

**A new species of the genus *Airapus* from the Wallacea area  
(Coleoptera: Scarabaeidae: Aphodiinae: Eupariini)**

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**Taxonomy, new species, Coleoptera, Scarabaeoidea, Scarabaeidae, Aphodiinae, Eupariini, *Airapus*, Australian Region, East Indonesia, Raja Ampat Islands**

**Abstract.** A new species of the genus *Airapus* Stebnicka & Howden, 1996, *A. wallaceanus* sp. nov. from East Indonesia (the Raja Ampat Islands lying in the Wallacea area), is described, illustrated and compared with the most similar species of the genus, *Airapus interstitialis* (Fairmaire, 1883). Affinities between the species described here and known New-Guinean members of the genus are emphasized.

## INTRODUCTION

In the course of the identification of materials from the Naturkundemuseum Erfurt, Germany, a new species of the genus *Airapus* Stebnicka & Howden, 1996 was discovered. The genus *Airapus* was established to include *Aulonocnemis sumatrae* Fairmaire, 1896 (the type species) and five Australian species with adding the following two remarks: all the names listed by Krikken (1970) under *Euparia* Le Peletier & Serville, 1828 should be considered in *Airapus* with exception of *Euparia squamosa* Lea, 1923; and some species considered by Balthasar (1964, 1967) under *Ataenius* Harold, 1867 or *Euparia* belong to the genus *Airapus*.

Nineteen species (divided into three species groups) from New Guinea, the Bismarck Archipelago and the Solomon Islands were keyed and described in a work by Stebnicka (1998); some drawings and SEM photos are also present in that work.

## MATERIAL AND METHODS

The specimens were observed by using the MBS-10 and SZP 1120-T stereoscopic microscopes. The photos published here were taken by the use of the Meopta laboratory microscope, CMEX 5 digital camera and Helicon Focus programme.

The following acronyms stand for collections, in which the specimens studied here are kept (curator in parentheses):

MRCD Miloslav Rakovič private collection, Dobřichovice, Czech Republic;

NMEC Naturkundemuseum Erfurt, Germany (Matthias Hartmann).

Exact label data concerning specimens of the new species described here are specified in the section Taxonomy below. Separate label lines are indicated by a slash (/), separate labels by a double slash (//).

For morphological terms used in the description of epipharyngeal structures we follow Dellacasa et al. (2010).

## TAXONOMY

### *Airapus wallaceanus* sp. nov.

(Figs. 1-3, 7-13, 14-17, 29-34, 35-38, 46-47)

**Type locality.** East Indonesia, Raja Ampat Islands, Misool Island SW, district Misool Utara, Aduwey (Adua) village, ~2-5 km NNW valley of River Hakau, 01°58'46"S, 129°54'37"E.

**Type material.** Holotype (♂): "INDONESIA E, Prov. Raja Ampat, / Misool SW, distr. Misool Utara, Aduwey / (Adua) vill.~2-5 km NNW valley of River Hakau, 01°58'46"S, 129°54'37"E / 26.iii.2009 primeval lowland forest, UV / light leg. D. Telnov & Greke [white printed label] // 2430, Dok. L. Mencl [pale green printed label, related to the photo-documentation system of the third author] // HOLOTYPE (♂) / *Airapus wallaceanus* sp. nov. / M. Rakovič, L. Mencl / & D. Král det. 2018 [red printed label]", (NMEC). Allotype: same data as with holotype on white label, symbol ♀ and word ALLOTYPE instead of symbol ♂ and word HOLOTYPE, respectively, on red label. Number 2429 instead of 2430 on pale green label, (NMEC). 2 paratypes: same data as with holotype on white label, PARATYPE on red labels instead of HOLOTYPE (♂), numbers 2451 and 2452 instead of 2430 on pale green labels, (NMEC, MRCD).

See also Fig. 34 for labels pinned under type specimens.

**Description of holotype.** Oblong oval, moderately convex, macrosetaceous, dark brown (anterior margin of clypeus lighter), body length of 4.6 mm, maximum width of 1.95 mm (Figs. 1-2 and 14).

Head (Figs. 7-8) convex, particularly medially, without frontoclypeal suture; head surface with mostly longitudinal punctures, intervals between punctures very narrow. Clypeus sharply denticulate each side of wide anteromedian emargination (denticles lifted upward), its lateral sides nearly aligned with genae. Genae obtusely rounded, large, considerably exceeding eyes.

