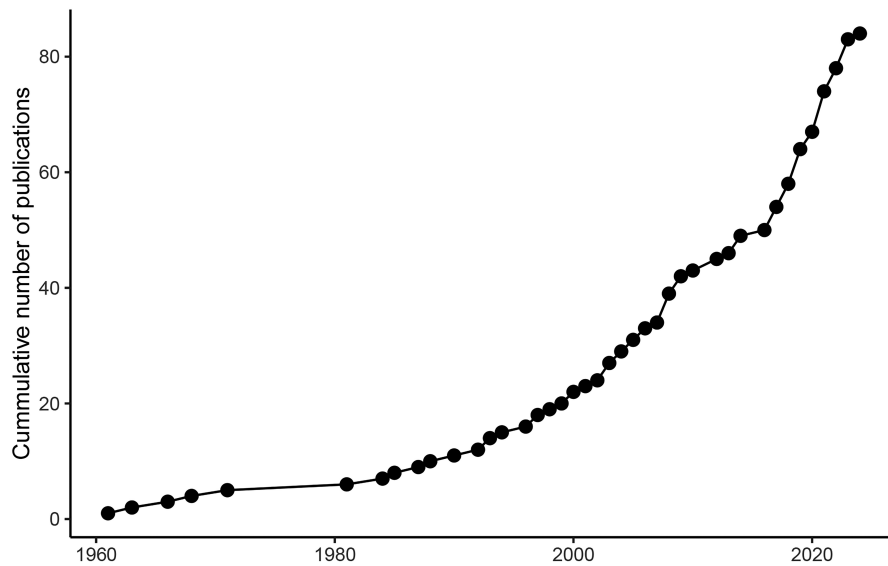


Fig. 2. Cumulative number of published studies on Scarabaeinae in Chiapas (1961–2024).

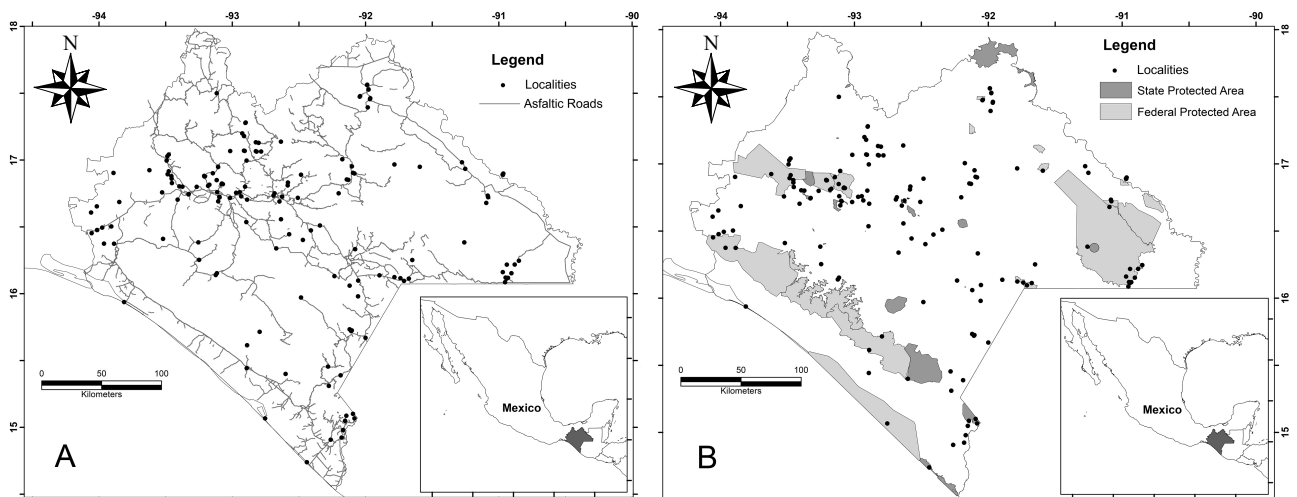


Fig. 3. Spatial distribution of localities where Scarabaeinae species have been recorded in Chiapas and their relationship with main communication routes (A) and Natural Protected Areas (B).

Sampling methods: hand collection, baited pitfall traps (squid, human excrement).

Habitat: tropical deciduous forest, tropical rain forest, pine-oak-liquidambar forest, cacao plantation.

Distribution: Mexico (CHP, OAX, ROO, YUC), Guatemala, Belize, Honduras, El Salvador, Costa Rica (Sánchez-Hernández et al. 2022a; Kohlmann et al. 2023).

2. *Ateuchus gershensoni* Kohlmann, 2000**

Sampling methods: unknown.

Habitat: mountain cloud forest.

Distribution: Mexico (CHP) (Kohlmann 2000).

3. *Ateuchus guatemalensis* (Bates, 1887)

= *Choeridium guatemalense* Bates, 1887

= *Ateuchus benitojuarezi* Moctezuma, Sánchez-Huerta & Halffter, 2018

Sampling methods: light trap, hand collection on leaf litter.

Habitat: coffee plantation.

Distribution: Mexico (CHP, OAX), Guatemala, Honduras, Nicaragua (Kohlmann 2000; Moctezuma et al. 2018).

4. *Ateuchus illaesus* (Harold, 1868)

= *Choeridium illaesum* Harold, 1868

= *Choeridium chrysopyge* Bates, 1887

= *Choeridium insulare* Fleutiaux & Sallé, 1889

Sampling methods: baited pitfall traps (cow dung, human excrement).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, pine-oak forest, coffee plantation.

Distribution: Mexico (CAM, CHP, HID, QUE, ROO, SLP, TAM, VER, YUC), Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica (Kohlmann 2000; Sánchez-Hernández et al. 2022a).

5. *Ateuchus laetitiae* Kohlmann, 1981

Sampling methods: baited pitfall traps (human excrement, fish).

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP), Belize (Schoolmeesters 2025).

6. *Ateuchus perezvelai* Kohlmann, 2000*

= *Ateuchus klugi* (Harold, 1868)

Sampling methods: baited pitfall traps (fish, pig dung).

Habitat: tropical rain forest.

Distribution: Mexico (CHP, OAX, VER, YUC) (Kohlmann 2000; Schoolmeesters 2025).

7. *Ateuchus rodriguezii* (Preudhomme de Borre, 1886)

= *Uroxys rodriguezii* Preudhomme de Borre, 1886

= *Ateuchus ampliatum* (Bates, 1887)

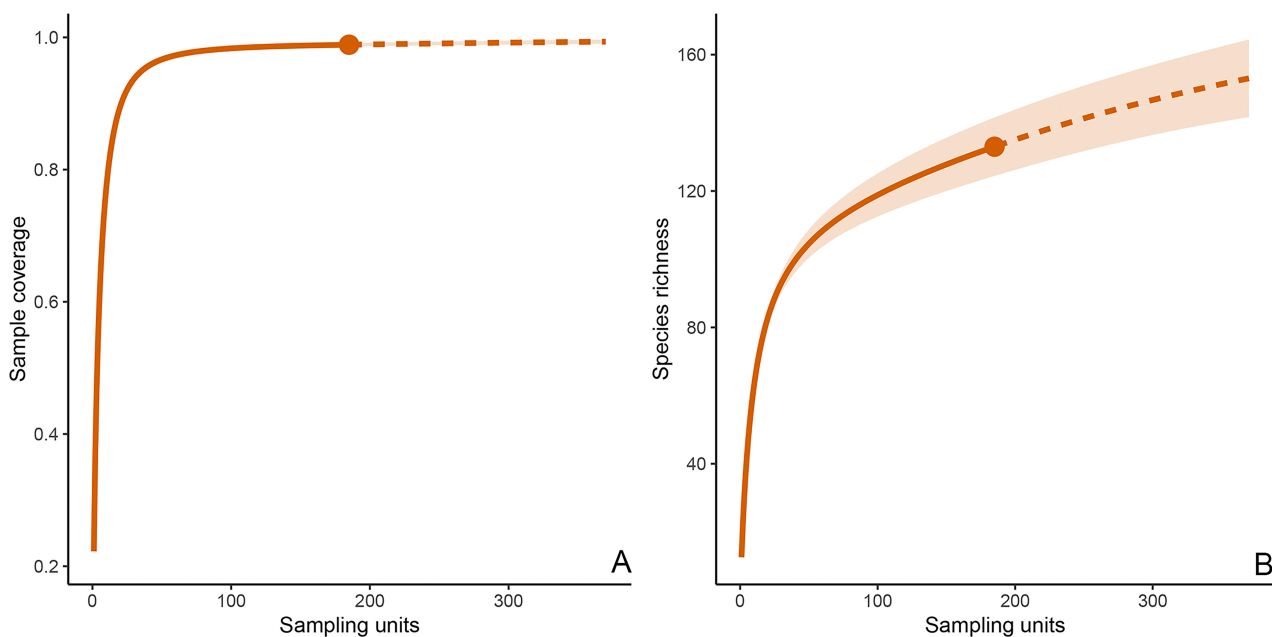


Fig. 4. Sampling coverage (A) and estimated species richness (B) of Scarabaeinae in Chiapas.

= *Choeridium ampliatus* (Bates, 1887)
 = *Choeridium rodriguezi* (Preudhomme de Borre, 1887)

Sampling methods: baited pitfall traps (fish, squid, jaguar, tapir, pig and cow dung, dead millipedes).

Habitat: tropical deciduous forest, tropical rain forest, pine forest, secondary vegetation, pastureland, fruit, and coffee plantations.

Distribution: Mexico (CHP, COL, DUR, GRO, JAL, MEX, MIC, MOR, NAY, OAX, PUE, ROO, SIN), Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica (Sánchez-Hernández et al. 2022a; Kohlmann et al. 2023; Schoolmeesters 2025).

Subtribe SCATIMINA Vaz-de-Mello, 2008

Martinezidium Vaz-de-Mello, 2008

It is a genus of small beetles, of which only four species are known, three from South America (Argentina) and only one from Mexico and Guatemala (Vaz-de-Mello 2008).

8. *Martinezidium maya* (Vaz-de-Mello, Halffter & Halffter, 2004)

= *Pedaridium maya* Vaz-de-Mello, Halffter & Halffter, 2004

Sampling methods: baited pitfall traps (dung).

Habitat: *Acacia* forest, tropical deciduous forest.

Distribution: Mexico (CAM, CHP, ROO, VER, YUC), Guatemala (Sánchez-Hernández et al. 2022a).

Scatimus Erichson, 1847

Scatimus comprises only 13 described species, with scarce taxonomic and biological information available (Génier and Kohlmann 2003; Schoolmeesters 2025). Only one species widespread in the Neotropics is distributed in Mexico, while the rest are reported from South America (Génier and Kohlmann 2003).

9. *Scatimus ovatus* Harold, 1862

= *Scatimus patruelis* Preudhomme, 1886

= *Scatimus quadridentatus* Balthasar, 1939

Sampling methods: baited pitfall traps (fish, human excrement, raccoon, tapir, pig and cow dung).

Habitat: tropical deciduous forest, tropical rain forest, pine-oak forest, mountain cloud forest, pastureland, live fences.

Distribution: Mexico (CHP, COL, DUR, MEX, GRO, JAL, MIC, MOR, NAY, OAX, VER), Guatemala, Belize, El Salvador, Nicaragua, Costa Rica, Panama,

Colombia (Génier and Kohlmann 2003; Schoolmeesters 2025).

Incertae Sedis in ATEUCHINI

Agamopus Bates, 1887

It comprises a group of small beetles. The genus includes five species of exclusive distribution in the Neotropics and only one of them inhabits Mexico (Schoolmeesters 2025).

10. *Agamopus lampros* Bates, 1887

Sampling methods: baited pitfall traps (cow dung).

Habitat: pastureland.

Distribution: Mexico (CHP, COL, JAL, OAX), Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Venezuela (Schoolmeesters 2025).

Tribe COPRINI Leach, 1815

Copris Geoffroy, 1762

Copris is globally distributed and includes an estimated 282 species. Its species are grouped into the subgenera *Copris* s. str. (232 spp.), *Paracopris* (26 spp.) and *Sinocopris* (24 spp.) (Schoolmeesters 2025). The genus is widely distributed in the Americas, where 39 species belonging to the *C. fricator* and *C. minutus* species groups are currently known, distributed from the United States to Brazil. For Mexico, 23 species are reported (Kohlmann 2003; Mora-Aguilar and Delgado 2015; Darling and Génier 2018).

11. *Copris costaricensis dolichocerus* Mathews, 1961

Sampling methods: baited pitfall traps (squid, fish).

Habitat: mountain cloud forest.

Distribution: Mexico (CHP), Guatemala (Kohlmann et al. 2003).

12. *Copris incertus* (Say, 1835)

= *Copris incerta* Say, 1835

= *Copris prociua* Say, 1835

= *Copris prociuus* Harold, 1869

Sampling methods: baited pitfall traps (squid, human excrement).

Habitat: pastureland.

Distribution: America [United States, Mexico (CAM, CHP, MEX, HID, JAL, MIC, OAX, PUE, QUE,

ROO, SLP, TAM, VER, YUC), Nicaragua, Costa Rica, Colombia, Ecuador, Peru], Oceania [New Zealand, Vanuatu, Solomon Islands] (Sánchez-Hernández et al. 2022a).

13. *Copris laeviceps* Harold, 1862

Sampling methods: baited pitfall traps (fish, squid, human excrement, coati, coyote, deer, jaguar, raccoon, tapir, cow and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, pastureland, secondary vegetation, coffee and cacao plantations.

Distribution: Mexico (CAM, CHP, MEX, HID, JAL, MIC, OAX, PUE, ROO, SLP, TAB, TAM, VER, YUC), Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica (Darling and Génier 2018; Sánchez-Hernández et al. 2022a).

