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### Monograph

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## Revision of the genus *Miridiba* Reitter, 1902 (Coleoptera, Scarabaeidae, Melolonthinae): genital morphotypes and new taxonomic data

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**Abstract.** The genus *Miridiba* Reitter, 1902, of phytophagous chafers from Asia, is revised based on external morphological and genital (male and female) characters. In this study, a total fifty-eight species of *Miridiba* were examined, and the genus is redescribed. Male genital characters of *Miridiba*, especially the morphology of parameres and endophallus, are studied in depth herein. The female genitalia of *Miridiba* are studied and described in detail for the first time. According to genital characters, nine genital morphotypes, including fifty-four species, are established under the genus *Miridiba*. Sixty-seven type specimens are studied. *Miridiba gressitti* (Frey, 1970) comb. nov., *Miridiba borneensis* (Moser, 1918) comb. nov., *Miridiba coxalis* (Arrow, 1944) comb. nov., *Miridiba rugaticollis* (Moser, 1913) comb. nov., *Miridiba nigrescens* (Moser, 1916) comb. nov., *Miridiba scutata* (Reitter, 1902) comb. nov., *Miridiba ciliatipennis* (Moser, 1903) comb. nov. and *Miridiba brunneipennis* (Moser, 1916) comb. nov. are transferred from *Holotrichia*. *Holotrichia dalatensis* Frey, 1970 is transferred to *Miridiba* as a synonym of *Miridiba sinensis* (Hope, 1842). Four junior subjective synonyms are proposed: *Miridiba pilosella* (Moser, 1908) (= *Holotrichia formosana* Moser, 1909), *Miridiba sinensis* (= *Holotrichia dalatensis* Frey, 1970), *Miridiba scutata* (= *Holotrichia scutulata* Dalla Torre, 1912 and *Miridiba lassallei* Keith, 2010). *Miridiba frontalis* (Fairmaire, 1886) is resurrected as a valid species. A key to 51 of the 58 valid species of *Miridiba* is presented.

**Keywords.** *Miridiba*, morphology, genital morphotypes, genitalia, taxonomy.

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## Introduction

*Miridiba* Reitter, 1902 (Scarabaeidae: Melolonthinae: Rhizotrogini) is an Asian genus, named and described for a single species *Rhizotrogus trichophorus* Fairmaire, 1891 based on 9-segmented antennae, the presence of a transversal frontal carina at the basal part and simple tarsal claws with a basal tooth developed (Reitter 1902). Prior to this study, *Miridiba* comprised 42 known species distributed in the Oriental and Palaearctic regions (Coca-Abia 2008; Schoolmeesters 2018). *Miridiba trichophora* (Fairmaire, 1891), *Miridiba sinensis* (Hope, 1842), *Miridiba formosana* (Moser, 1909) and *Miridiba castanea* (Waterhouse, 1875) are the most common species, occurring mainly in East Asia (Liu *et al.* 1997; Kim 2011). In northern and southern China, these species are considered pests of grain and other cash-crops because of the rhizophagous habits of larvae. Besides, the short and quick development (one generation per year) of the three former species (*M. trichophora*, *M. sinensis* and *M. formosana*) implies a rapid proliferation of populations, increasing the agricultural damage (Zhang 1984; Wei *et al.* 1989). The important economic losses caused by these species in Asian agriculture justifies the taxonomic study of *Miridiba* species.

Reitter (1902) described *Pledina* as a subgenus of *Holotrichia* Hope, 1837, including *Holotrichia sinensis* Hope, 1842 and *Holotrichia castanea* Waterhouse, 1875, for taxa bearing 10-segmented antennae, a developed frontal carina and claws with a tooth perpendicular to the claw axis (appendiculate). The genera *Neodontocnema* Arrow, 1948 and *Hippotrichia* Arrow, 1948 were described to separate the Oriental species from those of the West Indian taxa belonging to *Ancylonycha* Dejean, 1833 (Arrow 1948). Chang (1964), in a revision of the species from China, synonymized *Neodontocnema*, *Hippotrichia* and *Miridiba* with *Holotrichia* and considered *Pledina*, *Eotrichia* Medvedev, 1951 and *Holotrichia* s. str. subgenera of *Holotrichia*. Frey (1970, 1971) considered *Neodontocnema* a valid genus based on the 9-segmented antenna. Nomura (1977) treated *Pledina* as a subgenus of *Miridiba* and re-elevated *Miridiba* to generic level. Sabatinelli (1983) and Sabatinelli & Migliaccio (1982), ignoring the papers of Chang (1964) and Nomura (1977), considered seven Himalayan species as belonging to *Neodontocnema*. This genus was redefined and redescribed according to external morphology and male genitalia, and the taxonomic status of *Neodontocnema*, *Hippotrichia* and *Shangaia* Lucas 1920, as synonyms of *Miridiba*, was confirmed (Coca-Abia 2008), in which twenty-seven species were confirmed in *Miridiba*, distinguished by external morphological characters and male genitalia. More recently, Bezděk (2016) considered *Miridiba* with two subgenera, *Miridiba* s. str. with twenty species and *Pledina* with one species. The aims of this paper are: i) to review the taxonomy of *Miridiba*; ii) to provide a detailed re-description of the genus *Miridiba*, its external morphology and genitalia (male and female); iii) to identify genital morphotypes (male and female), grouping species by them and iv) to establish a key that allows the correct identification of the species of *Miridiba*. In this paper, the endophallus, temones and the female genitalia are used in the taxonomy of *Miridiba* for the first time.

## Material and methods

Sixty-seven type specimens of twenty-eight *Miridiba* species and eight synonymous taxa (including eleven types of synonymous taxa), from the Oriental and Palaearctic regions, were studied. For a list of institutional and private collections which loaned the type specimens, see Abbreviations.

### Specimens and genitalia preparation procedure

The taxonomic discussion is based on external morphology and genital characters (male and female). Adult specimens were relaxed in boiling distilled water. Mouthparts, genitalia (male and female) and endophallus were removed and cleared in hot distilled water and 5% hot KOH solution for 5–10 minutes until completing clean and then rinsed in distilled water. These anatomical structures were studied in distilled water with a binocular Olympus SZX7. Afterwards, mouthparts and male genitalia (genital segment and tegmen) were fixed to a card pinned to the specimen. Endophallus and female genitalia

**Table 1.** Measures of external morphology structures.

Character	Measures	
	From	To
Total length	anterior clypeus margin	pygidium tip
Antennal club length	club tip	funicle insertion
Funicle length	club insertion	scape insertion
Scape length	funicle insertion	head insertion
Clypeus length	anterior clypeus margin from the most anterior edges	clypeal suture
Frons length	clypeal suture	frontal carina
Ocular ridge length	canthus tip	head insertion
Distance of inner spur to second or third tooth of protibia	insertion of inner spur	anterior edge of second or third tooth
Maximum anal plate length	anterior margin	posterior margin

were mounted on small slides with DMHF (dimethyl hydantoin formaldehyde resin) or included in small tubes with glycerol pinned to the specimen.

### Digital imaging and line drawings

Pictures were captured by an Optika Vision Pro digital camera attached to the binocular. Photographs of the habitus were taken with a Nikon D7100 digital camera with a Nikon AF-S 60 mm micro less and a lambency box. Helicon Focus 6 and Adobe Photoshop CS6 were used as digital imaging and drawing tools.

### Measurements

Measurements were taken with a micrometric objective associated with the binocular Olympus SZX7. The metric characters considered and how the measures were taken are shown in Table 1.

### Terminology

The terminology of the numeration of the abdominal segments and other features of adults' morphology follows Crowson (1955, 1981). The ventrites (visible sternites) are numbered from the first, which corresponds to the third abdominal segment until the sixth ventrite (eighth abdominal segment). On the other hand, the terminology employed to describe the male genitalia in this study is that specified by D'Hotman & Scholtz (1990a). According to these authors, there is some confusion about the orientation of the aedeagus. The tegmen is positioned laterally on one of its sides when at rest and requires rotation for copulation. Taking into account that in copula the male is fixed on the female's dorsal surface, the concave side of tegmen must be in ventral position in order for copulation to occur. Thereby, for this study, we consider the concave aspect of the tegmen to be ventral and the convex aspect dorsal, as in other Melolonthinae Leach, 1819 (Coca-Abia & Martín-Piera 1998). On the other hand, to specify the position of structures into the endophallus, we consider it at rest (invaginated). The term proximal refers to the cephalic end (anterior). On the contrary, the term distal refers to the caudal end (posterior). The

apical ostium of parameres and the vaginal ostium of the genital chamber are in the most caudal end of genitalia (in distal position). Therefore, all internal genital structures placed further from the ostium of parameres or vaginal ostium are at the proximal end. While the genital structures set nearer from the ostium of parameres or vaginal ostium are at the distal end.

### **Abbreviations**

#### **Structures of female genitalia**

- af = anal fold
- ag = accessory glands
- bc = bursa copulatrix
- ep = elongate plates of the median oviduct
- g = gonopore
- gf = gonopore fold
- mo = median oviduct
- ov = oviduct
- p = plate (sensorial)
- psc = peduncle of bursa copulatrix
- pg = pygidium
- r = rectum
- sp = spermatheca
- spg = spermatheca gland
- v = vulva
- vs = vestigial sternites
- vt = vestigial tergites

#### **Structures of male genitalia**

- cil = collum
- db = dorsal branch
- dba = dorsal branched structure
- ed = endophallus
- ma = membranous area
- nt = notch
- pb = phallobase
- rs = area of raspulae
- sc = scar
- spn = spines
- ssa = soft setal area
- tm = temones
- vb = ventral branch

### **Institutions or private collections**

- BMNH = Natural History Museum (NHMUK) (formerly British Museum, Natural History), London, UK
- DKC = Denis Keith Collection, Paris, France
- IZCAS = Institute of Zoology (IOZ), Chinese Academy of Sciences, China
- MFNB = Museum für Naturkunde (currently MfN), Berlin, Germany
- MHBU = The Museum of Hebei University, China
- MLUH = Martin-Luther-Universität Zoologische Sammlung, Halle, Germany
- MNHN = Muséum national d'histoire naturelle, Paris, France
- NHMB = Naturhistorisches Museum, Basel, Switzerland



- NSMT = National Museum of Nature and Science, Tokyo, Japan  
NWAUFU = Northwest A&F University of China  
SNSD = Senckenberg Naturhistorische Sammlungen Dresden (currently MTD), Germany  
SWU = Southwest University, Chongqing, China  
SYAU = Shenyang Agricultural University, China  
TMC = Takeshi Matsumoto Collection, Japan

## Results

Class Insecta Linnaeus, 1758  
Family Scarabaeidae Latreille, 1802  
Subfamily Melolonthinae Leach, 1819  
Tribe Melolonthini Leach, 1819  
Subtribe Rhizotrogina Burmeister, 1855

Genus *Miridiba* Reitter, 1902

*Miridiba* Reitter, 1902: 170.

*Holotrochus* Brenske, 1894a: 75 (non Erichson, 1840).

*Holotrichia* (*Pledina*) Reitter, 1902: 173.

*Shangaia* Lucas, 1920: 592.

*Neodontocnema* Arrow, 1948: 50.

*Hippotrichia* Arrow, 1948: 51.

*Miridiba* – Dalla Torre 1912: 248 (catalogue). — Lucas 1920: 420. — Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 673 (review). — Li *et al.* 2015: 522 (redescription; in key). — Bezděk 2016: 271 (catalogue). — Gao *et al.* 2018: 12 (catalogue); 2019: 461 (species list; in key).

*Holotrochus* – Dalla Torre 1912: 219 (catalogue). — Lucas 1920: 332 (as nom. nov. for *Holotrochus* Brenske; catalogue). — Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 674 (type material). — Bezděk 2016: 271 (catalogue).

*Holotrichia* (*Pledina*) – Dalla Torre 1912: 200 (catalogue). — Chang 1964: 145, 148 (species list; in key). — Nomura 1977 (as subgenus of *Miridiba*). — Smetana & Král 2006: 219 (catalogue).

*Neodontocnema* – Chang 1964: 145 (as synonym of *Holotrichia*). — Nomura 1977: 88 (as synonym of *Miridiba*). — Frey 1971: 223 (in key). — Smetana & Král 2006: 222 (catalogue). — Sabatinelli 1983: 123.

*Hippotrichia* – Chang 1964: 145 (as synonym of *Holotrichia*). — Nomura 1977: 88 (as synonym of *Miridiba*). — Smetana & Král 2006: 222. — Bezděk 2016: 271.

*Shangaia* – Itoh 1990: 5 (as synonym of *Miridiba*). — Smetana & Král 2006: 222 (catalogue). — Bezděk 2016: 271.

## Type species

*Rhizotrogus trichophorus* Fairmaire, 1891, by original designation (Reitter 1902).

## Diagnosis

Species of *Miridiba* are distinguished from other melolonthines by the following combination of features. Head densely punctate. Antennal club in both sexes shorter than stem. Mentum with dense pubescence between its palpi. Labrum strongly depressed at middle of anterior part. Posterior frontal carina transverse and well developed. Vertex finely punctate with short decumbent pubescence. Pronotal anterior margin widely flanged, lateral margins smooth (not serrated) or serrated. Foretibia with a pubescent longitudinal carina. Apices of first four tarsomeres of fore- and mesotarsi with a tuft

of setae ventrally. First ventrite under metacoxa, just its thickened posterior edge visible and not at the same level as next ventrite, with strong and short pubescence. Second ventrite densely punctate, with conspicuous and decumbent pubescence. Third and fourth ventrites with punctures and pubescence irregularly distributed, sparsely at middle and denser at sides. Fifth ventrite more or less depressed at posterior half, densely punctate and with conspicuous pubescence of different lengths. Sixth ventrite more or less concave, densely punctate and with conspicuous pubescence. Parameres with branches of variable shape. Genital chamber with reduced sternites or without them, median oviduct with wrinkled and/or hardened epithelium.

### **Redescription**

External morphology of *Miridiba* is distinguished by the following combination of features.

**COLORATION AND BODY SHAPE.** Brown, body strong, oblong; length 11.0–26.0 mm.

**HEAD.** Antenna 9, or 10 segmented, antennal club with 3 lamellae shorter than stem (funiculus and scape). Mouthparts: mentum with dense pubescence between palpi, with a notch at middle of anterior edge; galea of maxilla with well-developed teeth; mandible with strong wrinkled molar lobe; edge of incisor lobe depressed in dorsal view; labrum strongly depressed at middle (Coca-Abia 2008: figs 1–5). Clypeus densely punctate, shorter and wider than frons, with anterior edge emarginate to a greater or lesser extent or depressed at middle, arcuate or oblique laterally. Ocular canthus pubescent, flat, short (0.5 mm), start out below the clypeus. Frons densely punctate with frontal carina. Vertex with short conspicuous setae.

**PRONOTUM.** Widest at posterior half; pronotal surface more or less densely punctate; anterior margin widely flanged, narrowing towards lateral sides; posterior margin not flanged at least at middle; lateral margins smooth (not serrated) or serrated to a greater or lesser extent; anterior angles obtuse or acute, more or less projected; posterior angles obtuse. Prosternal process varying in shapes.

**SCUTELLUM.** With punctures more or less densely distributed, glabrous.

**ELYTRA.** Elytral surface without strong striations, at most with weak ones; sutural costa a little more developed than the other ones; punctures less defined than those of pronotum; epipleuron with or without marginal pubescence.

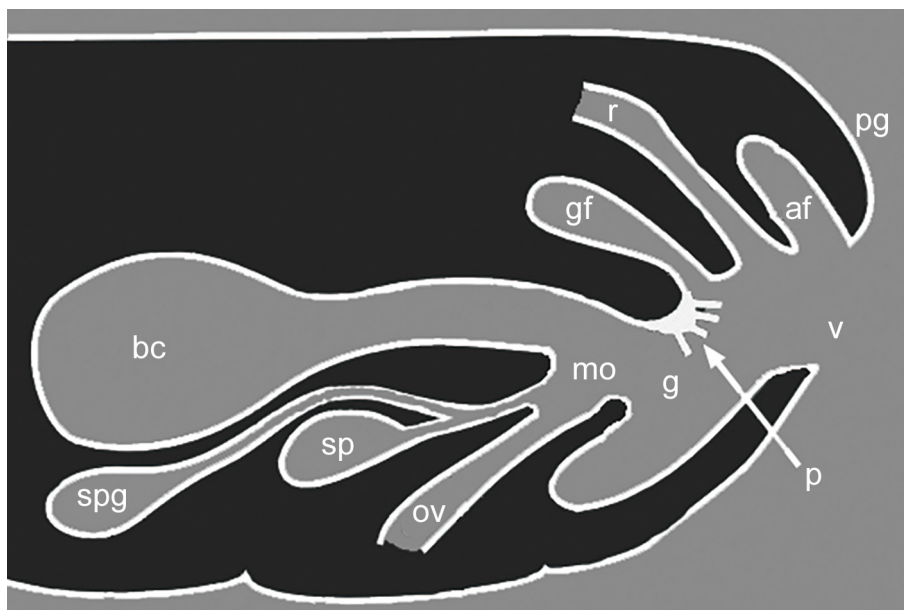
**LEGS.** Dorsal surface of foretibia with longitudinal carina developed to a greater or lesser extent and with a longitudinal row of pubescent punctures; three outer strong teeth spaced equally; insertion of inner spur between second and third outer tooth. Meso- and metatibia with transverse carina on outer surface complete or interrupted at middle; dorsal surface with or without spines. Metatibial plates with two articulated free spurs, proximal one behind tarsomere 1 and longer than distal one; the distal spur below tarsomere 1. Fore- and mesotarsi with a tuft of setae on apex underside of tarsomeres 1–4. Metafemora thick, surface with a row of coarse punctures near posterior margin with long and thick pubescence. Hind coxal plate rectangular shaped, with external free vertex forming a right angle. Tarsal claws sickle-shaped with one tooth developed at medial.

**ABDOMEN.** Pygidium with surface punctate and pubescent or glabrous. Ventrite 1 almost completely under metacoxa, just its thickened posterior edge visible, not at the same level as next ventrite, with short pubescence more or less dense. Ventrite 2 densely punctate and with conspicuous, short and decumbent pubescence. Ventrites 3 and 4 with punctures and pubescence irregularly distributed, punctures denser and deeper at sides together with short and sparse pubescence. Ventrite 5 moderately depressed at posterior half, densely punctate and with conspicuous pubescence in different lengths. Ventrite 6 (anal

plate) moderately concave, densely punctate with conspicuous pubescence, articulating by a complete suture. Ventrites 2–4 with the suture almost obliterated at middle.

**MALE GENITALIA.** Consisting of five parts: 1) Genital segment, derived from abdominal segment 9, resting on ventral wall of abdominal segments 7 and 8 (Krell 1996), consisting of a Y-shaped sclerite (spiculum gastrale), a vestigial sternite and a vestigial tergite, which acting as an anchor for aedeagus to abdominal wall through a connective membrane. 2) Tegmen derived from abdominal segment 10 (Krell 1996) consisting of parameres and phallobase (basal piece), both pieces articulated to each other. Parameres distinctively varying in shapes of dorsal and ventral branches among *Miridiba* species, apices of branches delimitating apical ostium (caudal); phallobase, a ventrally open structure partly obliterated by connective membrane, without sclerotized plates and with a gently dorsal strangulation as attachment point for connective membrane (Krell 1996). 3) Endophallus (internal sac of aedeagus) lying within tegmen anchored through connective membrane and temones, evaginated during copulation through apical ostium. Epithelium covered with soft sensillae, occasionally, with areas termed raspulae, with dense sensillae and with spines of different sizes and shapes probably acting as a mechanism to anchor endophallus inside female genital chamber during copulation (D'Hotman & Scholtz 1990b). 4) Temones, two dorsal elongate apophysis extending into basal piece; distal ends surrounding endophallus partially or completely. 5) Vesicula seminalis or caudal diverticulum, serving as a sperm reservoir.

**FEMALE GENITALIA.** Tubular type (Lindroth & Palmén 1970), usually membranous, with parts of structures sclerotized, consisting of five parts: 1) Genital chamber at posterior extension of oviduct behind sternum 8, symmetrical bilaterally, opens through vaginal ostium or vulva (Snodgrass 1935); dorsal wall with two folds (anal and gonopore folds), allowing its extension and retraction (Fig. 1); anal fold at posterior position with two pairs of vestigial tergites, one pair at each side of rectum; gonopore fold at anterior position above opening of median oviduct (gonopore) and below of anal fold (Fig. 1); ventral wall of gonopore fold with sensory structures (genital palps or styli) or plates located behind gonopore (Fig. 1); ventral anterior end of genital chamber without or with one pair of vestigial sternites



**Fig. 1.** Outline of the female genitalia of *Miridiba* Reitter, 1902 in lateral section. Abbreviations: see Material and methods throughout the figure captions.

weakly developed, sometimes with sensory setae. 2) Accessory glands, on each side of anterior end of genital chamber with a dark area; probably produce pheromone for sexual attraction (Zamotailov 1988). 3) Oviducts lead gonads from ovaries and opens ventrally to median oviduct, which is a wide chamber with wrinkled and/or hardened epithelium sclerotized to a greater or lesser extent, median oviduct is opened to genital chamber through gonopore (Fig. 1) locating beneath genital chamber when the female genitalia rest. 4) Bursa copulatrix, diverticulum with function of storage and enzymatic digestion of spermatophore to deliver sperm (Krell 1996), pedunculated, opens dorsally to median oviduct, with a pouch at proximal position with plicate epithelium and small setae of pressosensorial function (Sanmartín & Martín-Piera 2003), some species with sclerotized structures in peduncle. 5) Spermatheca (receptaculum seminis or seminal receptacle) with function of sperm storage after releasing from bursa copulatrix, pedunculated with a pouch at proximal position, opens to median oviduct ventrally. Spermathecal gland, longer than spermatheca, opens at spermathecal tract just below pouch, its secretion leads sperm chemotactically through a concentration gradient from spermatophore to spermatheca (Krell 1996). Both spermathecal and its gland have a distal tubular duct and a proximal caecum more or less globular.