Epipharynx (Fig. 45). Transversal, anterior outline shallowly emarginate, lateral outlines regularly widely rounded; tormae and nesium well sclerotised, approximately symmetrical, apotormae missing; epitorma trianuglate, well sclerotised, covered with group of distinct sensilla anteriorly and laterally and with two sinuate rows of dense sensilla basally; corypha with two spines; prophobae sclerotized with only one distinct spine; adelochaetae consisting of row of 11 closely spaced spines; chaetopariae with dense row of 30 long stout spines; ipophobae weakly sclerotized, covered with several macrosetae.

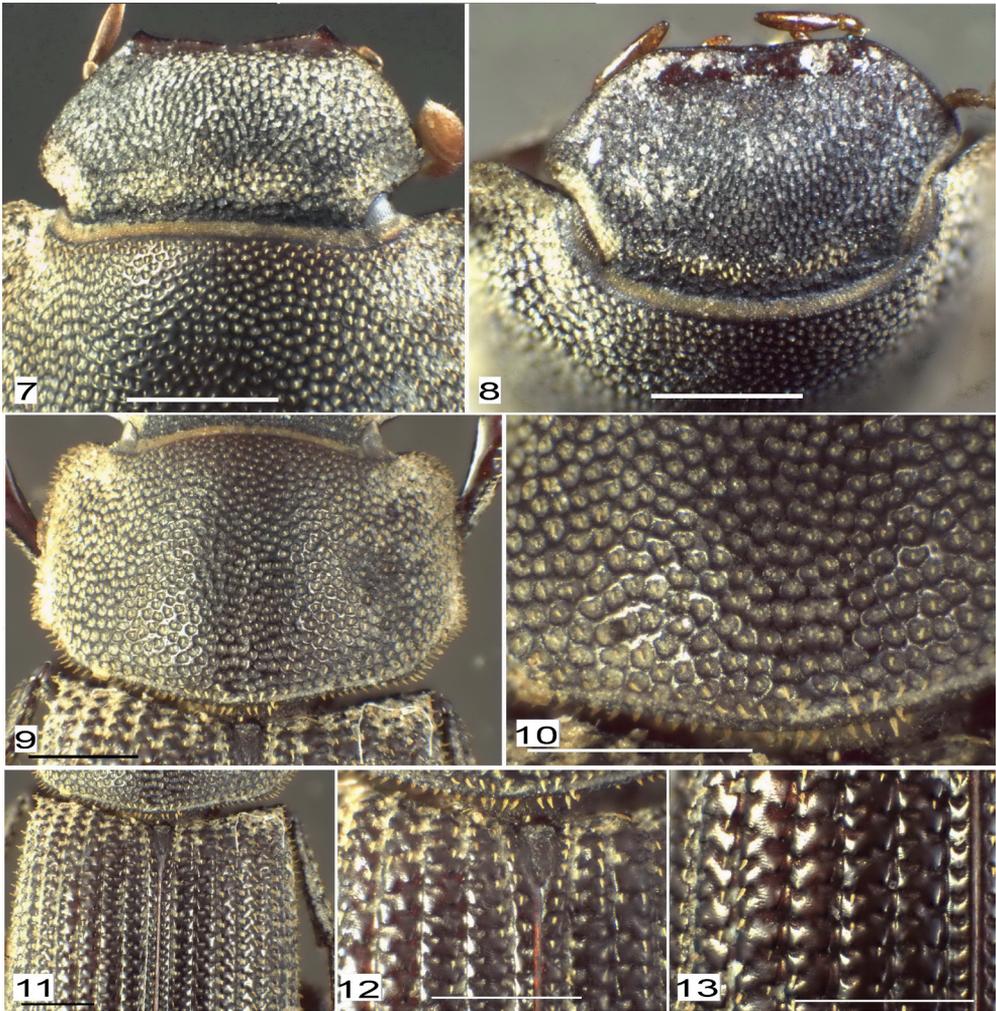
Pronotum (Figs. 9-10 and 15) transversal (length-to-width ratio 0.641), widest before posterior angles, with straight, slightly sinuate sides and truncate, excised posterior angles. Wider than head. Pronotum surface with shortly macrosetigerous punctures, punctures larger basally and laterally, smaller medially and anteriorly. Macrosetae in setigerous pronotum punctures short, but distinct throughout pronotum surface (Fig. 10). Pronotum lateral margins with dense, tough, acuminate macrosetae evenly narrowed from their bases to their apices (Figs. 1-2, 9-10, and 12).



