New information about and illustrations of Psammodiini species (Coleoptera: Scarabaeidae: Aphodiinae). 4. *Leiopsammodius evanidus*

Miloslav RAKOVIČ[1)], Ladislav MENCL[2)] & David KRÁL[3)]

[1)]U Kruhárny 548, CZ-252 29 Dobřichovice, the Czech Republic
e-mail: mrakovic@volny.cz
[2)]Masarykovo náměstí 5, CZ-281 26 Týnec nad Labem, the Czech Republic
e-mail: l.mencl@centrum.cz
[3)]Department of Zoology, Faculty of Science, Charles University,
Viničná 7, CZ-128 43, Praha 2, Czech Republic
e-mail: kral@natur.cuni.cz

Taxonomy, distribution, redescription, Coleoptera, Scarabaeoidea, Scarabaeidae, Aphodiinae, Psammodiini, Psammodiina, *Leiopsammodius*, Afrotropical Region

Abstract. Results of studying the lectotype (designated here) of *Leiopsammodius evanidus* (Péringuey, 1901) are presented. Photographs of its habitus as well as details are published for the first time. A specimen formerly designated as the neotype was also studied and discussed. Most important features differentiating the species from other Afrotropical members of the genus are emphasized.

INTRODUCTION

The present communication is the fourth study within the framework of a series of works focused on refining knowledge of particular species in the tribe Psammodiini, particularly in the subtribe Psammodiina. Studies 1 to 3 (Rakovič et al. 2017, 2018, 2019) dealt with the species *Rakovicius thailandicus* (Balthasar, 1965) *Granulopsammodius transcaspicus* (Petrovitz, 1961), and *Leiopsammodius modestus* (Péringuey, 1901), respectively.

In the present work, the authors offer results of examining the *Leiopsammodius evanidus* (Péringuey 1901) lectotype designated here and the formerly designated neotype.

MATERIAL AND METHODS

The specimens were observed by using the MBS-10 and SZP 1120-T stereoscopic microscopes. The photos published here were taken by the use of the Meopta laboratory microscope, CMEX 5 digital camera and Helicon Focus programme.

Prior to the study and taking photos, they were kept in a detergent solution for 30 to 60 min and submitted to mechanical cleaning.

The following acronym is employed for the collection, in which the specimen studied here is kept:
SAMC Iziko South African Museum, Cape Town, Republic of South Africa.

In the text below, in descriptions of the pronotal structure, we adhered to the following concept:

- Psammodiini with the complete pronotal structure (for example members of the genera *Psammodius*, *Granulopsammodius*, *Rhyssemodes*, etc.) have the pronotum with five transversal ridges (ridges 1-5), five transversal furrows (furrows 1-5) and a posterior longitudinal midline furrow; an accessory swelling can also be present between ridges 4 and 5 (for example in many *Rhyssemus* species);
- Psammodiini with a reduced pronotal structure (missing the transversal ridges, which is the case of the genus *Leiopsammodius*, *Platytomus*, *Pleurophorus*, etc.), consisting of vestiges of

the complete furrows, such as transversal furrow 1 (the anterior furrow), transversal furrow 3 with lateral impressions and posterior longitudinal furrow (not all of them must be necessarily present).

TAXONOMY

Leiopsammodius evanidus (Péringuey, 1901)
(Figs. 1-17)

Psammodius evanidus Péringuey, 1901: 446 (original description).
Psammobius evanidus: Schmidt 1922: 479 (monograph - Aphodiinae, world fauna); Endrődi: 1964: 337 (monograph - Aphodiinae, Afrotropical species).
Psammodius (*Leiopsammodius*) *evanidus*: Rakovič 1981: 30 (revision of *Psammodius* Old World species); Endrődi & Rakovič 1981: 62 (review of Aphodiinae from S. and SW. Africa); Rakovič 1986: 5 (notes to revision).
Leiopsammodius evanidus: Dellacasa 1988: 418 (catalogue); Rakovič 1990: 6 (outline of *Leiopsammodius* - world fauna), 1995: 6 (key to Afrotropical Leiopsammodius species).

Type locality. "Natal (? Frere)" [not mentioned on labels under the type specimen, but mentioned in this way in original description; Frere is a KwaZulu-Natal Province, the Republic of South Africa]".

