



An unexpected new flightless dung beetle species (Coleoptera: Scarabaeidae: Scarabaeinae: Endroedyolini) from the Cederberg Mountains, South Africa

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Abstract

Silvaphilus joselmae Daniel, Strümpher & Deschodt, new species is diagnosed and described from the Cederberg Mountains, South Africa. The tribal affiliation of *Silvaphilus* Roets & Oberlander, 2010 is briefly discussed. We revise some generic characters and update the key for the species and genera in the tribe Endroedyolini Davis, Deschodt & Scholtz, 2019. We also provide a distribution map of the two *Silvaphilus* species.

Key words: Afrotropical Region, flightless taxa, Fynbos riparian vegetation, taxonomy, Scarabaeoidea, *Silvaphilus joselmae*, Western Cape Province

Introduction

Since the description of the dung beetle tribe Endroedyolini Davis, Deschodt & Scholtz, 2019 only a single new monotypic genus has been added (Deschodt *et al.* 2020) bringing the total to eight mostly monotypic genera with 12 (including the presently described) currently valid species (Deschodt *et al.* 2020; Deschodt & Scholtz 2008; Howden & Scholtz 1988; Roets & Oberlander 2010; Scholtz & Howden 1987). The tribe was thought to be restricted to forest habitats in the south and east of South Africa (Davis *et al.* 2019; Deschodt *et al.* 2020; Deschodt & Scholtz 2008; Roets & Oberlander 2010), but quite unexpectedly, a new species of *Silvaphilus* Roets & Oberlander, 2010 was discovered in Fynbos riparian vegetation in the Cederberg Mountains extending the known distribution of the Endroedyolini much further west. The new taxon from this unlikely locality and habitat is described in this paper.

Material and methods

The material examined in this study is deposited in the following institutions: Ditsong National Museum of Natural History, Pretoria, South Africa (TMSA); National Museum, Bloemfontein, South Africa (BMSA); Iziko South African Museum, Cape Town, South Africa (SAMC) and University of Pretoria Scarab Collection, Pretoria, South Africa (UPSA). Label data of type specimens are reported verbatim: separate lines within each label are indicated by a single vertical bar “|”, while separate labels are indicated by a double vertical bar “||”. Clarifications or additional information are cited in square brackets “[]”. Specimens were examined using an Olympus dissecting microscope. All the images were taken using a Canon 760D camera body with a Canon MPE 65 mm macro lens. Images were stacked using Helicon remote and Helicon focus software packages. Measurements of the total body length (from tip of clypeus to posterior extremity of pygidium) and width (the greatest width of pronotum) were made using a digital calliper.

Type material used for comparison: *Silvaphilus oubosiensis* Roets & Oberlander, 2010, Holotype, ♂ (SAMC) [through detailed photograph]: “03-11-2009 | SOUTH AFRICA | Western Cape Province | Riviersonderend | col. F. Roets | Oubos forest | 34.04S 19.49E” || “*Silvaphilus oubosiensis* | F. Roets & K.C. Oberlander | ♂ | HOLOTYPE | Beneath herbivore dung” || “SAM – COL – A074575”. Paratype, ♂ [UPSA, preserved in ethanol] first label identical to holotype || “*Silvaphilus oubosiensis* | F. Roets & K.C. Oberlander | ♂ | PARATYPE | Beneath dung of insectivorous mammal”.

Taxonomy

Genus *Silvaphilus* Roets & Oberlander, 2010

Type species: *Silvaphilus oubosiensis* Roets & Oberlander, 2010, by original designation.
Silvaphilus Roets & Oberlander, 2010: 369; Davis *et al.* 2019: 139; Davis *et al.* 2020: 159.

Silvaphilus joselmae Daniel, Strümpher & Deschodt, new species

(Figs 1A–F, 2–3)

Nomenclatural act:

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Type locality. 4 km SE of Algeria Forest Station (32°24'30"S 19°05'03"E), Cederberg Wilderness Area, Western Cape Province, South Africa (Figs 2–3).