### **Distribution**

Species of *Miridiba* are documented in the eastern Palaearctic Region (China, Japan, Korean Peninsula, Far East of Russia) and Oriental Region (India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam).

### **Genital morphotypes**

Based on the examination of type series of twenty-eight species and eight synonymous taxa of *Miridiba*, nine genital morphotypes were established and described as follows.

#### **Morphotype I “*Trichophora*”**

Figs 2–4

##### **Male genitalia**

Parameres (Fig. 2) consisting of two dorsal and two ventral thin branches separated in dorsal, ventral and lateral views; dorsal branches longer than ventral ones; branches start from a collar-shaped structure, termed *collum* at proximal part of parameres close to phallobase; collum short, with a suture dorsally and ventrally sclerotized to a greater or lesser extent. Endophallus (Fig. 3) slim and graceful with spines becoming larger towards distal end and in some species arranged helicoidally around internal walls of the sac, some species with large spines or raspulae in distal end. Temonos (Fig. 3) laid at proximal half of endophallus; gently developed, seldom strongly developed, apophysis fused at proximal end.

##### **Female genitalia** (Fig. 4)

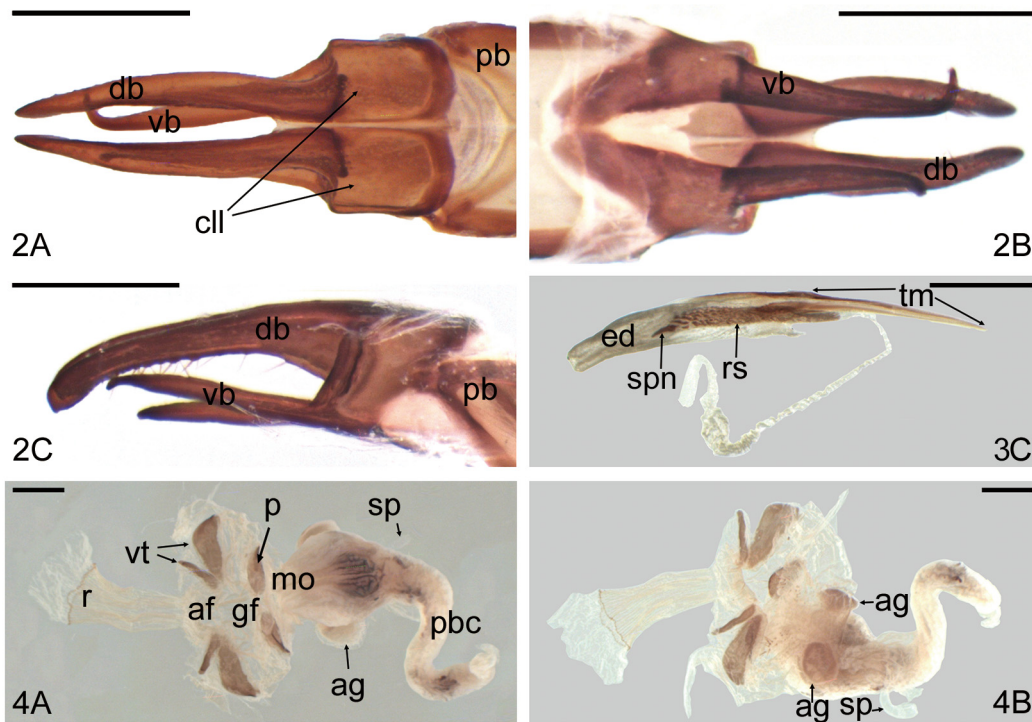
Anal fold with one tergite of each pair distinctly reduced; gonopore fold with a pair of sensory plates in oval-transverse shaped, plates with sensilla at posterior margin; vestigial sternites absent or weakly developed with a few sensillae. Median oviduct with wrinkled and/or hardened epithelium sclerotized to a greater or lesser extent. Bursa copulatrix with striated pouch. Spermatheca with short peduncle.

#### **Morphotype II “*Gressitti*”**

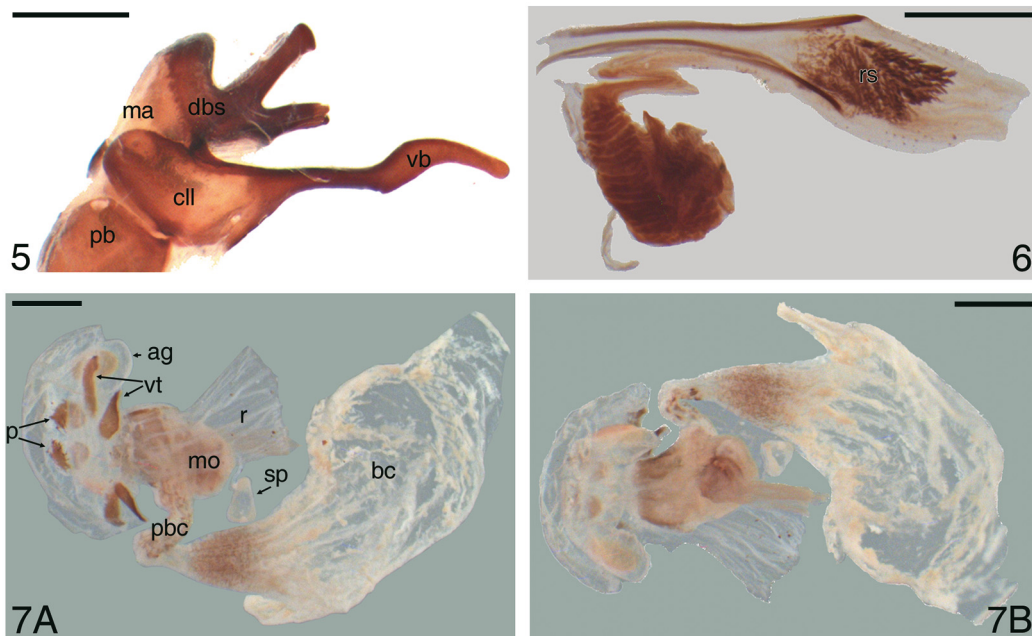
Figs 5–7

##### **Male genitalia**

Parameres (Fig. 5) with a dorsal complex divided into three parts, upper part continuous and joined to collum by a membrane, intermediate and lower parts each with two branches. Two ventral branches



**Figs 2–4.** Morphotype I “*Trichophora*”. 2–3. Male genitalia of *M. trichophora* (Fairmaire, 1891), paralectotype (MNHN). 2. Parameres in dorsal (A), ventral (B) and lateral (C) views. 3. Endophallus in lateral view. 4. Female genitalia of *M. abdominalis* (Hope, 1831), lectotype (BMNH), in dorsal (A) and ventral (B) views. Scale bars = 1.0 mm.



**Figs 5–7.** Morphotype II “*Gressitti*”. 5–6. Male genitalia of *Miridiba herteli* (Frey, 1971), paratype (NHMB). 5. Parameres in lateral view. 6. Endophallus and temones in dorsal view. 7. Female genitalia of *M. gressitti* (Frey, 1970), paratype (NHMB) in dorsal (A) and ventral (B) views. Scale bars = 1.0 mm.

simple and similar to those of morphotype I. Endophallus slim and raspulae conspicuous or gently at distal end, spines absent (Fig. 6). Temones laid at proximal half of endophallus, thin and apophysis separated each other (Fig. 6).

**Female genitalia** (Fig. 7)

Anal fold with all vestigial tergites similar in size; gonopore fold with a pair of elongate plates with sensillae at posterior edge; vestigial sternites weakly developed with a few sensillae. Median oviduct with wrinkled and hardened epithelium and two rectangular plates at distal dorsal wall. Pouch of bursa copulatrix striated with punctate sensillae. Spermatheca with short peduncle.

**Morphotype III “*Leucophthalma*”**

Fig. 8

**Male genitalia** (Fig. 8)

Parameres (Coca-Abia 2008: fig. 17) consisting of dorsal and ventral branches separated in ventral and lateral views; dorsal branches only separated in distal end. Two ventral branches longer than dorsal ones, strong and curved downward. Collum absent. Endophallus with an area of soft setae, hair-like, at distal end, in some species spines arranged helicoidally around internal walls of sac. Temones laid at proximal half of endophallus, reduced; apophysis fused at proximal end.

**Female genitalia**

Anal fold with all vestigial tergites similar in size; gonopore fold with plates varying in shapes with sensillae at posterior margin; vestigial sternites weakly developed with or without sensillae. Median oviduct strongly sclerotized. Peduncle of bursa copulatrix very long. Spermathecal reduced, gland strongly developed with caecum longer than tubular duct.

**Morphotype IV “*Bidentata*”**

Figs 9–11

**Male genitalia**

Parameres (Fig. 9) consisting of one dorsal and two ventral branches separated in lateral and ventral views. Presumably, dorsal branch resulted of two branches coalescence, showing a central sutural scar toward apical ostium varying in shapes and designs at distal end. Ventral branches bilaterally symmetrical, outer edge curved and elevated or straight; inner edge straight and converge at distal end. Collum absent. Endophallus (Fig. 10) with a few spines and, in some species, raspulae with dense sensillae. Temones laid at proximal half of endophallus, apophysis joined at proximal end, some species with distal ends surrounding endophallus partially (T-shaped) (Fig. 10).

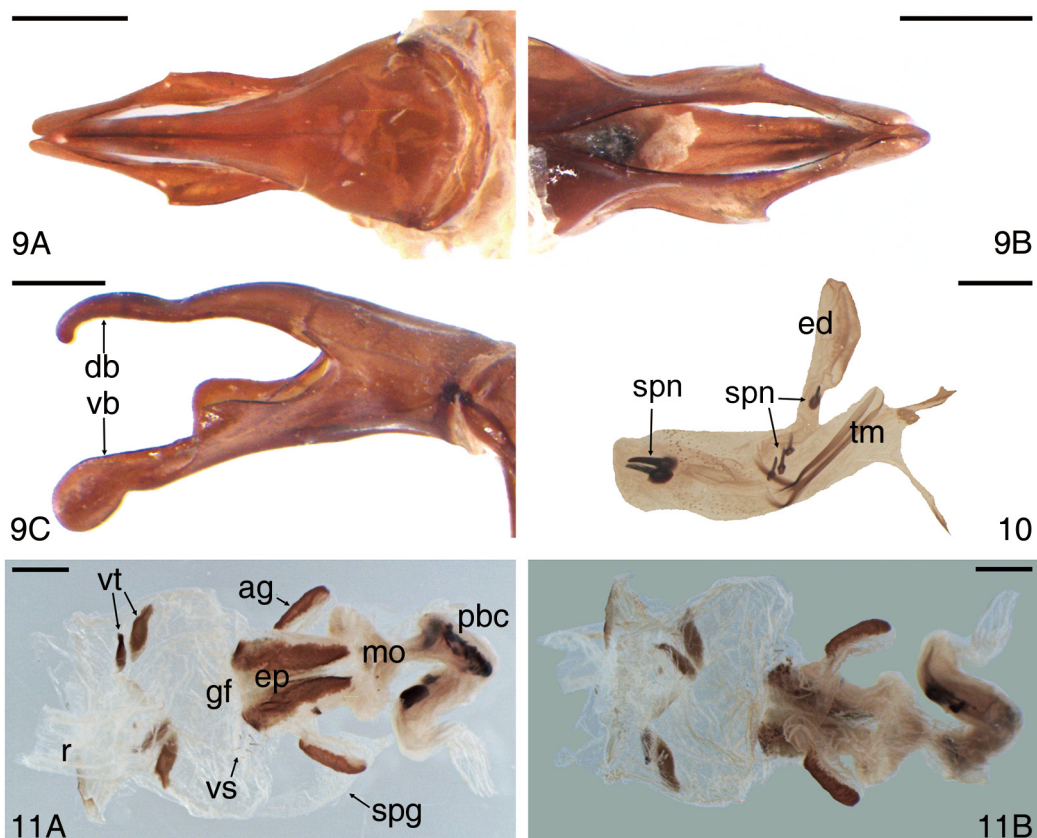
**Female genitalia** (Fig. 11)

Anal fold with all vestigial tergites similar in size; gonopore fold with a pair of plates, without sensillae, in rectangular-elongate shape extending into median oviduct dorsal wall; vestigial sternites weakly developed with a few sensillae. Median oviduct with wrinkled and/or hardened epithelium sclerotized to a greater or lesser extent. Bursa copulatrix with long peduncle. Spermatheca with short peduncle, gland with marked pouch.





**Fig. 8.** Morphotype III “*Leucophthalma*”. Male genitalia of *M. leucophthalma* (Wiedemann, 1819) (non-type, MFNB). Parameres in dorsal (A) and lateral (B) views. Scale bars = 1.0 mm.



**Figs 9–11.** Morphotype IV “*Bidentata*”. **9–10.** Male genitalia of *M. behrensi* Brenske, 1892, lectotype (MFNB). **9.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **10.** Endophallus and temones in ventral view. **11.** Female genitalia of *M. saigonensis* (Moser, 1912), ?syntype (MFNB) in dorsal (A) and ventral (B) views. Scale bars = 1.0 mm.

**Morphotype V “*Sinensis*”**

Figs 12–14

**Male genitalia**

Parameres (Fig. 12) consisting of two dorsal and two ventral branches separated in dorsal and ventral views and fused laterally. Lateral scars, presumably, formed by the fusion of dorsal and ventral branches, or joined totally or partially by a lateral membranous area. Dorsal branches with symmetrical or asymmetrical design; collum undefined in lateral view, with a membranous area in dorsal view. Ventral branches bilaterally symmetrical, straight and convergent at distal end. Phallobase shorter than paramere. Endophallus (Fig. 13) with a dense area of small spines (raspulae), stronger towards distal end, or raspulae absent, only acicular soft setae. Temonos laid at proximal half of endophallus, slender, apophysis separated each other (Fig. 13).

**Female genitalia** (Fig. 14)

Anal fold with all vestigial tergites similar in size; gonopore fold with a pair of short sensory elongate plates, with sensilla at posterior edge; vestigial sternites weakly developed without apparent sensillae. Median oviduct with wrinkled and hardened epithelium sclerotized to a greater or lesser extent. Bursa copulatrix with short peduncle, pouch arranged transversely. Spermatheca with short peduncle, gland very long.

**Morphotype VI “*Borneensis*”**

Figs 15–17

**Male genitalia**

Parameres (Fig. 15) consisting of two dorsal and two ventral branches separated in dorsal and lateral views. Dorsal branches varying in shapes, reduced and shorter than ventral ones. Ventral branches joined by a dorsal membrane and fused ventrally forming up a tubular structure through which endophallus passes; apices of ventral branches separate. Collum absent. Parameres and phallobase joined by a wide dorsal membrane varying in shapes. Endophallus (Fig. 16) almost empty, with few spines at middle of sac and inconspicuous sensillae. Temonos laid at proximal half of endophallus, apophysis joined, distal ends surrounding endophallus completely (Fig. 16).

**Female genitalia** (Fig. 17)

Anal fold with all vestigial tergites similar in size; gonopore fold with a pair of conspicuous plates varying in shapes without sensillae, extending into median oviduct dorsal wall; vestigial sternites absent; ventral wall of vulva with a gently sclerotized area with punctate sensillae. Median oviduct with wrinkled and/or hardened epithelium sclerotized to a greater or lesser extent. Bursa copulatrix with short peduncle. Spermatheca with long peduncle.

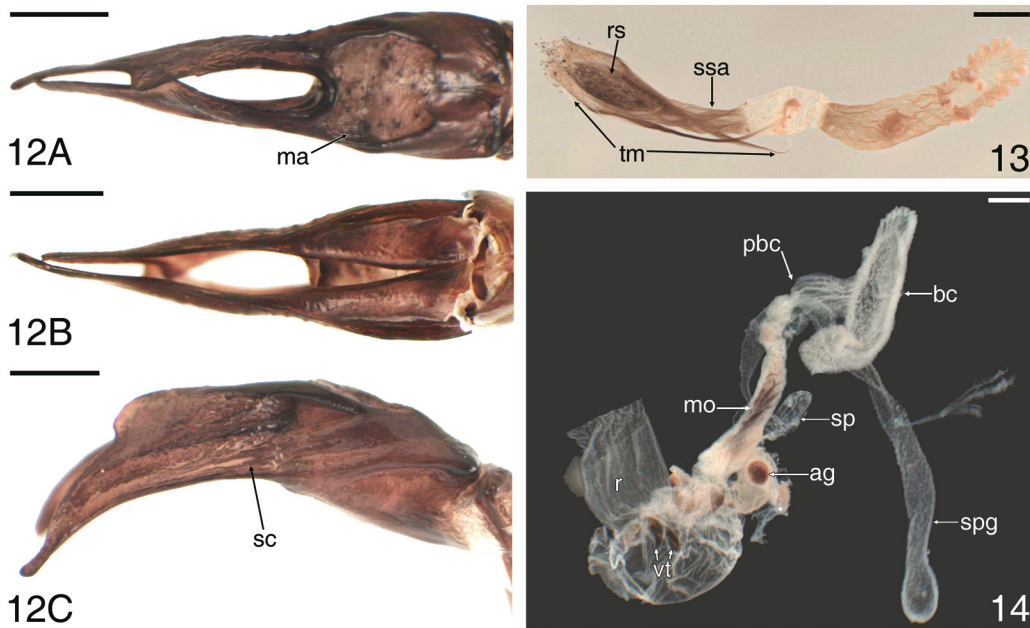
**Morphotype VII “*Rugaticollis*”**

Figs 18–19

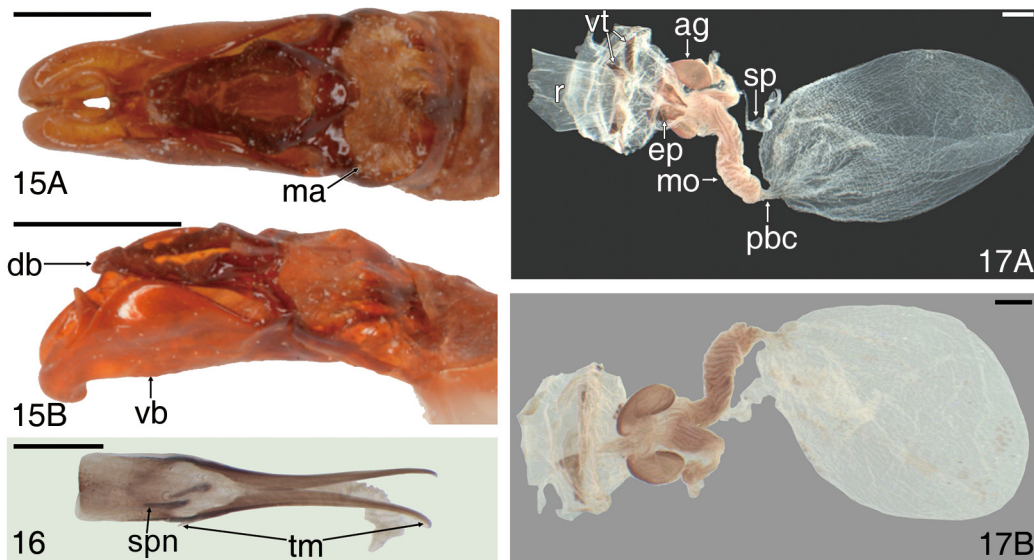
**Male genitalia**

Parameres (Fig. 18) consisting of one dorsal and two ventral branches. Presumably, dorsal branch resulted of two branches coalescence, showing a central sutural scar opened toward apical ostium. Dorsal branch thick and wide, gently narrowing toward apex in dorsal view; with a notch varying in shapes at distal end in lateral and ventral views. Collum undefined in lateral view and with a triangular-shaped area less sclerotized at proximal half. Ventral branches longer and thinner than dorsal ones, with apices gently

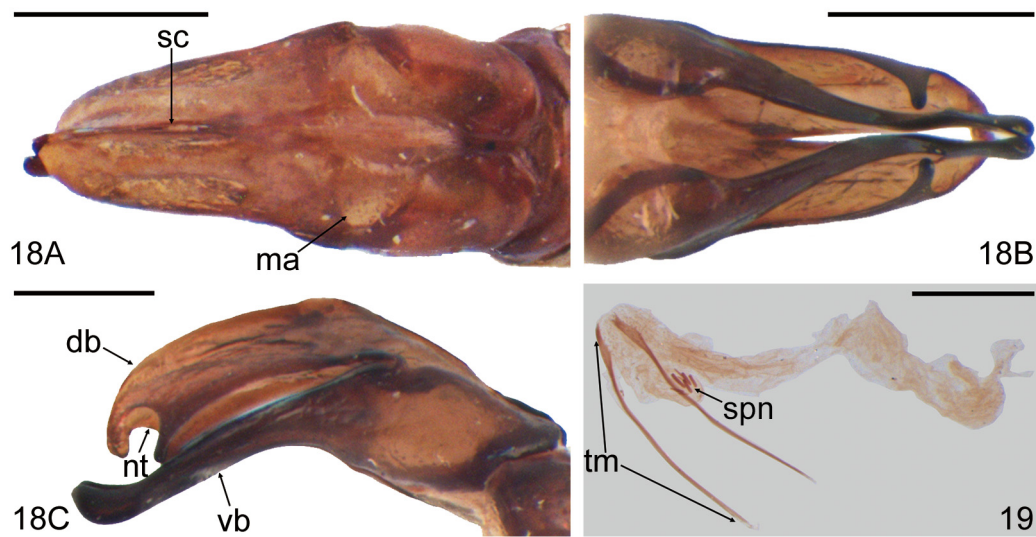




**Figs 12–14.** Morphotype V “*Sinensis*”. **12–13.** Male genitalia of *M. sinensis* (Hope, 1842), lectotype (BMNH). **12.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **13.** Endophallus and temones in ventral view. **14.** Female genitalia of *M. dalatensis* Frey, 1970, holotype (NHMB) in lateral view. Scale bars = 1.0 mm.