Figs. 1-6. *Airapus wallaceanus* sp. nov. (Figs. 1-3), holotype, ♂, and *A. interstitialis* (Fairmaire) (Figs. 4-6), specimen from PNG, Pereia Creek, Kwagira River, 50 m, Aug 30-31, 1953 (MRCD), ♂, habitus: 1- dorsal view; 2- dorsolateral view; 3- ventral view; 4- dorsal view; 5- dorsolateral view; 6- ventral view. Scale line 1 mm. Photographs by L. Mencl.

Scutellum small, triangular, about twice as long as wide (Fig. 21).

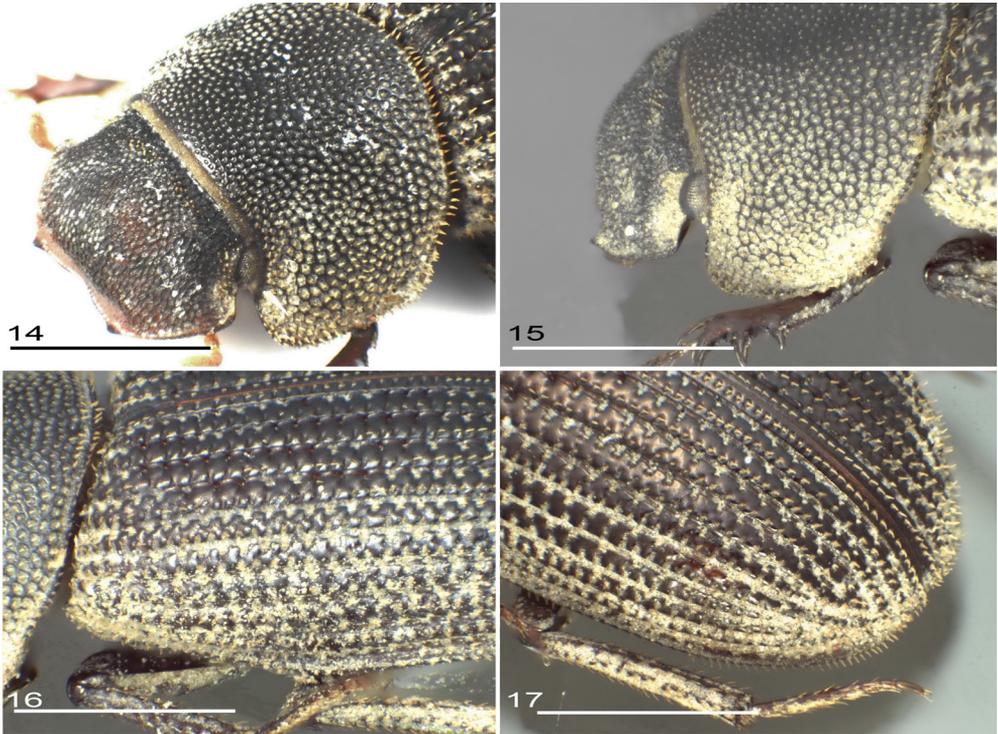
Elytra (Fig. 1) with 10 striae and 10 intervals, with distinct humeral denticles, elongate (length-to-width ratio of 1.53), distinctly broader behind (broadest point at about 2/3 elytra



Figs. 7-13. *Airapus wallaceanus* sp. nov., holotype, ♂ (Figs. 8-12) and allotype, ♀ (Figs. 7 and 13), details in dorsal view: 7- head in declined position; 8- head in view perpendicular to its circumference; 9- pronotum; 10- pronotum surface sculpture; 11- anterior area of elytra; 12- macrosetae on basal margin of pronotum; 13- elytral surface sculpture at elytral suture. Scale lines 0.5 mm. Photographs by L. Mencl.

length from base to apex). Striae narrow, without distinct punctures. Intervals with two rows of macrosetae outgrowing from transversal tubercles (each tubercle has a larger outside elevation and a smaller inside one). Detailed sculptures in different areas of elytra as in Figs. 11-13 and 16-17.