14. *Copris lugubris* Boheman, 1858

= *Pinotus lugubris* Harold, 1869

Sampling methods: light traps, hand collection in horse dung, baited pitfall traps (squid, human excrement, coyote, tapir and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, live fences, pastureland.

Distribution: Mexico (CAM, CHP, COA, COL, DUR, GRO, GUA, HID, JAL, MEX, MIC, MOR, NAY, SIN, SON, PUE, ROO, TAB, TAM, VER, YUC), Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama (Darling and Génier 2018; Sánchez-Hernández et al. 2022a).

15.1. *Copris matthewsi matthewsi* Delgado & Kohlmann, 2001

= *Copris boucardi* Harold, 1869

Sampling methods: hand collection in horse and cow dung.

Habitat: pine forest.

Distribution: Mexico (CHP), Guatemala (Schoolmeesters 2025).

15.2. *Copris matthewsi pacificus* Delgado & Kohlmann, 2001

= *Copris boucardi* Harold, 1869

Sampling methods: hand collection in horse and mule dung, baited pitfall traps (squid).

Habitat: mountain cloud forest, coffee plantation.

Distribution: Mexico (CHP, OAX), Guatemala, El Salvador (Kohlmann et al. 2023; Schoolmeesters 2025).

Tribe DELTOCHILINI Lacordaire, 1856

Anomiopus Westwood, 1842

A genus comprises small-sized species with an exclusively Neotropical distribution, although most are found in South America. Comprises 62 described species into the groups *cuprarius* (10 spp.), *smaragdinus* (31 spp.) and *virescens* (21 spp.) (Escobar-Hernández et al. 2019; Schoolmeesters 2025). Only one species occurs in Mexico (Escobar-Hernández et al. 2019).

16. *Anomiopus cirulito* Cano, 2018

Sampling methods: baited pitfall traps (cow dung).

Habitat: tropical rain forest.

Distribution: Mexico (CHP), Guatemala (Escobar-Hernández et al. 2019).

Canthon Hoffmannsegg, 1817

= *Coprobium* Latreille, 1829

= *Hyboma* Castelnau, 1840

= *Coeloscelis* Reiche, 1841

= *Paedhyboma* Kolbe, 1893

= *Canthomoechus* Pereira & Martínez, 1959

Canthon is one of the most widely distributed taxa with the largest number of described species in the American fauna of Scarabaeinae (Rivera-Cervantes and Halfpeter 1999). The genus is represented by 189 species grouped in 11 subgenera: *Bajacanthon* (1 sp.), *Boreocanthon* (13 spp.), *Canthon* s. str. (66 spp.), *Francomonrosia* (6 spp.), *Glaphyrocantion* (49 spp.), *Goniocanthon* (3 spp.), *Nesocanthon* (3 spp.), *Peltecanthon* (4 spp.), *Pseudepilissus* (14 spp.), *Pseudocanthon* (11 spp.), and *Trichocanthon* (1 sp.), in addition to 18 species outside the current subgeneric limits. Its species are distributed from Canada to Argentina (Schoolmeesters 2025). Currently in Mexico, 47 reported species are known (Halfpeter 2003; Chamé-Vázquez and Gómez 2005; Halfpeter and Halfpeter 2009; Halfpeter et al. 2015; Edmonds 2022; Rivera-Gasperín et al. 2022 2025; Moctezuma et al. 2025).

17. *Canthon angustatus* Harold, 1867

Sampling methods: baited pitfall traps (fish, cow dung, human excrement), hand collection on shrub vegetation and on the ground.

Habitat: preserved and fragmented tropical rain forest.

Distribution: Mexico (CHP, VER), Guatemala, Belize, Nicaragua, Costa Rica, Panama, Colombia,

Ecuador, Peru (Sánchez-Huerta et al. 2019).

18. *Canthon championi* Bates, 1887

Sampling methods: baited pitfall traps (human excrement, squid, fish).

Habitat: mountain cloud forest, coffee and cacao plantations.

Distribution: Mexico (CHP, OAX), Guatemala, El Salvador, Nicaragua (Rivera-Cervantes and Halffter 1999; Maes et al. 2020).

19. *Canthon cyanellus* LeConte, 1859

= *Canthon cyanellus havranekae* Martínez, 1988

= *Canthon cyanellus violetae* Halffter, 1961

= *Canthon sallei* Harold, 1863

= *Canthon sallei gutticollis* Schmidt, 1920

= *Canthon sallei triangulatus* Schmidt, 1920

= *Canthon speciosus* Harold, 1868

= *Canthon spinosus* Harold, 1863

= *Coprobium spinosus* Dejean, 1836

Sampling methods: baited pitfall traps (fish, squid, human excrement, coati, coyote, deer, jaguar, raccoon, tapir, pig and cow dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, secondary vegetation, pastureland, live fences, coffee and cacao plantation.

Distribution: United States, Mexico (CAM, CHP, COL, GRO, HID, JAL, MOR, NAY, NLE, OAX, PUE, ROO, SLP, TAB, TAM, VER, YUC), Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Trinidad, Colombia, Venezuela, Ecuador, Brazil (Solís and Kohlmann 2002; Halffter 2003; Sánchez-Hernández et al. 2022a).

20. *Canthon delgadoi* Rivera-Cervantes & Halffter, 1999*

Sampling methods: baited pitfall traps (cow dung, human excrement, squid).

Habitat: tropical deciduous forest, pastureland, secondary vegetation, live fences.

Distribution: Mexico (CHP, OAX) (Rivera-Cervantes and Halffter 1999; Halffter and Halffter 2009).

21. *Canthon euryscelis* Bates, 1887

Sampling methods: baited pitfall traps (human excrement).

Habitat: tropical deciduous forest, tropical rain forest, cacao plantation.

Distribution: Mexico (CAM, CHP, GRO, OAX,

ROO, TAB, VER, YUC), Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama (Rivera-Cervantes and Halffter 1999; Solís and Kohlmann 2002; Sánchez-Hernández et al. 2022a).

22. *Canthon femoralis* (Chevrolat, 1834)

= *Coprobium femoralis* Chevrolat, 1834

= *Canthon ochropus* Harold, 1867

= *Geocanthon femoralis balsensis* Martínez & Halffter, 1972

Sampling methods: baited pitfall traps (fish, squid, human excrement, coati, coyote, deer, jaguar, monkey, raccoon, tapir, pig, cow and dung).

Habitat: tropical deciduous forest, tropical rain forest, secondary vegetation, pastureland, live, fences, coffee plantation.

Distribution: Mexico (CAM, CHP, COL, GRO, JAL, MEX, NAY, OAX, PUE, SLP, SIN, TAB, TAM, VER), Guatemala, Belize, El Salvador, Nicaragua (Maes et al. 2020; Sánchez-Hernández et al. 2022a; Pablo-cea et al. 2023).

23.1. *Canthon humectus incisus* Robinson, 1948*

Sampling methods: baited pitfall traps (human excrement).

Habitat: pine forest.

Distribution: Mexico (CHP, GRO, MEX, MIC, MOR, PUE) (Halffter 1961).

23.2. *Canthon humectus sayi* Robinson, 1948*

Sampling methods: baited pitfall traps (human excrement, cow dung).

Habitat: pastureland.

Distribution: Mexico (CHP, OAX, VER) (Halffter 1961).

24. *Canthon chiapas* Robinson, 1948

= *Canthon indigaceus chiapas* Robinson, 1948

Sampling methods: baited pitfall traps (squid, human excrement, cow dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, pine-oak forest, pastureland.

Distribution: Mexico (CHP, HID, QUE, ROO, SLP, VER, YUC), Guatemala, Nicaragua (Halffter 1961; Rivera-Gasperín et al. 2025).

25. *Canthon leechi* (Martínez, Halffter & Halffter, 1964)

= *Canthon viridis leechi* Martínez, Halffter & Halffter,

1964

Sampling methods: baited pitfall traps (fish, human excrement, cow dung).

Habitat: tropical rain forest, pine forest, pastureland.

Distribution: Mexico (AGU, CAM, CHP, GUA, GRO, JAL, MEX, MOR, OAX, PUE, QUE, ROO, VER, YUC), Guatemala, Costa Rica (Sánchez-Hernández et al. 2022a).

26. *Canthon lucreciae* Halffter & Halffter, 2009**

Sampling methods: baited pitfall traps (human excrement, squid), hand collection by preying on a millipede (*Messicobolus magnificus*).

Habitat: fragmented tropical deciduous forest, tropical rain forest, secondary vegetation, pastureland.

Distribution: Mexico (CHP) (Sánchez-Hernández and González-Martin del Campo 2023).

27. *Canthon meridionalis* (Martínez, Halffter & Halffter, 1964)

= *Canthon viridis meridionalis* (Martínez, Halffter y Halffter, 1964)

= *Glaphyrocantion viridis meridionalis* Martínez, Halffter y Halffter, 1964

Sampling methods: baited pitfall traps (human excrement).

Habitat: tropical rain forest, mangrove.

Distribution: Mexico (CHP), Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama (Rivera-Cervantes and Halffter 1999; Solís and Kohlmann 2002; Maes et al. 2020).

28. *Canthon morsei* Howden, 1966

Sampling methods: flight intercept traps, baited pitfall traps (fish and human excrement).

Habitat: tropical deciduous forest, tropical rain forest.

Distribution: Mexico (CHP, GRO, HID, JAL, TAM, VER), El Salvador, Costa Rica, Panama, Ecuador (Solís and Kohlmann 2002; Halffter and Halffter 2009).

29. *Canthon perplexus* (LeConte, 1847)

= *Pseudocantion perplexus* (LeConte, 1847)

Sampling methods: baited pitfall traps (human excrement).

Habitat: pastureland.

Distribution: United States, Mexico (CAM, CHP, GRO, JAL, MOR, OAX, PUE, ROO, TAB, VER,

YUC), Bahamas, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Brazil, Venezuela, Argentina (Sánchez-Hernández et al. 2022a).

30. *Canthon subhyalinus* Harold, 1867

= *Canthon quadrimaculatus* Schmidt, 1922

= *Glaphyrocantion rufocoeruleus* Martínez, 1948

Sampling methods: baited pitfall traps (human excrement).

Habitat: tropical deciduous forest, tropical rain forest.

Distribution: Mexico (CAM, CHP, CHP, ROO, VER), Guatemala, Belize, Costa Rica, Panama, Colombia, Venezuela, Guyana, French Guyana, Ecuador, Peru, Brazil, Bolivia (Solís and Kohlmann 2002; Sánchez-Hernández et al. 2022a).

31. *Canthon vazquezae* (Martínez, Halffter & Halffter, 1964)

= *Canthon viridis vazquezae* Martínez, Halffter & Halffter, 1964

Sampling methods: baited pitfall traps (fish, squid, coati, coyote, deer, jaguar, raccoon, tapir, pig and cow dung, wounded and dead millipedes), flight interception traps.

Habitat: tropical rain forest, tropical deciduous forest, mountain cloud forest, secondary vegetation, coffee plantation.

Distribution: Mexico (CHP, VER), Guatemala, Nicaragua, Costa Rica, Panama (Rivera-Cervantes and Halffter 1999; Solís and Kohlmann 2002).

Deltochilum Eschscholtz, 1822

= *Hyboma* LePeletier & Serville, 1828

= *Anamnesis* Vigers, 1826

= *Meghyboma* Kolbe, 1893

Deltochilum is a genus endemic to the Americas that includes 114 species grouped in the subgenera *Aganhyboma* (27 spp.), *Calhyboma* (13 spp.), *Deltochilum* s.tr. (7 spp.), *Deltohyboma* (50 spp.), *Euhyboma* (1 sp.), *Hybomidium* (13 spp.), *Parahyboma* (2 spp.) and *Rubrohyboma* (1 sp.) (Schoolmeesters 2025). Its species are widely distributed from the United States to Argentina (Schoolmeesters 2025), but most are confined to Central and South America, while Mexico is home to only nine species (Halffter 2003; González-Alvarado and Vaz-de-Mello 2014; Silva et al. 2018).

32. *Deltochilum acropyge* (Bates, 1887)

= *Deltochilum valgum* var. *acropyge* Paulian, 1938

= *Deltochilum valgum acropyge* Howden & Young

1981

Sampling methods: baited pitfall traps (live millipedes).

Habitat: mountain cloud forest.

Distribution: Mexico (CAM, CHP, YUC), Guatemala, Belize, Honduras, Costa Rica, Panama (Silva et al. 2018; Schoolmeesters 2025).

33. *Deltochilum carrilloi* González-Alvarado & Vaz-de-Mello, 2014

Sampling methods: baited pitfall traps (squid, cow dung).

Habitat: tropical deciduous forest, tropical rain forest.

Distribution: Mexico (CAM, CHP, GRO, JAL, MOR, OAX, ROO, VER), Guatemala, Belize, Nicaragua (Sánchez-Hernández et al. 2022a).

34. *Deltochilum densepunctatum* Balthasar, 1939*

Sampling methods: unknown.

Habitat: tropical deciduous forest.

Distribution: Mexico (CHP, SIN, TAM, VER) (González-Alvarado and Vaz-de-Mello 2014).

35. *Deltochilum lobipes* Bates, 1887

Sampling methods: baited pitfall traps (squid, fish, human excrement).

Habitat: tropical deciduous forest, tropical rain forest, pastureland.

Distribution: Mexico (CAM, CHP, OAX, ROO, TAM, VER, YUC), Guatemala, Belize, El Salvador, Honduras, Nicaragua (Kohlmann 2003; González-Alvarado and Vaz-de-Mello 2014).

36. *Deltochilum mexicanum* Burmeister, 1848

Sampling methods: baited pitfall traps (squid, fish, human excrement).

Habitat: mountain cloud forest, pine forest, pine-oak-liquidambar forest, secondary vegetation, pastureland, maize and coffee plantation.

Distribution: Mexico (CHP, DUR, GRO, HID, OAX, PUE, QUE, VER), Guatemala, Belize, El Salvador, Honduras, Nicaragua (Moctezuma et al. 2021b).

