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Three new species of *Onthophagus* Latreille, 1802 from Bioko Island, Equatorial Guinea, belonging to d'Orbigny's group IX, with a taxonomic note on *O. denudatus* d'Orbigny, 1902 (Coleoptera: Scarabaeidae: Scarabaeinae: Onthophagini)

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Abstract

Three new dung beetle species (*Onthophagus basilensis* Génier **sp. nov.**, *O. castus* Génier **sp. nov.**, *O. larseni* Génier **sp. nov.**) are described from Bioko Island, Equatorial Guinea, and assigned to d'Orbigny's group IX. Specimens were collected in montane and lowland rainforest using dung-baited pitfall traps. Diagnostic characters, including male genitalia and intraspecific variation, are provided. A review of related taxa indicates that *O. denudatus* d'Orbigny, 1902 and *O. denudatus endroedii* Frey, 1973 are distinct, sympatric species separable by external characters and parameral morphology, with no intermediates; *Onthophagus endroedii* is therefore reinstated as a valid species. These findings highlight the island's still underexplored Scarabaeinae fauna and emphasize the importance of continued taxonomic surveys and reassessment of species boundaries within the group.

Key words: dung beetles, Afrotropical region, Gulf of Guinea islands, Cameroon Volcanic Line, island biodiversity, taxonomy

Introduction

Bioko Island, located in the Gulf of Guinea approximately 36 km off the coast of Cameroon, forms part of the Cameroon Volcanic Line and represents the northernmost island of this chain. Although it lies close to the African mainland and was connected to it during periods of lower sea level in the late Pleistocene, its subsequent isolation following post-glacial sea-level rise approximately 10 000–12 000 years ago (Ceríaco *et al.* 2022) and complex topography, culminating in Pico Basilé at 3011 m, have contributed to the development of a distinctive biota. The Gulf of Guinea oceanic islands are widely recognized as biogeographically important due to their exceptionally high levels of endemism and the distinctive composition of their flora and fauna (Ceríaco *et al.* 2022).

Despite its recognized biogeographical importance, the beetle fauna of Bioko remains poorly documented. Most available records are based on scattered historical collections and occasional taxonomic studies rather than comprehensive faunistic surveys. As a result, several beetle groups have only recently been recorded or remain represented by very few species in the literature. For example, the first Hydraenidae reported from Bioko were described only recently, illustrating the still fragmentary knowledge of the island's coleopteran fauna (Hernando & Ribera 2017). Likewise, faunistic information for many beetle families in the Gulf of Guinea islands remains sparse and often derived from isolated taxonomic treatments or museum material (Zoia 2015). These examples highlight the incomplete state of knowledge of the island's Coleoptera diversity.

Dung beetles (Scarabaeidae: Scarabaeinae) play essential ecological roles in tropical ecosystems through dung removal, nutrient cycling, and secondary seed dispersal (Nichols *et al.* 2008), yet their diversity on Bioko has only begun to be documented. A recent survey along an elevational gradient provided the first baseline data for the island, revealing a community of at least 32 species and emphasizing the need for additional taxonomic and faunistic work (Sukhdeo *et al.* 2019). During a recent survey of dung beetles on Bioko established by T. Larsen, more than

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5,800 specimens were collected and subsequently studied by the author. The material represents about 60 species; a comprehensive faunistic treatment of this assemblage will be presented in a future contribution.

The present contribution adds to the knowledge of Bioko's poorly documented insect fauna by describing three new species of Scarabaeinae collected on the island. These findings further highlight the incomplete state of taxonomic knowledge for Bioko and underscore the importance of continued exploration of its biodiversity.

Material and Methods

The 108 specimens of the new species studied here were collected during recent fieldwork (2024) conducted by Trond Larsen as part of a Conservation International (CI) Rapid Assessment Program (RAP) on Bioko Island and at one locality in Wele-Nzas Province in continental Equatorial Guinea. All species described herein originate from Bioko Island. Procedures for the dissection and preparation of genitalia follow Génier & Moretto (2017).

Metadata for examined material and species descriptions were compiled and generated using the Mantis database (Naskrecki & Génier 2024, *Mantis: A Manager of Taxonomic Information and Specimens*, version 2.9.2). The holotype metadata are cited verbatim, with "||" indicating separate labels and "|" separating lines of text within a label. Unless otherwise stated, labels are printed on white paper. Missing or additional information in type data and in the material examined is indicated in square brackets "[]".

The specimens examined are deposited in the following institutions:
CMNC—Canadian Museum of Nature, Gatineau, QC, Canada;
FGIC—François Génier, personal collection, Gatineau, QC, Canada;
JFJC—Jean-François Josso, personal collection, Muzillac, France;
MNHN—Muséum national d'Histoire Naturelle, Paris, France;
NHMUK—The Natural History Museum, London, United Kingdom;
PMOC—Philippe Moretto, personal collection, Toulon, France.

Taxonomy

The three species will key to species group IX (Génier 2026) and share the following combination of characters: clypeal margin toothless; vertexal carina present, simple, straight or broadly arcuate in dorsal view, positioned slightly anterior to eye mid-distance; lateral pronotal margin straight from widest point to posterior angle in lateral view; dorsal surface glabrous, with only minute squamiform setae visible at ~80× magnification.

Onthophagus (*sensu lato*) *basilensis* Génier sp. nov.

https://zoobank.org/urn:lsid:zoobank.org:act:71E043EB-8DA4-448D-A007-943C578FB0B7
(Figs. 1–8, 25)

Type locality. 13.3 km S on Camino al Pico Basilé (03°38.14'N 08°49.19'E, 1600 m.), Bioko Norte, Equatorial Guinea

Type material. Holotype ♂ (CMNC): || EQU. GUINEA: BIOKO NORTE | 13.3 km S on Camino al Pico Basilé | 03°38.14'N 08°49.19'E, 1600 m. | 29.I.2024, secondary montane | forest, pitfall trap 4: human dung | T. Larsen, GNQ2024-132 ||; WORLD | SCARAB. | DATABASE | WSD00052922 || [Data Matrix label]; || HOLOTYPE ♂ | *Onthophagus* | *basilensis* | Dés. F. Génier, 2026 || [red card].

Paratypes (21 ♂♂, 29 ♀♀). EQUATORIAL GUINEA: BIOKO NORTE, 13.3 km S on Camino al Pico Basilé, 1600 m, 03°38'N, 008°49'E, 29.i.2024, secondary montane forest, pitfall trap 1: human dung, T. Larsen, (GNQ2024-129)—2 ♂♂, 6 ♀♀ paratypes (FGIC); same locality, 29.i.2024, secondary montane forest, pitfall trap 2: human dung, T. Larsen, (GNQ2024-130)—3 ♂♂, 4 ♀♀ paratypes (FGIC), 1 ♂, 1 ♀ paratypes (MNHN); same locality, 29.i.2024, secondary montane forest, pitfall trap 3: human dung, T. Larsen, (GNQ2024-131)—2 ♂♂ paratypes (FGIC); same locality, 29.i.2024, secondary montane forest, pitfall trap 4: human dung, T. Larsen, (GNQ2024-

132)—♀ allotype (CMNC), 4 ♂♂, 6 ♀♀ paratypes (FGIC), 1 ♂, 1 ♀ paratypes (NHMUK), 1 ♂, 1 ♀ paratypes (PMOC); same locality, 29.i.2024, secondary montane forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-133)—1 ♀ paratype (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 1: human dung, T. Larsen, (GNQ2024-134)—1 ♂, 1 ♀ paratypes (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 2: human dung, T. Larsen, (GNQ2024-135)—4 ♂♂, 1 ♀ paratypes (FGIC), 1 ♂, 1 ♀ paratypes (JFJC); same locality, 30.i.2024, secondary montane forest, pitfall trap 3: human dung, T. Larsen, (GNQ2024-136)—1 ♀ paratype (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 4: human dung, T. Larsen, (GNQ2024-137)—2 ♀♀ paratypes (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-138)—1 ♂, 2 ♀♀ paratypes (FGIC).