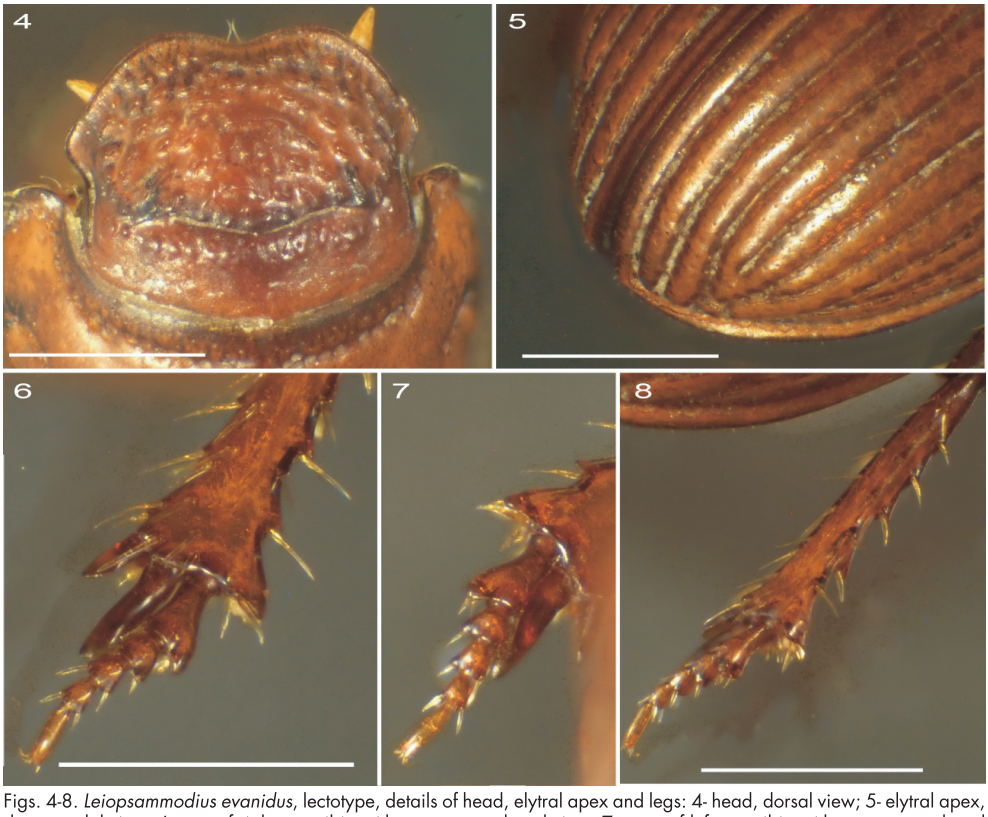
The material examined. The type from the SAMC (not sexed) bearing the labels as shown in Fig. 17 and designated here as the lectotype. The following two labels were added by the present authors: a pale green printed label added by the second author of the present work (L. M.), concerning his photo-documentation system; a red printed label associated with the present designation of the lectotype. The remaining labels including the Péringuey´s white handwritten label "Psammodius evanidus Type" were pinned under the specimen as obtained from the SAMC for the present study.
The neotype from the same institution (see the part Discussion for the explanation).

Figs. 1-3. *Leiopsammodius evanidus*, lectotype, habitus: 1- dorsal view; 2- dorsolateral view; 3- ventral view. Scale line 1 mm. Photographs by L. Mencl.

Lectotype redescription. Small (body length of 3.2 mm), convex, oblong oval, moderately broader behind (maximum width of 1.4 mm), dorsal surfaces glabrous, shining, reddish brown, elytral suture with narrow zone of sutural interval) darkened (darkening limited to suture itself at

elytral base and moderately widened toward elytral apex) (Figs. 1-2).

Head (Fig. 4) convex, granulate. Clypeus rounded each side of anteromedian emargination, its lateral margins glabrous, nearly aligned with glabrous margins of genae. Anteromedian surface area of clypeus with considerably transversal granules tending to concentric arrangement in semicircular lines. Middle protuberance of head (as known in numerous Psammodiini) not distinctly elevated above remaining areas of head, with poorly delimited, irregularly shaped granules. Frontoclypeal suture very distinct, deep, narrow; darkened zone present before suture. Head vertex with granulate swelling, only partially broken into discrete granules.

