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Paraphacosomoides Balthasar, 1968, a junior synonym of *Lepanus* Balthasar, 1966 (Coleoptera: Scarabaeidae: Scarabaeinae), with redescription of *Lepanus curvipes* (Balthasar, 1966)

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Abstract

The monotypic genus *Paraphacosomoides* Balthasar, 1968 (Coleoptera: Scarabaeidae: Scarabaeinae) is treated as a junior synonym of the genus *Lepanus* Balthasar, 1966, and *Lepanus curvipes* (Balthasar, 1966), **new combination** is proposed for *Paraphacosomoides curvipes* (Balthasar, 1966). The invalid genus-group names *Phacosomoides* Balthasar, 1966 and *Pseudophacosoma* Paulian, 1975 are also placed in synonymy with *Lepanus*. Morphological evidence supports this synonymy and the tentative placement of *Lepanus curvipes* in the *Lepanus villosus* species group.

Key words: New Guinea, *Phacosomoides*, Australasian endemic genera

Introduction

Paraphacosomoides Balthasar, 1968 (Coleoptera: Scarabaeidae: Scarabaeinae) is a replacement name for *Phacosomoides* Balthasar, 1966, a junior primary homonym of *Phacosomoides* Martínez and Pereira, 1959, which was established by Balthasar (1966) in his paper on new genera and species of Scarabaeoidea from the Australian and Neotropical regions. It was based on the type species *P. curvipes* Balthasar, 1966, described from a single male specimen from the surroundings of "Hollandia, New Guinea-Irian" [Jayapura, Papua Province, Indonesia] collected in 1956. He stated that the new genus was not closely related to any of the canthonine genera of the Australian or Indochinese subregion of the Oriental Region and could be distinguished easily by the number of elytral striae (eight) and the presence of only one tarsal claw on each leg.

Subsequently, *P. curvipes* has received little attention, although Paulian (1985) noted that Henry Howden had suggested that *Penalus waui* Paulian, 1985 might represent specimens of *Paraphacosomoides curvipes*. *Penalus* Paulian, 1985 is also a monotypic genus endemic to New Guinea, and this suggestion may have been based on the striking similarity in the shape of the metatibia, which is strongly curved in well-developed males and illustrated in Balthasar's (1966) description. Here, we reexamine the classification of *Paraphacosomoides curvipes,* through direct comparison of the primary types.

Materials and methods

To verify the identity of the specimen identified as *Phacosomoides curvipes*, we examined the holotype and produced high-resolution images of this singleton. We then compared the characters with Balthasar's (1966)

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original description, and to primary types of *Lepanus ovatus* Balthasar, 1966 (examined by NG & TW) and *Penalus waui* Paulian, 1985 (examined by FG). The redescription follows the format for description of Australian *Lepanus* (Gunter & Weir 2019a, 2019b, 2021; Gunter *et al.* 2022). Body length measurement was taken from the tip of the clypeal teeth to the posterior end of the elytra. Width measurement was taken at the widest point. Label data are given verbatim inside quotations with "|" to indicate line breaks.

Results

One of us (FG) obtained a loan of the holotype of *Paraphacosomoides curvipes* from the National Museum, Prague, Czech Republic (NMPC) and examined the holotype of *Penalus waui* housed at the Canadian Museum of Nature, Ottawa, Canada (CMNC). High-resolution images were produced for examination. We confirm that *Paraphacosomoides curvipes* and *Penalus waui* are distinctly different (Fig. 1), and that *Paraphacosomoides curvipes* has two tarsal claws (although very small and set together) and not one as stated by Balthasar (1966), no pseudepipleura, and with eight elytral striae, the eighth located along the flange-like edges of the epipleura (Fig. 2). These characters place *Paraphacosomoides curvipes* in a group of four Australasian endemic genera: *Lepanus* Balthasar, 1966, *Sauvagesinella* Paulian, 1935, *Matthewsius* Gunter & Weir, 2017, and *Monteithocanthon* Gunter & Weir, 2017. The lack of a trochanterofemoral pit, the small claws, presence of three protibial teeth (not four as stated by Balthasar (1966)) and simple pygidium will run it to *Lepanus* in the key to tribes and genera of Australian Scarabaeinae in Gunter *et al.* (2019). No other characters present on the holotype would preclude its placement in *Lepanus* and moreover, it has the very small projection at the base of elytral stria 7 (Fig. 2D), which defines all known species of *Lepanus* and is lacking from all other genera from this region. Unfortunately, the preservation method of the holotype fixed the tissue of the abdomen and prevented us safely extracting the aedeagus.

