

Studies on genus *Rhyparus* Westwood, 1845 (Coleoptera: Scarabaeidae: Aphodiinae) with description of two new species from Southeast Asia

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Description of two new species from genus *Rhyparus* Westwood, 1845: *R. merkli* sp. nov. from Malaysia and *R. jakli* sp. nov. from Indonesia are given. *R. merkli* sp. nov. seems to be most closely related to *R. denticollis* Fairmaire, 1893 and *R. mindanaoensis* Anichtchenko, Minkina, Vasiljeva & Medina, 2021. *R. jakli* sp. nov. seems to be most closely related to *R. verrucosus* Schmidt, 1916. Additional distributional data to *R. denticollis* and *R. verrucosus* are given. Short discussion about one taxonomic and nomenclature problem of *R. denticollis* is given. Photographies of *R. denticollis* and *R. verrucosus* are given in literature for the first time.

Key words: new species, Scarabaeoidea, Aphodiinae, Rhyparini, Malaysia, Indonesia.

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INTRODUCTION

Based on current knowledge genus *Rhyparus* Westwood, 1845 is represented by 84 of described taxa (among of them 83 species and one subspecies) worldwide. Most of known species inhabits the South-East, Island part of Asia and Oceania. Group is usually not so frequently collected and because of it still unsufficiently examined. Part of species have relatively wide distribution while others occur only on very small areas restricted to single island. Additional problem is variability of species – part of them have extraordinary vari-

ability not only in size (largest known specimens of some species can be even three times larger than smaller) what in shape of caudal bulbs (what is depend from size of specimens) or lateral lobes (what is not depend from size of specimens) or even from structure of costae and intercostae (size of them can be very variable, as well structure).

In last ten years in genus *Rhyparus* was described 29 species what state a relatively large part of known species. Undoubtedly there will be still a lot of undescribed species. However because of extraordinary variability, problematic distribu-

tion and unknowledge of type specimens for descriptors, relatively a lot of known species need to be synonymised in the future. To show the issue of genus, as well to clarify current knowledge authors decided to publish a series of articles before revision/iconography which here is necessary.

MATERIAL AND METHODS

The specimens was observed with a Nikon SMZ-U stereoscopic microscope. The photos published here were taken by the use of the Canon EOS 5D Mark III connected with Canon MP-E 65mm macro lens. Photos were edited in the Helicon Focus 7 and Adobe Photoshop Elements 2018 programs.

For morphological terms used in the description of specimens I follow Krikken and Hujibregts (1987) and Dellacasa *et al.* (2010).

The type series of the new species is indicated by a red, printed label bearing the status of the specimen, its name, name of the authors, and year and month of the designation.

The following acronyms stand for collections are here used:

DUBC – Daugavpils University beetle collection (Latvia),

ISEA – Institute of Systematics and Evolution of Animals in Kraków (Poland),

ŁMCN – collection private of Łukasz Minkina (Nowy Targ) deposited in ISEA (Poland),

NMPC – National Museum Praha collection (Czech Republic),

PBCS – collection private of Patrice Bordat (Saint Cirq) (France).

Photography of the holotype of *R. verrucosus* was done by Gunvi Lindberg (©2019 Naturhistoriska riksmuseet). Photography has been made available by the Swedish Museum of Natural History under Creative Commons Attribution 4.0 International Public License, CC-BY 4.0.

TAXONOMY

Rhyparus merkli sp. nov.

(Figs 1–3, 7, 9, 11)

Type locality. Malaysia, Pahang, Cameron Highlands, Tanah Rata.

Type material. Holotype (♂): Malaysia, Pahang, Cameron Highlands, Tanah Rata, from illuminated, white-washed walls, 23.-31.iii.1995, leg. O. Merkl [ISEA]. Paratypes (6 exx.): 4 exx.: Malaysia, Pahang, Cameron Highlands, 2km S Tanah Rata on Tapah Road, montane rainforest, 29.iii.1995, leg. O. Merkl & Szikossy [2 exx. ISEA, 1 ex. ŁMCN, 1 ex. DUBC]; 1 ex.: Malaysia, Pahang, Cameron Highlands, Tanah Rata, edge of degraded rainforest, at light, 21.iii.-2.iv.1995, leg. O. Merkl [ISEA]; 1 ex.: W Malaysia: Perak, Cameron Highlands, v.1985, leg. Wong [ISEA].

