

***Indoblackburneus* gen. nov. and three new species of the genus from the Oriental Region and China (Coleoptera: Scarabaeidae: Aphodiinae: Aphodiini)**

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**Taxonomy, new genus, new species, new combinations, key, distribution, Coleoptera, Scarabaeoidea, Aphodiinae, Aphodiini, *Indoblackburneus*, Oriental and Palaearctic Regions**

**Abstract.** A new genus, *Indoblackburneus* gen. nov. is proposed to include *Aphodius minutissimus* A. Schmidt, 1908 as its type species and further four species occurring in South India and in inland as well as maritime zones of Southeast Asia. Three new species are described: *Indoblackburneus continentalis* gen. et sp. nov. from Laos, Thailand, Vietnam and Malaysia, *Indoblackburneus merbabuanus* gen. et sp. nov. from Java (Indonesia) and *Indoblackburneus sinomeridionalis* gen. et sp. nov. from Yunnan (China). New combinations are proposed as follows: *Indoblackburneus javanus* (A. Schmidt, 1909) comb. nov., *I. minutissimus* (A. Schmidt, 1908) comb. nov., and *I. ohkurai* (Masumoto, 1992) comb. nov. A diagnosis of the new genus, key to species, appropriate descriptions and redescrptions, and detailed photos are presented. Taxonomical problems of the genus are discussed.

## INTRODUCTION

Within a period of about 20 years, the present authors have encountered enormously small specimens of Aphodiini from Southeast Asia and South India in private as well as institutional collections. The use of keys to species in monographs available (Schmidt 1922, Balthasar 1964) always resulted in their identification as *Aphodius (Blackburneus) minutissimus* (A. Schmidt, 1908) or *Aphodius (Pharaphodius) javanus* (A. Schmidt, 1909). In spite of the placement in different subgenera, currently genera in accordance with Dellacasa et al. (2001), all the specimens in question were very similar. Due to this, we felt the need for their detailed study together with appropriate types. The results of the study, including a definition of a new genus, descriptions of three new species and proposals for two new combinations, are presented below.

## MATERIAL AND METHODS

Specimens were examined with the Olympus SZ61, MBS-10 and SZP 1120-T stereomicroscopes. Measurements were taken with an ocular grid. The elytra length is considered as a distance between a line connecting anterior margin of elytra (at humeri) and elytral apex (along the elytral suture). The photographs published here were taken by using

a Meopta laboratory microscope and CMEX 5 digital camera with the Helicon Focus 3.20.2 Pro software.

Male genitalia (aedeagi) were treated by boiling with a 10% sodium hydroxide solution. Their photos were taken in glycerol.

Exact label data (as shown on white labels) are cited for the material examined. Individual lines within each label are separated by slashes “/”; double slash “//” stands for the separation of individual labels. Information in quotation marks indicates the original spelling. Our remarks and additional comments are found in brackets. Type specimens are provided with printed red label indicating the type status (HOLOTYPE, ALLOTYPE, PARATYPE, LECTOTYPE or PARALECTOTYPE, respectively), name of the species and authors of the identification or designation and with a pale green label specifying numbers related to the photo-documentation system by the first author (LM); the numbers printed on the pale green labels are employed below, throughout both the texts and legends to figures, to provide unambiguous specification of the specimen concerned.

Morphological terminology concerning the epipharyngeal structures was adopted from Dellacasa et al. (2010).

The following acronyms identify the collections housing the material examined (curators names are in parentheses):

DKCP David Král collection, deposited in NMPC;

LMCT Ladislav Mencl private collection, Týnec nad Labem, Czech Republic;

MRC D Miloslav Rakovič private collection, Dobřichovice, Czech Republic;

NSMT National Museum of Nature and Science, Tsukuba, Japan (Shuhei Nomura);

NMPC National Museum, Praha, Czech Republic (Jiří Hájek);

PBCS Patrice Bordat private collection, Saint-Cirq, France;

SMNH Swedish Museum of Natural History, Stockholm, Sweden (Johannes Bergsten).

## TAXONOMY

### **Genus *Indoblackburneus* gen. nov.**

**Type species.** *Aphodius minutissimus* Schmidt, 1908, by the original designation.

**Diagnosis.** Very small (1.8-3.4 mm), oblong oval, dorsal surfaces microreticulate and thus only moderately shining, glabrous. Head moderately convex, punctate, clypeus rounded each side of anteromedian emargination, frontoclypeal suture without tubercles, very fine to indistinct, genae aligned with or only moderately differentiated from anterior clypeus margin, glabrous to sparingly macrosetaceous. Epipharynx with characteristic corypha bearing stout setae: two long and two shorter ones. Pronotum transversal, punctate, anterior and basal margins not bordered, lateral margins and distinctly truncate and emarginate posterior angles bordered. Elytra elongate, moderately broader behind, with humeral denticles either indistinct or absent, with ten striae and ten intervals, striae distinctly punctate, intervals convex, finely and sparsely punctate or impunctate. Protibiae anteriorly with three large outer teeth in apical half and in some species with few small denticles in basal half; protibial

upper face with row of setigerous punctures parallel with outside margin, otherwise glabrous and smooth, impunctate. Meso- and metatibia with superior terminal spine about as long as basal tarsomere; inferior terminal spine much shorter. Apical edges of meso- and metatibiae fringed with not numerous inequal spinules. Underside also brown, mostly glabrous with exception of macrosetaceous abdominal ventrites.

**Note.** The shape and bordering of posterior pronotal angles and the arrangement of the epipharynx are very characteristic features differentiating the new genus from other related genera, which also have non-bordered pronotal base and inequal spinules on the metatibia apex.

**Geographic distribution of the genus species.** Members of the genus proposed here are currently known from Indonesia, Southeast Asia, South India and South China.

**Generic name derivation.** A combination of two parts: *Indo-* to point out the prevalent occurrence in the Oriental [= Indomalayan] Region and *blackburneus* referring to the name of another genus of Aphodiini. Masculine gender.

***Indoblackburneus continentalis* sp. nov.**

(Figs. 1-14)

**Type locality.** Northern Laos, Luang Prabang Province, Thong Khan, 19°35'N 101°58'E. 750 m.

**Type material examined (holotype, allotype and 43 paratypes).** Holotype, ♂ (NMPC) "LAOS-N (Louangphrabang), 11.-21. v. 2002 / 19°35'N 101°58'E, / THONG KHAN, / ~750m, Vít Kubáň leg. [white printed label] // 1529 / Dok.L.Mencl, 2012 / [pale green label printed] // HOLOTYPUS / *Indoblackburneus continentalis* / gen. et sp. nov. L. Mencl, D. Král & / M. Rakovič det. 2017". Allotype, ♀ (NMPC): white printed labels with same data as holotype, pale green printed label with No. 2339 instead of 1529, red printed label with word ALLOTYPUS instead of HOLOTYPUS. 9 paratypes (1 DKCP, 6 LMCT, 3 NMPC) with white printed labels bearing same data as holotype. 10 paratypes (1 DKCP, 3 LMCT, 5 NMPC, 1 MRCD) with white printed labels "LAOS-N, 10.-16. v. 1999, / Louang Phrabang prov, 20° 33-4'N, 102° 14'E, / Ban Song Cha (5 km W), / ± 1200m, Vít Kubáň leg.". 1 paratype (DKCP) with white printed label "Laos 600 m 13.-24. v. / Luang Namtha 1997 / Chalupka lgt!". 1 paratype (DKCP) with white printed label "LAOS / Louangnamtha pr., / LOUANG NAMTHA, / 4. v. 1997, 600 m / Vít Kubáň leg.". 2 paratypes (DKCP) with white printed labels "THAI. 28. iv-6. 5. 1993 / LAMPHANG riv. – 1000m / 16°07'N 99°00'E [white printed label] // Thailand '91 / Thanon Thong Chai / D. Král & V. Kubáň". 2 paratypes (DKCP) with white printed label "THAI. 10.-16. v. 1991 ~40 / Chiang Dao 600m / 19°24'N 98°55'E // Thailand '91 / Thanon Thong Chai / D. Král & V. Kubáň". 2 paratypes (MRCD) with two white printed labels "N. THAI: Pai // 13. xi. [19]00 / M. Rakovič lgt.". 2 paratypes (MRCD) with two white printed labels "N. THAI: ~40 / km SE of / Fang [white printed label] // 1. xi. [19]00 / M. Rakovič lgt.". 1 paratype (DKCP) with white printed label "THAILAND, 26. iv.-6. v. 1991 / UMPHANG / 16°04' N. 98°53' E 500 m / David Král lgt.". 6 paratypes (1 MRCD, 5 PBCS) with white printed label "HOA.BINH / TONKIN / H. PERROT". 2 paratypes (PBCS) with white printed label "26. xi. 2002, Ninh Sim / Duc. Ny JF Voisin & / Nguyen Quang P, leg.". 1 paratype (NMPC) with white printed label "HOAH BINH / TONKIN vii. 1934 / A DE COOMAN." 1 paratype (PBCS) with white printed label "Ko. Pasir / Malaysia // 7. viii. [19]75 / G. MINET". 3 paratypes (DKCP) with printed label "China, YUNNAN / JINGHONG / vi. 1993, coll. [not legit, but only collection of] D. Král".