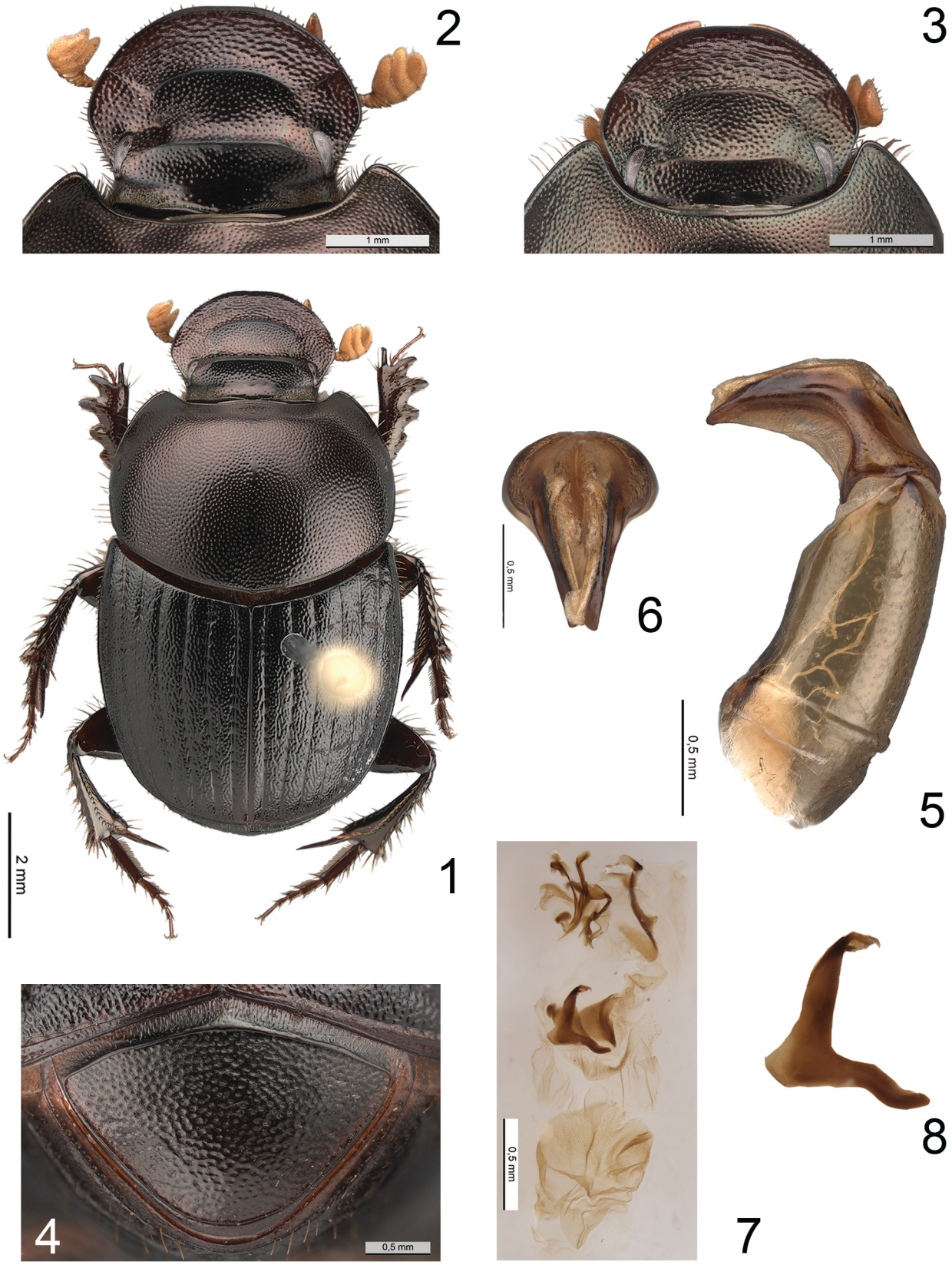
Description. Male holotype (Fig. 1). **Body.** Length 8.3 mm, maximum width 4.7 mm. Body elongate in dorsal view, dorsum slightly convex. **Color.** Dorsal surface uniformly black, with faint reddish metallic sheen on head and pronotum; elytra black; ventrum dark brown to black; pygidium black; legs dark brown to black. **Pubescence.** Dorsal surface mostly glabrous; pubescence present on elytral epipleuron only, semi-erect; setae simple, fine, fulvous. **Head.** Clypeal margin broadly arcuate, slightly truncate at median fifth (Fig. 2); clypeal marginal bead indistinct laterally; clypeal surface with dense, moderately sized punctures forming transverse rugulae anteriorly; clypeofrontal carina simple, broadly arcuate, reaching clypeogenal suture laterally, situated at midlength between anterior clypeal margin and vertexal carina; dorsal edge of clypeofrontal carina straight in frontal view. Clypeogenal suture distinct. Vertex with simple, straight carina, tapering to internal margin of eye, aligned with midlength of eye; vertexal surface with fine, dense punctures. Eyes very small in dorsal view; eye length/width ratio 2.7, interocular distance/eye width ratio 17.2. Genal surface with fine, dense punctures; genal margin subangular medially. Interpunctural surface glossy. Antennae with nine antennomeres; antennal club fulvous. **Pronotum.** Pronotum transverse in dorsal view; width/length ratio along midline 1.5. Surface with fine, dense punctures throughout, punctures separated by less than one puncture diameter; interpunctural surface glossy. Disc evenly convex, anterior portion sloping behind head insertion. Lateral pronotal fossae indistinct. Surface adjacent to posterior angles simply convex, punctation and sculpturing similar to disc. Lateral margin feebly arcuate between widest point and anterior angle in dorsal view, straight between widest point and posterior angle in lateral view. Posterior marginal bead fine, interrupted over short distance laterally. Anterior hypomeral depression nearly flat; anterior hypomeral carina distinct, interrupted before lateral margin. **Elytra.** Elytra slightly transverse; combined width/length ratio 1.2. Elytral striae distinct, wide; strial punctures strongly impressed, strial edges slightly encroaching on interstriae, punctures separated by 3–5 puncture diameters. Elytral stria 7 slightly sinuous. Interstriae slightly convex; interpunctural surface glossy; interstriae with fine, dense punctures forming distinct longitudinal rugulae, irregularly arranged (Fig. 25). **Pygidium.** Pygidium moderately large, transverse (Fig. 4); width/length ratio 1.5. Basal carina well defined, broadly arcuate. Surface entirely punctate; punctures simple, fine, dense, separated by about one puncture diameter. Interpunctural surface with coarse microsculpture on basal half. **Legs.** Protibia with four teeth on lateral margin; apical margin forming obtuse angle with internal margin; apicointernal angle with small conical process. Protibial spur as long as lateral apical tooth, bent internally on apical third. **Male genitalia.** Phallobase 1.5× longer than parameres in lateral view; apicoventral surface unmodified; basolateral paramerites absent. Parameres long, apex acute in lateral view (Fig. 5), tapering dorsoventrally in caudal view (Fig. 6); surface glossy. Copulatory endophallite fragmented; main element trifid (Fig. 7–8).

Measurements (22 ♂♂, 29 ♀♀). Body length: male 6.7–8.5 (7.6 ± 0.5), female 6.0–8.3 (7.6 ± 0.6) mm.

Variation. Females differ from males, in addition to the usual secondary sexual characters in *Onthophagus* (clypeal surface with distinct transverse rugulae; sixth abdominal ventrite not medially compressed; pygidium shorter), by a slightly narrower transverse carina on the vertex (Fig. 3) and a weakly, evenly convex anterior pronotal declivity. Variation is mainly in the metallic sheen of the head and pronotum, which may be absent in some specimens or strong in others.

