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Two new species of *Phyllophaga* of the Schizorhina species group from cloud forests of Chiapas, México and Guatemala
(Coleoptera: Scarabaeidae: Melolonthinae)

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Two new species of *Phyllophaga* of the Schizorhina species group from cloud forests of Chiapas, México and Guatemala (Coleoptera: Scarabaeidae: Melolonthinae)

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Abstract. *Phyllophaga* (*Phyllophaga*) *badbunnyi* Cano **new species**, and *Phyllophaga* (*Phyllophaga*) *sechi* Cano **new species**, of the Schizorhina species group (Coleoptera: Scarabaeidae: Melolonthinae), are described and illustrated from specimens collected at cloud forests between 1300–1750 m elevation of southeastern Chiapas, México and western Guatemala. A key to the Guatemalan and Chiapanecan species of *Phyllophaga* Harris, group Schizorhina, with dorsal finger-like projections of genital capsule, is provided.

Key words. cloud forests, genital capsule, genital plates, *Phyllophaga acacoyahuana*, *Phyllophaga alvareztoroi*, *Phyllophaga javepacuana*, *Phyllophaga ginigra*.

Resumen. Con base en especímenes colectados en bosques nubosos entre 1300 y 1750 m de altitud del sureste de Chiapas, México y del oeste de Guatemala, se describe y se ilustra a *Phyllophaga* (*Phyllophaga*) *badbunnyi* Cano **nueva especie**, y a *Phyllophaga* (*Phyllophaga*) *sechi* Cano **nueva especie** (Coleoptera: Scarabaeidae: Melolonthinae). Se provee una clave para las especies guatemaltecas y chiapanecas de *Phyllophaga* Harris del grupo Schizorhina que presentan la cápsula genital con proyecciones dorsales en forma de dedos.

Palabras clave. Bosques nubosos, cápsula genital, placas genitales, *Phyllophaga acacoyahuana*, *Phyllophaga alvareztoroi*, *Phyllophaga javepacuana*, *Phyllophaga ginigra*.

ZooBank registration. urn:lsid:zoobank.org:pub:945E9711-35FE-466D-80BC-725AD484DE4B

Introduction

The Schizorhina species group of the genus *Phyllophaga* s.str. Harris, 1827, was established by Morón (1986: 241–242) for eleven species distributed from Mexico to Panama, and diagnosed by the forms of tarsal claws, genital capsule, labrum, antennae, and clypeus, among other characters. Later, Morón (2003) revised the group, excluding four species, including six species of other groups, describing 25 as new, and redescribing more strictly the species group considering the increase in the number of species (38). Currently, the species group includes 44 described species distributed from México to Ecuador, occurring between 100 to 3330 m elevation (Morón 2003, 2016; Morón and Riley 2005; Morón and Blas 2006; Morón and Maes 2014; Morón and Neita-Moreno 2014). The group is diverse, particularly in the middle altitude cloud forests (60% of described species) and associated pine oak and conifer forests. Some species also inhabit lowland deciduous and tropical rain forests. Although monophyly of the Schizorhina species group has been preliminarily suggested (Rivera-Gasperín and Morón 2017: 601), the included species are actually ambiguously diagnosed (*sensu* Morón 1986, 2003) by a robust and elongate body, dorsal integument shiny (black or reddish-brown), elytra glabrous or with some minute setae (some species more setose), clypeus short with anterior border notched, antennae with 10 segments, and tarsi long and scarcely setose. Sexual dimorphism is minimal, but the male genital capsule shows an amazing diversity of structures that clearly distinguish each species (Morón and Blas 2006). While curating *Phyllophaga* from Guatemala, I dissected several specimens from the Chiapanecan *Phyllophaga alvareztoroi* Moron and Blas, 2006, and two specimens from the Chiapanecan and Guatemalan *Phyllophaga acacoyahuana* Morón and Blas, 2006. The study of male genitalia and analyses of morphological characters showed that the specimens belonged to two new species, here described.

Materials and Methods

For nomenclature of characters Morón (1986, 2003) was followed. Drawings were elaborated with a camera lucida on an Olympus SZX7 stereomicroscope; photographs were taken with a 85mm macro lens on a Nikon 5100 camera with a stacking process, using Helicon Focus software. Measurements were taken with a caliper, except that of the head and antennae, which were taken with an ocular micrometer. Label data of specimens are verbatim. Descriptions are based on the holotype, and the variation of other specimens is given separately. Type specimens are deposited in the Colección Entomológica of Escuela de Biología of Universidad de San Carlos de Guatemala (USAC) and the Arthropod Collection of Universidad del Valle de Guatemala (UVGC).

Systematics

Genus *Phyllophaga* Harris, 1827

Subgenus *Phyllophaga* (*Phyllophaga*) Harris, 1827

Species group: Schizorhina, Morón 1986

Subgroup 2 (*sensu* Morón 2003)

Morón (2003) divided his Schizorhina species group of *Phyllophaga* s.str. into seven subgroups based principally on characters of male genitalia, body size, and dorsal sculpture and vestiture.

Diagnosis of subgroup 2 (*sensu* Morón 2003). Large species (19–30 mm), shiny black or reddish brown, pronotum, elytra and pygidium irregularly punctured, abdominal sternites 3–5 convex, phallobase with two finger-like dorsal projections and two ventral elongate projections (parameres) and aedeagus with strong sclerotized tube and/or notable spines. The species of the subgroup 2 are distributed from Northeastern Mexico to Colombia.

Species included and remarks. Until now the subgroup 2 included nine described species (plus the two here described): *Phyllophaga ginigra* Saylor, 1940, *P. necaxa* Saylor, 1943, *P. saylori* Sanderson, 1965, *P. tuxtleca*, Morón, 2003, *P. humboldtiana* Morón, 2003, *P. javepacuana* Morón, 2003, *P. alvareztoroi* Morón and Blas, 2006, *P. acacoyahuana* Morón and Blas, 2006, and *P. velezangeli* Morón and Neita-Moreno, 2014. Morón and Neita-Moreno (2014: 207) erroneously (a typographical error) assigned their *P. velezangeli* of Boyacá, Colombia to the subgroup 3 of Morón (2003), instead of subgroup 2. Although Morón (2003: 231) diagnosed the subgroup as glabrous, detailed observations of the pronotum and elytra of *P. ginigra*, *P. javepacuana*, *P. acacoyahuana* and the following new species, showed that the pronotum and elytra are covered with minute, decumbent, whitish setae that disappear in old specimens, as occurs in many other species of the Schizorhina group.

Phyllophaga (*Phyllophaga*) *badbunnyi* Cano, new species

(Fig. 1–4)

Phyllophaga alvareztoroi: Morón and Blas (2006: 39, in part); Schuster and Cano (2006: 63); Gómez and Morón (2010: 212–213, in part).

Material examined. 35 specimens, plus one not seen (species figured in Morón and Blas 2006: 39).

Type material. Holotype male. GUATEMALA: Suchitepéquez, Santa Bárbara, Fca. Panamá, Reserva UVG, 1500 msnm, 14.546818, –91.193639. Bosque nuboso. 14 VI 2002. Col. E. Cano (USAC).

