

Revision of the genus *Bardunia* Stål (Hemiptera, Fulgoroidea, Issidae)

Vladimir M. Gnezdilov*

Zoological Institute, Russian Academy of Sciences, Universitetskaya nab.1, 199034 St. Petersburg, Russia

Abstract

Received 4 October 2010
Accepted 5 May 2011
Published 17 November 2011

The Oriental genus *Bardunia* Stål, 1863 is revised. The genus comprises 8 species 6 of which are new: *B. curvinaso* sp. n. from Vietnam, *B. brevinaso* sp. n. from Laos, *B. angustinaso* sp. n. and *B. duboisi* sp. n. from Java, *B. celebensis* sp. n. from Sulawesi, and *B. papua* sp. n. from New Guinea. *B. nasuta* Stål, 1863 and *B. rugifrons* (Melichar, 1906) are redescribed.

Key Words

Parahiraciini
New species
Southeastern Asia

Introduction

The genus *Bardunia* Stål, 1863 belongs to the tribe Parahiraciini Cheng & Yang distributed in the South-eastern part of Palaearctic Region (China) and Oriental Region. Recently the tribe was revised and treated as including 11 genera with 32 species including those described below (Gnezdilov & Wilson 2007; Zhang & Chen 2008, 2009, 2010). The members of the Parahiraciini are characterized by beetle-like, convex, elongate, apically narrowed fore wings with a net of transverse veins, well-developed three- or two-lobed hind wings, with a deep cleft between remigium and vannus, and long fore and middle legs.

The genus *Bardunia* was erected by Stål (1863) for *Bardunia nasuta* Stål, 1863. Gnezdilov & Wilson (2007) have placed the genus *Prosonoma* Melichar, 1906 in synonymy under *Bardunia* and transferred *Prosonoma rugifrons* Melichar, 1906 to the last genus. During the examination of unidentified materials from eight European museums six new species of the genus *Bardunia* were discovered. Totally now the genus comprises eight species distributed from Indochina through Malay Archipelago to New Guinea: *B. curvinaso* sp. n. (Vietnam), *B. brevinaso* sp. n. (Laos), *B. angustinaso* sp. n. and *B. duboisi* sp. n. (Java), *B. celebensis* sp. n. (Sulawesi), *B. nasuta* Stål, 1863 (Batjan I.), *B. rugifrons* (Melichar, 1906) (Sumatra, Engano I.), *B. papua* sp. n. (New Guinea). Unidentified

female is known also from Sumba Island. Correct identification is basing on examination of male genitalia.

The genus *Bardunia* is distinguished by glossy swelling on the apex of proboscis which is formed by genae and metope (Figs 1–2, 9). *Bardunia* is closely related to the genus *Narinosus* Gnezdilov & Wilson, 2005, known from China (Gnezdilov & Wilson 2005), according to the structure of male genitalia: dorsolateral phallobase lobes may have horn-shaped processes subapically, male anal tube with apex turned down and bearing lateral processes.

Material and methods

The terminology of the head follows Emeljanov (1995) and the terminology of the genitalia follows Bourgoin (1993) for female and Gnezdilov (2002, 2003) for female and male. The genital segments of the examined specimens were macerated in 10% KOH and figured in glycerin jelly using the light microscopes Mikmed-1 and Leica M165C. Photographs of the specimens were made using Leica MZ8 with JVC video camera KY F70B, images are produced using the software Synoptics Automontage and Adobe Photoshop.

The material examined is deposited in the following museums:

BMNH	The Natural History Museum, London, UK
NHMB	Naturhistorisches Museum, Basel, Switzerland
MMBC	Moravian Museum, Brno, Czech Republic
MSNG	Museo Civico di Storia Naturale, Genova, Italy
RMNH	Museum of Natural History Naturalis, Leiden, The Netherlands

* E-mail: vmgnezdilov@mail.ru

ZMAN	Universiteit van Amsterdam, Zoölogisch Museum, The Netherlands
ZMHB	Zoologisches Museum, Humboldt Universität, Berlin, Germany
ZIN	Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia

Results

Genus *Bardunia* Stål, 1863

Bardunia Stål, 1863: 589.

Type species. *Bardunia nasuta* Stål, 1863.

Diagnosis. Genae strongly protruding forming with metope the proboscis (Figs 1–7, 10–14). Metope with tubercles along lateral keels and glossy swelling on the apex (Figs 1, 2, 9). Metope sometimes with weak median and sublateral carinae. Lateral keels of metope reach the apex of proboscis (Figs 2, 5, 7, 10–11, 14). Upper margin of metope almost straight or weakly concave (Fig. 9). Coryphe usually transverse or as wide as long (Figs 1, 12). Fore wings coleopterous, narrowing apically, without hypocostal plate, venation reticulate (Figs 6, 8, 14). Hind wings well-developed, bi-lobed, with a net of transverse veins distally (Fig. 1). Fore femora and tibiae distinctly foliate (Fig. 11). Middle femora weakly foliate. Each hind tibia usually with two large lateral spines distally. First metatarsomere longer than second one, with intire row of intermediate spines apically. Gonoplags without keels, with deep incision between first and second lobes (Fig. 27).

Each fore tibia with large light spot proximally (Fig. 11).

Bardunia nasuta Stål, 1863

Figures 1–2, 16, 32

Bardunia nasuta Stål, 1863: 589.

Type material examined. ♀ (holotype by monotypy), [Indonesia], “Bac.”, “64/66” (BMNH).

Redescription. Metope weakly enlarged to the apex of proboscis (in dorsal view), with distinct globose bulge (in lateral view) (Fig. 16), with weak sublateral carinae (Figs 1–2). Lateral keels of metope are not joint on the apex of proboscis. Proboscis and clypeus are joined at obtuse angle in lateral view (Fig. 16). Coryphe nearly square, with anterior margin weakly convex. Rostrum reaches hind coxae. Pronotum and mesonotum without carinae. Anterior margin of pronotum strongly convex. Hind tibia with 3 lateral spines (2 large distally and 1 small proximally) and 6 intermediate spines apically. First metatarsomere with 6 intermediate spines apically.

Coloration. Generally light yellow, with dense dark brown dots. Metope with black stripes below coryphe along the lateral keels. Metopial swelling black. Genae black below the lateral keels of metope. Proboscis

black above the clypeus. Scapus light yellow. Pedicel almost black. Postclypeus dark brown excluding light yellow stripes and dots basally. Anteclypeus dark brown. First and second segments of rostrum light yellow, with brown stripes. Third segment of rostrum almost black. Paradiscal fields of pronotum dark brown, with yellow tubercles. Fore wings with reddish veins, sometimes with dark brown spots in the cells. Hind wings dark brown. Fore femora with dense dark brown dots, each with dark brown oval spot apically on internal side. Middle femora brown basally. Fore and middle tibiae dark brown, with light yellow areas. Hind femora and tibiae sometimes with dark brown stripes. Fore and middle tarsi dark brown. Hind first and second metatarsomeres light yellow dorsally, dark brown ventrally. Hind third metatarsomere dark brown. Apices of spines black. Abdominal sternum VII dark brown basally. Abdominal tergites dark brown.

Female genitalia. Sternum VII with hind margin concave – wedge-shaped, with peculiar step below the concavity (Fig. 32). Anal tube relatively short, broad, narrowing to truncate apex. Anal column short. Gonoplags convex, rounded.

Total length (from apex of metopial proboscis to apices of fore wings). 8.0 mm.

Distribution. The species was described from Batjan Island (also spelled Bachan or Batschian) (Maluku Islands) in Indonesia (Stål 1863).

Bardunia rugifrons (Melichar, 1906)

Figures 3, 19–31

Prosonoma rugifrons Melichar, 1906: 236.

Bardunia rugifrons: Gnezdilov & Wilson, 2007: 106.