Each paratype is provided with a red printed label as that pinned under the holotype, but bearing the word PARATYPUS instead of HOLOTYPUS. See also Figs. 16 and 17 for labels pinned under the holotype and a paratype, respectively.

**Description.** An enormously small member of Aphodiini (holotype body length of 1.9 mm). Dorsal surface microreticulate and thus moderately shining, glabrous, castaneous to dark brown, posterior area of head, prevailing area of pronotum and scutellum darker than clypeus, lateral margins of pronotum and elytra (Figs. 1-2).

Head (Figs. 4-5) moderately convex, with flat margins, its surface punctate (punctures medium-sized, intervals between punctures comparable to puncture diameters), frontoclypeal suture poorly distinct, clypeus rounded each side of distinct anteromedian emargination, genae small, anteriorly moderately differentiated from clypeus lateral margins.

Epipharynx as in Fig. 13. Anterior margin remarkably bisinuate, angulate anterolaterally; epitorma triangular, broadly, regularly widened posteriad; mesoepitorma bare; nesium with one arcuate row of small ankosensilla; corypha distinctly exceeding anterior margin, with two long, stout spinules and two shorter ones; zygum bare; acropariae with transversal tuft of stout macrosetae; chaetopariae with row of about 22 stout long macrosetae touching each other; prophobae with row of about 12 stout, short spine-like macrosetae; apotormae absent, pternotormae long, acute apically; crepis symmetrical.

Pronotum (Fig. 7) transversal, its length-to-width ratio of 0.826. Not margined anteriorly and posteriorly, moderately margined laterally, considerably margined in distinctly emarginate posterior angles (Figs. 6 and 8), posterior angle margin line show continuous narrowing in direction of scutellum. Pronotum surface rather coarsely punctate (punctures larger than those on head, intervals between punctures comparable to or larger than puncture diameters).

Scutellum small, triangular, darker than elytra (Fig. 10).

Elytra elongate, broader behind, their length-to-width ratio of 1.29, slightly wider than pronotum (ratios pronotum width : maximum elytral width = 0.929, pronotum length : elytra length = 0.583); without humeral denticles; with ten striae and ten intervals. Striae with very distinct punctures crenating inside margins of discal intervals and outside margins of lateral intervals (Figs. 8 and 10); intervals convex discally and laterally, strongly convex apically, sparsely and finely punctate, punctures distinct under high magnification only (about 50x); intervals 4-6 fused together immediately before elytral apex (Fig. 11).

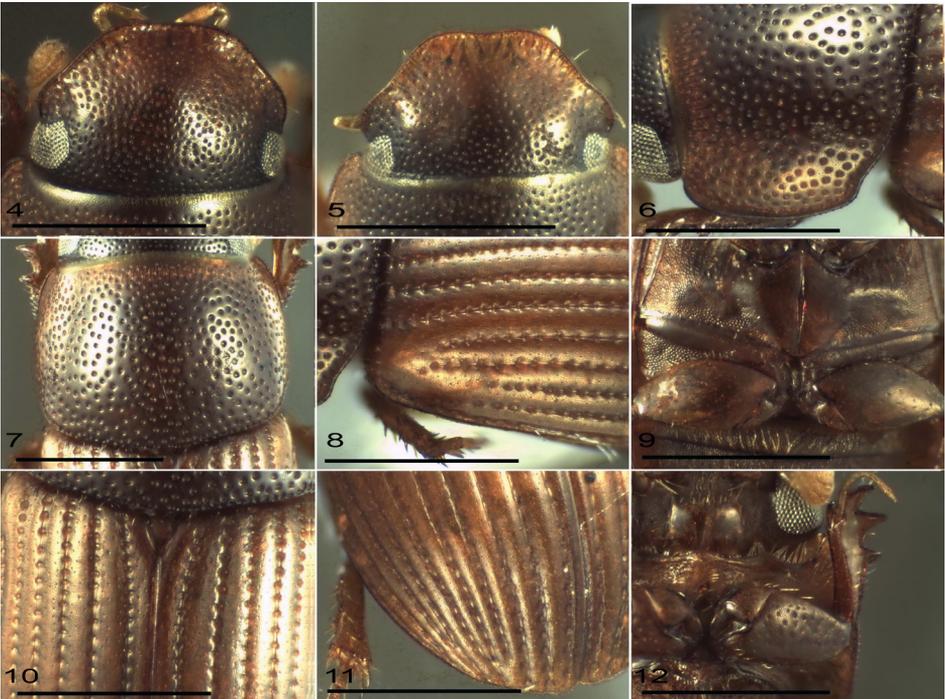
Legs (dorsal aspect). Protibiae anteriorly with three large outer teeth in apical half and few (about six) small denticles (each bearing a short macroseta) in basal half; upper face with row of setigerous punctures parallel with outside margin, otherwise glabrous and smooth, impunctate; terminal spine arcuately bent outward, not reaching to apex of basal protarsomere. Mesotibiae with superior terminal spine about as long as basal mesotarsomere; inferior terminal spine much shorter. Metatibiae with superior terminal spine about as long as basal metatarsomere; inferior terminal spine much shorter. Apical edges of meso- and metatibiae fringed with not numerous unequal spinules.

Underside (Figs. 3, 9, 12) brown (similarly as elytra), rather matte. Profemora considerably punctate, meso- and metafemora scarcely microscopically punctate. Metaventral plate glabrous, impunctate, with a complete, but anteriorly and posteriorly narrowed midline furrow. Abdominal ventrites with distinct macrosetigerous punctures.