Of interest is that the single specimen of the type species of *Lepanus*, *Lepanus ovatus* Balthasar, 1966, was collected in the same place and same time (1956) as the type of *Phacosomoides curvipes,* and both genera and species were described in the same paper (Balthasar 1966). It is unsurprising that when Balthasar considered only these specimens, and others known from New Guinea at the time, the differences in number of protibial teeth, shape of metatibiae, and pygidial ornamentation, among other characters, warranted their separation. It was not until Matthews (1974) revised the Australian 'Scarabaeini' and transferred seven species previously classified as *Epilissus* Dejean, 1836 or *Panelus* Lewis, 1895 to *Lepanus* that morphological variation within the genus became more apparent. Despite the morphological variation in diagnostic leg and pygidial characteristics, *Lepanus* as revised by Gunter & Weir (2019a), has been shown to reflect a natural group supported by morphology and DNA. With the transfer of *Phacosomoides curvipes* to *Lepanus,* the genus now comprises seven species from New Guinea, one species from New Ireland, and 51 species from Australia.

Lepanus Balthasar, 1966

Lepanus Balthasar, 1966: 177; Matthews 1974: 100; Gunter & Weir 2019a: 41; Gunter *et al.* 2019: 459. Type species *Lepanus ovatus* Balthasar, 1966 (by original designation).

Panelus (*Parapanelus*) Balthasar, 1966: 180. Type species *Panelus* (*Parapanelus*) *gressitti* Balthasar, 1966 (by monotypy). Synonymy by Matthews (1974).

Phacosomoides Balthasar, 1966: 178. Type species *Phacosomoides curvipes* Balthasar, 1966 (by original designation). **New synonymy.**

Paraphacosomoides Balthasar, 1968: 92. Replacement name for *Phacosomoides* Balthasar, 1966, not *Phacosomoides* Martínez & Pereira, 1959. **New synonymy.**

Pseudophacosoma Paulian, 1975: 241. Unnecessary replacement name for *Phacosomoides* Balthasar, 1966. **New synonymy.**

Oficanthon Paulian, 1985: 227. Type species *Oficanthon mirabilis* Paulian, 1985 (by original designation). Synonymy by Gunter *et al.* (2022).

Comments. *Paraphacosomoides* is a monotypic genus here treated as a junior synonym of *Lepanus.* Both genera are described in Balthasar (1966), *Lepanus* appearing on page 177, *Phacosomoides* appearing on page 178. For a generic description of *Lepanus*, refer to Matthews (1974) and Gunter *et al.* (2019).

***Lepanus curvipes* (Balthasar, 1966), new combination**
Figs 1A,B, 2

Phacosomoides curvipes Balthasar, 1966: 179 (original description); Paulian 1985: 229 (classification); Bezděk & Hájek 2011: 373 (type data, comment).
Paraphacosomoides curvipes : Balthasar 1968: 92.

Type material examined, Holotype (1♂ NMPC), "Nova Guinea | Irian-1956 | Hollandia" "Phacosomoides | curvipes **sp. nov.** | Balthasar | Holotypus" "ex coll. V. Balthasar | National Museum | Prague, Czech Republic".

Redescription. Head and pronotum uniformly brown. Elytra dull yellow/orange with brown sutural intervals, brown spots at basal one third of elytral intervals 6 and 8, and brown apical one-third. Dorsal surface with barely discernible, fine setae. Ventral surface uniformly brown with scattered, barely discernible, fine setae. Legs brown. **Measurements.** Length: 3.2 mm, maximum width 2.3 mm.

Head. Width to length ratio 36:29, clypeus somewhat raised medially. Surface reticulate with fine meshes, tending more transverse on clypeus; punctate with each puncture bearing a seta about as long as distance between punctures; punctures becoming finer anteriorly and obsolescent behind clypeal teeth. Clypeal teeth unturned and with a broad U-shaped area between. Margin of head bordered all around, more obvious on genae. Genal angles rounded, only slightly prominent. Dorsal part of eyes wide, separated by an interocular space approximately 8 times eye width. Eye canthus not dividing the eye.

Prothorax. Pronotal surface reticulate with fine meshes; punctate, with each puncture bearing a fine seta longer than the distance between punctures; punctures becoming finer anteriorly on disc. Pronotum slightly divergent anteriorly in basal two-thirds then tapering in a straight line to anterior angles in dorsal view, median and anterior angles blunt and obtuse; lateral and anterior margins finely bordered; posterolateral angles rounded; basal margin rounded, without border. Pronotal width to length ratio 62:39. Hypomeron deeply excavated anteriorly for reception of the profemur; vaguely reticulate; with scattered very fine setose punctures; hypomeral stria absent.

