

## Research article

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# 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

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## 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 interstitial 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 1<sup>st</sup> antennomere to apex of 11<sup>th</sup> antennomere

Pronotal width: across maximum width, excluding spines

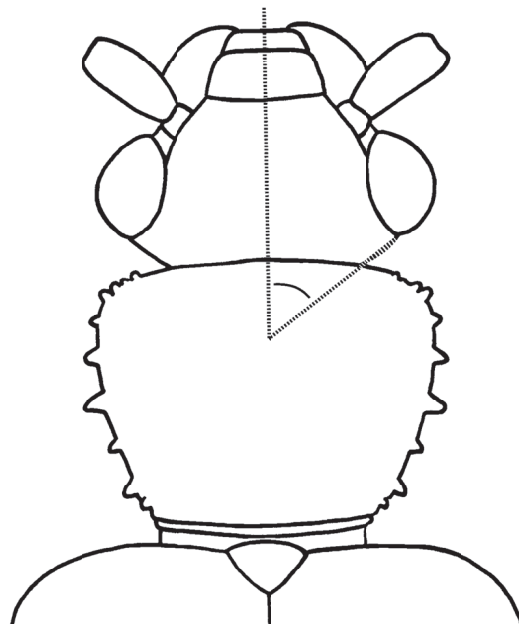
Pronotal length: from anterior to posterior margin

Elytral width: across maximum joint width

Elytral length: along suture including scutellum

Relative proportions (lengths) of antennomere are listed from 1<sup>st</sup> to 11<sup>th</sup> 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.

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 = Termesztudományi Múzeum, 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

[urn:lsid:zoobank.org:act:FEA38F3A-722B-45B0-B336-1C885FDB7262](http://urn:lsid:zoobank.org:act:FEA38F3A-722B-45B0-B336-1C885FDB7262)

### Diagnosis

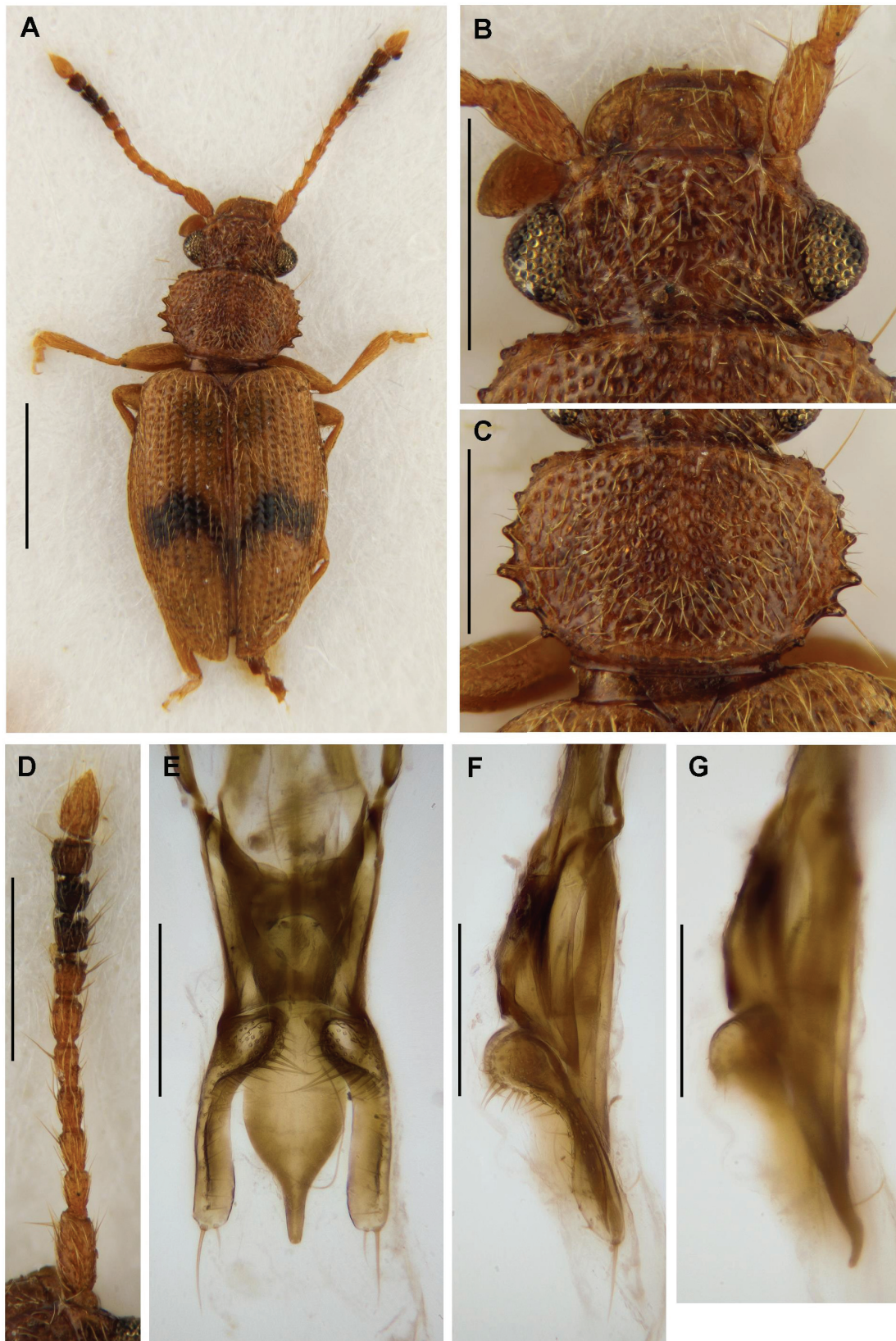
The following combination of character states is diagnostic for this species: 1<sup>st</sup> antennomere 2.1 times as long as 2<sup>nd</sup> antennomere; maximum pronotal width near middle; lateral margins of pronotum with distinct, triangular teeth with wide bases, anterior angle of pronotum with distinct 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. lucti* Karner, 2012 and can be distinguished by its narrower elytral striae; it differs from *P. lucti* 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**

