

Three possibly allied species of the genus *Rhyssemus* occurring in southern areas of the Arabian Peninsula and exerting affinity to the East-African fauna (Coleoptera: Scarabaeidae: Aphodiinae: Psammodiini)

Miloslav RAKOVIČ¹⁾ David KRÁL²⁾ & Ladislav MENCL³⁾

¹⁾U Kruhárny 548, CZ-252 29 Dobřichovice, Czech Republic
e-mail: mrakovic@volny.cz

²⁾Charles University in Prague, Faculty of Science, Department of Zoology,
Viničná 7, CZ-128 43, Praha 2, Czech Republic
e-mail: kral@natur.cuni.cz

³⁾Masarykovo náměstí 5, CZ-281 26 Týnec nad Labem, Czech Republic
e-mail: l.mencl@centrum.cz

Taxonomy, new species, Coleoptera, Scarabaeoidea, Scarabaeidae, Aphodiinae, Psammodiini, Rhyssemina, *Rhyssemus*, Palaearctic Region, Afrotropical Region

Abstract. A new species of the genus *Rhyssemus* Mulsant, 1842, *Rhyssemus saldaitisi* sp. nov. from Oman and Yemen, is described and illustrated. The new species belongs to a group of three species of the genus together with *R. asperocostatus* Fairmaire, 1892 and *R. punctatissimus* Pittino, 1984 sharing important characters such as relatively medium-sized to large, elongate, subparallel body, mostly continuous and convex pronotal ridges, distinctly punctate pronotal furrows, suddenly narrowed pronotum before base, setae on pronotal margins at most slightly dilated, and quite distinct, forward-directed humeral spines. Specific differences within the group are detailed. The still known distribution of particular species of the group (in southern Oman, Yemen or western provinces of Saudi Arabia on the one hand and in Djibouti, Eritrea or Ethiopia on the other) is discussed.

INTRODUCTION

When studying material from the Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium (forwarded by Alain Drumont), the first author of the work presented here encountered eight specimens from southern Oman, which belonged to a new *Rhyssemus* Mulsant, 1842 species. Thereafter, in the course of the manuscript preparation, 18 specimens were found in material from the private collection of Pavel Kučera (Liberec, Czech Republic) and further two specimens were submitted for identification by Jiří Hájek from the National Museum Praha. Many characters of the new species were different from those of species known from Saudi Arabia (Pittino 1984a). On the other hand, the specimens studied exerted a combination of characters such as relatively (compared to most *Rhyssemus* species) medium-sized to large (five or nearly five mm of body length in the largest individuals), elongate species having subparallel body, suddenly narrowed pronotum before base in such a way that the posterior part of the lateral margin is emarginate and produces a nearly right angle with the pronotum base, macrosetae on pronotal margins acuminate, truncate or at most slightly dilated apically (never strongly clavate or absent), mostly continuous and convex pronotal ridges (not broken in discrete granules), pronotal furrows densely filled with coarse punctures (never granulate), rather low lateral calluses on the pronotum, non-costate elytral

intervals, considerable obliquely forward directed humeral teeth, and absence of the sexual dimorphism expressed in some species by apical spurs of male protibiae strongly bent inward. This combination of characters is typical for two East-African species of the genus, which are also known to occur in eastern and/or southern areas of the Arabian Peninsula: *Rhyssemus asperocostatus* Fairmaire, 1892 and *R. punctatissimus* Pittino, 1984.

The description of the new species is presented below. The relationships between probably allied *Rhyssemus* species from East Africa (Djibouti, Eritrea and Ethiopia) and those occurring in eastern and southern areas of the Arabian Peninsula (western provinces of Saudi Arabia, Yemen and Oman) are discussed.

Exact redescription of *R. asperocostatus* and description of *R. punctatissimus*, respectively, are available (Pittino 1984b), however, in the present work, and also in future intended works aimed at studying the enormously difficult genus *Rhyssemus*, we would like to emphasize some data useful in practice, in the identification to species. To that end, we offer paragraphs entitled “Supplementary outline of important characters” for the two species here and appropriate illustrations.

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, CMOS 5 digital camera and the Helicon Focus programme.

The specimens as specified in the section Taxonomy below were examined. They are equipped with white labels presenting locality data, pale green labels specifying numbers related to a photo-documentation system by the third author and red labels indicating the identification and type status. Specimens of the newly described species are provided with one red printed label “*Rhyssemus saldaitisi* sp. nov. / HOLOTYPUS ♂, ALLOTYPUS ♀ or PARATYPUS / *Rhyssemus / saldaitisi* sp. nov. / M. Rakovič, D. Král & / L. Mencl det. 2015”. Exact label data are cited for the type material, individual labels are indicated by a double slash (//), individual lines of every label by a single slash (/). Information in quotation marks (“ ”) indicates the original spelling. Our remarks and additional comments are found in brackets.

As to the terms describing the pronotal structure in Psammodiini (numbering of pronotal ridges), in the present work, we adhered to the terminology formerly proposed by the first author (Rakovič 1987). The reasons for this are as follows. In Psammodiini, there are genera characterized by a complete pronotal structure, i.e. five transversal ridges, five transversal furrows and a posterior longitudinal furrow (as is the case for example in the genera *Psammodius* Fallén, 1807 *Neopsamodius* Rakovič, 1986, *Rhyssemodes* Reitter, 1982, etc.), or by a reduced pronotal structure, i.e. a posterior longitudinal furrow and some vestigial furrows or at least lateral impressions corresponding to ends of the first and third transversal furrows (which is encountered for example in *Leiopsammodius* Rakovič, 1981 *Pleurophorus* Mulsant, 1842, etc.). In most Old-World *Rhyssemus* species, between ridges 4 and 5 (sensu Rakovič 1987), which are interrupted by the posterior longitudinal furrow, there is a transversal swelling on each side. Due to this, some authors consider that these members

of the genus *Rhyssemus* have six transversal ridges. This consideration itself does not pose any problem, but the problem arises when numbering the ridges, since in this case, ridge “5 sensu auct.” in *Rhyssemus* is by no means homologous with ridge 5 in other Psammodiini having the complete pronotal structure. We thus prefer consideration of five transversal ridges with right and left accessory transversal swellings present between ridges 4 and 5 (in the transversal furrow 4).

For morphological terms used in the description of epipharyngeal structures we follow Dellacasa et al. (2001).

The following acronyms stand for collections, in which the specimens studied here are kept:

- DKCP David Král collection, deposited in NMPC;
IRSB Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium (Alain Drumont);
LMCT Ladislav Mencl, private collection, Týnec nad Labem, Czech Republic;
MRCD Miloslav Rakovič, private collection, Dobřichovice, Czech Republic;
MNHN Muséum national d’Histoire naturelle, Paris, France (Antoine Mantilleri, Olivier Montreuil);
NMPC National Museum Praha, Czech Republic (Jiří Hájek);
PKCL Pavel Kučera private collection, Liberec, Czech Republic.

TAXONOMY

Rhyssemus asperocostatus Fairmaire, 1892

(Figs. 1-17)

Rhyssemus asperocostatus Fairmaire, 1892: 94. Type locality: “Bogos [nowadays in Eritrea: Anseba prov.]”.

Rhyssemus exaratus Marseul, 1878: 57 var. *asperocostatus*: Clouët: 1901: 101 (revision).