Description. Dorsum (Fig. 1). Body length of holotype 6.0mm. Moderate in size as member of the genus. Elongate-oval, except of preapical parts of elytra, inner part of legs and strongly convex elements as costae – mat, brownishblack; except punctures, tops of costae and legs glabrous.

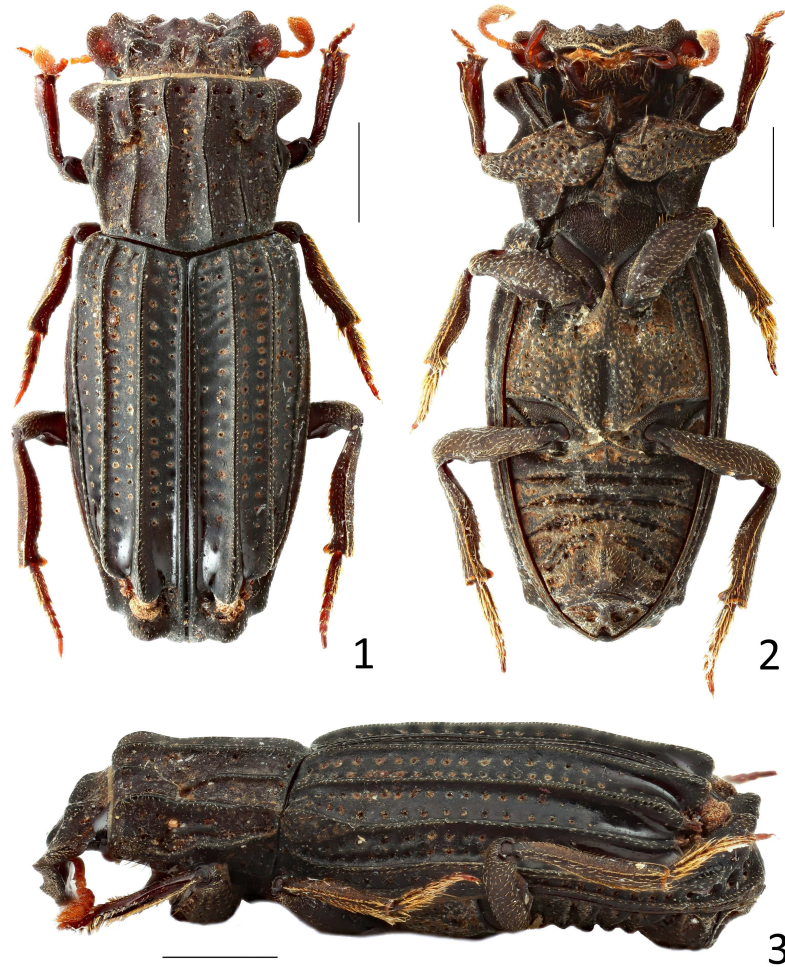
Head (Fig. 7) trapezoidal, clypeus anteriorly truncate, with indistinct teeth on sides, laterally distinctly emarginated and next with widely rounded angles, relatively distinctly separated from distinctly protruding, rounded genae. Clypeocentral disc distinctly convex, ringed by deep groove, with pair of distinct, moderately convex, shiny only on top, somewhat longitudinal tubercles. Clypeocentral disc relatively sparsely punctate. Frons with four short, relatively narrow longitudinal costae. Punctuation of head relatively regular, all punctures bearing short macrosetae.

Epipharynx (Fig. 11) distinctly transverse, rather distinctly sinuate at middle, corypha with several long celter, with two lateral lobes bearing tuft of smaller and finer celttes. Epitorma broad, somewhat oval-shaped, with dense chaetopodia laterally. Tormae moderately long.

Pronotum transverse, with six distinct, costae and seven longitudinal intercostae; on each side of costae there is row of short and small yellowish macrosetae. Lateral margin with two distinctly protruding lobes; anterior lobes sharply triangular, much more developed than broadly triangular posterior. Paramedian costae continuous, almost parallel. Discolateral costae relatively widely interrupted in apical half. Median intercosta with relatively dense, but concentrated medially, medium sized punctures, lateral intercostae almost without punctures.