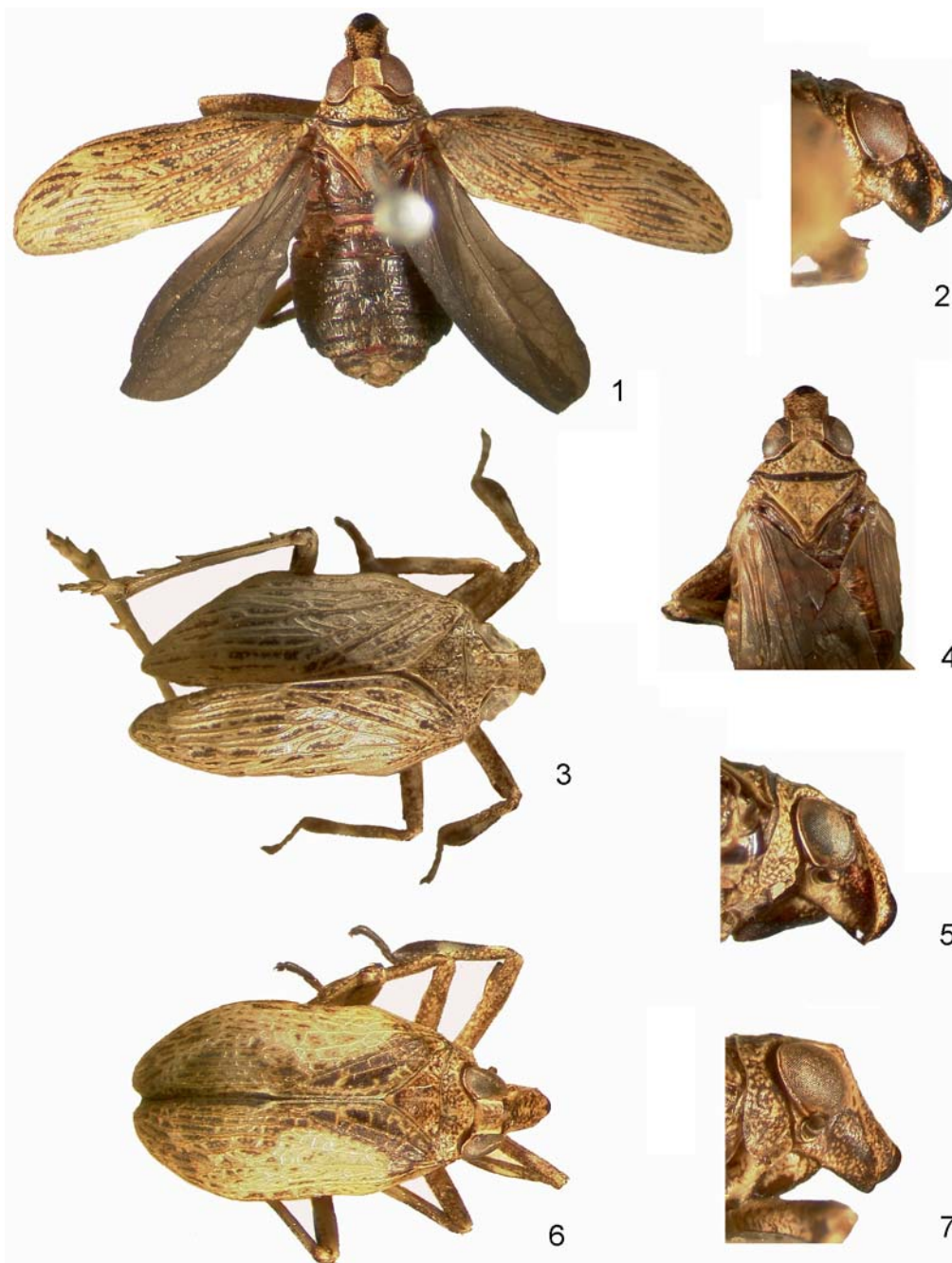
Type material examined. ♂ (holotype by monotypy), [Indonesia], Engano, Kifa-juc., V. 1891, Modigliani (MSNG).

Other material examined. **Indonesia:** 1 ♀, Sumatra's OK., Sibolangit, 18.X.[19]21, 550 m, J.B. Corporaal (ZMAN).

Redescription. Metope covered by small corrugations, with large elongate glossy swelling and with weak sublateral carinae in female. Lateral keels of metope are not fused at the apex of proboscis (large incision visible from above). Coryphe weakly transverse, anterior margin weakly convex, posterior margin obtusely angulate (Fig. 3). Pronotum without carinae, with strongly convex anterior margin and nearly straight posterior margin. Mesonotum 1.7 times as long as pronotum, with median carina in female. Hind tibia with 2–3 lateral spines. First metatarsomere with 5–6 intermediate spines apically.

Coloration

Male. Generally light brown yellowish, with dark brown and black dots and spots. Metopial swelling dark brown or black. Genae under the lateral keels of metope dark brown. Clypeus dark brown excluding lateral parts basally. Fore wings light brown yellowish, some-



Figures 1–7. *Bardunia* spp. **1.** *Bardunia nasuta* Stål, female holotype in dorsal view, 8.0 mm; **2.** *B. nasuta* Stål, female holotype, head in lateral view; **3.** *Bardunia rugifrons* (Melichar), male holotype in dorsal view, 5.7 mm; **4.** *Bardunia papua* sp. n., male holotype in dorsal view, 6.2 mm; **5.** *B. papua* sp. n., male holotype, head in lateral view; **6.** *Bardunia angustinaso* sp. n., female paratype in dorsal view, 7.5 mm; **7.** *B. angustinaso* sp. n., male holotype, head in lateral view, 6.6 mm.

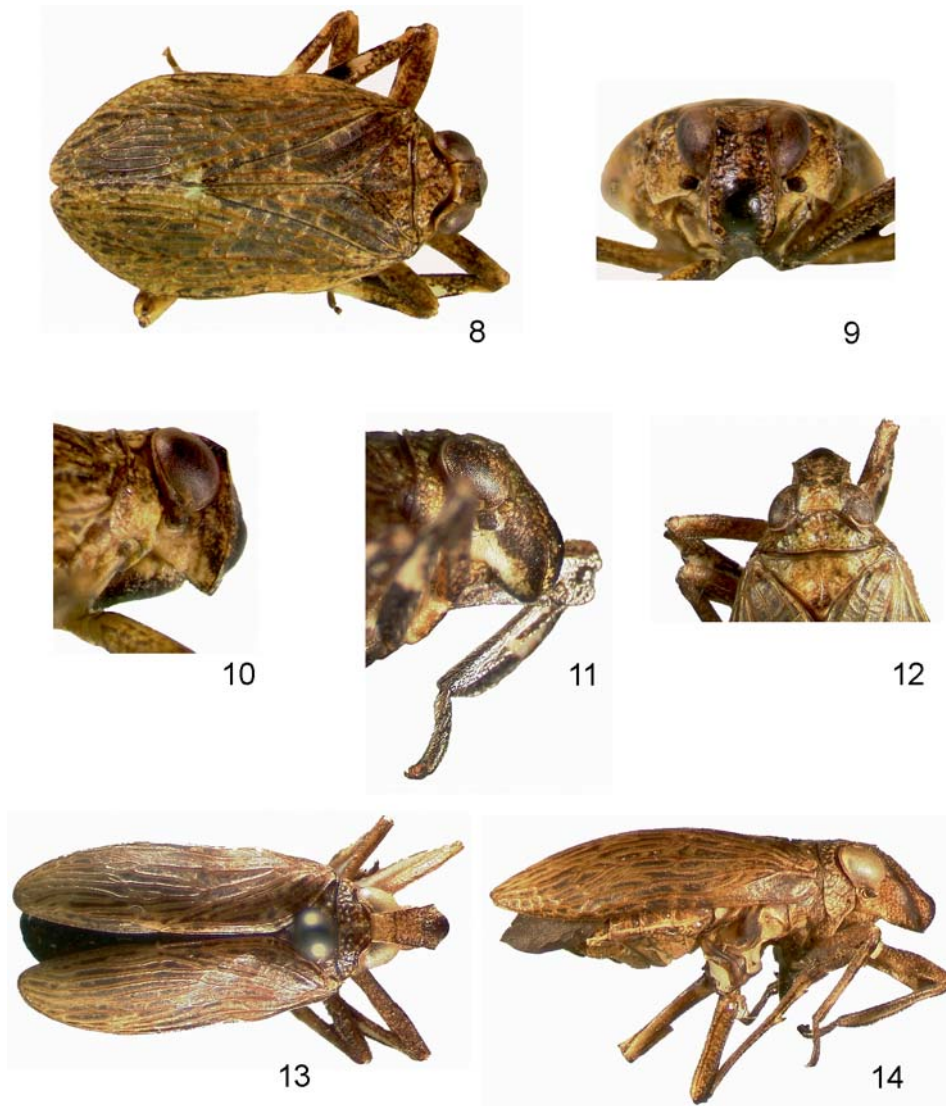
times with dark brown or black dots and stripes in the cells. Hind wings dark brown. Fore tibia dark brown distally. Hind tibiae with longitudinal dark brown stripes. Tarsi dark brown. Apices of spines black. Anal tube with brown apex.

Female. Generally light yellow, with brown and dark brown dots. Metopial swelling black. Metopial proboscis above the clypeus, postclypeus frontally, and anteclypeus dark brown. Fore wings with reddish veins, sometimes with dark brown cells. Hind wings dark brown. Inner sides of fore femora with dense dark

brown dots. Fore tibia dark brown distally. Fore and middle tarsi dark brown. Hind tarsi brown yellowish. Abdominal sternites light yellow, with dark brown dots. Abdominal tergites dark brown.