Elytra. Elytral surface convex, reticulate with fine meshes; intervals very finely punctate, each puncture bearing a very fine seta; with 8 impressed impunctate striae, striae 8 located along the flange-like edges of the epipleura. All striae reach the base of the elytra, with a very small projection at the base of stria 7; stria 8 impressed for its whole length and continuing almost to elytral apex. Intervals 1–3 together somewhat rounded apically and overhanging the epipleural flange. Ratio of length of elytra along suture to maximum elytral width 60:81. Epipleura reticulate with elongate meshes, broad basally, narrowing apically and reaching the elytral apex, somewhat wrinkled and appearing impunctate.

Legs. Protibia with 3 sharp teeth on outer edge, which is crenulate basal to the teeth, and weakly denticulate between the teeth. Apical digit present, short, with a long ventral brush of stout setae and an apical spur between digit and first tooth. Dorsal surface reticulate with a carina extending from base to basal tooth and sparse scattered setose punctures. Ventral surface reticulate with an obsolete carina, a small tooth lateral to the base of the apical spur and near the base of the tarsus, and a row of 6–7 elongate setae along the inner edge. Trochanterofemoral pit absent. Mesotibia with brushes of pale yellow setae apically on inner and outer edges. Mesotarsi with long, pale yellow setae on all tarsomeres; tarsal claws very small, set together and basally dentate. Metatibia long, narrow in basal half then strongly curved and greatly widened towards the apex, with flattened inner and outer faces in the apical one third. Metatarsi mostly missing, metatarsomere 2 longer than metatarsomere 1.

Abdomen. Pygidium rather flat, reticulate with fine meshes except on medial portion of apical fifth, which is almost glossy; fine meshes more elongate laterally and basally; with sparse scattered setose punctures, more obvious medially towards the apex; without any depressions, grooves or modified areas. Abdominal ventrites reticulate with elongate meshes, more evident laterally than medially; sparsely and weakly setose punctate; sutures between ventrites clearly visible. Ventrites 2–5 narrowed medially, ventrite 6 longest, as long as 2–5 medially combined.

Pterothorax. Mesoventrite smooth, nitid, virtually impunctate. Mesepimeron smooth, nitid, virtually impunctate. Medial lobe of metaventrite smooth, nitid with fine setose punctures, very narrowly margined beside mesocoxae. Lateral lobes of metaventrite reticulate with elongate fine meshes interspersed with a few setose punctures, distinctly margined beside mesocoxae. Metanepisternum reticulate. Mesometaventral suture obsolete, nearly straight.

