

**Studies on types in the genus *Rhyssemus*. 2.  
*Rhyssemus keisseri* Bénard, 1910 and *Rhyssemus rohani* Bénard, 1920  
(Coleoptera: Scarabaeidae: Aphodiinae: Psammodiini)**

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**Taxonomy, redescription, Coleoptera, Scarabaeoidea, Scarabaeidae, Aphodiinae, Psammodiini, Rhyssemina, *Rhyssemus*, Afrotropical Region**

**Abstract.** Results of studying type materials, the lectotype of *Rhyssemus keisseri* Bénard, 1910 and four paralectotypes of *R. rohani* Bénard, 1920, are presented. Supplements to redescrptions of the two species are provided with putting emphasize on the pronotal and elytral structures and sculptures, details of which are difficult to describe without appropriate illustrations. Photographs of the two species (habitus in different aspects and details) are published for the first time.

## INTRODUCTION

The work presented here is further to our quite recent communication (Rakovič et al. 2016) comprising general considerations concerning the problem of the explanation and/or understanding of details characterizing species in the genus *Rhyssemus* Mulsant, 1842 and dealing with the species *Rhyssemus mayeti* Clouët des Pesruches, 1901. Results of studying the lectotype of *R. keisseri* Bénard, 1910 and four paralectotypes of *R. rohani* Bénard, 1920 from Muséum national d'Histoire naturelle, Paris are discussed here.

The two species belong to the Afrotropical fauna. The first monograph of the genus *Rhyssemus* (Clouët des Pesruches 1901) deals with 43 species on the world basis (some of them were later synonymized or transferred to other genera) including 18 Afrotropical species. The monograph of world Aphodiinae by Schmidt (1922) comprises 47 *Rhyssemus* species including 27 ones from the Afrotropical Region (from both the African continent and Madagascar). The monographic treatise by Endrödi (1964), essentially covering the Afrotropical fauna of Aphodiinae, presents a key to 24 *Rhyssemus* species from the African continent (without Madagascar). A number of individual species were described since then, but the last most important comprehensive works dealing with many *Rhyssemus* species (Pittino 1983, 1984) are older than 30 years. One hundred and sixty-two species of *Rhyssemus* are listed in the worldwide catalogue by Dellacasa (1988), including nearly 70 Afrotropical species from the continent and 23 species from Madagascar.

In addition to the two lectotypes and paralectotypes studied, a specimen of *R. bicolor* Clouët des Pesruches, 1901 (compared with a syntype from the IRSB) was also examined for reasons detailed in the Discussion and in the Note under the appropriate paragraph Material examined.

The two species discussed here are members of the most numerous group of species having two rows of granules in each elytral interval (outside row of larger granules and inside row of smaller ones). These granules are, however, different as to their size, shape and possibility of their resolution depending on the magnification and direction of the observation. The purpose our

works focused on stepwise studies on types of *Rhyssemus* species is to help finding differences between similar species, particularly as to the pronotal and elytral sculptures and structures, *inter alia* with taking the advantage of contemporary photographic techniques.

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

The following acronyms stand for collections, in which the specimens studied here are kept:  
DKCP David Král collection, deposited in the National Museum, Praha, Czech Republic;  
IRSB Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium (Alain Drumont);  
LMCT Ladislav Mencl private collection, Týnec nad Labem, Czech Republic;  
MNHN Muséum national d'Histoire naturelle, Paris, France (Antoine Mantilleri);  
MRCD Miloslav Rakovič private collection, Dobřichovice, Czech Republic.

The description of transversal structural elements of the pronotum is based on a concept proposed by Rakovič (1987), which is also explained, justified and illustrated by a schematic drawing in our recent work (Rakovič et al. 2016): five transversal ridges, five transversal furrows and accessory swelling present in furrow 4 each side of the posterior longitudinal furrow.

## RESULTS

### *Rhyssemus bicolor* Clouët des Pesruches, 1901 comb. nov.

*Rhyssemus bicolor* Clouët des Pesruches, 1901: 76.