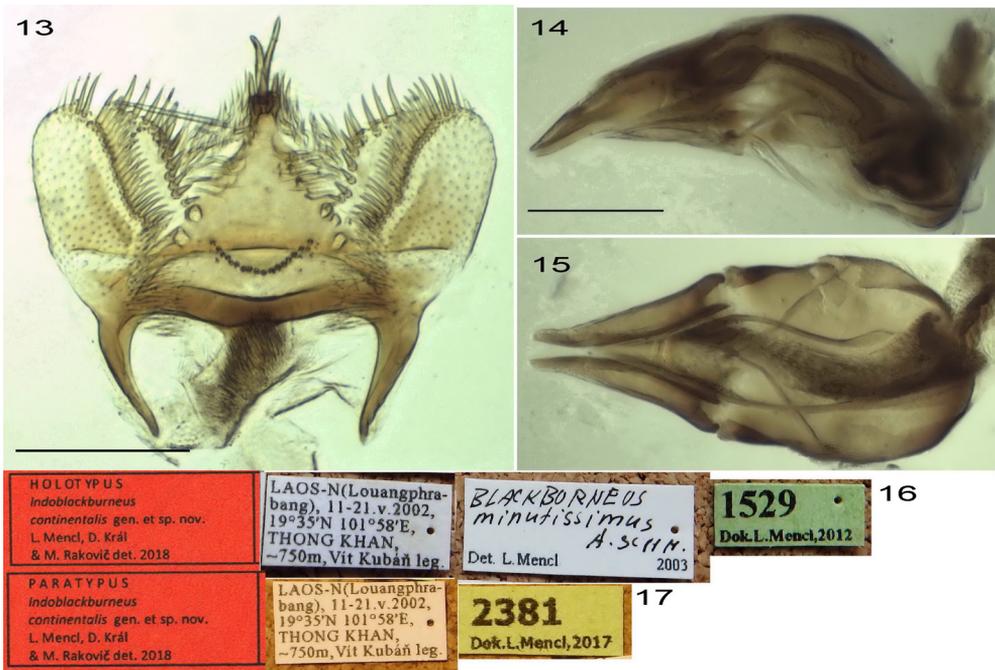
Aedeagus as in Figs. 14-15.



Figs. 1-3. *Indoblackburneus continentalis* gen. et sp. nov., paratype, ♀, habitus: 1- dorsal view; 2- dorsolateral view; 3- ventral view; Scale line 1 mm. Photographs by L. Mencl.



Figs. 4-12. *Indoblackburneus continentalis* gen. et sp. nov. (Fig. 5 holotype, ♂, Figs. 4 and 6-12 paratype, ♀) details: 4- head, dorsal view; 5- head, dorsal view; 6- left posterior angle of pronotum, lateral view; 7- pronotum, dorsal view; 8- humeral area of left elytron, lateral view; 9- metaventral plate and metafemora, ventral view; 10- basal area of elytra and scutellum, dorsal view; 11- elytral apex, dorsal view; 12- left anterior leg, ventral view. Scale lines 1.0 mm. Photographs by L. Mencl.



Figs. 13-17. *Indoblackburneus continentalis* gen. et sp. nov., holotype, ♂, epipharynx, aedeagus and labels: 13- epipharynx; 14- aedeagus, lateral view; 15- aedeagus, ventral view; 16- labels pinned under holotype; 17- labels pinned under paratype specimen. Scale lines 0.1 mm. Photographs by L. Mencl.

**Sexual dimorphism.** In males, the genae are more distinctly differentiated from the clypeus lateral margins (Fig. 5) compared to females (Fig. 4).

**Variability.** In the type series (43 specimens) the body length varies between 1.8 and 2.4. There is otherwise no noticeable variability in the type series studied (in shapes, sculptures or colours).

**Differential diagnosis.** Within the Key to Asian species below, *Indoblackburneus continentalis* sp. nov. is most similar to *I. javanus*. Differences in their aedeagi may be emphasized: slimmer parameres in the former species and more robust parameres in the latter one.

**Collection circumstances.** Not known in all the specimens, but at least some of them were collected in water buffalo excrements.

**Distribution.** Inland zone of Southeast Asia (Laos, Malaysia, Thailand, Vietnam), southern China (Yunnan).

**Name derivation.** The specific name reflects the occurrence of the species in Southeast Asia, which can be divided into mainland (continental) and maritime (insular) zones and also in continental China (Yunnan).

***Indoblackburneus javanus* (A. Schmidt, 1909) comb. nov.**

(Figs. 18-31)

*Aphodius javanus* A. Schmidt, 1909: 114 (original description).

*Aphodius* (*Pharaphodius*) *javanus*: Schmidt 1913: 125 (subgenus assignment); Schmidt 1922: 62 (monograph); Balthasar 1964: 69 (monograph); Dellacasa 1988: 392 (catalogue).

**Type locality.** “Batavia [= city of Jakarta, Java, Indonesia]”.

**Type material examined (lectotype and two paralectotypes).** Lectotype, not sexed (SMNH) “Batavia [white printed label] // TYPUS [red printed label] // NHRS-JLKB / 000027125 [white printed label] // 2346 / Dok.L.Mencl [pale green printed label]”. Paralectotype, not sexed (SMNH) “Sumatra / Djambi, 2011 [white handwritten label] // NHRS-JLKB / 000027127 [white printed label] 2348 / Dok.L.Mencl [pale green printed label]”. Paralectotype, ♂ (SMNH) “Java / Batavia / Douglas [white printed label] // NHRS-JLKB / 000027126 [white printed label] // 2347 / Dok.L.Mencl [pale green printed label]”.

In addition, each lectotype or paralectotype bears a red printed label with wording as follows: LECTOTYPUS [or PARAELECTOTYPUS, respectively] / *Aphodius javanus* A. Schmidt, 1909 / = *Indoblackburneus javanus* (A. Schmidt, 1909) / gen. et comb. nov. / n. validum / designated by / L. Mencl D. Král & M. Rakovič 2017.

See also Figs. 29-31 for photos of labels situated under type specimens.

**Additional material examined.** 2 specimens (DKCP), Indonesia, Flores Island, Ruteng env., ix. 2007.

**Redescription based on lectotype and two paralectotypes.** An enormously small member of Aphodiini (1.8-2.1 mm). Dorsal surface microreticulate and thus moderately shining, glabrous, mostly reddish brown to castaneous, posterior area of head, pronotum disc and pronotum base darker than elytra (Figs. 18-19).

Head (Fig. 21) moderately convex, with flat margins, its surface punctate (punctures medium-sized, rather obsolete anteriorly, very distinct anteriorly, separation between punctures rather irregular, moderately smaller than, comparable to or moderately larger than puncture diameters), frontoclypeal suture fine, but distinct, without horns, clypeus rounded each side of shallow anteromedian emargination, genae small, never exceeding beyond eyes, anteriorly at most slightly differentiated from clypeus lateral margins.

Epipharynx as in Fig. 26. Anterior margin remarkably bisinuate, subangulate anterolaterally; epitorma triangular, broadly, regularly widened posteriorly; mesoepitorma bare; nesium with one arcuate row of small ankosensilla; corypha distinctly exceeding anterior margin, with two long, stout spinules and two shorter ones; zygum bare; acropariae with oval tuft of stout macrosetae; chaetopariae with row of about 24 stout long macrosetae touching each other; prophobae with row of about 10 stout, short spine-like macrosetae; apotormae absent, pternotormae long, acute apically; crepis symmetrical.

Pronotum (Fig. 23) transversal, its length-to-width ratio of 0.763. Not margined anteriorly and posteriorly, moderately margined laterally, considerably margined in distinctly emarginate posterior angles (Fig. 22) with presence of posterior angle margin line show continuous row of large punctures. Pronotum surface rather coarsely punctate (punctures comparable to those on area of head behind frontoclypeal suture, intervals between punctures comparable to or moderately larger than puncture diameters).

Scutellum (Fig. 25) small, triangular, at most slightly darker than adjacent elytral intervals.

