Published online: 5 November 2022 ISSN (online) 2376-3191

Records of the Hawaii Biological Survey for 2022. Edited by Neal L. Evenhuis. *Bishop Museum Occasional Papers* 148: 99–106 (2022)

lsid:zoobank.org:pub:805B9555-8BF8-4FAA-AE57-F499155CDA6D

# On *Psammoecus* Latreille (Coleoptera: Silvanidae: Brontinae) from the Hawaiian Islands

Michael Karner

*Voluntary Scientist, Sektion Entomologie I, Forschungsinstitut Senckenberg, Senckenberganlage 25, 60325 Frankfurt am Main, Germany; email: michael.karner@senckenberg.de*

**Abstract**. Hawaiian species of the genus *Psammoecus* (Coleoptera: Silvanidae) are reviewed. *Psammoecus t-notatus* Blackburn, 1903 is recorded for the first time from the Hawaiian Islands. A diagnosis of *Psammoecus pradieri* Grouvelle, 1878 is provided. Two new synonymies are discovered: *Psammoecus cruciger* (Waterhouse, 1876) = *Psammoecus insularis* Sharp, 1885 **syn**. **nov**.; *Psammoecus pradieri* Grouvelle, 1878 = *Psammoecus pallidipennis* Blackburn, 1885 **syn**. **nov**.

## INTRODUCTION

The Old World beetle genus *Psammoecus* Latreille, 1829 (Silvanidae: Brontinae: Telephanini) is a highly diverse genus with currently 82 described species.

Two species were recorded from the Hawaiian Islands: *Psammoecus insularis* (Sharp, in Blackburn & Sharp 1885), whose description is based on two syntypes collected on Kauaʻi and Oʻahu, and *P. pallidipennis* (Blackburn, in Blackburn & Sharp 1885), described from a specimen collected in Honolulu (Oʻahu). Recent studies of type specimens and of additional material from several collections revealed that three species of the genus *Psammoecus* occur on the Hawaiian Islands, and that both *P. insularis* and *P. pallidipennis* are junior synonyms to previously described species.

## MATERIAL AND METHODS

The preparation of genitalia followed the protocol described by Karner (2012, 2020). After examination, genital structures were embedded in dimethylhydantoin formaldehyde resin on the specimen labels or cellulose acetate labels, pinned with the respective specimens.

Observations and measurements were made with an Olympus SZX16 stereo microscope. The habitus photograph was taken with a Canon EOS 7D Mark II digital camera and a Canon MP-E 65mm macro objective. Higher magnifications for photography of head, pronotum, and antennae were obtained with Mitutoyo M Plan Apo objectives (10× and 20×), attached to Asahi Takumar 200 mm and Carl Zeiss MC Sonnar 135 mm telephoto lenses. Genitalia were photographed with a Canon EOS 7D Mark II digital camera attached to an Olympus CH microscope. Images and image layers were processed with Zerene Stacker (Version 1.04), Adobe Lightroom 5.7 and GIMP (Version 2.10.30) software. A total of 100 specimens from the following collections were studied:

BPBM = Bernice P. Bishop Museum, Honolulu, Hawaiʻi, USA
FSCA = Florida State Collection of Arthropods, Gainesville, Florida, USA
MKF = Michael Karner, Frankfurt, Germany

MNHN = Muséum National d'Histoire Naturelle, Paris, France
NHMUK = Natural History Museum, London, UK

Measurements were taken according to the definitions provided by Karner (2020). For holotypes and type material of previous authors, label data are cited verbatim, including uncommon use of interpunction and spaces. Labels are cited beginning with the uppermost one, the respective lines are separated by '|'. Comments on label colors, label shapes, etc. are included in squared brackets. A question mark in squared brackets indicates words or characters that were found to be illegible. Data are condensed for other material.

## RESULTS

Three species of *Psammoecus* are recorded from the Hawaiian Islands: *Psammoecus cruciger* (Waterhouse, 1876), *P. t-notatus* Blackburn, 1903, and *P. pradieri* Grouvelle, 1878. Previously, two species of *Psammoecus* were reported from this region: *Psammoecus insularis* (Sharp, 1885) (in Blackburn & Sharp 1885), being a junior synonym of *P. cruciger*, and *P. pallidipennis* (Blackburn, 1885) (in Blackburn & Sharp 1885), a junior synonym of *P. pradieri*.