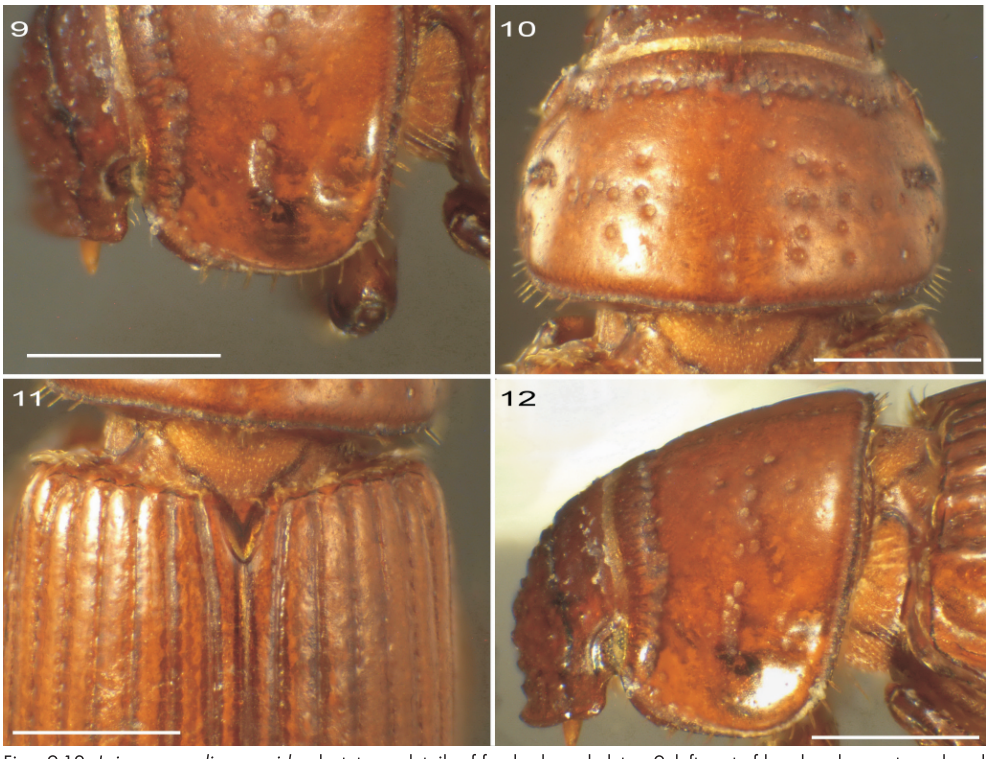


Figs. 4-8. *Leiopsammodius evanidus*, lectotype, details of head, elytral apex and legs: 4- head, dorsal view; 5- elytral apex, dorsocaudal view; 6- part of right metatibia with metatarsus, dorsal view; 7- apex of left metatibia with metatarsus, dorsal view; 8- right mesotibia and mesotarsus, lateral view. Scale lines 0.5 mm. Photographs by L. Mencl.

Pronotum (Figs. 9, 10, 12) transversal (length-to-width ratio 0.641), wider than head, widest behind midlength. Basal margin furrowed (Fig. 12). Basal margin, posterior angle margins and lateral margins setaceous: lengths, arrangement and shapes of setae as in Figs. 9-11; detailed photo of setae on pronotum lateral margins shown in Fig. 14. Pronotum surface with considerable punctures (Figs. 1, 2, 9, 10, 12); most of them present in vestigial structural elements (vestiges of first pronotal furrow and of third pronotal furrow) and few punctures distributed irregularly, beyond these vestigial structural elements.

Scutellum (Figs. 1 and 11) small, triangular, impunctate, with darkened V-shaped area.

Elytra (Figs. 1, 2, 5, and 11) without distinct humeral denticles, with ten striae and ten intervals, elongate (length-to-width ratio of 1.39), broader behind (broadest point at about 0.76 elytra