37. *Deltochilum pseudoparile* Paulian, 1938

Sampling methods: baited pitfall traps (squid, fish,

human excrement, cow dung, dead millipedes).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, secondary vegetation, pastureland, cacao and coffee plantation.

Distribution: Mexico (CAM, CHP, OAX, ROO, TAB, VER), Guatemala, Nicaragua (Maes et al. 2020; Sánchez-Hernández et al. 2022a).

38. *Deltochilum scabriusculum* Bates, 1887

= *Deltochilum scabriusculum montanum* Howden, 1966

Sampling methods: baited pitfall traps (fish, squid, human excrement, coyote, jaguar, tapir, cow and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, pine-oak forest.

Distribution: United States, Mexico (CAM, CHP, COL, DUR, GRO, HID, JAL, MEX, MOR, NAY, NLE, OAX, PUE, QUE, ROO, SLP, SIN, SON, VER, YUC), Guatemala, El Salvador, Nicaragua, Costa Rica (Sánchez-Hernández et al. 2022a).

39. *Deltochilum sublaeve* (Bates, 1887)

= *Deltochilum gibbosum* var. *sublaeve* Bates, 1887

= *Deltochilum densepunctatum* Balthasar, 1939

= *Deltochilum gibbosum sublaeve* Howden, 1966

Sampling methods: baited pitfall traps (squid, human excrement, coyote, jaguar and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, secondary vegetation, pastureland, coffee and cacao plantation.

Distribution: Mexico (CHP, COL, DUR, GRO, HID, JAL, MOR, NAY, PUE, ROO, SIN, SLP, SON, TAM, VER, YUC), Guatemala, Honduras, Nicaragua (Halffter 2003; González-Alvarado and Vaz de Mello 2014).

Malagoniella Martínez, 1961

This genus is composed of large beetles, distributed in the Neotropical region. It includes nine species grouped in the subgenera *Malagoniella* s. str. (4 spp.) and *Megatophomima* (5 spp.) (Schoolmeesters 2025). Only one species is found in Mexico (Halffter 2003).

40. *Malagoniella astyanax yucateca* (Harold, 1863)

= *Megatophomima astyanax yucateca* Halffter, Pereira & Martínez, 1960

Sampling methods: unknown.

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP, OAX, ROO, SIN, SLP, YUC), Guatemala, Nicaragua (Sánchez-Hernández et al. 2022a; Kohlmann et al. 2023).

Megathoposoma Balthasar, 1939

= *Glaucania* Paulian, 1939

Megathoposoma is a monospecific, large-sized genus distributed in the Neotropics (Halffter 2003; Schoolmeesters 2025).

41. Megathoposoma candezei (Harold, 1873)

= *Megathopa candezei* Harold, 1873

= *Megathoposoma deltochiloides* Balthasar, 1939

Sampling methods: baited pitfall traps (mixture of human and pig dung).

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP, YUC), Guatemala, Nicaragua, Costa Rica, Panama (Schoolmeesters 2025).

Tribe DICHOTOMIINI Pereira, 1954

Dichotomius Hope, 1938

= *Brachycopris* Haldeman, 1845

= *Pinotus* Erichson, 1847

Dichotomius comprises a genus endemic to the Americas with 210 described species, grouped in the subgenera *Cephagonus* (40 spp.), *Dichotomius* s. str. (70 spp.), *Homocanthonides* (1 sp.), *Luederwaldtius* (17 spp.), and *Selenocopris* (82 spp.) (Schoolmeesters 2025; Solís and Kohlmann 2025). Its species are distributed from the United States to Argentina, but its greatest diversity is concentrated in South America, with around 150 species, while only nine species are recorded for Mexico (Chamé-Vázquez et al. 2020; Montoya-Molina and Vaz-de-Mello 2021).

42. Dichotomius amplicollis (Harold, 1869)*

= *Pinotus amplicollis* Harold, 1869

Sampling methods: baited pitfall traps (squid, fish, human excrement, coati, coyote, jaguar, raccoon, tapir, cow and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, secondary vegetation, pastureland, live fences, coffee and cacao plantation.

Distribution: Mexico (CHP, CHH, GRO, JAL, MEX, SON, OAX) (Moguel-López et al. 2024).

43. Dichotomius annae Kohlmann & Solís, 1997

Sampling methods: baited pitfall traps (squid, fish, human excrement).

Habitat: tropical rain forest, mountain cloud forest, coffee plantation.

Distribution: Mexico (CHP, OAX), Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia (Kohlmann and Solís 1997).

44. Dichotomius centralis (Harold, 1869)

= *Pinotus centralis* Harold, 1869

Sampling methods: baited pitfall traps (fish).

Habitat: mango plantation.

Distribution: Mexico (CHP), Guatemala, Belize? Honduras, El Salvador, Nicaragua, Costa Rica (Chamé-Vázquez et al. 2020; Solís and Kohlmann 2022).

45. Dichotomius chamuco Solís & Kohlmann, 2025

= *Pinotus satanas* Harold, 1867

Sampling methods: baited pitfall traps (fish, squid, human excrement).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, cacao plantation.

Distribution: México (CHP, HGO, JAL, MOR, OAX, PUE, ROO, TLA, VER), Guatemala, Belize, Honduras, (Kohlmann et al. 2023; Solís and Kohlmann 2025).

46. Dichotomius colonicus (Say, 1835)

= *Copris colonicus* Say, 1835

= *Pinotus colonicus* Harold, 1869

= *Pinotus bituberculatus* Harold, 1869

= *Dichotomius bituberculatus* Harold, 1869

Sampling methods: baited pitfall traps (fish, tapir and cow dung), light traps.

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, pastureland, live fences, horticultural zone.

Distribution: United States, Mexico (AGU, BCS, CAM, COA, COL, CHP, CHH, CMX, DUR, GUA, GRO, HID, JAL, MEX, MIC, MOR, NAY, NLE, OAX, PUE, ROO, SLP, SIN, SON, TAB, TAM, TLA, VER, YUC, ZAC), Guatemala, Panamá, Colombia, Venezuela, Guyana (Kohlmann 2003; López-Guerrero 2005; Schoolmeesters 2025).

47. *Dichotomius enioi* Montoya-Molina & Vaz-de-Mello 2021

Sampling methods: baited pitfall traps (human excrement).

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP), Guatemala (Montoya-Molina and Vaz-de-Mello 2021; Solís and Kohlmann 2022).

48. *Dichotomius maya* Peraza & Deloya, 2006

Sampling methods: baited pitfall traps (cow dung).

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP, YUC), Belize (Sánchez-Hernández et al. 2019).

49. *Dichotomius sagittarius* (Harold, 1869)

= *Pinotus sagittarius* Harold, 1869

Sampling methods: unknown.

Habitat: tropical rain forest.

Distribution: México (CHP, OAX, SLP, VER), Belize (Montoya-Molina and Vaz-de-Mello 2021).

Tribe EURYSTERNINI Vulcano, Martínez & Pereira, 1960***Eurysternus* Dalman, 1824**

= *Aeschrotes* Saint-Fargeau & Audinet-Serville 1828

= *Amartinezus* Özdikmen, 2009

= *Tropicalia* Koçak & Kemal, 2008

Eurysternus consists of 53 described species distributed in the Neotropics, of which eight are recorded in Mexico (Génier 2009; Schoolmeesters 2025).

50. *Eurysternus angustulus* Harold, 1869

Sampling methods: baited pitfall traps (fish, squid, human excrement, cow and pig dung).

Habitat: tropical deciduous forest, tropical rain forest.

Distribution: México (CHP, OAX, VER), Guatemala, Belize (Génier 2009; Kohlmann et al. 2023).

51. *Eurysternus caribaeus* Herbst, 1789

= *Scarabaeus caribaeus* Herbst, 1789

= *Eurysternus nebulosus* Harold, 1880

= *Eurysternus planus* Gremminger & Harold, 1869

= *Eurysternus peruanus* Jessop, 1985

Sampling methods: flight interception traps, light traps, hand collection in carrion of toads, dogs and anteaters, tapir and spider monkey dung, baited pitfall traps (squid, fish, human excrement, pig and cow dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, pine forest, secondary vegetation, coffee and cacao plantations.

Distribution: Mexico (CAM, CHP, GRO, OAX, ROO, TAB, VER), Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Trinidad and Tobago, Guyana, Suriname, French Guyana, Ecuador, Brazil, Peru, Bolivia, Paraguay, Argentina (Génier 2009; Sánchez-Hernández et al. 2022a).

52. *Eurysternus foedus* Guérin-Ménéville, 1830

= *Eurysternus claudicans* Kirsch, 1871

Sampling methods: baited pitfall traps (fish, human excrement, cow dung).

Habitat: tropical deciduous forest, tropical rain forest.

Distribution: Mexico (CAM, CHP, GRO, OAX, VER), Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, French Guyana, Ecuador, Peru, Bolivia, Brazil (Génier 2009; Schoolmeesters 2025).

53. *Eurysternus magnus* Castelnau, 1840

Sampling methods: flight interception traps, baited pitfall traps (carrion, human excrement, cow, pig and horse dung).

Habitat: tropical rain forest, liquidambar forest, mountain cloud forest, secondary vegetation and coffee plantations.

Distribution: Mexico (CAM, CHP, COL, JAL, GRO, HID, NAY, NLE, OAX, PUE, QUE, ROO, SLP, TAB, TAM, VER, YUC, ZAC), Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama (Génier 2009; Sánchez-Hernández et al. 2022a).

54. *Eurysternus maya* Génier, 2009

Sampling methods: flight interception traps, baited pitfall traps (human excrement, cow dung).

Habitat: tropical rain forest.

Distribution: Mexico (CHP, OAX, VER), Guatemala, Belize (Génier 2009; Kohlmann et al. 2023).

55. *Eurysternus mexicanus* Harold, 1869

Sampling methods: light traps, flight interception

traps, baited pitfall traps (fish, human excrement, pig, cow and horse dung).

Habitat: tropical deciduous forest, tropical rain forest, pastureland, coffee and cacao plantation.

Distribution: Mexico (CAM, CHP, HID, OAX, QUE, ROO, SLP, TAB, TAM, VER, YUC), Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Trinidad and Tobago, Guyana (Génier 2009; Sánchez-Hernández et al. 2022a).

Tribe ONITICELLINI Kolbe, 1905
Subtribe ONITICELLINA Kolbe, 1905

***Euoniticellus* Janssens, 1953**

It is a genus of African origin consisting of 19 species distributed in the Afrotropical, Oriental, and Palearctic regions (Schoolmeesters 2025). In the Americas it is represented by a single species, introduced in the United States, later becoming established in Mexico and Central America (Montes de Oca and Halfpeter 2008; Solís et al. 2015).

56. *Euoniticellus intermedius* (Reiche, 1849)

Sampling methods: light traps, baited pitfall traps (squid, human excrement, cow and pig dung).

Habitat: mountain cloud forest, secondary vegetation, pastureland, coffee and maize-pumpkin plantations.

Distribution: Africa [Angola, Ethiopia, Ghana, Ivory Coast, Mauritania, Mozambique, Republic of Guinea, Senegal, Somalia, South Africa], Americas [United States, Mexico (BCN, BCS, CHP, CHH, DUR, HID, JAL, MIC, NLE, OAX, SLP, SON, TAM, VER), Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia], Asia [Arabian Peninsula], Europe [Italy], Oceania [Australia, New Caledonia] (Montes de Oca and Halfpeter 1998; Solís et al. 2015; Kohlmann et al. 2023).

Tribe ONTHOPHAGINI Streubel, 1846

***Digitonthophagus* Balthasar, 1959**

This genus gathers 16 valid species organized in six species groups distributed in the Afrotropical, Oriental and Palearctic regions (Génier and Moretto 2017). It is represented in the Americas by only one species introduced in the United States, and then dispersed to Central America (Montes de Oca and Halfpeter 1998; Pablo-Cea et al. 2017).

57. *Digitonthophagus gazella* (Fabricius, 1787)

- = *Scarabaeus gazella* Fabricius, 1787
- = *Scarabaeus dorcas* Olivier, 1789
- = *Copris dorcas* Fabricius 1798
- = *Copris gazella* Fabricius 1801
- = *Onthophagus gazella* Dejean 1821
- = *Onthophagus bonasus* Latreille 1827

Sampling methods: light trap, hand collection at street lighting, baited pitfall traps (cow and pig dung).

Habitat: pastureland, urban zone.

Distribution: Africa [Angola, Botswana, The Congo, Kenya, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe], Americas [United States, Mexico (CHP, SLP, SIN, SON, VER), Jamaica, Guadeloupe, Nicaragua, Colombia, Brazil, Haiti], Europe [France], Oceania (Australia, Fiji, Madagascar, New Caledonia, Papua New Guinea, Vanuatu) (Montes de Oca and Halfpeter 1998; Solís et al. 2015; Génier and Moretto 2017; Pablo-Cea et al. 2017).

***Onthophagus* Latreille, 1802**

- = *Psilax* Erichson 1848
- = *Chalcoderus* Erichson 1848
- = *Monapus* Erichson 1848
- = *Gonocyphus* Lansberg 1885
- = *Tauronthophagus* Shipp 1895
- = *Digitonthophagus* Balthasar 1959

Onthophagus is the most diverse genus of Scarabaeinae, comprising a total of 2242 species (~33%) grouped into 29 subgenera globally distributed (Schoolmeesters 2025). Currently, there are 229 described species of American *Onthophagus* (Cupello et al. 2023; Rossini and Génier 2024; Sánchez-Huerta et al. 2025), of which 128 (55.9%) are estimated to occur in Mexico (Moctezuma 2021; Moctezuma and Halfpeter 2021a; Moctezuma et al. 2021c 2023a b; Chamé-Vázquez and Sánchez-Hernández 2022; Sánchez-Huerta et al. 2025).