### *Psammoecus cruciger* (Waterhouse, 1876)

*Telephanus cruciger* Waterhouse, 1876: 125.
*Telephanus insularis* Sharp, 1885: 143. **Syn**. **nov**.
*Psammoecus upsilon* Blackburn, 1903: 155; Arrow 1927: 44.
*Psammoecus cephalotes* Grouvelle, 1919: 20; Arrow 1927: 44; Hetschko 1930: 82; Pal 1985: 41.
*Psammoecus cruciger*: Grouvelle 1908: 476; Arrow 1927: 44; Hetschko 1930: 82; Karner 2020: 137.
*Psammoechus insularis*: Sharp, 1908: 428 (misspelling).
*Psammoecus ypsilon*: Hetschko 1930: 82; Pal 1985: 41 (misspellings).
*Psammoecus insularis*: Ford 1961: 318.
non *Psammoecus trimaculatus*: Grouvelle 1908: 476; Pal 1985: 41 (misidentifications).

**Distribution**. *Psammoecus cruciger* has previously been recorded from Australia (Queensland), Malaysia, and Papua New Guinea (Karner 2020). Among the three species of *Psammoecus* found on the Hawaiian Islands, this is the most frequent one within the studied material.

**Material Examined**. HAWAIIAN ISLANDS: **Hawai'i Island**: 1 specimen, Kea'au [label saying "Olaa"], 28 Oct 1908, BPBM 2005034587;1 specimen, Pā'auhau [probably near Honoka'a], Jun 1903, Perkins leg., BPBM 2005034603. **Kaua'i**: 1 specimen, Kipu, Jun 1914, BPBM 2005034526; 5 specimens; Wailua; Dec 1956, Isenberg leg., light trap, BPBM 2005034569, 2005034570, 2005034574, 2005034575, 2005034576. **Maui**: 1 specimen, Kīpahulu Valley, Pua'alu'u Stream, 300–500 m, 22 Jul 1980, G.M. Nishida & D. Bishop leg., BPBM 2005034594. **O'ahu**: 1 specimen, 15 Nov 1965, Beardsley leg., light trap, BPBM 2008001918; 1 specimen, same locality, Koebele leg., BPBM 2005034599; 1 specimen, Awāwaloa (Mt. Olympus), 30 m, 19 Jan 1919, Swezey leg., BPBM 2005034525; 1 specimen, 'Ewa, 5 Mar 1949, Ford leg., light trap, BPBM 2005034588; 1 specimen, same locality, Aug 1949, Ford leg., BPBM 2005034537; 3 specimens, same locality, Jan 1950 [hardly legible], Ford leg., light trap, BPBM 2005034534, 2005034535, 2005034536; 1 specimen, same locality, Jan 1952, Ford leg., light trap, BPBM 2005034582; 2 specimens, same locality, 7–11 Jun 1967, light trap, BPBM 2008001909, 2008001910; 2 specimens, same locality, 26 Dec 1967–8 Jan 1968, light trap, FSCA; 2 specimens, 'Ewa, Waipi'o, 10 Feb 1947, light trap, FSCA; 2 specimens, same locality, Sep 1957, Ford leg., light trap, BPBM 2005034572, 2005034573; 6 specimens, same locality, Jun 1960, Beardsley leg., light trap, BPBM 2005034518, 2005034519, 2005034520,