Scutellum almost imperceptible.

Elytra elongate, relatively wide, widest before the middle. Each elytron with five distinct costae and five intercostae; on each side of costae there is row of short and small yellowish macrosetae. Fourth costae widened basally; covered by relatively dense, moderately large punctures. Intercostae flat, all of them with two rows of medium sized punctures. Postdiscal bulbs relatively small. Caudal bulbs well developed; external protrusion distinctly divided from median and internal which are fused into one and visible as one not so large elongately-spherical bulb. Pygidium with elevated area basally; medially with relatively deep grooves on sides.



Figs 1–3. *Rhyparus merkli* sp. nov., ♂, holotype: 1 – dorsal view, 2 – ventral view, 3 – lateral view (scale lines: 1.0 mm).

Macropterous.

Venter matt, brownishblack (Fig. 2). Meso-meta-ventral plate flat, with distinct, relatively shallow, wide median impression in basal 2/3; relatively densely covered by medium sized punctures bearing very thin macrosetae. Abdomal ventrites separated by relatively large, irregular in shape impressed sutures.

Legs sturdy, matt, with a lot of small punctured with erected short setae. Mesofemora with two distinct teeth on basal border; metafemora with two indistinct teeth there. All femora with dense, not so fine, quite regular punctation bearing very thin macrosetation. Protibia tridentate apically, straight, with distinct, relatively large first dent. Mesotibiae narrow at base, widest before middle of length, and next narrowed to apex; at apex with widened apical projection. Metatibiae with similar structure as mesotibiae, but widest nearby middle of length and with more distinctly developed apical projection. Metatibiae as general with distinct sinuations.

Aedeagus (Fig. 9) Phallobase much longer than parameres, moderately de-curved toward apex in lateral view. Parameres small, thin, semitransparent, visible as weak protrusion of each side of median lobe.

Variability. Body length: 5.8-6.3mm. Punctation of intercostae of pronotum is slightly variable. Shape of caudal bulbs is slightly variable: sinuation between median and internal protrusion is somewhat variable, sometimes it is well visible, and sometimes sinuation is weak.

Sexual dimorphism. Characteristic for genus. Visible in shape of meso- and metatibiae as larger sinuosity and flattening with presence of elongate projection at apex in males.

Etymology. Patronymic. Name of newly described species is dedicated to its collector and our colleague who passed away some time ago: Otto Merkl.