♂ 'Afrika RUANDA | Pref. Cyangugu | Umg. Nyakabuye | 17.2.1985 [17 Feb. 1985] | leg. H. Mühle' (SMF).

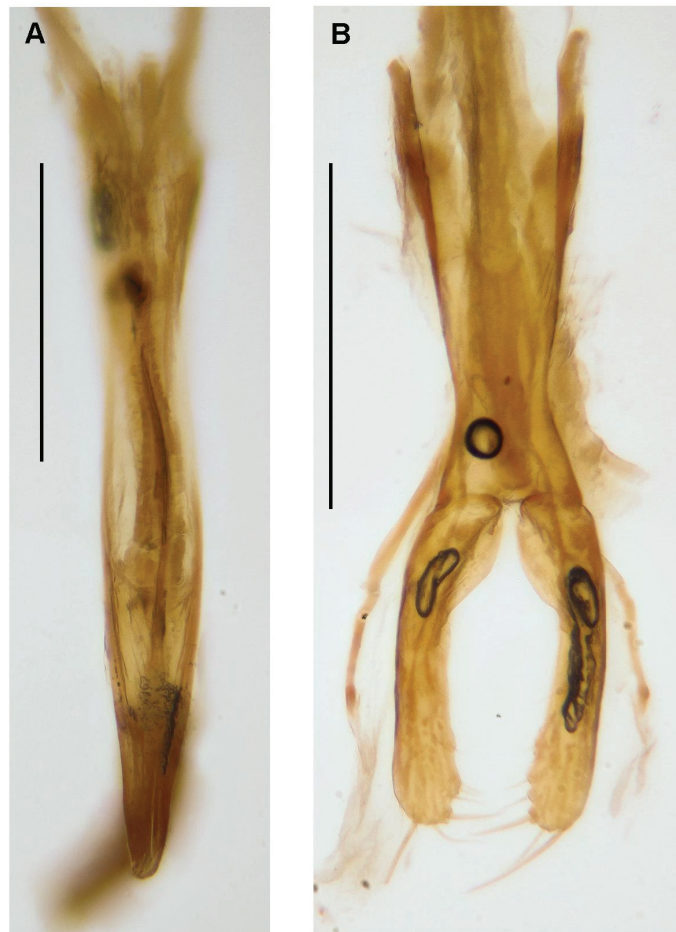
**Paratypes**

2 ♀♀ 'Afrika RUANDA | Pref. Cyangugu | Umg. Nyakabuye | 16.10.1984 [16 Oct. 1984] | leg. H. Mühle' (MKF). 1 ♂ 'Afrika/Rwanda | Bez. Cyangugu | Urw.v.Nyakabuye | 1700–1900 m | leg. V.u.C.Brachat | 14.–27.2.1985 [14–27 Feb. 1985]' (MKF).