Differential diagnosis. *Onthophagus basilensis* **sp. nov.** keys to *O. depilis* d'Orbigny, 1902 (couplet 4.(5), p. 163) in d'Orbigny's synopsis (d'Orbigny 1913). It differs from *O. depilis* by the coarser elytral punctation forming more or less distinct longitudinal rugulae (Fig. 25) (punctation finer and not forming irregular rugulae in *O. depilis*; Fig. 29), and by the simpler structure of the main element of the copulatory endophallite (Fig. 8) (distinctly more complex in *O. depilis*; Fig. 33).

Among species described after d'Orbigny's synopsis that also key to couplet 4.(5), it differs from *O. bakweri* Moretto, 2014 by the simple elytral punctation (punctures shallower and the elytral surface largely covered with



FIGURES 1–8. *Onthophagus basilensis* Génier **sp. nov.**, male holotype unless stated otherwise. 1, habitus, dorsal; 2, head, dorsal; 3, head, dorsal, female allotype; 4, pygidium, caudal; 5, aedeagus, lateral; 6, parameres, caudal; 7, endophallites, lateral; 8, main element of copulatory endophallite, lateral.

strong microsculpture in *O. bakweri*; Fig. 24); from *O. bordati* Moretto, 2014 by the larger elytral punctation forming more or less distinct longitudinal rugulae (punctation finer, more scattered, and the elytral surface flat in *O. bordati*; Fig. 26); and from *O. larseni* **sp. nov.** by the coarser elytral punctation forming more or less distinct longitudinal rugulae (punctation finer, more scattered, and not forming irregular rugulae in *O. larseni*; Fig. 28).

Distribution. Equatorial Guinea (Bioko).

Etymology. The specific epithet *basilensis* is a Latin toponymic adjective referring to the type locality, Pico Basilé, indicating that the species originates from this location.

Natural history. All specimens were obtained from pitfall traps baited with human dung and installed at 1600 m elevation in secondary montane rainforest. Traps operated continuously for two days, under unusually dry environmental conditions at the time of sampling (Trond Larsen, personal communication).

Remarks. *Onthophagus basilensis* belongs to a group of species (*O. bakweri*, *O. bordati*, *O. depilis*, *O. larseni* **sp. nov.**) characterized by long, recurved parameres tapering to a point and by the general configuration of the copulatory endophallite, which consists of three more or less disjunct elements, the main element being roughly tricuspid in shape (Figs. 7, 22, 32). The external morphology of *Onthophagus denudatus* d'Orbigny, 1902 is very similar to that of species in this group, but the parameres are of a different type (Moretto 2014).

Onthophagus (*sensu lato*) *castus* Génier sp. nov.

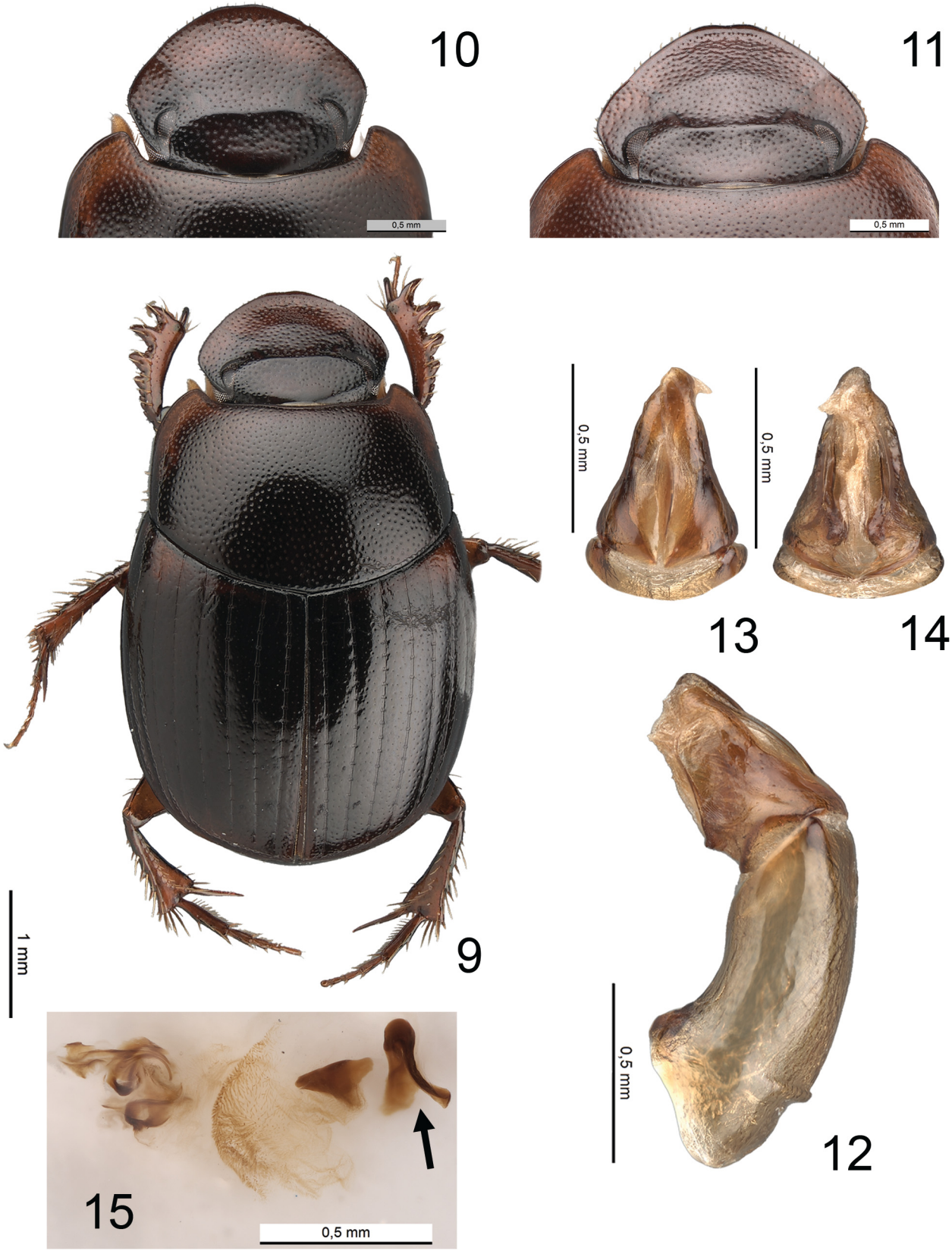
https://zoobank.org/urn:lsid:zoobank.org:act:5A35A5A9-0E6B-4079-830C-F5F709E2EDDD
(Figs. 9–15)

Type locality. Hormigas Camp (03°19.46'N 08°28.69'E, 490 m.), Gran Caldera de Luba Scientific Reserve, Bioko Sur, Equatorial Guinea

Type material. Holotype ♂ (CMNC): || EQU. GUINEA: BIOKO SUR | Hormigas Camp, Gran Cald. Luba | Sci.Res., 03°19.46'N 08°28.69'E | 490 m., 14.I.2024, prim. pre-mount. | forest, pitfall trap 3: human dung | T. Larsen, GNQ2024-043 ||; WORLD | SCARAB. | DATABASE | WSD00053008 || [Data Matrix label]; || HOLOTYPE ♂ | *Onthophagus* | *castus* | Dés. F. Génier, 2026 || [red card].

Paratypes (1 ♂, 2 ♀♀). EQUATORIAL GUINEA: BIOKO SUR, Hormigas Camp, Gran Caldera de Luba Scientific Reserve, 490 m, 14.i.2024, primary pre-mountain forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-045)—1 ♀ paratype (FGIC); same locality, 16.i.2024, primary pre-mountain forest, pitfall trap 3: human dung, T. Larsen, (GNQ2024-063)—1 ♂ paratype (FGIC); same locality, 16.i.2024, primary pre-mountain forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-065)—♀ allotype (CMNC).