Genitalia

Male (Figs 19–24). Pygofer with convex hind margin. Anal tube elongate, weakly narrowing basally and apically (in dorsal view) (Fig. 24). Apex of anal tube truncate, turned down (Fig. 23), clutched between apex of phallobase and its dorsal process which is chamber-



Figures 8–14. *Bardunia* spp. **8–9.** *Bardunia brevinaso* sp. n., male holotype in dorsal (**8**) and frontal (**9**) views, 7.0 mm; **10.** *B. brevinaso* sp. n., male holotype, head in lateral view; **11–12.** *Bardunia curvinaso* sp. n., male holotype, head in lateral (**11**) and dorsal (**12**) views, 8.0 mm; **13–14.** *Bardunia celebensis* sp. n., male holotype in dorsal (**13**) and lateral (**14**) views, 9.0 mm.

shaped (in lateral view) (Fig. 20). Anal column short (Fig. 24). Phallobase wide (in ventral view) (Fig. 19). Each dorso-lateral phallobase lobe with one wide semicircular and one horn-shaped subapical processes (Fig. 20). Dorso-lateral phallobase lobes are fused dorsally. Ventral margin of each dorso-lateral lobe strongly convex under the ventral hook (in lateral view). Dorsal surface of the phallobase with long chamber-shaped process medially and protrusion below this process. Ventral phallobase lobe long and wide, narrowing to acute apex (Fig. 19). Apical aedeagal processes long, wide, weakly enlarged subapically (Fig. 19). Aedeagus with pair of short narrowing to acute apices ventral hooks. Style without neck, with strongly concaved hind margin (Fig. 21). Capitulum of style narrowing apically in shape of narrow nose (in dorsal view) (Fig. 22), lateral tooth wide.

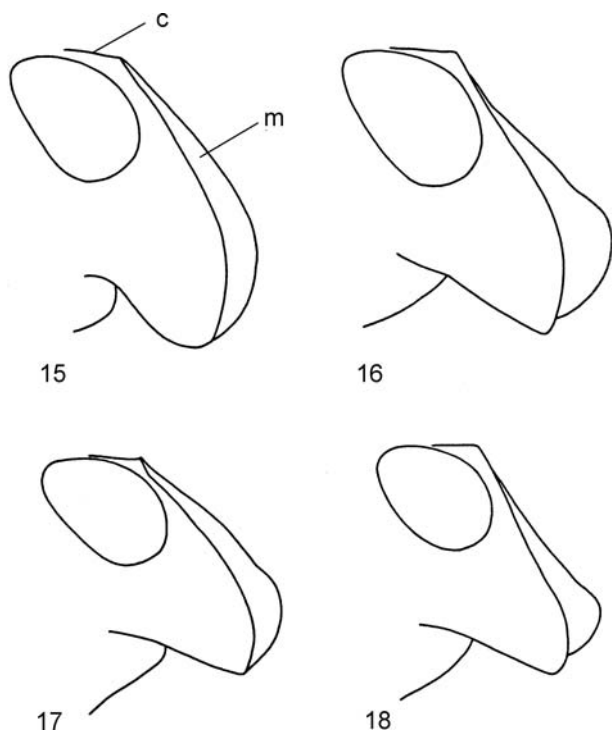
Female (Figs 25–31). Sternum VII with weakly concave hind margin (wedge-shaped) (Figs 30, 31). Anal tube truncate apically (Fig. 29). Posterior connective la-

mina of gonapophyses IX wide (Fig. 26). Distal parts of the lamina turned at right angle, each with two processes. Lateral fields of the lamina with projections. Median field of the lamina with fused lobes. Hind margin of gonocoxa VIII with triangular lobe distally (Fig. 25). Endogonocoxal process bifurcate apically, with subapical lobe. Anterior connective lamina of gonapophyse VIII with 3 teeth in apical group and 4 keeled teeth in lateral group (Fig. 25). Diverticulum ductus of spermateca bean-shaped (Fig. 28).

Total length. Male: 5.7 mm. Female: 7.3 mm.

Distribution. Sumatra and Engano I. (near to SW coast of Sumatra) (Melichar 1906 and current data).

Note. A female from Sumatra differs from the type male of the species by the number of lateral spines on hind tibia – 2 spines in female and 3 spines in male. However the number of spines sometimes varies be-



Figures 15–18. *Bardunia* spp., head in lateral view. **15.** *B. curvinaso* sp. n., male holotype, 8.0 mm; **16.** *Bardunia nasuta* Stål, female holotype, 8.0 mm; **17.** *B. papua* sp. n., male holotype, 6.2 mm; **18.** *B. angustinaso* sp. n., male holotype, 6.6 mm. Abbreviations: **c** – coryphe; **m** – metope.

tween the specimens of the same species. We propose to treat this female as *B. rugifrons* until a male from the same region will be found and the structure of male genitalia will be examined.

***Bardunia papua* sp. n.**

Figures 4–5, 17, 33–39

Type material. Holotype, ♂, [Indonesia], Malay Archipelago, Humboldt Bay [New Guinea, Teluk Yos Sudarso], W. Doherty leg (BMNH).

Description. Coryphe, metope, pro- and mesonotum without carinae. Coryphe nearly square, anterior margin weakly convex, posterior margin weakly concave (Fig. 4). Proboscis and clypeus are joined at obtuse angle (in lateral view) (Figs 5, 17). Proboscis is nearly equal in length to postclypeus (in lateral view). Pronotum concaved along the median line. Mesonotum concaved in the centre. Hind tibia with single large lateral spine distally.

Coloration. Generally light yellow, with brown and dark brown dots. Metopial swelling black. Proboscis dark brown above the clypeus. Genae dark brown below the lateral keels of metope. Scapus light yellow. Pedicel dark brown, with light yellow apex. Clypeus dark brown, with 2 light yellow spots below metopoclypeal suture. Hind wings dark brown. Legs with dense dark brown dots and stripes. Tarsi dark brown. Apices of spines black. Abdominal tergites brown.

Male genitalia (Figs 33–39). Pygofer with weakly convex hind margin (Fig. 33). Anal tube elongate, weakly narrowing basally and apically (in dorsal view) (Fig. 37), with two apical processes (Fig. 38), convex (in lateral view) (Fig. 39). Anal column short. Phallobase wide (in ventral view) (Fig. 36). Each dorso-lateral phallobase lobe with one narrow semicircular and one horn-shaped subapical processes (Fig. 34). Dorso-lateral phallobase lobes are fused dorsally, with acute triangular process medioapically (Fig. 35). Ventral margin of each dorso-lateral phallobase lobe strongly convex under the ventral hooks (in lateral view) (Fig. 34). Dorsal surface of the phallobase with long chamber-shaped process medially (Figs 34–35). Ventral phallobase lobe long, wide, narrowing to acute apex (Fig. 36). Apical aedeagal processes long, wide. Aedeagus with pair of short narrowing to acute apices ventral hooks. Style without neck, with strongly concaved hind margin. Capitulum of style narrowing apically in shape of narrow nose (in dorsal view), lateral tooth wide.

Total length. Male (specimen without fore wings): 6.2 mm.

Distribution. NW coast of New Guinea.