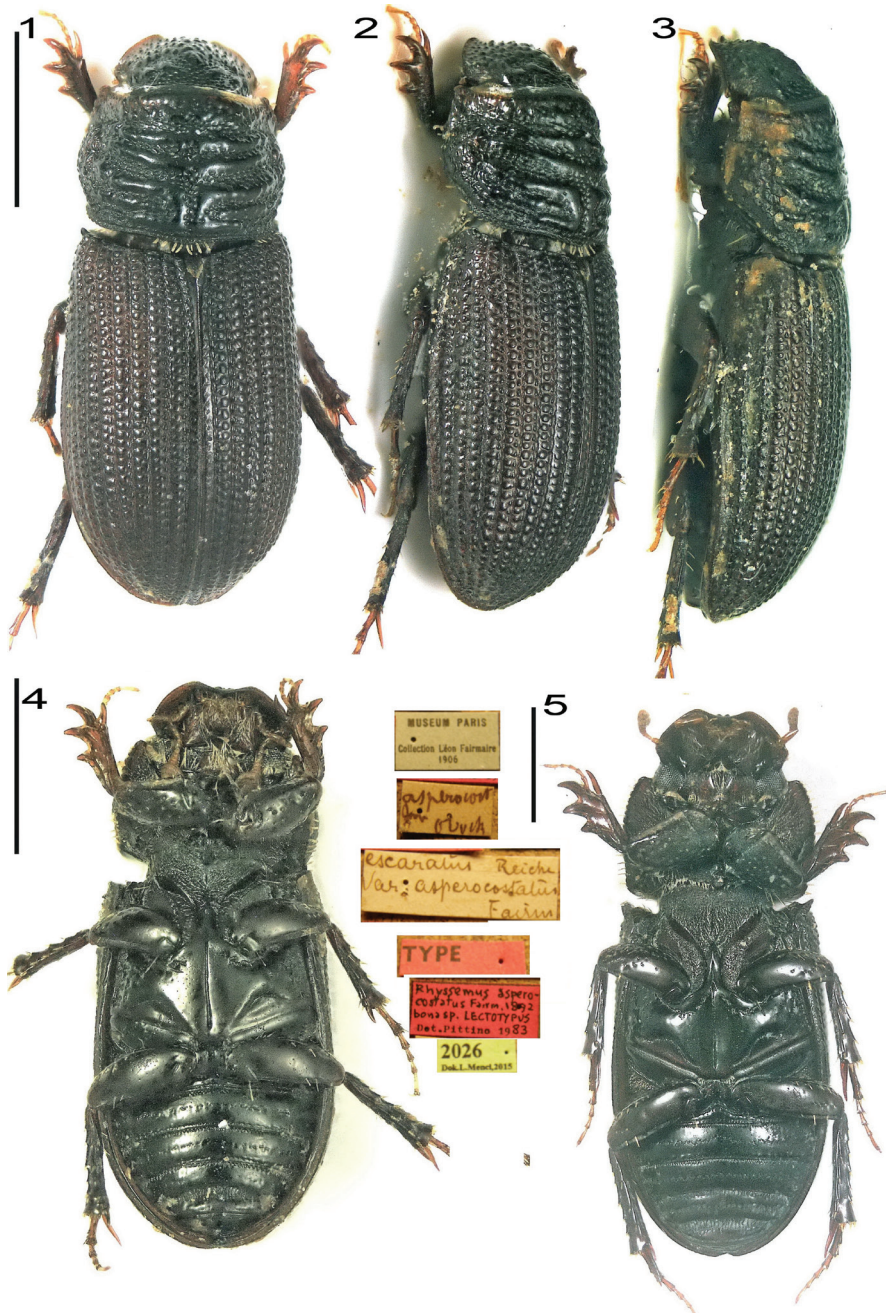
Rhyssemus exaratus asperocostatus: Schmidt: 1922: 504 (monograph).

Rhyssemus asperocostatus: Pittino: 1984b: 46 (valid species, redescription).

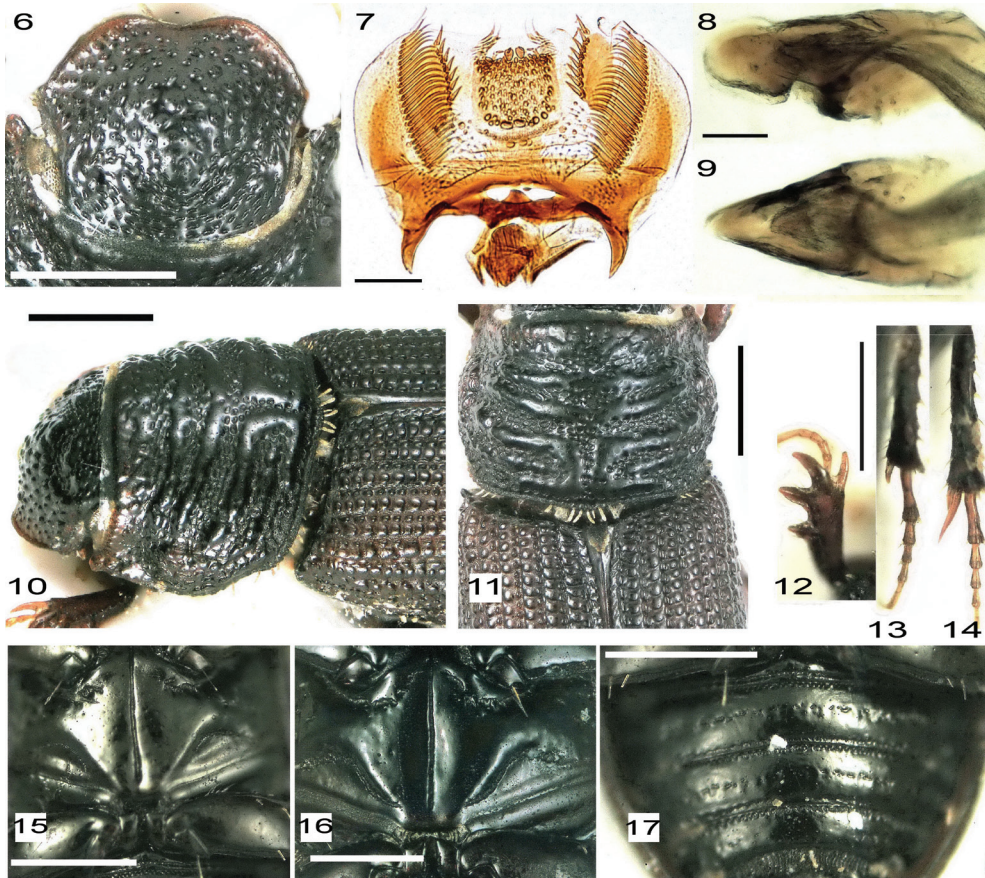
Rhyssemus ghindanus Petrovitz, 1970: 389. Type locality. “Eritrea, Ghinda und Gaharre” Synonymized by Pittino 1984b: 47.

Type material examined. Lectotype (♂), (MNHN), “MUSEUM PARIS / Collection Léon Fairmaire / 1906 [blue printed label] // asperocost. / Frm. / Obock [white handwritten label] // TYPE [red printed label] // exaratus Reiche / var asperocostatus / Fairm. [white handwritten label] // *Rhyssemus aspero-* / *costatus* Fairm. 2892 / bona sp. LECTOTYPUS / det.Pittino 1983 [red handwritten/printed label] // 2026 / Dok.L.Mencl, 2015 [pale green printed label]”.