Legs in dorsal view: protibia with three large teeth in anterior part of outer margin, not denticulate in basal part, its upper surface impunctate, apical spine about as long as basal protarsomere; basal meso- and metatarsomeres long, shorter than superior terminal spines of mesotibia and metatibia, respectively.



Figs. 14-17. *Airapus wallaceanus* sp. nov., holotype, ♂ (Figs. 14-16) and allotype, ♀ (Fig. 17) details: 14- head and pronotum, oblique frontal view; 15- head and pronotum, lateral view; 16- anterior area of elytra, lateral view; 17- elytral apex. Scale lines 1 mm. Photographs by L. Mencl.

Ventral surfaces (Figs. 3 and 29-32) shining, femora, metaventrum, as well as abdominal ventrites with macrosetigerous punctures, abdominal ventrites fluted anteriorly (Fig. 33).

Pygidium with macrosetigerous punctures (Figs. 35-38).

Aedeagus as in Figs. 46-47.

**Sexual dimorphism.** Difference between male and female pygidium shapes as in Figs. 35-38.

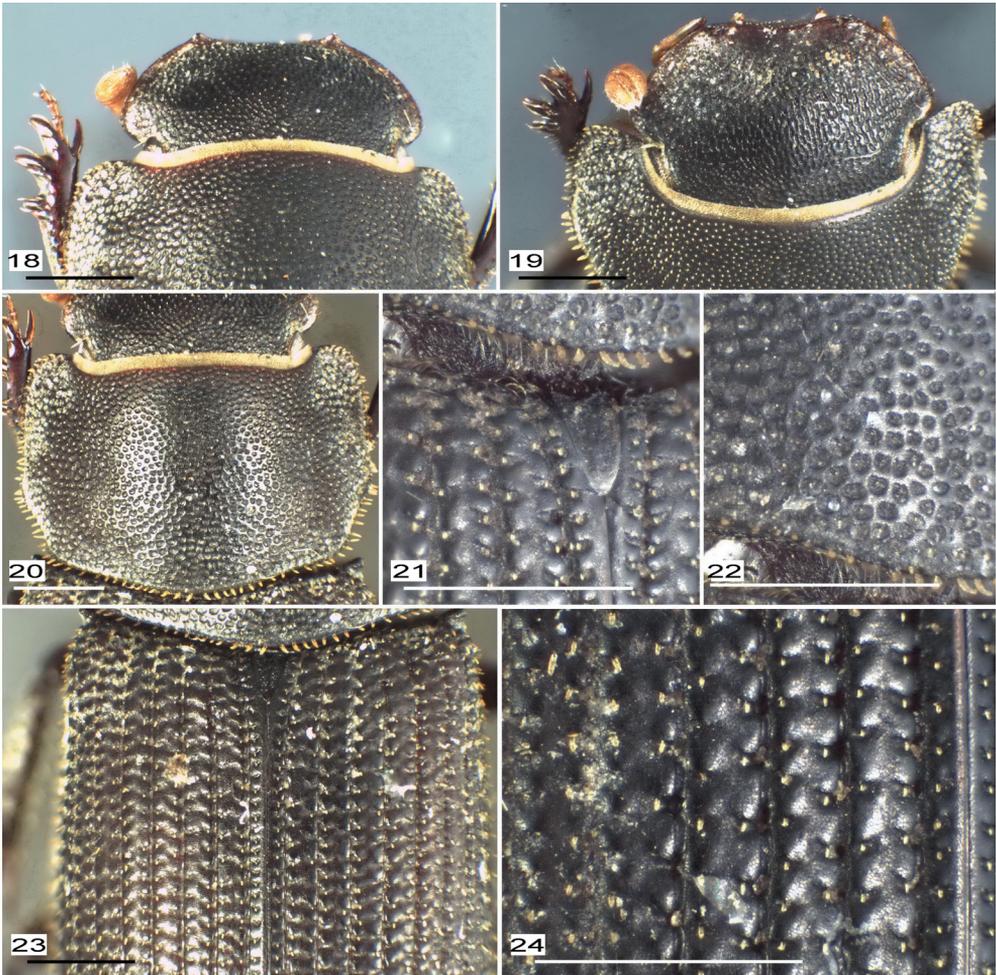
**Variability.** No variability in shapes, sculptures or colours. In the type series (4 specimens) the body length varies between 4.5 and 4.8 mm.