Allotype female. GUATEMALA: Suchitepéquez, Santa Bárbara, Res. Refugio Quetzal UVG, 15–18 III 2007. 1600m [1373m]. Latitud 14.5417598494, Longitud –91.1972949818. [Cols.] Camposeco, Pérez, Cortéz (USAC).

Paratypes (21 ♂, 13 ♀). Same data as holotype (3 ♂, 2 ♀, USAC); same data as allotype (9 ♂, 8 ♀, UVGC); same data as allotype except VIII 2018 (1 ♂, USAC); same data as allotype except 20 II 2007 (1 ♀, UVGC); same data as allotype except 11 V 2013, Col. Monzón y Camposeco (1 ♀, UVGC); same data as allotype except 20–30 IV 2007 (3 ♂, 1 ♀, USAC). GUATEMALA: Suchitepéquez, Finca Mocá, Volcán Atitlán, 1600m, 5 IV 2000,

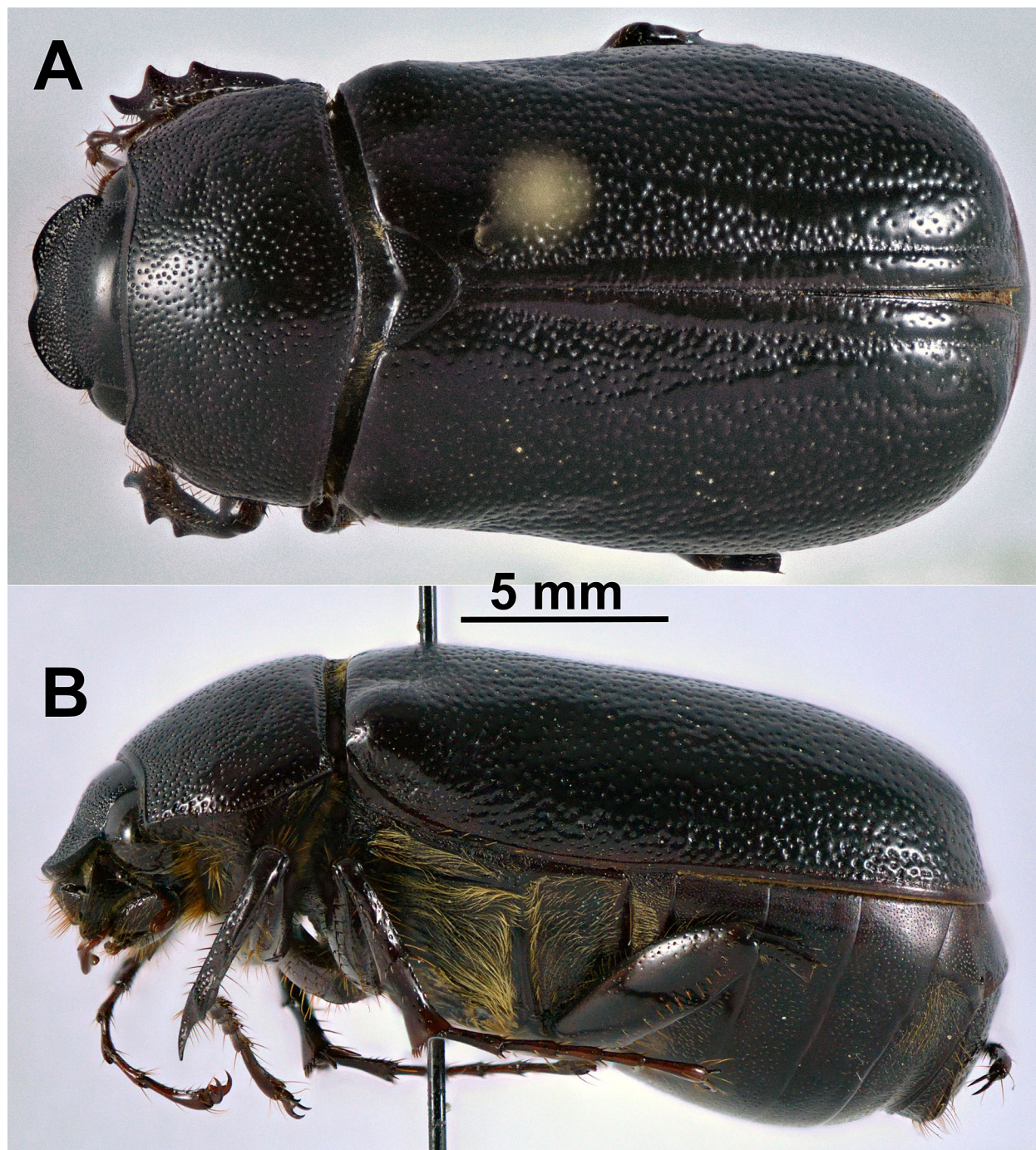


Figure 1. *Phyllophaga badbunnyi* n. sp. A) Dorsal habitus. B) Lateral habitus.

Colector José Monzón (1 ♂, UVGC). GUATEMALA: San Marcos, San Rafael Pié de la Cuesta, camino Fraternidad a El Bojonal, 1600m, 10 V 2008, 14.9459, -91.8806, Col. Monzón y Camposeco (1 ♂, USAC); same data except camino de Fraternidad-Bojonal, 28-31 VIII 2005, 1600m, Colector José Monzón Sierra (1 ♂, UVGC); same data except aldea El Bojonal, 14° 57' N, 91° 53' W, 1600m, X 2010, bosque nuboso, luz UV+Metalarc 400w, F. Camposeco (1 ♂, UVGC). MÉXICO: Chiapas, Siltepec, Reserva Cordón Pico, Barrio Las Moras [15.557778, -92.428056; 1750m; cloud forest], 20 III 2001, Col. V. Galdamez (1 ♂, figured in Morón and Blas (2006: 39)), officially at MXAL-IEXA but not located.

Type locality. Guatemala, Suchitepéquez Dept., Santa Bárbara, Reserva Refugio del Quetzal, 1500m, coordinates 14.546818, -91.193639, cloud forest on the southern slopes of Atitlán volcano. Some specimens (including holotype) were collected before the territorial changes for the establishment of the Biological Reserve.

Diagnosis. *Phyllophaga badbunnyi* new species (Fig. 1–3) is similar to *Phyllophaga alvareztoroi* (Fig. 7B) from which it can be separated by dorsal keel of tectum barely marked, tectum separated from basal piece by a strong constriction, parameres (lower projections of phallobase) thinner apically and superior genital plates of females with upper margin markedly dentate. Although genital plates of female are similar to those of *Phyllophaga javapacuana*, both, males and females of the new species can be separated by absence of a row of setae along sides of abdomen and absence of a strong sulcus on prepygidium, between the posterior spiracles.

Description. Dorsal coloration shiny black with some bluish reflections, epipleuron and adjacent elytral border reddish-brown, ventral coloration of abdomen and metasternum dark reddish-brown; legs reddish-brown. Total length of body: 24.05 mm. Humeral width 10.62 mm.