*Rhyssemus bicolor*: Schmidt 1922: 511 (monograph, key), Endrődi 1960: 233 (key), Endrődi 1964: 345 (key).

*Rhyssemus* (*Trichiorhyssemus*) *bicolor*: Pittino 1984: 77, fig. 15 (redescription, lectotype designation).

*Trichiorhyssemus bicolor*: Dellacasa 1988: 242 (catalogue), Rakovič & Král 1997: 243 (legend to distribution map).

**Type locality.** "Congo [= Democratic Republic of the Congo] (Kinschassa [= Kinshasa])".

**Material examined. D. R. Congo:** A specimen from MRCD, compared with type from IRSB, and equipped with the following labels: 1) white, printed: "Kinshassa [= Kinshasa] / Waelbroeck / 18. i. 1900"; 2) red, printed: "compd. / w. type 2000 / M. Rakovič"; white, handwritten / printed "Trichiorhyssemus / bicolor Cl. / M. Rakovič det. 2000".

**Note.** The specimen was examined just in support of data from the literature, to facilitate the comparison of three *Rhyssemus* species with broadly rounded clypeus each side of the anteromedian emargination: *R. bicolor*, *R. franzi* Petrovitz, 1963 and *R. keisseri*. The comparison is presented here in the part Discussion.

### *Rhyssemus keisseri* Bénard, 1910

(Figs. 1-15)

*Rhyssemus Keisseri* Bénard, 1910: 266, fig. 1.

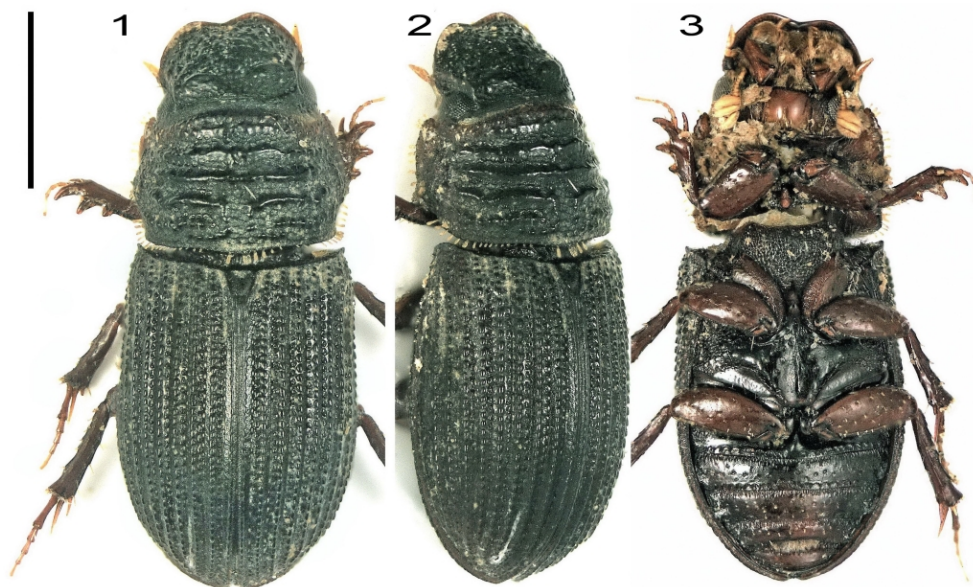
*Rhyssemus bicolor keisseri*: Schmidt 1922: 512 (monograph, key, incorrect downgrading to subspecies of *R. bicolor* Clouët, 1901: 76), Endrődi 1960: 233 (key), Endrődi 1964: 345 (key).

*Rhyssemus keisseri*: Pittino 1984: 62 (redescription, lectotype designation, restitution - valid sp., not ssp. of *R. bicolor*), Dellacasa 1988: 424 (catalogue).