**Collection circumstances.** In primeval forest, attracted to UV light.

**Distribution.** East Indonesia (the Raja Ampat Islands).

**Name derivation.** Based on the Wallacea area (= biogeographical designation for a group of mainly Indonesian islands separated by deepwater-straits from the Asian and Australian continental shelves), where the type specimens were collected.

**Differential diagnosis.** The new species exerts the affinity to *Airapus* species from New Guinea, the Bismarck Archipelago and the Solomon Islands rather than to species from the Oriental Region. The new species falls in the *Airapus interstitialis* group, Stebnicka (1998). In the key to species of this group, Stebnicka first separated *A. idenburgi* (Paulian, 1937)



Figs. 18-24. *Airapus interstitialis* (Fairmaire), specimen from PNG, Pereia Creek, Kwagira River, 50 m, Aug 30-31, 1953 (MRCB), ♂, details in dorsal view: 18- head in declined position; 19- head in view perpendicular to its circumference; 20- pronotum; 21- base of elytra and scutellum; 22- basal margin of pronotum with macrosetae and sculpture of pronotum surface; 23- anterior area of elytra; 24- detailed sculpture of elytra at elytral suture. Scale lines 1 mm. Photographs by L. Mencl.

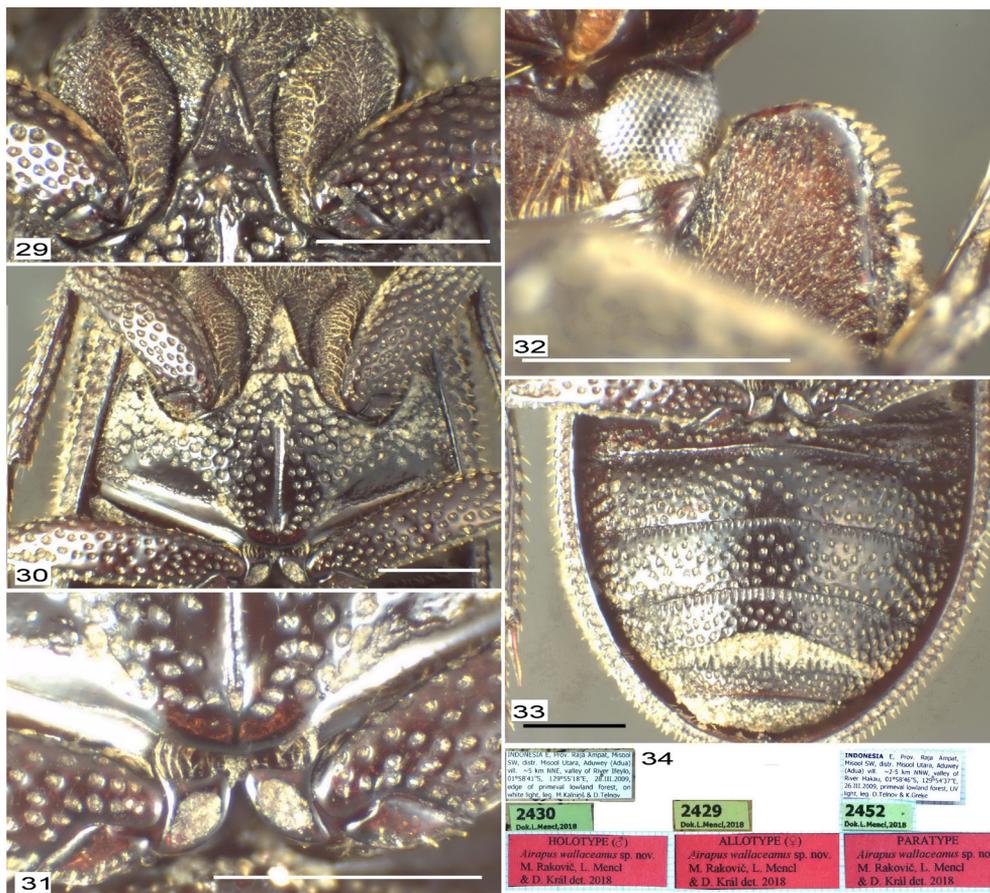
from the Papua New Guinea (PNG) based on the presence of a band of macrosetation along the frontoclypeal suture. Thereafter, she employed the following differentiation based on the body length: larger species (4.8-6.3 mm) - *A. spinator* (Harold, 1877) from PNG and *A. interstitialis* (Fairmaire, 1883) from PNG and the Solomon Islands; and smaller species (3.0-4.0 mm) - *A. popondettae* Stebnicka, 1998 from PNG and *A. hollandiae* Stebnicka, 1998, also from PNG. In this way of classing, the species *A. wallaceanus* most closely resembles *A. interstitialis* in external characters and even in the structure of their epipharyngi (Figs. 45 and 48). The two species can be differentiated from each other as shown in the following table.