Head. Clypeus short, 3.75 times wider than long, anterior border deeply and widely emarginate, anterior angles markedly rounded and moderately elevated; clypeal disc glabrous, concave towards lateral sides and slightly convex centrally, with circular dense deep punctures separated by less than a diameter, giving a strong rugose aspect. Frontoclypeal suture marked and bisinuate, less marked medially. Frons 3.55 times wider than long, uniformly convex, with deep circular punctures giving a slightly rugose aspect, more abundant at disc and smaller and sparse toward sides and anterolateral areas, each puncture with a very minute whitish, decumbent seta (visible only at great magnification); vertex smooth. Antennae 10 segmented; segments 3 and 4 subcylindrical of equal length; segments 5 and 6 shorter and wide, with a rounded projection; segment 7 slightly shorter than 6 and very wide, with an acute projection; wide (length in most authors) of antennal club as the length of segments 3–5 combined, with segment 8 wider than 9 or 10. Interocular distance 10.8 mm, width of each eye 2.1 mm. Ocular canthus short and narrow with 8–11 erect setae. Labrum bilobate, with anterior border deeply emarginate, with many erect setae on lateral borders. Labium longitudinally widely and deeply excavate, disc bare, with abundant long setae toward the sides, anterior border emarginate.

Prothorax. Pronotum convex, 1.8 times wider than long. Anterior angles almost straight, slightly acute; posterior angles slightly obtuse. Lateral borders forming a wide angle at the central portion; marginal border narrow and crenulate with scarce sparse setae; posterior border marked by an impression and evanescent at middle in front of scutellum and crenulate at sides. Disc with circular and deep punctures, irregularly distributed giving a rugose aspect, each puncture with a decumbent, whitish setae; punctures denser towards the sides and scarce medially and near the posterior border.

Pterothorax. Scutellum wider than long (1.7:1) with deep punctures toward anterolateral portions, each puncture with a decumbent, whitish seta; middle line barely marked; anterior border declivous. Elytra almost parallel and almost the same width as posterior margin of pronotum (at the level of humeri), slightly wider from anterior $\frac{1}{3}$ to apex; moderately rugose-punctured; punctures rounded and each with a minute seta (only visible at great magnification); each elytron 2.6 times longer than wide. A row of minute decumbent white setae is present on punctures at most anterior portion, between epipleuron and humeral callus. Elytral epipleura with scattered short yellow-whitish setae; epipleural keel progressively effacing from middle of third abdominal segment to apex. Sutural costa elevated and well-marked, with scarce and disperse punctures, each puncture with a minute, decumbent seta; two discal costae longitudinally transverse and arising near humeral callus, proximal narrowly marked at anterior $\frac{2}{3}$ and more widely marked at posterior $\frac{1}{3}$ where fused with apical callus, the second very narrow and barely marked; lateral costa behind humeral callus, narrowly marked. Humeral callus prominent and rounded; apical callus wide, rounded, moderately prominent. Pterosternum densely punctate-rugose, each puncture with a long, yellowish setae, giving a hairy aspect.

Abdomen. Prepygidium with a small excavation separated from fifth abdominal segment of venter, at level of posterior spiracle. Pygidium convex and shiny, punctate-rugose, punctures wider at disc, each puncture with a whitish minute seta (only visible at great magnification); disc with a longitudinal, irregular and smooth tumosity; apical border with each puncture containing a long, yellowish seta. Abdominal segments 2–4 widely convex; sides with moderately abundant small and shallow punctures, each containing a minute decumbent whitish seta; setose punctures scarce medially (small setae on segment 2). Abdominal segments 3–4 with a shallow, longitudinal,

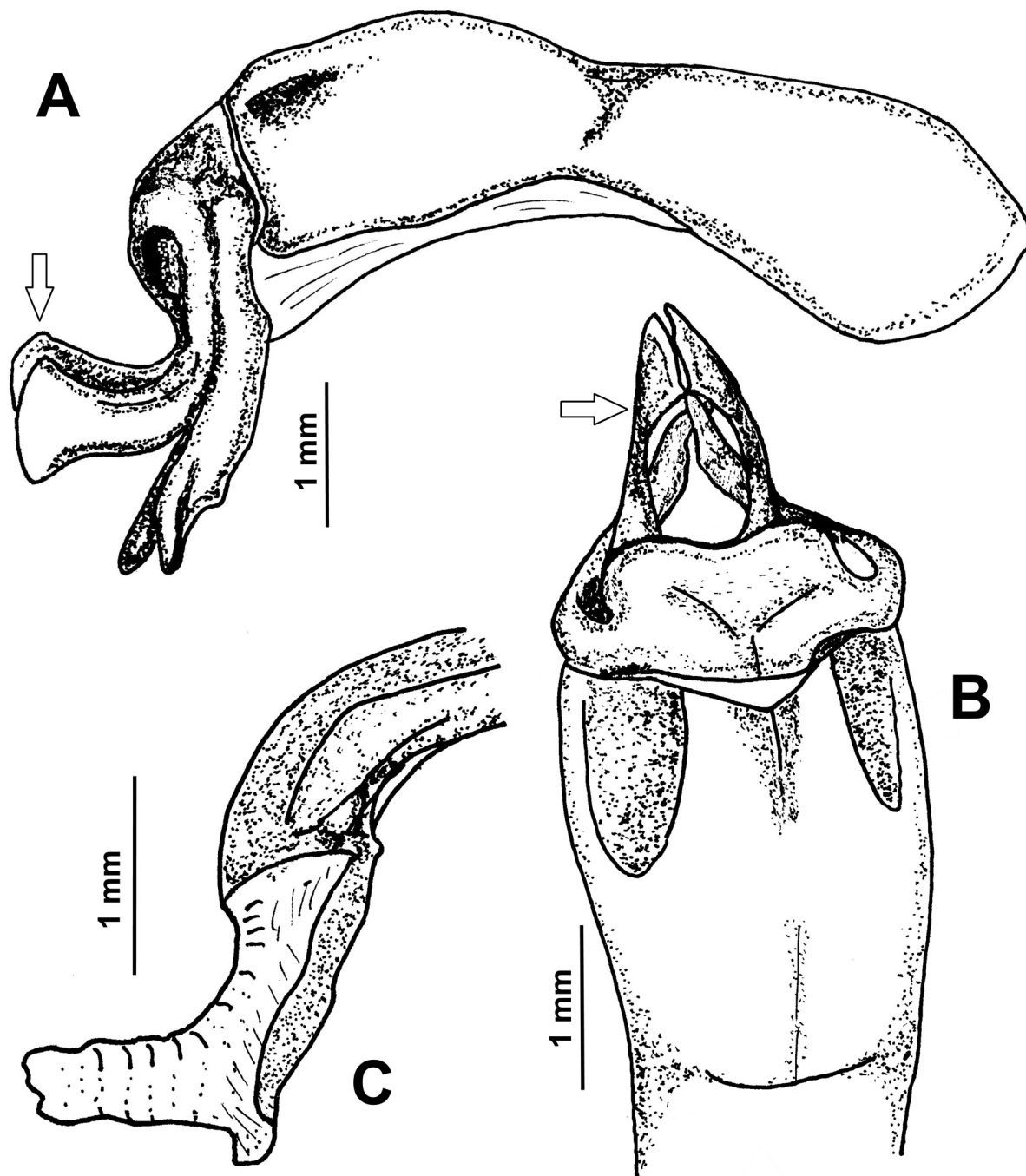


Figure 2. Genital capsule of *Phyllophaga badbunnyi*, n. sp. A) Lateral view. B) Dorsal view. C) Lateral view of aedeagus. Arrows indicate the finger-like dorsal projections of phallobase (*sensu* Morón 2003: 231).

lateral impression. Abdominal segment 5 widely convex, except at posterior transversal, almost smooth concavity and densely rugose and setose-puncturate posterolateral shallow and rounded concavity; setae of concavity whitish and long, forming a brush when seen laterally; anterior border of posterolateral concavity excavate at level of impression of fourth segment. Medial portion of fifth segment with minute rugose-punctures, denser posteriorly before transverse concavity. Anal plate narrow, medially concave, with minute and shallow rugose-punctures, surface with some long and short setae.