**Type locality.** "Haut Niger [= nowadays Mali], Koulikoro".

**Type material studied. Mali:** A female specimen (MNHN), equipped with labels as shown in Fig. 7.

**Additional material studied. Sudan, Darfur Province:** A male specimen (MRCD): Gureida, at light, 22. x. 1974.



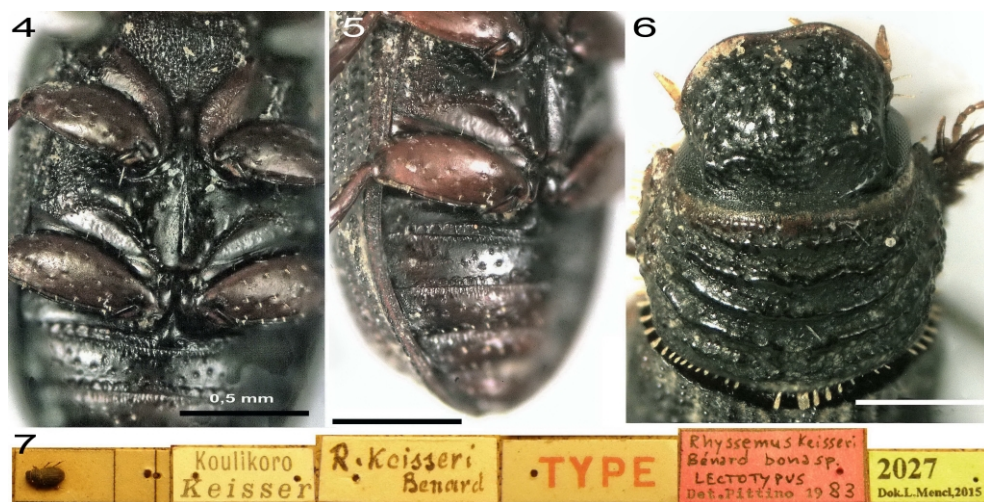
Figs. 1-3. *Rhyssesus keissleri*, lectotype, ♀, habitus: 1- dorsal view; 2- dorsolateral view; 3- ventral view. Scale line 1 mm. Photographs by L. Mencl.

**Supplementary redescription based on the lectotype** (aedeagus and some further details also studied in a male specimen from Sudan - see the paragraph above). Total body length: 3.25 mm. Relatively short, subparallel (very slightly broader behind), broadest at about elytra midlength, length-to-width ratio of 2.45, shining, dark brown (Fig. 1).

Clypeus (Fig. 6) broadly rounded each side of anteromedian emargination, its margins slightly narrowly lifted, arcuate laterally and aligned with genae; genae less protruding than large eyes and bearing few fine, acuminate macrosetae. Clypeus surface with irregular, not very dense granules varying in size and shape and merging into anterior part of low middle protuberance; small posterior piece of protuberance formed by few confluent, larger, irregular granules. Oblique ridges with rather uneven surface, directed more sideward than forward. Head vertex transversally wrinkled.

Epipharynx (Fig. 8) transversal, anteriorly shallowly emarginate, 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 and one longitudinal row of long microtrichia anteriorly; corypha and zygum absent; phobae weakly sclerotised, glabrous; chaetoparia with row of approximately 24 long, stout, closely spaced spines; area of prophobae well sclerotised, bearing longitudinal row of seven short, stout, densely spaced spines.

Pronotum (Fig. 6) transversal (its length-to-width ratio of 0.695 - width measured in dorsal view,



Figs. 4-7. *Rhyssemus keisseri*, lectotype, ♀, details: 4- metaventrum, ventral view; 5- abdomen, ventrolateral view; 6- head and pronotum, dorsal view; 7- original position of lectotype on card and labels pinned under lectotype. Scale lines 0.5 mm for Figs. 4-6. Photographs by L. Mencl.