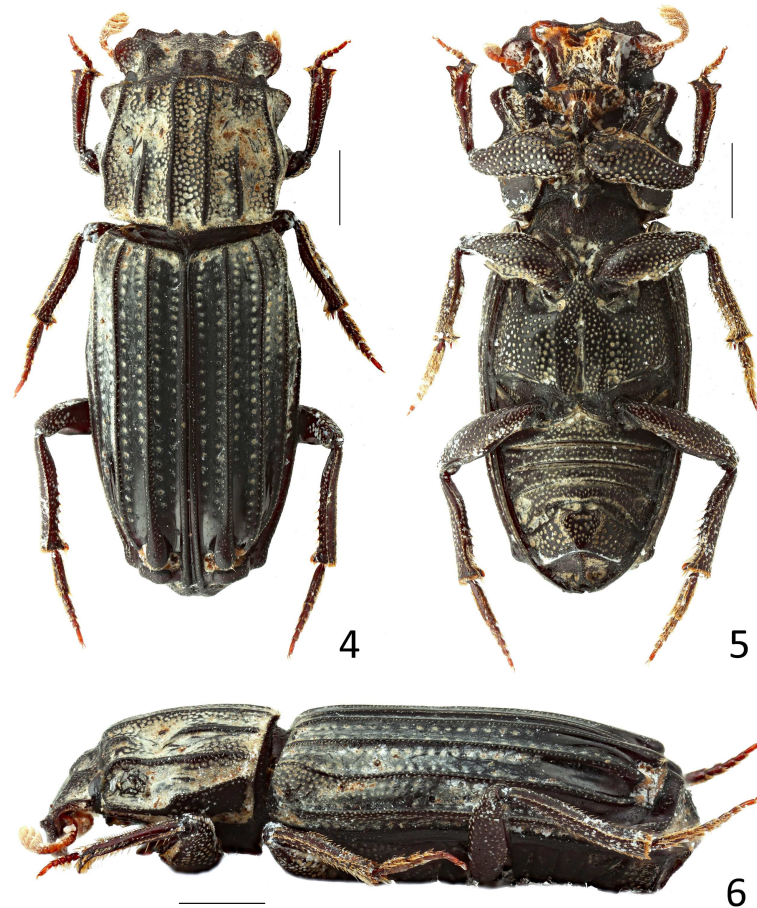
Affinity. Because of compilation of features, i.e. relatively medium size of body; well-developed lateral lobes of pronotum, with anterior lobe distinctly larger than posterior; relatively short and wide elytra, each intercostae of elytra with two rows of medium sized punctures and external protrusion of caudal bulbs distinctly, sinuately divided from median this species can be confused only with *R. denticollis* Fairmaire, 1893 (see fig. 13) and *R. mindanaoensis* Anichtchenko *et al.*, 2021 (see Anichtchenko *et al.*, 2021: figs 5a-c, 11, 17, 23, 29a-b). From both species can be easily distinguished by punctation of intercostae of pronotum (*R. denticollis* have all intercostae densely punctate; *R. mindanaoensis* have median intercosta similarly, but much more densely punctate and third intercostae with small area with dense punctation in basal part) and shape of caudal bulbs (*R. denticollis* as well *R. mindanaoensis* have median and internal protrusions of caudal bulbs well distinguishable, with more or less distinct sinuation between them) (compare figs: 1, 13 and 5a from Anichtchenko *et al.*, 2021). What interesting aedeagus of *R. merkli* sp. nov. is more distinctly de-curved than aedeagus of *R. denticollis* and *R. mindanaoensis* (compare figs: 9 and 29a from Anichtchenko *et al.*, 2021) – what is relatively rarely observed distinguishal feature among genus *Rhyparus*.

***Rhyparus jakli* sp. nov.**
(Figs 4–6, 8, 10, 12, 16)

Type locality. Indonesia, W Timor, 50km S of Kupang, Buraen.

Type material. Holotype (♂): Indonesia, W Timor, 50km S of Kupang, Buraen, 350m., 26.i.-09.ii.2006, leg. Stanislav Jakl [ŁMCN].

Description. Dorsum (Fig. 4). Body length of holotype 8.4mm. Large in size as member of the genus. Elongate, except of 1/3 preapical parts of elytra and strongly convex elements as costae – weakly shiny, brownishblack; except punctures, tops of costae and legs glabrous.



Figs 4–6. *Rhyparus jakli* sp. nov., ♂, holotype: 4 – dorsal view, 5 – ventral view, 6 – lateral view (scale lines: 1.0 mm).

Head (Fig. 8) trapezoidal, clypeus anteriorly weakly sinuate, with relatively distinct teeth on sides, laterally distinctly emarginated and next with widely rounded angles, relatively not so relatively distinctly separated from distinctly protruding, rounded genae. Clypeocentral disc relatively large, distinctly convex, ringed by not so deep groove, with pair of indistinct, weakly convex, shiny, longitudinal tubercles. Clypeocentral disc densely punctate. Frons with four short, longitudinal costae. Punctuation of head relatively regular, all punctures bearing short macrosetae.

Epipharynx (Fig. 12) distinctly transverse, rather distinctly sinuate at middle, corypha with several long celter, with two lateral lobes bearing tuft of

smaller and finer celtes. Epitorma broad, somewhat rectangular, with dense chaetopodia laterally. Tormae long.

Pronotum transverse, with six distinct, costae and seven longitudinal intercostae; on each side of costae there is row of short and small yellowish macrosetae. Lateral margin with two distinctly protruding lobes; anterior lobes sharply triangular with relatively rounded top, somewhat less developed than broadly triangular posterior which have somewhat rounded top too. Paramedian costae continuous, parallelogram. Discolateral costae interrupted in apical half. All intercosta with dense, medium sized punctures.