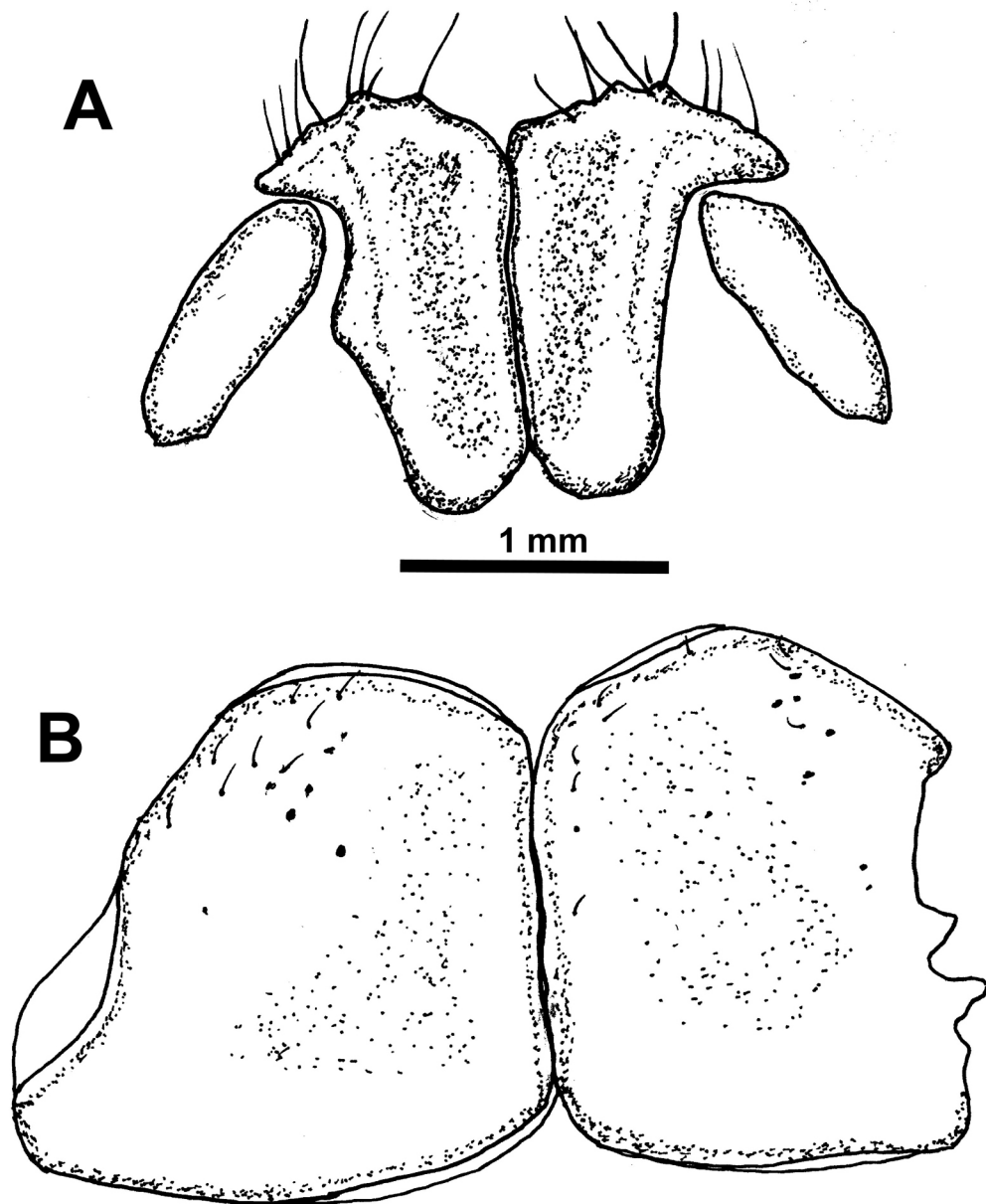


Figure 3. Genital plates of *Phyllophaga badbunnyi*, n. sp. A) Superior and lateral plates. B) Inferior plates (the right broken).

Legs. Protibiae tridentate, shorter than protarsus (1:1.13); protibial spur straight, with acute and slightly downward curved apex; longer than second segment of protarsus (1.2:1). Middle of external face of mesotibiae with a well-marked, crenulate, oblique, transverse keel, with 9 thorny setae arising from base in each crenulation. Proximal $\frac{1}{3}$ of mesotibiae with small and incomplete keel, with 2–3 thorny setae. Mesotibial spurs articulate, almost straight and with acute and slightly curved, apex; both spurs almost with the same length. Metatibiae shorter than metatarsus (1:1.26); middle of external face with a well-marked, crenulate, oblique, transverse keel, with 8 thorny setae arising from base in each crenulation. Proximal $\frac{1}{3}$ with only two thorny setae and two crenulations marked. Metatibial spurs articulate; superior elongated and slender, slightly curved and with rounded apex, longer than first segment of metatarsus; inferior spur $\frac{1}{3}$ length of superior, markedly curved and with apex acute, shorter than first segment of metatarsus. Pro- and meso-tarsal segments 1–4 with small spine on distal