2005034521, 2005034522, 2005034523; 1 specimen, Hickam Air Force Base, 30 Dec 1977, at light, FSCA; 1 specimen, same locality, 6 Jan 1978, at light, FSCA; 1 specimen, same locality, 10 Jan 1978, at light, FSCA; 1 specimen; same locality, 13 Jan 1978, at light, FSCA; 2 specimens, same locality, 16 Jan. 1978, at light; FSCA; 1 specimen, Honolulu, 15 Apr 1941, Y. Kondo leg., light trap, BPBM 2005034583; 1 specimen, same locality, 2 Jul 1919, E.H. Bryan leg., BPBM 2005034527; 1 specimen, same locality, 28 Apr 1943, E.C. Zimmerman leg., beaten from dead coconut fronds, BPBM 2005034533; 1 specimen, same locality, 7–11 Jun 1967, Beardsley leg., light trap, BPBM 2008001916; 2 specimens, Honolulu, Mānoa, 10 May 1929, E.H. Bryan leg., at light, BPBM 2005034529, 2005034530; 4 specimens, Honolulu, Mount Tantalus, 24 Apr 1927, E.H. Bryan leg., BPBM 2005034531 (only fragments), 2005034532, 2005034590, 2005034591; 1 specimen, Lualualei, Oct 1958, light trap, BPBM 2005034589; 2 specimens, same locality, Sep 1960, light trap, BPBM 2005034600, 2005034601; 1 specimen, Mānoa, 17 Oct 1936, N.L.H. Krauss leg., at light, BPBM 2005034602; 1 specimen, Mokulēʻia, Apr 1901, Perkins leg., BPBM 2005034604; 1 specimen, same locality, May 1907, NHMUK; 1 specimen, Pearl City, 8 Apr 1944, W.M. Herms leg., light trap, BPBM 2005034586; 1 specimen, Pearl Harbor Naval Air Site, 24 May 1944, T.C. Russell leg., light trap, BPBM 2005034585; 10 specimens, Salt Lake, Āliamanu Crater, 12 May 1958, C.F. Clagg leg., BPBM 2005034538, 2005034539, 2005034540, 2005034541, 2005034542, 2005034543, 2005034544, 2005034545, 2005034546, 2005034547; 1 specimen, Wai'anae Range, 9 Nov 1919, O.H. Swezey leg., BPBM 2005034528; 2 specimens, Wahiawā, Apr 1907 [hardly legible], Perkins leg., BPBM 2005034592, 2005034593; 1 specimen, same locality, Dec 1953, Ford leg., BPBM 2005034579; 1 specimen; Waolani, 30 m, Apr 1976, Bishop leg., BPBM 2005034524.

**Remarks**. A redescription of this widely distributed species and new synonymies were given by Karner (2020). The description of *Telephanus insularis* (Sharp, in Blackburn & Sharp 1885: 143) was based on two female specimens. Sharp mentioned its close similarity to *Telephanus cruciger* Waterhouse, 1876 (= *Psammoecus cruciger*): "*This* [species] *is similar to several very closely allied species found in the Indo-Malasian* [sic!] *regions, but does not seem to agree with any of them, although closely allied to T. cruciger, Wat., from New Guinea*." Later, Sharp (1908: 428) hypothesized its synonymy with *Psammoecus trimaculatus* Motschulsky, 1858: "*This insect may prove to be not distinct from P. trimaculatus Motsch., an insect distributed somewhat widely, and probably by commercial means*." This was published on 18 December 1908, and may have been a reaction to Grouvelle (1908: 476) treating *P. cruciger* as junior synonym of *P. trimaculatus*. The examination the type specimens of *Telephanus insularis*, as well as of numerous specimens from the Hawai'ian Islands, as listed above, revealed that all of them are conspecific to *P. cruciger*.

### *Psammoecus t-notatus* Blackburn, 1903

*Psammoecus t-notatus* Blackburn, 1903: 154.
*Psammoecus amoenus* Grouvelle 1912: 92.
*Psammoecus t-notatus*: Hetschko 1930: 84; Karner 2020: 144.

**Material examined**. HAWAIIAN ISLANDS: **Hawai'i Island**: 1 specimen, Kahaluʻu-Keauhou, int. Aliʻi Dr. & Kaleiopapa St., 19°33′27.1″N, 155°57′33.1″W, 15–27 Jun 2013, T. Smith leg., dry scrub & lava fields, UV light trap, FSCA; 2 specimens, Kahaluʻu-Keauhou, UH Extension Office Farm, 19°32′1.6″N, 155°55′28.1″W, 13–27 Jun 2013, T. Smith leg., macadamia, lychee, coffee, avocado groves, UV light trap, FSCA. **Oʻahu**: 1 specimen, Honolulu, Fort Street, 18 Nov 1950, BPBM; 1 specimen, Honolulu, Univ. Hawaii, 10 Jan 1965, J.W. Beardsley leg., light trap, BPBM; 1 specimen, Mānoa, 2 Nov 1936, N.L.H. Krauss leg., BPBM; 1 specimen, Nuʻuanu Valley, Waolani, 6 May 1971,

F.G. Howarth leg., BPBM; 1 specimen, Wahiawā, Dec 1953, E.J. Ford leg., mouldy coconut bract, BPBM; 1 specimen, same locality, [?] Jul 1958, E.J. Ford leg., light trap, BPBM; 1 specimen, Waipi‘o, Sep 1957, E.J. Ford leg., light trap, BPBM.