including lateral calli exceeding pronotum circumference at middle), widest at middle, arcuately narrowed anteriorly, its lateral sides straight, parallel with body axis, but about middle partially concealed under overlapping lateral callus in dorsal view (Figs. 1 and 11), obviously straight in lateral or oblique, dorsolateral view (Figs. 2 and 3), and then emarginate before nearly right posterior angle. Pronotal margins crenulate, equipped with relatively short and thick macrosetae, moderately dilated toward apex of macroseta. Pronotal structure consisting of five transversal ridges, five transversal furrows, posterior longitudinal furrow and accessory swelling present in furrow 4 on each side of the longitudinal furrow arranged as follows: all transversal ridges narrower than respective furrows, ridge 1 subdivided in its middle part by narrow line into anterior and posterior parts, both of them being partially continuous, but more or less granulate, ridges 2-4 very narrow, continuous, smooth, accessory swelling consisting of rows of discrete tubercles, ridge 5 reduced, consisting of short rows of discrete tubercles each side of posterior longitudinal furrow; pronotal furrows filled with not very deep, but large punctures (punctures in anterior furrows slightly transversal, those in posterior ones round). Lateral calli granulate, distinctly exceeding pronotum lateral margins.

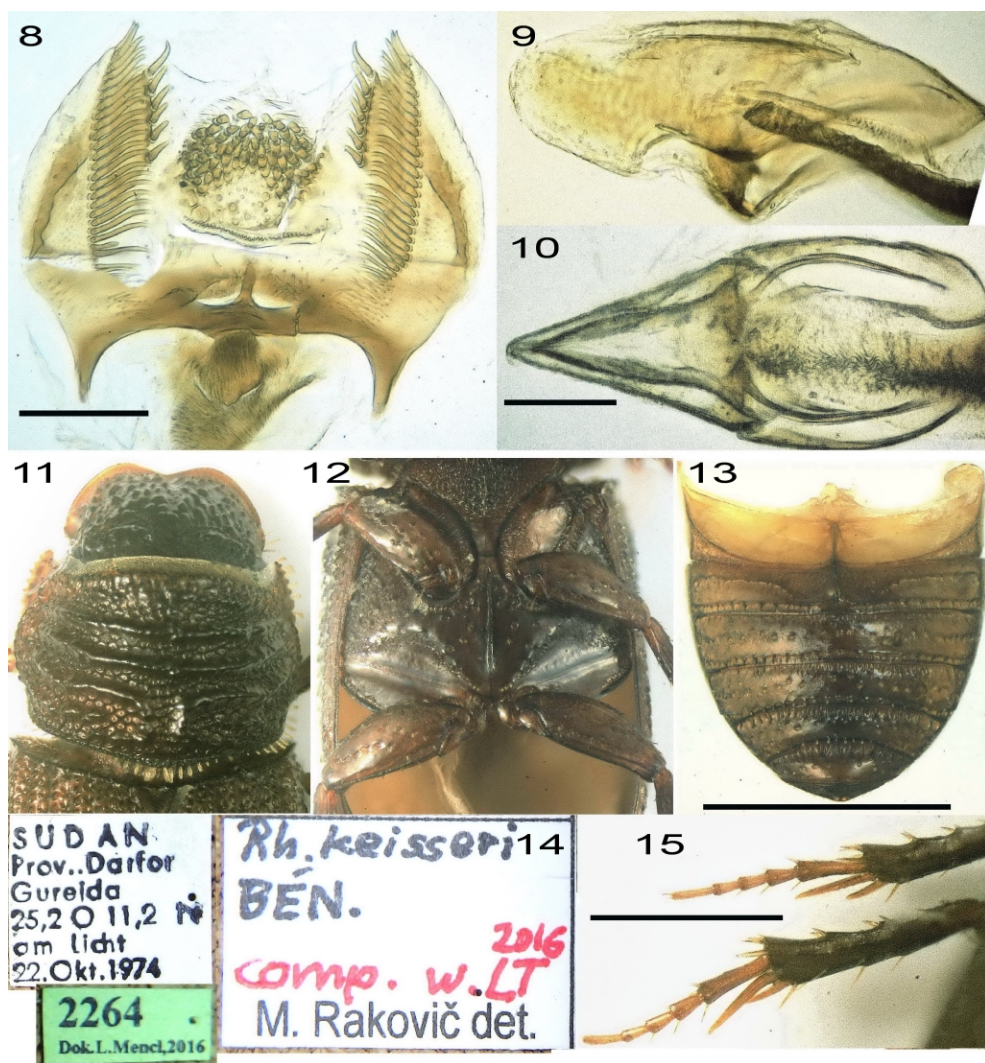
Scutellum small, triangular, alutaceous.

