Three new species and new records of African Psammoecus Latreille (Coleoptera, Silvanidae)

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Abstract. Three new African species of Psammoecus Latreille, 1829 are described: Psammoecus nyakabuyensis sp. nov., Psammoecus procerus sp. nov. and Psammoecus sinuaticollis sp. nov. New distribution data and a revised identification key for African Psammoecus are given.

Key words. Africa, Silvanidae, Psammoecus, taxonomy, distribution

Introduction

In the course of work that followed a revision of African Psammoecus Latreille, 1829, predominantly based on material from the Tervuren Museum (Karner 2012), 237 specimens from several other collections were examined. Since little is known about the distribution of African Psammoecus, the present paper makes the new faunistic data available. The material also contained three new species that are described here.

Notes on some characters

The shape of the temples shows considerable differences between species. Temples may be well developed and wide, or they may be narrowed very steeply. To provide a measure for the degree of narrowing, the angle between the temple and the longitudinal axis of the head can be used (see Fig. 1). The resulting value is called the ‘temple angle’, it is given as an angular degree.

The pubescence on head and pronotum is composed of mostly semierect setae; the elytral pubescence consists of strial and interstrial setae. In all African species studied by the author so far, the setae are directed anteriorly on the head and pronotum, and posteriorly on the elytra.

Near the anterior angles of the pronotum, small seta-bearing denticles or groups of denticles are present in all African species, sometimes reduced to minute structures. A posterior denticle near the posterior angle is present in most species. Frequently, also the lateral pronotal margins bear teeth of different size, shape and pattern. Teeth along the lateral pronotal margin - located between anterior and posterior denticles - are numbered in roman numerals, starting anteriorly, and are named ‘T I’, ‘T II’, etc. Setae
originating from these teeth are more or less damaged in most museum specimens; they are extremely fragile and prone to being damaged during collection of specimens in the field. Even in well conserved material, specimens with undamaged setation (such as shown in Fig. 2A) are rarely observed. While the cleaning of specimens for photography would be desirable from an aesthetic point of view, any attempt to remove dirt, dust particles, etc. was found to severely damage the pubescence even in well softened specimens. For that reason, it was not attempted to clean specimens, even though the aesthetics of photographs was somewhat compromised.

**Material and Methods**

Measurements were taken as follows:

Length: from apical margin of clypeus to apex of elytra  
Head width: across eyes  
Head length: from apical margin of clypeus to imaginary line between hind margins of eyes  
Eye length: from anterior to posterior margin  
Antennal length: from base of 1st antennomere to apex of 11th antennomere  
Pronotal width: across maximum width, excluding spines  
Pronotal length: from anterior to posterior margin  
Elytral width: across maximum joint width  
Elytral length: along suture including scutellum  

Relative proportions (lengths) of antennomere are listed from 1st to 11th antennomere. Microsculpture was assessed at 80x magnification.

For dissection of genitalia, the method described by Karner (2012) was used. For photography, the isolated aedeagus was placed in a warm drop of Kaiser’s glycerol gelatin (Carl Roth GmbH) to enable precise orientation. After study, structures were embedded in dimethylhydantoin formaldehyde resin (Steedman 1958) on a cellulose acetate label and attached to the pin of the respective specimen.

![Fig. 1. Scheme for temple angle measurement.](image)
Photographs were taken with a Canon EOS 650D digital camera attached to an Olympus SZX16 stereo microscope and photographs of genitalia were taken with a Canon EOS 650D digital camera attached to an Olympus CH microscope. Images and image layers were processed with Zerene Stacker (Version 1.04 Build T201311272225), Adobe Lightroom 5.3 and GIMP (Version 2.8.0) software.

All label data are given verbatim for type material. The labels are cited beginning with the uppermost one; the respective lines are separated by ‘|’. Comments on label colors, label shapes, etc. regarding the respective specimen are included in square brackets.

Locality and collection data for other material examined are condensed, sorted alphabetically by country.