**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. Punctuation 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 lucti* Karner, 2012. **A.** Median lobe. **B.** Parameres. Scale lines = 0.2 mm.

comparatively stout, 1.44 mm long; antennomere proportions: 2.5 : 1.2 : 1.3 : 1.3 : 1.3 : 1.3 : 1.0 : 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. Punctuation 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 interstitial 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. lucti* in general appearance, the structures of the male genitalia differ very much (Fig. 3A–B shows the genitalia of *P. lucti* for comparison). A close relation of these two species is therefore very unlikely.

### *Psammoecus procerus* sp. nov.

Fig. 4A–G

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### Diagnosis

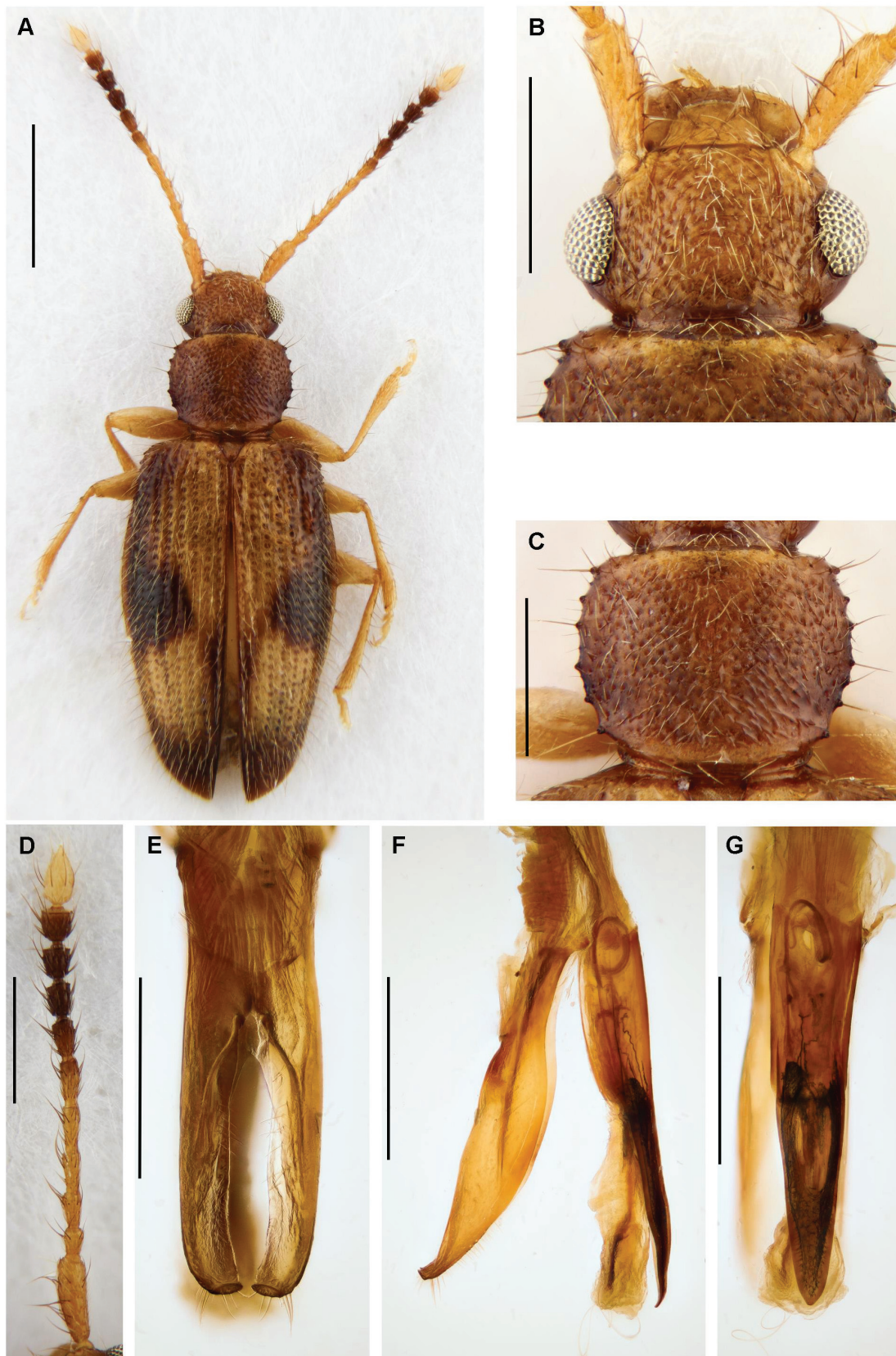
The following combination of character states is diagnostic for this species: lateral margins of pronotum with very small teeth; antennomeres slender; 1<sup>st</sup> antennomere 3 times as long as 2<sup>nd</sup>; microsculpture on vertex and disk of pronotum distinct, reticulate; median lobe of aedeagus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