**Figs 15–17.** Morphotype VI “*Borneensis*”. **15.** Parameres of *M. borneensis* (Moser, 1918), lectotype (BMNH) in dorsal (A) and lateral (B) views. **16.** Endophallus and temones of *M. coxalis* (Arrow, 1944), lectotype (BMNH) in dorsal view. **17.** Female genitalia of *M. coxalis*, paralectotype (BMNH) in dorsal (A) and ventral (B) views. Scale bars = 1.0 mm.



**Figs 18–19.** Morphotype VII “*Rugaticollis*”. Male genitalia of *M. rugaticollis* (Moser, 1913), lectotype (MFNB). **18.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **19.** Endophallus and temones in lateral view. Scale bars = 1.0 mm.

raised. Endophallus (Fig. 19) with a sacculus bearing several short spines at distal half. Temones laid at distal end of endophallus, apophysis slender and separated (Fig. 19).

### Female genitalia

Unknown.

### Morphotype VIII “*Scutata*”

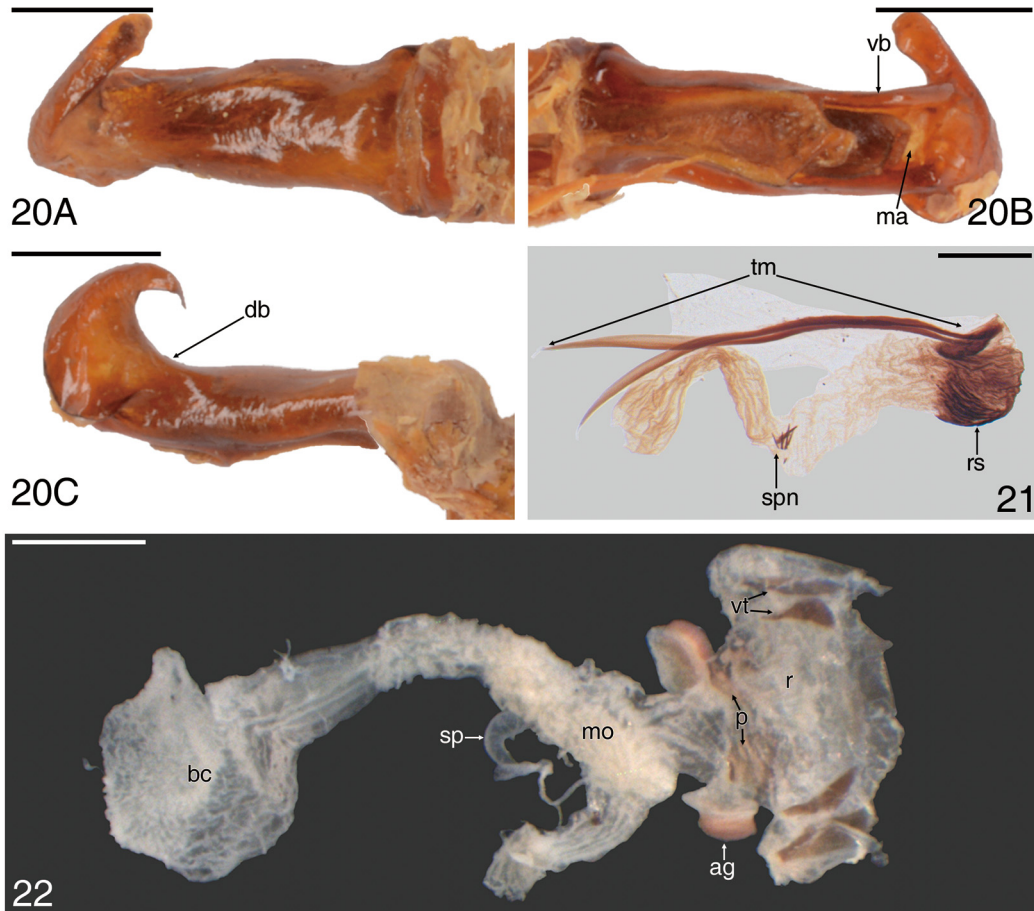
Figs 20–22

#### Male genitalia

Parameres (Fig. 20) consisting of one dorsal branch semi-tubular with proximal half obturated ventrally by a strong membrane; sutural scar absent; apex varying in shapes. Collum absent. Ventral branches thin, fused to dorsal one, emerging from edge of ventral obturating membrane toward distal end. Endophallus (Fig. 21) with an area of conspicuous acicular setae (raspulae) and spines at distal end; a few spines isolated at middle of sac. Temones (Fig. 21) laid at distal part of endophallus, slender; apophysis separated.

#### Female genitalia (Fig. 22)

Anal fold with all vestigial tergites similar in size; gonopore fold with a pair of sensory plates in oval-transverse shaped, plates with sensilla along internal margin; vestigial sternites weakly developed with a few sensillae. Median oviduct slightly developed with membranous epithelium. Bursa copulatrix with part of peduncle striated. Spermatheca with long peduncle.



**Figs 20–22.** Morphotype VIII “*Scutata*”. **20.** Male genitalia of *M. scutata* (Reitter, 1902), lectotype (MFNB), parameres in dorsal (A), ventral (B) and lateral (C) views. **21.** Endophallus and temones of *M. lassallei* Keith, 2010, holotype (DKC) in lateral view. **22.** Female genitalia of *M. scutata*, non-type (MFNB) in dorsal view. Scale bars = 1.0 mm.

### Morphotype IX “*Ciliatipennis*”

Fig. 23

#### Male genitalia

Parameres (Fig. 23) consisting of one strong dorsal tubular complex divided into two parts, both parts with two branches at distal end; upper part with branches (Fig. 23A) varying in shapes and length; branches of lower part (Fig. 23B) shorter than those of dorsal part, convergent at distal end with varying shapes tips. In lateral view, branches of dorsal complex form a concavity (Fig. 23C) varying in shapes. Collum absent. Ventral branches reduced, fused laterally to dorsal tubular complex with a weak lateral scar. Endophallus with short spines and pointed sensilla at middle (Gao *et al.* 2018: fig. 3j). Temones slender and apophysis separated (Gao *et al.* 2018: fig. 3j).

#### Female genitalia

Not studied.





**Fig. 23.** Morphotype IX “*Ciliatipennis*”. Male genitalia of *M. ciliatipennis* (Moser, 1903), lectotype (MFNB). Parameres in dorsal (A), ventral (B) and lateral (C) views. Scale bars = 1.0 mm.

### ***Species included in Morphotype I “Trichophora”***

The group is composed of twenty-nine species, which are characterized by antenna 9-segmented, head and pronotal surface densely punctate (distance between punctures smaller than diameter of puncture) and male and female genitalia as specified above.

#### ***Miridiba trichophora* (Fairmaire, 1891)**

Figs 2–3, 24–25

*Rhizotrogus trichophorus* Fairmaire, 1891: 199 (type loc.: Shanghai, China).

*Holotrochus vestitus* Brenske, 1894a: 75.

*Shangaia vestita* Lucas, 1920: 592.

*Holotrochus vestitus* – Dalla Torre 1912: 219 (catalogue). — Coca-Abia 2008: 674, 683, figs 1–5, 8–9 (type material).

*Holotrichia trichophora* – Chang 1964: 146, 149–150, figs 44–45 (species list; in key).

*Miridiba trichophora* – Reitter 1902: 170 (combination of *Rhizotrogus trichophorus*). — Dalla Torre 1912: 248 (catalogue). — Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 674, 683, figs 1–5, 8–9 (type material; in key). — Bezděk 2016: 272. — Gao *et al.* 2018: 17 (catalogue); 2019: 462 (species list; in key).

*Shangaia vestita* – Itoh 1990: 5 (synonym of *Miridiba trichophora*). — Smetana & Král 2006: 222 (catalogue).

### **Diagnosis**

External morphology of adult (Fig. 24). Length 12.4–18.0 mm. Dorsal surface with long and yellowish pubescence. Clypeus flat with anterior edge almost straight, oblique laterally; surface glabrous. Clypeal suture almost straight. Frontal carina sharp. Anterior margin of pronotum with pubescence; lateral margins smooth; anterior angles obtuse, not projected forward. Prosternal process conical in

shape, bulging ventrally. Scutellum glabrous, shiny, punctures tiny. Epipleuron with pubescence. Foretibia with moderately developed dorsal carina; insertion of inner spur almost equidistant between second and third outer tooth. Meso- and metatibiae with a weak transverse carina continuous without dorsal and ventral prominences; inner margin of dorsal surface with spines. Prepygidium with pubescence shorter than those of pygidium, punctures irregularly distributed. Pygidium with surface irregularly punctate and conspicuous pubescence irregularly in length. Ventrite 5 moderately depressed at posterior half. Male genitalia (Figs 2–3): Ventral face of dorsal branches with pubescent granules (Fig. 2C); apices of dorsal branches moderately curved downwardly, with a small sharp tip. Endophallus with a basiconic spine and a raspula with sensilla more robust towards distal end (Fig. 3). Apophysis of temones separated from each other at distal end. Female genitalia (Fig. 25) described in the morphotype I “*Trichophora*”.

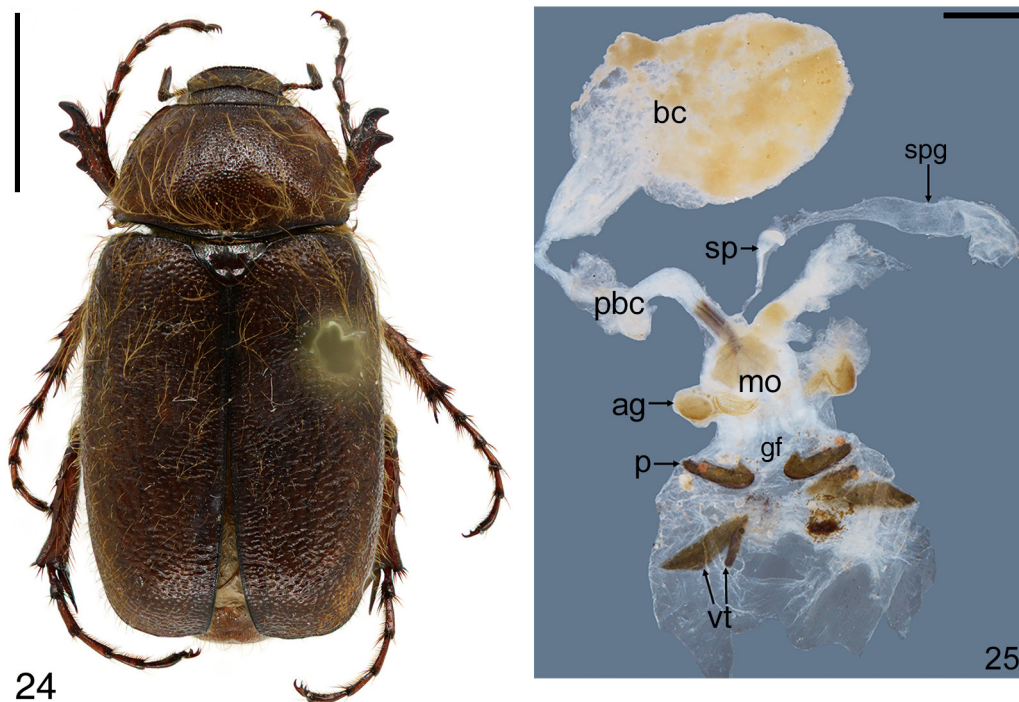
### Material examined

#### Paralectotype (here indicated)

CHINA • ♂; “*Rhizotrogus trichophorus* Fairm., Tchang-Yang” [Tchang Yang, now Changyang, a road in Shanghai]; “Type”; “Museum Paris 1906 Coll. Leon Fairmaire”; “*Miridiba trichophora* (Fairmaire, 1891) CH. Bu Gao & M. Coca-Abia det. 2017”; MNHN.

#### Other material

CHINA – **Hebei Prov.** • 1 ♂; Cangxian; Gao det.; SYAU. – **Henan Prov.** • 1 ♀; Yuanyang, Jintang; 14 Apr. 1973; Gao det.; SYAU. – **Jiangxi Prov.** • 1 ♂; Nanchang, Liantang Town; Apr. 1953; SYAU. – **Shaanxi Prov.** • 1 ♂; Xianyang; 22 Nov. 1971; Gao det.; SYAU. – **Shandong Prov.** • 2 ♂♂; Weifang, Zhucheng; May 1977; Gao det.; SYAU.



**Figs 24–25.** *Miridiba trichophora* (Fairmaire, 1891). **24.** Habitus in dorsal view, paralectotype (MNHN). **25.** Female genitalia in ventral view, non-type (SYAU). Scale bars: 24 = 5.0 mm; 25 = 1.0 mm.

## Remarks

Coca-Abia (2008) designated the lectotype based on a specimen preserved in the Hungarian Natural History Museum (Budapest). An additional syntype has been found in the Léon Fairmaire collection (MNHN) with an identification label handwritten, specifying Tchang-Yang as locality. This locality was cited by Fairmaire in the original description, which makes it the typical locality. According to the ICZN (Art. 72.4.1.1) “For a nominal species or subspecies established before 2000, any evidence, published or unpublished, may be taken into account to determine what specimens constitute the type series” (sic). Two pieces of evidence support our decision to consider this specimen belonging to the type series: it is preserved in the collection of L. Fairmaire and has a handwritten label specifying Tchang-Yang as locality. Thus, this syntype specimen is indicated herein as paralectotype.

## Distribution

China (Anhui, Beijing, Chongqing, Gansu, Guizhou, Fujian, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Liaoning, Neimengol, Shaan Xi, Shandong, Shanghai, Shanxi, Sichuan, Tianjin, Zhejiang).

### *Miridiba abdominalis* (Hope, 1831)

Figs 4, 26

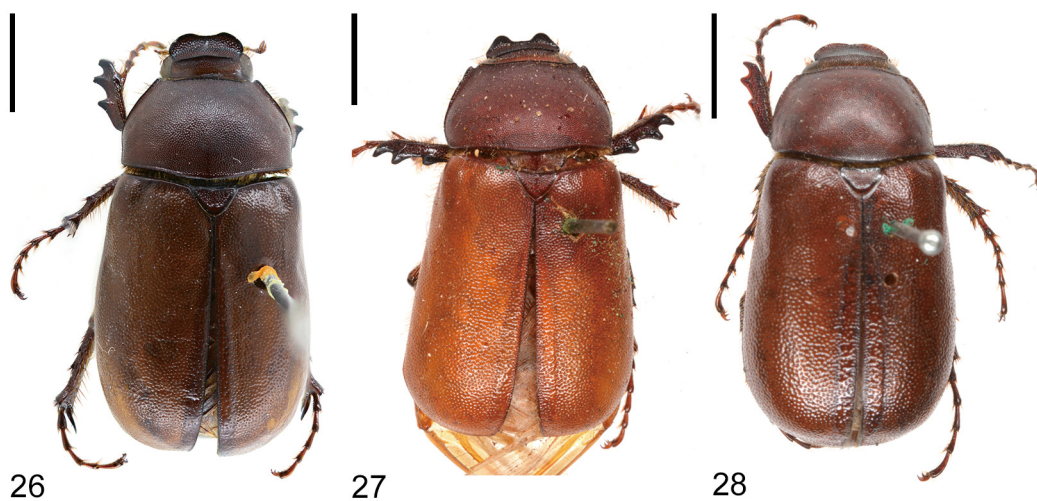
*Melolontha abdominalis* Hope, 1831: 23 (type loc.: Nepal).

*Neodontocnema abdominalis* – Arrow 1948: 51 (combination).

*Miridiba abdominalis* – Nomura 1977: 88 (combination). — Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 674. — Bezděk 2016: 271 (catalogue).

## Diagnosis

External morphology of adult (Fig. 26). Length 21.5 mm. Dorsal surface glabrous, at most, with tiny seta on each puncture hardly visible. Clypeus concave, with anterior edge broadly sinuate, oblique laterally. Frons strongly inclined in lateral view; frontal carina sharp and raised. Pronotal anterior margin with, at most, a few short setae and with a concavity at each lateral end; posterior margin not flanged,



**Figs 26–28.** Habitus in dorsal view. **26.** *Miridiba abdominalis* (Hope, 1831), lectotype (BMNH). **27.** *M. bilobata* (Moser, 1913), lectotype (BMNH). **28.** *M. castanea* (Waterhouse, 1875), lectotype (BMNH). Scale bars = 5.0 mm.

glabrous, with a row of punctures; lateral margins smooth, glabrous and gently sinuate at posterior half; anterior angles sharp, projected forward and elevated laterally. Prosternal process trapezoidal in shape. Scutellum glabrous, with punctures at middle, lateral margins without punctures. Epipleuron with short pubescence in basal half. Foretibia with strong dorsal carina; insertion of inner spur closer third outer tooth than second one. Meso- and metatibia with strong punctures; transverse carina interrupted at middle, with a dorsal and ventral prominence; inner margin of dorsal surface with strong spines. Prepygidium regularly punctate, glabrous, at most with a tiny seta on each puncture hardly visible. Pygidium irregularly punctate with thinner and denser punctures at apex; short pubescence on disc, longer toward apex; apical margin widened and gently raised. Ventricle 5 moderately depressed at posterior half. Ventricle 6 moderately bulging at anterior edge. Female genitalia (Fig. 4) described in the morphotype I “*Trichophora*”. Genital chamber without vestigial sternites neither sensory setae; bursa copulatrix with epithelium of peduncle hardened. Male unknown.

### Material examined

#### Lectotype (here designated)

NEPAL • ♀; “Nepal 3983”; “*abdominalis* Hope”; “Type”; “Lectotype *Miridiba abdominalis* (Hope, 1831) CH. Bu Gao & M. Coca-Abia det. 2017”; BMNH.

### Remarks

Although the type specimens of *M. abdominalis* was never studied, this species was transferred to *Miridiba* (Nomura 1977) and currently belongs to this genus (Coca-Abia 2008; Bezděk 2016). The lectotype is designated herein based on a syntype deposited in the Natural History Museum, London (BMNH). Hope (1831) did not indicate how many specimens he studied, and in case other syntypes are found, the known syntype is herewith designated as the lectotype. According to the features of the female genitalia, we consider that this species belongs to genital morphotype I “*Trichophora*”.

### Distribution

Nepal, India (Assam).

#### *Miridiba bannaensis* Gao & Fang, 2018

*Miridiba bannaensis* Gao & Fang in Gao *et al.*, 2018: 2, figs 1, 6 (type loc.: Xishuangbanna, Yunnan, China).

*Miridiba bannaensis* – Gao *et al.* 2019: 461 (species list; in key).

### Diagnosis

See Gao *et al.* (2018).

### Remarks

Gao *et al.* (2018) described *Miridiba bannaensis* based on one male holotype and three paratypes (one male and two females) preserved in IZCAS. The antenna 9-segmented, pronotal surface densely punctate and parameres with two dorsal and two ventral branches (Gao *et al.* 2018: fig. 1) allow us to include *M. bannaensis* in genital morphotype I “*Trichophora*”.

### Distribution

China (Yunnan).

***Miridiba bilobata*** (Moser, 1913)

Fig. 27

*Holotrichia bilobata* Moser, 1913a: 54 (type loc.: Kanara, India).

*Neodontocnema bilobata* – Arrow 1948: 51 (combination).

*Miridiba bilobata* – Coca-Abia 2008: 676, 684 (combination; type material; in key).

**Diagnosis**

External morphology of adult (Fig. 27). Dorsal surface glabrous. Clypeus concave, with anterior edge deeply emarginate at middle, oblique laterally. Frons strongly inclined in lateral view; frontal carina sharp and raised. Pronotal anterior margin glabrous, with a concavity at each lateral end; posterior margin glabrous, flanged except at middle; lateral margins smooth, glabrous; anterior angles sharp, projected forward and elevated laterally. Scutellum glabrous and punctate. Epipleuron with pubescence in basal half. Foretibia with strong dorsal carina. Meso- and metatibia with transverse carina interrupted at middle; inner margin of dorsal surface with strong spines. Pygidium irregularly punctate with pubescence longer toward apex; apical margin widened and gently raised. Ventricle 5 moderately depressed at posterior half. Ventricle 6 moderately bulging at anterior margin. Male genitalia: parameres with dorsal and ventral branches separated from each other and with pubescence on ventral surface of dorsal branches. Female unknown.