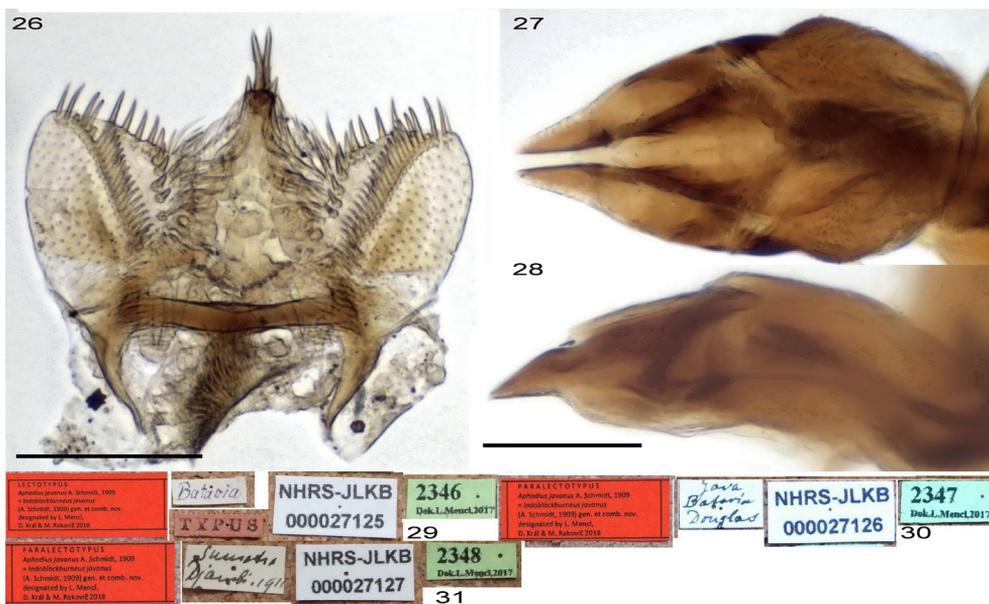
Elytra elongate, broader behind, their length-to-width ratio of 1.38, wider than pronotum



Figs. 18-20. *Indoblackburneus javanus* (A. Schmidt) gen. et comb. nov., paralectotype, ♂, habitus: 18- dorsal view; 19- dorsolateral view; 20- ventral view. Scale line 1 mm. Photographs by L. Mencl.



Figs. 21-25. *Indoblackburneus javanus* (A. Schmidt) gen. et comb. nov., lectotype, not sexed, details: 21- head, dorsal view; 22- left posterior angle of pronotum and humeral area of left elytron, lateral view; 23- pronotum, dorsal view; 24- elytral apex, dorsal view; 25- basal area of elytra and scutellum, dorsal view. Scale lines 0.5 mm. Photographs by L. Mencl.



Figs. 26-31. *Indoblackburneus javanus* (A. Schmidt) gen. et comb. nov., paralectotype, ♂, epipharynx, aedeagus and labels: 26- epipharynx; 27- aedeagus, dorsal view; 28- aedeagus, lateral view; 29- labels pinned under lectotype; 30 and 31- labels pinned under paralectotypes. Scale lines 0.1 mm. Photographs by L. Mencl.

(ratios pronotum width : maximum elytral width = 0.923, pronotum length : elytra length = 0.509); without humeral denticles; with ten striae and ten intervals; striae with punctures moderately crenating intervals, distances between neighbouring punctures smaller than or at most as large as puncture diameter; intervals convex on disc, rather more convex on apex, sparsely and finely punctate, punctures rather indistinct even under high magnification (50x); intervals 4 and 5 fused together immediately before elytral apex.

Legs (dorsal aspect). Protibiae with three large external teeth in apical half and few (about four to five) small denticles in basal half; upper face with row of setigerous punctures parallel with outside margin, otherwise glabrous and impunctate; terminal spine not at all reaching to apex of basal protarsomere, rather thick, only slightly bent outward. Mesotibiae with superior terminal spine about as long as basal mesotarsomere; inferior terminal spine much shorter. Metatibiae with superior terminal spine about as long as basal metatarsomere; inferior terminal spine much shorter.

Underside mostly brown, but femora paler, yellowish brown with edges and apices darkened to various extents (Fig. 20). Femora glabrous, profemora obsolete punctate, meso- and metafemora impunctate. Metaventral plate paler than lateral areas, with midline longitudinal furrow, which is uniformly wide throughout its length, slightly reduced posteriorly and moderately reduced anteriorly. Abdominal ventrites glabrous, ventrite 1 with dense, fine punctures, ventrites 2-6 rather impunctate or at most quite vaguely punctate.

Aedeagus as in Figs. 27-28.

**Sexual dimorphism.** Not available.

**Variability.** No considerable variability was observed within the type specimens studied.

**Differential diagnosis.** Within the Key to *Indoblackburneus* gen. nov. species below, *I. javanus* is most similar to *I. continentalis* sp. nov. Differences in their aedeagi may be emphasized: more robust parameres in the former species and slimmer parameres in the latter one.

**Collection circumstances.** Unknown.

**Distribution.** Indonesia (Flores, Java, Sumatra).

***Indoblackburneus merbabuanus* sp. nov.**

(Figs. 32-42)

**Type locality.** Mount Merbabu [= Gunung Merbabu in Indonesian - a dormant stratovolcano in Central Java Province on the Indonesian island of Java].

**Type material examined (holotype and three paratypes).** Holotype, ♀ (SMNH) “G. Merbaboe [= Gunung Merbabu] / Java [white printed label] // NHRS-JLKB / 000027140 [white printed label] // 2350 / Dok.L.Mencl [pale green printed label]”. Paratypes: allotype, ♀ (SMNH) bearing labels with same data as holotype, except for numbers 2349 and 2351 instead of 2350 on pale green labels; paratype (DKCP) “Indonesia, Sept. 2007 / Java Island / Mt. Argopuro / Bermi env.”.

In addition, holotype and paralectotypes bear red printed labels with wording as follows: HOLOTYPUS [and PARATYPUS, respectively] / *Indoblackburneus merbabuanus* gen. et sp. nov. L. Mencl / D. Král & / M. Rakovič det. 2018.

See also Figs. 40-42 for photos of labels situated under type specimens.

**Description based on holotype and two paratypes.** An enormously small member of Aphodiini (2.2-2.3 mm). Dorsal surface microreticulate and thus moderately shining, glabrous, castaneous to dark brown, clypeus anterior and lateral margins and pronotum lateral margins lighter (Figs. 32-33).

Head (Fig. 35) moderately convex, with flat margins, its surface finely punctate, frontoclypeal suture fine, without horns, clypeus rounded each side of distinct anteromedian emargination, genae small, never exceeding beyond eyes, anteriorly weakly differentiated from clypeus lateral margins.

Pronotum (Fig. 37) transversal, its length-to-width ratio of 0.781. Not margined anteriorly and posteriorly, considerably margined laterally, and in distinctly emarginate posterior angles; groove above posterior angle margin line impunctate (Fig. 36).

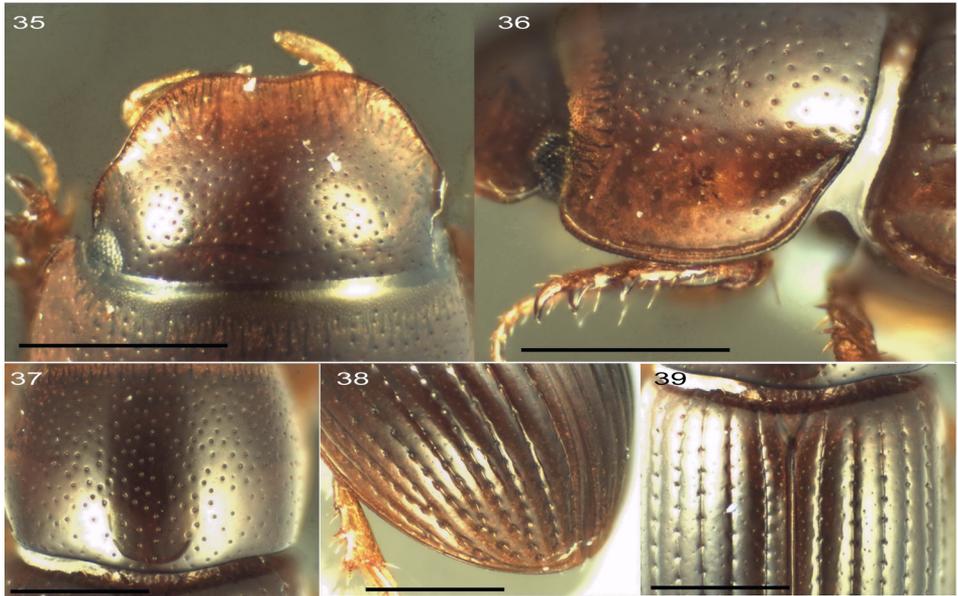
Pronotum surface punctate (punctures sparser and moderately larger than those on head).