Additional material examined. 19 specimens from Yemen: Dharan gov., 2 km E of Hammam Ali, 14°40’N 44°10’E, 1677 m, 29.x.2005, at light, David Král lgt., 9 specimens in NMPC; Ma’rib gov., dam SW of Ma’rib, 15°24’00’’N 45°16’06’’E, 1100 m, 8.-9. x.2005, at light, David Král lgt., 4 specimens in NMPC; Ta’izz gov., S of Najd an Ashamah, 13°20’02’’N 44°04’30’’E, 1480 m, 24.x.2005, at light, David Král lgt., 1 specimen in NMPC; Abyan gov., Lawdar W. env., N13°52’36’’ E45°48’01’’ , 1150 m, 22.-23. x.2005, at light, David Král lgt., 3 specimens in NMPC; Hadramwt gov., Wadi Idim, Sah env., 14°40’51’’N 48°52’04’’E, 728 m, 10.-11.x.2005, at light, David Král lgt., 1 specimen in NMPC. Saudi Arabia: Adnan, 21.ix.[19]78, W. Buttiker lgt. // *Rhyssemus asperocostatus* Fairm, BONA sp., det.Pittino 1983 // = *R. ghindanus* Petr., det.Pittino 1983 // 1761, Dok.L.Mencl 2014, in MRCD.



Figs. 1-5. *Rhyssenus asperocostatus* Fairmaire, 1892, habitus: 1- ♂ lectotype, dorsal view; 2- ♂ lectotype, dorso-lateral view; 3- ♂ lectotype, lateral view; 4- ♂ lectotype, ventral view; 5- ♀ specimen from Yemen, ventral view. Scale lines: 1 mm for all figures. Photographs by L. Mencl.



Figs. 6-17. *Rhyssesus asperocostatus* Fairmaire, 1892, details: 6- ♂ lectotype, head; 7- ♂ lectotype, epipharynx; 8- ♂ lectotype, aedeagus, lateral view; 9- ♂ lectotype, aedeagus, dorsal view; 10- ♂ lectotype, head, pronotum and basal part of elytra, dorsolateral view; 11- ♂ lectotype, pronotum and basal part of elytra, dorsal view; 12- ♂ lectotype, left protibia, dorsal view; 13- ♂ lectotype, right mesotibia, dorsal view; 14- ♂ lectotype, right metatibia, dorsal view; 15- ♂ lectotype, metaventral plate, ventral view; 16- ♀ specimen from Yemen, metaventral plate, ventral view; 17- ♂ lectotype, abdomen, ventral view. Scale lines: 0.5 mm for Figs. 6, 10-17, 0.1 mm for Figs. 7-9. Photographs by L. Mencl.

Supplementary outline of important characters. Relatively medium-sized to large (3.5 to 4.9 mm) subparallel species, only slightly broader behind, glabrous, shining, blackish brown, forebody sometimes darker than elytra; dorsal habitus as in Fig. 1.

Head convex, granulate, with two pairs of posterior oblique ridges, clypeus not broadly, but still fairly rounded each side of anteromedian emargination (Fig. 6; see also paragraph Remarks below); its margins moderately lifted upward anteriorly; lateral margins not emarginate, continuously arcuate, not quite aligned with anterior margins of genae; genae not strongly protruding and bearing about three tough, acute setae each. Most surface area of head (between middle protuberance and lateral and anterior clypeus margins) with small, but

distinctly delimited, most frequently round, less frequently transversal granules (granulation not very dense, interspaces between granules moderately larger than granule size). Middle protuberance continuously, moderately ascending anteriorly from anterior granulate area, more elevated posteriorly and more or less irregularly granulate there and separated by V-shaped furrow, densely filled with small, moderately transversal granules, from anterior pair of oblique ridges. Ridges of anterior pair not strong, but still distinct, smooth or moderately granulate, ridges of posterior pair considerably reduced or even indistinct. Head vertex as granulate as above mentioned V-shaped furrow between middle protuberance and oblique ridges.

Epipharynx (Fig. 7) transversal, anterior outline almost straight, lateral outlines regularly widely rounded; tormae and nesium well sclerotised, approximately symmetrical, apotormae missing; epitorma subquadrate, weakly sclerotised; helus with group of somewhat irregularly spaced sensilla (including two remarkably large ones medially) and two longitudinal rows of long microtrichia anteriorly; corypha and zygum absent; phobae weakly sclerotised, glabrous; chaetoparia with row of approximately 25 long, stout, closely spaced spines; area of prophobae well sclerotised, bearing longitudinal row of eight short, stout, densely spaced spines.

Pronotum convex, transversal, broadest at about middle; with complete pronotal structure of Psammodiini (five transversal ridges, five transversal furrows, posterior longitudinal furrow - see the section Material and methods for terminology - and accessory swelling each side of posterior longitudinal furrow between ridges 4 and 5), anterior corners moderately rounded, lateral margins nearly straight anteriorly, then distinctly arcuate about middle, but suddenly narrowed before base with producing nearly right angle between posterior part of lateral margin and pronotum base (Fig. 1). Lateral margins crenate, with short, blunt, at most slightly apically dilated macrosetae, basal margin with two groups of few similar macrosetae present against elytral intervals 1-3 and 5-7, respectively (Figs. 10-11). Transversal ridge 1 wide, continuous on disc, but with uneven surface due to presence of coarse punctures, ridges 2-5 narrower, continuous, mostly smooth and finely, sparsely microscopically punctate, ridge 5 short (reduced laterally), accessory swelling rather smooth on disc, but granulate laterally, shorter than ridge 4, but longer than ridge 5; transversal ridges mostly smooth not only on pronotal disc, but even laterally up to their ends, area between their ends and lateral margins of pronotum granulate, but without considerable lateral callus (produced in some *Rhyssemus* species due to elevated fusions of lateral ends of pronotal ridges 2 and 3 with ridges 4 and 5). All furrows densely filled with coarse round to moderately transversal punctures (Figs. 10-11).

Scutellum small, rather narrowly ogival than triangular, alutaceous (Fig. 11).

Elytra subparallel, broadest at about 2/3 their length, with quite distinct, obliquely forward directed humeral teeth. Elytral intervals distinctly granulate: each interval with outside row of large, mostly round granules and inside row of small grains (Figs. 1-3 and 10-11).

Legs as shown in Figs 12 (left protibia and protarsus), 13 (right mesotibia and mesotarsus), and 14 (right metatibia and metatarsus).

Ventrum. Mostly glabrous, smooth or sparingly punctate, as shown in Figs. 4, 5 and 17.

Aedeagus as in Figs. 8 and 9.

Sexual dimorphism. The area surrounding the metaventral plate longitudinal furrow is flat in the male (Figs. 4 and 15) and concave in the female (Figs. 5 and 16).

Variability. The variability in size (the body length between 3.5 and 4.9 mm) is also discussed below in the paragraph Remarks. In some specimens, granules on the clypeus tend to exert a concentric arrangement.