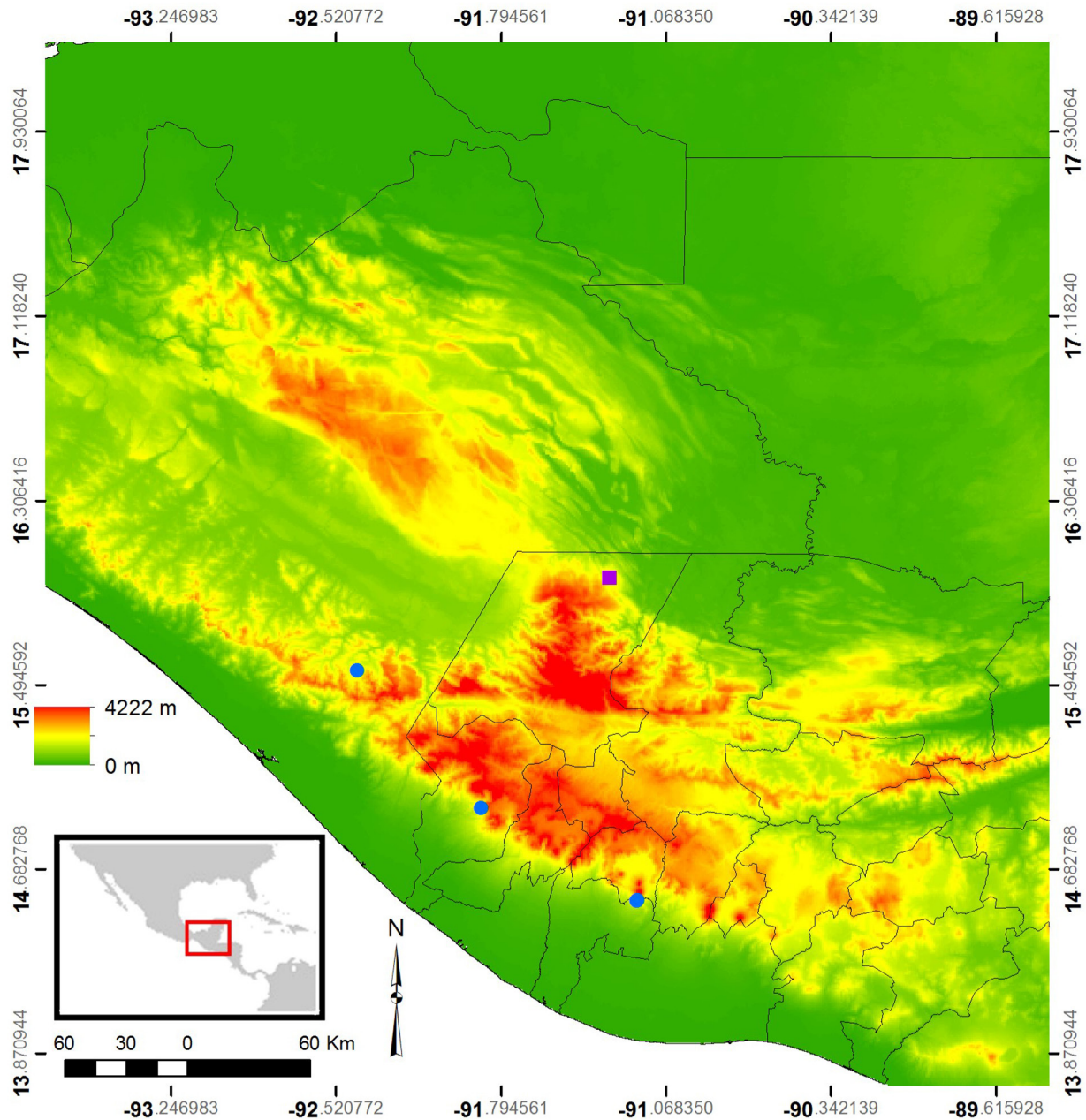


Figure 4. Collecting localities of the new species. Circles: *Phyllophaga badbunnyi* n. sp. Cano. Square: *Phyllophaga sechi* n. sp. Cano.

border; second protarsal segment shorter than first and same length as the third; first meso-tarsal segment longer and wider than second. Second metatarsal segment longer than first and segments 3–5; meta-tarsal segments 1–4 with row of ventral thorny setae, forming comb. All tarsal claws divided and equal; basal tooth ventrally almost as long as apical tooth; basal tooth closer to basal process than to apical tooth.

Genital capsule. Parameres in lateral view narrow, elongate and free at apex; angulate before thin, apical $\frac{1}{4}$; basally fused and with pair of superior projections in lateral view in form of “U”, with expanded apex (Fig. 2A). Tectum (Fig. 2A–B) separated from basal piece by constriction; dorsally with weakly marked wide keel, not extended over phallobase. Basal $\frac{2}{3}$ of aedeagus ventrally membranous and dorsally sclerotized and furrowed;

asymmetrical and partially coiled near level of apical $\frac{2}{3}$ to apex; apical $\frac{1}{3}$ containing a dorsal membranous tubular projection (Fig. 2C). Length of genital capsule from apex of parameres to end of basal piece: 6.9 mm.

Allotype. Female. Similar to holotype except as follows: pygidium scarcely convex, puncturate-rugose with longitudinal tumosity scarcely marked; fifth abdominal segment more plain; anal plate long and plain, puncturate-rugose. Metatibial spurs widened with rounded apex. Inferior genital plates rounded and separated, with few scattered minute setae (extreme of right plate broken in allotype); lateral plates present and irregularly oval; superior genital plates united at middle forming a longitudinal keel, apical border roughly dentate and with long setae, latero-basally excavated forming an apical lateral projection (Fig. 3). Total length of body: 24.5 mm. Humeral width: 11.1 mm.

Variation in paratypes. Males similar to holotype except as follows: old specimens without minute seta on frons, pronotum and elytra. Two female, teneral specimens with 10 long, yellowish setae on middle of frons and one female with tumosity of pygidium almost smooth. Males: total body length 23.98–27.74 mm ($\mu = 26.33$, $n = 6$), humeral width 10.54–12.21 ($\mu = 11.34$, $n = 6$). Females: total body length 25.98–29 mm ($\mu = 27.32$, $n = 6$), humeral width 11.05–12.04 ($\mu = 11.67$, $n = 6$).

Etymology. Named after the Puerto Rican urban singer and composer Benito Antonio Martínez, known as “Bad Bunny”. During the first weeks of the quarantine due to the SARS-CoV-2 I worked on the description of this new species listening to old and new works of the inspirational bunny.

Ecology and distribution. This species is known from cloud forests between 1500 and 1750 meters elevation, located at the southern slopes of the Sierra Madre de Chiapas and Guatemalan western volcanoes (Fig. 4). It has been collected at lights in February (1), March (19), April (5), May (2), June (6), August (2) and October (1).

Nomenclatural comments. Although unseen and unlabeled, I included the Siltepec paratype specimen of *P. alvareztoroi* Morón and Blas, as a paratype of *P. badbunnyi* **new species** according to article 72.4.1 of ICZN (1999), because the figures 6–8 are signed by Morón himself, in Morón and Blas (2006: 39), clearly indicate that it belongs to the new species here described.

Phyllophaga (Phyllophaga) sechi Cano, new species

(Fig. 4–6)

Type material. Holotype male. GUATEMALA: Huehuetenango, San José Maxbal, 1–5 VIII 2008, 1300m. 15.965805, –91.31645. Bosque nuboso. Trampa Metal Arc 400 + UV. Col. F. Camposeco (USAC). Paratypes (2 ♂, USAC), same data as holotype except 23-junio-2008, 1396m, 15.95805, –91.31645, luz UV, Col. Juan Tapia Tadero.

Type locality. Low altitude cloud forest near Laguna Maxbal, at the northern slopes of Sierra de los Cuchumatanes in Guatemala.

Diagnosis. *Phyllophaga sechi* **new species** (Fig. 5–6) is similar to *Phyllophaga acacoyahuana* (Fig. 7A) from which it can be easily separated by lack of a strong impression at anterior sides of pronotum, wider and shorter base of parameres, the notably laminated, finger-like dorsal projections of phallobase, and presence of a pair of ventral sclerotized plates of genital capsule. *Phyllophaga sechi* **new species** is probably the sister species of *P. acacoyahuana*.

Description. Dorsal coloration shiny reddish-brown to almost black, with some bluish reflections; epipleuron, elytral border and apex of elytra reddish-brown; ventral coloration of abdomen and metasternum dark reddish-brown; legs reddish-brown. Total length of body: 24.47 mm. Humeral wide: 10.14 mm.