Description. Male holotype (Fig. 9). **Body.** Length 4.2 mm, maximum width 2.6 mm. Body oval in dorsal view, dorsum convex. **Color.** Dorsal surface dark brown, lacking metallic sheen; head with anterior portion of clypeus and gena brown, remaining surface dark brown; pronotum with anterior angles brown, remaining surface dark brown; elytra dark brown, with small brown spot on sixth and seventh interstriae basally; ventrum dark brown to black; pygidium dark brown; legs brown. **Pubescence.** Dorsal surface mostly glabrous; pubescence present as a single row on elytral epipleuron only. **Head.** Clypeal margin subangular, truncate at median sixth (Fig. 10); clypeal marginal bead absent; clypeal surface finely punctate throughout, interpunctural surface glossy; clypeofrontal carina absent; clypeogenal suture absent. Vertex with simple, straight carina, slightly anterior to midlength of eye; vertexal surface finely punctate, punctures separated by 4–5 puncture diameters. Eyes very small in dorsal view; eye length/width ratio 2.7, interocular distance/eye width ratio 7.8. Genal surface with fine punctures separated by 4–5 puncture diameters; genal margin subangular medially. Antennae with eight antennomeres; antennal club fulvous. **Pronotum.** Pronotum transverse in dorsal view; width/length ratio along midline 1.7. Surface with fine punctation throughout; punctures simple, separated by 2–3 puncture diameters; interpunctural surface glossy. Disc evenly convex; anterior portion simply convex. Lateral pronotal fossae indistinct. Surface adjacent to posterior angles simply convex, punctation and sculpturing similar to disc. Lateral margin simply arcuate between widest point and anterior angle in dorsal view, straight between widest point and posterior angle in lateral view. Posterior marginal bead finely carinate throughout. Anterior hypomeral depression concave; anterior hypomeral carina distinct, reaching lateral pronotal margin. **Elytra.** Elytra slightly transverse; combined width/length ratio 1.2; widest at basal third in dorsal view. Elytral striae distinct, moderately broad; strial punctures strongly impressed, strial edges slightly encroaching on interstriae, punctures separated by 4–5 puncture diameters. Elytral stria 7 very broadly arcuate. Interstriae weakly



FIGURES 9–15. *Onthophagus castus* Génier **sp. nov.**, male holotype unless stated otherwise. 9, habitus, dorsal; 10, head dorsal; 11, head dorsal, female paratype; 12, aedeagus, lateral; 13, parameres, dorsal; 14, parameres, ventral; 15, endophallites, lateral.

convex; interstriae finely and evenly punctate, punctures regularly spaced but irregularly arranged; interpunctural surface glossy. **Pygidium.** Pygidium moderately large, transverse; width/length ratio 1.6. Basal carina well defined, broadly arcuate. Surface entirely punctate; punctures simple, moderately large, separated by about one puncture diameter. Interpunctural surface glossy. **Legs.** Protibia with four teeth on lateral margin; apical margin forming an obtuse angle with internal margin; apicointernal angle bearing a small conical process. Protibial spur approximately as long as lateral apical tooth, regularly bent downward. **Male genitalia.** Phallobase 1.7× longer than parameres in lateral view (Fig. 12); apicoventral surface unmodified; basolateral paramerites absent. Parameres obliquely truncated apically, with small teeth on basal third of ventral surface in lateral view; tapering dorsoventrally in caudal view (Fig. 13), apex truncated. Surface mostly glossy, with localized microsculpture adjacent to ventral teeth (Fig. 14). Copulatory endophallite fragmented; main element angular (Fig. 15, arrow).

Measurements (2 ♂♂, 2 ♀♀). Body length: male 4.2–4.5 (4.4 ± 0.2), female 4.6–4.8 (4.7 ± 0.1) mm.

Variation. Females are very similar to males, differing mainly in having the clypeal punctures more or less confluent (Fig. 11), while the vertexal transverse carina is identical to that of males. Intraspecific variation is mostly limited to the darkness of the brown coloration, which is nearly black in older specimens and light brown in teneral individuals, and to the extent of the lighter pronotal and elytral spots. The four specimens examined are quite similar.

Differential diagnosis. As for *Onthophagus pooensis* Cambefort & Nicolas, 1991, this species exhibits ambiguous characters that do not match perfectly with any currently recognized species group characterized by simple pronotal punctation. It nevertheless appears to be somewhat related to *O. pooensis*, which is presently placed in d'Orbigny's species group IX. As in *O. pooensis*, the very broadly arcuate or nearly straight seventh elytral stria, combined with the entirely glabrous dorsal surface and the absence of a frontal carina in the male, separates it from all other species of group IX. The presence of pale markings on the pronotum and elytra (Fig. 9), together with the absence of a setal row on the lateral elytral interval along the pseudepipleural carina (Fig. 9), distinguishes it from *O. pooensis*.

Distribution. Equatorial Guinea (Bioko).

Etymology. Etymology. The specific epithet *castus* is derived from Latin, meaning "pure" and refers to the species' simple, unornamented appearance and sober coloration.

Natural history. All specimens were collected using pitfall traps baited with human dung at Hormigas Camp, located in pre-mountain rainforest.

Remarks. *Onthophagus castus* **sp. nov.** appears closely related to *O. pooensis* based on external characters. However, the parameres differ between the two species. In lateral view, the parameres are tapering toward the apex in *O. castus* (Fig. 12), whereas they are widening toward the apex in *O. pooensis*. In caudal view, the parameres are symmetrical in *O. castus*, whereas they are asymmetrical in *O. pooensis*. The original description of *O. pooensis* provides no detailed account of parameres morphology, and the available figures (two general views) do not illustrate this condition; this character state is therefore documented here for the first time based on examined material.

Onthophagus (sensu lato) larseni Génier sp. nov.

https://zoobank.org/urn:lsid:zoobank.org:act:8D46269A-837A-4C3F-BB4C-E6437DB29573
(Figs. 16–23, 28)

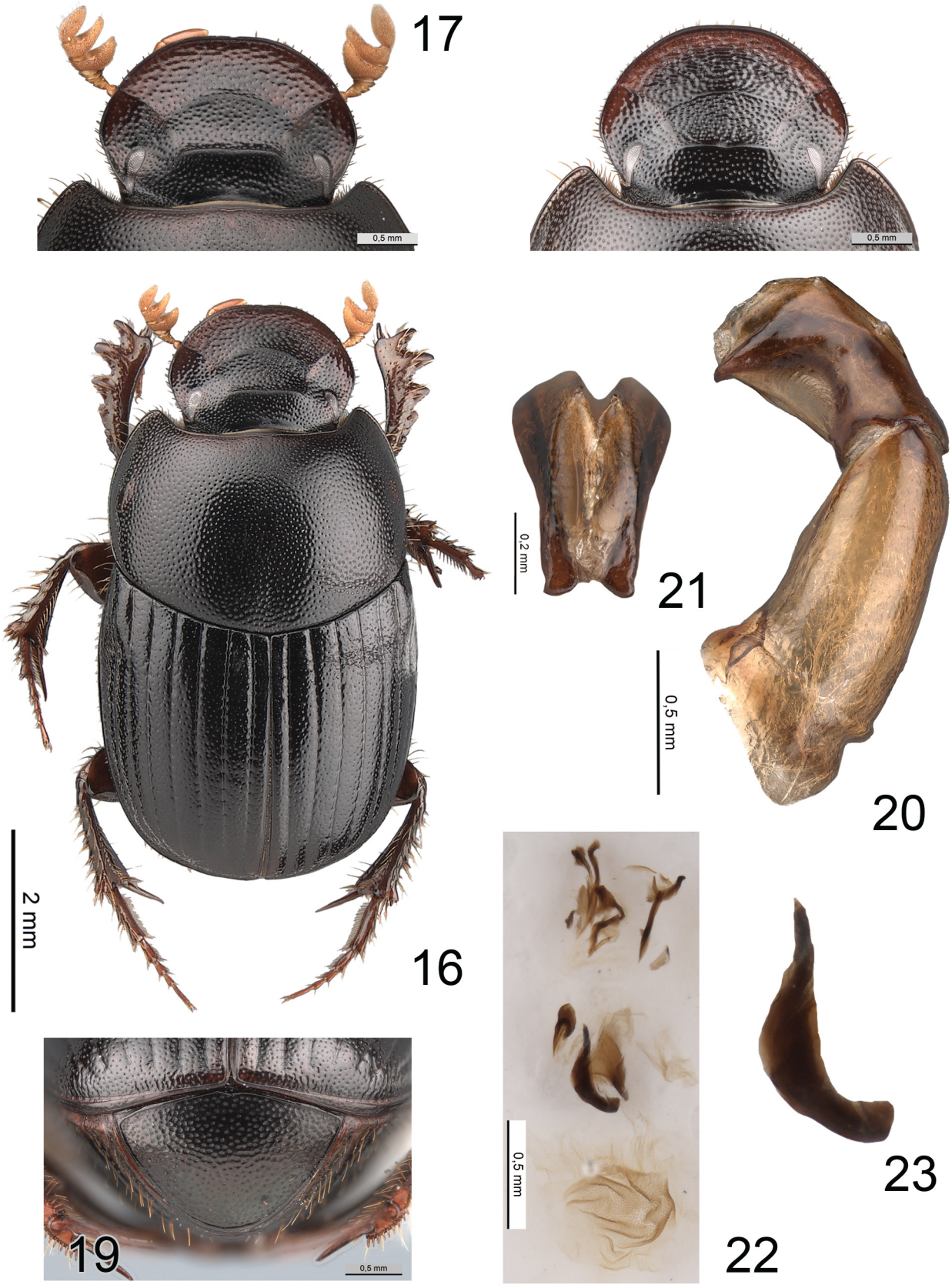
Type locality. 13.3 km S on Camino al Pico Basilé (03°38.14'N 08°49.19'E, 1600 m.), Bioko Norte, Equatorial Guinea.