Differential diagnosis. Most characters of *R. asperocostatus* are very similar to those of the species *R. punctatissimus* considered below. *R. punctatissimus* is, however, more elongate: body length-to-width ratio is over 2.4 in *R. punctatissimus* and under 2.2 in *R. asperocostatus* (compare Figs. 18 and 19 with Figs. 1 and 4, respectively); elytra length-to-width ratio is of 1.61 in *R. punctatissimus* and 1.44 in *R. asperocostatus* (compare Fig. 18 with Fig. 1, respectively). Profemora are more considerably punctate in *R. punctatissimus* (Figs. 19 and 22) compared to *R. asperocostatus* (Figs. 4 and 5). Meso- and metafemora are slimmer, longer and more distinctly bordered in *R. punctatissimus* (Fig. 19) compared to *R. asperocostatus* (Figs. 4 and 5).

Distribution. Djibouti (“Obock”), Eritrea (Central province), Saudi Arabia (Asir, Baha, Jizan, Makkah and Madinah Provinces), “Somalia” and Yemen (Shabwah Governorate: “Beihan” [nowadays Bayhan al Qisab]) (Pittino 1984a, b). First records from Abyan, Dharan, Hadramwt, Ibb, Ma’rib, Sana’a and Ta’izz Governorates of Yemen (19 specimens collected there by the second author of the present work, in October 2005, at altitudes above the sea level of 728 to 2350 m).

Remarks. There is a traditional allegation that the type locality of the species is “Obock” (currently corresponding with the territory of Djibouti), or possibly “Somalia, Obock” (cf. Dellacasa 1988, Pittino 1984b, Schmidt 1922), most likely due to the fact that the work by Fairmaire (1892), comprising the *R. asperocostatus* description, is entitled “Coléoptères d’Obock”. Both syntypes also bear the etiquette with the word “Obock” (Pittino 1984b). However, just in the Fairmaire’s description, there is information that the species comes from “Bogos” and the area with this historical name can be found in the nowadays territory of Eritrea, Anseba Province (a mountainous landscape south of the city Keren) (cf. Petermann & Hassenstein 1864). The specimen designated as the lectotype (Pittino 1984b) is relatively small (3.4 mm). The range of body lengths reported by this author based on the material studied by him (seven species from East Africa) ranged between 3.4 and 3.9 mm. Of course materials from different locations can differ in size, most likely due to different ecological conditions in the course of the larval development. In 19 specimens collected by the second author of the present work in Yemen, the body length ranges between 3.45 and 4.92 mm; the values of the body length follow a fairly symmetrical distribution (the mean value of the body length, 3.85 mm, coincides with the median value).

In *Rhyssenus*, the direction of the observation is enormously important to avoid misinterpretations of shapes and structures. For example, in the dorsal aspect of the whole specimen, the anterior margin of the clypeus seems to be only roundly angulate each side of the anteromedian emargination (Fig. 1), since in this position, the head is usually moderately bent downward. However, when observing the head in direction perpendicular to its circumference, then the clypeus anterior margin is shown to be not broadly but still fairly rounded there (Fig. 6).

***Rhyssemus punctatissimus* Pittino, 1984**
(Figs. 18-28)

Rhyssemus punctatissimus Pittino, 1984: 49. Type locality. "Ethiopia (Harrar Prov.), Dire-Dawa".

Material examined. 2 specimens from Ethiopia: Afar Region, Metahara, 8°54.237'N, 39°56.249'E, 1052 m, 27.v.2011, volcanic region with Acacia, V. Hula & J. Niedobová lgt., in NMPC. A specimen from Yemen: [Hajjah Governorate], Wadi Sharez [= Wadi Shaares,], iii.1985, de Rougemont // *Rhyssemus punctatissimus* m., Det. Pittino 1987 // 1762, Dok.L.Mencl 2014, in MRCD.

Supplementary outline of important characters. Relatively medium-sized to large (3.8 to 4.7 mm) subparallel species, only slightly broader behind, glabrous, shining, blackish brown, forebody sometimes darker than elytra; dorsal habitus as in Fig. 18.

Head (Fig. 24) similar to that of preceding species as to its shape, structure and sculpture, but genae more prolonged backward (not symmetrical), and most surface area of clypeus (between middle protuberance and lateral and anterior clypeus margins) with rather larger and denser granules tending to produce concentric arrangement.

Epipharynx (Fig. 23) transversal, anterior outline almost straight, lateral outlines regularly widely rounded; tormae and nesium well sclerotised, approximately symmetrical, apotormae missing; epitorma subquadrate, weakly sclerotised; helus with group of somewhat irregularly spaced sensilla (including two remarkably large ones medially) and two longitudinal rows of long microtrichia anteriorly; corypha and zygum absent; phobae weakly sclerotised, glabrous; chaetoparia with row of approximately 25 long, stout, closely spaced spines; area of prophobae well sclerotised, bearing longitudinal row of seven short, stout, densely spaced spines.

Pronotum (Fig. 28) similar to that of preceding species as to its shape, structure and sculpture as well as marginal macrosetae.

Scutellum small, isosceles triangular, alutaceous (Fig. 28).

Elytra (Figs. 18, 20, 21) more elongate, but otherwise similar to those of preceding species (see also paragraph Remarks under *R. asperocostatus*).

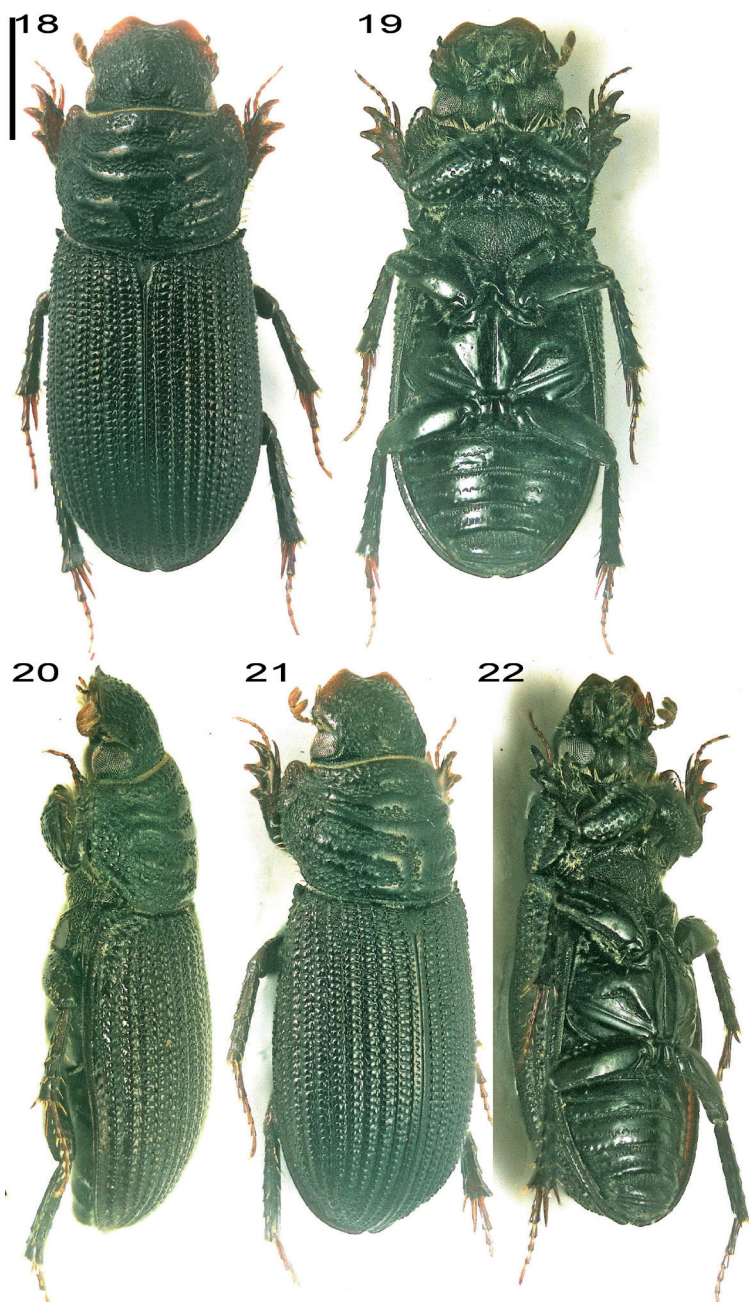
Legs as shown in Figs. 25 (left protibia and protarsus), 26 (left mesotibia and mesotarsus), and 27 (left metatibia and metatarsus).