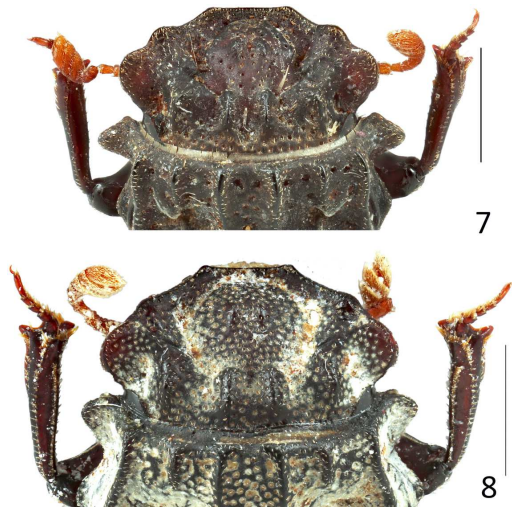
Scutellum almost imperceptible.

Elytra elongate, relatively narrow, widest before the middle. Each elytron with five distinct costae and five intercostae; on each side of costae there is row of short and small yellowish macrosetae. Fourth costae widened basally; covered by relatively dense, moderately large punctures. Intercostae flat, all of them with two rows of medium sized punctures; sometimes simple additional punctures are visible between them – especially basally on second intercosta; third intercosta with distinct row of relatively small punctures between two rows of medium sized punctures. Postdiscal bulbs relatively moderate in size. Caudal bulbs moderately strongly developed; external protrusion quite distinctly divided from median and internal which are fused into one and visible as transverse, elongate bulb; only very weak sinuation between them. Pygidium with elevated area basally; medially with relatively deep grooves on sides.

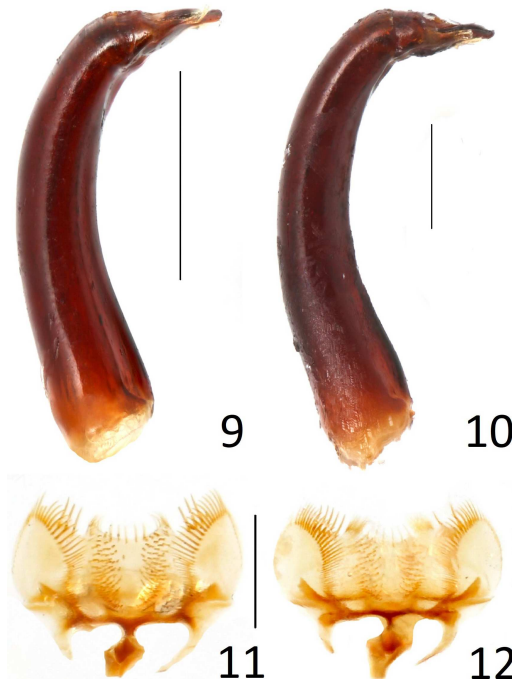
Macropterous.

Venter weakly shiny, brownishblack (Fig. 5). Meso-metaventral plate concave, with distinct, relatively shallow, relatively thin, somewhat arrow-shaped median impression in basal 4/5; densely covered by medium sized punctures bearing very thin macrosetae; punctures here distinctly variable in size. Abdomal ventrites separated by not so large, but deep, quite regular in shape impressed sutures.

Legs sturdy, shiny, with a lot of small punctured with erect short setae. Mesofemora with distinct teeth on basal border, metafemora without teeth there. All femora with very dense, not so fine, quite regular punctation bearing very thin macrosetation. Protibia tridentate apically, straight, with rather distinct, relatively small basal dent. Mesotibiae narrow at base, widest in basal third of length, and next narrowed to apex; at apex with widened apical projection. Metatibiae with similar structure as mesotibiae, but with more distinctly developed apical projection. Metatibiae as general relatively straight.



Figs 7, 8. Heads: 7 – *Rhyparus merkli* sp. nov., 8 – *R. jakli* sp. nov. (scale lines: Fig. 7: 0.5mm, Fig. 8: 1.0mm).



Figs 9–12. Aedeagi and epipharyngi: 9 – aedeagus of *Rhyparus merkli* sp. nov., 10 – aedeagus of *R. jakli* sp. nov., 11 – epipharynx of *R. merkli* sp. nov., 12 – epipharynx of *R. jakli* sp. nov. (scale lines: Figs 9, 10: 0.5mm, Figs 11, 12: 1.0mm).