Type material. Holotype ♂ (CMNC): || EQU. GUINEA: BIOKO NORTE | 13.3 km S on Camino al Pico Basilé | 03°38.14'N 08°49.19'E, 1600 m. | 30.I.2024, secondary montane | forest, pitfall trap 1: human dung | T. Larsen, GNQ2024-134 ||; WORLD | SCARAB. | DATABASE | WSD000529872 || [Data Matrix label]; || HOLOTYPE ♂ | *Onthophagus* | *larseni* | Dés. F. Génier, 2026 || [red card].

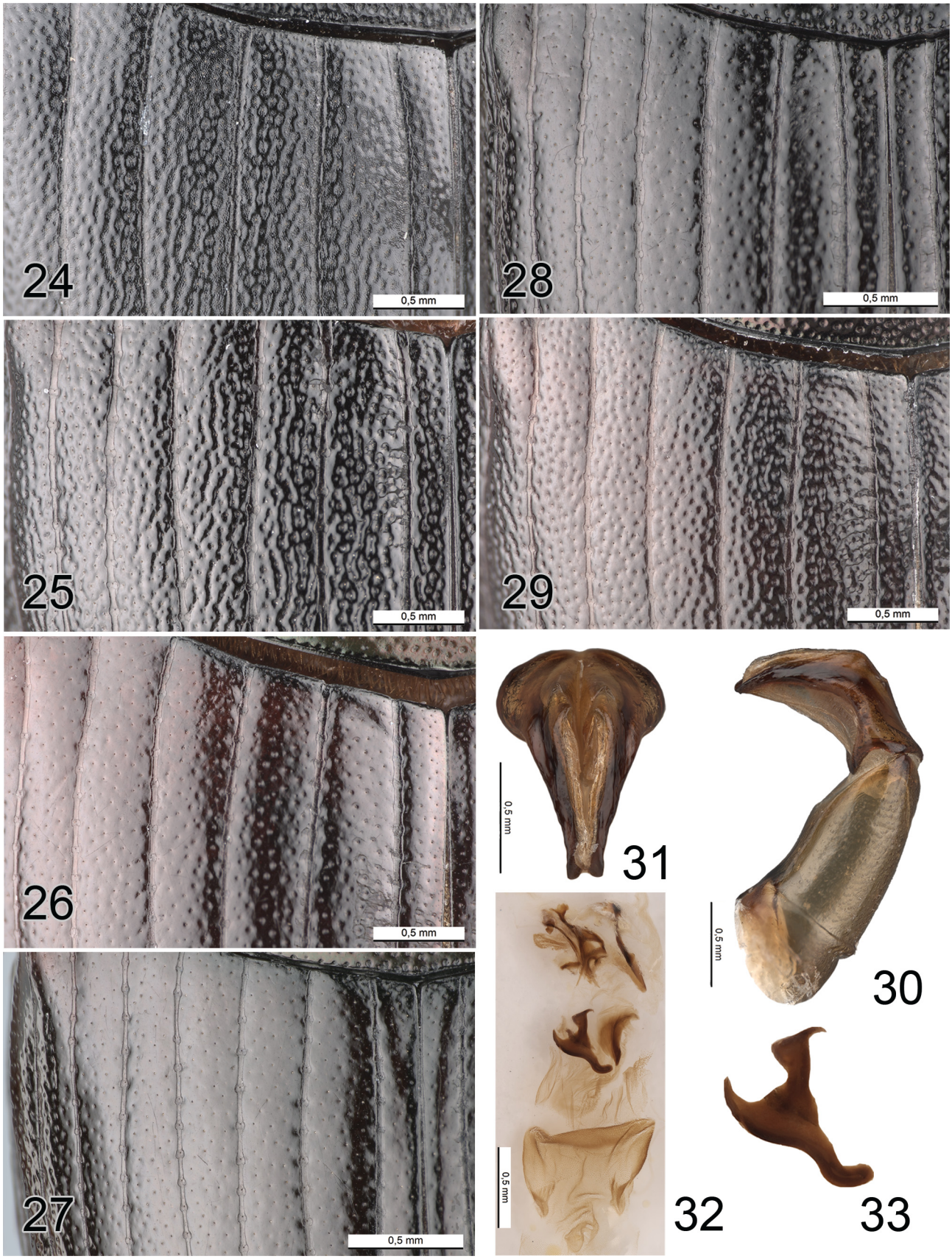
Paratypes (11 ♂♂, 42 ♀♀). EQUATORIAL GUINEA: BIOKO NORTE, 13.3 km S on Camino al Pico Basilé, 1600 m, 03°38'N, 008°49'E, 29.i.2024, secondary montane forest, pitfall trap 1: human dung, T. Larsen, (GNQ2024-129)—1 ♂, 3 ♀♀ paratypes (FGIC); same locality, 29.i.2024, secondary montane forest, pitfall trap 2: human dung, T. Larsen, (GNQ2024-130)—1 ♂, 6 ♀♀ paratypes (FGIC), 2 ♀♀ paratypes (NHMUK); same locality, 29.i.2024, secondary montane forest, pitfall trap 3: human dung, T. Larsen, (GNQ2024-131)—1 ♂ paratype (FGIC);