Ventrum. Mostly glabrous, profemora considerably punctate, but otherwise smooth or sparingly punctate, as shown in Figs. 19 and 22.

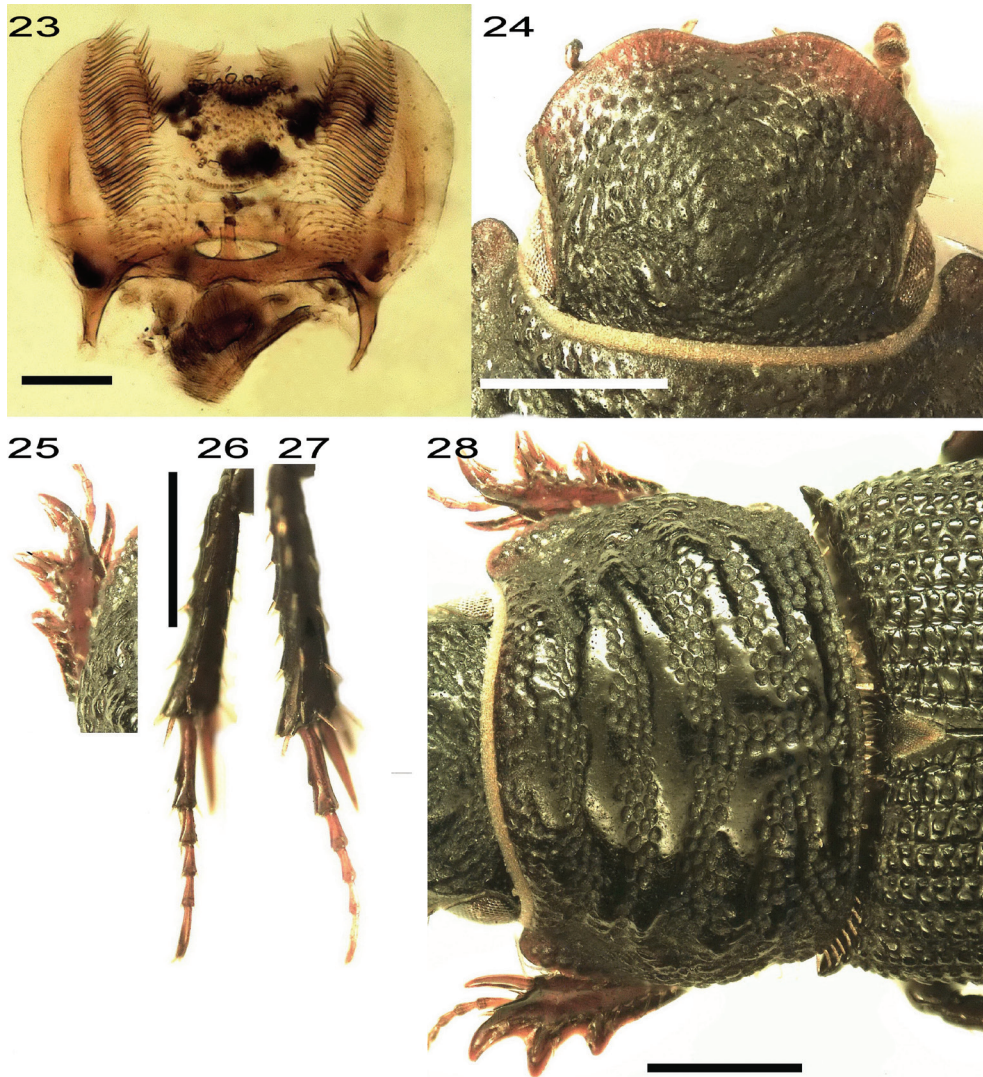
Sexual dimorphism. Not applicable here (no male specimen has been available to the present authors), but in the female specimens studied, the metaventral plate has also a concave area surrounding the longitudinal furrow (Figs. 19 and 22), as is the case in the preceding species.

Differential diagnosis. The species exerts most characters similar to those of the preceding species. However, the two species can be reliably differentiated from each other as pointed out in the paragraph Differential diagnosis above for *R. asperocostatus*.

Distribution. Ethiopia (Gamu-Gofa, Harrar, Shoa and Sidamo provinces) (Pittino 1984b). First records from the Afar Region of Ethiopia and Yemen (Hajjah Governorate).



Figs. 18-22. *Rhyssalus punctatissimus* Pittino, 1984, habitus, ♀ specimen from Yemen: 18- dorsal view; 19- ventral view; 20- lateral view; 21- dorso-lateral view; 22- ventro-lateral view. Scale lines: 1 mm for all figures. Photographs by L. Mencl.



Figs. 23-28. *Rhysselus punctatissimus* Pittino, 1984, ♀ specimen from Yemen, details: 23- epipharynx; 24- head; 25- left protibia, dorsal view; 26- left mesotibia, dorsal view; 27 left metatibia dorsal view; 28- pronotum with basal parts of head and elytra. Scale lines: 0.1 mm for Fig. 23, 0.5 mm for Figs. 24-28. Photographs by L. Mencl.

Remarks. Many characters of *R. punctatissimus* are similar to those of the preceding species. Differences between the two species are mentioned above in Remarks on the species *R. asperocostatus*.

Rhyssemus saldaitisi sp. nov.