Aedeagus (Fig. 10) Phallobase much longer than parameres, moderately de-curved toward apex in lateral view. Parameres small, thin, semitransparent, visible as weak protrusion of each side of median lobe.

Variability. Unknown.

Sexual dimorphism. Unknown.

Etymology. Patronymic. Dedicated to its collector: Stanislav Jakl.

Affinity. Because of combination of features: large size of body, dense punctation of all intercostae of pronotum and external protrusion of caudal bulbs quite distinctly divided from median protrusion *R. jakli* sp. nov. can be confused only with two Oceanian species: *R. denticollis* (see fig. 13) and *R. philippinensis* Arrow, 1905 (see: Anichtchenko *et al.*, 2021: figs 6a-c, 12, 18, 24, 30a-b). However *R. denticollis* has: smaller size of body; lateral lobes of pronotum much more distinct, anterior lobe larger than posterior; elytra proportionally shorter and wider, with distinct situation between median and inner protrusion of caudal bulb (compare figs: 4 and 13). *R. philippinensis* has: smaller size of body (moderate in size species); lateral lobes of pronotum widely rounded. Median and internal protrusions of pronotum differently directed – less transverse (compare figs: 4 and 6a from Anichtchenko *et al.*, 2021). However when we base on distributional data, size of body, general proportions, shape of ventral side of body (similar meso-metaventral plate and abdominal ventrites) we can suspect that most closely related to *R. jakli* sp. nov. is *R. verrucosus* Schmidt, 1916 (see Fig. 14). Both species are very easily distinguishable by punctation of intercostae of pronotum (*R. verrucosus* have densely punctate only median intercosta), shape of lateral lobes of pronotum (*R. verrucosus* have somewhat rounded lobes), shape of caudal bulb (clearly less developed in *R. verrucosus*) (compare figs: 4 and 14) and different shape of last abdominal ventrite and pygidium (compare figs: 15 and 16).

FAUNISTIC

Rhyparus denticollis Fairmaire, 1893 (Fig. 13)

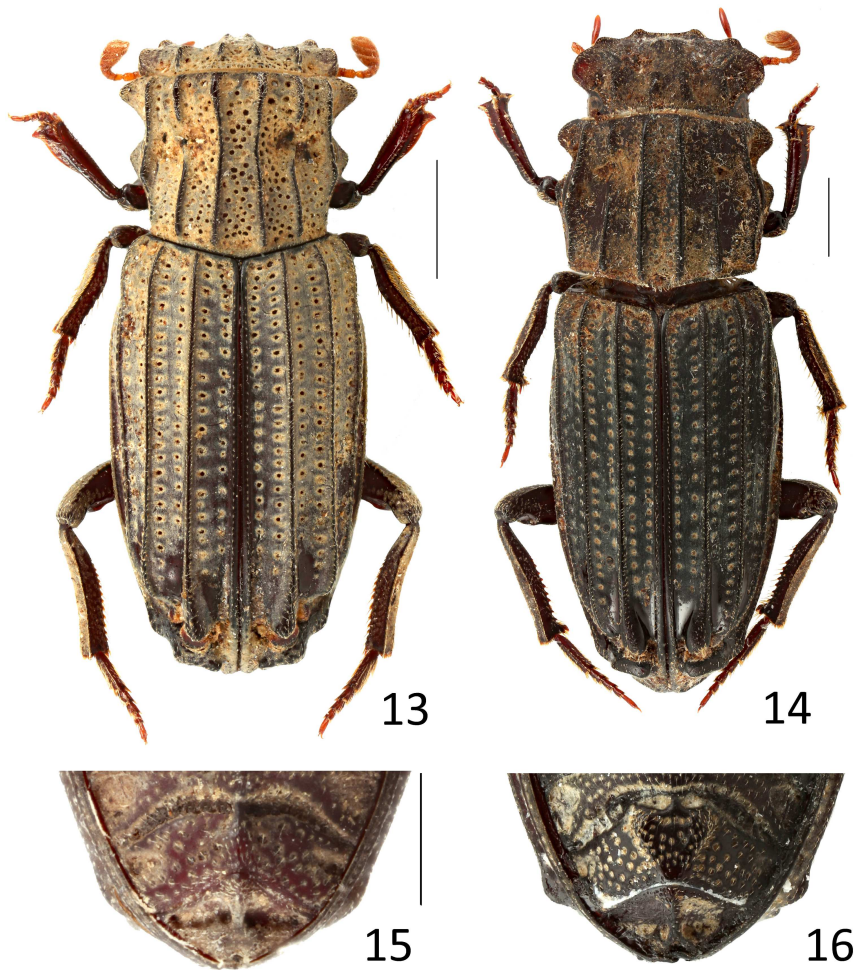
Examined material. 1 ex.: Indonesia, Sumatra, Palembang [NMPC]; 1 ex.: Indonesia: Sumatra, Aceh, G. Leuser Nat. Pk., Ketambe Res. Sta., xi. 1989, D. C. Darling, Malaise Tp. 350m, Primary Rainforest, 3°41'N, 97°39'E, H. & A. Howden collection [PBCS]; 1 ex.: Indonesia, West Sumatra, Mt. Sanggul, cca 35km N of Payakumbuh Landai vill. Env., 1250-1400m alt., 19.xii.2014, leg. Stanislav Jakl [ŁMCN]; 1 ex.: Malaysia: Sabah, Balu, Punggul Resort env. 24.vi.-1.vii.1996, vegetation debris and forest floor litter accumulated around large trees near river [ISEA]; 1 ex.: Malaysia, N Borneo, Sabah, Keningau distr., Trus Modi Mt., 1160m., 18.viii.2012, leg. A. Klimenko [ŁMCN] [photographed specimen]; 1 ex.: Malaysia, Borneo, Sabah, Kinabalu N.P., Poring, 500m., at light, 2.xii.1997, leg. D. Grimm [ŁMCN].