Figs. 25-28. *Airapus interstitialis* (Fairmaire), specimen from PNG, Pereia Creek, Kwagira River, 50 m, Aug 30-31, 1953 (MRCD), ♂, details: 25- head and pronotum, oblique frontal view; 26- head and pronotum, lateral view; 27- anterior area of elytra, lateral view 28- elytral apex, dorsal view. Scale lines 1 mm. Photographs by L. Mencl.

<i>Airapus wallaceanus</i> sp. nov.	<i>Airapus interstitialis</i> (Fairmaire, 1883)
Smaller on average - body length of 4.5-4.8 mm	Larger on average - body length of 4.8-5.5 mm.
Dark brown (Figs. 1-2).	Mostly darker, greyish to brownish black. (Figs. 4-5).
The posterior pronotal angle emargination shorter (Figs. 1, 9, 14-15).	The posterior pronotal angle emargination longer (extended more forward) (Figs. 4, 20, 25-26).
Macrosetae in setigerous pronotum punctures short, but distinct throughout pronotum surface (Figs. 9, 14-15).	Macrosetae in setigerous pronotum punctures even shorter, distinct only laterally (Figs. 20, 24-25).
Macrosetae on pronotum margins denser, evenly narrowed from their bases to their apices (Figs. 9-10, 12, 14, 32).	Macrosetae on pronotum margins sparser, not quite evenly narrowed from their bases to their apices (Figs. 20, 22, 25-26).
Punctures on ventral surfaces (on femora, abdominal ventrites and meso-metaventral plate) larger (Fig. 3).	Punctures on ventral surfaces (on femora, abdominal ventrites and meso-metaventral plate) smaller (Fig. 6).
Parameres (in lateral view) with more acute, downward bent tip, the lower margin of the paramere evenly arcuate from the paramere base to the paramere apex (Fig. 47).	Parameres (in lateral view) with rather blunt tip, the lower margin of the paramere nearly straight from the paramere base to the paramere apex (Fig. 49).

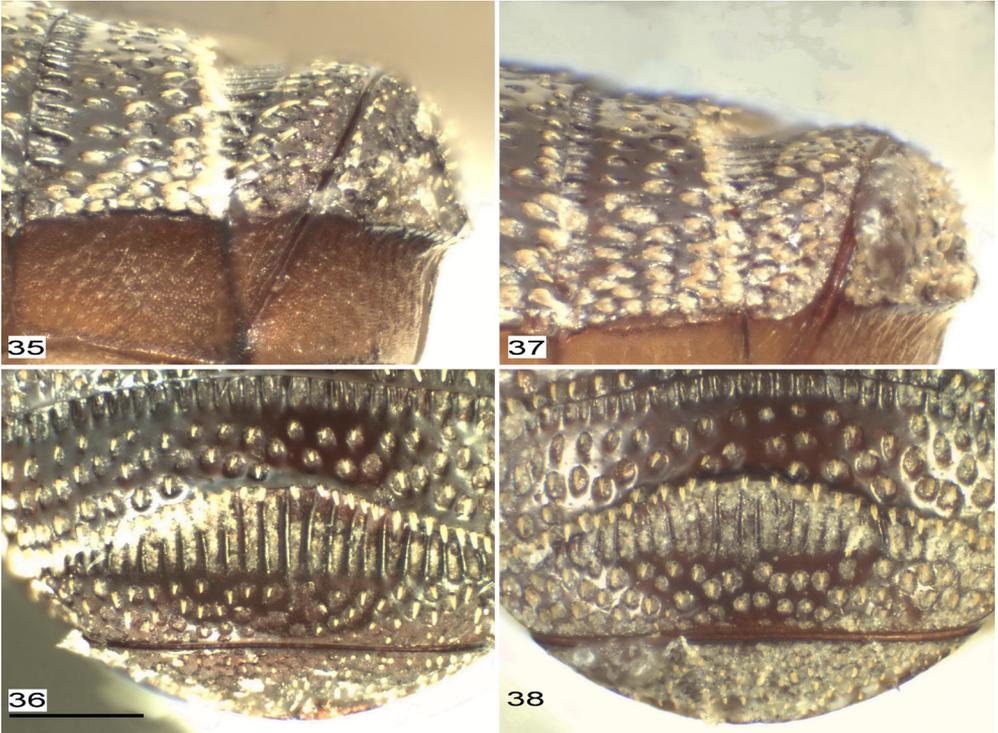
In addition to illustrations quoted above, some further details are depicted here, concerning characters observed on dorsal surfaces (Figs. 18-19, 23, 27-28), ventral surfaces (Figs. 39-44) and aedeagus (Fig. 50) of the species *Airapus interstitialis*.