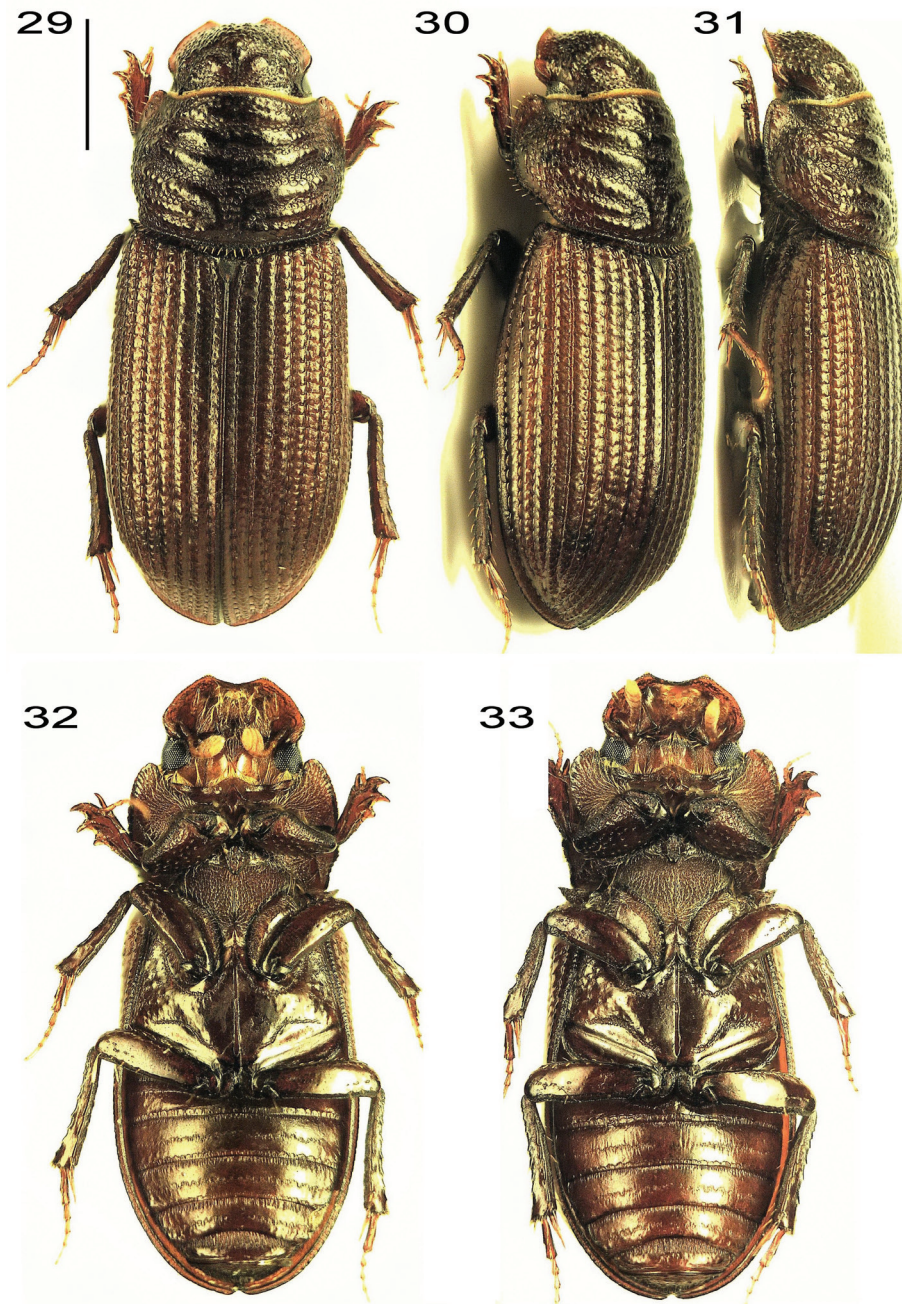
(Figs. 29-44)

Type material. Holotype (♂) bearing the following printed labels: 1) white: "Coll. R. I. Sc. N. B."; 2) another white: "S. Oman, Dhofar, 20 km N.E. from Jihjat, h-550 m, 25.9.2006, Kriueger, Saldaitis"; 3) pale green [related to the photo-documentation system of the third author]: "1673, Dok. L. Mencl". Allotype (♀), also bearing labels as follows: 1) white: same data as with the holotype; 2) another white: same data as with the holotype 3) pale green "1669, Dok. L. Mencl"; 4). Six paratypes: each bearing the same white labels as the holotype. The above mentioned type specimens are deposited as follows: holotype and allotype in IRSB three paratypes in IRSB, a paratype in DKCP, a paratype in LMCT, and a paratype in MRCD. A paratype bearing three labels as follows: 1) white: "E Yemen, Jabal al Fatk / Hawf NE Al Ghaydah / N 16°39', E 53°04' / 477 m, 31.iii.2007 / lgt. S. Kadlec"; 2) another white label: "ex coll. S. Kadlec / National Museum Prague / Czech Republic" (deposited in NMPC). A paratype bearing three labels as follows: 1) white: "YEMEN, Al Mahra gov. / HAWF NE env., 736 m / 12-16.x.2005, N / 16°30'54", E 053°05'19" / David Král lgt."; 2) another white label: "ex coll. D. Král / National Museum Prague / Czech Republic" (deposited in DKCP). Seven paratypes bearing the following printed labels: 1) white: "OMAN, Dhofar Provincie / Jabal al Qamar / AJDARAWT env. / Ra's Sájir-Wádi, 750m n. m. / (30 m.n.m.) 24.ix.2011 / lgt. P. Kučera" (3 specimens deposited in PKCL, 2 specimens in LMCT, 1 specimen in DKCP, 1 specimen in MRCD). Five paratypes bearing the following printed labels: 1) white: "OMAN, Dhofar Provincie / Jabal al Qamar / 15 km W Al Mughsayi / N 16.85591° E 53.72375° / (450 m. n. m.) 26.ix.2011 / lgt. P. Kučera" (2 specimens deposited in PKCL, 1 specimen in DKCP, 1 specimen in MRCD). Three paratypes bearing the following printed labels: 1) white: "OMAN, Dhofar pr. / Jabal Samhán / AQARHANAWT / 1000-1200 m. n. m. 17.x.2013 / N 17°06'014 E 54°41'50 lgt. P. Kučera" (2 deposited in PKCL, 1 specimen in DKCP 1x). A paratype bearing the following printed labels: 1) white: "OMAN, Dhofar pr. / Jabal Samhán / Wadi Darbat (160 m. n. m.) / N of Taqah 9.x.2013 / N 17°05' E 54°26' / lgt. P. Kučera" (deposited in PKCL). A paratype bearing the following printed labels: 1) white: "OMAN, Dakhilliah pr. / SW 30km of Izki / Wadi Indam (465 m. n. m.) / N 22°45' E 58°00'32 / 15.x.2013 / lgt. P. Kučera" (deposited in PKCL). A paratype bearing the following printed labels: 1) white: "OMAN, Dhofar.x.2013 provincie / Jabal al Qamar 20 km N 30km Dhalqut / N 16.71092° E 53.15350° / (1100 m.n.m.) 28.8.2012 / lgt. P. Kučera" (deposited in LMCT).