**Distribution**. The data given here represent the first records of *P. t-notatus* from the Hawaiian Islands and from the New World. *P. notatus* is a very widely distributed species. It has been found in Australia (Queensland), Fiji, India, Indonesia, Malaysia, Papua New Guinea, Sri Lanka, Thailand, and Vanuatu (Karner 2020).

**Remarks**. *Psammoecus t-notatus* was redescribed by Karner (2020). It seems likely that the extremely wide distribution of this species is, at least in part, a result of human trade, and that *P. t-notatus* was imported to the Hawaiian Islands.

The material collected by E. J. Ford listed above in all probability represent the specimens of "*Psammoecus* sp." that Ford (1961) referred to.

### ***Psammoecus pradieri* Grouvelle, 1878**

Fig. 1 A–H

*Psammoecus pradieri* Grouvelle 1878:74
*Psammoecus pallidipennis* (Blackburn 1885:144). **Syn**. **nov**.
*Psammoecus pradieri*: Hetschko 1930: 82
*Telephanus pallidipennis*: Blackburn 1885: 144
*Psammoechus pallidipennis*: Sharp 1908: 428
*Psammoecus pallidipennis*: Hetschko 1930: 84; Ford 1961: 318.

**Diagnosis**

The following combination of character states distinguishes this species:
Body (Fig. 1 A) elongate oval, length 2.88 – 3.40 mm; coloration ranging from bright testaceous to castaneous; eyes (Fig. 1 B) large, moderately protruding, unevenly rounded with stronger curvature near temples, separated from vertex and temples by a deep groove; temples short, steep, irregularly curved, somewhat angled near eyes, temple angle appr. 75°; frontal grooves shallow, almost obsolete (in few specimens distinct), curved outwards, short, attaining anterior 1/4 of eyes; vertex with moderate punctation, punctures strongly elongate, most punctures about 1 1/4 as long as eye facet diameter, pubescence directed anteriorly, composed of setae of varying length, longest setae about half as long as eyes, microsculpture on vertex absent; antennae (Fig. 1 D) moderately slender, antennomeres 9 and 10 wider than long, antennomeres 6–7 slightly darkened, 8–10 piceous, 11 yellowish white; pronotum (Fig. 1 C) widest just in front of middle, pronotal disk strongly and densely punctate, punctures widened, pubescence on pronotal disk uniform, shorter than on vertex, setae directed medially on disk and anteromedially near lateral margins, microsculpture mostly absent, in few specimens punctures surrounded by faintly reticulate areas; lateral pronotal margin in most specimen with 6 short teeth (sometimes with 5 or 7 teeth), anterior denticles small, flat, posterior denticle small; elytra (Fig. 1 A) elongate oval, widest at middle, with transverse piceous maculae slightly behind middle, maculae often reduced or absent; elytral striae slightly narrower than interstices, strial and interstrial pubescence moderate, semierect, microsculpture absent; male genitalia (Figs 1 E–H) strongly sclerotized, median lobe lancet-shaped, blunt, tip bent ventrally, parameres in ventral view wide and parallel-sided, in lateral view narrowed and bent ventrally toward apex, with several short setae along dorso-lateral margin and longer setae at apex.