same locality, 29.i.2024, secondary montane forest, pitfall trap 4: human dung, T. Larsen, (GNQ2024-132)—1 ♂ paratype (FGIC), 1 ♂, 1 ♀ paratypes (MNHN); same locality, 29.i.2024, secondary montane forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-133)—2 ♀♀ paratypes (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 1: human dung, T. Larsen, (GNQ2024-134)—♀ allotype (CMNC), 1 ♂, 2 ♀♀ paratypes (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 2: human dung, T. Larsen, (GNQ2024-135)—1 ♂, 2 ♀♀ paratypes (FGIC), 2 ♀♀ paratypes (JFJC), 1 ♂, 1 ♀ paratypes (PMOC); same locality, 30.i.2024, secondary montane forest, pitfall trap 3: human dung, T. Larsen, (GNQ2024-136)—3 ♀♀ paratypes (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 4: human dung, T. Larsen, (GNQ2024-137)—3 ♀♀ paratypes (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-138)—3 ♀♀ paratypes (FGIC); 7.2 km S on Camino al Pico Basilé, 1085 m, 03°40’N, 008°50’E, 29.i.2024, secondary montane forest, pitfall trap 4: human dung, T. Larsen, (GNQ2024-122)—1 ♀ paratype (FGIC); same locality, 29.i.2024, secondary montane forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-123)—1 ♂, 2 ♀♀ paratypes (FGIC); same locality, 30.i.2024, secondary montane forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-128)—1 ♀ paratype (FGIC); BIOKO SUR, Hormigas Camp, Gran Caldera de Luba Scientific Reserve, 490 m, 03°19’N, 008°28’E, 14.i.2024, primary pre-mountain forest, pitfall trap 2: human dung, T. Larsen, (GNQ2024-042)—2 ♀♀ paratypes (FGIC); same locality, 14.i.2024, primary pre-mountain forest, pitfall trap 5: human dung, T. Larsen, (GNQ2024-045)—1 ♀ paratype (FGIC); same locality, 14.i.2024, primary pre-mountain forest, pitfall trap 7: human dung, T. Larsen, (GNQ2024-047)—1 ♀ paratype (FGIC); Moraka Camp, Gran Caldera de Luba Scientific Reserve, 25 m, 03°15’N, 008°28’E, 8.i.2024, primary costal forest, pitfall trap 2: human dung, T. Larsen, (GNQ2024-002)—1 ♂, 1 ♀ paratypes (FGIC); same locality, 8.i.2024, primary costal forest, pitfall trap 4: human dung, T. Larsen, (GNQ2024-004)—1 ♀ paratype (FGIC); same locality, 8.i.2024, primary costal forest, pitfall trap 10: human dung, T. Larsen, (GNQ2024-010)—1 ♀ paratype (FGIC).

Description. Male holotype (Fig. 16). **Body.** Length 7.7 mm, maximum width 3.4 mm. Body elongate oval in dorsal view, dorsum moderately convex. **Color.** Dorsal surface black, with faint metallic sheen on anterior portion of lateral pronotal declivities; ventrum black with faint green metallic sheen; pygidium black; legs dark brown to black. **Pubescence.** Dorsal surface mostly glabrous; pubescence present as a single row on elytral epipleuron only. **Head.** Clypeal margin broadly arcuate, slightly truncate at median third (Fig. 17); clypeal marginal bead well defined on median third only; clypeal surface with dense, moderately sized punctures, forming transverse rugulae anteriorly; clypeofrontal carina simple, slightly arcuate in dorsal view, not reaching clypeogenal suture laterally, situated at midlength between anterior clypeal margin and vertexal carina; dorsal edge of clypeofrontal carina straight in frontal view. Clypeogenal suture fine. Vertex with simple, straight carina, covering slightly more than half of interocular distance, slightly anterior to midlength of eye; vertexal surface finely punctate, punctures separated by 1–4 puncture diameters. Eyes small in dorsal view; eye length/width ratio 2.8, interocular distance/eye width ratio 11.6. Genal surface with fine punctures; genal margin subangular medially. Antennae with eight antennomeres; antennal club fulvous. **Pronotum.** Pronotum transverse in dorsal view; width/length ratio along midline 1.6. Surface with fine punctation throughout; punctures simple, separated by 1–3 puncture diameters; interpunctural surface glossy. Disc evenly convex; anterior portion simply convex. Lateral pronotal fossae indistinct, replaced by smooth, impunctate convexity. Surface adjacent to posterior angles simply convex, punctation and sculpturing similar to disc. Lateral margin feebly arcuate between widest point and anterior angle in dorsal view, straight between widest point and posterior angle in lateral view. Posterior marginal bead fine, interrupted over short distance laterally. Anterior hypomeral depression slightly concave, not enclosing anterior femur and tibia; anterior hypomeral carina well defined, interrupted before lateral margin. **Elytra.** Elytra slightly transverse; combined width/length ratio 1.2; widest at basal third in dorsal view. Elytral striae distinct, moderately wide; strial punctures strongly impressed, strial edges slightly encroaching on interstriae, punctures separated by 2–3 puncture diameters. Elytral stria 7 slightly sinuous. Interstriae feebly convex; interstriae finely punctate throughout, punctures evenly spaced but irregularly arranged; interpunctural surface glossy (Fig. 28). **Pygidium.** Pygidium moderately large, transverse (Fig. 19); width/length ratio 1.4. Basal carina well defined, broadly arcuate, narrowly sinuous medially. Apical marginal bead widened on apical third. Surface entirely punctate; punctures simple, moderately large, separated by one puncture diameter or less. Interpunctural surface with fine microsculpture basally, becoming glossy toward apex. **Legs.** Protibia with four teeth on lateral margin; apical margin forming an obtuse angle with internal margin; apicointernal angle produced into a very small conical process. Protibial spur approximately as long as lateral apical tooth, regularly bent downward. **Male genitalia.** Phallobase 1.6× longer than parameres in lateral view (Fig. 20);



FIGURES 16–23. *Onthophagus larseni* Génier **sp. nov.**, male holotype unless stated otherwise. 16, habitus, dorsal; 17, head, dorsal; 18, head, dorsal, female allotype; 19, pygidium, caudal; 20, aedeagus, lateral; 21, parameres, caudal; 22, endophallites, lateral; 23, main element of copulatory endophallite, lateral.



FIGURES 24–33. *Onthophagus* species, body structure details : 24, *O. bakweri*, elytron; 25, *O. basilensis*, elytron; 26, *O. bordati*, elytron; 27, *O. denudatus*, elytron; 28, *O. larseni*, elytron; 29–33, *Onthophagus depilis*, male: 29, elytron; 30, aedeagus, lateral; 31, parameres, caudal; 32, endophallites, lateral; 33, main element of copulatory endophallite, lateral.

apicoventral surface unmodified; basolateral paramerites absent. Parameres tapering from base to apex in dorsal view, broadly arcuate apically; apicoventral portion obliquely directed downward in lateral view; tapering from dorsal to ventral side in caudal view, apex angularly truncated (Fig. 21). Surface mostly glossy, with microsculpture on ventroapical portion. Copulatory endophallite fragmented; main element arcuate (Fig. 22–23).

Measurements (11 ♂♂, 42 ♀♀). Body length: male 4.2–7.8 (6.3 ± 1.1), female 4.6–8.0 (6.4 ± 0.8) mm.

Variation. Females are extremely similar to males, differing only in the usual secondary sexual characters of *Onthophagus* (clypeal surface with distinct transverse rugulae (Fig. 18); sixth abdominal ventrite not medially compressed; pygidium shorter). The vertexal carina is usually slightly notched in females. Variation is limited to size, and in most specimens the faint metallic sheen on the pronotum is absent.

Differential diagnosis. *Onthophagus larseni* **sp. nov.** keys to *O. depilis* or *O. denudatus* d'Orbigny, 1902. It differs from *O. depilis* by the simple and scattered elytral punctation (Fig. 28) (slightly raspy and more confluent in *O. depilis*; Fig. 29), and by the dorsal surface lacking metallic sheen (metallic sheen usually present on the head and pronotum in *O. depilis*). It differs from *O. denudatus* by the coarser pronotal punctation, the absence of metallic sheen on the dorsum, and by the parameres, whose apices are not strongly recurved in lateral view.

Among species described after d'Orbigny's synopsis that also key to couplet 4.(5), it differs from *O. bakweri* Moretto, 2014 by the simple and scattered elytral punctation (Fig. 28) (punctures more confluent and the surface largely covered with strong microsculpture in *O. bakweri*; Fig. 24); from *O. bordati* Moretto, 2014 by the faint metallic sheen only visible on lateral pronotal declivities (strong metallic sheen on head and pronotum in *O. bordati*); and from *O. basilensis* **sp. nov.** by the finer and more scattered elytral punctation not forming irregular longitudinal rugulae(Fig. 28) (coarser and forming rugulae in *O. basilensis*; Fig. 25).