Scutellum small, triangular, its lateral margins moderately darkened.

Elytra elongate, broader behind, their length-to-width ratio of 1.32, wider than pronotum (ratios pronotum width : maximum elytral width = 0.917, pronotum length : elytra length = 0.537); without humeral denticles; with ten striae and ten intervals; striae with medium-sized punctures moderately crenating intervals (Figs. 32, 39); intervals convex, sparsely and finely punctate, punctures poorly distinct even under high magnification (about 50x); intervals on apex (Fig. 38) only moderately more convex than discal ones, intervals 4 and 5 and 7 fused together immediately before elytral apex (interval 6 shorter).



Figs. 32-34. *Indoblackburneus merbabuanus* gen. et sp. nov., holotype, ♀, habitus: 32- dorsal view; 33- dorsolateral view; 34- ventral view; Scale line 1 mm. Photographs by L. Mencl.



Figs. 35-42. *Indoblackburneus merbabuanus* gen. et sp. nov., holotype, not sexed, details and labels pinned under holotype and paratypes: 35- head, dorsal view; 36- left posterior angle of pronotum, lateral view; 37- pronotum, dorsal view; 38- elytral apex, dorsal view; 39- basal area of elytra and scutellum, dorsal view; 40-42- labels pinned under type specimens. Scale lines 0.5 mm. Photographs by L. Mencl. Photographs by L. Mencl.

Legs (dorsal aspect). Protibiae with three large external teeth in apical half and few (about six) rather indistinct but considerably macrosetaceous denticles in basal half; upper face with row of setigerous punctures parallel with outside margin, otherwise glabrous and impunctate; terminal spine wide at base, considerably narrowing apically and reaching to apex of basal protarsomere. Mesotibiae with superior terminal spine slightly longer than basal mesotarsomere; inferior terminal spine much shorter. Metatibiae with superior terminal spine slightly longer than basal metatarsomere; inferior terminal spine much shorter.

Underside as in Fig. 34, mostly bare (except for macrosetaceous abdominal ventrites 2, 5 and 6) and impunctate, brown, femora paler. Metaventral plate with narrow (slightly widened medially and slightly reduced anteriorly) midline furrow; area surrounding the furrow distinctly concave.

**Sexual dimorphism.** Not available. The specimens studied were females.

**Variability.** Only slightly variable in size, without distinct individual differences in shapes, sculptures or colours.

**Differential diagnosis.** See the Key to Asian species below. The nature of the posterior pronotal angle line is the most important character to differentiate the species from the most similar *Indoblackburneus minutissimus* (A. Schmidt, 1908) comb. nov.

**Collection circumstances.** Unknown.

**Distribution.** Indonesia (Central Java Province).

**Name derivation.** The specific name is derived from the holotype locality (Mount Merbabu).

***Indoblackburneus minutissimus* (A. Schmidt, 1908) comb. nov.**

(Figs. 43-57)

*Aphodius minutissimus* Schmidt, 1908: 47 (original description).

*Aphodius* (*Blackburneus*) *minutissimus*: Schmidt 1913: 137 (subgenus assignment); Schmidt 1922: 146 (monograph); Balthasar 1964: 178 (monograph); Dellacasa 1988: 372 (catalogue).

**Type locality.** “Nilgiri Hills, Hulikal: 6000 feet [South India, State of Karnataka, close to Tamil Nadu State border]”.

**Type material examined (lectotype and two paralectotypes, all of them females).** Lectotype, ♀ (SMNH) “Nilgiri / Hills [white printed label] // 123 [white printed label] // TYPE [red printed label] // minutissimus / Type [white handwritten label] // minutissimus [white handwritten label] // NHRS-JLKB / 000027124 [white printed label] // 2343 / Dok.L.Mencl [pale green printed label]”. Paralectotype, ♀ (SMNH) “Nilgiri / Hills [white handwritten label] // NHRS-JLKB / 000027128 [white printed label] // 2344 / Dok.L.Mencl [pale green printed label]”. Paralectotype, ♀ (SMNH) “Nilgiri / Hills [white handwritten label] // NHRS-JLKB / 000027138 [white printed label] // 2345 / Dok.L.Mencl [pale green printed label]”.

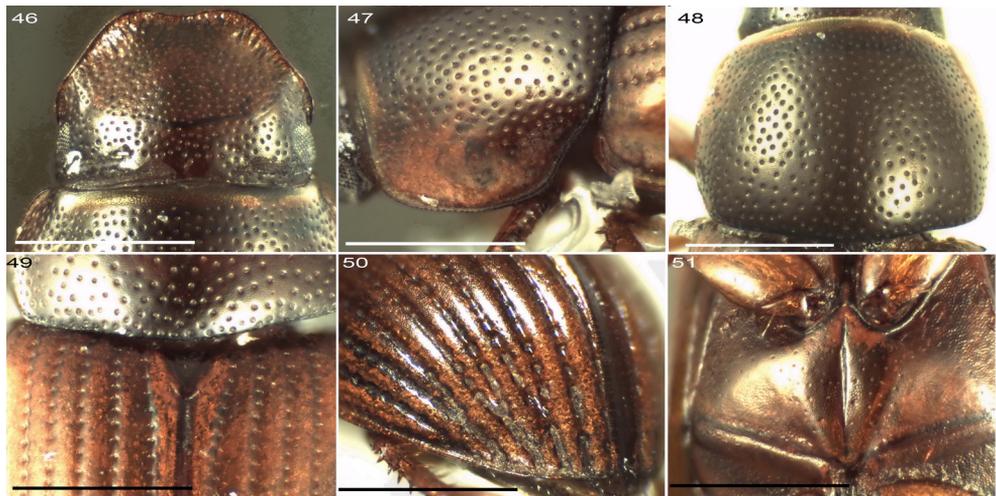
In addition, each lectotype or paralectotype bears a red printed label with wording as follows: LECTOTYPUS [or PARALECTOTYPUS, respectively] / *Aphodius minutissimus* A. Schmidt, / 1908 / = *Blackburneus minutissimus* (A. Schmidt, 1908) gen. et comb. nov. / n. validum / designated by L. Mencl, / D. Král & M. Rakovič 2017.

See also Figs. 55-56 for photos of labels situated under type specimens.

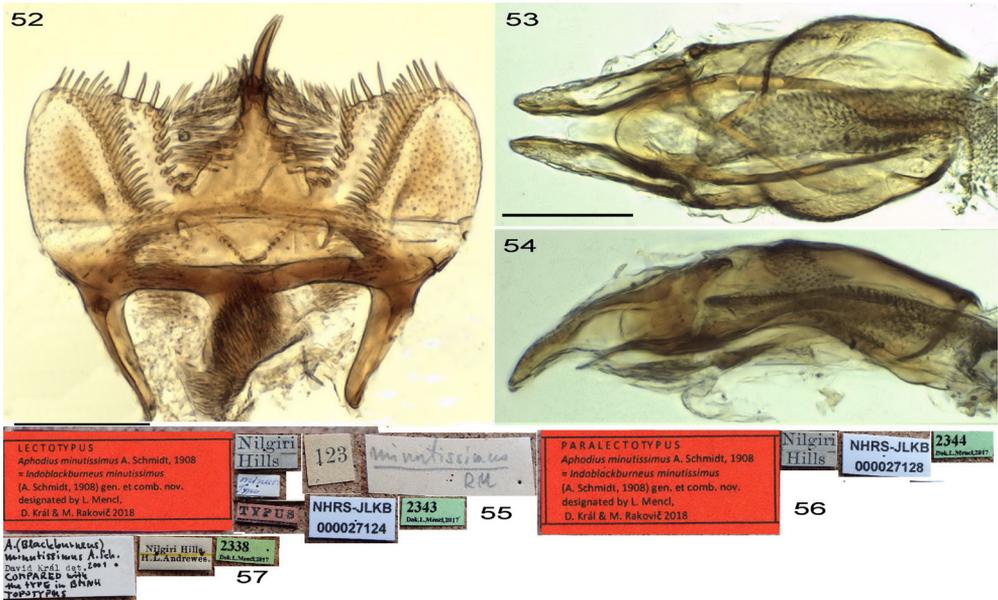
**Additional material examined.** A male specimen from Nilgiri Hills, H. L. Andrewes lgt. (DKCP). See also Fig. 57 for photos of labels situated under this specimen.