**Distribution**. *Psammoecus pradieri* is recorded from French Polynesia and Hawai‘i.

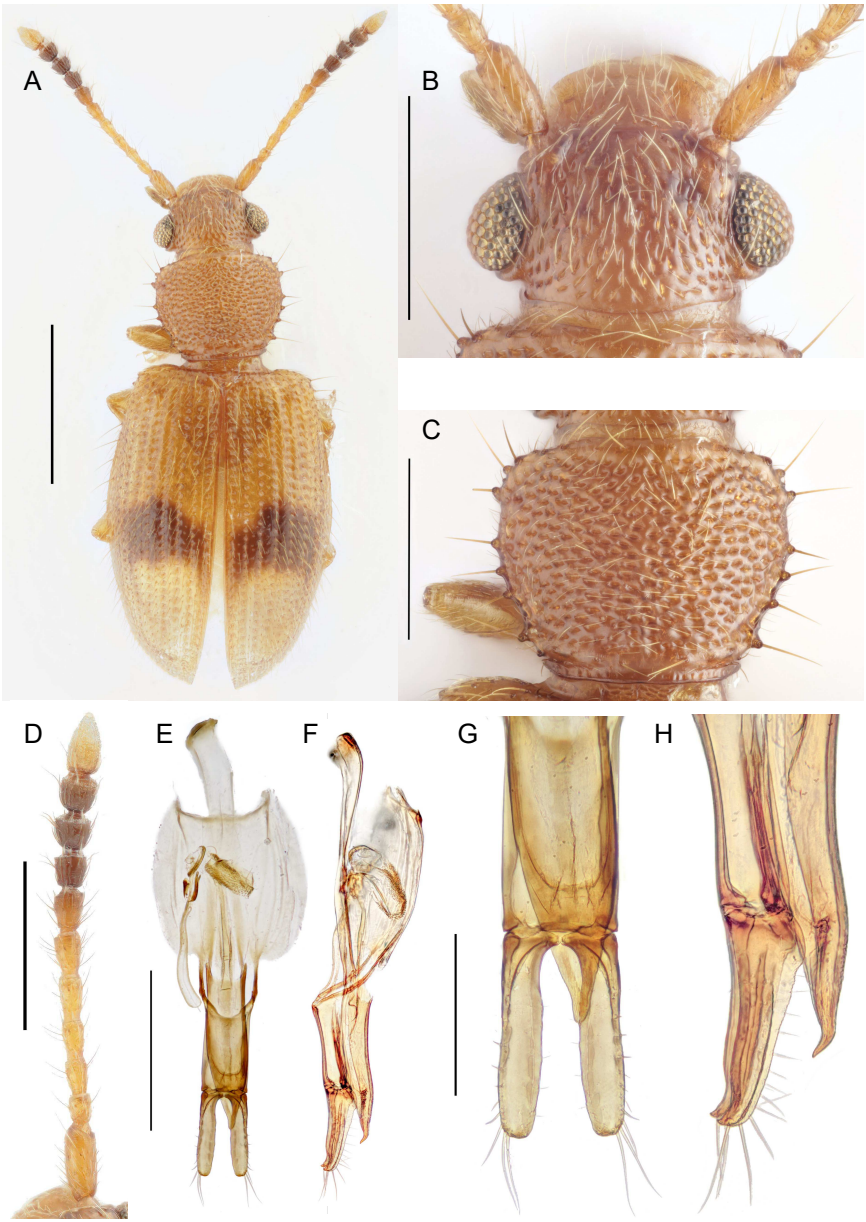


**Figure 1**. *Psammoecus pradieri* Grouvelle, 1878. A–D, specimen from Moloka'i (coll. BPBM). A, Habitus; B, head; C, pronotum; D, right antenna. E–H, specimen from Guadalcanal, Solomon Islands (coll. NHMUK). E, aedeagus, ventral view; F, lateral view; G, detail of aedeagus, ventral view; H, detail of aedeagus, lateral view (Scale bars: 1: 1.0 mm; 2–6: 0.5 mm; 7–8: 0.2 mm.