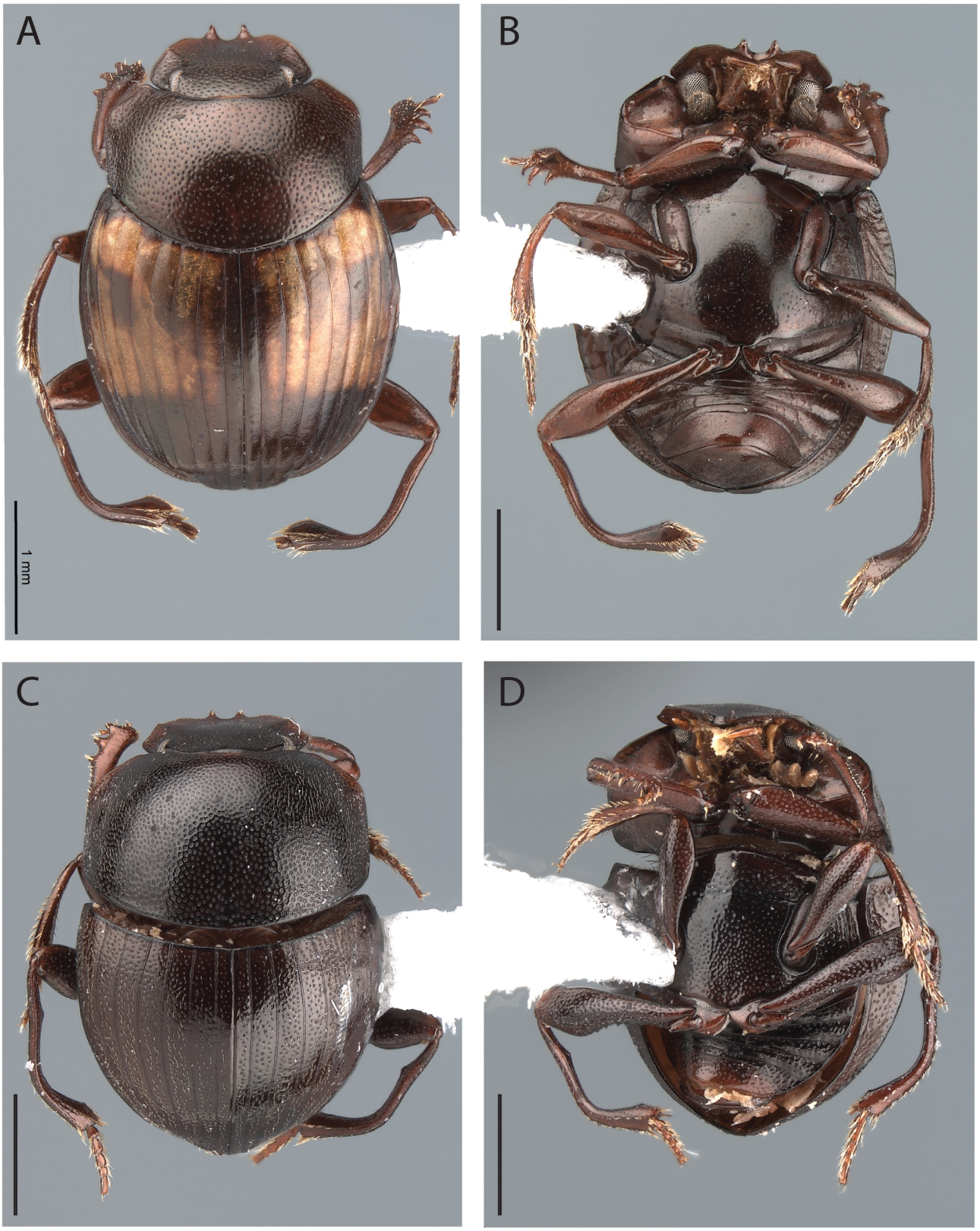

FIGURE 1. Dorsal and ventral habitus of holotypes. **A**, dorsal habitus of *Lepanus curvipes*; **B**, ventral habitus of *Lepanus curvipes*; **C**, dorsal habitus of *Penalus waui*; **D**, ventral habitus of *Penalus waui*. Specimens to the same scale. Scale bar 1 mm.

FIGURE 2. Diagnostic characters of the *Lepanus curvipes*. **A**, lateral habitus, note the absence of hypomeral striae and pseudepipleuron; **B**, mesotarsal claws, showing two close-set claws; **C**, elytra, showing eight striae, flange-like edge (black arrow), close-up of surface with microreticulations, and elytral apex (white dashed line); **D**, ventral surface, with close-up to highlight the very small projection at the base of stria 7; **E**, dorsal view of protibia, white arrow points to small apical digit, black arrow points to apical spur; **F**, ventral view, note the absence of trochantofemoral pits on procoxae, and deeply excavated hypomeron; **G**, pygidium; **H**, head, note the eye canthus not dividing the eyes; **I**, ventral view of protibia, white arrow points to tooth near tarsal insertion, black arrow points to apical spur. Images not to the same scale.

Diagnosis. Within the Australasian endemic clade, this species can be placed in *Lepanus* by the elytra lacking pseudepipleura, lack of a single large curved spur on the inner angle of mesotibiae and metatibiae, prothoracic legs without a trochanterofemoral pit, elytra with 8 striae, stria 8 located along the flange-like edges of the epipleura, mesocoxae not strongly oblique, small tarsal claws, protibiae with three teeth, simple pygidium, and a very small projection at the base of elytral stria 7.

Geographical distribution. Northern coastal New Guinea.

Remarks. In the key to species groups of *Lepanus* in Gunter & Weir (2019a), *L. curvipes* can be tentatively assigned to the *L. villosus* species group by virtue of elytral striae impunctate (Figs 1A, 2C), simple pygidium, pygidial surface rather flat with prominent microreticulations (Fig. 2G), protibiae with three teeth on outer edge, one small tooth near the base of tarsus, inner apical edge truncate, apical spur present, male apical digit short with comb of stout setae at inner apex (Figs 2E, I). Differences from the *L. villosus* species group as presently defined include wide eyes with incomplete canthus (Fig. 2H), hypomeral striae absent (Fig. 2A), basal margin of pronotum with punctures not extending to the hind edge (Fig. 1A), and lacking a row of punctures along anterior edges of abdominal ventrites 2–5 (Fig. 1B).

Within the *L. villosus* species group (see Gunter & Weir 2019b), *L. curvipes* would appear to be most closely related to *L. vestitus* Matthews, 1974 by the presence elytral reticulation of fine meshes (Fig. 2C), intervals 1–3 together somewhat rounded apically and overhanging the epipleural flange (Fig. 2C), mesoventrite virtually impunctate (Fig. 2D), and modified male metatibiae (Figs 1A, B).

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