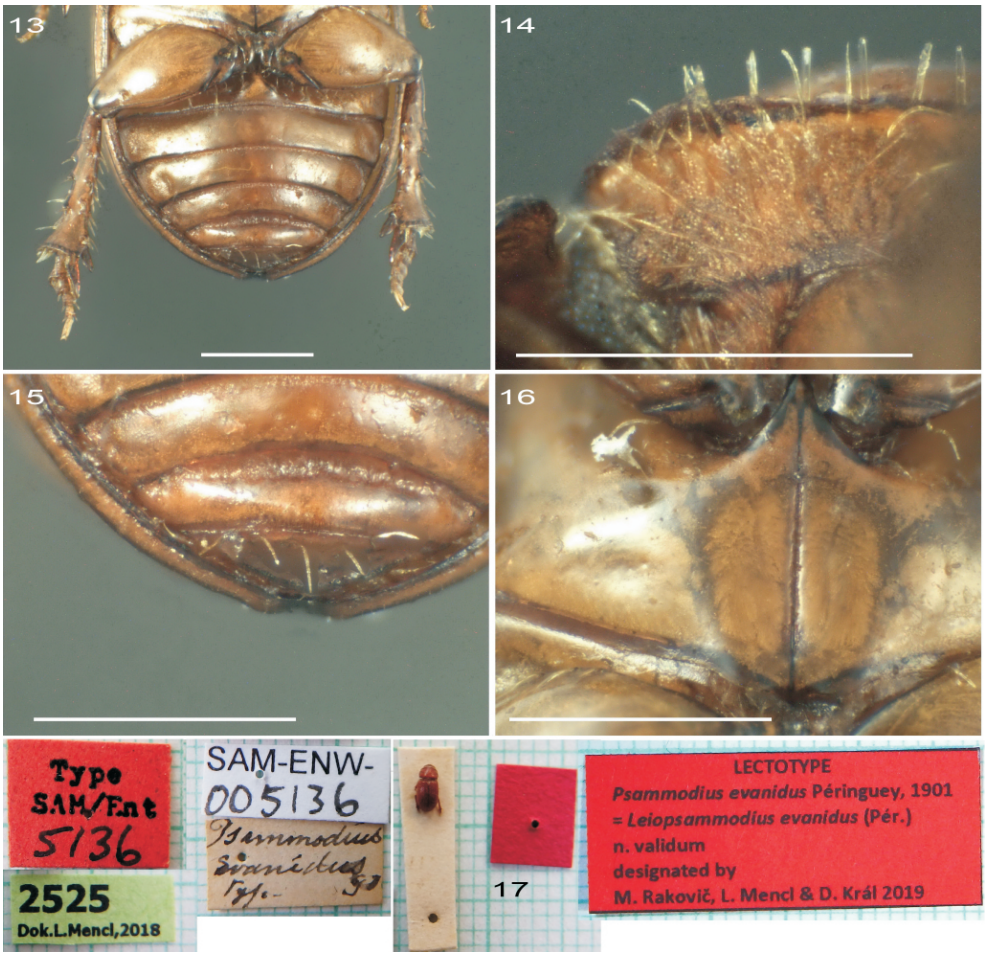


Figs. 9-12. *Leiopsammodius evanidus*, lectotype, details of forebody and elytra: 9- left part of head and pronotum, dorsal view; 10- pronotum, dorsal view; 11- anterior part of elytra with scutellum and pronotum base, dorsal view; 12- head and pronotum, lateral view. Scale lines 0.5 mm. Photographs by L. Mencl.

length), 2.60 times longer than pronotum and 1.16 times wider at broadest point than pronotum. Elytral intervals convex at base and on disc, strongly convex on apex, with sparse and very fine punctures apically (observable under very high magnification only), otherwise rather impunctate, interval 10 not considerably reduced in length posteriorly, achieving about 0.84 elytron length, but nearly flat there (Fig. 2). Intervals 8-10 peculiarly fused together anteriorly (Fig. 2). Apical arrangement of elytral intervals as in Fig. 5.

Legs observed on specimen mounted with its dorsum up as shown in Figs. 6-8 making possible to see shapes of meso- and metatibiae (outer faces), shapes and lengths of their apical spines and shapes of tarsomeres: right mesotibia and mesotarsus (Fig. 8), part of right metatibia with metatarsus (Fig. 6) and apex of left metatibia with metatarsus (Fig. 7).

Underside (Figs. 3 and 13-16). Mostly smooth, glabrous (with exception of individual setae on femora and pygidium) and impunctate (with exception of enormously sparse and fine punctures, nearly non-observable even under high magnification), abdominal ventrites and meso-metaventrum light brown, femora light brown with small darkened areas at basal as well as apical ends. Femora as in Figs. 3 and 13; metafemora wide, their length to-width ratio of 1.9. Meso-metaventral plate with complete, narrow but quite distinct midline furrow exerting no dilation throughout (Fig. 16). Meso- and metafemora moderately furrowed anteriorly as well as posteriorly. Abdominal ventrites 3-6 moderately fluted anteriorly (fluting stepwise increasing in length from ventrite 3 to ventrite 6). Pygidium smooth, pygidial setae most likely to be 4 or 6 in number (original number is difficult to definitely determine due to possible breaking off).



Figs. 13-17. *Leiopsammodius evanidus*, lectotype, details of underside and etiquettes: 13- metafemora and abdominal ventrites, ventral view; 14- setae on left lateral margin of pronotum, ventral view; 15- abdominal ventrites 5-6 with pygidium, ventral view; 16- mesometaventral plate, ventral view; 17- etiquettes pinned under the specimen. Scale lines 0.5 mm. Photographs by L. Mencl.

Sexual dimorphism. Not available.

Variability. Not available.