**Fig. 4.** *Psammoecus 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

♂ 'SAO TOMÉ | Bom Successo, | ECOFAC compound | 7.-13.vi.1999 [7-13 Jun. 1999]', 'A. Polaszek | BMNH 2005-138' (BMNH).

### 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  $44^\circ$ ; 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.



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; striae setae about 1/3 shorter than interstitial 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).

*Psammoecus sinuaticollis* sp. nov.

Fig. 6A–F

[urn:lsid:zoobank.org:act:A9A3CA72-0F29-490D-8364-8F6DA42FE3A7](https://doi.org/10.21203/rs.3.rs-10000000/v1)

### Diagnosis

The following combination of character states is diagnostic for this species: lateral margins of pronotum with distinct teeth; 1<sup>st</sup> antennomere 2.3 times as long as 2<sup>nd</sup> 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

♂ 'GHANA: Ashanti region | Jamasi | 289 m, N 6 58 - E 1 28 | Dr. S. ENDRÖDY-YOUNGA', 'Nr.310 | beaten | 23.II.1969 [23 Feb. 1969]' (HNHM).



**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.

**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. Puncturation 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; striae setae slightly shorter than interstitial 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**

MADEIRA: Canhas, 15 Feb. 2002, leg. Lott, 3 specimens (2 BMNH, 1 MKF).

SOUTH AFRICA: Limpopo Province: Arbor Farm, Levubu, 23 Jan. 1998, leg. Müller, 1 specimen (TMSA); Entabeni, 21 Apr. 1976, leg. Endrödy-Younga, 5 specimens (3 TMSA, 2 MKF); Pietersburg, Sep. 1960, leg. Leleup, 1 specimen (TMSA); Soutpansberg, 14 Mar. 1973, leg. Endrödy-Younga, 2 specimens (TMSA). Mpumalanga Province: Barberton, Oct. 1961, leg. Leleup, 1 specimen (TMSA); Nelshoogte, Knuckles Rocks Forest, 11 Feb. 1987, 25 Dec. 1986, leg. Endrödy-Younga, 2 specimens (TMSA).

TANZANIA: Ngare Sero, Usa River, 15 Nov.–31 Dec. 1965, leg. Szunyoghy, 1 specimen (HNHM); Usa River, 24–31 Mar. 1981, leg. Bremer, 1 specimen (HNHM); near Usa River, 20 km east of Arusha, 17 Feb.–6 Mar. 1982, leg. Bremer, 1 ♀ (HNHM).



UGANDA: Kawanda, 15 Feb.–6 Mar. 1958, leg. P. Whalley, 1 specimen (BMNH). Mbale District, Bubulu, Oct. 1938, leg. Taylor, 1 ♂, 1 ♀ (BMNH).

*Psammoecus hacquardi* Grouvelle, 1889

**New records**

CONGO: Brazzaville, Orstom Park, 19–31 Dec. 1963, leg. Endrödy-Younga, 5 specimens (4 HNHM, 1 MKF); Sibiti, 26–27 Nov. 1963, leg. Endrödy-Younga, 2 specimens (1 HNHM, 1 MKF).

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).

UGANDA: Bundibugyo District, Semliki Forest, 5–12 Feb. 1997, leg. Wagner, 3 specimens (coll. Thomas Wagner); Bwamba County, Jun. 1948, leg. van Someren, 1 ♀ (BMNH).

*Psammoecus laetulus* Grouvelle, 1914

Fig. 7A–G

**New records**

MADAGASCAR: Fianarantsoa, Ranomafana, 26 Oct. 2001, leg. Schuh, 1 ♂ (MKF); Toamasina, 4 km SE of Andasibe, 25 km E of Moramanga, 1 Nov. 2001, leg. Schuh, 1 ♀ (MKF); Toamasina, road to Anosibe an' Ala, road km 18 S of Moramanga, 31 Oct. 2001, leg. Schuh, 1 ♀ (MKF).