**Material examined**

**Lectotype** (here designated)

INDIA • ♂; S. India, Kanara; “?Kanara”; “♂”; “*Holotrichia bilobata* Type Mos.”; “Type”; “Andrewes Bequest B.M. 1922-221”; “*Miridiba bilobata* (Moser, 1913) CH. Bu Gao det. 2017”; BMNH.

**Remarks**

This species was transferred to *Miridiba*, and a type specimen (MFNB) was indicated as holotype (Coca-Abia 2008). Moser (1913a) did not indicate how many specimens he studied, so the indication as holotype by Coca-Abia (2008) was not valid (Art. 73.1 ICZN) (the specimen labelled as holotype was lost on the way back to MFNB). One syntype has been found in Natural History Museum of London (BMNH), which is designated as lectotype herein. The external morphology and male genitalia indicate that this species belongs to morphotype I “*Trichophora*”.

**Distribution**

India (Karnataka, West Bengal).

***Miridiba brancuccii*** (Sabatinelli, 1983)

*Neodontocnema brancuccii* Sabatinelli, 1983: 211, figs 1–2 (type loc.: Darjeeling, India).

*Miridiba brancuccii* – Smetana & Král 2006: 222 (combination; catalogue). — Coca-Abia 2008: 677, 684 (in key). — Bezděk 2016: 271 (catalogue).

**Diagnosis**

See Sabatinelli (1983).



### Remarks

Sabatinelli (1983) described *Neodontocnema brancuccii* ignoring the papers of Chang (1964) and Nomura (1977) in which *Neodontocnema* was synonymized with *Miridiba*. Later, Smetana & Král (2006) transferred this species to *Miridiba*, which was confirmed by Bezděk (2016). According to the original description based on a unique male specimen, features of male genitalia such as parameres with two dorsal and two ventral branches (Sabatinelli 1983: figs 1–2) characterize to morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.

### Distribution

India (West Bengal).

### *Miridiba castanea* (Waterhouse, 1875)

Figs 28–31

*Holotrichia castanea* Waterhouse, 1875: 104 (type loc.: Kawachi, Japan).

*Holotrichia castanea* – Dalla Torre 1912: 201 (catalogue). — Chang 1964: 149–150, figs 60–61 (combination; species list; in key).

*Neodontocnema castanea* – Arrow 1948: 51 (combination).

*Miridiba castanea* – Isida & Fujioka 1988: 35 (combination; catalogue). — Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 677, 684 (type material; in key). — Kim 2011: 6, 17, 139 (catalogue). — Bezděk 2016: 271 (catalogue). — Gao *et al.* 2018: 13 (catalogue); 2019: 461 (species list; in key).

### Diagnosis

External morphology of adult (Fig. 28). Length 18.5–22.5 mm. Dorsal surface glabrous. Clypeus as long as frons, flat, with anterior edge emarginate at middle. Frons with inconspicuous short pubescence hardly noticeable and some sparse long setae; frontal carina moderately developed. Pronotum glabrous, at most, with short setae in each puncture hardly visible; anterior margin with short and sparse setae; without concavity at each lateral end; posterior and lateral margins smooth and glabrous; anterior angles obtuse, not projected forward, moderately elevated laterally. Prosternal process rounded in shape, bulging ventrally. Scutellum glabrous and punctate. Elytra glabrous, at most, some sparse setae on basal margin and short setae in each puncture hardly visible; epipleuron with pubescence on full length, sparse on apex. Foretibia with moderately developed dorsal carina; insertion of inner spur in male equidistant between second and third outer tooth, insertion of inner spur in females closer to third outer tooth than second one. Meso- and metatibia with strong punctures; transverse carina interrupted at middle, with a dorsal and ventral prominence; inner margin of dorsal surface with strong spines. Prepygidium regularly punctate, conspicuous short pubescence. Pygidium regularly punctate; conspicuous pubescence on disc, longer toward apex; apical margin widened and gently raised. Ventrites with conspicuous pubescence, more scattered on third and fourth ventrites. Ventrite 5 moderately depressed at posterior half. Ventrite 6 bulging at anterior margin, bulge without punctures. Male genitalia: parameres (Fig. 29) with dorsal branches gently curved, their apices surpassing those of ventral branches; ventral side of dorsal branches and dorsal side of ventral branches with sparse granules, each one with a short seta (Fig. 29C). Endophallus with spines near distal end (Fig. 30) and dense raspula at proximal position. Temones reduced, apophysis separated from each other at distal end. Female genitalia (Fig. 31): genital chamber with a pair of vestigial sternites reduced to a few sensillae. Peduncle of bursa copulatrix reduced. Median oviduct well developed with hardened epithelium.

## Material examined

### Lectotype

JAPAN • ♂; “S. Japan” [Southern Japan]; “*Holotrichia castanea* (Type) C. Waterh.”; “TYPE”; “LECTOTYPE”; “LECTOTYPE *Miridiba castanea* (Waterhouse, 1875) M. Coca-Abia, det. 2001”; BMNH.

### Paralectotype

JAPAN • 1 ♂; same collection data as for lectotype; “PARALECTOTYPE”; “PARALECTOTYPE *Miridiba castanea* (Waterhouse, 1875) M. Coca-Abia, det. 2001”; BMNH.

### Other material

JAPAN • 1 ♂; Japan; 1910; G. Lewis leg.; BMNH • 1 ♀; Mt Simbara; 1901; P.A. Holst leg.; BMNH • 1 ♂; Kyoto; 18 May 1932; Yie S. leg.; IZCAS.

CHINA – **Beijing** • 1 ♀; Mt Shangfangshan; 27 Aug. 1965; Y.-J. Liu leg.; Y.-W. Zhang det.; IZCAS. – **Chongqing** • 1 ♂; Wulong; 650 m a.s.l.; 5 Jul. 1989; B.-W. Sun leg.; Y.-W. Zhang det.; IZCAS. – **Gansu Prov.** • 1 ♂; Tianshui, Mt Maijishan; 24 Jul. 1986; C.-Z. Wang leg.; Z.-L. Zhang det.; SYAU. – **Liaoning Prov.** • 1 ♀; Chaoyang, Beili; 1984; J. Liu leg.; Y.-W. Zhang det.; IZCAS. – **Shanxi Prov.** • 1 ♂; Mt Zhongtaishan; 30 Jul. 1995; W.-Z. Li leg.; Y.-W. Zhang det.; IZCAS. – **Sichuan Prov.** • 1 ♂; Mt Emeishan, Baoguosi; 25 Apr. 1957; Y.-C. Lu leg.; Y.-W. Zhang det.; IZCAS.

## Remarks

Isida & Fujioka (1988) transferred this species to *Miridiba*. Coca-Abia (2008) studied and designated a lectotype and a paralectotype. This species shows the external morphology and male and female



**Figs 29–31.** Genitalia of *Miridiba castanea* (Waterhouse, 1875). **29–30.** Male genitalia, paralectotype (BMNH). **29.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **30.** Endophallus and temones in ventral view. **31.** Female genitalia in ventral view (non-type, BMNH). Scale bars = 1.0 mm.

genitalia that characterize morphotype I “*Trichophora*”. Hence, *M. castanea* is included in this genital morphotype.

### Distribution

China (Beijing, Chongqing, Gansu, Liaoning, Shanxi, Sichuan), Japan: (Honshu island: Osaka, Kyoto), Korean Peninsula, Russian (S Far East).

### *Miridiba coromandeliana* (Blanchard, 1850)

*Ancylonycha coromandeliana* Blanchard in Milne-Edwards *et al.*, 1850: 139 (type loc.: Coromandel, India).

*Holotrichia conferta* Sharp, 1903: 467 (type loc.: Ootacamund, India).

*Holotrichia coromandeliana* – Dalla Torre 1912: 202 (catalogue).

*Neodontocnema coromandeliana* – Arrow 1948: 51 (combination). — Frey 1971: 224 (in key). — Sabatinelli 1983: 123 (species list).

*Holotrichia conferta* – Dalla Torre 1912: 202 (catalogue). — Arrow 1948: 51 (as synonym of *N. coromandeliana*).

*Neodontocnema conferta* – Frey 1971: 222, 224, fig. 38 (in key). — Sabatinelli 1983: 213–214, fig. 3 (species list) (as synonym of *N. coromandeliana*).

*Miridiba coromandeliana* – Nomura 1977: 88 (combination). — Coca-Abia 2008: 677, 684, figs 10–11 (type material; in key).

### Diagnosis (from Coca-Abia 2008)

Head glabrous, except for vertex with thin pubescence, clypeus with anterior margin moderately emarginate at middle. Pronotum glabrous on disc, at most, with short setae in each puncture hardly visible; anterior margin elevated with a perpendicular anterior face, without a concavity at each lateral end and with short pubescence; anterior angles blunt and not projected. Epipleuron with pubescence except on apex. Foretibia with gently developed dorsal carina. Meso- and metatibiae with spines on dorsal surface; transverse carina interrupted and complete, respectively, placed behind middle. Pygidium with scattered punctures and sparse pubescence, conspicuous on apex. Male genitalia: dorsal branches of paramere ventrally with granules each one bearing a short seta. Apices of ventral branches S-shaped in lateral view, with granules and setae at dorsal and ventral sides.

### Material examined

#### Lectotype of *H. conferta* (here designated)

INDIA • ♂; “Ootacamund; C.A. Barber leg.”; “*Holotrichia conferta* Type D.S. ♂”; “Type”; “Sharp Coll. 1905-313”; “Lectotype *Miridiba conferta* (Sharp, 1903) Chuan-bu Gao and M. Coca-Abia det. 2019”; BMNH.

#### Paralectotype of *H. conferta* (here indicated)

INDIA • 1 ♂; same collection data as for lectotype; BMNH.

#### Other material of *M. coromandeliana*

INDIA • 1 ♂; “Cotype”; “Ootacamund”; “C.A. Barber leg.”; “S. India 1903-78”; “*Ancylonycha coromandeliana* Bl. Compared with type G.J.A.”; BMNH • 1 ♂; “Co-type”; “Ootacamund C.A. Barber”; “S. India 1903-78”; BMNH.

#### Other material of *M. conferta*

INDIA • 2 ♂♂; Nilgiri Hills; 21 Feb. 1922; Andrewes leg; Gao det.; BMNH.

### Remarks

Coca-Abia (2008) studied *Miridiba coromandeliana* and designated a lectotype and a paralectotype. Features of morphotype I “*Trichophora*” are present in *M. coromandeliana*. Hence, this species is included in this genital morphotype. On the other hand, *Holotrichia conferta* Sharp 1903 was synonymized with *N. coromandeliana*, type species of *Neodontocnema* (Arrow 1948). Frey (1971) and Sabatinelli (1983) deemed that both taxa were valid species by considering them separately in identification keys of *Neodontocnema*, while without giving any further justification. In the original description of *H. conferta*, Sharp (1903) mentioned an old specimen in the British Museum labelled “Madras” and several other specimens in the Cambridge Museum, British Museum and D. Sharp collections. Two male specimens of the Sharp collection have been found in BMNH, which are labelled as the type and cotype. Both specimens of *H. conferta* show features of external morphology and male genitalia that characterize *M. coromandeliana* (Coca-Abia 2008: fig. 10). Then, we confirm the synonymy of *H. conferta* with *M. coromandeliana* (Arrow 1948), and designate them as lectotype and paralectotype of *Miridiba conferta*.

### Distribution

India (Coromandel, Western Ghats).

#### *Miridiba diversiceps* (Moser, 1912)

*Holotrichia diversiceps* Moser, 1912: 445 (type loc.: Kurseong, Darjeeling, West Bengal, India).

*Neodontocnema diversiceps* – Arrow 1948: 51 (combination). — Frey 1971: 222, 224, fig. 37 (in key).  
— Sabatinelli 1983: 123, 214, fig. 6 (species list).

*Miridiba diversiceps* – Nomura 1977: 88 (combination). — Smetana & Král 2006: 222 (catalogue). —  
Coca-Abia 2008: 677, 684 (type material; in key). — Bezděk 2016: 271 (catalogue).

### Diagnosis

External morphology of adult (Coca-Abia 2008). Dorsal surface glabrous. Clypeus with anterior edge rather emarginate at middle but not deeply. Frons with strong carina. Pronotum with anterior margin with a concavity at each lateral end, glabrous; anterior angles projecting with blunt apices. Epipleuron partially pubescent. Meso- and metatibiae with transverse carina interrupted at middle and inner margin of dorsal surface with spines. Pygidium with pubescence and conspicuous punctures, apical margin moderately widened and raised.

### Remarks

Coca-Abia (2008) studied this species and designated a lectotype and three paralectotypes. *Miridiba diversiceps* shows features of external morphology and genitalia that characterize morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.

### Distribution

India (West Bengal).

#### *Miridiba excisa* (Moser, 1913)

Figs 32–33

*Holotrichia excisa* Moser, 1913a: 53 (type loc.: Nilgiri Hills, India).

*Neodontocnema excisa* – Arrow 1948: 51 (combination). — Frey 1971: 222, 224, fig. 36 (in key). —  
Sabatinelli 1983: 213–214, fig. 5 (species list).

*Miridiba excisa* – Coca-Abia 2008: 678, 684, figs 12–13 (combination; type material; in key).

### Diagnosis

External morphology of adult (Fig. 32). Length 19.3–20.2 mm. Dorsal surface glabrous. Clypeus shorter than frons, with anterior edge emarginate at middle. Frons with strong carina. Pronotum glabrous; anterior margin with short and sparse setae; without concavity at each lateral end; lateral margins smooth and glabrous; anterior angles obtuse, not projected forward, elevated laterally. Scutellum triangular, glabrous and densely punctate. Elytra glabrous; epipleuron with pubescence excepted on apex. Foretibia with dorsal carina moderately developed. Meso- and metatibia with strong punctures; transverse carina complete at middle, inner margin of dorsal surface with strong spines. Pygidium with conspicuous pubescence only on apex; apical margin moderately widened and raised. Ventrites 1 and 2 with dense, short pubescence, denser than those on ventrites 3 and 4. Ventrite 5 moderately depressed at posterior half. Ventrite 6 bulging at anterior half. Male genitalia: parameres (Fig. 33) with dorsal branches arc-curved toward apices, sharp at distal ends; ventral side with dense, long setae; apices of ventral branches expanded and nearly S-shaped in lateral view, with granules and setae at dorsal and ventral sides. Female genitalia unknown.

### Material examined

#### Paralectotype (here indicated)

INDIA • 1 ♂; “Nilgiri Hills”; “H.L. Andrewes leg.”; “*Miridiba excisa* (Moser, 1913) CH. Bu Gao det 2017”; 1721 BMNH.



**Figs 32–33.** *Miridiba excisa* (Moser, 1913), paralectotype (1721 BMNH). **32.** Habitus in dorsal view. **33.** Parameres in dorsal (A) and lateral (B) views. Scale bars: 32 = 5.0 mm; 33 = 1.0 mm.



### Remarks

Coca-Abia (2008) studied and designated a lectotype and three paralectotypes. Moreover, the first author of this paper found another former syntype (BMNH) indicated as a paralectotype herein. Antenna 9-segmented, and parameres with two dorsal and two ventral branches separated from each other (Coca-Abia 2008: figs 12–13), which characterize morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.

### Distribution

India (Bombay, Tamil Nadu; North India), Myanmar.

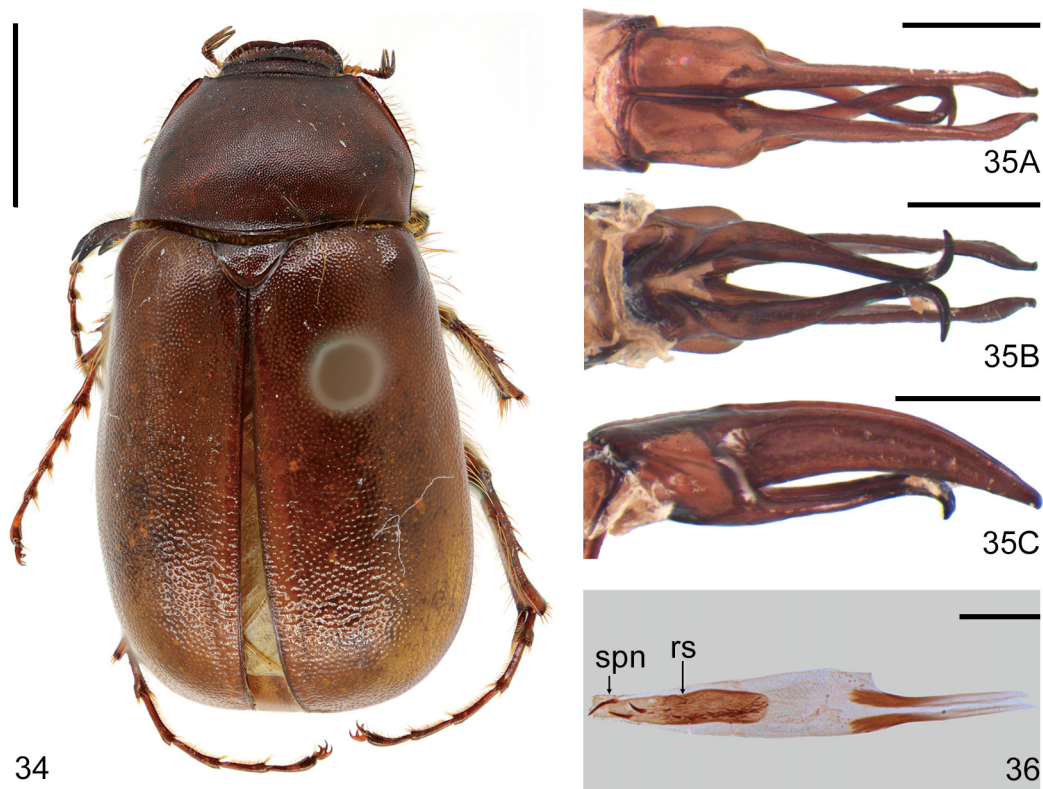
*Miridiba frontalis* (Fairmaire, 1886) (valid species)  
Figs 34–36

*Rhizotrogus frontalis* Fairmaire, 1886: 325 (type loc.: Yunnan, China).

*Miridiba frontalis* – Keith 2005: 98 (combination).

### Diagnosis

External morphology of adult (Fig. 34). Body size 17–19.5 mm. Body surface with conspicuous pubescence on frons, basal part of elytra and pygidium. Clypeus shorter than frons, concave, with anterior edge emarginate at middle. Frontal carina well developed and sharp. Pronotum without pubescence on



**Figs 34–36.** *Miridiba frontalis* (Fairmaire, 1886), holotype (MNHN). **34.** Habitus in dorsal view. **35.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **36.** Endophallus (everted) and temones in dorsal view. Scale bars: 34 = 5.0 mm; 35–36 = 1.0 mm.

disc; anterior margin with short setae, without concavity at each lateral end; lateral margins smooth and glabrous, moderately sinuate at posterior half; anterior angles acute, not projected forward, elevated laterally; posterior angles obtuse. Prosternal process quadrangular-shaped. Scutellum glabrous, with punctures except lateral margins. Elytra with conspicuous pubescence on basal part, disc glabrous; epipleuron with pubescence except on apex. Foretibia with strong and sharp carina; insertion of inner spur closer third outer tooth than second one. Meso- and metatibia with transverse carina interrupted at middle, with a marked dorsal and ventral prominence; inner margin of dorsal surface with strong spines. Prepygidium regularly punctate, conspicuous short pubescence. Pygidium with punctures of irregular size and distribution; conspicuous pubescence on disc, longer toward apex; apical margin moderately widened and raised. Ventrites with conspicuous pubescence; ventrite 5 moderately depressed at posterior half, with pubescence longer on depressed part. Ventrite 6 flat, with diffuse punctures. Male genitalia. Parameres (Fig. 35) with apices of dorsal branches moderately curved; without pubescence or granules. Endophallus (Fig. 36) with raspula of setae and spines larger toward distal end. Temonos (Fig. 36) with apophysis reduced and separated at distal end. Female unknown.

### Material examined

#### Holotype

CHINA • ♂; “Yunnan”; “Museum Paris 1906 Coll. Léon Fairmaire”; “*Rhizotrog frontalis* Fair Yunan”; “Type”; “Holotype *Miridiba frontalis* (Fairmaire, 1886) CH. Bu Gao & M. Coca-Abia det. 2018”; “*Miridiba castanea* (Wat.) Denis Keith det. 2003”; MNHN.