Figs. 29-34. *Airapus wallaceanus* sp. nov., details of underside, holotype, ♂ (Figs. 30-33), paratype, ♂ (Fig. 29) and labels (Fig. 34): 29- anterior process of meso-metaventral plate; 30- meso-metaventral plate; 31- posterior process of meso-metaventral plate 32- pronotum lateral margin with macrosetae; 33- abdomen; 34- labels pinned under type specimens. Scale lines 0.5 mm. Photographs by L. Mencl.

## DISCUSSION

The study of data from the literature, particularly of those published by Stebnicka (1998), and examination of numerous species of the genus *Airapus* represented by specimens in our collections demonstrated that the species *Airapus wallaceanus* sp. nov. definitely exerts affinity rather to species from New Guinea than to the fauna of the Oriental Region. The new species comes from the Raja Ampat Islands lying in the Indonesia's West Papua Province. It



Figs. 35-38. *Airapus wallaceanus* sp. nov., holotype, ♂ (Figs. 35-36) and allotype, ♀ (Figs. 37-38), pygidium: 35- male, lateral view; 36- male, ventral view; 37- female, lateral view; 38- female, ventral view. Scale line 1 mm. Photographs by L. Mencl.

undoubtedly falls into the *Airapus interstitialis* group established by Stebnicka (1998) within the framework of her revision of the Aphodiinae of New Guinea, the Bismarck Archipelago and the Solomon Islands.

Most important characters of the new species are summarized above in the table, which is a part of the differential analysis.

The enormous number of individual islands forming archipelagos spread between the insular zone of the Southeast Asia and New Guinea suggests that further new species of the genus *Airapus* are likely to be found in Wallacea.

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## REFERENCES

- BALTHASAR V. 1964: *Monographie der Scarabaeidae und Aphodiidae der palaearktischen und orientalischen Region. Coleoptera Lamellicornia. Band 3. Aphodiidae*. Verlag der Tschechoslowakischen Akademie der Wissenschaften Prag, 652 pp., 2 pls.