Type material. HOLOTYPE, ♂ (TMSA) (Figs 1A–F): “SOUTH AFRICA: Western Cape Prov., | Cederberg Wilderness Area, | 4 km SE of Algeria Forest Station,” || “7-9.viii.2021, altitude 790 m, | 32°24'30"S 19°05'03"E, | GM Daniel & WP Strümpher” || “SITE IV: 790 m, Shaded vegetation, | near stream, pitfall trap | baited with pig dung.” || “HOLOTYPE | *Silvaphilus joselmae* | Daniel, Strümpher & | Deschodt, 2021 [red cardstock]”.

PARATYPES, 10♂♂, 18♀♀ (BMSA 4♂♂6♀♀; TMSA 5♂♂9♀♀; SANC 1♂; 3♀♀); same collection data as holotype.

Description of holotype (♂).

Size: Length: 3.4 mm. Width: 1.7 mm.

Colour (Figs 1A–B): Black; mouthparts and antenna yellowish. Body surface covered with recurved tan setae.

Body shape (Fig. 1A): Round (in dorsal view) and strongly convex (in lateral view).

Head (Figs 1A–B): Rounded, surface densely and coarsely punctate with few scattered tan setae. Clypeus broadly rounded, somewhat depressed anterolaterally. Anterior clypeal margin bidentate; edge between denticles broadly W-shaped with small triangular medial denticle present; lateral clypeal margin continuous; fronto-clypeal suture indistinct. Clypeo-genal margin continuously rounded. Dorsal part of eyes elongated and curved. Antennae with nine antennomeres; mouthparts with few setae.

Pronotum (Fig. 1A): Strongly convex, wider than long, coarsely punctate, some punctures bearing recurved tan setae; basal margin with single clear line of uniform elliptical punctures arranged in parallel; basal margin wider than apical; lateral margin somewhat explanate.

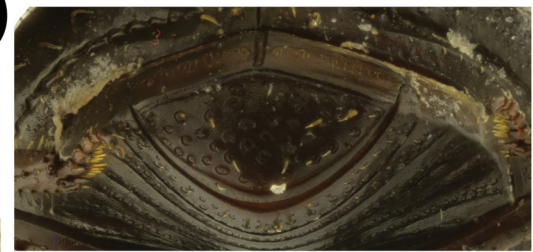
Elytra (Figs 1A, D): Strongly convex, fused, with nine striae. Striae 1–7 formed by continuous row of double semi-circles; stria 8 with a carina on either side, modified as deep and obvious groove; stria 9 adjacent to epipleuron. Epipleuron surface smooth, well-defined, wider basally and narrower apically. Elytral interstriae with single row of recurved tan setae paralleling outer edge of each interval; seta spaced every four or five punctures. Medial edges impunctate; interstriae surface densely punctate on first basal half, while on second apical half punctate only on lateral edges. Elytral humerus and apical callosity absent. Metathoracic wings absent.

Prosternum and propleuron (Fig. 1B): Surface dull, with few irregular sets of ocellate punctures.

Ventrites (Fig. 1B): Mesepimere with few punctures; surface dull. Mesoventrite with surface shining; virtually glabrous; punctures almost touching and about twice larger than those on the metaventrite. Mesometaventral suture very slightly curving anteriorly. Metaventrite surface shining; surface completely punctate with punctures separated by almost one puncture diameter, glabrous anteriorly, setose posteriorly. Six abdominal ventrites visible, punctate laterally, last abdominal ventrite twice wider than others with single row of recurved setae.

A**B**

2 mm

C**D****E**

1 mm

F

SOUTH AFRICA: Western Cape Prov.,
Cederberg Wilderness Area,
4 km SE of Algeria Forest Station,

7-9.viii.2021, altitude 790 m,
32°24'30"S 19°05'03"E,
GM Daniel & WP Strümpher

SITE IV: Shaded vegetation,
near stream, pitfall trap
baited with pig dung.

HOLOTYPE
Silvaphilus joselmae
Daniel, Strümpher &
Deschodt 2021

FIGURES 1A–F. *Silvaphilus joselmae* Daniel, Strümpher & Deschodt, new species, holotype (TMSA). A, habitus, dorsal view; B, habitus, ventral view; C, pygidium; D, elytron, lateral view; E, aedeagus (paratype), lateral and dorsal views; F, holotype labels.

Pygidium (Fig. 1C): About twice as wide as high, surface shagreened with punctures, lateral edges with few punctures, each bearing tan seta. Complete and strongly marginate, marginal bead obtusely angulate at basal midline.