RWANDA: Cyangugu, Nyakabuye, 25 Nov. 1982, leg. Mühle, 1 ♂ (MKF).

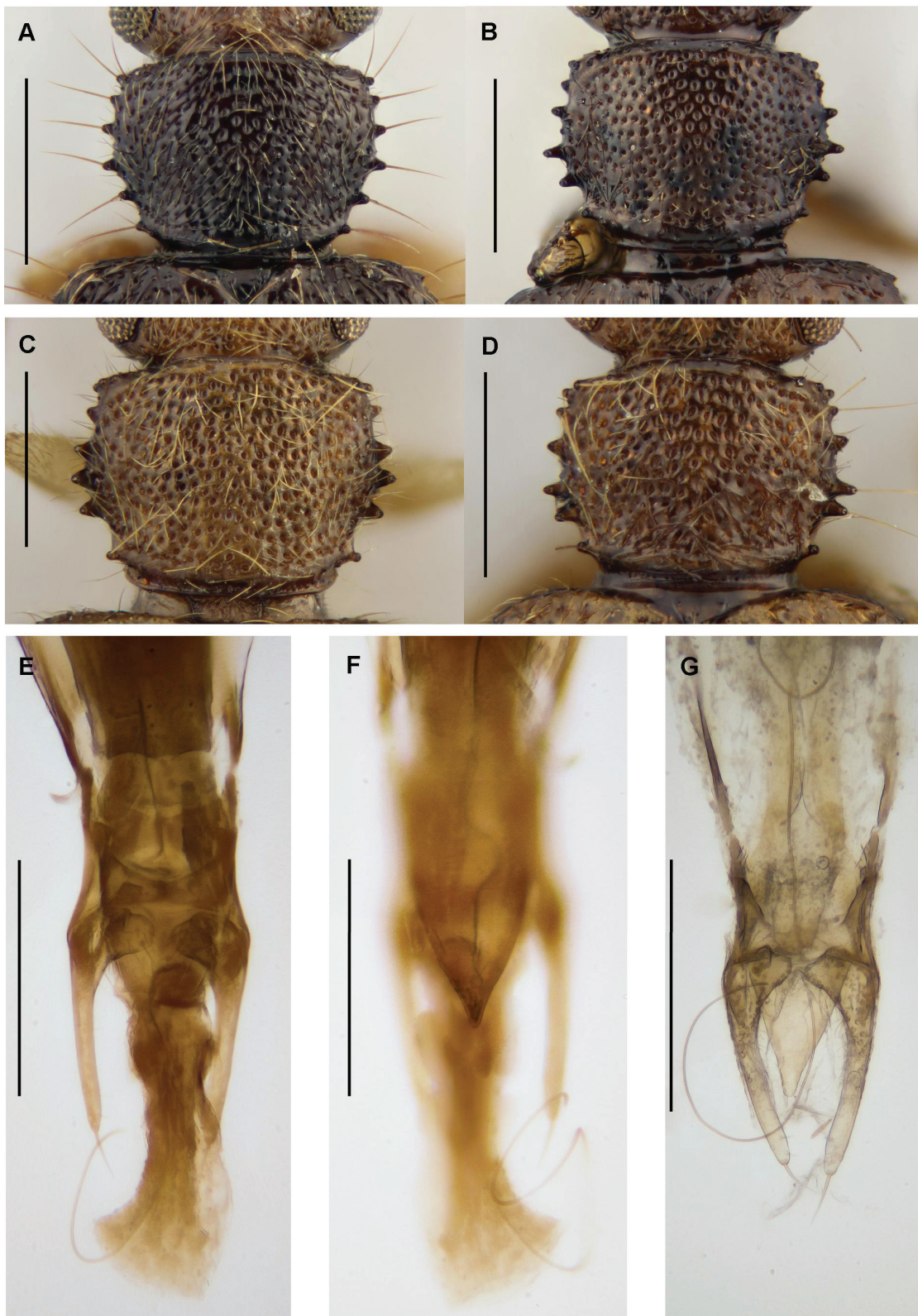
SEYCHELLES: Silhouette, 1908, 1 ♂ (BMNH).