Specimens from the following collections were studied:

BMNH = The Natural History Museum, London
HNHM = Termeszettudomanyi Musuem, Budapest
MKF = Michael Karner, Frankfurt am Main (later in SMF)
MHNG = Muséum d’Histoire Naturelle, Geneva
SMF = Forschungsinstitut Senckenberg, Frankfurt am Main
TMSA = Ditsong National Museum of Natural History, Pretoria
ZMHB = Museum für Naturkunde der Humboldt-Universität, Berlin

Results

Taxonomy

Class Hexapoda Blainville, 1816
Order Coleoptera Linnaeus, 1758
Family Silvanidae Kirby, 1837
Subfamily Brontinae Erichson, 1845
Tribe Telephanini LeConte, 1861
Genus Psammoecus Latreille, 1829

Psammoecus nyakabuyensis sp. nov.
Fig. 2A–G

Diagnosis

The following combination of character states is diagnostic for this species: 1st antennomere 2.1 times as long as 2nd antennomere; maximum pronotal width near middle; lateral margins of pronotum with distinct, triangular teeth with wide bases, anterior angle of pronotum with distinct denticle; elytral striae narrower than interstices; interstices of lateral elytral striae with very small tubercles; median lobe of aedeagus wide, abruptly narrowed towards apex; parameres distinctly separated from basal piece.

Differential diagnosis

Psammoecus nyakabuyensis sp. nov. resembles P. luchti Karner, 2012 and can be distinguished by its narrower elytral striae; it differs from P. luchti and all other African Psammoecus also by the shape of the male genitalia.

Etymology

The specific epithet is derived from the name of the locality where the type material was collected.
Fig. 2. *Psammoecus nyakabuyensis* sp. nov., holotype. A. Habitus. B. Head. C. Pronotum. D. Right antenna. E. Aedeagus, ventral view. F. Paramere, lateral view. G. Median lobe, lateral view. Scale lines: A = 1.0 mm, B–D = 0.5 mm, E–G = 0.2 mm.
Material examined

**Holotype**

**Paratypes**

Description of holotype

**Body** (as in Fig. 2A). Oval, castaneous, total length 3.05 mm. Elytra with transverse, dark brown maculae near middle. Antennomeres 8–10 dark brown, 11 bright testaceous.

**Head** (as in Fig. 2B). Eyes large, prominent; temples distinctly narrowed immediately behind eyes, temple angle 65°; head width 0.79 mm, length 0.46 mm. Puncturation on vertex coarse, punctures about 1.25 times as large as an eye facet diameter, contiguous laterally, well separated medially; pubescence composed of short, semierect setae, directed anteriorly; microsculpture absent. Longitudinal impressions on vertex short and shallow, curved outwardly, attaining 1/5 of eyes. Eyes 0.21 mm long, distance of inner margins 0.50 mm. Temples immediately narrowed behind eyes, slightly curved. Antennae

![Fig. 3. Psammoecus luchti Karner, 2012. A. Median lobe. B. Parameres. Scale lines = 0.2 mm.](image-url)
comparatively stout, 1.44 mm long; antennomere proportions: 2.5 : 1.2 : 1.3 : 1.3 : 1.3 : 1.0 : 1.0 : 1.0 : 2.0 (Fig. 2D).

**Pronotum** (as in Fig. 2C). Wider than head, lateral margins strongly curved, widest at middle, surface slightly impressed near posterior angles and basis; width 0.90 mm, length 0.64 mm. Anterior angles with small denticles; lateral margins with four wide teeth; T I very small, only slightly larger than anterior denticles, T II about twice as big as T I, T III and T IV of same size, about twice as big as T II; posterior angle with small denticle, located in the middle between T IV and posterior margin. Puncturation and pubescence on pronotal disk as on vertex; punctures more sparse near posterior angles and basis. Microsculpture absent.

**Elytra**. Oval, widest at middle, length 2.00 mm, combined width 1.35 mm. Rows of punctures on disc somewhat narrower than interstices; pubescence composed of short semierect setae, strial and interstrial setae of identical length; microsculpture absent.

**Male genitalia** (as in Fig. 2E–G). Parameres wide, moderately narrowed towards apex, bearing numerous long setae near mesal face of basis, shorter setae on ventral edge, and a very long and a short seta at apex; in lateral view strongly narrowed near middle, and widened, somewhat spoon-shaped, towards apex. Median lobe wide, narrowed towards apex in a basally convex, apically concave curve to form a narrow, almost parallel-sided protrusion with blunt tip; S-curved towards apex in lateral view.

**Variation**
The paratypes vary in body length from 2.92 to 3.30 mm.

**Remarks**
Even though *Psammoecus nyakabuyensis* sp. nov. resembles *P. luchti* in general appearance, the structures of the male genitalia differ very much (Fig. 3A–B shows the genitalia of *P. luchti* for comparison). A close relation of these two species is therefore very unlikely.

**Psammoecus procerus** sp. nov.

**Diagnosis**
The following combination of character states is diagnostic for this species: lateral margins of pronotum with very small teeth; antennomeres slender; 1st antennomere 3 times as long as 2nd; microsculpture on vertex and disk of pronotum distinct, reticulate; median lobe of aedeagus slender; parameres long, slender.