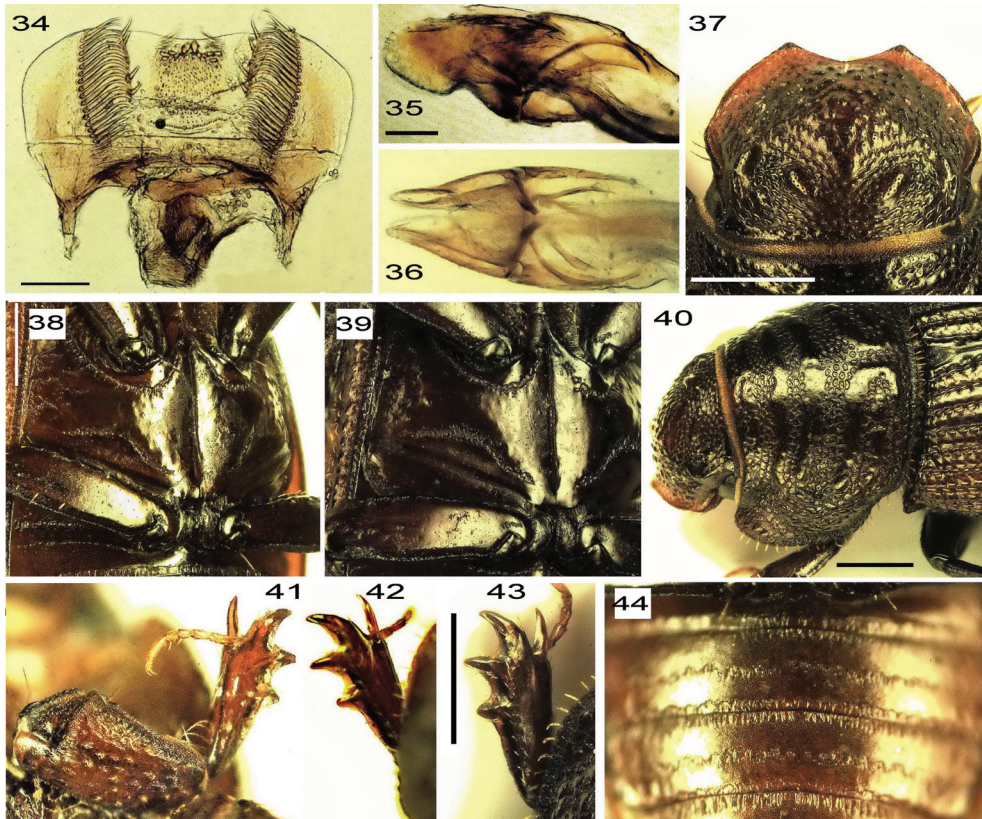
Description of holotype. Relatively large (4.64 mm) subparallel, only slightly broader behind, glabrous, fore body strongly, elytra moderately shining, brown; dorsal habitus as in Fig. 29.

Head (Fig. 37) convex, granulate, with two pairs of posterior oblique ridges (ridges of anterior pair quite distinct, smooth, non-granulate, microscopically punctate, those of posterior pair much smaller, less indistinct) and distinct supraocular ridges. Clypeus with round anteromedian emargination, with sharp upturned tooth each side of it, clypeal sides distinctly sinuate behind the teeth, not sinuate or at most slightly sinuate in front of genae, each gena with 2-4 thin, acute macrosetae. Clypeus surface with distinct, rather sparsely distributed, not very large granules varying in shape and decreasing in size toward lateral and anterior margins. Middle protuberance in form of relatively wide area of larger and denser granules, only slightly elevated. Head surface in front of as well as behind anterior pair of oblique ridges with elongate granules.

Epipharynx (Fig. 34) transversal, anterior outline almost straight, lateral outlines regularly widely rounded; tormae and nesium well sclerotised, approximately symmetrical, apotormae missing; epitorma subquadrate, weakly sclerotised; helus with group of somewhat irregularly spaced sensilla (including two remarkably large ones medially) and two longitudinal rows of long microtrichia anteriorly; corypha and zygum absent; phobae weakly sclerotised, glabrous; chaetoparia with row of approximately 20 long, stout, closely spaced spines; area



Figs. 29-33. *Rhyssemus saldaitisi* sp. nov., habitus: 29- ♂ holotype, dorsal view; 30- ♂ holotype, dorso-lateral view; 31- ♂ holotype, lateral view; 32- ♂ holotype, ventral view; 33- ♀ allotype, ventral view. Scale lines: 1 mm for all figures. Photographs by L. Mencl.



Figs. 34-44. *Rhysselus saldaitisi* sp. nov., details: 34- ♀ allotype, epipharynx; 35- ♂ holotype, aedeagus, lateral view; 36- ♂ holotype, aedeagus, dorsal view; 37- ♂ holotype, head; 38- ♂ holotype, metaventral plate; 39- ♀ allotype, metaventral plate; 40- ♂ holotype, pronotum with head and part of elytral base, dorso-lateral view; 41- ♂ holotype, left leg, ventral view; 42- ♂ holotype, left protibia, dorsal view; 43- ♀ allotype, left protibia, dorsal view; 44- ♂ holotype, abdomen, ventral view. Scale lines: 0.1 mm for Figs. 34-36, 0.5 mm for Figs. 37-44. Photographs by L. Mencl.

of prophobae well sclerotised, bearing longitudinal row of four short, stout, densely spaced spines.

Pronotum (Fig. 40) convex, transversal, broadest at about middle; with complete pronotal structure of *Psammodiini* (five transversal ridges, five transversal furrows, posterior longitudinal furrow - see the section Material and methods for terminology - and accessory swelling each side of the posterior longitudinal furrow between ridges 4 and 5), anterior corners moderately rounded, lateral margins arcuate, but suddenly narrowed before base with producing nearly right angle between posterior part of lateral margin and pronotum base (Fig. 29). Lateral margins crenate, with rather long, tough and moderately acuminate macrosetae, basal margin with shorter setae. Transversal ridge 1 continuous but moderately granulate, ridges 2-5 continuous, smooth and finely sparsely punctate, ridge 5 short (reduced

laterally), accessory swelling rather granulate, shorter than ridge 4, but longer than ridge 5. All transversal ridges smooth not only on pronotal disc, but even laterally up to their ends, area between their ends and lateral margins of pronotum granulate, but with only low lateral callus. All furrows densely filled with coarse round to moderately transversal punctures (Fig. 40).

Scutellum small, rather isosceles triangular than narrowly ogival, moderately alutaceous (Fig. 29).

Elytra with ten striae and ten intervals, with strong, obliquely forward-directed humeral teeth, subparallel, only slightly widened backward. Intervals transversely incised, areas between incisions producing rather indistinct, backward directed elevations, two rows of granules (usually more or less distinct in many *Rhyssemus* species) being thus hard to recognize (Figs. 29-31). Intervals 2 and 3 free apically, reaching apex; intervals 4 and 5 fused together apically, not reaching apex; interval 6 even shorter than the fusion of intervals 4 and 5; interval 7 free, about as long as fusion of intervals 4 and 5; interval 8 shorter, about as long as interval 6; intervals 9 and 10 rather flat apically.

Legs brown. Dorsal face of protibia with a longitudinal row of macrosetigerous punctures parallel with outer margin, otherwise glabrous, smooth, shining, impunctate; apical spur moderately arcuately bent outward. Superior terminal spur of metatibia about as long as basimetatarsomere.

Ventrum. Ventral surfaces (Figs. 32-33, 38-39, 41, 44) mostly glabrous, smooth and shining. Profemora punctate; meso- and metafemora with few punctures in apical third, furrowed along anterior as well as posterior margins; meso-metavenral plate with nearly complete (posteriorly slightly reduced), narrow longitudinal furrow, moderately widening toward its posterior end; abdominal ventrites fluted anteriorly and sculptured posteriorly as shown in figures, with distinct central transverse serrate lines ("zig-zag" lines).

Pygidium scabrous, most likely with four macrosetae (the accurate number of setae is hard to determine since some of them may always be broken off).

Aedeagus as in Figs. 35-36.

Sexual dimorphism. In the female, the protibia apical spur is shorter and thicker (Fig. 43) compared to that in the male (Fig. 42). The middle area of the metavenral plate is flat in the male; in the female, it is concave (Figs. 32 and 33, respectively).