#### Other material

CHINA – **Guizhou Prov.** • 3 ♂♂, 1 ♀; Guiyang; 6 Oct. 1979; C.-J. Yang leg.; C.-B. Gao det.; SYAU. – **Hainan Prov.** • 1 ♂; Hainan; 1952; C.-B. Gao det.; SYAU. – **Sichuan Prov.** • 1 ♂; Xichang, Mt Lushan, Yuhuangdian; 1700 m a.s.l.; 8 May 2005; J.-Y. Qiu leg.; C.-B. Gao det.; SYAU. – **Yunnan Prov.** • 3 ♂♂; Yunnan; A. Davis leg.; Fairmaire det.; Coll. Fairmaire; MNHN • 2 ♂♂, 16 ♀♀; Kunming; C.-W. Li leg.; Y.-W. Zhang det.; IZCAS • 3 ♂♂, 2 ♀♀; Shaotong; 1981; C.-B. Gao det.; IZCAS.

### Remarks

Keith (2005) transferred *Rhizotrogus frontalis* to *Miridiba* and synonymized it with *M. castanea* based on a series of male specimens labelled with the name of collector (Armand David). Indeed, Fairmaire (1886), in the introduction of the work in which he described *R. frontalis*, thanked Armand David for the Coleoptera specimens received, which could suggest that the types of *R. frontalis* are these specimens labelled with the name of that collector. However, Fairmaire (1886) indicated that the description of *R. frontalis* was based on only one specimen; therefore, the series studied by Keith (2005) cannot be syntypes. We have examined a male specimen of *R. frontalis* preserved in the collection of Léon Fairmaire (MNHN) labelled as a type and with an original label with his determination. Although Fairmaire (1886) thought that this unique specimen was a female judging from its short antennal club, it is actually a male. In fact, and contrary to other Rhizotrogini, the species of *Miridiba* do not show obvious sexual dimorphism in the antennal club, which is very short in both sexes. On the other hand, we agree with the transfer of *R. frontalis* to *Miridiba*, the features of the external morphology and genitalia show that this species belongs to this genus. Moreover, the antenna 9-segmented and parameres with two dorsal and two ventral branches separated from each other, allow us to include it in morphotype I “*Trichophora*”. In contrast, we do not agree with the synonymy of *Miridiba frontalis* with *M. castanea* proposed by Keith (2005), who did not sufficiently justify this synonymy. We have compared the type of *M. frontalis* with those of *M. castanea*, finding them to differ by the following characters (Table 2): head (pubescence on clypeus and frons, frontal carina), pronotum (anterior margin, anterior angles), the shape of the prosternal process, elytra (pubescence), foretibia (carina, inner spur), the protarsi and mesotarsi (tufts of setae), parameres (pubescence and granules at branches) and endophallus (internal structures). Accordingly,

**Table 2.** Differences between holotype of *M. frontalis* (Fairmaire, 1886) and lectotype and paralectotype of *M. castanea* (Waterhouse, 1875).

Character	<i>M. frontalis</i>	<i>M. castanea</i>
Clypeus length	shorter than the frons	as long as the frons
Clypeus shape	concave	flat
Frontal pubescence	present and long	absent or, at most, very short hardly noticeable
Frontal carina	high, sharp.	low, not sharp
Pronotal anterior edge	gently wavy behind eyes	without wavy behind eyes
Anterior angles	acute	obtuse
Prosternal process	quadrangular shaped	rounded with a bulge on ventral face
Elytral pubescence	Long on basal part	absent or, at most, very short hardly noticeable
Carina of the protibia	strongly elevated. Sharp	gently elevated
Protibia, insertion of the inner spur	closer than 3 <sup>th</sup> than 2 <sup>nd</sup> tooth	equidistant between the 2 <sup>nd</sup> and 3 <sup>th</sup> tooth
Pro- and metatarsi	conspicuous tufts of setae	inconspicuous tufts of setae
Branches of the parameres	without pubescence or granules	with pubescence or granules
Endophallum	with soft spurs	with strong spurs

*M. frontalis* is established herein as valid species. The unique type specimen of *M. frontalis* (Fairmaire, 1886) found in coll. Léon Fairmaire (MNHN) is a holotype by monotypy, and is labelled as holotype.

### Distribution

China (Hainan, Guizhou, Sichuan, Yunnan).

### *Miridiba furcillata* Keith & Sabatinelli, 2010

*Miridiba furcillata* Keith & Sabatinelli, 2010: 340, figs 5–6 (type loc.: Kathmandu valley, Nepal).

*Miridiba furcillata* – Bezděk 2016: 271 (catalogue).

### Diagnosis

See Keith & Sabatinelli (2010).

### Remarks

Keith & Sabatinelli (2010) described *Miridiba furcillata* based on a series of 32 specimens, designating holotype, allotype and thirty paratypes. This species shows features of external morphology, which characterize *Miridiba*. Also, parameres with two dorsal and ventral branches separated from each other (Keith & Sabatinelli 2010: figs 5–6) characterize morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.



**Distribution**

Nepal (Kathmandu).

*Miridiba hanoiensis* Keith, 2006

*Miridiba hanoiensis* Keith, 2006: 44 (type loc.: Tonkin, Vietnam).

*Miridiba hanoiensis* – Coca-Abia 2008: 680.

**Diagnosis**

See Keith (2006).

**Remarks**

Keith (2006) described *Miridiba hanoiensis* based on only one male specimen designated as holotype. This species shows features of external morphology that characterize *Miridiba*. On the other hand, the male genitalia described and illustrated by Keith (2006) do not provide enough data on the genital morphology, making it difficult to specify the morphotype to which this species belongs. Nevertheless, the acicular expansions at the base of the aedeagus described by Keith (2006), which could be ventral branches, and the antenna 9-segmented lead us to believe that this species could belong to morphotype I “*Trichophora*”.

**Distribution**

Vietnam (Hanoi).

*Miridiba hirsuta* Itoh, 2001  
Figs 37–40

*Miridiba hirsuta* Itoh, 2001: 435, figs 1–9 (type loc.: Ishigakijima, Ryukyus).

*Miridiba hirsuta* – Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 680, 683 (in key). — Bezděk 2016: 271 (catalogue).

**Diagnosis**

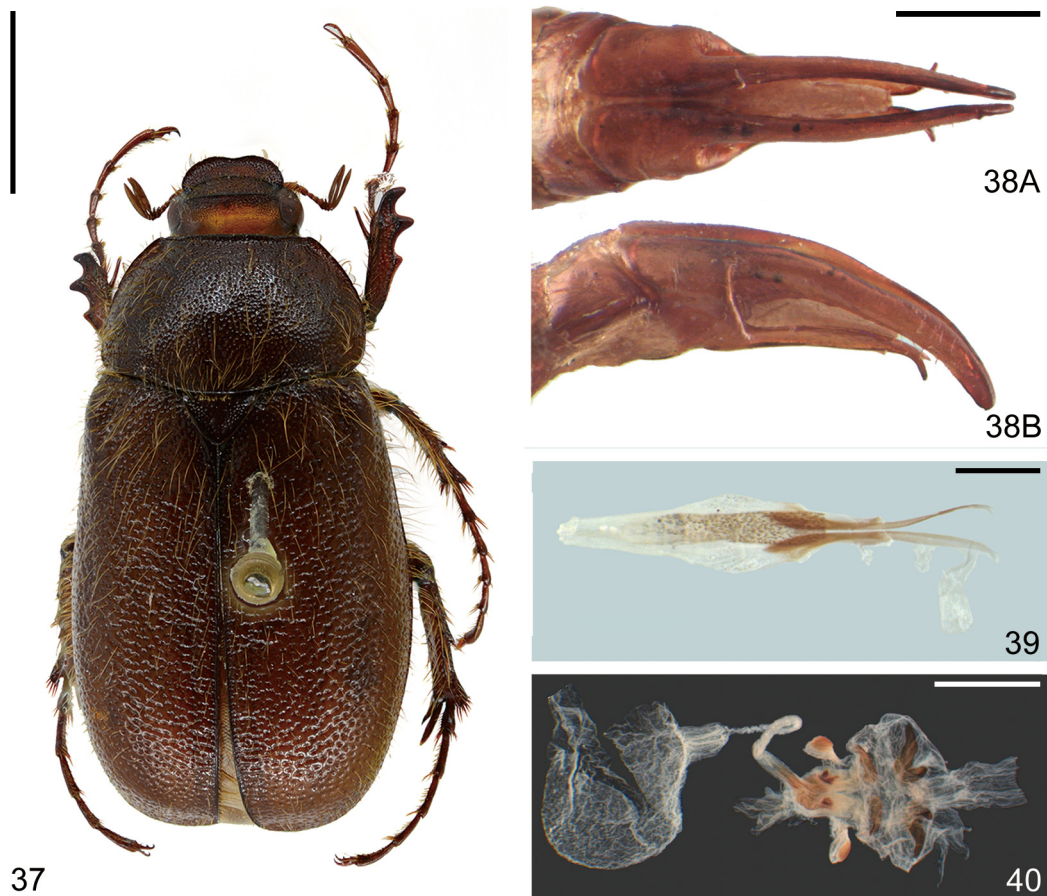
See Itoh (2001). External morphology of adult and male genitalia (Figs 37–40).

**Material examined**

JAPAN • 1 ♂; Okinawa, Is. Ishigakijima, Tonosiro-Takeda; 29 Feb. 2004; T. Nakata leg.; Matsumoto det.; TMC • 2 ♂♂, 2 ♀♀; same collection data as for preceding; TMC.

**Remarks**

Itoh (2001) described *Miridiba hirsuta* based on a male holotype and five paratypes (2 males and 3 females). According to the author (Itoh 2001), this species is closely allied to *M. trichophora*, but *M. hirsuta* is distinguishable by the larger size, sharper apices of upper branches of parameres, and antennal club weakly more elongate in male. We have studied five specimens (TMC) collected from the type locality and identified by Mr Matsumoto as *M. hirsuta*, observing some differences with the type of *M. trichophora* in endophallus. However, given that we were unable to examine the types of *M. hirsuta*, it is not possible to confirm that these differences characterize *M. hirsuta*. Until the types of *M. hirsuta* are studied, we consider it a valid species. According to the antenna 9-segmented and the parameres described by Itoh (2001), this species is included in this genital morphotype I “*Trichophora*”.



**Figs 37–40.** *Miridiba hirsuta* Itoh, 2001 (non-types, TMC). **37.** Habitus in dorsal view. **38.** Parameres in dorsal (A) and lateral (B) views. **39.** Endophallus and temones in dorsal view. **40.** Female genitalia in dorsal view. Scale bars: 38–40 = 1.0 mm.

### Distribution

Ryukyus.

### *Miridiba huesiotoi* Li & Yang, 2015

*Miridiba huesiotoi* Li & Yang in Li *et al.*, 2015: 524 (type loc.: Green Island, Taiwan, China).

*Miridiba huesiotoi* – Bezděk 2016: 271 (catalogue). — Gao *et al.* 2018: 13 (catalogue); 2019: 461 (species list; in key).

### Diagnosis

See Li *et al.* (2015).

### Remarks

*Miridiba huesiotoi* was described based on the male holotype and eleven paratypes (5 males and 6 females) (Li *et al.* 2015). According to the original description, *M. huesiotoi* can be separated from *M. formosana* by having pubescence on pronotum, elytra and scutellum hardly observable; apex of clypeus moderately bilobed; anterior angles slightly protuberant; metafemora slender, slightly broadened

at middle; parameres with upper part curved downwardly, exceeding the end of the ventral branches extremely. In our opinion, features at the external morphology are not discrete enough to differentiate *M. huesiotoi* from *M. formosana*. 1) Setae on body distinctly short / distinctly long. 2) The apex of clypeus moderately bilobed / weakly bilobed. 3) Anterior angles of pronotum slightly protuberant / moderately protuberant. 4) Metafemora slender, slightly broadened at middle / expanded anteriorly and posteriorly. 5) Parameres with upper part curved / strongly curved. These differences found by Li *et al.* (2015) could be due to intraspecific variability of *M. formosana*. However, given that we were unable to examine the types of *M. huesiotoi* to study the variability of these characters or to compare them with the type of *M. formosana*; *M. huesiotoi* is considered a valid species until further investigation is done. Based on the 9-segmented antennae and the parameres described by Li *et al.* (2015), this species is included in this genital morphotype I “*Trichophora*”.

### Distribution

China (Taiwan).

### *Miridiba hybrida* (Moser, 1912) Figs 41–43

*Holotrichia hybrida* Moser, 1912: 444 (type loc.: Assam, India).

*Holotrichia hybrida* – Chang 1964: 145, 149–150, figs 58–59 (species list; in key). — Smetana & Král 2006: 219 (catalogue).



**Figs 41–43.** *Miridiba hybrida* (Moser, 1912) (non-type, BMNH). **41.** Habitus in dorsal view. **42.** Parameres in dorsal (A) and lateral (B) views. **43.** Endophallus (everted) and temones in dorsal view. Scale bars: 41 = 5.0 mm; 42–43 = 1.0 mm.

*Neodontocnema hybrida* – Arrow 1948: 51 (combination). — Frey 1971: 222–223, fig. 34 (in key). — Sabatinelli 1983: 213–214, fig. 4 (species list).

*Miridiba hybrida* – Nomura 1977: 88. — Coca-Abia 2008: 680, 684 (combination; type material; in key). — Bezděk 2016: 271 (catalogue).

### Diagnosis

External morphology of adult (Coca-Abia 2008). Dorsal surface glabrous (Fig. 41). Clypeus with anterior edge deeply emarginate at middle. Frontal carina very sharp and developed. Pronotum with anterior margin moderately concave at each lateral end, with short and sparse pubescence; posterior margin finely flanged except at middle; lateral margins smooth, glabrous and moderately sinuate at anterior half; anterior angles sharp, elevated laterally; posterior angle obtuse and rounded. Epipleuron with pubescence except on apex. Foretibia with conspicuous carina; insertion of inner spur equidistant between second and third outer tooth. Meso- and metatibia with transverse carina complete; inner margin of dorsal surface with spines. Pygidium with short and decumbent pubescence, punctures irregularly distributed; apical margin moderately raised. Ventricle 5 moderately depressed at posterior half. Ventricle 6 bulging. Male genitalia as that of morphotype I. Parameres (Fig. 42) robust, with dorsal branches abruptly curved downward and with dorsal and ventral pubescence; ventral branches moderately curved upwardly; apices of dorsal and ventral branches crossing each other at caudal end. Endophallus (Fig. 43) with spines towards distal end and soft sensillae towards proximal end. Temones (Fig. 43) with apophysis reduced and separated at distal end. Female unknown.

### Material examined

INDIA • 1 ♂; Assam, Shiling; 5000 ft; 1 May 1924; Fletcher leg.; BMNH.

### Remarks

This species was transferred by Nomura (1977) without studying any type specimens. Coca-Abia (2008) studied and designated a lectotype and a paralectotype of *M. hybrida*, confirming its transfer to *Miridiba*. This species shows features of external morphology and male genitalia, which characterize morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.

### Distribution

India (Assam).

### *Miridiba imitatrix* (Brenske, 1899)

Figs 44–46

*Holotrichia imitatrix* Brenske, 1899: 178 (type loc.: Darjeeling, India).

*Holotrichia imitatrix* – Dalla Torre 1912: 203 (catalogue). — Chang 1964: 146, 149–150, figs 46–47 (species list; in key).

*Neodontocnema imitatrix* – Arrow 1948: 51 (combination). — Frey 1971: 222–223, fig. 35 (in key). — Sabatinelli 1983: 123, 214, fig. 8 (species list).

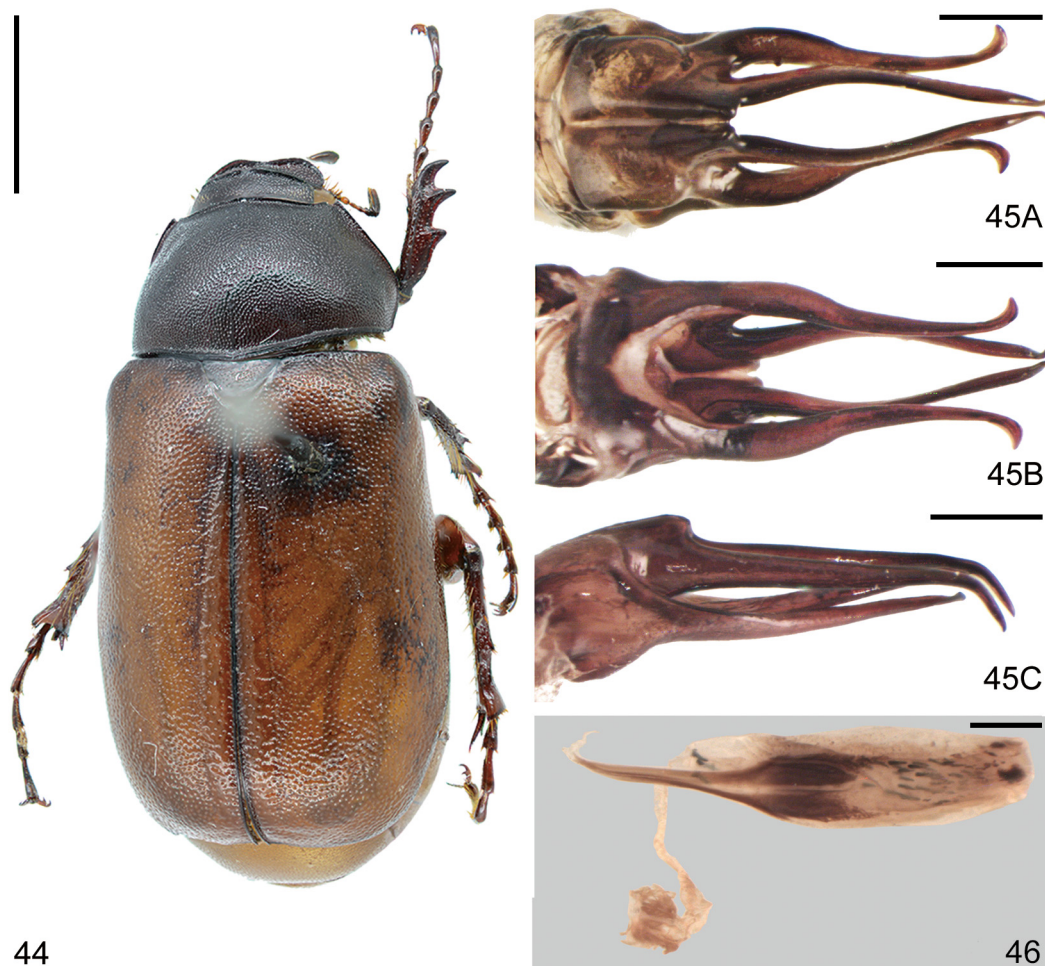
*Miridiba imitatrix* – Nomura 1977: 88 (combination). — Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 680. — Bezděk 2016: 272 (catalogue).

### Diagnosis

External morphology of adult (Fig. 44). Body size 21.5 mm. Dorsal surface glabrous, at most, with short setae in each puncture hardly visible. Clypeus concave, with anterior edge moderately emarginate at middle. Frons very sloping, strong carina sunk at middle. Pronotal anterior margin sloped forward with a row of punctures, glabrous or, at most, some short setae at sides, with a slight concavity at each lateral end; posterior margin glabrous, finely flanged except at middle; lateral margins smooth,



glabrous, convergent and elevated at anterior half, moderately sinuate at posterior half; anterior angles acute, not projected forward; posterior angles obtuse and rounded. Prosternal process cone-shaped. Scutellum glabrous, with punctures except on sides. Elytra with punctures regularly distributed, less densely punctate than pronotum; epipleuron with pubescence in basal half. Foretibia in male with insertion of inner spur equidistant between second and third outer tooth, with strong dorsal carina. Meso- and metatibia with transverse carina interrupted at middle; inner margin of dorsal surface with spines. Prepygidium regularly punctate, with conspicuous pubescence in lateral view. Pygidium with short and decumbent pubescence, longer on apex; irregularly punctate, punctures thinner and denser at dorsal margin; apex pointed with thick and rough punctures; apical margin thicker and moderately raised. Ventrite 5 moderately depressed at posterior half, which has strong punctures; longer pubescence on depressed area. Anterior margin of ventrite 6 bulging at middle, bulge without pubescence. Male genitalia. Parameres (Fig. 45) glabrous; dorsal branches thin and elongated, starting below collum; distal margin of collum bilobed in dorsal view, raised in relation to dorsal branches. Ventral branches joined at proximal end forming a semi-circle, apices thin and slightly curved outwards. Endophallus (Fig. 46) with spines arranged helicoidally around internal walls of sac and soft sensillae at distal end. Apophysis of temones (Fig. 46) widened and joined at distal end. Female unknown.



**Figs 44–46.** *Miridiba imitatrix* (Brenske, 1899), lectotype (MFNB). **44.** Habitus in dorsal view. **45.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **46.** Endophallus and temones in dorsal view. Scale bars: 44 = 5.0 mm; 45–46 = 1.0 mm.

### Material examined

#### Lectotype (here designated)

INDIA • 1 ♂; “imitatrix Brsk”; “Sikkim Darjiling” [Darjeeling, a city of India]; “fühler 9 gl” [antenna 9-segmented]; “Coll. Brenske”; “SYNTYPE *Holotrichia imitatrix* Brenske 1899 labelled by MFNB 2017”; “*Neodontocnema Holotrichia imitatrix* Br det G. Frey 1969” [*Holotrichia* det. G. Frey 1969 printed, *Neodontocnema imitatrix* Br handwritten]; “Lectotype *Miridiba imitatrix* (Brenske, 1899) Chuan-bu Gao & Coca-Abia, det. 2018”; MFNB.