Figs. 43-45. *Indoblackburneus minutissimus* (A. Schmidt) gen. et comb. nov., lectotype, ♀, habitus: 43- dorsal view; 44- dorsolateral view; 45- ventral view. Scale line 1 mm. Photographs by L. Mencl.



Figs. 46-51. *Indoblackburneus minutissimus* (A. Schmidt) gen. et comb. nov., lectotype, ♀, details: 46- head, dorsal view; 47- left posterior angle of pronotum, lateral view; 48- pronotum, dorsal view; 49- basal area of elytra and scutellum, dorsal view; 50- elytral apex, dorsal view; 51- metaventral plate, ventral view. Scale lines 0.5 mm. Photographs by L. Mencl.



Figs. 52-57. *Indoblackburneus minutissimus* (A. Schmidt) gen. et comb. nov., lectotype, ♀, and topotype, ♂, epipharynx, aedeagus and labels pinned under specimens: 52- lectotype, epipharynx; 53- topotype, ♂, aedeagus, ventral view; 54- topotype, ♂, aedeagus, lateral view; 55-57- labels pinned under respective specimens. Scale lines 0.1 mm. Photographs by L. Mencl.

**Redescription based on lectotype and two paralectotypes.** An enormously small member of Aphodiini (2.0-2.7 mm). Dorsal surface microreticulate and thus moderately shining, glabrous, castaneous to dark brown, posterior area of head, prevailing area of pronotum and scutellum darker than clypeus, lateral margins of pronotum and elytra (Figs. 43-44).

Head (Fig. 46) moderately convex, with flat margins, its surface punctate (punctures medium-sized), frontoclypeal suture fine, without horns, clypeus rounded each side of distinct anteromedian emargination, genae small, never exceeding beyond eyes, anteriorly weakly differentiated from clypeus lateral margins.

Epipharynx as in Fig. 52. Anterior margin remarkably bisinuate, subangulate anterolaterally; epitorma triangular, broadly, regularly widened posteriad; mesoepitorma bare; nesium with one arcuate row of small ankosensilla; corypha distinctly exceeding anterior margin, with two long, stout spinules and two shorter ones; zygom bare; acropariae with oval tuft of stout macrosetae; chaetopariae with row of about 22 stout long macrosetae touching each other; prophobae with row of about 10 stout, short spine-like macrosetae; apotormae absent, pternotormae long, acute apically; crepis symmetrical.

Pronotum (Fig. 48) transversal, its length-to-width ratio of 0.750. Not margined anteriorly and posteriorly, moderately margined laterally, considerably margined in distinctly emarginate posterior angles (Fig. 47); the posterior angle margin line is stepwise attenuating in direction of scutellum and vanishes against about base of elytral intervals 5-6. Pronotum surface rather coarsely punctate (punctures larger than those on head, intervals between punctures mostly larger than puncture diameter).

Scutellum small, triangular, darker than elytra (Fig. 49).

Elytra elongate, broader behind, their length-to-width ratio of 1.39, wider than pronotum (ratios pronotum width : maximum elytral width = 0.870, pronotum length : elytra length = 0.460); without humeral denticles; with ten striae and ten intervals; striae with well distinct punctures moderately crenating intervals; intervals convex, sparsely and finely punctate, punctures distinct under high magnification only (about 50x); intervals 4 and 5 fused together immediately before elytral apex (Fig. 50).

Legs (dorsal aspect). Protibiae with three large external teeth in apical half and few (about four) small macrosetaceous denticles in basal half; upper face with row of setigerous punctures parallel with outside margin, otherwise glabrous and impunctate; terminal spine nearly straight, rather thick at base, narrowing toward apex not at all reaching to apex of basal protarsomere. Mesotibiae with superior terminal spine about as long as or slightly longer than basal mesotarsomere; inferior terminal spine much shorter. Metatibiae with superior terminal spine about as long as or slightly longer than basal metatarsomere; inferior terminal spine much shorter.

Underside as in Fig. 45. Brown, femora and anterior and posterior areas of metaventral plate rather paler, yellowish brown. Mostly smooth and glabrous, but abdominal ventrites longly macrosetaceous. Metaventral plate with few minute punctures, with nearly complete longitudinal midline furrow surrounded by moderately concave area (Fig. 51).

Aedeagus as in Figs. 53-54.

**Sexual dimorphism.** In males, anterior margins of genae are slightly differentiated from clypeus lateral margins, in females, these margins are aligned.

**Variability.** There is no considerable variability in shapes, structures and colours. In specimens studied, the body length varied between 2.0 and 2.7 mm.

**Differential diagnosis.** See the Key to Asian species below. The nature of the posterior pronotal angle line is the most important character to differentiate the species from the most similar *Indoblackburneus merbabuanus* sp. nov.

**Collection circumstances.** Unknown.

**Distribution.** South India (Nilgiri Hills).

***Indoblackburneus ohkurai* (Masumoto, 1992) comb. nov.**  
(Figs. 58-72)

*Aphodius* (*Plagiogonus*) *ohkurai* Masumoto, 1992: 115; pl. 7: figs. 1, 3, 5, 6 (original description).

*Aphodius* (*Plagiogonus*) *ohkurai*: Dellacasa 1995: 170 (addenda to catalogue).

**Type locality.** “Northwest Thailand, Chiang Rai Prov., Doi Mae Salong”.

**Type material examined.** Holotype, ♂ (NSMT) “Doi Mae Salong / Chiang Rai Prov. / Northwest Thailand / 30. xii. 1990 K. MASUMOTO leg. [white printed label] // Holotype / *Aphodius* (*Plagiogonus*) / *ohkurai* MASUMOTO [pink handwritten label] // 2444 / Dok.L.Mencl 2018 [pale green printed label]”. Paratype (not sexed) (PBCS) “Fang / Chiang Rai Prov. / Northwest Thailand / 25. xi. 1988 / K. MASUMOTO leg. [white printed label] // Paratype / *Aphodius* (*Plagiogonus*) / *ohkurai* MASUMOTO [pink handwritten label] // 2422 / Dok.L.Mencl 2018 [pale green printed label]”. In addition, each specimen bears a label with wording as follows: *Indoblackburneus ohkurai* (Masumoto, 1992) / gen. et comb. nov. / L. Mencl, / D. Král & M. Rakovič det. 2017.

See also Figs. 71-72 for etiquettes pinned under the holotype and paratype studied, respectively.



Figs 58-60. *Indoblackburneus ohkurai* (Masumoto) gen. et comb. nov., paratype, ♀, habitus: 58- dorsal view; 59- dorsolateral view; 60- ventral view. Scale line 1 mm. Photographs by L. Mencl.

**Remarks.** The following information can be pointed out in addition to the original description of the species. Punctures on head more distinct and denser posteriorly than anteriorly (Fig. 61). Punctures on pronotal disc moderately larger than those on head, separated at least by two puncture diameters (Fig. 58). Border of pronotum lateral margin and posterior angle suddenly ending against elytral stria 5 (Figs. 59 and 62). Lateral margins of elytra arcuate (Fig. 58), length-to-width ratio of 1.51 punctures in elytral striae moderately crenating intervals, distances between them comparable to puncture diameter (Figs. 64-65). Arrangement of elytral intervals on apex as in Figs. 59, 65. Profemora with medium-sized punctures (Fig. 60), meso- and metafemora as well as metaventrum, with sparser and finer punctures (Figs. 60, 66, 69-70). Metaventral plate with narrow, complete midline furrow, abdominal ventrites with macrosetigerous punctures, pygidium with two long setae (Fig. 60)

**Sexual dimorphism.** Strongly expressed. See Figs. 67 and 68 for shapes of apical spines of the protibiae in male and female, respectively

**Differential diagnosis.** Compared to other species of the new genus, *Indoblackburneus ohkurai* is characteristic by its distinctly macrosetaceous genae, relatively large average body size, arcuate lateral margins of elytra and considerable sexual dimorphism.