Legs (Figs 1A–B): Profemora ventrally punctate, with some punctures bearing seta, surface micro-shagreened, shining; upper anterior and posterior edges strongly marginate; lower anterior edge weakly marginate; distinct pit on trochanterofemoral segments present. Protibiae, slender basally and stouter apically, truncate apically with three prominent teeth on outer margin; entire margin distinctly serrated, area between teeth serrate; apical tooth largest, medial tooth somewhat smaller than basal one. In dorsal view, a row of six-aligned setae running parallel to outer margin visible; outer margin carina present, extending from basal edge of tibia to basal tooth. In ventral view, median row of seven-aligned setae running in between inner and outer margin; shallowly carinate on basal half of outer margin. Protibial spur present. Protarsi with four visible tarsomeres and tiny pair of claws; protarsomeres 1–3 triangular and short; protarsomere 4 cylindrical at least twice longer than others, with pair of tiny apical claws. Meso- and metafemora ventrally sparsely, finely punctate hind edges, punctures bearing setae, surfaces micro-reticulate, shiny; anterior and posterior edges marginate. Meso- and metatibiae flattened, gradually expanded nearly to apex, with prominent spur on inner margin. Meso- and metatarsomeres with five tarsomeres, protarsomeres 1–4 triangular, short, covered with few stiff setae; protarsomere 5 cylindrical at least twice longer than others, with pair of very tiny apical claws.

Aedeagus (Fig. 1E): Symmetrical, parameres with the apex tapered and inwardly curving.

Morphological variation: Length: 3.3–3.8 mm. Width: 1.6–1.9 mm. There is no clear sexual dimorphism, but females are slightly larger than males.

Diagnosis: *Silvaphilus joselmae* new species can be distinguished from *S. oubosiensis* by the following combination of characters: males of the new species lack the lateral elytral spine which is present in males of *S. oubosiensis*. *Silvaphilus oubosiensis* shows a pronotal depression on the basal-medial edge, which is not present in the new species. *Silvaphilus joselmae* new species is much smaller in size than *S. oubosiensis*; in the former the medial width of its mesoventrite is twice wider and with two rows of punctures, in the latter the mesoventrite is narrower and with one row of punctures. Furthermore, the mesometaventral suture curves very slightly anteriorly in the new species, whereas it is rounded in *S. oubosiensis*. Lastly, the eighth stria in *S. joselmae* new species is modified to form a deep and obvious groove, but in *S. oubosiensis* it is formed of deep and clear elongated and connected punctures.

Etymology: The new species is named after Joselma G. Pereira, the wife of the first author, Gimo M. Daniel, for her unconditional love and support in his entomological career.

Distribution (Figs 2–3): *Silvaphilus joselmae* new species is known from a single locality in the Cederberg Mountains where it was recorded in Fynbos riparian vegetation (Aza 1; Mucina & Rutherford 2006) (Fig. 3). In the Cederberg area there are less than ten severely fragmented patches of the Fynbos riparian vegetation covering a total area of less than 50 km². Although the vegetation unit is well protected in the Cederberg Wilderness Area dedicated collecting in the area is required to determine if this species occurs in any of the other patches of riparian scrub vegetation or if it exhibits broader vegetation specialisation.

Discussion

Tribal placement of the genus

The habitus of *Silvaphilus* is very round (in dorsal view) and strongly convex (in lateral view) and it is generally much larger in size as opposed to the more elongate and convex habitus of the other species that characterise the Endroedyolini. Furthermore, although the habitat for *Silvaphilus joselmae* new species is shaded, and is characterised by low scrublands (Mucina & Rutherford 2006) it is vastly different from the forest habitat that the other Endroedyolini species occur in. The combination of differing habitus shape and size, together with the new distribution of this species differing from the typical forest-dwelling Endroedyolini species, raises the question of whether the original tribal placement of *Silvaphilus*, as suggested by Roets & Oberlander (2010) and published by Davis *et al.* (2019), is actually correct.