### Remarks

Brenske (1899) did not indicate how many specimens used in describing *Holotrichia imitatrix*. We have studied a male specimen conserved in the Brenske collection (MFNB) labelled as syntype and identified as *Neodontocnema imitatrix* by Frey (1971). Although Brenske (1899) specified that this specimen was a female, probably based on the short antennal club, it is a male. As stated above, this confusion is attributable to the absence of sexual dimorphism in the antennal club. One syntype specimen of *M. imitatrix* found in MFNB is designated as the lectotype herein. *Miridiba imitatrix* is very similar to *M. tuberculipennis* (Moser, 1913). Still, it is possible to distinguish them by the metatibial transverse carina, the apex of the pygidium, ventrite 6 and male genitalia. The antenna 9-segmented and parameres with two dorsal and two ventral branches separated from each other, allow us to include it in morphotype I “*Trichophora*”.

### Distribution

India (West Bengal).

#### *Miridiba kuatunensis* Gao & Fang, 2018

*Miridiba kuatunensis* Gao & Fang in Gao *et al.*, 2018: 4, figs 2, 6 (type loc.: Guadun, Fujian, China).

*Miridiba kuatunensis* – Gao *et al.* 2019: 461 (species list; in key).

### Diagnosis

See Gao *et al.* (2018).

### Remarks

Gao *et al.* (2018) described *Miridiba kuatunensis* based on a male holotype and fifteen paratypes (eight males and seven females) conserved in IZCAS. The 9-segmented antenna, pronotal surface densely punctate and parameres with two dorsal and two ventral branches (Gao *et al.* 2018: fig. 2) allow us to include *M. kuatunensis* in morphotype I “*Trichophora*”. *Miridiba kuatunensis* is a species related to *M. brancuccii*, the parameres shape illustrated by Sabatinelli (1983: figs 1–2) shows similarities with those of *M. kuatunensis* (Gao *et al.* 2018: fig. 2h–i). However, these species differ in the dorsal surface of the body, glabrous in *M. brancuccii* (Sabatinelli 1983) and pubescent in *M. kuatunensis*. On the other hand, *M. kuatunensis* and *M. pilosella* (Moser, 1908) are quite similar, both species can be distinguished by the ratio between dorsal and ventral branches of the parameres and the curving of dorsal branches tips (Gao *et al.* 2018).

### Distribution

China (Fujian, Guangdong, Guangxi, Hainan, Zhejiang).

#### *Miridiba kuraruana* Nomura, 1977

Figs 47–50

*Miridiba kuraruana* Nomura, 1977: 89 (type loc.: Kenting, Taiwan, China).

*Miridiba kuraruana* – Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 680, 683 (in key). — Li *et al.* 2015: 523, figs 1, 7, 13, 19, 25–26 (redescription; in key). — Bezděk 2016: 272 (catalogue). — Gao *et al.* 2018: 14 (catalogue; type material); 2019: 461 (species list; in key).

### Diagnosis

External morphology of adult (Fig. 47). Body size 18.9–20.0 mm. Dorsal surface shiny. Clypeus concave, with oblique sides, anterior edge moderately emarginate at middle and pubescence short. Frons with conspicuous pubescence; punctures thicker than those of clypeus; angular strong carina with a mid-vertex. Pronotum with hardly visible short setae in each puncture; pronotal anterior margin sloped forward, glabrous, at most, some short setae; posterior margin glabrous; lateral margins strongly serrated, with conspicuous short pubescence; anterior angles obtuse, not projected forward; posterior angles obtuse and rounded. Prosternal process tongue-shaped. Scutellum punctate, with short setae. Elytra with punctures regularly distributed, disc with very short setae in each puncture hardly visible; basal and lateral part with conspicuous long pubescence; epipleuron with pubescence except on apex. Foretibia with dorsal strong carina, insertion of inner spur in male equidistant between second and third outer tooth. Meso- and metatibia with complete transverse carina, inner margin of dorsal surface with spines. Prepygidium regularly punctate, with short but conspicuous pubescence. Pygidium irregularly punctate, with conspicuous pubescence, longer on apex; apical margin moderately raised. Ventrite 5 moderately depressed at posterior half, with strong punctures and pubescence, longer on depressed part. Ventrite 6 with punctures irregularly distributed, conspicuous pubescence, bulky at anterior margin, bulge without punctures. Male genitalia: parameres (Fig. 48) with setae on ventral side of dorsal branches and dorsal



**Figs 47–50.** *Miridiba kuraruana* Nomura, 1977. **47–49.** holotype (NSMT). **50.** Paratype (NSMT). **47.** Habitus in dorsal view (holotype). **48.** Parameres in dorsal (A) and lateral (B) views. **49.** Endophallus and temones in dorsal view. **50.** Female genitalia in dorsal view. Scale bars: 47 = 5.0 mm; 48–50 = 1.0 mm.

side of ventral ones; in lateral view, moderately bent towards apices at two stretches; apices of ventral branches thin and slightly curved outwards and upward, with a small apical tip. Endophallus (Fig. 49) with spines at distal end; all proximal part of sac covered with trichodea sensilla. Female genitalia (Fig. 50) as that of morphotype I, with two dark rounded sclerotized areas on dorsal membrane of median oviduct.

### Material examined

#### Holotype

CHINA • ♂; “Formosa [Taiwan], Kenting Park; 12 Jun. 1971; Y. Maeda leg.”; “light”; “Sizumu Nomura 1981 Bequest, 1981”; “♂”; “Holotype *Miridiba kuraruana* Nomura (1977)”; NSMT.

#### Paratypes

CHINA • 1 ♀; “Taiwan, Kenting; 7 May 1977; M. Sakaino leg.”; “Sizumu NOMURA Bequest, 1981”; “♀”; “PARATYPE *Miridiba kuraruana* NOMURA (1977)”; NSMT • 1 ♂; Taiwan, Kenting; 2 Apr. 1970; S. Cho leg.; “♂”; “PARATYPE *Miridiba kuraruana* NOMURA (1977)”; NSMT • 1 ♂; “Ken ding” [Taiwan, Kenting]; 19 May 1973; K. Masumoto leg.; “♂”; “B. n. 1985-385”; “PARATYPE *Miridiba kuraruana* NOMURA, 1977”; BMNH • 1 ♀; same collection data as for preceding; “♀”; BMNH.

### Remarks

Nomura (1977) described *Miridiba kuraruana* based on a male holotype and thirty-three paratypes (18 males and 15 females). After studying the holotype and four paratypes of *M. kuraruana*, we conclude that *M. kuraruana* shows features of male and female genitalia that characterize morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype I.

### Distribution

China (Taiwan).

#### *Miridiba newari* (Sabatinelli & Migliaccio, 1982)

*Neodontocnema newari* Sabatinelli & Migliaccio, 1982: 107, figs 3–4 (type loc.: Kathmandu, Nepal).

*Neodontocnema newari* – Sabatinelli 1983: 123, 214, fig. 7 (species list).

*Miridiba newari* – Smetana & Král 2006: 222 (combination; catalogue). — Coca-Abia 2008: 681. — Bezděk 2016: 272 (catalogue).

### Diagnosis

See Sabatinelli & Migliaccio (1982).

### Remarks

We were unable to examine any type specimens of *Miridiba newari*. However, the original description and illustration of male genitalia given by Sabatinelli & Migliaccio (1982) prove that this species belongs to Morphotype I “*Trichophora*”.

### Distribution

Nepal (Kathmandu), Sikkim.

#### *Miridiba obscura* Itoh, 1995

*Miridiba obscura* Itoh, 1995: 199.

*Miridiba tuberculipennis obscura* Itoh, 1995: 199 (type loc.: Doi Suthep, Thailand).



*Miridiba obscura* – Gao *et al* 2018: 14, figs 5a–c, 6 (combination; type material); 2019: 461 (species list; in key).

### Diagnosis

External morphology of adult (Itoh 1995; Gao *et al.* 2018). Dorsal surface glabrous. Clypeus with anterior edge arcuate. Frontal carina sharp and developed. Pronotum densely punctate; anterior margin widely flanged; lateral margins smooth, elevated laterally at anterior third. Scutellum densely punctate. Elytral surface glabrous and punctate; epipleuron with setae at basal half. Meso- and metatibia with transverse carina interrupted at middle, inner margin of metatibial dorsal surface with spines. Pygidium irregularly punctate with scattered punctures dorsally, conspicuous setae on apex; apical margin moderately raised. Ventrite 5 depressed at posterior half. Male genitalia: parameres without pubescence, dorsal branches starting slightly below collum, long, thin and curved downwards; ventral branches widened, apices bent outwards ninety degrees.

### Remarks

Itoh (1995) described the subspecies *Miridiba tuberculipennis obscura* base on a male holotype, a female allotype and thirteen paratypes (three males and ten females) from Thailand and Laos. According to Itoh (1995), the subspecies is distinguishable by robust and shorter parameres branches of male genitalia and variability in intensity of coloration of elytral tubercles. After studying two paratypes deposited in MFNB and additional non-type specimen from China, Gao *et al.* (2018) elevated this subspecies to species rank as *Miridiba obscura* according to parameres and clypeus shape (Gao *et al.* 2018: fig. 5). Male genitalia indicates that this species is characteristic of the morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.

### Distribution

China (Yunnan), Thailand (Chiang Mai, Kanchanoburi, Chaiyaphum), Laos (Xiangkhouang).

### *Miridiba pilosella* (Moser, 1908)

Figs 51–54

*Holotrichia pilosella* Moser, 1908: 336 (type loc.: Mount Mẫu Sơn, Vietnam).

*Holotrichia formosana* Moser, 1909: 470 (type loc.: Taiwan, China). syn. nov.

*Holotrichia pilosella* – Dalla Torre 1912: 205 (catalogue). — Chang 1964: 146, 149–150, figs 48–49 (species list; in key). — Frey 1970: 248 (in key).

*Miridiba pilosella* – Nomura 1977: 88. — Coca-Abia 2008: 681 (combination). — Gao *et al.* 2018: 15 (catalogue); 2019: 461 (species list; in key).

*Holotrichia formosana* – Dalla Torre 1912: 202 (catalogue). — Chang 1964: 146, 149–150, figs 46–47 (species list; in key).

*Neodontocnema formosana* – Arrow 1948: 51 (combination).

*Miridiba formosana* – Nomura 1977: 88 (combination). — Smetana & Král 2006: 222 (catalogue). — Coca-Abia 2008: 679, 683, figs 14–16 (type material; in key). — Li *et al.* 2015: 523, 528, figs 4, 10, 16, 22, 31–32 (redescription; in key). — Bezděk 2016: 271 (catalogue). — Gao *et al.* 2018: 13 (catalogue); 2019: 461 (species list; in key).

### Diagnosis

External morphology of adult (Fig. 51). Body size 17.4–19.0 mm. Dorsal surface with conspicuous short pubescence. Clypeus flat with anterior edge moderately emarginate at middle, oblique laterally. Frons with sharp carina, not interrupted at middle. Pronotal anterior margin with short setae, without

concavity at lateral ends; posterior margin glabrous; lateral margins strongly serrated with short setae; anterior angles acute almost right, rounded, not projected forward; posterior angles obtuse and rounded. Prosternal process with a ventral bulge and posterior margin rounded. Scutellum densely punctate. Elytra with punctures regularly distributed, more scattered and larger than those of pronotum; epipleuron with long marginal setae except on apex. Foretibia with sharp dorsal carina, insertion of inner spur closer third outer tooth than second one. Meso- and metatibia with interrupted and complete transverse carina, respectively; inner margin of dorsal surface with strong spines. Pygidium with rough punctures, dense pubescence and irregular in length. Abdominal ventrites covered with dense, short and decumbent setae and punctures regularly distributed. Male genitalia: parameres (Fig. 52) with sparse setae on ventral side of dorsal branches and on dorsal side of ventral ones; in lateral view dorsal branches moderately bent at two stretches towards apices, which are curved downward with a small apical tip; ventral branches with apices curved outward. Endophallus (Fig. 53) with spines arranged helicoidally around internal walls towards distal end, with a raspula of dark sensillae at proximal half of sac. Apophysis of temones (Fig. 53) with distal ends separated from each other. Female genitalia as describe at morphotype I. Genital chamber with a pair of vestigial sternites reduced to few sensillae, median oviduct very developed with hardened epithelium and dark sclerotized areas (Fig. 54).



**Figs 51–54.** *Miridiba pilosella* (Moser, 1908). **51.** Lectotype (MFNB). **52–54.** Paralectotypes (MFNB). **51.** Habitus in dorsal view. **52–53.** Male genitalia. **52.** Parameres in dorsal (A) and lateral (B) views. **53.** Endophallus and temones in dorsal view. **54.** Female genitalia in dorsal view. Scale bars: 51 = 5.0 mm; 52–54 = 1.0 mm.

### Material examined

#### Lectotype (here designated)

VIETNAM • 1 ♂; “Tonkin, Montes Mauson” [Tonkin, centre of Vietnam; Montes Mauson, Mount Mẫu Sơn]; “April Mai” [Apr.–May]; “2-3000’ H. Fruhstorfer; 100753”; “*H. pilosella* Mos”; “Lectotype *Miridiba pilosella* (Moser, 1908) Chuan-bu Gao & Coca-Abia det. 2018”; MFNB.

#### Paralectotypes (here indicated)

VIETNAM • 2 ♂♂, 3 ♀♀; same collection data as for lectotype; “Paralectotype *Miridiba pilosella* (Moser, 1908) Chuan-bu Gao & Coca-Abia det. 2018”; MFNB.

#### Other material

CHINA • 1 ♀; Guangzhou; Lehmann S. leg.; MFNB.

VIETNAM • 1 ♂; Tonkin; H. Fruhstorfer leg.; MFNB.

### Remarks

Moser (1908) did not indicate the number of specimens used in describing *Holotrichia pilosella*. We have studied a series of specimens (MFNB), two of them labelled as types by the author and another five specimens with the same collection data, which belong to the type series. We designate the lectotype and five paralectotypes. On the other hand, *Miridiba formosana* (Moser, 1909) was transferred to *Miridiba* by Nomura (1977), and a lectotype and two paralectotypes were studied and were designated by Coca-Abia (2008). After studying the types of *M. pilosella*, we noted that features of the external morphology and male genitalia of *M. formosana* (Moser, 1909) (Coca-Abia 2008) match well those of *M. pilosella*. These characters are body pubescence (short and decumbent), head (clypeus shape, frontal suture and carina), pronotum (pubescent anterior margin, crenulate and pubescent lateral margins), foretibiae (strongly carinate), pygidium (conspicuous punctures and pubescence), male genitalia (parameres shape, internal structures of endophallus and temones shape). Therefore, we here synonymize *M. formosana* with *M. pilosella* and include it in morphotype I “*Trichophora*”, from its antenna 9-segmented and male and female genital morphology.

### Distribution

China (Anhui, Guangzhou, Fujian, Guangxi, Guizhou, Hebei, Hubei, Jiangsu, Jiangxi, Liaoning, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang) (Gao *et al.* 2018), Vietnam.

#### *Miridiba recta* Keith & Sabatinelli, 2010

*Miridiba recta* Keith & Sabatinelli, 2010: 343, figs 7–9 (type loc.: Doi Sanjac, Thailand).

### Diagnosis

See Keith & Sabatinelli (2010).

### Remarks

Keith & Sabatinelli (2010) described *Miridiba recta* based on a male holotype. We were unable to examine the type specimen of *Miridiba recta*. However, according to the original description, this species shows features of the external morphology that characterize *Miridiba*. Besides, the parameres show two dorsal and two ventral branches separated from each other (Keith & Sabatinelli 2010: figs 8–9), which characterize morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.

### Distribution

Thailand (Doi Sanjac).

### *Miridiba sus* (Moser, 1912)

Figs 55–56

*Holotrichia sus* Moser, 1912: 443 (type loc.: Kuang-tri, Vietnam).

*Hippotrichia hainana* Arrow, 1948: 51 (type loc.: Hainan, China).

*Holotrichia sus* — Chang 1964: 146, 149–150, fig. 56 (species list; in key). — Frey 1970: 250 (in key).

*Miridiba sus* — Itoh 1995: 199, figs 7, 25 (combination). — Coca-Abia 2008: 682–683 (type material; in key). — Bezděk 2016: 272 (catalogue). — Gao *et al.* 2018: 16 (catalogue); 2019: 461 (species list; in key).

*Hippotrichia hainana* Arrow, 1948: 51. — Chang 1964: 145 (as synonym of *H. sus*). — Nomura 1977: 88. — Itoh 1995: 199. — Smetana & Král 2006: 222 (catalogue). — Bezděk 2016: 271 (catalogue).

### Diagnosis

External morphology of adult (Coca-Abia 2008). Head and elytra glabrous. Clypeus with anterior edge almost straight. Frontal carina strongly developed. Pronotal surface glabrous, except a tuft of brush-shaped pubescence placed longitudinally on the middle line; anterior margin widely flanged with a concavity at each lateral end and pubescent; lateral margins smooth; anterior angles sharp and elevated laterally. Scutellum with lateral margins without punctures. Elytral surface glabrous, epipleuron with pubescence on basal half. Meso- and metatibia with transverse carina interrupted at middle; inner



**Figs 55–56.** *Hippotrichia hainana* Arrow, 1948, lectotype (BMNH). **55.** Habitus in dorsal view. **56.** Parameres in dorsal (A) and lateral (B) views. Scale bars: 55 = 5.0 mm; 56 = 1.0 mm.

margin of dorsal surface without spines. Pygidium with scattered punctures, inconspicuous pubescence, conspicuous on apex, apical margin moderately raised. Ventrite 5 depressed at posterior half. Male genitalia with thin dorsal branches convergent at apices in dorsal view; apices of ventral branches sharp and abruptly curved outwards ninety degree. Endophallus with spines of different size at distal end. External morphology (Fig. 55) and parameres (Fig. 56) of *H. hainana*. Female genitalia not studied.

#### Material examined

##### Lectotype of *H. hainana* (here designated)

CHINA • ♂; Hainan; J. Whitehead leg.; “99. 315”; “*Miridiba hainana* (Arrow, 1948) CH. Bu Gao det. 2018”; BMNH.

##### Other material of *M. sus*

LAOS • 1 ♂; Muang sing near Haut-mekong; 18 Apr. 1918; R.V. de Salvaza leg.; BMNH.

#### Remarks

Itoh (1995) transferred this species to *Miridiba* and synonymized it with *Hippotrichia hainana* Arrow, 1948 without justification. Coca-Abia (2008) studied the types and indicated holotypes for *M. sus* (MFNB) and *H. hainana* (BMNH). However, Moser (1912) and Arrow (1948) never indicated how many specimens they studied. Therefore, these holotype indications by Coca-Abia (2008) were incorrect (Art. 73.1 ICZN). Hence, the ‘holotypes’ remain syntypes, and other syntypes may be found. In fact, the first author of this work found a syntype of *H. hainana* in the BMNH collection, which is designated as lectotype herein. *Miridiba sus* shows features of the external morphology and male genitalia, which characterize *Miridiba* and morphotype I “*Trichophora*”. Thus, this species is included in this genital morphotype.

#### Distribution

China (Hainan); Laos; Thailand; Vietnam.

#### *Miridiba taipei* Wang & Li, 2015

*Miridiba taipei* Wang & Li in Li *et al.*, 2015: 530 (type loc.: Taipei, Taiwan, China).

*Miridiba taipei* – Bezděk 2016: 272 (catalogue). — Gao *et al.* 2018: 16 (catalogue); 2019: 461 (species list; in key).

#### Diagnosis

See Li *et al.* (2015).

#### Remarks

*Miridiba taipei* was described based on a male holotype and seven type specimens (six males and one female) (Li *et al.* 2015). According to the original description, *M. taipei* can be separated from the similar species *M. trichophora* and *M. hirsuta* by having three distinctive morphological characters at the apex of clypeus, anterior margin of pronotum and parameres. We were unable to examine the types of *M. taipei* but, according to the 9-segmented antenna and shape of parameres, this species is included in this genital morphotype I “*Trichophora*”.

#### Distribution

China (Taiwan).

*Miridiba taoi* Li & Wang, 2015

*Miridiba taoi* Li & Wang in Li *et al.*, 2015: 528, figs 3, 9, 15, 21, 29–30 (type loc.: Lanyu Island, Taiwan, China).

*Miridiba taoi* – Bezděk 2016: 272 (catalogue). — Gao *et al.* 2018: 17 (catalogue); 2019: 462 (species list; in key).

**Diagnosis**

See Li *et al.* (2015).

**Remarks**

Li *et al.* (2015) described *Miridiba taoi* based on a male holotype and two male paratypes. We were unable to examine the types of *M. taoi* to study its characters. Hence, *M. taoi* is considered a valid species. According to antenna 9-segmented and parameres (Li *et al.* 2015) this species is included in genital morphotype I “*Trichophora*”.

**Distribution**

China (Taiwan).

*Miridiba thai* Keith, 2010

Figs 57–59

*Miridiba thai* Keith, 2010: 235, figs 4–6 (Chiang Mai, Thailand).