**Material examined**. **Types**. FRENCH POLYNESIA: ♀, holotype of *Psammoecus pradieri* Grouvelle, 1878, Tahiti, Pradier leg., "taiti | Pradier", "Type", "Pradieri | Grouv.", "*Psammoecus* | *Pradieri* | Grouv." [Grouvelle's hand], MNHN. HAWAIIAN ISLANDS: **Hawai'i Island**: ♀, holotype of *Telephanus pallidipennis* Blackburn, 1885, Hawaii, Blackburn leg., "Type" [round label with red border], "Hawaiian Is. | Rev. T. Blackburn. | 1883-30.", "TYPE | *Telephanus* | *pallidipennis* Blkb. | det. R.G. Booth 2016", NHMUK. **Other material examined**. HAWAIIAN ISLANDS: **Hawai'i Island**: 1 specimen, 2 mi east of Pāhoa, 145 m, 7 Feb 1987, W.C. Gagné leg., at UV light, BPBM 2005034596; 1 specimen, Kealakekua, Extension Office Farm, 19°32′1.6″N, 155°55′28.1″W, 13–27 Jun 2013, Trevor Smith leg., macadamia, lychee, coffee, avocado groves, UV light trap, FSCA. **Kaua'i**: 1 specimen, Wailua, Dec 1956, C.A. Isenberg leg., light trap, BPBM 2005034568. **Maui**: 1 specimen, Kīpahulu Valley, Puaaluu Stream. 300 m, 21–22 Dec 1980, at UV light, BPBM 2005034595. **Moloka'i**: 1 specimen, Papio Stream, 180 m, 19 Aug–2 Oct 1994, Perreira leg., yellow sticky board trap, BPBM 2006014159; 4 specimens, same locality, 2–16 Sep 1994, Perreira leg., yellow sticky board trap, BPBM 2006014154 (in coll. MKF), 2006014155 (in coll. MKF), 2006014156, 2006014158; 1 specimen, Pala'au State Park, 150 m, 29 Sep–13 Oct 1995, Perreira leg., yellow sticky board trap, BPBM 2006014157. **O'ahu**: 1 specimen, Honolulu, 'Āina Haina, 15 Feb 1969, Beardsley leg., light trap, BPBM 2008001919; 1 specimen, Honolulu, Kalihi, 120 m, 1–10 Apr 1979, F.G. Howarth leg., BPBM 2005034597; 4 specimens, Honolulu, Univ. Hawaii, 10 Jan 1965, Beardsley leg., light trap, BPBM 2008001911, 2008001912, 2008001913, 2008001914; 1 specimen, same locality, 10 Sep 1965, Beardsley leg., light trap, BPBM 2008001917.

**Remarks**. The holotypes of *Psammoecus pradieri* and *P. pallidipennis* are female. Studying the Hawai'an material was the first opportunity for the present author to examine the male genitalia and to confirm that small differences in external characters of the different type specimens are well within the range of individual variation.

It is premature to speculate about the distribution range of *P. pradieri*,and wether its ocurrence is limited to the Oceanian Islands of the tropical Pacific, provided the few data currently available. Frequent records of this species at light indicate high mobility, so *P. pradieri* might well be widely distributed, like several other species within the genus *Psammoecus*.

**Discussion**. None of the three *Psammoecus* species found on the Hawai'ian islands is endemic, and at least two of them – *P. cruciger* and *P. t-notatus* – are very widely distributed.

The data presented here, as well as data published earlier (Karner 2012, 2014, 2020, Yoshida & Hirowatari 2014, Yoshida *et al.* 2018) show that *Psammoecus* are frequently found at light or in light traps, and in flight intercept traps, indicating high mobility and a tendency to accumulate near light sources. This, together with an association with plant detritus, increases the likelyhood of *Psammoecus* species to be distributed by human trade activities. Such distribution still occurs at the present time, as shown e.g. by Thomas & Yamamoto (2007), who report *Psammoecus trimaculatus* being imported to Brazil, and, more recently, by Ouellette (2018), who mentions four species of Silvanidae associated with goods imported to Michigan (U.S.A.). The latter include two species of *Psammoecus*, imported with goods from Hong Kong, and Taiwan, respectively.

The proclivity to being dispersed by means of human trade, combined with the sometimes extremely wide distribution of *Psammoecus* species and the scarcity of faunistical data renders it presently impossible to formulate solid hypotheses regarding the geographical origins of the *Psammoecus* found on the Hawaiian islands.

**ACKNOWLEDGEMENTS**

For their generous loan of material I am indebted to the following colleagues: The late Jim Boone (BPBM ); Paul Skelley and the late Michael C. Thomas (FSCA); Azadeh Taghavian (MNHN); Maxwell Barclay and Roger Booth (NHMUK).

**REFERENCES**

**Arrow**, **G**.**J**. 1927. Clavicornia, Cucujidae. *In*: Insects of Samoa and other Samoan terrestrial Arthropoda. Part IV Fasc. 1: 42–47. London.