Elytra (Figs. 1 and 2) moderately broader behind, broadest at about middle (their length-to-width ratio of 1.44), with ten striae and ten intervals; humeral denticles not large, but sharp, well distinct, directed forward. Striae relatively wide (of about half interval width on disc). Intervals with two rows of granules: outside row of larger, moderately elongate and backward elevated granules, and inside row of smaller, less elongate ones; large granules quite distinct even under low magnification. Odd intervals not higher than even ones, not only on disc but also on apex.

Meso- and metatibia with meso- and metatarsomere as in Fig. 15. Superior terminal spur of metatibia slightly longer than basal metatarsomere, the latter moderately shorter than metatarsomeres 2-4 combined.

Ventral surface as in Fig. 3, alutaceous, with small punctures on femora (Figs. 3 and 12) and





Figs. 8-15. *Rhyssalus keisseri*, specimen from Sudan, ♂, details: 8- epipharynx; 9- aedeagus, lateral view; 10- aedeagus, dorsal view; 11- head and pronotum, dorsal view; 12- metaventrum, ventral view; 13- abdomen, ventral view; 14- labels pinned under the specimen; 15- left mesotibia with mesotarsus (above), left metatibia and metatarsus (below). Scale lines 0.1 mm for Figs. 8-10, 1 mm for Figs. 11-13, 0.5 mm for Fig. 15. Photographs by L. Mencl.

abdominal ventrites bearing very short macrosetae. Abdominal ventrites (Figs. 5 and 13) without serrate lines ("zig-zag lines"). Ventrite 2 widely fluted posteriorly, ventrite 3 narrowly fluted anteriorly and widely fluted posteriorly, ventrites 4-5 narrowly fluted anteriorly, ventrite 6 uneven in anterior half and smooth in posterior half. Metaventral plate (Fig. 4) with narrow, posteriorly slightly reduced longitudinal furrow, surrounded by concave area.

Aedeagus (Figs. 9 and 10).

**Sexual dimorphism.** The metaventral plate is flat at midline longitudinal furrow in the male. It is slightly concave there in the female.

**Distribution.** Chad, Ivory Coast, Mali, Niger, Nigeria, Senegal (based on data by Pittino (1984)); Sudan (based on the specimen studied here – first record from Sudan).

***Rhyssemus rohani* Bénard, 1920**

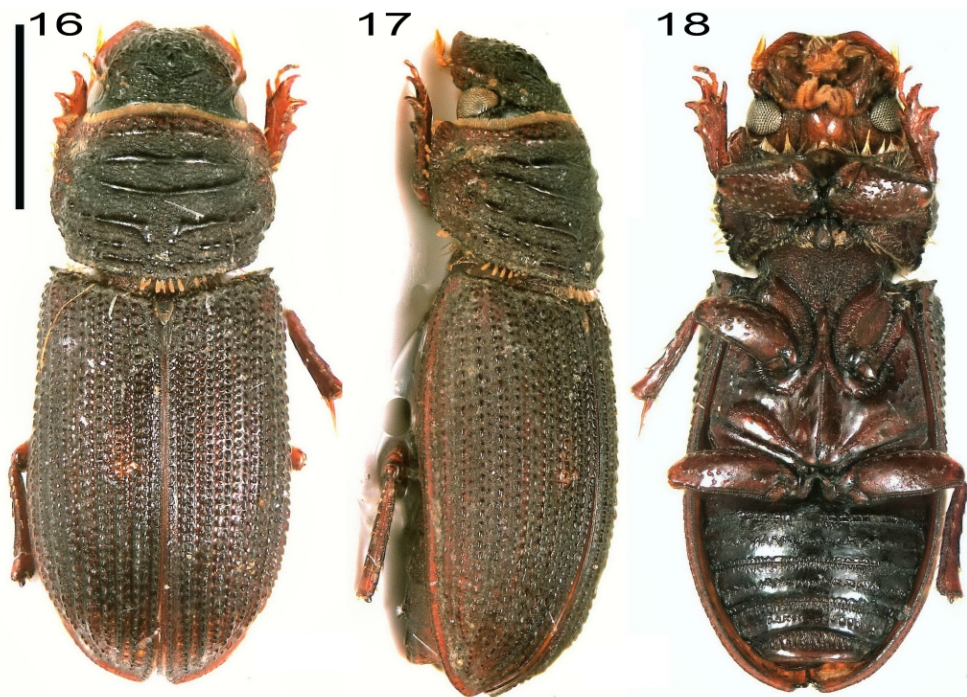
(Figs. 16-25)