**Diagnosis**

External morphology of adult (Fig. 57). Body size 20.5 mm. Dorsal surface glabrous, at most, with tiny setae in each puncture hardly visible. Clypeus shorter than frons, concave, oblique sides, with anterior edge emarginate at middle. Frons with strong carina. Pronotal anterior margin widely flanged, with a perpendicular anterior face glabrous, with concavity at each lateral end; posterior margin, glabrous, finely flanged except at middle; lateral margins smooth and glabrous, elevated at fore half; anterior angles acute, not projected forward; posterior angles obtuse and rounded. Prosternal process cone-shaped. Scutellum with dense punctures except at lateral sides. Elytra with dense punctures except on sutural costae; epipleuron with pubescence on basal half. Foretibia with develop dorsal carina. Meso- and metatibia with complete transverse carina moderately developed; inner margin of dorsal surface with sparse but conspicuous spines. Prepygidium regularly punctate and with short pubescence. Pygidium irregularly punctate, with conspicuous pubescence longer on apex. Ventrite 5 moderately depressed at posterior half, with pubescence on surface, longer on depressed part. Ventrite 6 with anterior margin bulky and without punctures, posterior half moderately concave with long pubescence. Male genitalia: parameres (Fig. 58) without pubescence; dorsal branches and collum continuous, apices convergent; ventral branches with apices moderately bent outwards. Endophallus (Fig. 59) arising from middle of temones apophysis, short, thin and with spines at distal end. Apophysis of temones (Fig. 59) very long and strongly sclerotized separated from each other at distal end, with a distal membrane at apices armed with spines. Female genitalia not studied.

**Material examined**

**Holotype**

THAILAND • ♂; “THAILANDE N” [Northern Thailand], “Chiang Dao Hill resort” [in Chiang Dao District, Chiang Mai]; 7–10 Jun. 2008; Murzin leg.; “HOLOTYPE”; “*Miridiba thai* nov. sp. Det. D. KEITH & G. SABATINELLI 2009”; DKC.

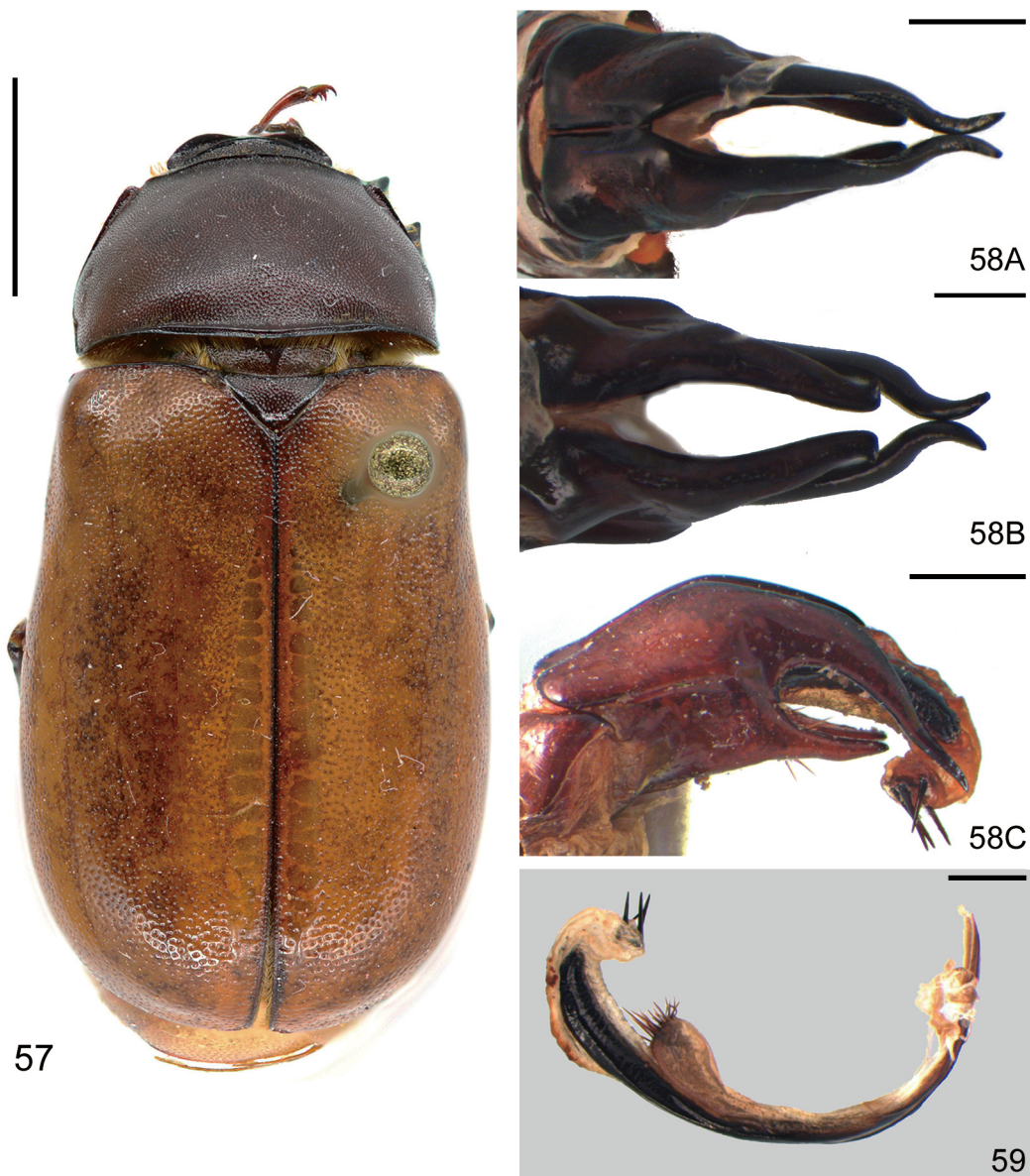


**Remarks**

Keith (2010) described *Miridiba thai* based on three specimens, two males and one female, and designated a holotype, a paratype and an allotype, respectively. We have studied the holotype and verified that this species shows features of external morphology that characterize *Miridiba*. Besides, the parameres show two dorsal and two ventral branches separated from each other (Keith 2010: figs 5–6) and antenna 9-segmented (not 10-segmented as was specified in the original description of Keith 2010), which characterize morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.

**Distribution**

Thailand (Chiang Mai).



**Figs 57–59.** *Miridiba thai* Keith, 2010, holotype, ♂ (DKC). **57.** Habitus in dorsal view. **58.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **59.** Endophallus and temones in lateral view. Scale bars: 57 = 5.0 mm; 58–59 = 1.0 mm.



*Miridiba tuberculipennis* (Moser, 1913)

Figs 60–62

*Holotrichia tuberculipennis* Moser, 1913a: 55 (type loc.: Myanmar).

*Neodontocnema ardoini* Frey, 1970: 245 (in key).

*Neodontocnema tuberculipennis* – Arrow 1948: 51 (combination).

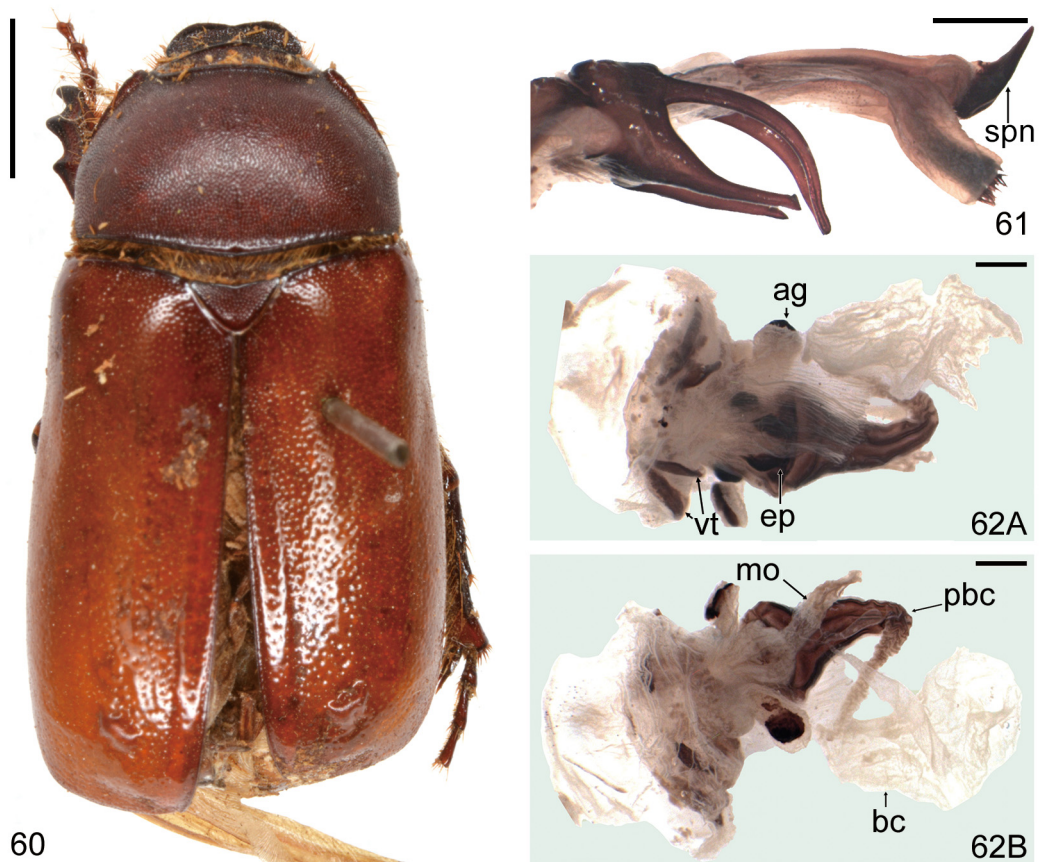
*Neodontocnema tuberculiventris* – Frey 1970: 245 (lapsus calami).

*Miridiba tuberculipennis* – Nomura 1977: 88 (combination). — Itoh 1995: 199 (combination). — Keith 2006: 45 (nom. nud.). — Coca-Abia 2008: 683–684, figs 19–20 (type material; in key). — Gao *et al.* 2018: 17, figs 5b, d, f, 6 (catalogue); 2019: 462 (species list; in key).

*Miridiba ardoini* – Keith 2006: 45 (as combination of *N. ardoini*). — Coca-Abia 2008: 676. — Keith 2010: 232 (synonym).

**Diagnosis**

External morphology of adult (Fig. 60). Body size 20.0–24.0 mm. Dorsal surface glabrous, at most, with tiny setae in each puncture hardly visible. Clypeus shorter than frons, concave, with anterior edge emarginate at middle. Frons very sloping, strong carina sunk at middle. Pronotal anterior margin with a perpendicular anterior face with sparse and short setae; posterior margin glabrous, finely flanged and with a row of punctures, except at middle where is a little bulky; lateral margins smooth and glabrous,



**Figs 60–62.** *Miridiba tuberculipennis* (Moser, 1913). **60–61.** Paralectotype, ♂ (MFNB). **62.** Non-type, ♀ (BMNH). **60.** Habitus in dorsal view. **61.** Male genitalia: parameres and endophallus in lateral view. **62.** Female genitalia in dorsal (A) and ventral (B) views. Scale bars: 60 = 5.0 mm; 61–62 = 1.0 mm.

strongly convergent and elevated at anterior half; anterior angles acute, not projected forward; posterior angles obtuse and rounded. Prosternal process cone-shaped. Scutellum glabrous, with punctures except at sides. Each elytron with a wart on apex only in females; epipleuron with setae at basal half. Foretibia with insertion of inner spur closer to third outer tooth than second one in females, in males almost equidistant between both outer teeth; with moderate carina. Mesotibia with transverse carina interrupted at middle in females, complete in males. Metatibia with transverse carina complete in both sexes; inner margin of dorsal surface with spines. Prepygidium roughly punctate and pubescent. Pygidium pubescent, irregularly punctate, truncated cone shaped, blunt, and apical margin moderately raised. Ventricle 5 moderately depressed at posterior half with pubescence longer on depressed part. Ventricle 6 moderately concave and bulging at anterior margin. Male genitalia: parameres (Fig. 61) without pubescence, dorsal branches starting slightly below collum, long, thin and ventrally curved, apices of ventral branches bent outwards ninety degrees. Endophallus (Fig. 61) asymmetrical in lateral view, with a dorsal part armed with a very strong spine and a ventral part with numerous setae. Apophysis of temones with distal ends separated from each other. Female genitalia (Fig. 62): genital chamber with vestigial sternites reduced to an area with a few sensillae. Median oviduct reduced with epithelium not sclerotized placed behind peduncle of bursa copulatrix that is strongly sclerotized.

### Material examined

#### Lectotype of *M. tuberculipennis*

MYANMAR • ♂; “Burma” [Myanmar]; A.K. Weld Downing leg.; “Zool. Mus. Berlin” [Zoologisches Museum in Berlin]; “*Holotrichia tuberculipennis* Mos. Type ♂”; “SYNTYPUS *Holotrichia tuberculipennis* Moser, 1913 labelled by MNHUB 2004”; “Lectotype *Miridiba tuberculipennis* (Moser, 1913) M. Coca-Abia, det. 2005”; MFNB.

#### Paralectotype of *M. tuberculipennis*

MYANMAR • ♀; same collection data as for lectotype of *M. tuberculipennis*; MFNB.

#### Paralectotypes of *M. tuberculipennis* (here indicated)

MYANMAR • 1 ♀; “Burma” [Myanmar]; “A. K. Weld Downing Burma”; “781”; “Andrewes Bequest B.M. 1922-221”; “*Holotrichia tuberculipennis* Type Mos.”; “Type” [round label]; “Type” [red print label]; “Paralectotype *Miridiba tuberculipennis* (Moser, 1913) Chuan-bu Gao & Coca-Abia det. 2019”; BMNH • 1 ♂; same collection data as for preceding; cotype; BMNH.

#### Holotype of *M. ardoini*

VIETNAM • ♀; “Vietnam; 1960”; “Type”; “*Neodontocnema ardoini* n sp. det G. Frey, 1970 Type”; “Holotype *Miridiba ardoini* (Frey, 1970) Chuan-bu Gao & Coca-Abia det. 2017”; NHMB.

#### Other material of *M. tuberculipennis*

MYANMAR • 1 ♂; Burma; A.K. Weld leg.; BMNH • 1 ♀; same collection data as for preceding; BMNH • 1 ♀; Shan State, Kalaw; 4000 ft; Apr. 1916; F.M. Mackwood leg.; BMNH.

### Remarks

*Neodontocnema ardoini* was described based on only one female specimen from Vietnam (Frey 1970). The external morphology described by Frey (1970) led Keith (2006) to consider the transfer of *N. ardoini* to *Miridiba*. Later, Keith (2010) synonymized *M. ardoini* with *M. tuberculipennis* after studying the type of *M. ardoini* and two non-type specimens of *Miridiba* from Vietnam (male and female), concluding that the features of these two specimens, female and male, matched well those of *M. ardoini* and *M. tuberculipennis*, respectively. However, to establish this synonymy, types of *M. tuberculipennis* should also have been studied. In this work, we have studied types of *M. ardoini* and *M. tuberculipennis* and verified that features of the external morphology and female genitalia that

characterize *M. tuberculipennis* are present in *M. ardoini*. Therefore, we confirm the synonymy of *M. ardoini* with *M. tuberculipennis*, and we include this species into morphotype I “*Trichophora*”. In addition, two further former syntypes of *M. tuberculipennis* are recognised as paralectotypes (BMNH), and the unique female specimen of *M. ardoini* is labelled as holotype (NHMB).

### Distribution

Laos, Myanmar (Shan State), Thailand, Vietnam.

### *Miridiba wangi* (Zhang, 1997) Figs 63–64

*Holotrichia wangi* Zhang in Zhang & Li, 1997: 773 (type loc.: Chongqing, China).

*Holotrichia wangi* — Smetana & Král 2006: 219 (catalogue).

*Miridiba wangi* – Bezděk 2016: 15, 272 (combination; catalogue). — Gao *et al.* 2018: 18 (catalogue); 2019: 462 (species list; in key).

### Diagnosis

External morphology of adult (Fig. 63). Body size 16.5–17.2 mm. Dorsal surface densely pubescent. Clypeus shorter than frons, with anterior edge moderately emarginate at middle, oblique laterally. Frons with carina bent backward at middle. Pronotal anterior margin with short setae and without concavity at each lateral end; posterior margin finely flanged; lateral margins strongly serrated, with short setae and moderately reflexed upwards; anterior and posterior angles obtuse. Prosternal process nearly trapezoidal-shaped. Scutellum pubescent. Elytra with pubescence, longer on basal surface;



**Figs 63–64.** *Miridiba wangi* (Zhang, 1997), holotype, ♂ (IZCAS). **63.** Habitus in dorsal view. **64.** Parameres in lateral (A) and dorsal (B) views. Scale bars: 63 = 5.0 mm; 64 = 1.0 mm.

epipleuron with pubescence on full length. Foretibia with moderately developed dorsal carina; insertion of inner spur closer to second outer tooth than third one in male. Meso- and metatibia with interrupted and complete transverse carina, respectively; inner margin of dorsal surface with spines. Prepygidium densely punctate. Pygidium pubescent, roughly and irregularly punctate. Ventrites with dense, short and decumbent setae; ventrite 5 with long pubescence; ventrite 6 moderately concave and bulging at anterior margin. Male genitalia: parameres (Fig. 64) with dorsal branches and collum continuous, apices downward; ventral branches with apices moderately curved upwards. Female genitalia not studied.

### Material examined

#### Holotype

CHINA • ♂; Chang Shou, Nanmu Yuan [Chang Shou, a district in Chongqing]; 6 May 1994; Ke-yi Wang leg.; “HOLOTYPE”; “*Holotrichia (Pledina) wangi* Zhang. sp. nov. det. You-wei Zhang, 1995 V”; “Coll. N° Scarab-13”; “IOZ(E)218205”; IZCAS.

### Remarks

Zhang & Li (1997) described *Holotrichia wangi* based on a male specimen from Sichuan in China. Bezděk (2016) transferred this species to *Miridiba*. We have studied the holotype, which shows features of external morphology and male genitalia characteristic of *Miridiba* and morphotype I “*Trichophora*”. Hence, this species is included in this genital morphotype.

### Distribution

China (Chongqing).

### *Miridiba youweii* Gao & Fang, 2018

*Miridiba youweii* Gao & Fang in Gao *et al.*, 2018: 9, figs 4, 6 (type loc.: Jingdong, Yunnan, China).

*Miridiba youweii* – Gao *et al.* 2019: 462 (species list; in key).

### Diagnosis

See Gao *et al.* (2018).

### Remarks

Gao *et al.* (2018) described *Miridiba youweii* based on the male holotype and 110 paratypes (71 males and 39 females) conserved in IZCAS. Antenna 9-segmented, pronotal surface densely punctate and parameres with two dorsal and two ventral branches (Gao *et al.* 2018: fig. 4) allow us to include *M. youweii* in morphotype I “*Trichophora*”.

### Distribution

China (Guizhou, Yunnan, Zhejiang)

### *Species included in Morphotype II “Gressitti”*

The group is composed of two species, which are characterized by antenna 10-segmented, pronotal surface scattered punctate (distance between punctures greater than diameter of puncture), and male and female genitalia as specified above.

*Miridiba gressitti* (Frey, 1970) comb. nov.  
Figs 5–7, 65

*Holotrichia gressitti* Frey, 1970: 249, 263 (type loc.: Vientiane, Laos).

**Diagnosis**

External morphology of adult (Fig. 65). Body size 18.6 mm. Dorsal surface glabrous, shiny appearance. Clypeus shorter than frons, flat, oblique sides, anterior edge strongly emarginate at middle. Frons with carina moderately developed. Pronotal anterior margin glabrous, moderately wavy forward just behind eyes; posterior margin glabrous, finely flanged with a row of punctures except at middle; lateral margins moderately serrated almost smooth with a few short setae; anterior and posterior angles obtuse, anterior angle not projected forward. Prosternal process cone-shaped. Scutellum glabrous, with scattered punctures and sides without punctures. Elytra with punctures bigger than those of pronotum, epipleuron with a few short setae at basal part. Foretibia with dorsal carina moderately developed; insertion of inner spur closer to third outer tooth than second one. Meso- and metatibia with transverse carina interrupted at middle and complete, respectively; inner margin of dorsal surface with few spines. Prepygidium and pygidium with scattered punctures and glabrous, pygidium with apical margin pubescent, widened and moderately raised. Ventrites 3 and 4 with inconspicuous punctures and glabrous. Ventrite 5 not depressed at posterior half, with pubescence of different length, with conspicuous scattered punctures. Ventrite 6 moderately bulging at anterior margin, with long pubescence near posterior margin. Male and female genitalia as described above (genital morphotype II “*Gressitti*”). Male genitalia: parameres (Fig. 5) with all branches of dorsal complex shorter than ventral branches. Endophallus (Fig. 6) with a strong raspulae with numerous setae. Female genitalia (Fig. 7).

**Material examined**

**Paratype**

LAOS • 1 ♀; Vientiane; 15 Jun. 1965; Ban Van Eue leg.; G. Frey 1969 det.; NHMB.