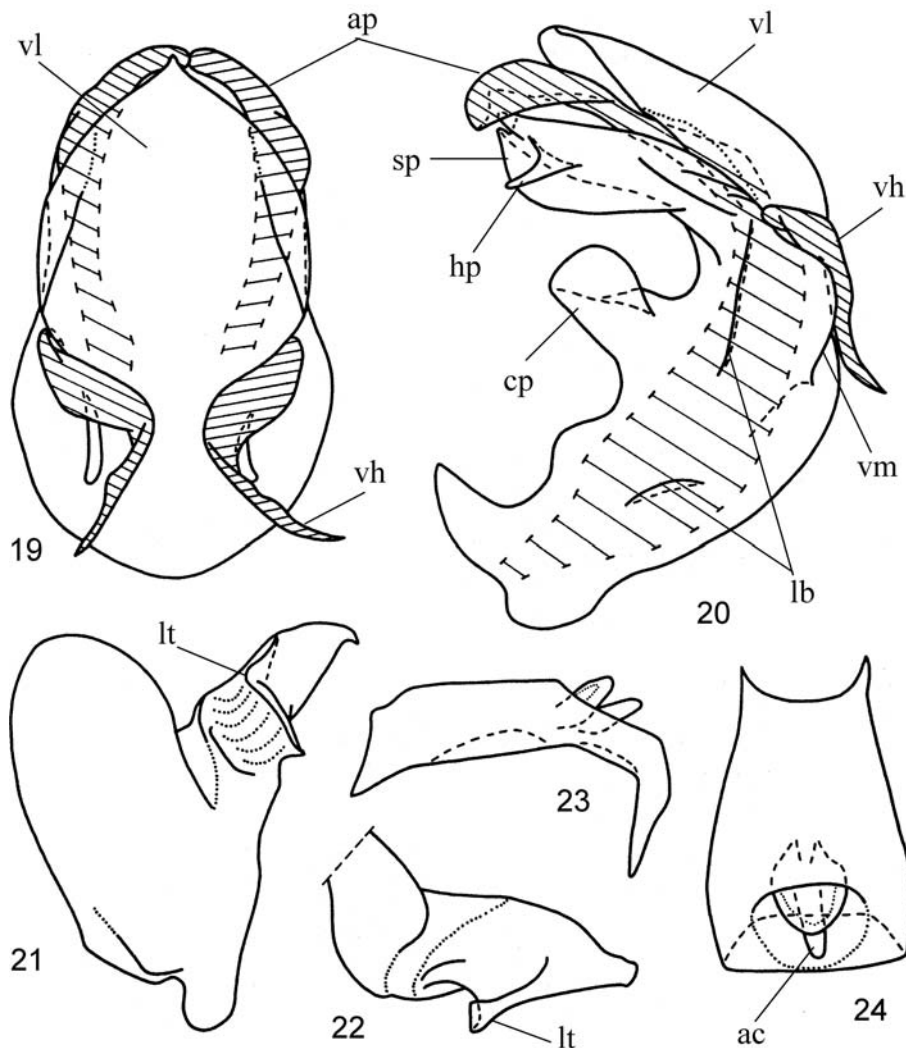
***Bardunia angustinaso* sp. n.**

Figures 6–7, 18, 40–48

Type material. Holotype, ♂, [Indonesia], Java, Slamet Gunung, XI.1925, Drescher, coll. Dr. MacGillivray (ZMAN). Paratype: ♀, as holotype (ZMAN).

Description. Metope almost parallel-sided, long and narrow, with very weak sublateral carinae joint far from its upper margin. Lateral keels of metope are not fused at the apex of proboscis (small incision visible from above). Proboscis relatively long, with “short” swelling (Fig. 6). Proboscis and clypeus are joint at obtuse angle in lateral view (Figs 7, 18). Coryphe transverse (1.7 times as wide as long), anterior margin weakly convex (Fig. 6). Pronotum without carinae. Mesonotum with weak median carina. Hind tibia with two lateral spines distally. First metatarsomere with 6 intermediate spines apically.

Coloration. Generally light yellow brownish, with dark brown dots and spots. Apical angles of metope below coryphe black. Metopial swelling dark brown or black, poorly visible from above (“short”). Metopial proboscis dark brown ventrally. Postclypeus frontally and whole anteclypeus dark brown. Scapus and pedicel dark brown. Genae and legs with dense dark brown dots. Fore wings light yellow, with dark brown cells of clavus and some cells of corium, particularly in its distal part of the wing. Hind wings dark brown or black. Fore and middle tibiae apically and fore and middle tarsi dark brown. Apices of spines black. Female abdominal sternites II–VI light yellow medially, sternite VII dark brown medially. Gonocoxae VIII partly dark brown.



Figures 19–24. *Bardunia rugifrons* (Melichar), holotype, male genitalia. 19–20. Penis in ventral (19) and lateral (20) views; 21. Style in lateral view; 22. Capitulum of style in dorsal view; 23–24. Anal tube in lateral (23) and dorsal (24) views. Abbreviations: **ac** – anal column; **ap** – apical aedeagal processes; **cp** – chamber-shaped process; **hp** – horn-shaped subapical process; **lb** – lobes of phallobase below ventral aedeagal hooks; **lt** – lateral tooth of capitulum; **sp** – semicircular process; **vh** – ventral aedeagal hooks; **vl** – ventral phallobase lobe; **vm** – ventral margin of dorso-lateral phallobase lobe.

Genitalia

Male (Figs 40–48). Pygofer with convex hind margin (Fig. 47). Anal tube wide (in dorsal view) (Fig. 41), with apical angles in shape of long massive processes (Fig. 40, 42). Anal column short (Fig. 41). Phallobase long and narrow (in ventral and lateral views) (Fig. 43). Each dorso-lateral phallobase lobe with subapical serrate lobe far not reaching the level of the base of ventral aedeagal hooks (in lateral view). Ventral phallobase lobe long and wide, with small acute projection apically (Fig. 44). Aedeagus with pair of long relatively narrow bifurcated apical processes, with acute apices (Fig. 44). Ventral aedeagal hooks relatively short, nearly third of phallobase length, narrowing apically (Fig. 43). Style without neck, with hind margin weakly concaved (Fig. 45). Margin of style under the capitulum with acuminate ledge (Fig. 45). Capitulum of style narrow and long, truncate apically (in dorsal view) (Fig. 46), with wide lateral tooth.

Female. Hind margin of sternum VII widely concave, with pair of very short rounded processes medially (Fig. 48). Anal tube wide, truncate apically. Anal column short.

Total length. Male: 6.6 mm. Female: 7.5 mm.

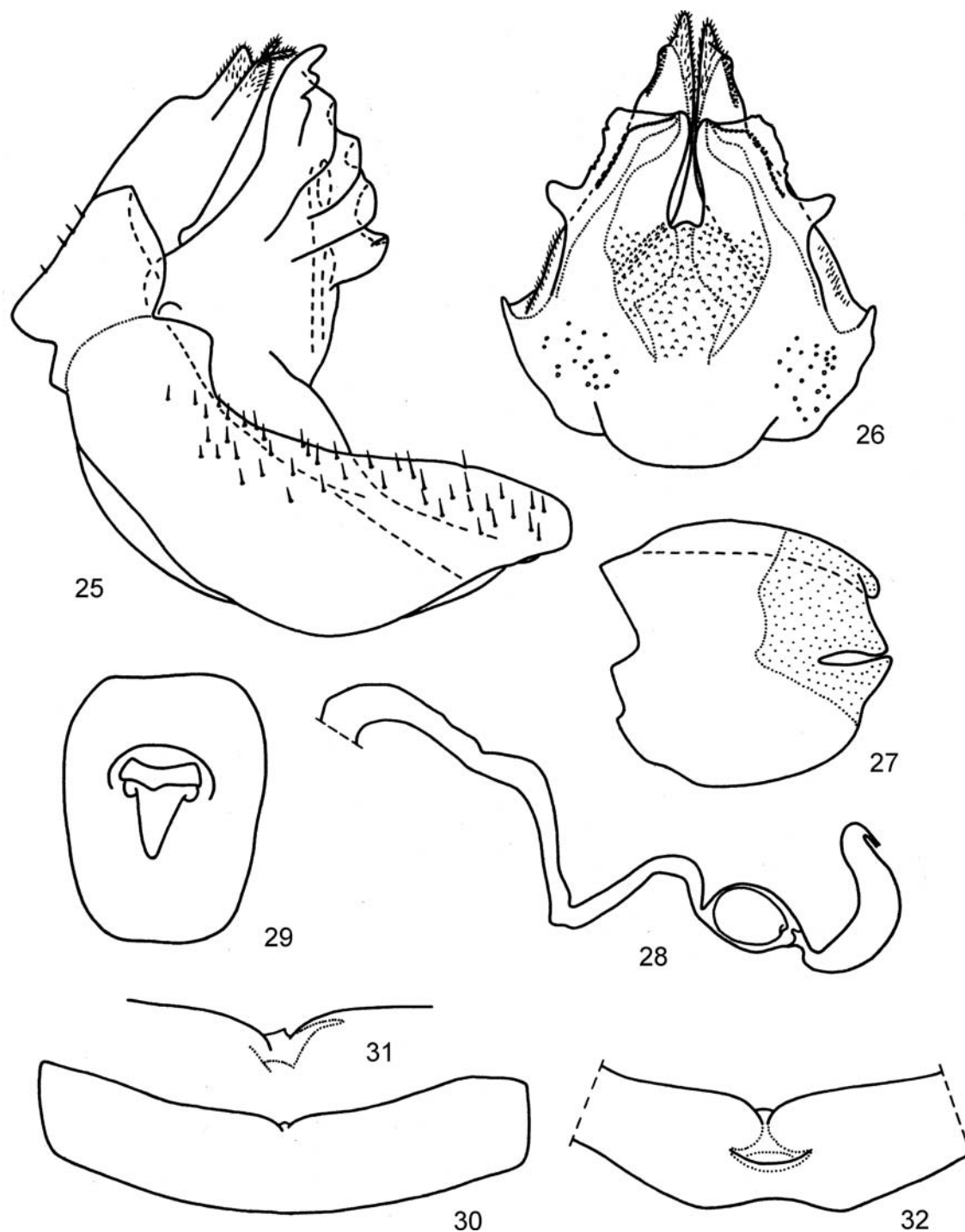
Distribution. Java.

Bardunia duboisi sp. n.

Figures 64–68

Type material. Holotype, ♂, [Indonesia], Java, Malang, A. Koller (RMNH). Paratypes: 1 ♂, “Candelay”, Fruhstorfer, “*planirostris* / det. Melichar” (ZMHB); 1 ♀, “Candelay”, Fruhstorfer, “*Prosonoma rugifrons* Mel. / Edm. Schmidt determ. 1909” (ZMHB).