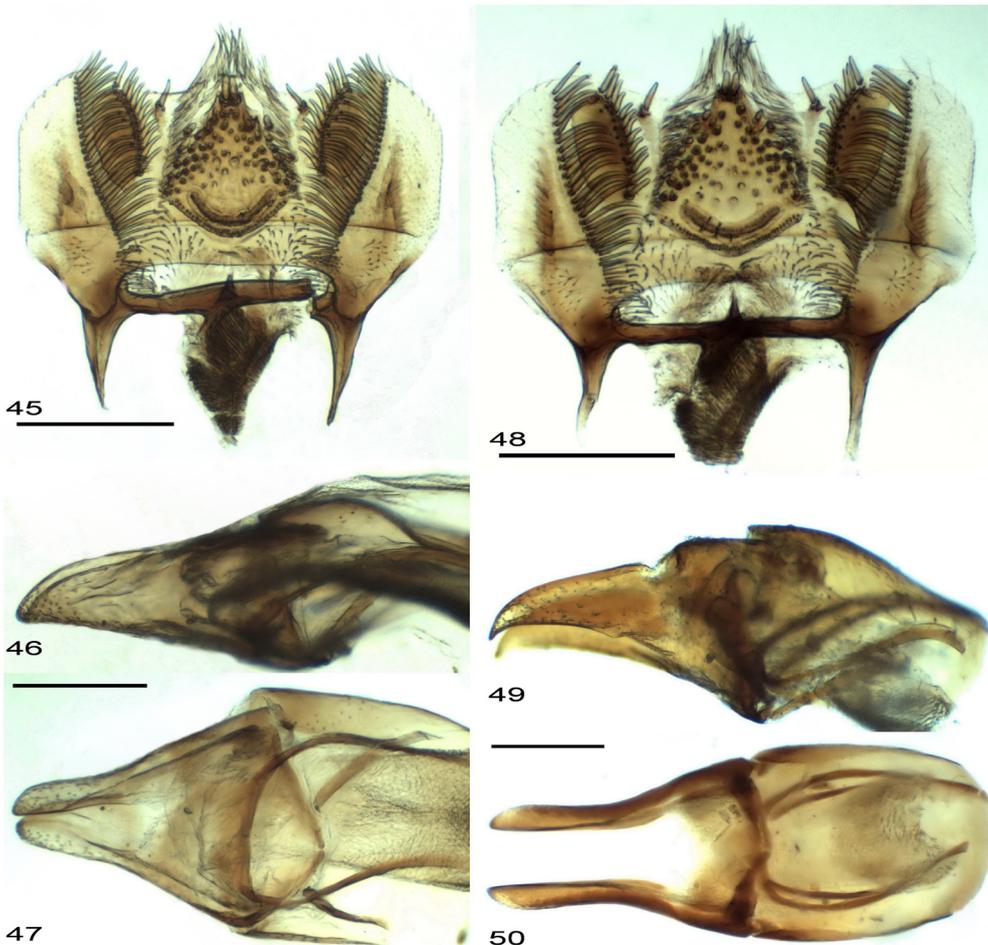
Figs. 39-44. *Airapus interstitialis* (Fairmaire), specimens from PNG, Pereia Creek, Kwagira River, 50 m, Aug 30-31, 1953 (MRCD), ♂ (Figs. 39-43), ♀ (Fig. 44), details on underside: 39- anterior process of meso-metaventral plate; 40- meso-metaventrum; 41- posterior process of meso-metaventral plate; 42- anterior leg; 43 – male abdominal ventrites; 44- female abdominal ventrites. Scale lines 0.5 mm. Photographs by L. Mencl.

BALTHASAR V. 1967: Neue Arten der Familie Aphodiidae (Coleoptera). 128. Beitrag zur Kenntnis der Scarabaeoidea. *Acta Entomologica Bohemoslovaca* 84: 122-139.

DELLACASA G., DELLACASA M., & MANN D. J. 2010: The morphology of the labrum (epipharynx, ikrioma and aboral surface) of adult Aphodiini (Coleoptera: Scarabaeidae: Aphodiinae), and its implications for systematics. *Insecta Mundi* 132: 1-21.

KRIKKEN J. 1970: New species of *Euparia* Lepeletier & Serville from New Guinea (Coleoptera: Aphodiidae). *Zoologische Mededelingen* 44: 317-327.

STEBNICKA Z. T. 1998: The Aphodiinae of New Guinea, the Bismarck Archipelago and the Solomon Islands (Coleoptera: Scarabaeoidea). *Invertebrate Taxonomy* 12: 833-895.



Figs. 45-50. *Airapus wallaceanus* sp. nov., holotype, ♂ (Figs. 45-47) and *Airapus interstitialis* (Fairmaire), specimen from PNG, Perea Creek, Kwagira River, 50 m, Aug 30-31, 1953 (MRCD), ♂ (Figs. 48-50), epipharynx and aedeagus: 45- *A. wallaceanus*, epipharynx; 46- *A. wallaceanus*, aedeagus, lateral view; 47- *A. wallaceanus*, aedeagus, ventral view; 48- *A. interstitialis*, epipharynx; 49- *A. interstitialis*, aedeagus, lateral view; 50- *A. interstitialis*, aedeagus, ventral view. Scale lines 0.2 mm. Photographs by L. Mencl.

STEBNICKA Z. T. & HOWDEN H. F. 1996: Australian Genera and Species in the Tribes Odontolochini, Psammodiini, Rhyparini, Stereomerini and Part of the Eupariini (Coleoptera: Scarabaeoidea: Aphodiinae). *Invertebrate Taxonomy* 10: 97-170.

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