SOUTHAFRICA: Eastern Cape Province: Alexandria Forest Station, 3 Apr. & 6 Dec. 1987, leg. Endrödy-Younga, 2 ♂♂, 1 ♀ (2 TMSA, 1 ♂ MKF); Amatole, Pirie Forest, 8 Dec. 1987, leg. Endrödy-Younga, 1 specimen (TMSA); Cape Amatole, Tsidenge Forest Station, 22 Nov. 1987, leg. Endrödy-Younga, 1 specimen (TMSA); Berlin, 22 Sep. & 8 Dec. 1986, leg. Endrödy-Younga, 2 specimens (TMSA); Dwesa Forest Reserve, 17, 26–27 Dec. 1979, leg. Endrödy-Younga, 4 ♀♀ (TMSA). KwaZulu Natal Province: Cape Vidal, 24 Jan. 1990, leg. Klimaszewski, 1 specimen (TMSA); Karkloof Forest, 2 Sep. & 13 Dec. 1989, leg. Endrödy & Klimaszew, 8 specimens (6 TMSA, 2 MKF); St. Lucia, Mission Rocks, 8–9, 18 Dec. 1975, leg. Endrödy-Younga, 5 specimens (TMSA); Drakensberge, Oqalweni Forest, Oct. 1960, 2 specimens (TMSA); Malvern, Mar. & Jun. 1897, leg. G.A.K. Marshall, 2 ♀♀ (BMNH); Oribi Gorge, Oct. 1961, leg. Leleup, 2 specimens (TMSA); Sodwana Bay National Park, 14–15 Nov. 1996, leg. Uhlig, 2 specimens (ZMHB); Zululand, Dukuduku Forest Station, 4 Apr. 1974, leg. Endrödy-Younga, 1 ♂ (MKF). Limpopo Province, Entabeni Forest Reserve, 21 Apr. 1976, leg. Endrödy-Younga, 2 ♂♂ (TMSA); Mariepskop Forest, Aug. 1960, leg. Leleup, 1 specimen; 6 May. 1981, leg. Endrödy-Younga, 1 specimen (TMSA); Soutpansberg, 1 ♀ (TMSA); Soutpansberg, Hanglip, 14 Mar. 1973, leg. Endrödy-Younga, 1 specimen (TMSA). Mpumalanga Province: Hazyview, 3 Apr. 1990, leg. Endrödy-Younga, 2 ♂♂ (MKF, TMSA); Nelshoogte, Knuckles Rocks Forest, 4 Dec. 1986, leg. Endrödy-Younga, 1 specimen (TMSA); Barberton, Oct. 1961, leg. Leleup, 1 specimen (TMSA). Ostkap, Port St. John, Oct. 1923, Jul. & Jan. 1924, leg. Turner, 4 specimens.

**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**

CONGO: Brazzaville, Kindamba, Méya, Louolo River, 12 Feb. 1963, leg. Endrödy-Younga, 1 specimen (HNHM); Orstom Park, 21 Dec. 1963, leg. Endrödy-Younga, 1 specimen (HNHM).

GHANA: Ashanti, Khumasi, Nhasu, 5 Feb. & 10 Dec. 1967, leg. Endrödy-Younga, 2 specimens (HNHM); Kwadaso, 25 Feb.–28 Jul. 1969, leg. Endrödy-Younga, 9 specimens (7 HNHM, 2 MKF). Northern Region, Banda-Nkwanta, 23–26 Aug. 1965, leg. Endrödy-Younga, 1 specimen (HNHM).

SOUTH AFRICA: 15 miles SW of Johannesburg, 28 Dec. 1971, 1 specimen (BMNH). KwaZulu Natal Province: Karkloof Forest, 13 Dec. 1989, leg. Endrödy & Klimaszew, 4 specimens (TMSA); Pondoland, Fort St. John, Sep. 1923, leg. R.E. Turner, 1 specimen (BMNH).

TANZANIA: Arusha, Usa River, 25 Sep. 1965, leg. Szunyoghy, 1 specimen (HNHM); Mizimu, Mwanihana, 3–6 Aug. 2010, leg. Smith & Takano, 1 specimen (BMNH); Morogoro, Feb. 1970, leg. T. Pócs, 1 specimen (HNHM).

UGANDA: District Masindi, Budongo Forest, Sonso, 5–15 Jan. 1997, leg. Th. Wagner, 1 ♀ (coll. Thomas Wagner); Kawanda, 15 Feb.–6 Mar. 1958, leg. Whalley, 1 specimen (BMNH).