Head. Clypeus short, 3.8 times wider than long, anterior border deeply and widely emarginate, anterior angles markedly rounded and moderately elevated; clypeal disc slightly rugose, concave towards lateral sides and slightly convex centrally, with circular shallow punctures mostly separated by at least one diameter, each puncture with a very minute, erect, whitish seta. Frontoclypeal suture marked and bisinuate, well-marked medially and projecting posteriorly occupying half of frons length. Frons 4.41 times wider than long, uniformly convex (except medially), with shallow and moderate circular punctures giving a slightly rugose aspect, each puncture with a very minute whitish, decumbent seta, except at sides with 2 (left) and 1 (right) small whitish setae; disc

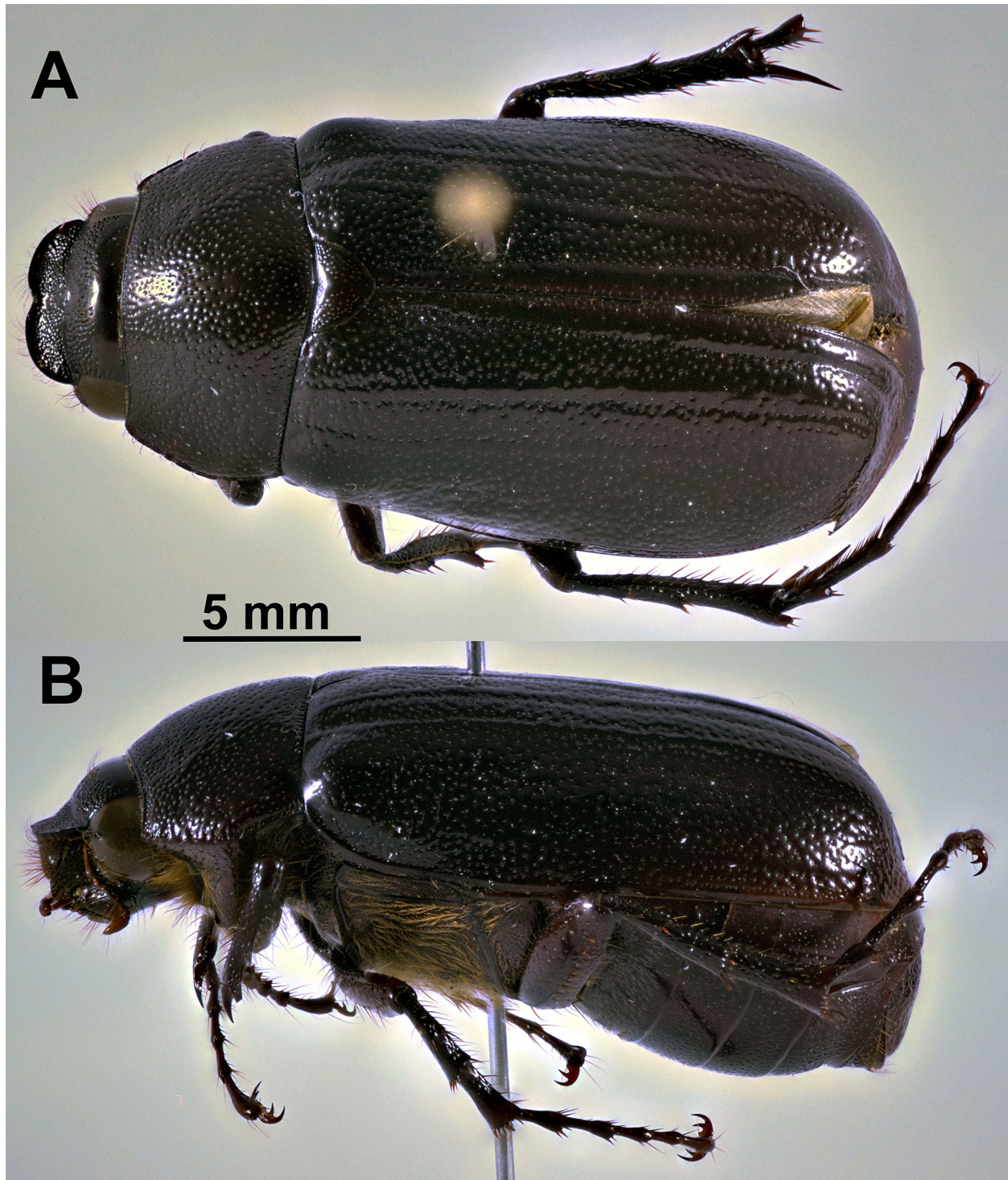


Figure 5. *Phyllophaga sechi* n. sp. A) Dorsal habitus. B) Lateral habitus.

with 7 long, yellowish setae, on strong and deeper punctures; vertex smooth. Antennae 10 segmented; segments 3 and 4 subcylindrical of equal length; segments 5 and 6 shorter and wide, with a rounded projection; segment 7 slightly shorter than 6 and very wide, with an acute projection; wide (length in most authors) of antennal club as the length of segments 3–5 combined, with segment 8 wider than 9 or 10. Interocular distance 11.25 mm, wide