**Differential diagnosis**
This species is most similar to *P. grandis* Grouvelle, 1908; it can be distinguished by the shape of the antennomeres and male genitalia. It differs from all other African *Psammoecus* by its large size.

**Etymology**
The specific epithet is the Latin word for “slender”.

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Fig. 4. *Psammeocus procerus* sp. nov., holotype. A. Habitus. B. Head. C. Pronotum. D. Right antenna. E–G. Aedeagus (E = ventral, F = lateral, G = dorsal view). Scale lines: A = 1.0 mm, B–G = 0.5 mm.
Material examined

Holotype

Paratypes
4 ♀♀, with same data as holotype (3 BMNH, 1 MKF).

Description of holotype

Body (as in Fig. 4A). Elongate, slender, total length 3.6 mm. Elytra testaceous; humeral swelling and lateral margin dark brown, the dark coloration extended to a broad macula near the middle; apical half of suture and apex dark brown. Head and pronotum reddish brown; lateral margins of pronotum a little darker; anterior and posterior margins of pronotum lighter brown. Antennae testaceous, apex of antennomere 6 and antennomeres 7-10 darkened, antennomere 11 yellowish white. Legs yellow.

Head (as in Fig. 4B). Eyes moderately rounded, temples well defined and curved, moderately narrowed behind eyes, temple angle 44°; head width 0.78 mm, length 0.46 mm. Puncturation on vertex irregular; punctures almost as large as an eye facet diameter, sometimes contiguous, sometimes leaving spaces the size of their diameter. Pubescence composed of long, semi-erect setae, directed anteriorly; microsculpture on apical part of vertex distinct, reticulate, on basal part of vertex very shallow. Longitudinal impressions on vertex short, slightly curved, barely attaining eye level. Eyes 0.23 mm long, distance of inner margins 0.52 mm. Antennae slender, attaining almost middle of elytra, 1.98 mm long; antennomere proportions: 3.0 : 1.0 : 1.3 : 1.5 : 1.7 : 1.5 : 1.4 : 1.3 : 1.1 : 1.1 : 2.1 (Fig. 4 D).

Fig. 5. Psammoecus grandis Grouvelle, 1908. A. Right antenna. B. Median lobe. C. Parameres. Scale lines = 0.5 mm.
Psammoecus sinuaticollis sp. nov.

**Pronotum** (as in Fig. 4C). About 1.1 times as wide as head; moderately wider than long; width 0.86 mm, length 0.73 mm. Area close to the posterior angles slightly depressed. Anterior angles separated from the disk by a slightly raised ridge; the small anterolateral space separated by that ridge without microsculpture, bearing 3 short teeth. Left lateral margin with 4, right margin with 5 very short teeth, posterior angle marked by a tooth of same size as lateral teeth. Puncture size on pronotal disk as on vertex, puncturation less dense. Pubescence as on vertex. Microsculpture distinct, reticulate.

**Elytra.** Long and slender, 3.3x as long as pronotum, widest just in front of middle, length 2.44 mm, combined width 1.40 mm. Elytral disk with a flat depression between first and second third. Rows of punctures on disk about half as wide as interstices; pubescence composed of long, semierect setae; strial setae about 1/3 shorter than interstrial setae; microsculpture restricted to areas near origin of setae, reticulate.

**Male genitalia** (as in Fig. 4E–G). Parameres in ventral view wide, elongate, lateral face parallel, curved medially towards the apex; in lateral view lancet-shaped, almost straight ventrally and curved dorsally, apical third of dorsal face with short setae, tip bent ventrally. Median lobe slender, evenly narrowed toward apex in dorsal view; in lateral view wide to about the middle, narrowed to a parallel-sided section of about 2/5 its length; apical 1/6 narrowed, dorsal face curved in an S-shape, tip bent ventrally.

**Variation**
The paratypes vary in body length from 3.60 to 3.92 mm.

**Remarks**
The general appearance and the unusual structure of the male genitalia make this species a very untypical member of the genus *Psammoecus*. Its habitus closely resembles that of *P. grandis* Grouvelle, 1908, but the antennae as well as the male genitalia of *P. grandis* have an exceedingly different structure (see Fig. 5A–C).

**Diagnosis**
The following combination of character states is diagnostic for this species: lateral margins of pronotum with distinct teeth; 1st antennomere 2.3 times as long as 2nd antennomere; interstices of lateral elytral striae with very small tubercles; anterior angle of pronotum without denticle.