*Rhyssemus rohani* Bénard, 1920: 298, fig. without No.

*Rhyssemus rohani*: Endrödi 1964: 345 (key), Dellacasa 1988: 424 (catalogue).

**Type locality.** “Rhodésia ouest, rivière Cuando [= nowadays in Angola]. Angola District Huilla: Lumuna Louengué”.

**Type material studied.** **Angola:** Four specimens (MNHN), equipped with labels as shown in Fig. 25.



Figs. 16-18. *Rhyssemus rohani*, paralectotype, ♂, habitus: 16- dorsal view; 17- dorsolateral view; 18- ventral view. Scale line 1 mm. Photographs by L. Mencl.

**Supplementary redescription based on four paralectotypes.** Total body length: 3.5-3.6 mm. Elongate, subparallel (very slightly broader behind), relatively narrow: broadest slightly behind elytra midlength, length-to-width ratio of 2.60 on average, shining, dark brown (Fig. 16).

Clypeus (Fig. 22) obtusely roundly angulate (with moderately lifted angles) each side of anteromedian emargination, its lateral sides actually not sinuate anteriorly when observed strictly in direction perpendicular to head surface (seemingly slightly sinuate due to projection of lifted angle, if observed in dorsal view of specimen, where head is always moderately declined

downward) - rather arcuate behind anterior angles, separated by minute notches from, and not quite aligned with anterior margins of genae protruding moderately more than eyes and bearing at most two thin, acuminate setae each. Clypeus surface with well delimited, not very dense, round and transversal, irregularly oriented granules stepwise increasing in size and density from clypeus margin to middle protuberance, but always having intervals between them larger than their size; middle protuberance anteriorly consisting of granules as mentioned above, its small posterior area consisting of about three rather larger and nearly confluent, irregularly shaped granules. Head vertex with oblique ridges; ridges of anterior pair well distinct, narrow, continuous, sometimes granulate but mostly non-granulate, ridges of posterior pair indistinct or missing. V-shaped furrow between middle protuberance and oblique ridges and head vertex area behind oblique ridges densely filled with well distinct, small, slightly transversal granules.

Epipharynx as in Fig. 19. transversal, anterior outline almost straight, lateral outlines regularly widely rounded; tormae and nesium well sclerotised, approximately symmetrical, apotormae missing; epitorma almost quadrate, weakly sclerotised; helus with group of somewhat irregularly spaced sensilla 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, somewhat sparsely spaced spines.

Pronotum transversal (its length-to-width ratio of 0.722), widest at middle, arcuately narrowed anteriorly, obliquely straight (at most slightly sinuate) narrowed toward round posterior angles, lateral margins crenulate, with numerous, relatively short, apically dilated macrosetae; macrosetae along basal margin similar. Pronotal structure (Fig. 16) consisting of five transversal ridges, five transversal furrows, posterior longitudinal furrow and accessory swelling present in furrow 4 on each side of the longitudinal furrow arranged as follows: all transversal ridges narrower than respective furrows, ridge 1 subdivided by row of transversal punctures, ridges 2-3 continuous, ridge 4 continuous near middle and broken into discrete tubercles laterally, accessory swelling and ridge 5 consisting of discrete tubercles; pronotal furrows transversally coarsely punctate (punctures more transversal in anterior furrows, less transversal, nearly round in posterior ones). Lateral calli moderately exceeding pronotum lateral margins.