The two known species in the genus *Silvaphilus* are flightless, but they show some morphological similarities with the macropterous genus *Aphengoecus* Péringuey, 1901 (Roets & Oberlander 2010). Because of these morphological similarities between the two genera, we believe that if other material and funding become available for a molecular study, this might remove *Silvaphilus* from the tribe Endroedyolini and group it with *Aphengoecus* in a new tribe of

their own. For instance, in Tarasov & Dimitrov (2016), *Aphengoecus* is strongly supported as a monotypic clade. Nevertheless, they did not formally assign *Aphengoecus* to a tribe and instead placed it in the category *incertae sedis*. However, a systematic reassessment of both these genera is not in the scope of the current study, and consequently, we believe the genus *Silvaphilus* should remain in the tribe Endroedyolini.

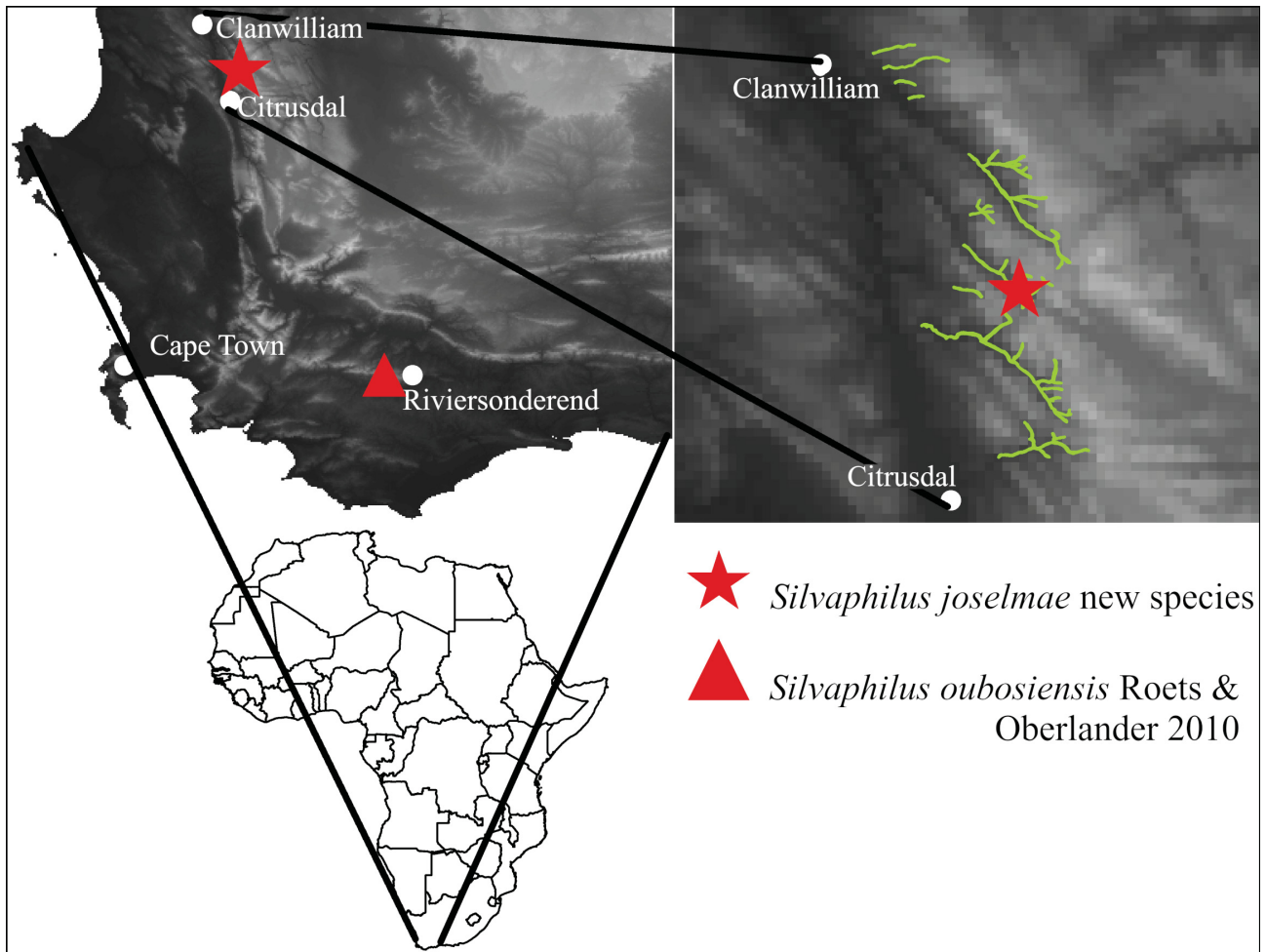


FIGURE 2. Distribution map of *Silvaphilus joselmae* Daniel, Strümpher & Deschodt, new species. In green, the limited extent of the Fynbos riparian vegetation following the valleys in the Cederberg Mountains as shown by Mucina & Rutherford (2006).