Distribution. Equatorial Guinea (Bioko).

Etymology. The species is named in honor of Trond Larsen, who collected all known specimens of this species and has made important contributions to the ecology of dung beetles. The epithet larseni is treated as a noun in the genitive case.

Natural history. All specimens were obtained from pitfall traps baited with human dung and installed at 1600 m elevation in secondary montane rainforest. Traps operated continuously for two days, under unusually dry environmental conditions at the time of sampling (Trond Larsen, personal communication).

Taxonomic note on *Onthophagus denudatus denudatus* d'Orbigny, 1902 and *Onthophagus denudatus endroedii* Frey, 1973

While examining the three new species described herein, it became necessary to review all closely related taxa in order to establish reliable diagnoses. *Onthophagus denudatus* is such related species. A series of more than 200 specimens collected by the author in Banco National Park (Abidjan, Côte d'Ivoire) proved difficult to identify using the recent revision of the group by Moretto (2014). In that work, the taxon reported from West Africa is *O. denudatus endroedii*, whereas the nominal subspecies is considered restricted to Central Africa, with confirmed records from Cameroon, Central African Republic, Congo, Democratic Republic of the Congo, and Gabon.

Moretto indicated that most specimens of *O. denudatus endroedii* lack a metallic sheen and are either dark brown or black, although occasional individuals, particularly from Togo, may show a metallic reflection (Moretto 2014). Among the material examined here, two specimens from Mont Tonkoui (Montagnes District) and three from Zamou (Zanzan District) exhibit a metallic reflection. The specimens from Mont Tonkoui were dissected and the shape of the parameres matches the morphology described by Moretto for *O. denudatus*. The three specimens from Zamou are females, but their external morphology agrees with that of *O. endroedii*.

Closer examination of the Banco material revealed that specimens with metallic sheen—representing more than half of the examined series—can be consistently separated from those lacking it by a combination of external characters. Dissections of several males from both forms further showed that the parameres fall into two clearly distinct and internally consistent morphological patterns. In specimens with metallic sheen, the parameral apices are strongly divergent in caudal view, corresponding to the morphology attributed to the nominal subspecies. In specimens lacking metallic sheen, the parameral apices are parallel-sided, although in some individuals they may be slightly divergent. It should be noted that no clear morphological differences in the endophallites were observed in the material studied. No intermediate parameral morphology was observed despite the large sample size examined.

The concordance between external characters and male genital morphology, together with the absence of intermediates in a large sympatric series, indicates that the two forms represent distinct evolutionary entities rather than geographic variants. Their treatment as subspecies is therefore not supported. Consequently, the status change proposed by Moretto (2014) is reversed here, and both taxa are treated as separate species, with *Onthophagus endroedii* Frey, 1973 reinstated as a **valid species**.

All other specimens examined from localities across Côte d'Ivoire belong to *O. endroedii*. Although the two species are morphologically similar, molecular data would provide a useful independent test of their species status and help clarify their phylogenetic relationship.

TABLE 1. Comparative characters distinguishing males of *O. denudatus* from *O. endroedii*.

Character	*O. denudatus*	*O. endroedii*
Dorsal surface	With metallic sheen	Usually lacking metallic sheen
Vertexal carina in hypertelic males	Lower; lateral extremities forming a transverse convexity reaching inner eye margin in larger males	Slightly higher; lateral extremities more abruptly terminated; surface near eye more or less flat
Anterior portion of pronotum in hypertelic male	Simply convex	Sloping
Pygidial surface	Interpunctural surface glossy on disc	Interpunctural surface with moderate to strong microsculpture on disc
Parameral apices (caudal view)	Strongly angularly divergent (≈90°)	Directed downward, rarely slightly divergent
Phallobase/parameres ratio (lateral view)	≈2.1 (Phallobase comparatively shorter)	≈2.4 (Phallobase comparatively longer)

Material examined

Onthophagus denudatus d'Orbigny: **Material examined (37 ♂♂, 26 ♀♀). CENTRAL AFRICAN REPUBLIC**: SANGHA-MBAÉRÉ, Lac 1, Parc national Ndoki, 02°28'51''N, 016°13'04''E, 30–31.i.2012, forêt à Gilbertiodendron, sous bois fermé, piège excr. humain, jour 2, P. Moretto, (2012-22)—1 ♀ (FGIC); **CÔTE D'IVOIRE**: LAGUNES, Piste des Avodirés, Parc National du Banco, 45 m, 05°22'57''N, 004°03'29''W, 4.xii.2019, forêt ombrophile, piège à interception de vol, F. Génier, (2019-54)—2 ♂♂, 2 ♀♀ (FGIC); Piste des Grands Vaux, Parc National du Banco, 25 m, 05°22'19''N, 004°02'55''W, 1.xii.2019, forêt ombrophile, piège à fosse: iules, F. Génier, (2019-50)—1 ♂ (FGIC); same locality, 1.xii.2019, forêt ombrophile, piège à fosse: excrément humain, F. Génier, (2019-51)—8 ♂♂, 5 ♀♀ (FGIC); same locality, 3.xii.2019, forêt ombrophile, piège à fosse: excrément humain, F. Génier, (2019-53)—2 ♂♂, 1 ♀ (FGIC); Piste du Col, Parc National du Banco, 30 m, 05°22'N, 004°02'54''W, 4.xii.2019, forêt ombrophile, piège à interception de vol, F. Génier, (2019-55)—10 ♂♂, 3 ♀♀ (FGIC); same locality, 4.xii.2019, forêt ombrophile, piège à fosse: iules (1 jour), F. Génier, (2019-56)—1 ♂ (FGIC); same locality, 4.xii.2019, forêt ombrophile, piège à fosse: excrément humain, F. Génier, (2019-57)—1 ♀ (FGIC); same locality, 5.xii.2019, forêt ombrophile, piège à interception de vol, F. Génier, (2019-64)—2 ♂♂, 3 ♀♀ (FGIC); Site 22-BA, Route des Irokos, Parc national du Banco, 50 m, 05°22'51''N, 004°03'56''W, 7–9.xii.2022, forêt ombrophile, F. Génier, (2022-14)—2 ♂♂, 6 ♀♀ (FGIC); Site 22-BB, Route des Avodires, Parc national du Banco, 50 m, 05°22'59''N, 004°03'20''W, 6–9.xii.2022, forêt ombrophile, F. Génier, (2022-15)—5 ♂♂, 1 ♀ (FGIC); Site 22-BC, Route du Col , Parc national du Banco, 50 m, 05°22'12''N, 004°02'46''W, 8–9.xii.2022, forêt ombrophile, F. Génier, (2022-16)—4 ♂♂, 2 ♀♀ (FGIC); **EQUATORIAL GUINEA**: WELE-NZAS, Mbua Camp, 14 km SW Aconibe, 725 m, 01°10'N, 010°53'E, 22.i.2024, selectively logged forest, pitfall trap 8: human dung, T. Larsen, (GNQ2024-081)—1 ♀ (FGIC).