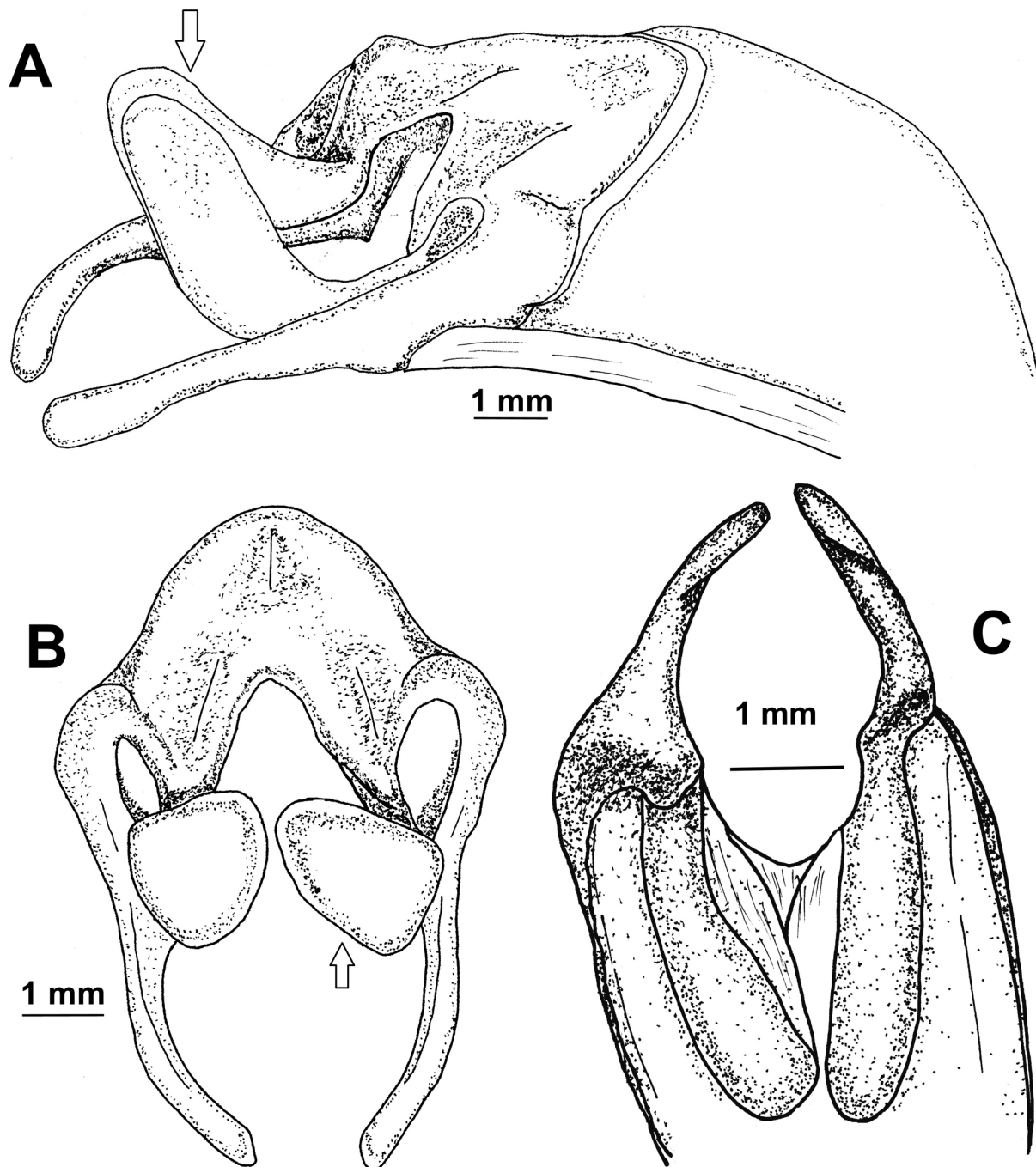


Figure 6. Genital capsule of holotype of *Phyllophaga sechi*, n. sp. **A)** Lateral view. **B)** Distal view. **C.** Ventral view. Arrows indicate the finger-like dorsal projections of phallobase (*sensu* Morón 2003: 231).

of each eye 1.95 mm. Ocular canthus short and narrow with 7–9 erect setae. Labrum bilobate, with anterior border deeply emarginated, with numerous erect setae on lateral borders. Labium longitudinally widely and deeply excavated, disc bare, with sparse long setae towards sides, anterior border emarginate.

Prothorax. Pronotum convex, 1.7 times wider than long. Anterior angles almost straight, slightly acute; posterior angles slightly obtuse. Lateral borders rounded, not angulate; marginal border very narrow and strongly

crenulated with scarce sparse setae; posterior border barely marked and evanescent at middle in front of scutellum and punctured-setose at sides. Disc with circular and deep punctures, irregularly distributed giving a rugose aspect, each puncture with a decumbent whitish-setae; punctures, denser and deeper towards antero-lateral border and near posterior border.

Pterothorax. Scutellum wider than long (1.4:1) with deep, irregular, punctures towards sides, each puncture with a decumbent, whitish seta; middle line marked only at posterior $\frac{1}{6}$; anterior border declivous. Elytra almost parallel and almost same wide than posterior margin of pronotum (at the level of humeri), slightly wider from anterior $\frac{1}{3}$ to apex; moderately rugose-punctured; punctures rounded on each with a minute, decumbent seta, only visible at great magnification; each elytron 2.7 times longer than wide. Elytral epipleura with scattered short yellow-whitish setae; epipleural keel progressively effacing from middle of the third abdominal segment to apex. Sutural costa elevated and well-marked, with scarce and disperse minute punctures, each puncture with a whitish decumbent minute seta; two marked, transversal, elevated and polished discal costae, arising near humeral callus, less marked at posterior $\frac{1}{4}$ where fuse with the apical callus; lateral costae behind humeral callus, polished and unmarked at anterior $\frac{1}{4}$. Humeral callus prominent and rounded; apical callus wide, rounded moderately prominent. Pterosternum densely punctured-rugose, each puncture with a long, yellowish setae, giving a hairy aspect.

Abdomen. Prepygidium with a small excavation continued with fifth abdominal segment of venter, at the level of posterior spiracle. Pygidium 1.6 times wider than long, convex and shiny, punctured-rugose, punctures wider at disc, each puncture with a whitish minute seta; disc with a longitudinal and smooth keel; apical border with punctures with long, yellowish setae. Abdominal segments 2–4 widely convex; segment 2 with moderately abundant small and shallow punctures, each containing a short decumbent yellowish seta; segments 3–4 similar to preceding but with a longitudinal lateral impression excavated anteriorly and punctures with minute setae (except medially with scarce, small setae). Abdominal segment 5 widely convex, except by posterior transversal, almost smooth concavity, and densely setose-punctured posterolateral shallow and rounded concavity; posterolateral concavity with whitish and minute setae together with some scattered short setae; anterior border of posterolateral concavity excavated at level of impression of fourth segment. Medial portion of fifth segment with small rugose-punctures, denser posteriorly before transverse concavity. Anal plate narrow, medially concave and with minute and shallow rugose-punctures, surface with some long and short setae.

Legs. Protibiae tridentate, shorter than protarsus (1:1.16); protibial spur straight, with acute and slightly curved downward apex; longer than second segment of protarsus (1.3:1). Middle of external face of mesotibiae with a well-marked, crenulated, oblique, transversal keel, with 8–9 thorny setae arising from base in each crenulation. Proximal $\frac{1}{3}$ of mesotibiae with a small and incomplete keel, with 3 thorny setae. Mesotibial spurs articulate, almost straight and with acute and slightly curved, apex; both spurs almost with the same length. Metatibiae shorter than metatarsus (1:1.26); middle of external face with a well-marked, crenulate, oblique, transversal keel, with 6–7 thorny setae arising from the base in each crenulation. Proximal $\frac{1}{3}$ with 2–3 thorny setae and 2–3 crenulations marked. Metatibial spurs articulated; superior elongated and slender, slightly curved and with acute apex, longer than first segment of metatarsus; inferior spur at least $\frac{1}{2}$ the length of superior, markedly curved and with apex acute, shorter than first segment of metatarsus. Pro- and meso-tarsal segments 1–4 with a small spine on distal border, shorter in fourth; second protarsal segment shorter than first and same length as third; first meso-tarsal segment longer and wider than second. Second metatarsal segment longer than first and the segments 3–5; meta-tarsal segments 1–4 with a row of ventral thorny setae, forming a comb. All tarsal claws divided and equal; basal tooth ventrally reaching same level of apical tooth; basal tooth closer to basal process than to apical tooth.

Genital capsule. Parameres in lateral view narrow, elongated and free at apex; angulate before clavate, apical $\frac{1}{4}$; basally fused and phallobase with a pair of superior finger-like laminated and convergent projections (Fig. 6A–B). Ventral membrane of genital capsule with sclerotized plates connected to parameres (Fig. 6C). Tectum prominent and separated from basal piece by a constriction. Aedeagus sclerotized, asymmetrical and long, dorsally membranous.