**Differential diagnosis**
This species differs from all other African *Psammoecus* by lacking the posterior pronotal denticle and by the shape of the male genitalia.

**Etymology**
The specific epithet refers to the rounded shape of the pronotum.

**Material examined**

**Holotype**
Fig. 6. *Psammoecus sinuaticollis* sp. nov., holotype. A. Habitus. B. Head and pronotum. C. Right antenna. D–F. Aedeagus (D = ventral, E = lateral, F = dorsal view). Scale lines: A = 1.0 mm, B–C = 0.5 mm, D–F = 0.2 mm.
KARNER M., New species of African Psammoecus

Paratypes
1 ♂, 1 ♀, with same data as holotype; antennae of male paratype missing (♂ paratype SMF, ♀ paratype HNHM).

Description of holotype
Body (as in Fig. 6A). Oval, total length 2.50 mm; testaceous, elytral disk darker brown. Antennae testaceous; antennomere 6 slightly darker; 7-10 dark brown; 11 yellowish white. Legs yellow.

Head (as in Fig. 6B). Eyes rounded; temples well defined and rounded, narrowed immediately behind eyes, temple angle 49°; head width 0.64 mm, length 0.36 mm. Punctures on vertex as large as an eye facet, separated by about their diameter, but sometimes contiguous; puncturation increasingly smaller and sparse towards frontoclypeal suture; pubescence composed of semierect setae, directed anteriorly; microsculpture absent. Longitudinal impressions on vertex distinct, curved outwardly, attaining anterior fourth of eyes. Eyes well rounded, 0.19 mm long, distance of inner margins 0.43 mm. Antennae 1.30 mm long, attaining anterior fourth of elytra; antennomere proportions of holotype: 2.5 : 1.1 : 1.3 : 1.3 : 1.3 : 1.3 : 1.1 : 1.0 : 1.0 : 1.0 : 2.3 (Fig. 6C).

Pronotum (as in Fig. 6B). Slightly wider than head, disk convex, rounded, with transverse impression in front of anterior margin; lateral margins evenly curved, widest near middle; width 0.68 mm, length 0.52 mm. Anterior angles with 2 small teeth, lateral margins with 4 teeth whose sizes increase from front to back; posterior angle without tooth. Punctuation and pubescence on pronotal disk as on vertex. Microsculpture absent.

Elytra. Oval, widest somewhat behind middle, length 1.60 mm, combined width 1.05 mm. Rows of punctures on disk a bit more than half as wide as interstices; pubescence composed of semierect setae; strial setae slightly shorter than interstrial setae; microsculpture absent.

Male genitalia (as in Fig. 6D–E). Parameres with wide basis, lateral face evenly curved, mesal face with rounded projection that bears short, stout spines, apical projection short, bearing one long and one short seta. Lateral faces of median lobe curved, narrowed towards the apex; apex in lateral view widened to form a small knob.

Variation
The paratypes are of the same body length as the holotype.

Psammoecus personatus Grouvelle, 1919

New records


**Psammoecus hacquardi** Grouvelle, 1889

**New records**


TANZANIA: Daressalam, 15 Apr. 1915, 1 specimen (BMNH); Usambara, Derema, 25 Oct.–21 Nov. 1891, leg. Conradt, 1 ♂ (ZMHB); Usambara, Nguelo, leg. Heinsen, 1 specimen (ZMHB).


**Psammoecus laetulus** Grouvelle, 1914

**Fig. 7A–G**

**New records**


SEYCHELLES: Silhouette, 1908, 1 ♂ (BMNH).


**Remarks and comparative notes**

Numerous specimens from the Ditsong National Museum of Natural History (Pretoria), were, at first sight, considered to belong to one, or even several, new species. Examination of the aedeagi revealed, however, no differences sufficient for a separation of these forms from *P. laetulus* (Fig. 7E–G). Unless
Fig. 7. *Psammoecus laetulus* Grouvelle, 1914. Pronotum of specimens from A. Mahe, Seychelles. B. Cape Province, South Africa. C. KwaZulu-Natal, South Africa. D. Mpumalanga, South Africa. E–F. Aedeagus of specimen from Mahe, Seychelles (E = dorsal, F = ventral view). G. Aedeagus of specimen from Mpumalanga, South Africa, dorsal view. Scale lines: A–D = 0.5 mm, E–G = 0.2 mm.
reliable diagnostic differences dictate otherwise, it is considered appropriate to treat *P. laetulus* as a species that shows significant variability. Fig. 7A–D shows the pronota of specimens from different locations to illustrate individual variations.