*Psammoecus leleupi* Karner, 2012

**New records**

ANGOLA: Cuanza Norte, Salazar, 9–15 Mar. 1972, 1 ♂, 3 ♀♀ (BMNH).

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

CONGO: Brazzaville, Orstom Park, 31 Dec. 1963, leg. Endrödy-Younga, 1 ♀ (HNHM); Sibiti, 25 Nov. 1963, leg. Endrödy-Younga, 2 specimens (HNHM).

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

GHANA: Ashanti, Jamasi, 15 Sep. 1969, leg. Endrödy-Younga, 1 ♂ (HNHM); Kwadaso, 22 May 1969, leg. Endrödy-Younga, 1 ♂ (HNHM). Northern Region, Banda-Nkwanta, 8 Sep. 1965, leg. Endrödy-Younga, 1 ♀ (HNHM).

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

RWANDA: Kawanda, 15 Feb.–6 Mar. 1958, leg. Whalley, 2 ♂♂ (BMNH).

UGANDA: Kabarole, Kibale National Park, 25 km SE of Fort Portal, Kanyawara, 26 Jul.–22 Aug. 1998, leg. Schmidt, 1 ♀ (MKF).

**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.

*Psammoechus luchtii* Karner, 2012**New record**

CAMEROON: Northwest Province, Bamenda, Nov. 1981, leg. Cho Chi Ignatius. 1 ♂ (HNHM).

*Psammoechus marginicollis* Grouvelle, 1908**New records**

KENYA: Chyulu Hills, Jun. 1938, 1 ♂ (TMSA).

UGANDA: Masindi District, Budongo Forest, 12–29 Jan. 1997, leg. Göllner, 4 specimens (ZMHB); Mbale District, Butandinga, Dec. 1938, leg. Taylor, 1 ♂ (BMNH).

*Psammoechus longicornis* Schaufuss, 1872**New record**

SOUTH AFRICA: Mpumalanga Province: Nelshoogte Pass, 10 Feb. 1987, leg. Endrödy-Younga, 11 specimens (9 TMSA, 2 MKF).

*Psammoechus trimaculatus* Motschulsky, 1858**New records**

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

RÉUNION: Bras des Chévrettes, 16–19 Dec. 1991, leg. Janék, 8 specimens (ZMHB).

SOUTH AFRICA: KwaZulu Natal Province: Dukuduku Forest Station, 4 Apr. 1974, leg. Endrödy-Younga, 2 specimens (TMSA); Magudu, 4 Jan. 2009, leg. Müller, 6 specimens (5 TMSA, 1 MKF); Mtubatuba, 4 Apr. 1974, leg. Endrödy-Younga, 1 specimen (TMSA); St. Lucia, Mission Rocks, 3–18 Dec. 1975, leg. Endrödy-Younga, 9 specimens (7 TMSA, 2 MKF); Zululand, Empageni, 5 Mar. 1977, leg. P.E. Reavel, 2 specimens (TMSA). Ostkap, Port St. Johns, Silaka, 2 Dec. 1987, leg. Endrödy-Younga, 2 specimens (TMSA).

TANZANIA: Usa River, 1965, leg. J. Szunyogy, 1 specimen (HNHM).

UGANDA: Bukalada, 3 May 1926, leg. Hargreaves, 1 specimen (BMNH); District Masindi, Budongo Forest, N. Sonso, 15–25 Jan. 1997, leg. Wagner, 1 ♂, 1 ♀ (coll. Thomas Wagner); Kabarole, Kibale Nat. Park, 25 km SE of Fort Portal, Kanyawara, 26 Jul.–22 Aug. 1998, leg. L. Schmidt, 1 specimen (MKF).

*Psammoechus simoni* Grouvelle, 1892**New records**

RÉUNION : Bourbier, 20 Dec. 1991, leg. Janék, 3 specimens (ZMHB); Bras des Chévrettes, 16–19 Dec. 1991, leg. Janék, 47 specimens (ZMHB); Plaine des Palmistes, Petite Plaine, 27 Dec. 1991, leg. Janék, 1

specimen (ZMHB); Ravine de St. Gilles, Bassin Cormoran, 13–14 Jan. & 22–23 Jan. 1992, leg. Janék, 2 specimens (ZMHB); Ravine de St. Gilles, Bassin des Algrettes, 13–14 Jan. 1992, leg. Janék, 1 specimen (ZMHB); Saint Paul, 29 Dec. 1991–1 Jan. 1992, leg. Janék, 3 specimens (ZMHB); Saint Paul, Grand Étang, 29 Dec. 1991–1 Jan. 1992, leg. Janék, 2 specimens (ZMHB); Saint Paul, Ravine de Bernica, 29 Dec. 1991–1 Jan. 1992, leg. Janék, 1 specimen (ZMHB).