Onthophagus endroedii Frey: **Material examined (125 ♂♂, 112 ♀♀). CÔTE D'IVOIRE**: HAUT-SASSANDRA, C. T. F. T. station [=Centre Technique Forestier Tropical], 3.5km NW Gregbeu, [06°48'N, 006°44'W], 1–2.vii.1980, secondary rainforest, dung trap, secondary rainforest, O. Kukal—, 1 ♂, 1 ♀ (CMNC); LAGUNES, École forestière, Parc National du Banco, 30 m, 05°23'N, 004°03'10''W, 1.xii.2019–5.xii.2109, forêt ombrophile, collecte générale, F. Génier, (2019-61)—1 ♂ (FGIC); Lamto, [06°13'25''N, 005°01'36''W], 1–5.vi.1980, gallery forest, dung traps, gallery forest, O. Kukal—3 ♀♀ (CMNC); same locality, 20.ix.–15.xi.1982, flight interception trap, D. Thomas—2 ♂♂, 2 ♀♀ (CMNC); Piste des Avodirés, Parc National du Banco, 45 m, 05°22'57''N, 004°03'29''W, 4.xii.2019,

forêt ombrophile, piège à interception de vol, F. Génier, (2019-54)—1 ♂ (FGIC); Piste des Grands Vaux, Parc National du Banco, 25 m, 05°22’19’’N, 004°02’55’’W, 1.xii.2019, forêt ombrophile, piège à fosse: excrément humain, F. Génier, (2019-51)—1 ♂, 3 ♀♀ (FGIC); same locality, 3.xii.2019, forêt ombrophile, piège à fosse: excrément humain, F. Génier, (2019-53)—1 ♂, 1 ♀ (FGIC); Piste du Col, Parc National du Banco, 30 m, 05°22’N, 004°02’54’’W, 4.xii.2019, forêt ombrophile, piège à interception de vol, F. Génier, (2019-55)—1 ♂, 3 ♀♀ (FGIC); same locality, 4.xii.2019, forêt ombrophile, piège à fosse: excrément humain, F. Génier, (2019-57)—1 ♂, 1 ♀ (FGIC); same locality, 5.xii.2019, forêt ombrophile, piège à interception de vol, F. Génier, (2019-64)—2 ♂♂, 1 ♀ (FGIC); Site 22-BA, Route des Irokos, Parc national du Banco, 50 m, 05°22’51’’N, 004°03’56’’W, 7–9.xii.2022, forêt ombrophile, piège copro, F. Génier, (2022-14)—11 ♂♂, 5 ♀♀ (FGIC); Site 22-BB, Route des Avodires, Parc national du Banco, 50 m, 05°22’59’’N, 004°03’20’’W, 6–9.xii.2022, forêt ombrophile, piège à interception de vol, F. Génier, (2022-15)—4 ♂♂, 3 ♀♀ (FGIC); Site 22-BC, Route du Col , Parc national du Banco, 50 m, 05°22’12’’N, 004°02’46’’W, 8–9.xii.2022, forêt ombrophile, piège à fosse: excrément humain, F. Génier, (2022-16)—1 ♂ (FGIC); MONTAGNES, Km 1,3, piste du Mont-Tonkoui, 1110 m, 07°27’09’’N, 007°38’26’’W, 23.xi.2019, forêt de nuage, piège à interception de vol, F. Génier & A. Gué, (2019-25)—1 ♀ (FGIC); Km 1,5, piste du Mont-Tonkoui, 1090 m, 07°27’06’’N, 007°38’29’’W, 23.xi.2019, forêt de nuage, piège à fosse: excrément humain, F. Génier & A. Gué, (2019-23)—2 ♂♂, 5 ♀♀ (FGIC); Km 1,8, piste du Mont-Tonkoui, 1120 m, 07°26’40’’N, 007°38’40’’W, 23.xi.2019, forêt de nuage, piège à fosse: excrément humain, F. Génier & A. Gué, (2019-17)—8 ♂♂, 8 ♀♀ (FGIC); same locality, 23.xi.2019, forêt de nuage, piège à interception de vol, F. Génier & A. Gué, (2019-20)—1 ♂, 1 ♀ (FGIC); same locality, 23.xi.2019, forêt de nuage, piège à fosse: serpent mort, F. Génier & A. Gué, (2019-21)—1 ♂ (FGIC); same locality, 23.xi.2019, forêt de nuage, piège à fosse: excrément humain, F. Génier & A. Gué, (2019-22)—3 ♂♂ (FGIC); Mont-Tonkoui, 1000–1200 m, 07°27’N, 007°38’W, 25.xi.2019, forêt de nuage, piège à fosse: iules, F. Génier & A. Gué, (2019-29)—1 ♀ (FGIC); same locality, 25.xi.2019, forêt de nuage, piège à interception de vol, F. Génier & A. Gué, (2019-30)—1 ♂ (FGIC); same locality, 25.xi.2019, forêt de nuage, piège à fosse: excrément humain, F. Génier & A. Gué, (2019-31)—8 ♂♂, 8 ♀♀ (FGIC); same locality, 26.xi.2019, forêt de nuage, piège à fosse: excrément humain, F. Génier & A. Gué, (2019-35)—6 ♂♂, 6 ♀♀ (FGIC); same locality, 27.xi.2019, forêt de nuage, piège à fosse: excrément humain, F. Génier & A. Gué, (2019-43)—10 ♂♂, 10 ♀♀ (FGIC); same locality, 27.xi.2019, forêt de nuage, piège à fosse: iules, F. Génier & A. Gué, (2019-44)—1 ♀ (FGIC); Site 22-TA, Mont-Tonkoui, 1160 m, 07°27’14’’N, 007°38’07’’W, 19.xi.–2.xii.2022, forêt de nuage à *Parinari*, piège à interception de vol, F. Génier, (2022-03)—3 ♂♂, 2 ♀♀ (FGIC); Site 22-TB, Mont-Tonkoui, 1110 m, 07°27’05’’N, 007°38’09’’W, 19.xi.–2.xii.2022, forêt de nuage à *Parinari*, piège à interception de vol, F. Génier, (2022-04)—5 ♂♂, 5 ♀♀ (FGIC); same locality, 25.xi.2022, forêt de nuage à *Parinari*, piège à fosse: excrément humain, F. Génier, (2022-09)—2 ♂♂, 5 ♀♀ (FGIC); Site 22-TC, Mont-Tonkoui, 1125 m, 07°27’N, 007°38’08’’W, 19.xi.–2.xii.2022, forêt de nuage à *Parinari*, piège à interception de vol, F. Génier, (2022-05)—4 ♂♂, 5 ♀♀ (FGIC); same locality, 25.xi.2022, forêt de nuage à *Parinari*, piège à fosse: excrément humain, F. Génier, (2022-10)—1 ♀ (FGIC); Site 22-TD, Mont-Tonkoui, 1100 m, 07°26’58’’N, 007°38’20’’W, 20.xi.–2.xii.2022, forêt de nuage à *Parinari*, piège à interception de vol, F. Génier, (2022-06)—5 ♂♂, 5 ♀♀ (FGIC); Site 22-TE, Mont-Tonkoui, 1090 m, 07°27’N, 007°38’28’’W, 20.xi.–2.xii.2022, forêt de nuage à *Parinari*, piège à interception de vol, F. Génier, (2022-07)—2 ♂♂, 1 ♀ (FGIC); Sommet, Mont-Tonkoui, 1200 m, 07°27’15’’N, 007°38’13’’W, 24.xi.2019, forêt de nuage, piège à interception de vol, F. Génier & A. Gué, (2019-27)—1 ♂ (FGIC); same locality, 27.xi.2019, forêt de nuage, piège à interception de vol, F. Génier & A. Gué, (2019-42)—2 ♂♂, 1 ♀ (FGIC); Villa du Gouverneur, Mont-Tonkoui, 1050 m, 07°26’51’’N, 007°38’10’’W, 22.xi.2019, forêt de nuage, piège à fosse: excrément humain, F. Génier & A. Gué, (2019-14)—6 ♂♂, 6 ♀♀ (FGIC); VALLÉE DU BANDAMA, Bouaké, 350 m, [07°41’N, 005°02’W], 15–28.v.1980, small dung trap, O. Kukal—20 ♂♂, 12 ♀♀ (CMNC); same locality, 27–29.v.1980, savana-rainforest, small dung trap, savana-rainforest, O. Kukal—8 ♂♂, 2 ♀♀ (CMNC); ZANZAN, Zamou, 08°33’N, 003°47’W, vi.2016, local collectors—3 ♀♀ (FGIC).

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