Description. Metope almost parallel-sided, long and narrow, with median and sublateral carinae. Last ones are joint far from the upper margin of metope. Lateral

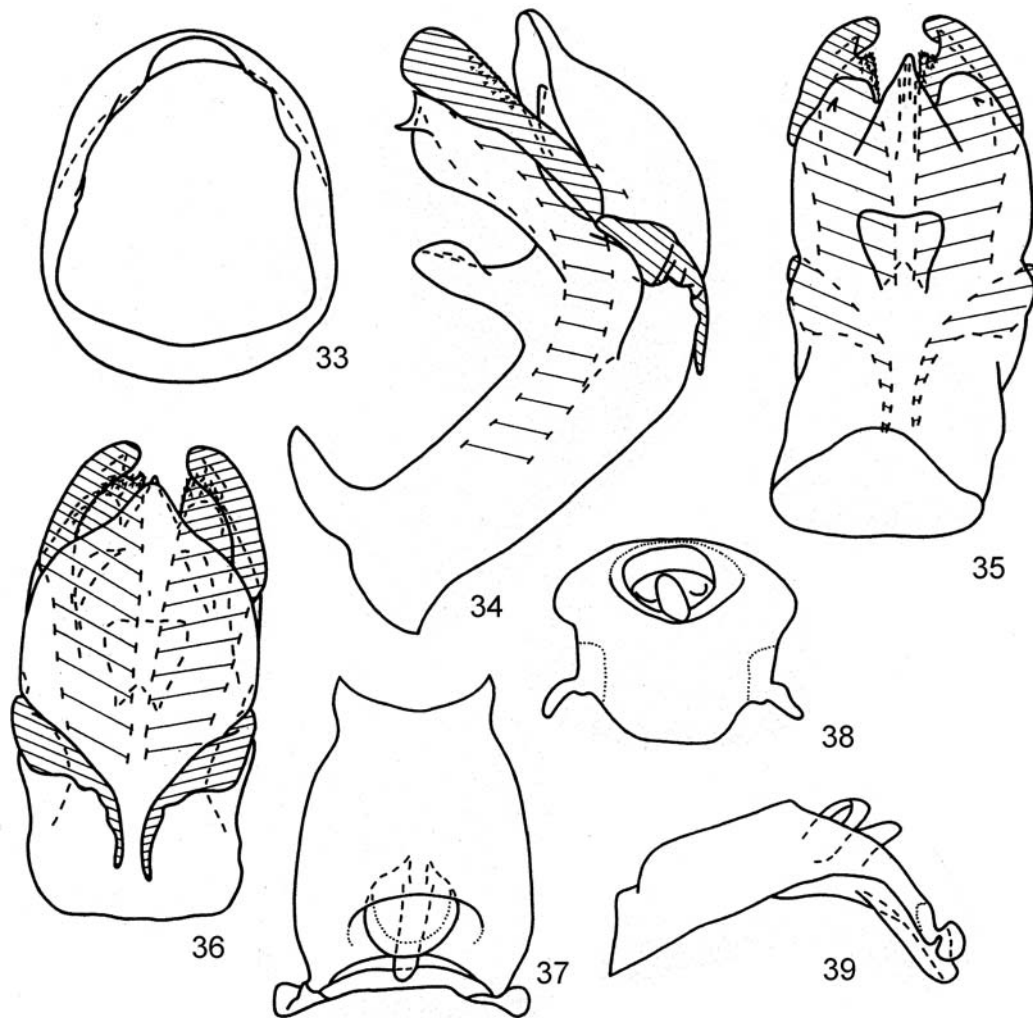


Figures 25–32. Female genitalia and sternum VII. **25–31.** *Bardunia rugifrons* (Melichar); **32.** *Bardunia nasuta* Stål. **25.** Anterior connective lamina of gonapophyse VIII in lateral view; **26.** Posterior connective lamina of gonapophyses IX in dorsal view; **27.** Gonoplags in lateral view; **28.** Spermateca: ductus receptaculi and diverticulum ductus; **29.** Anal tube in dorsal view; **30, 32.** Sternum VII; **31.** Hind margin of sternum VII.

keels of metope are not fused at apex of proboscis (small incision visible from above). Proboscis shorter than postclypeus in lateral view, with “short” swelling. Proboscis and clypeus are joint at obtuse angle in lateral view. Coryphe transverse (1.5–1.6 times as wide as long), anterior margin weakly obtusely angulate or convex. Pronotum without carinae. Mesonotum with weak median carina. Hind tibia with two lateral spines dis-

tally. First metatarsomere with 6 intermediate spines apically.

Coloration. Generally light brown yellowish, with dark brown dots. Apical angles of metope black. Metopial swelling dark brown or black, poorly visible from above (“short”). Proboscis dark brown ventrally. Postclypeus frontally and whole anteclypeus dark brown. Scapus



Figures 33–39. *Bardunia papua* sp. n., holotype, male genitalia. **33.** Pygofer in caudal view; **34.** Penis in lateral view; **35.** Same in dorsal view; **36.** Same in ventral view; **37.** Anal tube in dorsal view; **38.** Same in caudal view; **39.** Same in lateral view.

and pedicel dark brown. Genae and legs with dense dark brown dots. Fore wings with reddish veins and some cells dark brown. Hind wings dark brown or black. Fore and middle tibiae apically and fore and middle tarsi dark brown. Apices of spines black.

Genitalia

Male (Figs 64–68). Pygofer with convex hind margin (Fig. 68). Anal tube wide (in dorsal view) (Fig. 65), with apical angles in shape of long massive processes slightly curved in lateral view (Fig. 64). Anal column short. Phallobase long and narrow (in ventral and lateral views). Each dorso-lateral phallobase lobe with large semicircular process on its ventral margin near the base of ventral aedeagal hooks and narrow subapical serrate lobe reaching the level of semicircular process (in lateral view) (Fig. 66). Ventral phallobase lobe long and wide, with small acute projection apically. Aedeagus with pair of long relatively narrow bifurcated apical processes, with acute apices. Ventral aedeagal hooks long, almost half of phallobase length, narrowing apically. Style without neck, with hind margin concaved

(Fig. 67). Margin of style under the capitulum with acuminate ledge. Capitulum of style narrow and long, truncate apically (in dorsal view), with wide lateral tooth.

Female. Hind margin of sternum VII widely concave, without processes. Anal tube wide, truncate apically. Anal column short.

Total length. Males: 6.7–7.0 mm. Female (specimen deformed): about 7.5 mm.

Distribution. Java.

Comparison. The species is closely related to *B. angustinaso* sp. n. It differs from the last species by coloration and details of male genitalia structure.

Note. The place “Candelay” was not located on the map.

Etymology. The species is named after famous Dutch paleontologist Eugene Dubois (1858–1940) who discovered *Pithecanthropus erectus* in Java.

***Bardunia curvinaso* sp. n.**

Figures 11–12, 15, 49–55

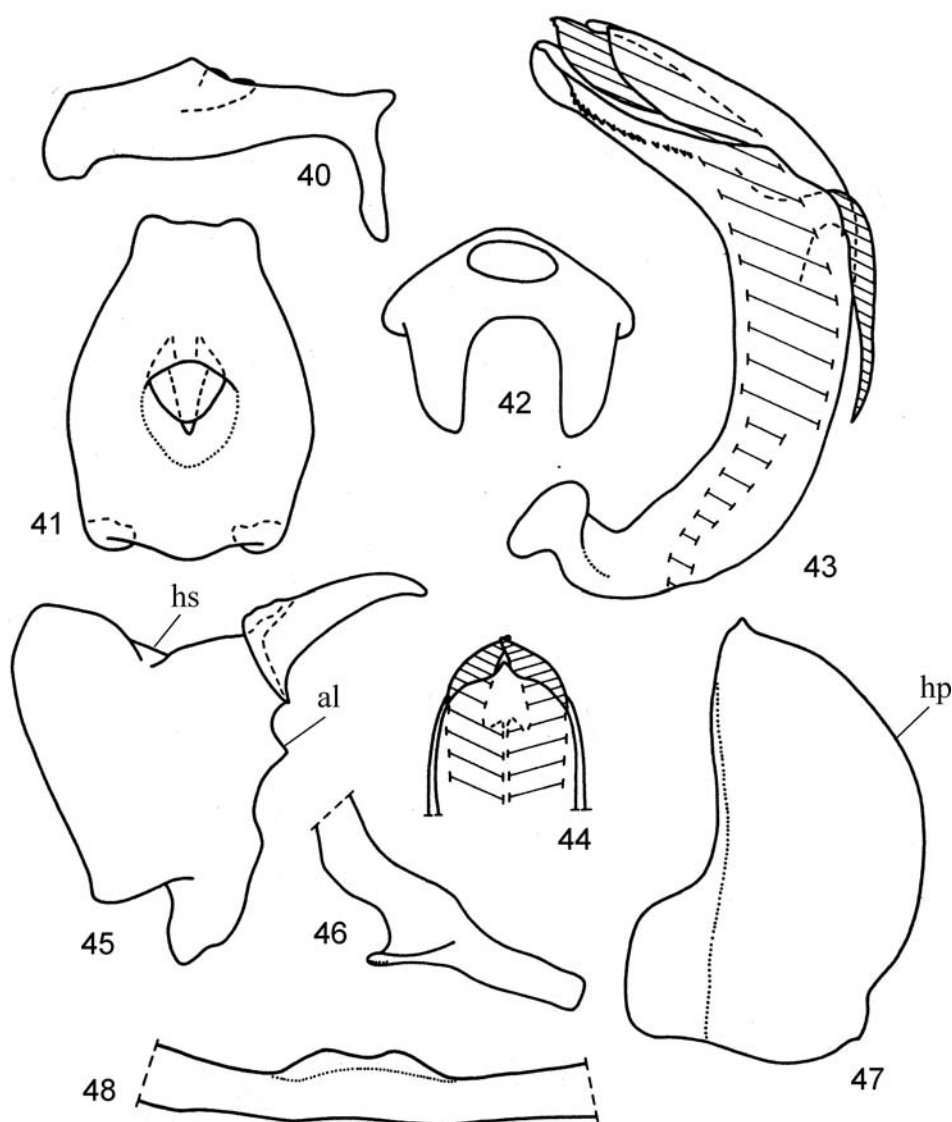
Type material. Holotype, ♂, Vietnam, Hoa Binh, Yen Thuy Da Phua, 100 m, 4.V.2002, S.A. Belokobylskij leg. (ZIN).