FIGURE 3: The type locality of *Silvaphilus joselmae* Daniel, Strümpher & Deschodt, new species. Photo by W.P. Strümpher, 9. viii. 2021.

New generic characters

This new species clearly belongs to the genus *Silvaphilus* and most of the characters used by Roets & Oberlander (2010) to describe the genus are still valid. The presence of the modified eighth stria into a groove or series of deep and clear elongated and connected punctures distinguishes *Silvaphilus* from other Endroedyolini and *Aphengoecus*. The generic characters that have changed are given here: (a) mesoventrite with one to two rows of punctures; (b) eighth stria modified to form a deep and obvious groove or series of deep and clear elongated and connected punctures; (c) pronotal depression on mid-basal edge present or absent.

Identification key to Endroedyolini, adapted and modified from Deschodt *et al.* (2020).

1. Metaventrite anteriorly with deep fovea on each side of midline, pronotal disc on each side near posterior angle with short elevated carina *Endroedyolus paradoxus* Scholtz & Howden, 1987
- Metaventrite anteriorly without deep fovea on each side of midline, and pronotal disc with or without short elevated carina on each side near posterior angle 2
2. Pronotal disc with short elevated carina on each side near posterior angle
..... *Aliuscanthoniola similis* Deschodt & Scholtz, 2008
- Pronotal disc without short, elevated carina on each side near posterior angle 3
3. Mesoventrite medially wide, or wide enough for, more than three irregular rows of punctures 4
- Mesoventrite medially narrow, with at most two irregular rows of punctures (punctures sometimes absent in this area) 5
4. Mesometaventral suture angulate at anterior apex *Outenikwanus tomentosus* Scholtz & Howden, 1987
- Mesometaventral suture rounded at anterior apex *Ursa centennial* Deschodt, Sole & Scholtz, 2020
5. Elytron in lateral view with depression on lateral side 6
- Elytron in lateral view without depression on posterolateral side 7
6. Pronotal depression on mid-basal edge present, mesometaventral suture rounded; lateral elytral spine in males present
..... *Silvaphilus oubosiensis* Roets & Oberlander 2010
- Pronotal depression on mid-basal edge absent, mesometaventral suture curving very slightly anteriorly; lateral elytral spine in males absent *Silvaphilus joselmae* Daniel, Strümpher & Deschodt **new species**
7. Mesometaventral suture rounded at anterior apex 8
- Mesometaventral suture angulate at anterior apex 10
8. Protibial teeth 2 and 3 small, almost half the size of protibial tooth 1 *Peckolus parvus* Scholtz & Howden, 1987
- Protibial teeth 2 and 3 minute, much less than half the size of protibial tooth 1 9
9. The recurved setae on the body almost half the length of the straight setae *Peckolus alpinus* Howden & Scholtz, 1988
- The recurved setae on the body barely discernible *Peckolus poenskopius* Deschodt & Scholtz, 2008
10. Lateral part of mesometaventral suture (between mesocoxae) converging anteriorly
..... *Parvuhowdenius harrisoni* Deschodt & Scholtz, 2008
- Lateral part of mesometaventral suture (between mesocoxae) parallel 11
11. Punctures on mesoventrite large and clear, separated by less than one puncture diameter
..... *Nebulasilvius insularis* Deschodt & Scholtz, 2008
- Punctures on mesoventrite small and separated by at least one puncture diameter
..... *Nebulasilvius johani* Deschodt & Scholtz, 2008

Acknowledgements

We wish to thank the Western Cape Nature Conservation Board (Permit No. CN44-87-17714) for authorization to collect specimens in the Western Cape Province. We would also like to thank Aisha Mayekiso (SAMC) for providing us with images of the holotype of *Silvaphilus oubosiensis*. Lastly, we thank an anonymous reviewer and David Král and editor (Aleš Bědžek) whose comments and suggestions improved the manuscript.

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