Variability. There is no considerable variability in the colour, sculpture or structure within the type series (28 specimens) but oblique ridges on the head (particularly those of the posterior pair) can be more or less distinct. The body length ranges between 4.2 and 5.0 mm.

Differential diagnosis. The new species described here can be obviously included into the group of three species of the genus together with two still known species discussed here, occurring in East Africa and/or in eastern and southern areas of the Arabian Peninsula, as demonstrated by the combination of nine characters stated in the Introduction. The differentiation of *R. saldaitsi* sp. nov. from both *R. asperocostatus* and *R. punctatissimus* is easy thanks to the toothed clypeus, to the absence of distinct granules in elytral intervals

and to long, acuminate macrosetae along the pronotum lateral margins in the new species; *R. asperocostatus* as well as *R. punctatissimus* have clypeus not broadly but fairly rounded each side of the anteromedian emargination, elytral intervals distinctly granulate, and short, blunt macrosetae along pronotum lateral margins.

Distribution. Oman (Dhofar Governorate, Ad Dakhiliyah Governorate) and SE Yemen (Al Mahrah Governorate).

Name derivation. Patronymic, in honour of one of collectors of the type specimens, an outstanding lepidopterist Aidias Saldaitis (Vilnius University, Lithuania).

DISCUSSION

From Saudi Arabia and adjacent areas of the Arabian Peninsula (Oman, Yemen), Pittino (1984a) reported total of 16 species in six genera of the tribe Psammodiini. Most of them (seven species) are members of the genus *Rhyssemus*. In the present work, we also take into account the occurrence of *R. punctatissimus* in Yemen (yet unpublished record of the species from the Arabian Peninsula) and describe the new species *R. saldaitisi* sp. nov. from Oman and Yemen. In terms of zoogeography, these species can be divided into groups as follows. A numerous group includes species known from the territory of the Arabian Peninsula only (*R. brevitarsis* Pittino 1984, *R. buettikeri* Pittino 1984, *R. saoudi* Pittino 1984, and the new species described here, *R. saldaitisi* sp. nov.). One species, *R. granosus* Klug, 1841, is considered as a widely distributed Afrotropical element extending into southern parts of the Arabian Peninsula (Oman, Qatar, Saudi Arabia, U.A.E. and Yemen) (Rakovič et al in press). A further interesting group comprises four species penetrating into the territory of the Arabian Peninsula from East Africa (*R. asperocostatus*, *R. exaratus* Marseul, 1878, *R. punctatissimus* and *R. rubeolus* Harold, 1871). Two of them, *R. asperocostatus* and *R. punctatissimus* are very similar and possibly also closely allied to the species *R. saldaitisi* sp. nov. The new species has still been found only in Oman and the very east area of Yemen (Al Mahra Governorate), whereas the remaining two species occur in countries of the Horn of Africa (Somali Peninsula), from which they penetrate into southern parts of the Arabian Peninsula.

The new species is thus likely to take vicariant distribution east of the distribution area of the other two species mentioned. This situation is quite not unusual in other groups of Scarabaeoidea: compare for example similar relationships in certain species of the genus *Onitis* Fabricius, 1798 (Scarabaeinae) (Keith & Moretto 2008) or *Pachnoda* Burmeister, 1842 (Cetoniinae) (Krajčič 2002) from territories of the East Africa and Arabian Peninsula.

ACKNOWLEDGEMENT. The authors are indebted to Alain Drumont (IRSB), Jiří Hájek (NMPC) and Pavel Kučera (Liberec, Czech Republic) who submitted interesting material, including type specimens of the *Rhyssemus saldaitisi* sp. nov., for identification. Thanks are extended to Antoine Mantilleri and Olivier Montreuil (both MHNH) for the loan of the lectotype of *R. asperocostatus*. David Král would like to acknowledge the institutional support from resources of the Ministry of Education, Youth and Sports of the Czech Republic.

REFERENCES

- CLOUËT DES PESRUCHES L. 1901: Essai monographique sur le genre *Rhyssemus*. *Mémoires de la Société Entomologique de Belgique* 8: 7-124.
- DELLACASA G., BORDAT P. & DELLACASA M. 2001: A revisional essay of world genus-group taxa of Aphodiinae. *Memorie della Società Entomologica Italiana* 79 (2000): 1-482.
- DELLACASA M. 1988: Contribution to a world-wide catalogue of Aegialiidae, Aphodiidae, Aulonocnemidae, Termitotrogidae (Coleoptera: Scarabaeoidea). *Memorie della Società Entomologica Italiana* 66 (1987): 1-455.
- FAIRMAIRE L. 1892. Coléoptères d'Obock. 3e pt. *Revue d'Entomologie* 11: 77-127.
- KRAJČÍK M. 2002: A new species of the genus *Pachnoda* from Oman (Col., Scarabaeidae: Cetoniinae). *Cetoniimania* 2:16- 18.
- KEITH D. & MORETTO P. 2007: Une nouvelle espèce du genre *Onitis* d'Arabie Saoudite (Coleoptera: Scarabaeoidea: Scarabaeidae). *Nouvelle Revue d'Entomologie (Nouvelle Serie)* 24: 177-178.
- MARSEUL S. A. 1878: Nouvelles et faits divers de L'Abeille. Deuxieme série Nos 14 et15. *Mélanges (suite). L'Abeille*: 53-60.
- PETERMANN A. & HASSENSTEIN B. 1864: *Originalkarte der Nord-Abessinischen Grenzlande: Bogos, Mensa, Marea, und der umliegenden Gebiete. Hauptsächlich nach den Aufnahmen und Arbeiten der Deutschen Expeditionen unter v. Heuglin, Kinzlbach, Muncinger & Steudner, 1861 und anderen Quellen.* Johann Perthes, Gotha, 1 p.
- PETROVITZ R. 1970: Zwei neue Aphodiinae aus dem Gebiet des Roten Meeres. *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano* 110: 387-390.
- PITTINO R. 1984a: Insects of Saudi Arabia. Coleoptera Scarabaeoidea: A revision of the family Aphodiidae. *Fauna of Saudi Arabia* 6: 267-360.
- PITTINO R. 1984b: Taxonomic considerations on, types revisions, lectotypes designations and descriptions of new or little known Psammodiini from Palaearctic, Oriental and Ethiopian Regions (Coleoptera Aphodiidae). *Giornale Italiano di Entomologia* 2: 13-98.
- RAKOVIČ M. 1987: A revision of the genus *Odochilus* Harold with remarks on the tribal classification of the subfamily Aphodiinae (Coleoptera, Scarabaeidae). *Acta Entomologica Bohemoslovaca* 84: 27-44.
- RAKOVIČ M., KRÁL D. & BEZDĚK A. 2016 (in press): Tribe Psammodiini. Pp. x-y. In: LÖBL I. & LÖBL D. (eds): *Catalogue of Palaearctic Coleoptera Vol. 3, Revised and Updated Edition. Scarabaeoidea - Scirtoidea - Dasciloidea - Buprestoidea - Byrrhoidea*. Leiden: E. J. Brill, xy pp.
- SCHMIDT A. 1922: *Coleoptera Aphodiinae (Das Tierreich)*. Berlin und Leipzig: Walter de Gruyter & Co., 614 pp.

Received: 20.11.2015

Accepted: 25.12.2015