Scutellum small, triangular, alutaceous.

Elytra (Figs. 16 and 17) slightly broader behind, broadest slightly behind middle (their length-to-width ratio of 1.61), with ten striae and ten intervals; humeral denticles not large, but well distinct, directed sideward. Striae narrow, well distinct, but their punctures indistinct. Intervals with two rows of moderately elongate, nearly round granules: outside row of larger granules and inside row of smaller ones; granules (even the smaller ones) well delimited and quite distinct even under low magnification. Odd intervals not higher than even ones, not only on disc but also on apex.

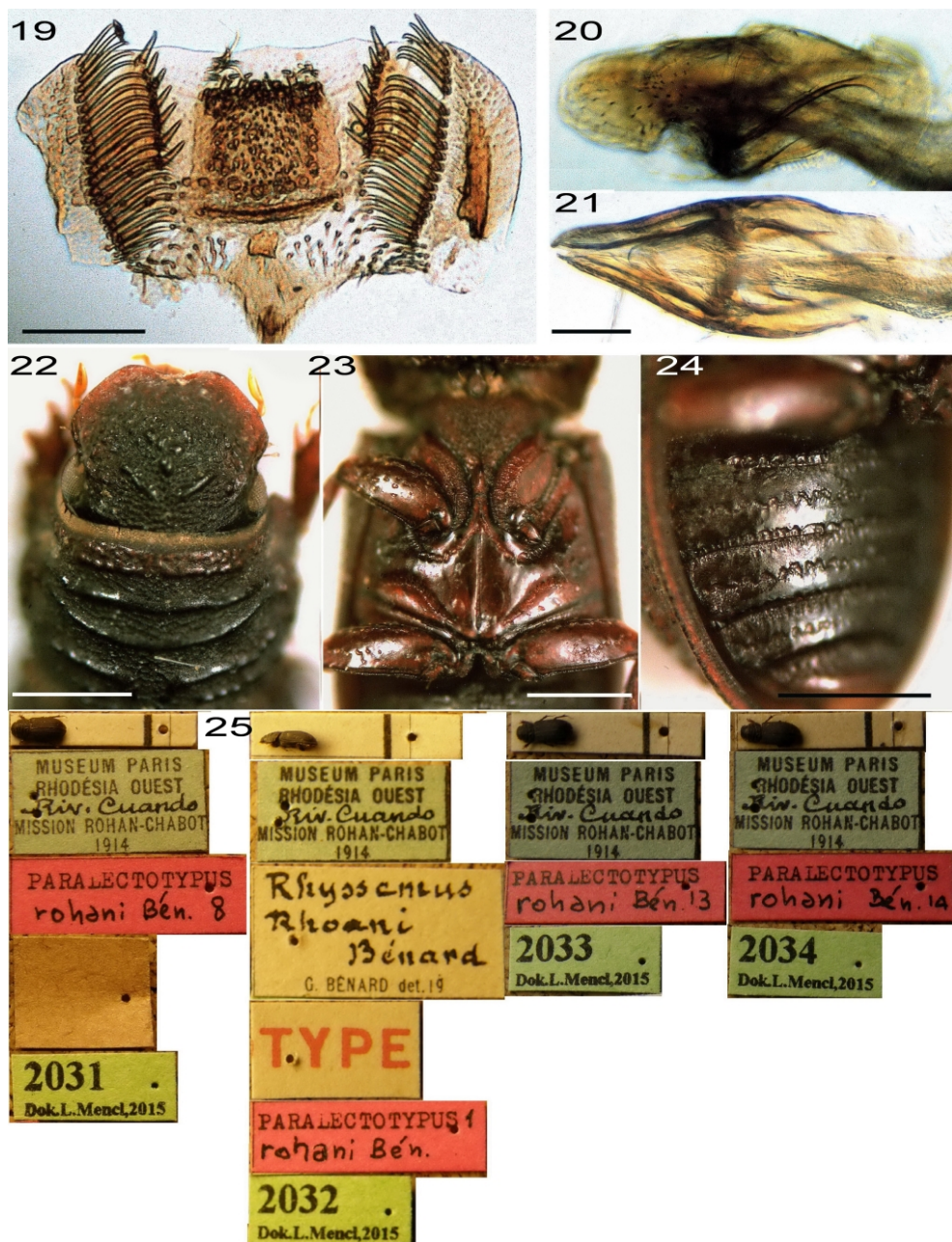
Superior terminal spur of metatibia about as long as basal metatarsomere.