58. *Onthophagus acuminatus* Harold, 1880

Sampling methods: baited pitfall traps (fish, human excrement).

Habitat: Tropical rain forest.

Distribution: Mexico (CHP, OAX, VER), Nicaragua, Costa Rica, Panamá, Colombia, Ecuador (Moctezuma 2021).

59. *Onthophagus anewtoni* Howden & Génier, 2004*

Sampling methods: baited pitfall traps (squid, pig

dung, fermented fungus *-Agaricus bisporus-*).

Habitat: tropical deciduous forest.

Distribution: Mexico (CHP, GRO, JAL, OAX) (Sánchez-Hernández and Gómez 2018).

60. *Onthophagus anthracinus* Harold, 1873

Sampling methods: baited pitfall traps (squid, human excrement, coati, coyote, deer, jaguar, raccoon, tapir, and cow dung).

Habitat: mountain cloud forest, pine-oak forest, maize plantation.

Distribution: Mexico (CHP, OAX, PUE, VER), Guatemala, Belize, Honduras, Costa Rica, Panama (Montezuma 2021).

61. *Onthophagus atriglabrus* Howden & Gill, 1987

Sampling methods: baited pitfall traps (squid, pig manure, fermented fungus).

Habitat: disturbed oak forest.

Distribution: Mexico (CHP), Costa Rica, Panama, Colombia (Sánchez-Hernández and Gómez 2018).

62. *Onthophagus batesi* Howden & Cartwright, 1963

Sampling methods: hand collection, baited pitfall traps (fish, human excrement, coati, coyote, deer, jaguar, raccoon, tapir, pig dung).

Habitat: tropical deciduous forest, tropical rain forest, pine-oak-liquidambar forest, pastureland, live fences.

Distribution: United States, Mexico (CAM, CHP, COL, GRO, HID, JAL, MIC, MOR, OAX, PUE, SLP, TAB, TAM, VER, YUC), Belize, El Salvador, Nicaragua, Costa Rica, Panama, Antilles, Colombia (Montezuma 2021).

63. *Onthophagus belorhinus* Bates, 1887

Sampling methods: baited pitfall traps (squid, fish, human excrement).

Habitat: mountain cloud forest, pine-oak forest, coffee and cacao plantations.

Distribution: Mexico (CHP, HID, OAX, PUE, VER), Guatemala, El Salvador (Chamé-Vázquez and Sánchez-Hernández 2022).

64. *Onthophagus carpophilus* Pereira & Halffter, 1961*

Sampling methods: hand collection on leaf litter, baited pitfall traps (fish, squid, cow dung, human

excrement).

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP, JAL, OAX, ROO, YUC) (Sánchez-Hernández et al. 2022a).

65. *Onthophagus championi* Bates, 1887

Sampling methods: baited pitfall traps (dung), hand collection in tapir dung.

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, pine-oak forest, secondary vegetation of pine-oak forest, managed pine forest.

Distribution: Mexico (CHP, OAX, VER), Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica (Montezuma 2021; Montezuma and Halffter 2021a).

66. *Onthophagus chiapanecus* Zunino & Halffter, 1988*

Sampling methods: baited pitfall traps (deer dung, catfish carrion).

Habitat: mountain cloud forest, pine-oak forest, pine forest.

Distribution: Mexico (CHP, OAX) (Moctezuma 2021; Kohlmann et al. 2023).

67. *Onthophagus corrosus* Bates, 1887*

Sampling methods: baited pitfall traps (human excrement, cow and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, pastureland.

Distribution: Mexico (CHP, HGO, OAX, VER) (Moctezuma 2021).

68. *Onthophagus coscineus* Bates, 1887

= *Onthophagus digitifer* Boucomont, 1932

Sampling methods: baited pitfall traps (fish, human excrement).

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP), Belize, Panama, Costa Rica, Colombia, Ecuador, Peru (Montezuma 2021).

69. *Onthophagus crinitus* Harold, 1869

Sampling methods: baited pitfall traps (squid, fish, human excrement, pig and cow dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, secondary vegetation, pastureland, coffee and cacao plantations.

Distribution: Mexico (CAM, CHP, OAX, TAB,

VER), Guatemala, Belize, El Salvador, Nicaragua, Costa Rica, Panama, Colombia (Montezuma 2021).

70. *Onthophagus cyanellus* Bates, 1887

Sampling methods: baited pitfall traps (squid, fish, jaguar dung).

Habitat: Tropical deciduous forest, tropical rain forest, mountain cloud forest, pine-oak-liquidambar forest, coffee plantations.

Distribution: Mexico (CAM, CHP, OAX, TAB, VER), Guatemala, Belize, El Salvador, Nicaragua, Costa Rica, Panama, Colombia (Montezuma 2021).

71. *Onthophagus cyclographus* Bates, 1887

Sampling methods: baited pitfall traps (fish, human excrement, pig and cow dung).

Habitat: tropical rain forest, pine-oak forest, secondary vegetation, pastureland.

Distribution: Mexico (CAM, CHP, OAX, ROO, YUC), Guatemala (Moctezuma 2021).

72. *Onthophagus guatemalensis* Bates, 1887

Sampling methods: baited pitfall traps (fish, jaguar, tapir and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, pine-oak forest, pastureland.

Distribution: Mexico (CHP, OAX), Guatemala, Belize (Montezuma 2021; Montezuma and Halffter 2021a).

73. *Onthophagus hoepfneri* Harold, 1869

Sampling methods: baited pitfall traps (pig dung).

Habitat: tropical deciduous forest, tropical rain forest, pastureland.

Distribution: United States, Mexico (CHP, MEX, GRO, JAL, MIC, MOR, NAY, OAX, PUE, VER), El Salvador, Honduras, Nicaragua, Costa Rica (Montezuma 2021).

74. *Onthophagus igualensis* Bates, 1887*

Sampling methods: baited pitfall traps (fish, human excrement, cow dung).

Habitat: tropical rain forest, pine-oak forest and pastureland.

Distribution: Mexico (CHP, MEX, GRO, HGO, JAL, MIC, MOR, PUE, VER) (Montezuma 2021).

75. *Onthophagus incensus* Say, 1835

Sampling methods: baited pitfall traps (fish, squid, human excrement, pig dung).

Habitat: tropical rain forest, mountain cloud forest, pine-oak forest, coffee and cacao plantations.

Distribution: United States, Mexico (CAM, CHP, GRO, HID, JAL, MOR, OAX, ROO, SLP, TAM, VER), Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama (Montezuma 2021).

76. *Onthophagus istmenus* Moctezuma, Sánchez-Huerta & Halffter, 2020*

Sampling methods: baited pitfall traps (human excrement).

Habitat: tropical rain forest.

Distribution: Mexico (CHP, OAX) (Moguel-López et al. 2024).

77. *Onthophagus landolti* Harold, 1880

Sampling methods: baited pitfall traps (human excrement, coati, coyote, deer, jaguar, raccoon, tapir, cow and horse dung).

Habitat: tropical rain forest, tropical deciduous forest, mountain cloud forest, secondary vegetation, pastureland.

Distribution: United States, Mexico (CAM, CHP, HID, JAL, OAX, ROO, VER, YUC), Guatemala, Belize, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Venezuela (Montezuma 2021).

78. *Onthophagus longimanus* Bates, 1887

Sampling methods: baited pitfall traps (squid, pig and cow dung).

Habitat: tropical rain forest, secondary vegetation, coffee plantation.

Distribution: Mexico (CAM, CHP, HGO, TAM, VER, YUC), Guatemala, Belize, Honduras (Montezuma 2021).

79. *Onthophagus marginicollis* Harold, 1880

Sampling methods: unknown.

Habitat: tropical deciduous forest.

Distribution: Mexico (CHP, GRO, OAX, VER), Guatemala, Cuba, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guyana, Ecuador, Peru, Brazil, Bolivia (Montezuma 2021).

80. *Onthophagus maya* Zunino, 1981

Sampling methods: baited pitfall traps (squid, fish, human excrement, pig and cow dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, secondary vegetation, pastureland, coffee and cacao plantations.

Distribution: Mexico (CAM, CHP, OAX, ROO, VER), Belize, Guatemala (Montezuma 2021).

81. *Onthophagus petenensis* Howden & Gill, 1993

Sampling methods: unknown.

Habitat: tropical rain forest.

Distribution: Mexico (CHP, OAX?), Belize, Guatemala, Honduras (Moctezuma 2021).

82. *Onthophagus rhinolophus* Harold, 1869

Sampling methods: baited pitfall traps (squid, fish, human excrement, pig and cow dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, pine forest, pine-oak-liquidambar forest, secondary vegetation, coffee and cacao plantations.

Distribution: Mexico (CAM, CHP, OAX, PUE, TAB, VER), Guatemala, Belize, Honduras, Panama, Colombia, Venezuela, Ecuador (Montezuma 2021).

83. *Onthophagus rufescens* Bates, 1887*

= *Onthophagus jalapensis* Balthasar, 1939

Sampling methods: unknown.

Habitat: tropical deciduous forest.

Distribution: Mexico (CHP, DGO, GRO, GUA, JAL, MOR, MX, OAX, PUE) (Moctezuma 2021).

84. *Onthophagus sancristobalensis* Moctezuma & Halffter 2020**

Sampling methods: hand collection, baited pitfall traps (fermented fungus, *Agaricus bisporus*).

Habitat: pine forest.

Distribution: Mexico (CHP) (Montezuma 2021).

85. *Onthophagus sharpi* Harold, 1875

Sampling methods: hand collection on Apocinae fruits.

Habitat: tropical rain forest.

Distribution: Mexico (CHP), Guatemala, Belize, Nicaragua, Costa Rica, Panama, Colombia, Ecuador (Montezuma 2021).

86. *Onthophagus tacanensis* Chamé-Vázquez & Sánchez-Hernández, 2022**

Sampling methods: baited pitfall traps (fish, squid).

Habitat: mountain cloud forest, coffee and maize plantation.

Distribution: Mexico (CHP) (Chamé-Vázquez and Sánchez-Hernández 2022).

87. *Onthophagus totonicapamus* Bates, 1887

Sampling methods: hand collection.

Habitat: mountain cloud forest.

Distribution: Mexico (CHP), Guatemala (Moctezuma 2021).

88. *Onthophagus veracruzensis* Delgado & Pensado 1998*

Sampling methods: baited pitfall traps (human excrement, squid).

Habitat: tropical rain forest, secondary vegetation.

Distribution: Mexico (CHP, VER) (Montezuma 2021).

89. *Onthophagus yucatanus* Delgado, Peraza & Deloya, 2006

Sampling methods: baited pitfall traps (squid, human excrement).

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP, ROO, VER, YUC), Belize, Guatemala (Montezuma 2021).

**Tribe PHANAEINI Kolbe, 1905
Subtribe PHANAEINA Kolbe, 1838*****Coprophanaeus* Olsoufieff, 1924**

The genus is composed of large dung beetles, with a total of 50 species gathered in eight species groups in the subgenera *Coprophanaeus* s. str.: (38 spp.), *Megaphanaeus* (4 spp.) and *Metallophanaeus* (8 spp.) (Edmonds and Zidek 2010; Schoolmeesters 2025). Its distribution covers most of the Neotropical region, mainly in South America (Edmonds and Zidek 2010); only four species have been reported for Mexico (Sánchez-Hernández et al. 2019).

90. *Coprophanaeus boucardi* (Nevinson, 1891)

= *Coprophanaeus pluto boucardi* (Nevinson, 1891)

= *Phanaeus boucardi* Nevinson, 1891

Sampling methods: baited pitfall traps (squid).

Habitat: tropical deciduous forest.

Distribution: Mexico (CHP), El Salvador, Honduras, Costa Rica (Sánchez-Hernández et al. 2019).

91. *Coprophanæus corythus* (Harold, 1863)

= *Phanaeus corythus* Harold, 1863

= *Coprophanæus telamon corythus* (Harold, 1863)

= *Phanaeus perseus* Harold, 1880

= *Coprophanæus telamon nevinsoni* Arnaud & Gámez, 2002

Sampling methods: baited pitfall traps (fish, squid, human excrement, dead millipedes, coyote, jaguar, raccoon and pig dung).

Habitat: tropical rain forest, mountain cloud forest, secondary vegetation, pastureland, live fences, coffee and cacao plantations.

Distribution: Mexico (CAM, CHP, HID, OAX, PUE, ROO, TAB, VER, YUC), Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Colombia (Edmonds and Zidek 2010; Lizardo et al. 2017; Schoolmeesters 2025).

92. *Coprophanæus gilli* Arnaud, 1997

= *Coprophanæus henryi* Malý & Pokorný, 2008

Sampling methods: baited pitfall traps (squid, fish).

Habitat: tropical rain forest.

Distribution: Mexico (CHP, HID, OAX, PUE, QUE, SLP, VER), Guatemala, Belize, Honduras (Edmonds and Zidek 2010; Lizardo et al. 2017).

93. *Coprophanæus pluto* (Harold, 1863)

= *Phanaeus pluto* Harold, 1863

= *Phanaeus morio* LeConte, 1863

= *Coprophanæus pluto nogueirai* Arnaud, 2002

Sampling methods: unknown.

Habitat: unknown.

Distribution: United States, Mexico (AGU, CHP, COL, GRO, HID, JAL, MEX, MIC, MOR, NAY, NLE, OAX, QUE, SLP, SIN, SON, TAM, VER) (Edmonds and Zidek 2010; Lizardo et al. 2017).

***Phanaeus* MacLeay, 1819**

= *Phanaeus (Notiophanaeus)* Edmonds, 1994

= *Palaeocopriss* Pierce, 1946

= *Onthurgus* Gistel, 1857

= *Lonchophorus* Germar, 1823

It is the most diverse genus of the tribe Phanaeini, with 83 described species distributed in 13 species

groups. Its distribution ranges from the United States to Brazil and northern Argentina; Mexico is the country with the greatest diversity, with 46 (56.1%) species reported (Lizardo et al. 2022; Kohlmann et al. 2023).