Differential diagnosis. The species discussed here can be differentiated from other Afrotropical *Leiopsammodius* species based on the following combination of characters: only moderately broader behind, clypeus surface with considerably transversal granules, anterior margins of genae nearly aligned with clypeus lateral margins, lateral margins of the pronotum smooth (not crenulate), relatively large punctures of the pronotum mostly arranged in vestiges of structural elements (see the explanation in Methods). Having in mind this combination of characters, *L. evanidus* should be considered to most closely resemble an East-African species

Leiopsammodius abyssinicus (Müller), which, however, has some of the relatively large punctures on the pronotum distinctly arranged in the vestigial posterior longitudinal furrow (not so in *L. evanidus*) and punctures of this type occurring beyond the vestigial structural elements are intermixed with fine punctures (quite absent in *L. evanidus*).

Distribution. The Republic of South Africa, Namibia.

DISCUSSION

In the course of the compilation of the *Psammodius* Fallén species revision from Europe, Asia and Africa, the first author of the present work (Rakovič 1981) was personally convinced by S. Endrödi that the type of *Psammodius evanidus* has been lost. Thus, he selected one of three specimens, which was equipped by Péringuey with a label "Psammodius evanidus Png", and designated it as the neotype. The locality data of the specimen were as follows: „Cape, Dumbrody, 23. iv. 1901". After a long period of time, the allegedly lost type was found.

In the present work, we compared the presently designated lectotype with the formerly designated neotype and found them to be definitely conspecific.

We believe that the present redescription of the lectotype and particularly the detailed photographs will help to unambiguously identify any specimens of *Leiopsammodius evanidus*. The interpretation of characters important for this purpose is summarized in the paragraph Differential diagnosis.

ACKNOWLEDGEMENTS. The authors thank Simon van Noort (SAMC) and Petr Janšta (Charles University, Prague, Czech Republic), who arranged the loan of the type specimens.

REFERENCES

DELLACASA M. 1988: Contribution to a world-wide catalogue of Aegialiidae, Aphodiidae, Aulonocnemidae, Termitotrogidae (Coleoptera: Scarabaeoidea). *Memorie della Societŕ Entomologica Italiana* 66 (1987): 1-455.

ENDRŐDI S. 1964: Die Aphodiinae des Congo-Gebietes in Rahmen der Fauna von zentral-Afrika (Coleoptera: Scarabaeidae). *Annales du Musée Royal de l'Afrique Centrale, Tervuren* 123: 1-415.

ENDRŐDI S. & RAKOVIČ M. 1981: Key to the species of South and South West African Aphodiinae. *Folia Entomologica Hungarica* 42: 31-77.

PÉRINGUEY L 1901: Descriptive catalogue of the Coleoptera of South Africa (Lucanidae and Scarabaeidae). *Transactions of the South African Philosophical Society* 12: 1-563.

RAKOVIČ M. 1981: A revision of the *Psammodius* Fallén species from Europe, Asia and Africa. *Rozpravy Československé Akdemie Věd* 91 (1): 1-82.

RAKOVIČ M. 1986: Complementary notes to my revision of old world Psammodius species (Coleoptera: Scarabaeidae: Aphodiinae). *Annotationes Zoologicae et Botanicae* 174: 1-19.

RAKOVIČ M. 1990: Review of the genus *Leiopsammodius* Rakovič on the world basis with a key to species from the Western Hemisphere and description of a new species (Coleoptera: Scarabaeidae: Aphodiinae). *Annotationes Zoologicae et Botanicae* 197: 1-18.

RAKOVIČ M. 1995: Description of a new species of the genus *Leiopsammodius* from Somalia and key to species of the Ethiopian Region. *Annotationes Zoologicae et Botanicae* 218: 3-8.

RAKOVIČ M., KRÁL D. & MENCL L. 2017: New information about and illustrations of Psammodiini species (Coleoptera: Scarabaeidae: Aphodiinae). 1. *Rakovicius thailandicus*. *Folia Heyrovskyana, Series A* 25: 147-152.

RAKOVIČ M., KRÁL D. & MENCL L. 2018: New information about and illustrations of Psammodiini species (Coleoptera: Scarabaeidae: Aphodiinae). 2. *Granulopsammodius transcaspicus*. *Folia Heyrovskyana, Series A* 26: 71-76.

RAKOVIČ M., KRÁL D. & MENCL L. 2019: New information about and illustrations of Psammodiini species (Coleoptera: Scarabaeidae: Aphodiinae). 3. *Leiopsammodius modestus*. *Folia Heyrovskyana, Series A* 27: 105-110.

SCHMIDT A. 1922: *Coleoptera Aphodiinae*. *Das Tierreich*. *Vol. 45*. Walter de Gruyter & Co., Berlin & Leipzig, 614 pp.

Published: 8. 10. 2019