Ventral surfaces (Figs. 18, 23 and 24) only finely alutaceous and thus moderately shining, glabrous. Femora considerably punctate (profemora throughout, meso- and metafemora in apical half). Abdominal ventrites 3-5 with considerable serrate lines ("zig-zag lines"). Ventrite 3 fluted posteriorly, ventrite 4 fluted anteriorly as well as posteriorly, ventrite 5 fluted anteriorly, ventrite 6 strongly scabrous in anterior half, smooth in posterior half. Pygidium scabrous. Metaventral plate smooth, with narrow, posteriorly slightly dilated longitudinal furrow, surrounded by concave areas in males, flat area in females.

Aedeagus as in Figs. 20 and 21.

**Sexual dimorphism.** No differences in external characters were found between males and females.





Figs. 19-25. *Rhyssemus rohani*, paralectotypes, details: 19- ♀, epipharynx; 20- ♂ aedeagus, lateral view; 21- ♂, aedeagus, dorsal view; 22- ♂, head and pronotum, dorsal view; 23- ♂, metaventrums, ventral view; 24- ♂, abdomen, ventral view; 25- original positions of paralectotypes on cards and labels pinned under paralectotypes. Scale lines 0.1 mm for Figs. 19-21, 0.5 mm for Figs. 22-24. Photographs by L. Mencl.



**Distribution.** Angola, Zimbabwe. Also reported by Endrödi (1964) from Namibia, but these data can possibly concern a different species.

## DISCUSSION

*Rhyssemus keisseri* is likely to be most relative to the species *R. bicolor* and *R. franzi* (Petrovitz 1963) because of having the clypeus broadly rounded (neither dentate nor angulate) each side of the anteromedian emargination. We completely agree with Pittino (1984) that *R. keisseri* is a valid species. It can be by no means synonymous with *R. bicolor*. Wider pronotal ridges and less distinct granules in elytral intervals in the latter species are the most striking differences. For example, in dorsal aspect, under magnification of about 30x, individual granules can be well resolved in elytral intervals on elytral disc of *R. keisseri*, whereas in *R. bicolor* the intervals seem to be only transversally cut under the same conditions. It is useless to repeat further differences exactly specified by Pittino (1984). *R. keisseri* is black; *R. bicolor* either has black forebody (except reddish anterior margin) and yellowish red (orange) elytra or is entire black (ab. *inurbanus*). For completeness' sake, it is to mention that Pittino (1964) considered the Clouët's species as *Rhyssemus* (*Trichiorhyssemus*) for formal reasons (presence of imperceptible setae on the elytral apex), but he added that classing in *Trichiorhyssemus* is disputable here (we also agree with this opinion; presence of setae not only on elytra but also on the pronotum and/or head is perhaps necessary to justify this classing). We have not yet examined the species *R. franzi*, but based on the literature (Petrovitz 1963, Pittino 1984) the species is easy to distinguish; it is tricolour, i.e. it has the head prevalently black, pronotum prevalently reddish brown and elytra prevalently yellowish brown and different structure and sculpture of the pronotum and elytra (particularly nearly flat and wide pronotal ridges, etc.).

Most characteristic features of the species *Rhyssemus rohani* are narrow pronotal ridges, coarsely punctate pronotal furrows and granules in elytral intervals, which are very distinct even under low magnification.

**ACKNOWLEDGEMENT.** The authors are indebted to Antoine Mantilleri (MHNH) for the loan of the lectotypes and paralectotypes studied here.

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