94. *Phanaeus amethystinus* Harold, 1863*

= *Phanaeus martinezi* Halffter, 1955

= *Phanaeus genieri* Arnaud, 2002

Sampling methods: baited pitfall traps (squid, fish).

Habitat: mountain cloud forest, coffee and maize plantation.

Distribution: Mexico (CHP, HID, OAX, PUE, QUE, SLP, TAM, VER) (Edmonds and Zidek 2012; Lizardo et al. 2017).

95. *Phanaeus balthasari* Arnaud, 2001

= *Phanaeus tridens balthasari* Arnaud, 2002

Sampling methods: baited pitfall traps (human excrement, cow and pig dung).

Habitat: tropical deciduous forest, pine-oak forest, pastureland, live fences.

Distribution: Mexico (CHP), Guatemala (Moctezuma et al. 2021a).

96. *Phanaeus chiapanecus* Moctezuma & Halffter, 2021**

Sampling methods: baited pitfall traps (squid, human excrement, cow dung).

Habitat: tropical deciduous forest, pine-oak forest, pastureland.

Distribution: Mexico (CHP) (Montezuma and Halffter 2021b).

97. *Phanaeus demon* Laporte-Castelnau, 1840

= *Phanaeus pegasus* Sturm, 1843

= *Phanaeus scintillans* Bates, 1887

Sampling methods: baited pitfall traps (tapir, cow and pig dung).

Habitat: tropical deciduous forest, pastureland, live fences.

Distribution: Mexico (CHP, COL, CMX, GUA, GRO, JAL, MEX, MIC, MOR, NAY, OAX, PUE, VER), Guatemala (Edmonds and Zidek 2012; Lizardo et al. 2017).

98. *Phanaeus endymion* Harold, 1863

= *Phanaeus endymion porioni* Arnaud, 2001

Sampling methods: baited pitfall traps (squid, fish,

human excrement, coati, coyote, jaguar, raccoon, tapir, pig and cow dung).

Habitat: tropical rain forest, mountain cloud forest, pine forest, pine-oak-liquidambar forest, secondary vegetation, pastureland, coffee and cacao plantations.

Distribution: Mexico (CAM, CHP, OAX, PUE, ROO, TAB, VER, YUC), Guatemala, Belize (Montezuma and Halffter 2021b).

99. *Phanaeus guatemalensis* Harold, 1871

= *Phanaeus amethystinus guatemalensis* Harold, 1871

= *Phanaeus tepanensis* Bates, 1889

Sampling methods: baited pitfall traps (squid, fish).

Habitat: mountain cloud forest, coffee plantation.

Distribution: Mexico (CHP), Guatemala, Honduras, El Salvador (Edmonds and Zidek 2012; Lizardo et al. 2017).

100. *Phanaeus jackenioi* Moctezuma & Halffter, 2021

Sampling methods: hand collection on cow and dog dung, light trap.

Habitat: tropical deciduous forest, pine forest, coffee plantation.

Distribution: Mexico (CHP), Guatemala (Montezuma and Halffter 2021b).

101. *Phanaeus melampus* (Harold, 1863)*

Sampling methods: baited pitfall traps (human excrement).

Habitat: tropical rain forest.

Distribution: Mexico (CHP, VER) (Edmonds and Zidek 2012; Lizardo et al. 2017).

102. *Phanaeus pacificus* Moctezuma & Halffter, 2021

Sampling methods: baited pitfall traps (excrement, carrion).

Habitat: coffee plantation.

Distribution: Mexico (CHP), Guatemala, El Salvador (Montezuma and Halffter 2021b).

103. *Phanaeus pilatei* Harold, 1863

= *Phanaeus wagneri pilatei* Harold, 1863

Sampling methods: baited pitfall traps.

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP, ROO, YUC),

Guatemala (Edmonds 1994; Lizardo et al. 2017).

104. *Phanaeus sallei* Harold, 1863

Sampling methods: baited pitfall traps (fish, squid, human excrement, pig and cow dung).

Habitat: tropical rain forest, secondary vegetation and coffee plantation.

Distribution: Mexico (CHP, HID, QUE, TAB, VER), Guatemala, Belize, Honduras (Edmonds and Zidek 2012; Lizardo et al. 2017).

105. *Phanaeus wagneri* Harold, 1873

= *Phanaeus wagneri wagneri* Harold, 1873

Sampling methods: baited pitfall traps (cow dung, human excrement).

Habitat: tropical deciduous forest, pine-oak forest and pastureland.

Distribution: Mexico (CHP), Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica (Edmonds and Zidek 2012; Lizardo et al. 2017).

106. *Phanaeus zoque* Moctezuma & Halffter, 2017

Sampling methods: baited pitfall traps (human excrement, carrion).

Habitat: pine-oak forest.

Distribution: Mexico (CHP, OAX) (Montezuma and Halffter 2021b).

Sulcophanaeus Olsoufieff, 1924

= *Eucopricus* Gistel, 1857

Sulcophanaeus is a genus with large species. It comprises a polyphyletic group with 15 described species distributed in the Neotropical region, mostly from South America, while only one species has been reported from Mexico (Edmonds 2000; Schoolmeesters 2025).

107. *Sulcophanaeus chryseicollis* (Harold, 1863)

= *Phanaeus chryseicollis* Harold, 1863

Sampling methods: baited pitfall traps (human excrement, tapir dung).

Habitat: tropical rain forest.

Distribution: Mexico (CHP, PUE, ROO, OAX, VER), Guatemala, Honduras (Lizardo et al. 2017; Kohlmann et al. 2023).

Tribe SISYPHINI Mulsant, 1842

***Sisyphus* Latreille, 1807**

It comprises a genus that groups 105 species valid worldwide. Its species are congregated in the subgenera *Neosisyphus* (34 spp.), *Parasisyphus* (16 spp.) and *Sisyphus* s. str. (55 spp.); only two are native to the Americas, which are distributed in Mexico (Schoolmeesters 2025).

108. *Sisyphus mexicanus* Harold, 1863

Sampling methods: direct collection (cow dung), baited pitfall traps (raccoon dung).

Habitat: tropical rain forest, pastureland.

Distribution: Mexico (CAM, CHP, OAX, QUE, QUE, ROO, TAM, VER, YUC), Guatemala, El Salvador, Nicaragua, Costa Rica (Sánchez-Hernández et al. 2022a).

INCERTAE SEDIS

***Bdelyropsis* Pereira, Vulcano & Martínez, 1960**

Bdelyropsis is a genus consisting of only three small species, two of which are distributed in Mexico and Central America and one in South America (Schoolmeesters 2025).

109. *Bdelyropsis bowditchi* (Paulian, 1939)

= *Bdelirus bowditchi* Paulian, 1939

Sampling methods: baited pitfall traps (human excrement, fish).

Habitat: tropical rain forest.

Distribution: Mexico (CAM, CHP), Guatemala, Belize, Honduras (Schoolmeesters 2025).

110. *Bdelyropsis newtoni* Howden, 1971*

Sampling methods: baited pitfall traps (human excrement, fish).

Habitat: tropical deciduous forest, tropical rain forest, pine-oak forest.

Distribution: Mexico (CHP, OAX? VER) (Kohlmann et al. 2023; Moguel-López et al. 2024).

***Canthidium* Erichson, 1847**

= *Pleronyx* van Lansberge, 1874

= *Eucanthidium* Martínez & Halffter, 1986

This genus comprises 177 described species that are grouped into the subgenera *Canthidium* s. str.

(80 spp.) and *Neocanthidium* (70 spp.), in addition to 27 species without subgeneric assignment (Cupello 2018; Schoolmeesters 2025). The vast majority of *Canthidium* species inhabit South America (Schoolmeesters 2025), while only 18 species are reported for Mexico (Moctezuma et al. 2019; Mora-Aguilar and Delgado 2019).

111. *Canthidium andersoni* Kohlmann & Solís, 2006**

Sampling methods: hand collection on leaf litter.

Habitat: mountain cloud forest.

Distribution: Mexico (CHP) (Kohlmann and Solís 2006).

112. *Canthidium ardens* Bates, 1887

= *Canthidium ardens mutatum* Bates, 1887

= *Canthidium rhodopus* Bates, 1887

Sampling methods: baited pitfall traps (fish, squid, human excrement).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest.

Distribution: Mexico (CAM, CHP, OAX, VER), Guatemala, Honduras, Nicaragua, Costa Rica, Panama (Kohlmann and Solís 2006; Kohlmann et al. 2023; Schoolmeesters 2025).

113. *Canthidium centrale* (Boucomont, 1928)

= *Neocanthidium centrale* Boucomont, 1928

= *Neocanthidium martinezi* Halffter & Halffter, 1978

Sampling methods: baited pitfall traps (fish, squid, human excrement, tapir, pig and cow dung).

Habitat: tropical rain forest, mountain cloud forest, coffee plantation.

Distribution: Mexico (CAM, CHP, OAX, ROO, VER), Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Suriname, French Guyana, Ecuador (Sánchez-Hernández et al. 2022a; Kohlmann et al. 2023).

114. *Canthidium hespenheidei* Howden & Young, 1981

Sampling methods: hand collection on leaf litter.

Habitat: mountain cloud forest.

Distribution: Mexico (CHP, OAX, VER), Costa Rica, Panama, Ecuador (Kohlmann and Solís 2006; Schoolmeesters 2025).

115. *Canthidium laetum* Harold, 1867

Sampling methods: hand collection on rotten fruit of *Spondias mombin*, baited pitfall traps (human excrement, cow and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, *Acacia* Forest, live fences, fallow land.

Distribution: Mexico (CHP, COL, GRO, JAL, MEX, MOR, OAX, PUE, SIN, SON), Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica (Kohlmann and Solís 2006; Kohlmann et al. 2023; Schoolmeesters 2025).

116. *Canthidium moroni* Kohlmann & Solís, 2006

Sampling methods: hand collection on leaf litter, baited pitfall traps (coyote, deer, raccoon and tapir dung).

Habitat: tropical rain forest, pine forest, pine-oak forest.

Distribution: Mexico (CAM, CHP, OAX, ROO), Guatemala, Honduras (Sánchez-Hernández et al. 2022a; Kohlmann et al. 2023).

117. *Canthidium pseudoperceptibile* Kohlmann & Solís, 2006

Sampling methods: flight interception trap, hand collection in cattle dung and on leaf litter, baited pitfall traps (squid, coyote, coati, deer, jaguar, raccoon, tapir, cow and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, mountain cloud forest, secondary vegetation, live fences, coffee plantation.

Distribution: Mexico (CAM, CHP, VER), Belize, Guatemala (Sánchez-Hernández et al. 2022a).

118. *Canthidium pseudopuncticolle* Solís & Kohlmann, 2004

Sampling methods: baited pitfall traps (squid, pig and cow dung).

Habitat: secondary vegetation of tropical rain forest, mountain cloud forest.

Distribution: United States, Mexico (CAM, CHP, OAX, ROO, SLP, TAM, VER, YUC), Guatemala, Belize, El Salvador, Costa Rica (Sánchez-Hernández et al. 2022a).

***Cryptocanthon* Balthasar, 1942**

Cryptocanthon is a genus of small coprophagous beetles. It is made up of 43 species that are widely distributed from Mexico to Brazil (Giraldo-Mendoza

2022; Schoolmeester 2025). Its species inhabit humid environments with abundant leaf litter, especially in high mountain forests. Most species have narrow distributions above 1000 m altitude (Cook 2002). In Mexico, 10 species have been recorded (Giraldo-Mendoza 2022).

119. *Cryptocanthon bochilae* Cook, 2002**

Sampling methods: hand collection on leaf litter.

Habitat: pine-oak-liquidambar forest.

Distribution: Mexico (CHP) (Cook 2002).

120. *Cryptocanthon brevisetosus* Howden, 1973

Sampling methods: hand collection on leaf litter.

Habitat: pine-oak forest.

Distribution: Mexico (CHP), Guatemala (Cook 2002).

121. *Cryptocanthon cristobalensis* Howden, 1973**

Sampling methods: hand collection on leaf litter, baited pitfall trap (pig dung).

Habitat: pine forest, mountain cloud forest.

Distribution: Mexico (CHP) (Cook 2002).

122. *Cryptocanthon howdeni* Cook, 2002**

Sampling methods: hand collection on leaf litter.

Habitat: liquidambar forest, mountain cloud forest.

Distribution: Mexico (CHP) (Cook 2002).

123. *Cryptocanthon montebello* Cook, 2002**

Sampling methods: hand collection on leaf litter.

Habitat: liquidambar forest, pine-oak-liquidambar forest.

Distribution: Mexico (CHP) (Cook 2002).

124. *Cryptocanthon newtoni* Howden, 1976**

Sampling methods: hand collection on leaf litter, baited pitfall trap (dung).

Habitat: mountain cloud forest.

Distribution: Mexico (CHP) (Cook 2002).

125. *Cryptocanthon ocosingo* Cook, 2002**

Sampling methods: hand collection on leaf litter.

Habitat: oak-pine forest.

Distribution: Mexico (CHP) (Cook 2002).

126. *Cryptocanthon rayonensis* Cook, 2002**

Sampling methods: hand collection on leaf litter.

Habitat: mountain cloud forest.

Distribution: Mexico (CHP) (Cook 2002).

***Ontherus* Erichson, 1847**

Ontherus is a genus with 60 recognized species grouped in the subgenera *Caelontherus* (25 spp.), *Ontherus* s. str. (23 spp.) and *Planontherus* (2 spp.). It is a genus of exclusively Neotropical distribution and Mexico represents its northern limit, with only two species recorded in the country (Génier 1996; Schoolmeesters 2025).