Short comment. Previously known from Java and Borneo. Additional records for Borneo. First records for Sumatra. Specimens from Borneo and Sumatra are almost identique. Only one very weak difference were observed in caudal bulbs structure, i.e. situation between median and internal protrusions is slightly less distinct in population from Sumatra. In opinion of authors such small feature is not enough to describe this population as separate taxa.

Rhyparus verrucosus Schmidt, 1916 (Figs 14, 15)

Examined material. 1 ex.: Indonesia, Bali, Bedugul region, 1200m., xi.2004 [ŁMCN] [photographed specimen].

Short comment. Previously was known only from Sumatra. First record for Bali Island.



Figs 13–16. Dorsal views and abdominal apices: 13 – dorsal view of *Rhyparus denticollis*, 14 – dorsal view of *R. verrucosus* (Bali Island), 15 – abdominal apex of *R. verrucosus* (holotype, Sumatra), 16 – abdominal apex of *R. jakli* sp. nov. (scale lines: 1.0 mm).

DISCUSSION

Rhyparus denticollis Fairmaire, 1893 was described from Java. Later from Borneo was described *R. dentatus* Fairmaire, 1896. Arrow (1935) saw both species and synonymised them. Bordat (1996) add new data about *R. denticollis* from Borneo. Mencl, Rakovič and Král (2013) create checklist of austral-asian species of genus *Rhyparus* and treat here *R. dentatus* and *R. denticollis* as valid species, without any comments about changes in taxonomy. They indicated there Borneo as distribution for *R. dentatus*, but *R. denticollis* were

erroneously cited for Java and Borneo (probably after Bordat). Next, Anichtchenko *et al.* (2021) were described *R. mindanaoensis* from Mindanao. In the same year Ochi *et al.* (2021) give additional comments on *R. mindanaoensis* and add distributional data: Basilan Island. Based on above we can state that Mencl, Rakovič and Král (2013) probably didn't know about synonymy of *R. dentatus* with *R. denticollis* proposed by Arrow (1935). Known for us material of *R. denticollis* (sensu Arrow) from Borneo in our opinion belongs to the same species as specimen from Sumatra. Unfortunately authors didn't saw types of *R. den-*

ticollis and *R. dentatus*. Anyway based on available material and knowledge that specimens of *R. denticollis* (sensu Arrow) from Borneo are the same species that from Sumatra, until examination of type of *R. denticollis* we propose to follow by Arrow (1935) and treat *R. dentatus* as synonym of *R. denticollis* – what for us most probably is true.

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