**Distribution.** Northwest Thailand (Chiang Rai Province).



Figs. 61-72. *Indoblackburneus ohkurai* (Masumoto) gen. et comb. nov., details, Figs. 61-65, 67, 69-70 ♂, holotype, Figs. 66, 68 ♀, paratype: 61- head, dorsal view; 62- pronotum, lateral view; 63- pronotum, dorsal view; 64- middle area of elytra, dorsal view; 65- elytra, dorsolateral view; 66- metasternum, ventral view; 67- male right protibia and protarsus, dorsal view; 68- female right protibia and protarsus, dorsal view; 69- intermediate leg, ventral view; 70- posterior leg, ventral view; 71- labels pinned under holotype; 72- labels pinned under paratype. Scale lines 0.5 mm. Photographs by L. Mencl.

***Indoblackburneus sinomeridionalis* sp. nov.**  
(Figs. 73-86)

**Type locality.** China, Yunnan, Jinhong.

**Type material examined.** Holotype, ♀ (DKCP) “China, YUNNAN / JINGHONG / 6. 1993, coll. [not legit, but only collection of] D. Král [white printed label] // 2509 / Dok.L.Mencl [pale green printed label] // HOLOTYPUS / *Indoblackburneus* / *sinomeridionalis* gen. et sp. nov. / L. Mencl D. Král & / M. Rakovič det. 2018 [red printed label]”.

See also Fig. 86 for photos of labels situated under the holotype specimen.

**Description of holotype.** Small (3.0 mm). Dorsal surface microreticulate and thus moderately shining, glabrous, castaneous. Clypeus and pronotal lateral and anterior margins moderately lighter than head vertex and pronotal disc (Figs. 73, 74).

Head (Fig. 76) moderately convex, with flat margins, its surface finely punctate, frontoclypeal suture fine, without horns, clypeus rounded each side of distinct anteromedian emargination, genae small, never exceeding beyond eyes, anteriorly weakly differentiated from clypeus lateral margins.

Epipharynx as in Fig. 82. Anterior margin remarkably bisinuate, almost rounded anterolaterally; epitorma triangular, broadly, regularly widened posteriad; mesoepitorma bare; nesium with one arcuate row of small ankosensilla; corypha distinctly exceeding anterior margin, with two long, stout spinules and two shorter ones; zygum bare; acropariae with oval tuft of stout macrosetae; chaetopariae with row of about 28 stout long macrosetae touching each other; prophobae with row of about 8 stout, short spine-like macrosetae; apotormae absent, pternotormae long, acute apically; crepis symmetrical.

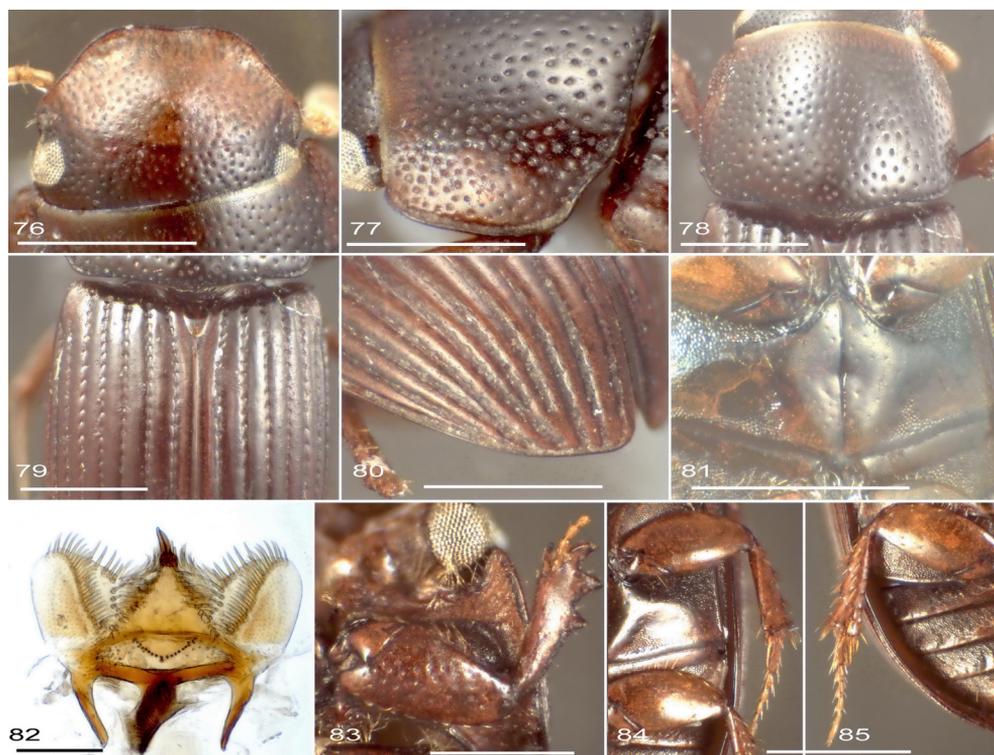
Pronotum (Figs. 77-78) transversal, its length-to-width ratio of 0.751. Not margined anteriorly and posteriorly, considerably margined laterally, and in distinctly emarginate posterior angles. Pronotum surface coarsely punctate, intervals between punctures larger than puncture diameter.

Scutellum small, triangular, with moderately rounded apex.

Elytra elongate, broader behind, their length-to-width ratio of 1.50, widest about 2/3 of their length, wider than pronotum (ratios pronotum width : maximum elytral width = 0.900, pronotum length : elytra length = 0.450); with ten striae and ten intervals; striae with medium-sized punctures moderately crenating intervals (Fig. 79); intervals strongly convex (Figs. 73, 74, 79) convex, impunctate, intervals on apex arranged as shown in Fig. 80.



Figs. 73-75. *Indoblackburneus sinomeridionalis* gen. et sp. nov., holotype, ♀, habitus: 73- dorsal view; 74- dorsolateral view; 75- ventral view. Scale line 1 mm. Photographs by L. Mencl.



HOLOTYPE <i>Indoblackburneus</i> <i>sinomeridionalis</i> gen. et sp. nov. L. Mencil, D. Král & M. Rakovič det. 2018	China, YUNNAN JIN GHONG 6. 1993, coll.D.Král	<b>2509</b> Dok.L.Mencil,2018
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Figs. 76-86. *Indoblackburneus sinomeridionalis* gen. et sp. nov., holotype, ♀, details: 76- head, dorsal view; 77- pronotum, lateral view; 78- pronotum, dorsal view; 79- anterior area of elytra with scutellum, dorsal view; 80- apex of left elytron, dorsolateral view; 81- metaventral plate, ventral view; 82- epipharynx; 83- left anterior leg, ventral view; 84- right intermediate leg, ventral view; 85- right posterior leg, ventral view; 86- labels pinned under holotype. Scale lines 0.1 mm for Fig. 82, 0.5 mm for all other figures. Photographs by L. Mencil.

Legs. Protibiae with three large external teeth in apical half, without small denticles in basal half; upper face with few setigerous punctures parallel with outside margin, otherwise glabrous and impunctate; terminal spine wide, longer than basal protarsomere, but shorter than protarsomeres 1 and 2 combined. Ventral views of anterior, intermediate and posterior legs as shown in Figs. 83, 84 and 85, respectively

Underside (Fig. 75), mostly bare (with exceptions of macrosetaceous prosternum, mesosternum and anterior edges of metafemora), finely, sparsely punctate (with exception of profemora bearing denser and medium-sized punctures); metaventral plate with narrow, complete midline furrow.