127. *Ontherus azteca* Harold, 1869

= *Ontherus villosus* Luederwaldt, 1930

= *Ontherus strius* Howden & Young, 1981

Sampling methods: baited pitfall traps (human excrement).

Habitat: mountain cloud forest, tropical rain forest.

Distribution: Mexico (CHP, JAL, NAY, OAX, ROO, VER), Costa Rica, Panama, Colombia, Ecuador, Peru, Bolivia, Paraguay, Brazil (Génier 1996).

128. *Ontherus mexicanus* Harold, 1868

Sampling methods: light trap, flight interception trap, baited pitfall traps (carrion, human excrement, cow dung).

Habitat: tropical deciduous forest, tropical rain forest, pine forest, mountain cloud forest, liquidambar forest.

Distribution: Mexico (CHP, HID, OAX, PUE, QUE, ROO, SLP, TAM, VER), Guatemala (Génier 1996).

***Uroxys* Westwood, 1842**

= *Pseudouroxys* Balthasar, 1832

The genus comprises a group of small dung beetles, among which a total of 59 species have been described, mostly from South America (Schoolmeesters 2025). Eight species have been reported from Mexico, the northern limit of its distribution (Delgado and Kohlmann 2007; Solís and Kohlmann 2013).

129. *Uroxys boneti* Pereira & Halffter, 1961

= *Uroxys bidentis* Howden & Young, 1981

Sampling methods: flight intercept traps, baited

pitfall traps (human excrement).

Habitat: tropical rain forest, pine forest.

Distribution: Mexico (CHP, OAX, VER), Guatemala, El Salvador, Honduras, Costa Rica, Panama, Colombia, Ecuador (Delgado and Kohlmann 2007; Solís and Kohlmann 2013).

130. *Uroxys deavilai* Delgado & Kohlmann, 2007

Sampling methods: baited pitfall traps (squid, coati, coyote, deer, jaguar, raccoon, tapir, pig and cow dung).

Habitat: tropical deciduous forest, secondary vegetation, live fences.

Distribution: Mexico (CAM, CHP, GRO, JAL, MIC, NLE, OAX, ROO, SLP, TAM, VER, YUC), Guatemala, El Salvador, Nicaragua, Costa Rica (Sánchez-Hernández et al. 2022a).

131. *Uroxys microcularis* Howden & Young, 1981

Sampling methods: baited pitfall traps (squid, fish, human excrement, coati, coyote, deer, jaguar, raccoon, tapir, cow and pig dung).

Habitat: tropical deciduous forest, tropical rain forest, secondary vegetation, live fences, coffee plantation.

Distribution: Mexico (CAM, CHP, GRO, HID, PUE, ROO, TAM, VER, YUC), El Salvador, Costa Rica, Panama (Sánchez-Hernández et al. 2022a).

132. *Uroxys micros* Bates, 1887

Sampling methods: baited pitfall traps (human excrement, carrion).

Habitat: tropical rain forest, *Brosimum* forest.

Distribution: Mexico (CAM, CHP, GRO, JAL, MEX, MOR, OAX, ROO, VER, YUC), Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia (Sánchez-Hernández et al. 2022a).

133. *Uroxys platypyga* Howden & Young, 1981

Sampling methods: baited pitfall traps (human excrement, carrion).

Habitat: tropical rain forest.

Distribution: Mexico (CHP, OAX, VER), Guatemala, Costa Rica, Panama, Colombia (Delgado and Kohlmann 2007; Kohlmann et al. 2023).

134. *Uroxys tacanensis* Delgado & Kohlmann, 2007**

Sampling methods: hand collection on leaf litter.

Habitat: mountain cloud forest.

Distribution: Mexico (CHP) (Delgado and Kohlmann 2007).

DISCUSSION

The study of Scarabaeinae in Mexico has increased considerably since the work of Morón (2003a). Since then, these numbers have been updated for several states within Mexico. For Chiapas, the Scarabaeinae fauna recorded in this work corresponds to 39.2% of the species and 88.9% of the genera known in Mexico, a higher value than previously documented by other authors (Sánchez-Hernández and Gómez 2018; Sánchez-Hernández et al. 2019b; Kohlmann et al. 2023). This places Chiapas as the second Mexican state with the highest diversity of Scarabaeinae, only behind Oaxaca with 157 species (Kohlmann et al. 2023). Only three of the 27 genera present in Mexico have no distribution in Chiapas: *Attavicinus* Philips and Bell, 2008, a monospecific genus restricted to western Mexico, in the states of Jalisco and Michoacán (Philips and Bell 2008); *Liatongus* Reitter, 1892, represented by a relict species that is restricted to mountain systems of Mexico, primarily in the Trans-Mexican Volcanic Belt (Morón 2003b); and *Melanocanthon* Halffter, 1958, a North American genus with species extending into the Nearctic region and a sole species occurring in northern Mexico (Edmonds 2023).

The high representativeness of the genera *Canthon*, *Onthophagus*, and *Phanaeus* is because these taxa are widely distributed throughout the Americas or have their diversification center in Mexico (Rivera-Cervantes and Halffter 1999; Moctezuma 2021; Lizardo et al. 2022). Conversely, some of the genera represented by a single species group a low number of species (e.g., *Martinezidium* Vaz-de-Mello, 2008 and *Megathoposoma* Balthasar, 1939) or their diversification center is in South America, and thus, they are poorly represented in Mexico and Chiapas, such as *Anomiopus* Westwood, 1842, *Sulcophanaeus* Olsoufieff, 1924 and *Scatimus* Erichson, 1847.

The endemism ratio shown in our results is also lower than that reported for the neighboring state of Oaxaca (Kohlmann et al. 2023). This may clearly be an effect of under-sampling, as many of these species are found in only one ecosystem or have very few occurrence data. The habitat of most of these species is reduced and related to mountain ecosystems in a well-preserved state, with a high concentration of leaf litter and humidity, very similar to that reported for endemism in other regions of the Americas (Kohlmann et al. 2023). *Canthon lucreciae* Halffter & Halffter, 2009

and *Phanaeus chiapanecus* Moctezuma & Halffter, 2021 are the only ones related to fragmented forest areas in lowlands, with strong anthropic influence (Moctezuma and Halffter 2021b; Sánchez-Hernández and González-Martín del Campo 2023).

A substantial increase in the number of studies during the last two decades has allowed us to broaden the knowledge of the Scarabaeinae of Chiapas. These studies are grouped in topics such as taxonomic revisions (e.g., Kohlmann and Solís 2006; Delgado and Kohlmann 2007; Moctezuma et al. 2021a), descriptions of new species (e.g., Moctezuma and Halffter 2020; Chamé-Vázquez and Sánchez-Hernández 2022), ecological-faunistic studies (Navarrete and Halffter 2008a; Arellano et al. 2013; Rodríguez-López et al. 2019; Sánchez-Hernández et al. 2018 2019b 2021 2022b; Hernández-Molina et al. 2023; Gómez-Méndez et al. 2023), or extension of geographic distribution ranges (Navarrete and Halffter 2008b; Sánchez-Hernández and Gómez 2018; Sánchez-Hernández et al. 2017 2019; Chamé-Vázquez et al. 2021). Nevertheless, a high proportion of the localities reported in these works correspond to sporadic sampling or punctual observations (taxonomic and geographic distribution works), while the localities with more intensive and systematic sampling are scarce (Sánchez-Hernández et al. 2020).

The high species diversity may be due to the geophysical characteristics of the state territory, as well as a wide variety of vegetation types. Five of the 17 biogeographic provinces recognized in Mexico converge in Chiapas: Chiapas Highlands, Chiapas Central Plateau, Gulf of Mexico Coastal Plain, Chiapas Central Depression, and Southeastern Coastal Plain (Morrone 2019). In addition, the state has established 60 protected areas throughout these five provinces, encompassing the diverse ecosystems they represent. Although the localities cover a wide geographical area within the state, they are distributed irregularly and heterogeneously, most concentrated in the Chiapas Central Depression and the Gulf of Mexico Coastal Plain. This indicates that it is necessary to intensify sampling in all unexplored regions. The physiographic provinces Sierra Madre de Chiapas, Northern Mountains, Chiapas Highlands, and Pacific Coastal Plain may be ideal for surveying Scarabaeinae assemblages, as they have remained almost unexplored. Also, several localities within these regions are considered priority areas for conservation, so research is essential to plan conservation strategies for their different ecosystem types (Sánchez-Hernández et al. 2020; Falcón-Brindis et al. 2021).

In some punctual localities of the state, high values of alpha diversity have been found with an

important species turnover between habitats (e.g., Navarrete and Halffter 2008a; Rivera et al. 2020), which reinforces the idea that the Scarabaeinae fauna is far from being complete. Nevertheless, it is worth noting that the diversity of Scarabaeinae present in Chiapas is also comparable to that estimated for Panama and Costa Rica, two of the best-studied countries in Central America (Ratcliffe 2002; Solís and Kohlmann 2012), as well as being considerably higher than that reported in El Salvador and Nicaragua, where 52 and 87 species are recorded, respectively (Maes et al. 2020; Pablo-Cea et al. 2023).

Several of the discarded species are deemed to be potentially present in Chiapas, and some are likely to form species complexes requiring taxonomic revision. *Copris aspericollis* Gillet, 1910, and *Eurysternus velutinus* Bates, 1887 are species found in localities in Guatemala near the border with Chiapas (Rivera-Cervantes and Halffter 1999; Kohlmann et al. 2003), so we would expect to find them with increased sampling in border localities. Similarly, *Copris sallei* Harold, 1869, *Onthophagus luismargaritorum* Delgado, 1995 and *Onthophagus violetae* Zunino & Halffter, 1997 are species known to occur in Mexican states bordering Chiapas (Moctezuma 2021; Mora-Aguilar and Delgado 2015), with a high probability of finding them within Chiapas territory. Therefore, the number of species present in the state is potentially higher than is currently known, and may include several species that were excluded from this study, as well as species that have not yet been described.

The amount of taxonomic information available is an important factor in ecological studies and diversity inventories. Despite constant advances in the study of the taxonomy of the group, there is still the challenge of reaching precise determinations of some taxa, particularly those genera that are hyper-diverse or with problems of taxonomic confusion, such as *Onthophagus*, *Uroxys* Westwood, 1842 or *Canthidium* Erichson, 1847. In this regard, the high number of species and the need for taxonomic revisions may also underestimate the geographic range of many species and hinder the recognition of endemic species. For these reasons, these taxa may be promising groups to study, as many of them still lack modern taxonomic revisions. It should be noted that many of the taxonomic keys available for Mexican species are limited to a few subgenera (e.g., Rivera-Cervantes and Halffter 1999; González-Alvarado and Vaz-de-Mello 2014), or mostly at the level of small groups or species complex (e.g., Mora-Aguilar and Delgado 2015; Moctezuma and Halffter 2020 2021b; Chamé-Vázquez and Sánchez-Hernández 2022), so there remains a high deficit in the knowledge of the biodiversity and taxonomy of the

subfamily (Moctezuma 2023). Although developing works with taxonomic keys for all the genera of Scarabaeinae recorded in Mexico may not be a feasible goal at present, it would be desirable to focus efforts on those that present greater ambiguity in their taxonomy, especially for their use as bioindicators.

Finally, comparing and reviewing specimens deposited in regional collections to generate valid records for local taxonomists will allow more accurate identifications of dung beetles in future research. Hence the importance of creating these lists is to have a more precise idea about the species that can be found in the region and to avoid, as far as possible, misidentifications when a specialist is not available. This information, together with the biological and distributional data, offers a broader overview of the biogeography and ecology of the group in a state of great diversity such as Chiapas.

CONCLUSIONS

The study of the Scarabaeinae in Chiapas has increased considerably in recent years. A high number of species has been recorded compared to other states or countries in the region, although with a relatively low percentage of endemism. However, the numbers presented here are probably underestimated and many species are waiting to be recorded or described for the state. In addition, there are gaps in knowledge in several regions of the state that contain a wide variety of ecosystems. For these reasons, there is a clear need to further study this group of beetles in poorly explored regions to contribute to the knowledge of their true diversity, or at least to have a better approximation.