Variation. Frons of male paratypes with 10 long, yellowish setae and lacking small whitish setae at sides. One reddish-brown specimen with soft genital capsule (teneral). Total length 24.5–25.92 mm, humeral width 10.75–10.91 mm.

Female. Unknown.

Etymology. Named after the Panamanian urban singer and composer Carlos Isaías Morales, known as “Sech”. The new species was detected during the livestream concert #coronavibras, during the first week of quarantine of my laboratory, to protect from SARS-CoV-2.

Ecology and distribution. This species is known only from two close sites at the lowland cloud forest near the Laguna Maxbal in Huehuetenango (Fig. 4). Other species of the Schizorhina group collected at the same site were *Phyllophaga javepacuana* Morón and *P. mentalis* Saylor.

Key to the species of subgroup 2 of the Schizorhina species group of *Phyllophaga* s. str. known from Chiapas, México and Guatemala

1. Finger-like dorsal projections of phallobase turned downward at apical $\frac{1}{3}$ or $\frac{1}{2}$ (Fig. 7C–D) 2
- Finger-like dorsal projections of phallobase turned upward at apical $\frac{1}{3}$ or $\frac{1}{2}$ (Fig. 1A, 6A–B, 7A–B) . . . 3
2. Sides of segments 1–5 of abdomen with a row of strong short setae; prepygidium with a deep strong sulcus running between the posterior spiracles. Lowland cloud forest *Phyllophaga javepacuana* Morón, 2003
- Sides of segments 1–5 of abdomen bare; prepygidium with a shallow sulcus running between the posterior spiracles. Tropical rain forest *Phyllophaga ginigra* Saylor, 1940
3. Ventral membrane of genital capsule with sclerotized plates connected to the parameres (Fig. 6C); finger-like dorsal projections of phallobase laminated (Fig. 6A–B). Disc of frons with several long setae *Phyllophaga sechi* Cano, n. sp.
- Ventral membrane of genital capsule without sclerotized plates; finger-like dorsal projections of phallobase thin or expanded at most at apical $\frac{1}{2}$. Disc of frons rarely with long setae 4
4. Tectum of genital capsule projected over the phallobase (Fig. 7B) *Phyllophaga alvareztoroi* Morón and Blas, 2006
- Tectum of genital capsule not projected over the phallobase 5
5. Anterolateral sides of pronotum with an impression. Phallobase (Fig. 7A) in dorsal view elongated and deeply intruding into tectum, forming a marked “V”; finger-like dorsal projections of phallobase almost clavate at apical $\frac{1}{3}$ *Phyllophaga acacoyahuana* Morón and Blas, 2006
- Anterolateral sides of pronotum without an impression. Phallobase (Fig. 2A–B) in dorsal view short, slightly intruding into tectum forming a very wide “V”; finger-like dorsal projections of phallobase widely expanded at apical $\frac{1}{3}$ *Phyllophaga badbunnyi* Cano, n. sp.

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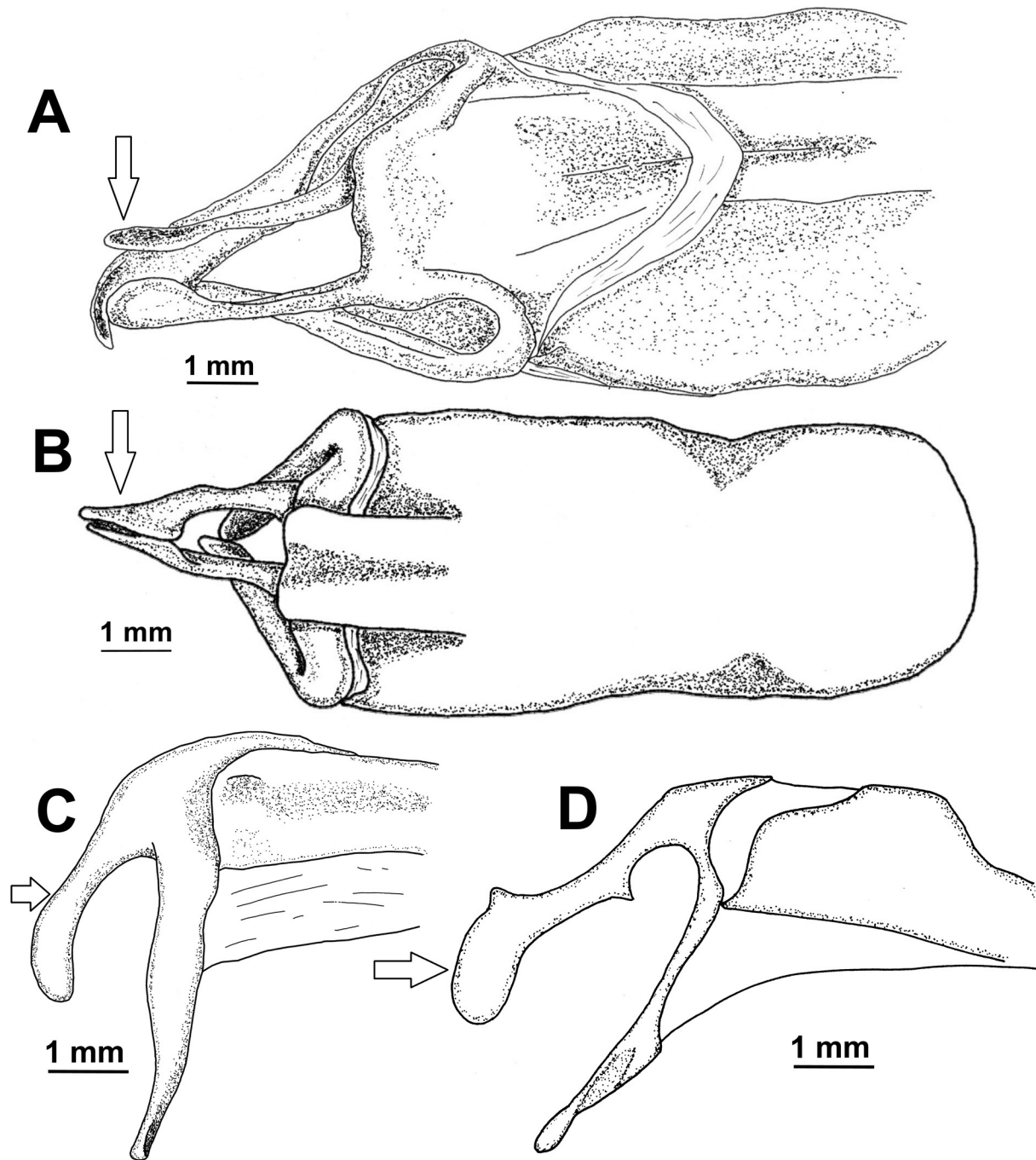


Figure 7. Genital capsule of species of *Phyllophaga* of Schizorhina subgroup 2, from Chiapas, México and Guatemala. **A)** *P. acacoyahuana*, dorsolateral view. **B)** *P. alvareztoroi*, dorsal view, redrawn from Morón and Blas (2006). **C)** *P. ginigra*, lateral view. **D)** *P. javepacuana*, lateral view. Arrows indicate the finger-like dorsal projections of phallobase (*sensu* Morón 2003: 231).

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