**Sexual dimorphism.** Not available. The holotype is a female.

**Variability.** Not available.

**Differential diagnosis.** See the Key to species below. A relatively larger body size, arcuate lateral margins of elytra and strongly convex, impunctate elytral intervals offer a combination of characters not encountered in any other species of the genus.

**Collection circumstances.** Unknown.

**Distribution.** China (Yunnan).

**Name derivation.** The specific name reflects the occurrence of the species in southern China.

#### KEY TO *INDOBLACKBURNEUS* GEN. NOV. SPECIES

- 1 (4) Species relatively larger on average (2.7-3.4 mm). Elytra broader behind, length-to-width ratio of about 1.50, their lateral margins arcuate throughout in dorsal view. Midline furrow of metaventral plate complete and narrow essentially throughout (Figs. 60 and 75).
- 2 (1) Punctures on pronotum surface smaller and denser (Figs. 58, 62-63). Elytral intervals moderately convex (Fig. 59), very finely punctate (punctures distinct under high magnification only). Anterior margins of metafemora glabrous. 2.7-3.4 mm. Thailand (Chiang Rai Province). ..... *I. ohkurai* (Masumoto) comb. nov.
- 3 (2) Punctures on pronotum surface larger and sparser (Fig. 73). Elytral intervals strongly convex (Figs. 73, 77-78), impunctate. Anterior margins of metafemora considerably fringed with acuminate setae 3.0 mm. China (Yunnan). ..... *I. sinomeridionalis* sp. nov.
- 4(1) Species relatively smaller on average (1.8-2.7 mm). Elytra not so broader behind, length-to-width ratio of about 1.30-1.40, their lateral margins straight in anterior 2/3 in strictly dorsal view. Midline furrow of metaventral plate moderately reduced anteriorly and/or posteriorly, or wider in its central part (Figs. 2, 20, 34, and 45).
- 5 (8) Punctures of pronotum finer and sparser; distances between punctures mostly larger than puncture diameter (Figs. 32 and 43).
- 6 (7) Line of lateral margin of pronotum narrow anteriorly, wider before posterior angle and in the angle and then continuously vanishing along pronotum base toward scutellum, ending against elytral interval 6 (Fig. 43). Punctures in discal elytral striae strongly crenating intervals, separation between them comparable to puncture diameter. 2.0-2.7 mm. South India (Nilgiri Hills). ..... *I. minutissimus* (A. Schmidt) comb. nov.
- 7 (6) Line of lateral margin of pronotum wide throughout (along the lateral edge and in posterior angle and then abruptly terminating still in the posterior angle, ending against elytral interval 7 (Fig. 32). Punctures in discal elytral striae only moderately crenating intervals, separation between them larger than puncture diameter. 2.2-2.3 mm. Indonesia (Central Java Province). ..... *I. merbabuanus* sp. nov.
- 8 (5) Punctures of pronotum larger, deeper and denser; distances between punctures comparable to puncture diameter (Figs. 1 and 18).
- 9 (10) Frontoclypeal suture enormously thin, nearly indistinct (Fig. 4). Punctures in posterior area of head (between eyes) finer than those in anterior zone of pronotum. Parameres slimmer (Figs. 14-15). 1.8-2.4 mm. China (Yunnan), Laos, Malaysia, Thailand, Vietnam. ..... *I. continentalis* sp. nov.
- 10 (9) Frontoclypeal suture fine, but still distinct (Fig. 21). Punctures in posterior area of head (between eyes) comparable to those in anterior zone of pronotum. Parameres more robust (Figs. 27-28). 1.8-2.1 mm. Indonesia (Flores, Java, Sumatra) ..... *I. javanus* (A. Schmidt) comb. nov.

#### DISCUSSION

The genus *Indoblackburneus* gen. nov. is proposed here with its type species originally described as *Aphodius minutissimus* A. Schmidt, 1908 and subsequently placed into the subgenus *Blackburneus* Schmidt, 1913. In our recent work (Král et al. 2018), we discussed possible existence of the genus *Blackburneus* in Asia and concluded that species of the genus do not inhabit this continent. The placement of two Asian species in the genus *Blackburneus* discussed there is quite provisional and can be employed just for practical reasons, to make

possible grouping of relatively small, glabrous, yellowish brown to reddish brown Asian Aphodiini having the frontoclypeal suture without tubercles, the pronotum base not bordered (without margin line), elytral intervals flat or more or less convex (but not costate) and apices of metatibiae fimbriate with inequal (not very numerous) spinules.

The genus *Indoblackburneus* gen. nov. is characteristic by the shape of posterior pronotal angles (considerably truncate, emarginate and bordered) and arrangement of the epipharynx (two longer and two shorter spines on the corypha, whereas *Blackburneus* and its allied genera have the epipharynx with the corypha bearing two long spines only).

The new genus is very homogeneous and includes six species: three species, for which new combinations were proposed, and three new species described here. The species *Indoblackburneus javanus* comb. nov. was removed from *Pharaphodius*; subgenus/genus *Pharaphodius* Reitter, 1892 cannot be accepted in this species even *sensu latissimo*, since the elytral intervals are not free on elytral apex. The species *Indoblackburneus ohkurai* comb. nov. was transferred from *Plagiogonus* Mulsant, 1842 into the new genus because of the absence of the keel produced by a fusion of elytral intervals 7-9 before the elytral apex, which is characteristic of *Plagiogonus*.

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## REFERENCES

- BALTHASAR V. 1964: *Monographie der Scarabaeidae und Aphodiidae der palaearktischen und orientalischen Region. Coleoptera Lamellicornia. Band 3. Aphodiidae*. Praha: Verlag der Tschechoslowakischen Akademie der Wissenschaften, 652 pp., 2 pls.
- DELLACASA G., BORDAT P. & DELLACASA M. 2001: A revisional essay of world genus-group taxa of Aphodiinae (Coleoptera Aphodiidae). *Memorie della Società Entomologica Italiana* 79(2000): 1-482.
- 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.
- DELLACASA M. 1988: Contribution to a world-wide catalogue of Aegialiidae, Aphodiidae, Aulonocnemidae, Termitotrogidae (Coleoptera: Scarabaeoidea). *Memorie della Società Entomologica Italiana* 66(1987): 1-455.
- DELLACASA M. 1995: Contribution to a world-wide catalogue of Aegialiidae, Aphodiidae, Aulonocnemidae, Termitotrogidae (Coleoptera: Scarabaeoidea). Addenda et Corrigenda (Third Note) *Memorie della Società Entomologica Italiana* 74: 159-232.
- KRÁL D., MENCL L. & RAKOVIČ M. 2018: Notes on possible existence of the genus *Blackburneus* in Asia (Coleoptera: Scarabaeidae: Aphodiinae: Aphodiini). *Studies and Reports, Taxonomical Series* 14: 407-416.
- MASUMOTO K. 1992: Coprophagid-beetles from Northwest Thailand (VIII) (Coleoptera, Scarabaeidae). *The Entomological Review of Japan* 47(2): 115-117.
- SCHMIDT A. 1908: Ein Beitrag zur indischen Aphodiinen-Fauna. *Entomologisches Wochenblatt* 25: 46-48.
- SCHMIDT A. 1909: Neue Aphodiinen und einige synonymische Bemerkungen. *Notes from the Leyden Museum* 31: 101-124.
- SCHMIDT A. 1913: Erster Versuch einer Einteilung der exotischen Aphodien in Subgenera and als Anhang einiger Neubeschreibungen. *Archiv für Naturgeschichte Abteilung A, Originalarbeiten* 79: 117-178.
- SCHMIDT A. 1922: *Coleoptera Aphodiinae. Das Tierreich. Vol. 45*. Berlin & Leipzig: Walter de Gruyter & Co., 614 pp.

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