Description. Metope weakly enlarged to the apex of proboscis, with “long” swelling. Proboscis relatively short (in lateral view) (Figs 11, 15). Lateral keels of metope are not fused at apex of proboscis (small incision visible from above). Proboscis and clypeus are joint at acute angle in lateral view (Fig. 15). Coryphe transverse (Fig. 12). Hind tibia with two lateral spines distally.

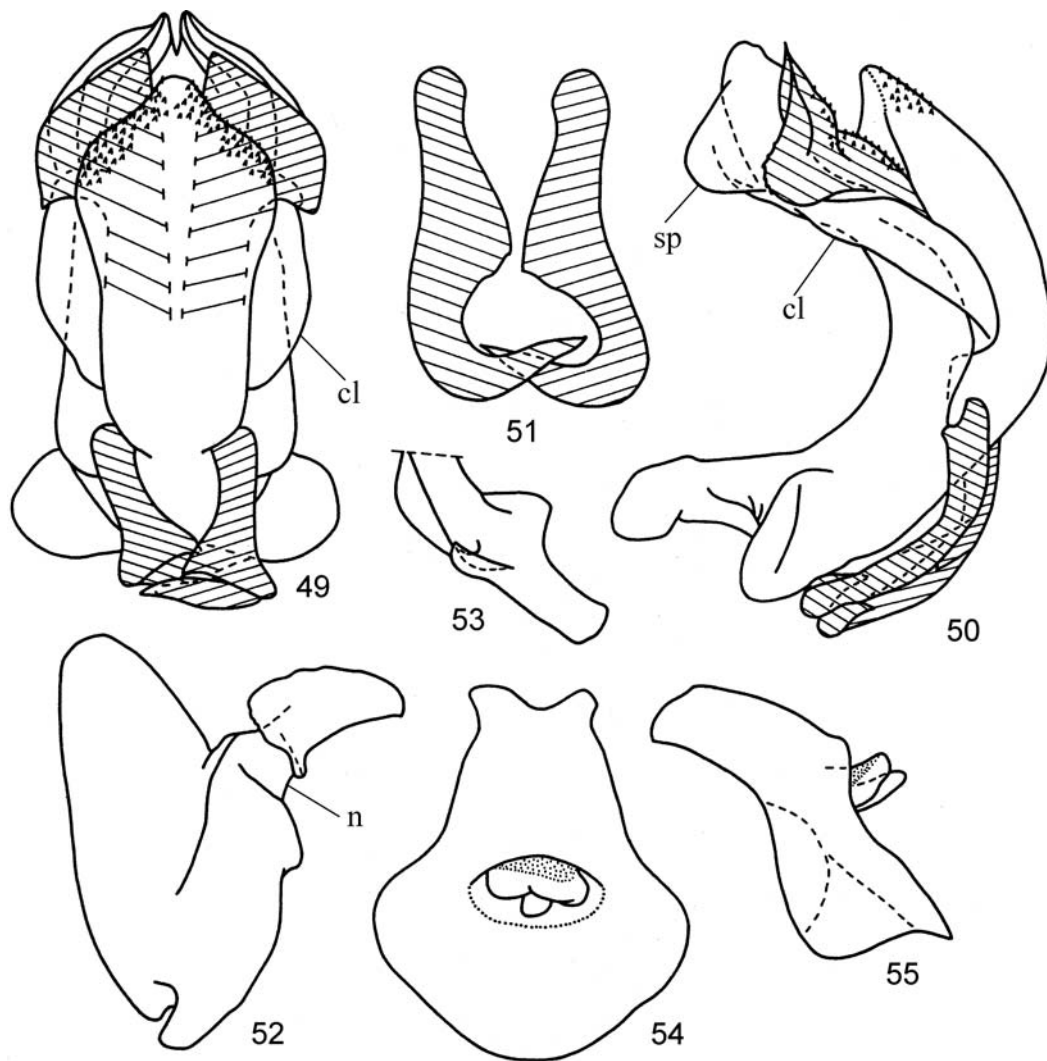
Coloration. Metope greenish brown, with dense dark brown or black dots. Metopial swelling black. Ante- and postclypeus dark brown or black excluding its latero-basal parts. Genae light yellow greenish. Coryphe,

pronotum, mesonotum, and abdominal tergites light yellow greenish, with brown and black dots. Fore wings brown, with black cells and reddish veins. Hind wings dark brown or black. Legs brown, with dark brown or black dots and spots.

Male genitalia (Figs 49–55). Anal tube enlarged apically (in dorsal view) (Fig. 54), apical angles in shape of semicircular processes (in lateral view) (Fig. 55). Anal column short. Phallobase horse-shoe shaped (in lateral view) (Fig. 50). Each dorso-lateral phallobase lobe with pair of processes: semicircular subapical one and elongate, wide, collar-shaped one below (Figs 49–50). Ventral phallobase lobe long, wide, narrowing to apex, with denticles (Fig. 49). Apical aedeagal processes significantly enlarged before its apices. Ventral aedeagal hooks long, wide, strongly curved, tongs-shaped (Fig. 51). Each ventral hook with large projec-



Figures 40–48. *Bardunia angustinaso* sp. n. 40–47. Male genitalia, holotype; 48. Female sternum VII, paratype. 40–42. Anal tube in lateral (40), dorsal (41) and caudal (42) views; 43. Penis in lateral view; 44. Apex of penis in ventral view; 45. Style in lateral view; 46. Capitulum of style in dorsal view; 47. Pygofer in lateral view. Abbreviations: **al** – acuminate ledge; **hp**, **hs** – hind margin.



Figures 49–55. *Bardunia curvinaso* sp. n., holotype, male genitalia. 49–50. Penis in ventral (49) and lateral (50) views; 51. Aedeagal hooks in ventral view; 52. Style in lateral view; 53. Capitulum of style in dorsal view; 54–55. Anal tube in dorsal (54) and lateral (55) views. Abbreviations: **cl** – collar-shaped process; **n** – neck of style; **sp** – semicircular process.

tion internally. Style with strongly concave hind margin (Fig. 52). Margin of style under the capitulum with keel-shaped ledge. Capitulum of style on short neck, with wide lateral tooth. Capitulum of style relatively wide, truncate apically (in dorsal view) (Fig. 53).

Total length. 8.0 mm.

Distribution. Northern Vietnam.