**Blackburn**, **T**. 1903. Further notes on Australian Coleoptera, with descriptions of new genera and species. *Transactions and Proceedings and Report of the Royal Society of South Australia* **27**: 91–181.

**Blackburn T**. **& D**. **Sharp**. 1885. Memoirs on the Coleoptera of the Hawaiian Islands. *The Scientific Transactions of the Royal Dublin Society* (2) **3**: 119–196.

**Ford**, **E**.**J**. 1961. [Notes & Exhibitions]. *Psammoecus* sp. *Proceedings of the Hawaiian Entomological Society* **17**(3): 318.

**Grouvelle**, **A**. 1878. Cucujides nouveaux ou peu connus, 3$^{e}$ mémoire. *Annales de la Société Entomologique de France* **8**: 67–76.

**Grouvelle**, **A**. 1908. Coléoptères de la région Indienne. *Annales de la Société Entomologique de France* **77**: 315–495.

**Grouvelle**, **A**. 1912. *Psammoecus* nouveaux du Musée de Leide. *Notes from the Leyden Museum* **34**: 81–94.

**Grouvelle**, **A**. 1919. Descriptions d'espèces nouvelles du genre *Psammoecus*. *Mémoires Entomologiques. Études sur les Coléoptères* **2**: 1–203.

**Hetschko**, **A**. 1930. Fam. Cucujidae. *In*: Junk, W. & Schenkling, S. (eds.), *Coleopterorum Catalogus* **15** (109): 1–93.

**Karner**, **M**. 2012. A revision of African *Psammoecus* from the collection of the Musée royal de l'Afrique centrale. *European Journal of Taxonomy* **17**:1–31. https://doi.org/http://dx.doi.org/10.5852/ejt.2012.17.

**Karner**, **M**. 2014. Three new species and new records of African *Psammoecus* Latreille (Coleoptera, Silvanidae). *European Journal of Taxonomy* **89**: 1–18. https://dx.doi.org/10.5852/ejt.2014.89

**Karner**, **M**. 2020. Taxonomic Studies on Australian *Psammoecus* Latreille (Coleoptera, Silvanidae, Brontinae). *European Journal of Taxonomy* **723**: 135–158

**Mola**, **L**. **& Yoshida**, **T**. 2019. *Psammoecus trimaculatus* Motschulsky, 1858, new to the Italian fauna (Cucujoidea Silvanidae). *Fragmenta Entomologica* **51**(1): 47–50. https://doi.org/10.13133/2284-4880/341

**Motschulsky**, **V**. 1858. Insectes des Indes orientales, 1$^{ière}$ série. *Études Entomologiques* **7**: 20–122.

**Ouellette**, **G**.**D**. 2018. Intercepted Silvanidae (Insecta, Coleoptera) from the International Falls MN (U.S.A.) Port of Entry. *Great Lakes Entomologist* **51**: 5–9.

**Pal**, **T**.**K**. 1985. A revision of Indian *Psammoecus* Latreille (Coleoptera: Silvanidae). *Records of the Zoological Survey* **71**: 1–54.

**Sharp**, **D**. **& Scott**, **H**. 1908. Coleoptera. IV. Coleoptera (Various). *In*: *Fauna Hawaiiensis or the Zoology of the Sandwich (Hawaiian) Isles* Vol. III. Part V. Coleoptera III. Pp. 367–579.

**Thomas**, **M**.**C**. **& Yamamoto**, **P**.**T**. 2007. New records of Old World Silvanidae in the New World (Coleoptera Cucujoidea). *Coleopterists Bulletin* **61**: 612–613.

**Waterhouse**, **C**.**O**. 1876. Descriptions of new species of Cucujidae and Cleridae. *The Entomologist's Monthly Magazine* **13**: 118–126.

**Yoshida T**. **& Hirowatari**, **T**. 2014. A revision of Japanese species of the genus *Psammoecus* Latreille (Coleoptera, Silvanidae). *ZooKeys* **403**: 15–45. https://doi.org/10.3897/zookeys.403.7145.

**Yoshida**, **T**., **Karner**, **M**. **& Hirowatari**, **T**. 2018. A revision of Taiwanese species in the genus *Psammoecus* Latreille (Coleoptera, Silvanidae). *Zoological Studies* **57**(18): 1–18. https://doi.org/10.6620/ZS.2018.57-18.