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REFERENCES

- Arellano L, León-Cortés JL, Halffter G, Montero J. 2013. *Acacia* woodlots, cattle and dung beetles (Coleoptera: Scarabaeinae) in a Mexican silvopastoral landscape. *Rev Mex Biodivers* **84**:650–660. doi:10.7550/rmb.32911.
- Chamé-Vázquez ER, Gómez B. 2005. Primer registro de *Canthon angustatus* Harold 1867 en México (Coleoptera: Scarabaeoidea). *Acta Zool Mex (n.s.)* **21**:159–160. doi:10.21829/azm.2005.2131981.
- Chamé-Vázquez ER, Sánchez-Hernández G, Bautista Arredondo ER. 2020. Presence of *Dichotomius (Dichotomius) centralis* (Harold) in Mexico and a new state record for *Dichotomius amplicolis* (Harold) (Coleoptera: Scarabaeidae: Scarabaeinae). *Coleopt Bull* **74**:384–387. doi:10.1649/0010-065X-74.2.384.
- Chamé-Vázquez ER, Sánchez-Hernández G. 2022. *Onthophagus tacanensis* (Coleoptera: Scarabaeidae: Scarabaeinae), a new species from Chiapas, Mexico. *Zootaxa* **5182**:196–200. doi:10.11646/zootaxa.5182.2.6.
- Cook J. 2002. Revision of the Neotropical genus *Cryptocanthon* Balthasar (Coleoptera: Scarabaeidae: Scarabaeinae). *Coleopt Bull* **56**:3–96. doi:10.1649/0010-065X(2002)56[3:AROTNG]2.0.CO;2.
- Cupello M. 2018. On the types species of the New World dung beetle genus *Canthidium* Erichson, 1847 (Coleoptera: Scarabaeidae: Scarabaeinae), with an annotated checklist of species. *Zootaxa* **4388**:451–486. doi:10.11646/zootaxa.4388.4.1.
- Cupello M, Silva FAB, Vaz-de-Mello FZ. 2023. The Taxonomic Revolution of New World dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae). *Front Ecol Evol* **11**:1168754. doi:10.3389/fevo.2023.1168754.
- Darling JDG, Génier F. 2018. Revision of the taxonomy and distribution of the Neotropical *Coprins incertus* species complex (Coleoptera: Scarabaeidae: Scarabaeinae). *Can Entomol* **150**:539–577. doi:10.4039/tce.2018.32.
- Delgado L, Kohlmann B. 2007. Revisión de las especies del género *Uroxys* Westwood de México y Guatemala (Coleoptera: Scarabaeidae: Scarabaeinae). *Fol Entomol Mex* **46**:1–36.
- Delgado L, Márquez J. 2006. Estado del conocimiento y conservación de los coleópteros Scarabaeoidea (Insecta) del estado de Hidalgo, México. *Acta Zool Mex (N.S.)* **22**:57–108. doi:10.21829/azm.2006.2222015.
- Deloya C. 2011. Escarabajos coprófagos y necrófagos (Insecta: Coleoptera: Scarabaeidae). In: CONABIO (ed) *La Biodiversidad en Veracruz: Estudio de Estado*. CONABIO, Gobierno del Estado de Veracruz, Universidad Veracruzana & Instituto de Ecología, A.C., Mexico City, MX.
- Deloya C, Covarrubias-Melgar D. 2014. *Escarabajos del estado de Guerrero* (Coleoptera: Scarabaeoidea). S y G editores, Mexico City, MX.
- Deloya C, Ponce-Saavedra J, Gasca-Álvarez HJ, Aguirre-León G, Zamora-Vuelvas MC. 2016. Familia Scarabaeidae Latreille, 1802. In: Deloya C, Ponce-Saavedra J, Reyes-Castillo P, Aguirre-León G (eds) *Escarabajos del estado de Michoacán* (Coleoptera: Scarabaeoidea). S y G editores, Mexico City, MX.
- Edmonds WD. 1994. Revision of *Phanaeus* Macleay, a new world genus of Scarabaeinae dung beetles (Coleoptera: Scarabaeidae, Scarabaeinae). *Contrib Sci* **443**:1–105.
- Edmonds WD. 2000. Revision of the Neotropical dung beetle genus *Sulcophanaeus* (Coleoptera: Scarabaeidae: Scarabaeinae). *Folia Heyrovskyana Suppl* **6**:1–60.
- Edmonds WD. 2022. Taxonomic review of the North American dung beetle genus *Boreocanthon* Halffter, 1958 (Coleoptera: Scarabaeidae: Scarabaeinae: Deltocilini). *Insecta Mundi* **0952**:1–65.
- Edmonds WD. 2023. Taxonomic review of the North American dung beetle genus *Melanocanthon* Halffter, 1958 (Coleoptera: Scarabaeidae: Scarabaeinae: Deltocilini). *Insecta Mundi* **1014**:1–28.
- Escobar-Hernández F, Rivera-Gasperín SL, Arellano L. 2019. First record of genus *Anomiopus* Westwood (Coleoptera: Scarabaeidae: Scarabaeinae) for Mexico. *Coleopt Bull* **73**:1105–1107. doi:10.1649/0010-065X-73.4.1105.
- Environmental Systems Research Institute (ESRI). 2014. ArcGIS release. Version 10. Redlands, California, USA. Available at: <https://www.esri.com/es-es/home>. Accessed 21 Dec. 2021.
- Falcón-Brindis A, León-Cortés JL, Montañez-Reyna M. 2021. How effective are conservation areas to preserve biodiversity in Mexico? *PECON* **19**:399–410. doi:10.1016/j.pecon.2021.07.007.
- Génier F. 1996. A revision of the Neotropical genus *Ontherus* Erichson (Coleoptera: Scarabaeidae, Scarabaeinae). *Mem Ent Soc Can* **128**:3–170. doi:10.4039/entm128170fv.
- Génier F. 2009. Le Genre *Eurysternus* Dalman, 1824 (Scarabaeidae: Scarabaeinae: Oniticellini): Révision taxonomique et clés de détermination illustrées. *Pensoft Series Faunistica*, Sofia, BG.
- Génier F, Kohlmann B. 2003. Revision of the Neotropical dung beetle genera *Scatimus* Erichson and *Scatrichus* gen. nov. (Coleoptera: Scarabaeidae: Scarabaeinae). *Faberies* **28**:57–111.
- Génier F, Moretto P. 2017. *Digitonthophagus* Balthasar, 1959: taxonomy, systematics, and morphological phylogeny of the genus revealing an African species complex (Coleoptera: Scarabaeidae: Scarabaeinae). *Zootaxa* **4248**:1–110. doi:10.11646/zootaxa.4248.1.1.
- Giraldo-Mendoza AE. 2022. A new species of the genus *Cryptocanthon* from Peru (Coleoptera: Scarabaeidae: Scarabaeinae). *Acta Zool Mex (n.s.)* **38**:1–11. doi:10.21829/azm.2022.3812443.
- Gómez B. 2013. Los escarabajos (Coleoptera: Scarabaeoidea). In: CONABIO & Gobierno del estado de Chiapas (eds) *La Biodiversidad en Chiapas: Estudio de Estado*. CONABIO, Mexico City, MX.
- Gómez-Méndez ADC, Sánchez-Hernández G, Gómez B, González-Martín del Campo F. 2023. Habitat type affects the structure but not the composition of dung beetle (Coleoptera: Scarabaeinae) assemblages in a tropical deciduous forest of southeastern Mexico. *Can Entomol* **155**:e25. doi:10.4039/tce.2023.12.
- González-Alvarado A, Vaz-de-Mello FZ. 2014. Taxonomic review of the subgenus *Hybomidium* Shipp 1897 (Coleoptera: Scarabaeidae: Scarabaeinae: *Deltocilium*). *Ann Soc Entomol Fr (N.S.)* **50**:431–476. doi:10.1080/00379271.2014.989178.
- Halffter G. 1961. Monografía de las especies norteamericanas del género *Canthon* Hoffsg. (Coleopt. Scarab.). *Ciencia* **20**:225–320.
- Halffter G. 2003. Tribu Scarabaeini. In: Morón MA (ed) *Escarabajos de México*. Coleoptera: Lamellicornia Vol. II. Familias Scarabaeidae, Trogidae, Passalidae y Lucanidae. Argania Editio, Barcelona, ESP.
- Halffter G, Rivera-Cervantes LE, Halffter V. 2015. Diversificación del grupo *Humectus* del género *Canthon* (Coleoptera: Scarabaeidae: Scarabaeinae) en el occidente de México. *Acta Zool Mex (n.s.)* **31**:208–220. doi:10.21829/azm.2015.312542.
- Halffter V, Halffter G. 2009. Nuevos datos sobre *Canthon* (Coleoptera: Scarabaeinae) de Chiapas, México. *Acta Zool Mex (n.s.)* **25**:397–407. doi:10.21829/azm.2009.252646.
- Hernández-Molina MA, Sánchez-Hernández G, Chamé-Vázquez ER, Noriega JA, Tejeda-Cruz C. 2023. Importance of live

- fences for dung beetle assemblage connectivity in a fragmented landscape. Journal Preprint [v1]. Research Square. doi:10.21203/rs.3.rs-3118198/v1.
- Hsieh TC, Ma KH, Chao A. 2016. iNEXT: an R package for rarefaction and extrapolation of species diversity (Hill numbers). *MEE* 7:1451–1456. doi:10.1111/2041-210X.12613.
- Kohlmann B. 2000. New species and distribution records of Mesoamerican *Ateuchus* (Coleoptera: Scarabaeidae). *Rev Biol Trop* 48:235–246.
- Kohlmann B. 2003. Tribu Coprini. In: Morón MA (ed) *Escarabajos de México. Coleoptera: Lamellicornia Vol. II. Familias Scarabaeidae, Trogidae, Passalidae y Lucanidae*. Argania Editio, Barcelona, ESP.
- Kohlmann B, Arriaga-Jiménez A, Mora-Aguilar EF. 2023. An annotated checklist of the dung beetle (Coleoptera: Geotrupidae and Scarabaeidae, subfamilies Aphodiinae and Scarabaeinae) of Oaxaca, Mexico. *Insecta Mundi* 981:1–34.
- Kolmann B, Solís A. 1997. El género *Dichotomius* (Coleoptera: Scarabaeidae) en Costa Rica. *G It Ent* 8:343–382.
- Kohlmann B, Solís A. 2006. El género *Canthidium* (Coleoptera: Scarabaeidae) en Norteamérica. *G it Ent* 11:235–295.
- Lizardo V, Escobar F, Rojas-Soto O. 2017. Diversity and distribution of Phanaeini (Coleoptera: Scarabaeidae: Scarabaeinae) in Mexico. *Zootaxa* 4358:271–294. doi:10.11646/zootaxa.4358.2.3.
- Lizardo V, Moctezuma V, Escobar F. 2022. Distribution, regionalization, and diversity of the dung beetle genus *Phanaeus* MacLeay (Coleoptera: Scarabaeidae) using species distribution models. *Zootaxa* 5213:546–568. doi:10.11646/zootaxa.5213.5.4.
- López-Guerrero I. 2005. Los *Dichotomius* (Coleoptera: Scarabaeidae, Dichotomiini) de la fauna de México. *Bol SEA* 36:195–209.
- Maes J-M, Hernández B, Solís A. 2020. Scarabaeinae (Coleoptera: Scarabaeidae) de Nicaragua. *Rev Nicar Entomol* 74:1–388.
- Márquez J, Morón MA, Moreno C, Asiain J, Sánchez-Rojas G. 2017. Los escarabajos de la familia Scarabaeidae (Insecta: Coleoptera). In: Ramírez-Bautista A, Sánchez-González A, Sánchez-Rojas G, Cuevas Cardona C (eds) *Biodiversidad del estado de Hidalgo, Tomo II. Universidad Autónoma del Estado de Hidalgo, Hidalgo, MX*. doi:10.29057/books.33.
- Márquez J, Reyes-Hernández JL, Cerón-Gómez R, Escoto-Moreno JA, Ramírez-Ponce A. 2022. Coleópteros Scarabaeoidea (Insecta: Coleoptera) de Aguascalientes, México. *Acta Zool Mex (n.s.)* 38:1–51. doi:10.21829/azm.2022.3812492.
- Moctezuma V. 2021. El género *Onthophagus* Latreille, 1802 (Coleoptera: Scarabaeidae) de México. *Dugesiana* 28:175–220. doi:10.32870/dugesiana.v28i2.7166.
- Moctezuma V. 2023. Luchando contra los déficits Linneano y Wallaceano en el avance del conocimiento de la diversidad de los escarabajos del estiércol: el caso de los géneros *Onthophagus* Latreille, 1802 y *Phanaeus* MacLeay, 1819 (Coleoptera: Scarabaeidae). *Dugesiana* 30:177–201. doi:10.32870/dugesiana.v30i2.7284.
- Moctezuma V, Halfpter G. 2020. A new species of the *Onthophagus cyanellus* species complex (Coleoptera: Scarabaeidae: Scarabaeinae: Onthophagini). *Coleopt Bull* 74:495–501. doi:10.1649/0010-065X-74.3.495.
- Moctezuma V, Halfpter G. 2021a. Species redescription and new species of the *Onthophagus mexicanus* species group (Coleoptera: Scarabaeidae), with notes on distribution and rodent-dung beetle associations. *Zool Stud* 60:30. doi:10.6620/ZS.2021.60-30.
- Moctezuma V, Halfpter G. 2021b. Taxonomic revision of the *Phanaeus endymion* species group (Coleoptera: Scarabaeidae), with the descriptions of five new species. *Eur J Taxon* 747:1–71. doi:10.5852/ejt.2021.747.1333.
- Moctezuma V, Halfpter G, Lizardo V. 2021a. The *Phanaeus tridens* species group (Coleoptera: Scarabaeoidea): a dung beetle group with genital morphological stasis but a changing ecological niche. *AEMNP* 61:447–482. doi:10.37520/aemnp.2021.025.
- Moctezuma V, Hernández B, Sánchez-Huerta JL, Lizardo V, Quiroz-Rocha GA et al. 2023a. Two new species from the Mexican Pacific Slope and new distributional records of *Onthophagus* Latreille, 1802 (Coleoptera: Scarabaeidae). *J Asia Pac Entomol* 26:102015. doi:10.1016/j.aspen.2022.102015.
- Moctezuma V, Hernández B, Sánchez-Huerta JL, Navarrete-Heredia JL, Martínez-Rodríguez PA. 2021c. *Onthophagus acernorus* (Coleoptera: Scarabaeidae: Scarabaeinae: Onthophagini), a new dung beetle species from Jalisco, Mexico. *Zootaxa* 5067:122–128. doi:10.11646/zootaxa.5067.1.8.
- Moctezuma V, Sánchez-Huerta JL, Halfpter G. 2018. Two new species of *Ateuchus* weber with remarks on ecology, distribution, and evolutionary relationship (Coleoptera, Scarabaeidae, Scarabaeinae). *ZooKeys* 748:71–86. doi:10.3897/zookeys.747.22731.
- Moctezuma V, Sánchez-Huerta JL, Halfpter G. 2019. New species of *Canthidium* (Coleoptera: Scarabaeidae: Scarabaeinae) from Mexico. *Can Entomol* 151:432–441. doi:10.4039/tce.2019.25.
- Moctezuma V, Sánchez-Huerta JL, Espinosa de los Monteros A, Halfpter G. 2025. Description of three new species of the *Canthon indigaceus* species group (Coleoptera: Scarabaeidae: Scarabaeinae). *Taxonomy* 5:26. doi:10.3390/taxonomy5020026.
- Moctezuma V, Sánchez-Huerta JL, Hernández B. 2023b. A new Mexican species of the genus *Onthophagus* Latreille, 1802 (Coleoptera: Scarabaeidae). *Stud Neotrop Fauna E* 58:204–211. doi:10.1080/01650521.2021.1986339.
- Moctezuma V, Sánchez-Huerta JL, Vaz-de-Mello F, Halfpter G. 2021b. Revalidation and redescription of *Deltochilum (Calhyboma) burmeisteri* (Coleoptera: Scarabaeidae), with a key to related species. *Rev Mex Biodivers* 92:e923712. doi:10.22201/ib.20078706e.2021.92.3712.
- Moguel-López MA, Sánchez-Hernández G, Mora-Aguilar EF, Escobar-Hernández F. 2024. New data on the distribution of three dung beetle species in the state of Chiapas, Mexico (Coleoptera: Scarabaeidae: Scarabaeinae). *Coleopt Bull* 78:572–575. doi:10.1649/0010-065X-78.4.572.
- Montes de Oca E, Halfpter G. 1998. Invasion of Mexico by two dung beetles previously introduced into the United States. *Stud Neotrop Fauna E* 33:37–45. doi:10.1076/snf.33.1.37.2174.
- Montoya-Molina S, Vaz-de-Mello FZ. 2021. Taxonomic review of the *Dichotomius (Luederwaldtinia) agenor* species group (Coleoptera: Scarabaeidae: Scarabaeinae). *Eur J Taxon* 734:1–64. doi:10.5852/ejt.2021.734.1233.
- Mora-Aguilar EF, Delgado L. 2015. Two new species of *Copris* (Coleoptera: Scarabaeidae: Scarabaeinae) from Mexico, with a key based on major males to the *remotus* species complex. *Ann Entomol Soc Am* 108:875–880. doi:10.1093/aesa/sav063.
- Mora-Aguilar EF, Delgado L. 2019. A new species of *Canthidium* Erichson (Coleoptera: Scarabaeidae: Scarabaeinae) from the endemic biota of Los Chimalapas, Oaxaca, Mexico. *Coleopt Bull* 73:1067–1074. doi:10.1649/0010-065X-73.4.1067.
- Morón MA. 2003a. Atlas de los escarabajos de México. Coleoptera: Lamellicornia Vol. II. Familias Scarabaeidae, Trogidae, Passalidae y Lucanidae. Argania Editio, Barcelona, ESP.
- Morón MA. 2003b. Tribu Oniticellini. In: Morón MA (ed) *Escarabajos de México. Coleoptera: Lamellicornia Vol. II. Familias Scarabaeidae, Trogidae, Passalidae y Lucanidae*. Argania Editio, Barcelona, ESP.
- Morón MA, Aragón-García A, Carrillo-Ruiz H. 2013. Fauna de escarabajos del estado de Puebla. MA Morón, Veracruz, MX.
- Morrone JJ. 2019. Regionalización biogeográfica y evolución