***Bardunia brevinaso* sp. n.**

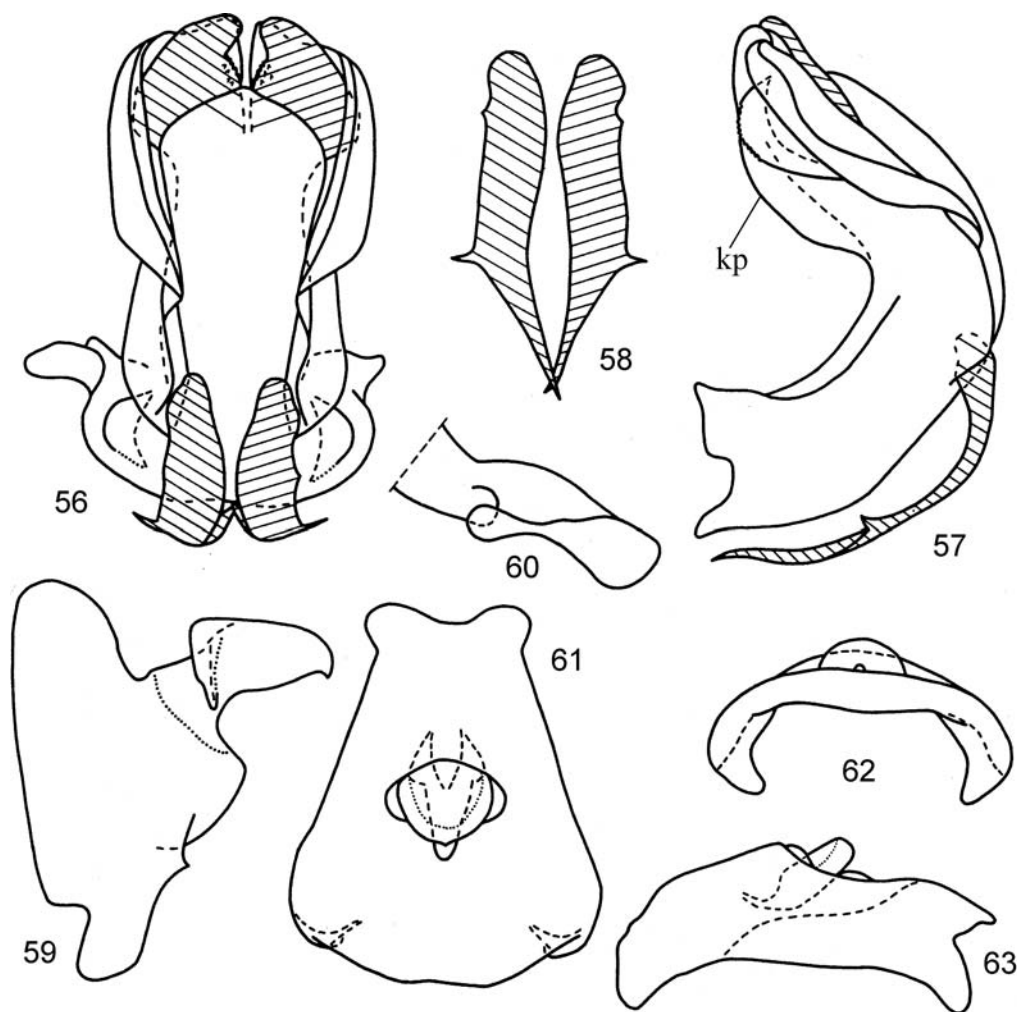
Figures 8–10, 56–63

Type material. Holotype, ♂, Laos, Phongsaly Province, environs of Ban Sano Mai, 21°21' N 102°03' E, 1150 m, 19–26.V.2004, Vit Kubáň (MMBC).

Description. Metope weakly enlarged to the apex of proboscis (Fig. 9). Lateral keels of metope are not fused at the apex of proboscis (large incision visible from above). Proboscis short, with “long” swelling (Figs 9–10). Coryphe transverse (Fig. 8).

Coloration. Generally brown yellowish, with dark brown or black dots and spots. Metopial swelling, almost all postclypeus, anteclypeus, apices of fore and middle tibiae, and tarsi black. Fore wings with reddish veins. Hind femora proximally dark brown or black.

Male genitalia (Figs 56–63). Anal tube wide, enlarged apically (in dorsal view) (Fig. 61), with apical angles in shape of narrowing apically processes (Figs 62–63). Anal column short. Phallobase curved at obtuse angle (in lateral view) (Fig. 57). Each dorso-lateral phallobase lobe with pair of processes: elongate collar-shaped one and semicircular, with serrate margin, subapical one behind the first one. Dorsal surface of the phallobase with elongate keel-shaped projection distally (Fig. 57). Ventral phallobase lobe long and wide, narrowing apically (Fig. 56). Apical aedeagal processes enlarged subapically. Ventral aedeagal hooks long and narrow, pincers-shaped, with acute apices. Each ventral hook with finger-shaped median process externally (Fig. 58). Style with strongly concave hind margin (Fig. 59). Margin of



Figures 56–63. *Bardunia brevinaso* sp. n., holotype, male genitalia. **56–57.** Penis in ventral (**56**) and lateral (**57**) views; **58.** Aedeagal hooks in ventral view; **59.** Style in lateral view; **60.** Capitulum of style in dorsal view; **61–63.** Anal tube in dorsal (**61**), caudal (**62**) and lateral (**63**) views. Abbreviation: **kp** – keel-shaped projection.

the style under the capitulum with keel-shaped ledge. Capitulum of style on short neck, with wide lateral tooth. Capitulum of style relatively wide, not narrowing apically (in dorsal view) (Fig. 60).

Total length. 7.0 mm.

Distribution. Northern Laos.

***Bardunia celebensis* sp. n.**

Figures 13–14

Type material. Holotype, ♀, [Indonesia], Celebes [Sulawesi], Kendari, IV.[18]74, O. Beccari leg. (MSNG).

Description. Metope is enlarged to the apex of proboscis, with tubercles and weak sublateral carinae. Proboscis as long as post- and anteclypeus together (in lateral view), with large swelling (Fig. 13). Proboscis and clypeus are joint at obtuse angle (Fig. 14). Coryphe weakly transverse, with straight anterior margin. Pronotum with tubercles. Mesonotum with weak lateral carinae. Hind tibia with two large lateral spines distally and single small spine proximally.

Coloration. Generally light brown yellowish, with dark brown dots and spots. Metopial swelling and anteclypeus black. Genae dark brown or black under the lateral keels of metope. Fore wings with reddish longitudinal veins and dark brown cells. Hind wings black.

Female genitalia. Sternum VII with weakly concave hind margin (wedge-shaped). Anal tube truncate apically.

Total length. 9.0 mm.

Distribution. Sulawesi.

Specimen incerta sedis

***Bardunia* sp.**

Material examined: **Indonesia:** 1 ♀, O. Sumba, Prai Jawang, Rende Wai, 13.VII.1949, Dr. Bühler & Dr. Sutter (NHMB).

Description. Lateral keels of metope are fused at the apex of metopial proboscis (without incision). Hind margin of female sternum VII with pair of short rounded processes medially. Anal tube rounded apically.

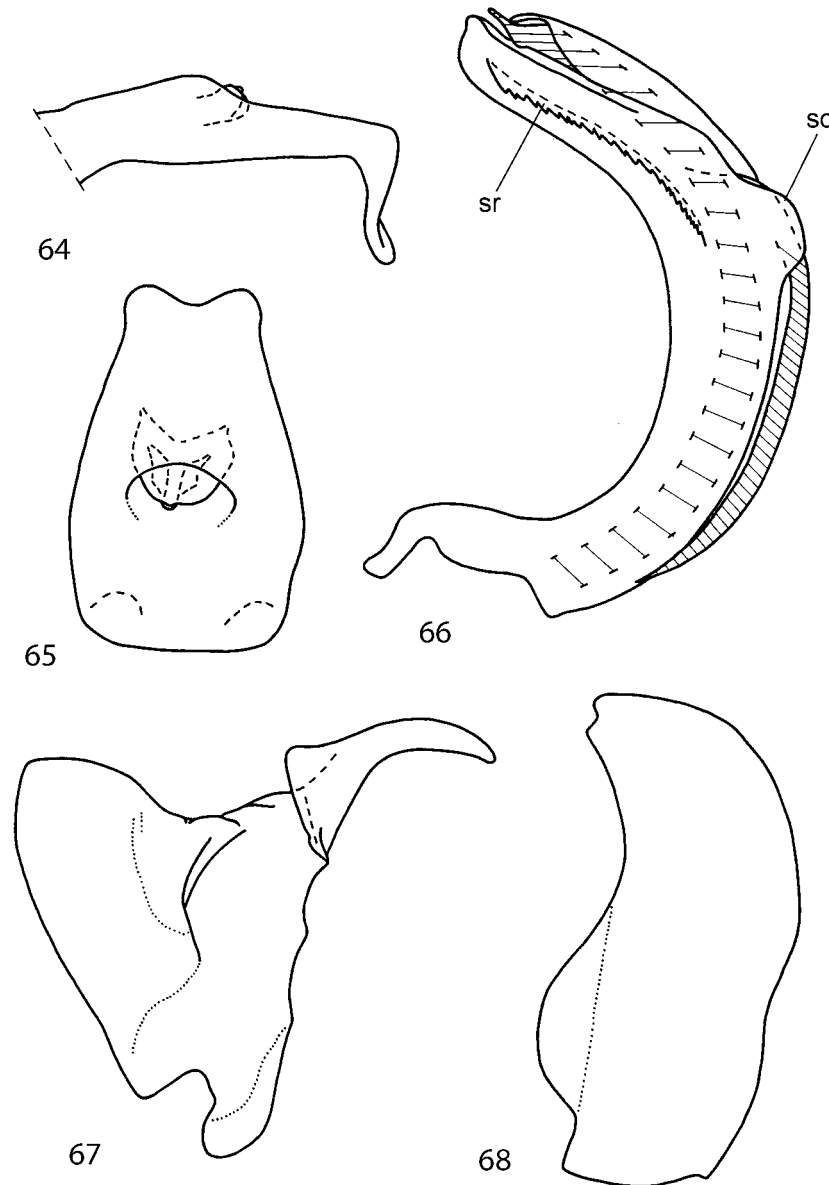
Total length. 8.0 mm.