One of the Malvern specimens (KwaZulu Natal Province of South Africa) collected by Marshall in 1897 (BMNH) bears a type label by A. Grouvelle, with the name ‘*Psammoecus distinctus*’. Since no description of a taxon with that name is available, the name is to be considered a manuscript name.

*Psammoecus parallelus* Grouvelle, 1919

**New records**


*Psammoecus leleupi* Karner, 2012

**New records**


**CAMEROON**: 1916, leg. Schwab, 3 ♀♀ (BMNH).


**GABON**: Ogooué-Ivindo Province, Makokou, Apr., May 1971, leg. Mateu, 2 specimens (MHNG).


**GUINEA**: Macenta Prefecture, Seredou, 4–8 Apr. 1975, leg. Zott, 3 specimens (ZMHB).


Remarks
The specimen from Cameroon bears a handwritten label ‘Psammoechus orbicollis t. Gr. Grouv.’, not in Grouvelle’s hand. This is to be considered a manuscript name, since no description of a taxon with that name is available.

Psammoecus luchi Karner, 2012

New record

Psammoecus marginicollis Grouvelle, 1908

New records


Psammoecus longicornis Schaufuss, 1872

New record

Psammoecus trimaculatus Motschulsky, 1858

New records
MAURITIUS: Jul. 1931, leg. Wigglesworth, 1 specimen (BMNH).


Psammoecus simoni Grouvelle, 1892

New records


Key to the African species of *Psammoecus* Latreille, 1829

*Psammoecus laetulus* Grouvelle, 1914 appears in couplets 12 and 15 of the determination key by intent, reflecting the high morphological variability that is observed in this species.

1 Lateral margins of pronotum without teeth; only anterior and posterior groups of small teeth present
   – Lateral margins of pronotum with various number of large or small teeth ................................2

2 3rd antennomere shorter than 2nd; elytral rows of punctures narrower than interstices ...........
   – 3rd antennomere longer than 2nd; elytral rows of punctures somewhat wider than interstices ....

3 Body length 3.40 – 4.20 mm; lateral margins of pronotum with very small teeth; 1st antennomere more than 3x as long as 2nd .................................................................
   – Body length not more than 3.30 mm; lateral margins of pronotum with distinct teeth, 1st antennomere less than 3x as long as 2nd .................................................................

4 Antennomeres 3 – 10 wide, stout (Fig. 5A); median lobe of aedeagus wide, abruptly narrowed towards apex (Fig. 5B) .................................................................grandis* Grouvelle, 1908
   – Antennomeres 3 – 10 slender (Fig. 4D); median lobe of aedeagus slender, gradually narrowed towards apex (Fig. 4G) .................................................................procerus sp. nov.

5 Interstices of lateral striae of elytra with large denticles; pronotum with very long lateral teeth .....spinosis* Grouvelle, 1882
   – Interstices of lateral striae of elytra with very small denticles or small tubercles ...

6 Anterior angle of pronotum without denticle (Fig. 6B) ............................................................sinuaticollis* sp. nov.
   – Anterior angle of pronotum with distinct denticle .............................................................

7 1st antennomere less than 2x as long as 2nd .................................................................
   – 1st antennomere not less than 2x as long as 2nd .............................................................

8 3rd antennomere longer than 2nd .................................................................marginicollis* Grouvelle, 1908
   – 3rd antennomere as long as 2nd .................................................................

9 Striae on elytral disk narrower than interstices; lateral teeth of pronotum with narrow bases .................................................................personatus* Grouvelle, 1919
   – Striae on elytral disk wider than interstices, lateral teeth of pronotum with wide bases .................................................................teleupi Karner, 2012

10 Maximum pronotal width near middle (excluding lateral teeth) ........................................11
   – Maximum pronotal width in anterior third (excluding lateral teeth) ..................................15
Discussion

Taking into account the considerable differences in the appearance of African species, it seems likely that *Psammoecus* is composed of several distinct species groups. However, given the high diversity of *Psammoecus* in the Oriental and Australian regions and the lack of revisionary work on species from these regions – with the exception of the revisions of Indian *Psammoecus* by Pal (1985) and Japanese *Psammoecus* by Yoshida & Hirowatari (2014) – it seems as yet premature to aim at establishing even a ‘working taxonomy’ on the genus or subgenus level. Hence, future studies will show whether a further subdivision of the genus *Psammoecus* is justified.

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