- biótica de México: encrucijada de la biodiversidad del Nuevo Mundo. *Rev Mex Biodivers* **90**:e902980. doi:10.22201/ib.20078706e.2019.90.2980.
- Navarrete DA, Halffter G. 2008a. Dung beetle (Coleoptera: Scarabaeidae: Scarabaeinae) diversity in continuous forest, forest fragments and cattle pastures in a landscape of Chiapas, Mexico: the effects of anthropogenic changes. *Biodivers Conserv* **17**:2869–2898. doi:10.1007/s10531-008-9402-8.
- Navarrete DA, Halffter G. 2008b. Nuevos registros de escarabajos copro-necrófagos (Coleoptera: Scarabaeidae: Scarabaeinae) para México y Chiapas. *Acta Zool Mex (N.S.)* **24**:247–250. doi:10.21829/azm.2008.241637.
- Nichols E, Larsen T, Spector S, Davis AL, Escobar F et al. 2007. Global dung beetle response to tropical forest modification and fragmentation: A quantitative literature review and meta-analysis. *Biol Conserv* **137**:1–19. doi:10.1016/j.biocon.2007.01.023.
- Nichols E, Spector S, Louzada J, Larsen T, Amezcua S et al. 2008. Ecological functions and ecosystem services provided by Scarabaeinae dung beetles. *Biol Conserv* **141**:1461–1474. doi:10.1016/j.biocon.2008.04.011.
- Pablo-Cea JD, Cave R, Serrano-Peraza RA, Alvarado-Larios R, Deloya C et al. 2023. Catalog and distribution atlas of the Scarabaeoidea (Insecta: Coleoptera) of El Salvador. *Rev Mex Biodivers* **94**:e945117. doi:10.22201/ib.20078706e.2023.94.5117.
- Pablo-Cea JD, Velado-Cano MA, Fuentes R, Cruz M, Noriega JA. 2017. First report of *Digitonthophagus gazella* (Fabricius, 1787) and new records for *Euoniticellus intermedius* (Reiche, 1849) (Coleoptera: Scarabaeidae Latreille, 1802) in El Salvador. *Acta Zool Mex (n.s.)* **33**:527–531. doi:10.21829/azm.2017.3331154.
- Phillips TK, Bell KL. 2008. *Attavicinus*, a new generic name for the myrmecophilous dung beetle *Liatongus monstrosus* (Scarabaeidae: Scarabaeinae). *Coleopt Bull* **62**:67–81. doi:10.1649/984.1.
- Ratcliffe BC. 2002. A checklist of the Scarabaeoidea (Coleoptera) of Panama. *Zootaxa* **32**:1–48. doi:10.11646/zootaxa.32.1.1.
- Rivera JD, Gómez B, Navarrete-Gutiérrez D, Ruiz-Montoya L et al. 2020. Mechanisms of diversity maintenance in dung beetle assemblages in a heterogeneous tropical landscape. *PeerJ* **8**:e9860. doi:10.7717/peerj.9860.
- Rivera-Cervantes LE, Halffter G. 1999. Monografía de las especies mexicanas de *Canthon* del subgénero *Glaphyrocantion* (Coleoptera: Scarabaeidae: Scarabaeinae). *Acta Zool Mex (N.S.)* **77**:23–150. doi:10.21829/azm.1999.77771693.
- Rivera-Gasperin SL, Escobar-Hernández F, Arellano L. 2025. A new species in the *Canthon indigaceus* species group (Coleoptera: Scarabaeidae: Scarabaeinae) from the Mexican Pacific Coast. *Taxonomy* **5**:11. doi:10.3390/taxonomy5010011.
- Rivera-Gasperin SL, Escobar-Hernández F, Halffter G. 2022. Los *Deltochilina* (Coleoptera: Scarabaeinae), un grupo indicador biogeográfico en el sureste de México. *Acta Zool Mex (N.S.)* **38**:1–13. doi:10.21829/azm.2022.3812457.
- Rodríguez-López ME, Sánchez-Hernández G, Gómez B. 2019. Escarabajos coprófagos de la reserva El Zapotal, Chiapas, México. *Rev Peru Biol* **26**:339–350. doi:10.15381/rpb.v26i3.16778.
- Rossini M, Génier F. 2024. A new classification for the *Onthophagus chypeatus* group (Coleoptera: Scarabaeidae: Scarabaeinae) and description of a new species from Western Ecuador. *Coleopt Bull* **78**:415–428. doi:10.1649/0010-065X-78.3.415.
- Sánchez-Hernández G, Agustín-Sánchez J, Bueno-Villegas J, Gómez B. 2019a. Utilizando un recurso inusual: escarabajos del estiércol atraídos a milpiés (Diplopoda: Spirobolida). *Rev Peru Biol* **26**:499–502. doi:10.15381/rpb.v26i4.15598.
- Sánchez-Hernández G, Chamé-Vázquez ER, Gómez B. 2019b. Nuevos datos de distribución para escarabajos del estiércol (Coleoptera: Scarabaeidae: Scarabaeinae) en México. *RCE* **45**:515–519. doi:10.35249/rche.45.4.19.02.
- Sánchez-Hernández G, Chamé-Vázquez ER, Salas-Suárez N, Noh-Balam VM. 2022a. Los escarabajos del estiércol (Coleoptera: Scarabaeidae: Scarabaeinae) de Quintana Roo, México: Lista anotada de especies y nuevos registros. *RCE* **48**:415–434. doi:10.35249/rche.48.2.22.24.
- Sánchez-Hernández G, Gómez B. 2018. First precise locality data for *Onthophagus atriglabrus* Howden and Gill and new state record for *Onthophagus anewtoni* Howden and Génier (Coleoptera: Scarabaeidae: Scarabaeinae) in Mexico. *Coleopt Bull* **72**:873–876. doi:10.1649/0010-065X-72.4.873.
- Sánchez-Hernández G, Gómez B, Chamé-Vázquez ER, Dávila-Sánchez RA, Rodríguez-López EM et al. 2020. Current status of dung beetles (Coleoptera, Scarabaeidae, Scarabaeinae) diversity and conservation in Natural Protected Areas in Chiapas (Mexico). *Neotrop Biol Conserv* **15**:219–244. doi:10.3897/neotropical.15.e53762.
- Sánchez-Hernández G, Gómez B, Delgado L, Rodríguez-López EM. 2017. Primer registro de *Onthophagus longimanus* Bates, 1887 (Coleoptera: Scarabaeidae: Scarabaeinae) en Chiapas, México. *Dugesiana* **24**:57–59. doi:10.32870/dugesiana.v24i1.6236.
- Sánchez-Hernández G, Gómez B, Chamé-Vázquez ER, Navarrete-Heredia JL, González-Martín del Campo F. 2022b. Dung beetle diversity and community composition along a fragmented landscape in an altitudinal gradient in southeastern Mexico. *Biologia* **77**:1027–1038. doi:10.1007/s11756-022-01036-4.
- Sánchez-Hernández G, Gómez B, Delgado L, Rodríguez-López ME, Chamé-Vázquez ER. 2018. Diversidad de escarabajos copronecrófagos (Coleoptera: Scarabaeidae: Scarabaeinae) en la Reserva de la Biosfera Selva El Ocote, Chiapas, México. *Caldasia* **40**:144–160. doi:10.15446/caldasia.v40n1.68602.
- Sánchez-Hernández G, Gómez B, Rodríguez-López ME, Dávila-Sánchez RA, Chamé-Vázquez ER. 2021. Variation in dung beetle (Coleoptera: Scarabaeidae: Scarabaeinae) assemblages in a tropical forest remnant from a Mexican National Park. *Pap Avulsos Zool* **60**:e20216150. doi:10.11606/1807-0205/2021.61.50.
- Sánchez-Hernández G, González-Martín del Campo F. 2023. Record of the dung beetle *Canthon lucreciae* Halffter & Halffter, 2009 (Coleoptera: Scarabaeinae) feeding on a millipede in a tropical rainforest. *RCE* **49**:643–648. doi:10.35249/rche.49.3.23.25.
- Sánchez-Huerta JL, Moctezuma V, Halffter G. 2019. Nuevo registro de distribución de *Canthon angustatus* Harold en Veracruz, México. *Southwest Entomol* **44**:353–355. doi:10.3958/059.044.0143.
- Sánchez-Huerta JL, Moctezuma V, Halffter G. 2025. Description of two new species of the *Onthophagus clypeatus* species group (Coleoptera: Scarabaeidae) from Mexico. *Biologia* **80**:2067–2075. doi:10.1007/s11756-025-01974-9.
- Scholtz CH, Davis ALV, Kryger U. 2009. Evolutionary biology and conservation of dung beetles. Pensoft, Sofia, BG.
- Schoolmeesters P. 2025. World Scarabaeidae Database (Version 2025-04-03). Available at: <http://www.catalogueoflife.org/col/details/database/id/27>. Accessed 15 Apr. 2025.
- Silva FAB, Vaz-de-Mello FZ, Barclay MVL. 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. *ISE* **49**:231–240. doi:10.1163/1876312X-00002173.
- Solís A, Kohlmann B. 2002. El género *Canthon* (Coleoptera: Scarabaeidae) en Costa Rica. *G it Ent* **10**:1–68.
- Solís A, Kohlmann B. 2012. Checklist and distribution atlas of the Scarabaeinae (Coleoptera: Scarabaeidae) of Costa Rica. *Zootaxa* **38**:1–32. doi:10.11646/zootaxa.3482.1.1.
- Solís A, Kohlmann B. 2013. El género *Uroxys* (Coleoptera:

- Scarabaeidae) en Costa Rica. *G it Ent* **13**:289–340.
- Solis A, Kohlmann B. 2022. *Dichotomius woodruffi*, a new *Dichotomius* species of the *agenor* group from Costa Rica and Nicaragua (Coleoptera: Scarabaeidae: Scarabaeinae). *Insecta Mundi* **0918**:1–12.
- Solis A, Kohlmann B. 2025. Three new species of *Dichotomius* Hope, 1838 (Coleoptera: Scarabaeidae: Scarabaeinae) from Mexico and Central America. *Insecta Mundi* **1129**:1–21.
- Spector S. 2006. Scarabaeine dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae): an invertebrate focal taxon for biodiversity research and conservation. *Coleopt Bull* **60**:71–83. doi:10.1649/0010-065X(2006)60[71:SDBCSS]2.0.CO;2.
- Vaz-de-Mello FZ. 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. doi:10.11646/zootaxa.1955.1.1.
- Zaragoza-Caballero S, Rodríguez-Mirón GM, Vega-Badillo V, González-Ramírez M, Zurita-García ML et al. 2019. A checklist of the Coleoptera (Insecta) from Morelos, Mexico. *Zootaxa* **4580**:1–122. doi:10.11646/zootaxa.4580.1.1.

Supplementary materials

Table S1. Summary of the studies used in this work. (download)

Table S2. Species recorded in the reviewed literature that are excluded from this work. (download)