Note. According to the shape of hind margin of female sternum VII the specimen is close to *B. angustinaso*.

stinaso sp. n. Final decision about taxonomic position of this specimen may be done after examination of male.

Key to species

1. Proboscis short (Figs 8, 10) *B. brevinaso* sp. n. 2
- Proboscis long (Figs 1–7, 11–14) 2
2. Proboscis relatively narrow apically in lateral view (Figs 7, 18) *B. angustinaso* sp. n. 3
- Proboscis relatively wide apically in lateral view (Figs 2, 5, 11, 14–17) 3
3. Proboscis in lateral view as long as post- and anteclypeus together *B. celebensis* sp. n. 4
- Proboscis in lateral view shorter than post- and anteclypeus together 4
4. Coryphe nearly square (Fig. 1) *B. nasuta* Stål 5
- Coryphe transverse, 1.5–2.0 times as wide as long (Figs 3–4, 12) 5
5. Proboscis and clypeus are joint at acute angle in lateral view (Fig. 15) *B. curvinaso* sp. n. 6
- Proboscis and clypeus are joint at obtuse angle in lateral view (Fig. 17) 6
6. Phallobase narrow in lateral view, without process on its dorsal surface (Fig. 66) *B. duboisi* sp. n. 7
- Phallobase wide in lateral view, with long process on its dorsal surface (Figs 20, 34) 7



Figures 64–68. *Bardunia duboisi* sp. n., paratype, male genitalia. **64–65.** Anal tube in lateral (**64**) and dorsal (**65**) views; **66.** Penis in lateral view; **67.** Style in lateral view; **68.** Pygofer in lateral view. Abbreviations: **sc** – semicircular process; **sr** – subapical serrate lobe.

7. Hind tibia with 2–3 lateral spines. Phallobase with long horn-shaped subapical process and with pair of narrow lobes below ventral hooks on each side (Fig. 20, lb). Dorsal surface of the phallobase with wide (in lateral view) chamber-shaped process. Apex of male anal tube without processes (Fig. 24). *B. rugifrons* (Melichar)
- Hind tibia with single lateral spine. Phallobase with short horn-shaped subapical process and without lobes below ventral hooks on each side (Fig. 34). Dorsal surface of the phallobase with narrow (in lateral view) chamber-shaped process. Apex of male anal tube with pair of weakly sclerotized processes (Fig. 38). *B. papua* sp. n.

Discussion

No data on ecology of the genus *Bardunia* is available. Apparently the species of the genus mimic curculionid beetles as it was supposed generally for the members of the tribe Parahiraciini (Shelford 1902; Gnezdilov & Wilson 2007).

According to the structure of male genitalia there are three groups of species. First group includes *B. curvina* sp. n. and *B. brevinaso* sp. n. from Northern Vietnam and Northern Laos. The species are closely related according to the following features: ventral aedeagal hooks tongs- or pincers-shaped (Figs 51, 58), each dorso-lateral phallobase lobe with pair of processes – one elongate collar-shaped and one semicircular (Figs 50, 57), margin of style under the capitulum with keel-shaped ledge (Figs 52, 59).

Second group includes *B. rugifrons* (Melichar) and *B. papua* sp. n. which have peculiar anal tube, with its apical part turned down (Figs 23–24, 37–39) and dorsal surface of the phallobase with long chamber-shaped process (Figs 20, 34).

Third group includes *B. angustinaso* sp. n. and *B. duboisi* sp. n. which are distinguished by narrow phallobase (Figs 43, 66).

Males are in need to make clear the position of *B. nasuta*, *B. celebensis* sp. n., and unidentified female from Sumba within the genus.

On the other hand according to the shape of hind margin of female sternum VII there are two groups of species. First group includes *B. nasuta*, *B. rugifrons*, and *B. celebensis* sp. n. characterized by wedge-shaped hind margin of the sternum (Figs 30–32). *B. nasuta* differs from two other species by peculiar step below the concavity of hind margin (Fig. 32). Second group includes *B. angustinaso* sp. n. and *B. duboisi* sp. n. characterized by widely concave hind margin of the sternum, with pair of short rounded processes medially in first species (Fig. 48).

Acknowledgements

I am sincerely grateful to Dr. Michael R. Wilson (Cardiff, UK), Mr. Mick Webb (London, UK), Dr. Igor Malenovský (Brno, Czech Republic), Dr. Fabio Penati (Genova, Italy), Dr. Hans Duffels and Dr. Willem Hogenes (Amsterdam, The Netherlands), Dr. Jan van Tol (Leiden, The Netherlands), Dr. Daniel Burckhard (Basel, Switzerland), Prof. Dr. Hannelore Hoch, Dr. Manfred Asche, Dr. Roland

Mühlethaler and Dr. Jürgen Deckert (Berlin, Germany) for their support and opportunity to study the material. The study was financially supported by the Royal Society' London (UK), the Russian Foundation for Basic Research (08–04–00134), and the Humboldt Stiftung (Germany).

References

- Bourgoin, T. 1993. Female genitalia in Hemiptera Fulgoromorpha, morphological and phylogenetic data. – *Annales de la Société Entomologique de France* (N.S.) 29 (3): 225–244.
- Emeljanov, A. F. 1995. On the problem of classification and phylogeny of the family Delphacidae (Homoptera, Cicadina) taking into consideration larval characters. – *Entomologicheskoe obozrenie* 74 (4): 780–794. [In Russian with English summary]. English translation published in *Entomological Review* 75 (9): 134–150.
- Gnezdilov, V. M. 2002. Morphology of the ovipositor in members of the subfamily Issinae (Homoptera, Cicadina, Issidae). – *Entomologicheskoe obozrenie* 81 (3): 605–626. [In Russian with English summary]. English translation published in *Entomological Review* (2004) 82 (8): 957–974.
- Gnezdilov, V. M. 2003. Review of the family Issidae (Homoptera, Cicadina) of the European fauna, with notes on the structure of ovipositor in planthoppers. – *Chteniya pamyati N. A. Kholodkovskogo* (Meetings in memory of N. A. Choldkovsky) 56 (1): 1–145. [In Russian with English summary].
- Gnezdilov, V. M. & Wilson, M. R. 2005. New genera and species of the tribe Parahiraciini (Hemiptera, Fulgoroidea, Issidae). – *Acta Entomologica Slovenica* 13 (1): 21–28.
- Gnezdilov, V. M. & Wilson, M. R. 2007. Review of the genus *Scantinius* Stål with notes on the tribe Parahiraciini Cheng & Yang (Hemiptera: Auchenorrhyncha: Fulgoroidea: Issidae). – *Arthropod Systematics & Phylogeny* 65 (1): 101–108.
- Melichar, L. 1906. *Monographie der Issiden* (Homoptera). – *Abhandlungen der K. K. Zoologisch-Botanische Gesellschaft in Wien* 3 (4): 1–327.
- Shelford, R. 1902. Observations on some mimetic insects and spiders from Borneo and Singapore. With appendices containing descriptions of new species by R. Shelford, Dr. Karl Jordan, C. J. Gahan, the Rev. H. S. Gorham, and A. Senna. – *Proceedings of the Zoological Society of London* 2: 230–284.
- Stål, C. 1863. Hemipterorum exoticorum generum et specierum nonnullarum novarum descriptiones. – *Transactions of the Entomological Society of London* (Serie 3) 1: 571–603.
- Zhang, Z. G. & Chen, X. S. 2008. Two new species of the Oriental genus *Neodurium* Fennah (Hemiptera: Fulgoroidea: Parahiraciini) from Southwest China. – *Zootaxa* 1785: 63–68.
- Zhang, Z. G. & Chen, X. S. 2009. Revision of the Oriental issid genus *Tetricodes* Fennah (Hemiptera: Fulgoroidea: Issidae) with the description of one new species. – *Zootaxa* 2094: 16–22.
- Zhang, Z. G. & Chen, X. S. 2010. Two new genera of the tribe Parahiraciini (Hemiptera: Fulgoromorpha: Issidae) from China. – *Zootaxa* 2411: 44–52.