SEYCHELLES: Mahé, 14–26 Arp. 1978, leg. Münch, 1 specimen (HNHM).

### 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 .....2
- Lateral margins of pronotum with various number of large or small teeth .....3
- 2 3<sup>rd</sup> antennomere shorter than 2<sup>nd</sup>; elytral rows of punctures narrower than interstices .....*lateralis* (Grouvelle, 1899)
- 3<sup>rd</sup> antennomere longer than 2<sup>nd</sup>; elytral rows of punctures somewhat wider than interstices .....*longicornis* Schaufuss, 1872
- 3 Body length 3.40 – 4.20 mm; lateral margins of pronotum with very small teeth; 1<sup>st</sup> antennomere more than 3x as long as 2<sup>nd</sup> .....4
- Body length not more than 3.30 mm; lateral margins of pronotum with distinct teeth, 1<sup>st</sup> antennomere less than 3x as long as 2<sup>nd</sup> .....5
- 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 .....*spinosus* Grouvelle, 1882
- Interstices of lateral striae of elytra with very small denticles or small tubercles .....6
- 6 Anterior angle of pronotum without denticle (Fig. 6B) .....*sinuaticollis* sp. nov.
- Anterior angle of pronotum with distinct denticle .....7
- 7 1<sup>st</sup> antennomere less than 2x as long as 2<sup>nd</sup> .....8
- 1<sup>st</sup> antennomere not less than 2x as long as 2<sup>nd</sup> .....10
- 8 3<sup>rd</sup> antennomere longer than 2<sup>nd</sup> .....*marginicollis* Grouvelle, 1908
- 3<sup>rd</sup> antennomere as long as 2<sup>nd</sup> .....9
- 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 .....*leleupi* Karner, 2012
- 10 Maximum pronotal width near middle (excluding lateral teeth) .....11
- Maximum pronotal width in anterior third (excluding lateral teeth) .....15



- |    |  |                                       |
|----|--|---------------------------------------|
| 11 | Lateral teeth of pronotum slender, with narrow bases .....   | 12                                    |
| –  | Lateral teeth of pronotum triangular, with wide bases .....  | 13                                    |
| 12 | Reticulate microsculpture on disk of pronotum .....  | <i>hacquardi</i> Grouvelle, 1889      |
| –  | Microsculpture on disk of pronotum absent .....  | <i>laetulus</i> Grouvelle, 1914       |
| 13 | Elytral striae distinctly wider than interstices; humeral swelling, a transverse band in the middle of elytra, elytral suture along posterior two thirds and elytral apex dark; parameres short, stout, fused with basal piece ..... | <i>simoni</i> Grouvelle, 1892         |
| –  | Elytrae with round macula and darkened suture near apex; parameres abruptly narrowed towards apex .....  | 14                                    |
| 14 | Elytral striae slightly wider than interstices; median lobe of aedeagus slender, evenly narrowed towards apex (Fig. 3A) .....  | <i>luchti</i> Karner, 2012            |
| –  | Elytral striae narrower than interstices, median lobe of aedeagus wide, abruptly narrowed towards apex (Fig. 2E) .....   | <i>nyakabuyensis</i> sp. nov.         |
| 15 | Elytrae with dark humeral area, wide dark band across middle and dark suture near apex; or only with darkened band behind middle, sometimes interrupted near suture; parameres gradually narrowed towards apex .....                 | <i>laetulus</i> Grouvelle, 1914       |
| –  | Elytral striae narrower or only slightly wider than interstices; parameres distinctly separated from basal piece .....   | 16                                    |
| 16 | Lateral margin of pronotum with 4 distinct teeth between small posterior tooth and anterior group of small teeth .....   | <i>trimaculatus</i> Motschulsky, 1858 |
| –  | Lateral margin of pronotum with 5 distinct teeth between small posterior tooth and anterior group of small teeth .....   | <i>parallelus</i> Grouvelle, 1919     |

## 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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