**Remarks**

Frey (1970) described *Holotrichia gressitti* based on three female specimens designated as a holotype and two paratypes, remaining the male unknown. We have studied one paratype (NHMB) which shows external morphology characteristic of *Miridiba*. Moreover, female genitalia has features not shared with species of other genital morphotypes. Hence, the female genitalia of morphotype II “*Gressitti*” was described based on this species (Fig. 7). Moreover, the male genitalia of *M. gressitti* is described based on a paratype of *Miridiba herteli* (see remarks under *M. herteli*), which is described in morphotype II “*Gressitti*” (Figs 5–6).

**Distribution**

Laos (Vientiane).

*Miridiba herteli* (Frey, 1971)  
Figs 66–68

*Holotrichia herteli* Frey, 1971: 220–221, fig. 29b (type loc.: Saharanpur, Uttar Pradesh, India).

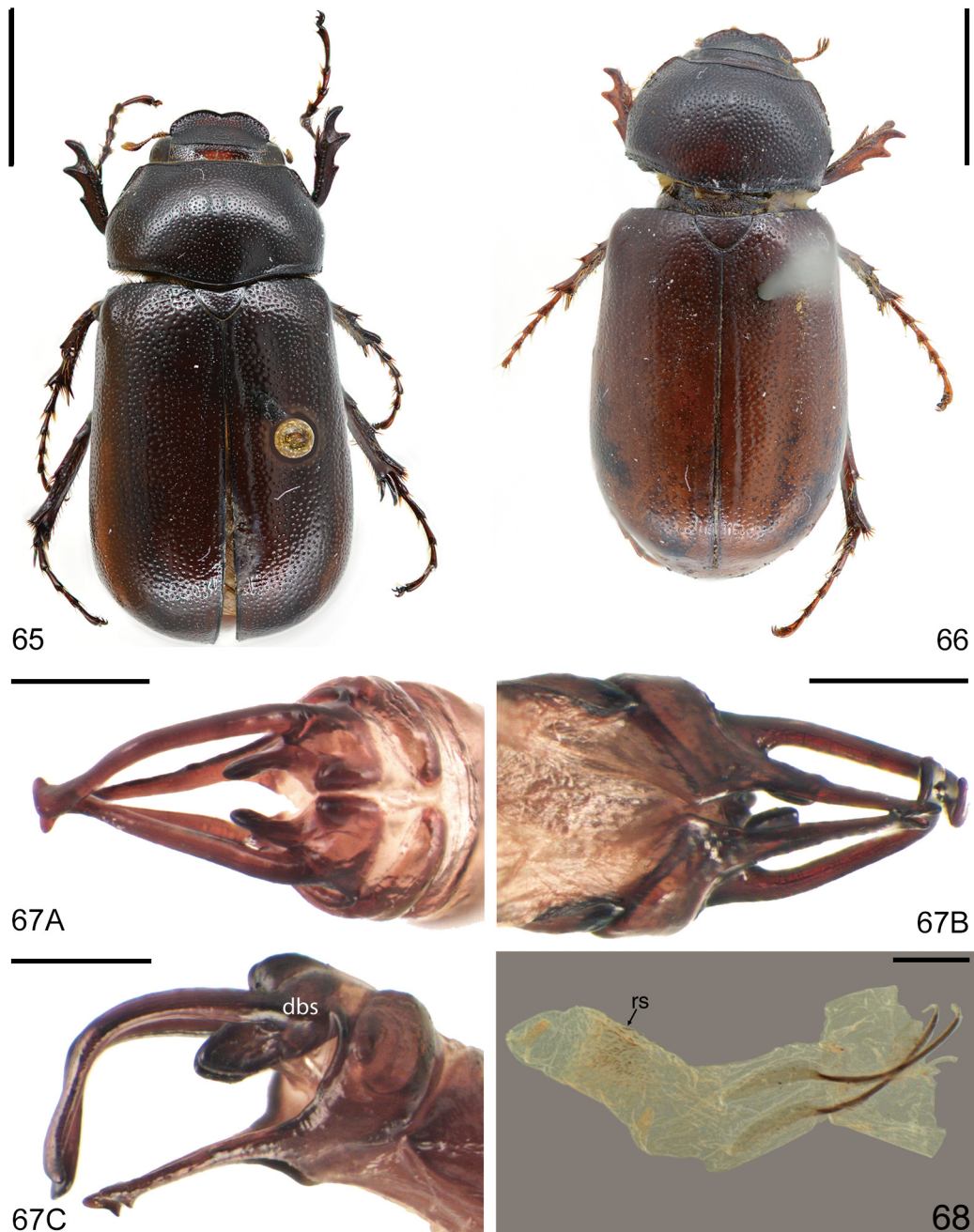
*Holotrichia herteli* – Smetana & Král 2006: 220 (catalogue).

*Miridiba herteli* – Keith 2004: 81 (combination). — Coca-Abia 2008: 680. — Bezděk 2016: 271 (catalogue).



**Diagnosis**

External morphology of adult (Fig. 66). Body size 17.2 mm. Dorsal surface glabrous, at most with tiny setae in each puncture hardly visible; matt appearance. Clypeus shorter than frons, flat, oblique sides, anterior edge strongly emarginate at middle. Frons with carina moderately developed. Pronotal anterior margin glabrous, regularly curved; posterior margin glabrous, finely flanged with a row of



**Figs 65–68.** 65. *Miridiba gressitti* (Frey, 1970), paratype, ♀ (MHNB). Habitus in dorsal view. 66–68. *M. herteli* (Frey, 1971) holotype, ♂ (SNSD 10629). 66. Habitus in dorsal view. 67. Parameres in dorsal (A), ventral (B) and lateral (C) views, 68. Endophallus and temones in lateral view. Scale bars: 65–66 = 5.0 mm; 67–68 = 1.0 mm.

punctures except at middle; lateral margins with posterior half sinuate, moderately serrated and with short setae; anterior angles obtuse, not projected forward, posterior angles almost right and marked. Prosternal process cone-shaped. Scutellum glabrous, with scattered punctures. Epipleuron with few short setae at basal part. Foretibia with dorsal carina sharp; insertion of inner spur almost equidistant between second and third outer tooth. Meso- and metatibia with transverse carina complete, inner margin of dorsal surface with few strong spines. Prepygidium with scattered punctures regularly distributed. Pygidium regularly flanged, surface with scattered punctures irregularly distributed, tiny setae in each puncture hardly visible, apical margin pubescent. Ventrites 3 and 4 glabrous, with inconspicuous punctures at middle, more conspicuous at sides. Ventrite 5 moderately depressed at posterior half, with pubescence of different length, with conspicuous scattered punctures. Ventrite 6 with a transversal anterior keel, with long pubescence near posterior margin. Male genitalia matches morphotype II “*Gressitti*” above described. Dorsal complex of parameres with intermediate branches longer than ventral ones, bending toward distal end; apices of ventral branches with a ventral sharp tip (Fig. 67). Endophallus with a soft raspula with scattered small spines (Fig. 68). Apophysis of temones with each distal end prolonged by an oval plate each weakly sclerotized (Fig. 68). Female genitalia unknown.

### Material examined

#### Holotype

INDIA • ♂; “Saharanpur, N.W. Indien”; “10629”; “Staatl. Museum für Tierkunde, Dresden” [Staatliches Museum für Tierkunde Dresden]; “*Holotrichia* n. sp. *sinensis*?”; “Type *Holotrichia herterli* n. sp. det. G. Frey 1970”; “TYPE”; “Holotype *Miridiba herteli* (Frey, 1970) CH. Bu Gao & M. Coca-Abia det. 2017”; SNSD.

#### Paratype

INDIA • 1 ♂; “Sylheti Ind Prov. Nagpur” [Sylhet region in India, Nagpur]; “♀”; “PARATYPE”; “*Holotrichia herteli* n. sp. det. G. Frey 1970”; “*Miridiba gressitti* (Frey, 1970) Coca- Abia & Chuan-bu Gao det. 2018”; NHMB.

### Remarks

Frey (1971) described *Holotrichia herteli* from two specimens, male and female, designated as holotype (SNSD) and paratype (NHMB), respectively. Later, Keith (2004) transferred this species to *Miridiba*. We have studied both type specimens and realized that the paratype is not female but male. In addition, after comparing both types, we have found that they differ by the following characters (Table 3): body (size, appearance and pubescence), pronotum (anterior and lateral margins), foretibia (carina, inner spur), mesotibia (lateral carina), pygidium (apical margin), ventrites 5 and 6 (appearance) and male genitalia (parameres shape and internal structures of endophallus). These differences between the holotype and paratype of *M. herteli* raise questions about the identity of the paratype. However, after studying and comparing the paratypes of *M. herteli* and *M. gressitti*, they turned out to be identical. Consequently, the paratype of *M. herteli* is identified as *M. gressitti*; features of external morphology confirm it (Table 3). Therefore, the male genitalia of *M. gressitti* is described based on the paratype of *M. herteli*, detailed above (morphotype II “*Gressitti*”). The holotype of *M. herteli* is considered to belonging to genital morphotype II “*Gressitti*”. The features of male genitalia described below confirm it.

### Distribution

India (Uttar Pradesh).



**Table 3.** Differences between holotype and paratype of *M. herteli* (Frey, 1971) and paratype of *M. gressitti* (Frey, 1970).

Character	<i>M. herteli</i> (holotype) ♂	<i>M. herteli</i> (paratype) ♂	<i>M. gressitti</i> (paratype) ♀
Body size	< 18 mm	≥ 18 mm	≥ 18 mm
Body appearance	matte	bright	bright
Body surface pubescence	tiny hardly visible	without pubescence	without pubescence
Anterior margin of pronotum	regularly curved	wavy forward just behind eyes	wavy forward just behind eyes
Lateral margins of pronotum	posterior half sinuate	posterior half straight	posterior half straight
Carina on foretibia	sharp	blunt	blunt
Inner spur of foretibia	between 2 <sup>nd</sup> and 3 <sup>rd</sup> tooth	closer to 3 <sup>rd</sup> tooth	closer to 3 <sup>rd</sup> tooth
Lateral mesotibial carina	complete	interrupted	interrupted
Apex of pygidium	regularly marginate	margin widened and gently raised	margin widened and gently raised
Fifth ventrite	gently depressed at posterior half	not depressed	not depressed
Sixth ventrite	with a transversal anterior keel	without keel only gently bulging	without keel only gently bulging
Intermediate branches of dorsal structure of the parameres	longer than ventral branches	shorter than ventral branches	
Raspula in endophallum	soft, with scattered setae	strong, with plenty setae	

### ***Species included in Morphotype III “Leucophthalma”***

The group is composed of three species, which are characterized by antenna 10-segmented, pronotal surface densely punctate (distance between punctures equal or smaller than diameter of a puncture) and male and female genitalia as specified above.

***Miridiba leucophthalma*** (Wiedemann, 1819)

Fig. 8

*Melolontha leucophthalma* Wiedemann, 1819: 170 (type loc.: Java, Indonesia).

*Ancylonycha leucophthalma* – Burmeister 1855: 316 (combination).

*Holotrichia leucophthalma* – Dalla Torre 1912: 204 (catalogue).

*Miridiba leucophthalma* – Coca-Abia 2008: 681, 683, fig. 17 (combination; type material; in key).

### Diagnosis

External morphology of adult (Coca-Abia 2008). Dorsal surface glabrous. Clypeus with oblique sides, anterior edge rather emarginate at middle. Frons with strong carina. Pronotal surface densely punctate, glabrous; anterior margin strongly flanged; posterior margin finely flanged except at middle; lateral margins smooth; anterior angles sharp and elevated, not projected forward; posterior angles obtuse and rounded. Epipleuron sparsely pubescent. Meso- and metatibia with transverse carina interrupted at middle, inner margin dorsal surface with very few spines moderately developed. Pygidium with pubescence hardly visible, conspicuous pubescence on apex. Tegmen (Coca-Abia 2008: fig. 17): Parameres (Fig. 8) with dorsal branches shorter than ventral ones, wrinkled at distal end. Endophallus with strong spines, larger towards distal end, placed helicoidally surrounding internal walls of sac. Temonies reduced, apophysis separated at distal end. Female genitalia not studied.

### Material examined

INDONESIA • 1 ♂; Indonesia, Java; MFNB (Fig. 8).

### Remarks

Coca-Abia (2008) studied this species and transferred it to *Miridiba*. *Miridiba leucophthalma* shows features of external morphology and male genitalia that characterize morphotype III “*Leucophthalma*”. Hence, this species is included in this genital morphotype.

### Distribution

Indonesia (Jakarta, Java).

### *Miridiba dohrni* (Brenske, 1894) Figs 69–72

*Holotrichia dohrni* Brenske, 1894b: 277 (type loc.: Deli, Sumatra).

*Holotrichia dohrni* – Dalla Torre 1912: 202 (catalogue).

*Miridiba dohrni* – Matsumoto 2016: 3, figs 4–8 (combination).

### Diagnosis

External morphology of adult (Fig. 69). Body size 23–25 mm. Dorsal surface glabrous, shiny appearance. Clypeus flat, oblique sides, anterior edge emarginate at middle. Frons with continuous carina. Pronotal surface densely punctate; anterior margin glabrous, narrowed at middle and at sides, without concavities at lateral ends; posterior margin glabrous, at most with very short setae at sides; lateral margins smooth, glabrous and with anterior third reflexed upwards; anterior and posterior angles almost right and rounded, respectively. Elytra shiny, punctures denser at base than apices; epipleuron with a few short setae at basal part. Foretibia with gently carina. Meso- and metatibia with incomplete transverse carina; inner margin of dorsal surface without spines. Pygidium heart-shaped, densely punctate, with a central depression in male; pygidium concave, moderately punctate and with two strong pointed protuberances in females, glabrous, only short setae along apical margin at both sexes. Ventrites 3 and 4 with sparse pubescence and inconspicuous punctures. Ventrite 5 strongly depressed at posterior half in males; moderately depressed in females, with pubescence of different length at both sexes, with conspicuous punctures. Ventrite 6 bulging anteriorly, with long pubescence near posterior margin. Male genitalia: parameres (Fig. 70) with short dorsal branches separated each other and blunt apices; ventral branches longer than dorsal ones, divergent, arcuate, each one with a spine at proximal position. Endophallus covered with sensilla, denser at distal end, without spines (Fig. 71). Female genitalia (Fig. 72). Gonopore fold with a strong quadrangular sensory plate. Vestigial sternites reduced with sensillae.

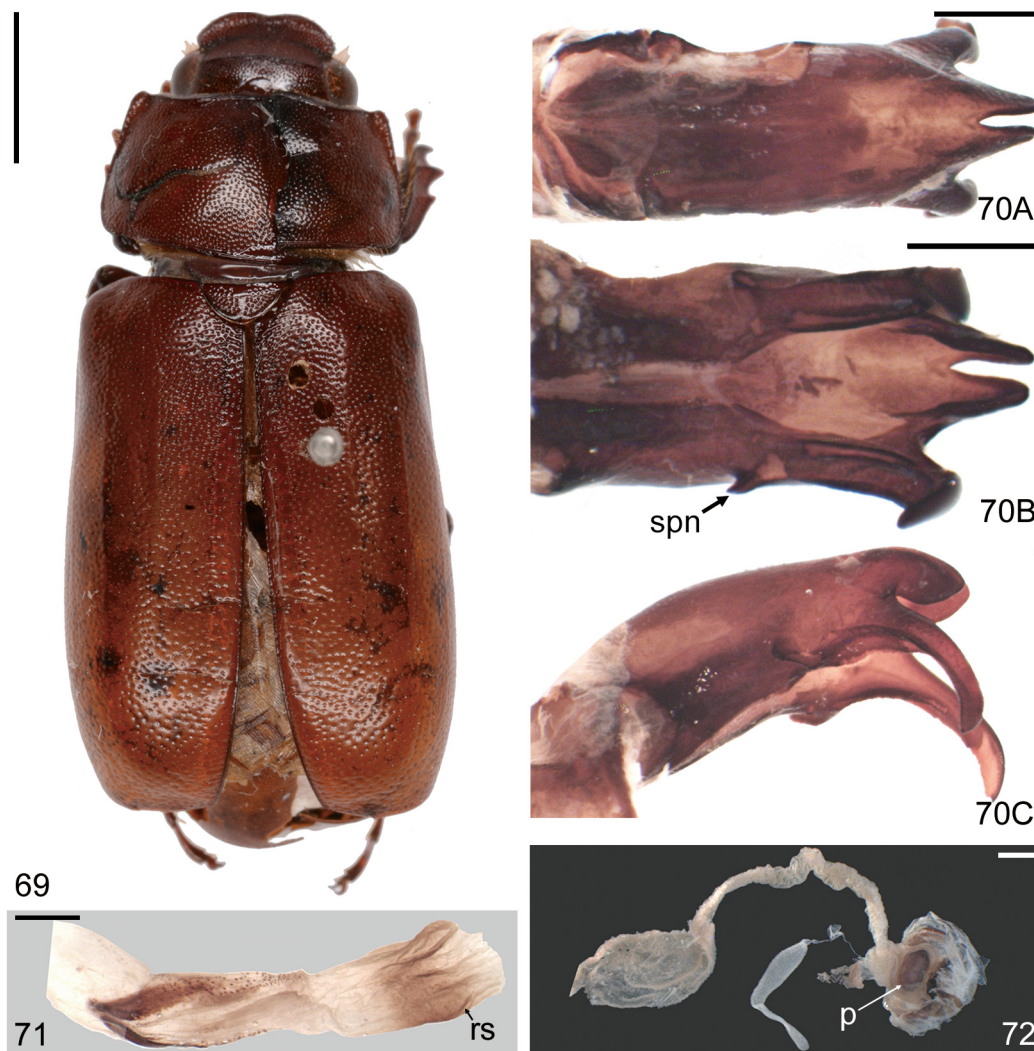
**Material examined**

**Lectotype** (here designated)

INDONESIA • ♂; “Sumatra, Deli”; “Dohrni Brensk”; “SYNTYPUS *Holotrichia dohrni* Brenske, 1894 labelled by MNHUB 2015”; “Lectotype *Miridiba dohrni* (Brenske 1894) Chuan-bu Gao & Coca-Abia det. 2019”; MFNB.

**Paralectotypes** (here indicated)

INDONESIA • 1 ♂; “Soekaranda Januar 1894 Dohrn”; “Coll Brenske”; “*Holotrichia Dohrni* Brnsk”; “SYNTYPUS *Holotrichia dohrni* Brenske, 1894 labelled by MNHUB 2015”; “Paralectotype *Miridiba dohrni* (Brenske 1894) Chuan-bu Gao & Coca-Abia det. 2019”; MFNB • 1 ♀; “Deli Sumatra”; “Coll Brenske”; “*Holotrichia Dohrni* Brnsk”; “SYNTYPUS *Holotrichia dohrni* Brenske, 1894 labelled



**Figs 69–72.** *Miridiba dohrni* (Brenske, 1894). **69–71.** Lectotype, ♂ (MFNB). **72.** Non-type, ♀ (MFNB). **69.** Habitus in dorsal view. **70.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **71.** Endophallus and temones in dorsal view. **72.** Female genitalia, in dorsal view. Scale bars: 69 = 5.0 mm; 70–72 = 1.0 mm.

by MNHUB 2015”; “Paralectotype *Miridiba dohrni* (Brenske 1894) Chuan-bu Gao & Coca-Abia det. 2019”; MFNB.

### Remarks

Matsumoto (2016) studied three syntypes of *Holotrichia dohrni* (two males and one female), transferred this species to *Miridiba* and considered *M. dohrni* closely allied to *Miridiba grvida* (Sharp, 1881). We have studied three syntypes (MFNB) and designated them as a lectotype and two paralectotypes. Also, we agree with the transfer of *H. dohrni* to *Miridiba* and the similarities between *M. leucophthalma* and *M. grvida*. Male genitalia matches morphotype III “*Leucophthalma*” above described. Hence, this species is included in this genital morphotype.

### Distribution

Indonesia (Sumatra).

### *Miridiba grvida* (Sharp, 1881)

*Lachnosterna grvida* Sharp, 1881: 227 (type loc.: Soerian, Sumatra).

*Holotrichia moffartsi* Brenske, 1900: 148 (type loc.: Sumatra).

*Holotrichia grvida* – Brenske 1894b: 277 (combination). — Dalla Torre 1912: 203 (catalogue). — Frey 1970: 248 (in key). — Itoh 2002: 17, figs 1–12 (redescription).

*Holotrichia moffartsi* – Itoh 2002: 17 (synonym). — Frey 1970: 248 (in key).

*Miridiba grvida* – Coca-Abia 2008: 679, 683 (combination; in key). — Matsumoto 2016: 3, figs 9–11 (type material).

### Diagnosis

See Sharp (1881) and Itoh (2002).

### Material examined

**Lectotype of *H. moffartsi*** (here designated)

INDONESIA • ♂; “Sumatra”; “Lectotype *Miridiba moffartsi* (Sharp, 1881) CH. Bu Gao det. 2017”; MFNB.

### Remarks

Itoh (2002) redescribed *Holotrichia grvida* and Coca-Abia (2008) transferred it to *Miridiba*. In the original description, Sharp (1881) indicated that this species is closely allied to *M. leucophthalma*. We have not studied type specimens of *H. grvida*, but, after reviewing the redescription by Itoh (2002), we agree with Sharp (1881) and include this species in morphotype III “*Leucophthalma*”. On the other hand, Brenske (1900) also considered *H. moffartsi* belonging to *Leucophthalma* group. The first author of this paper has studied and compared a syntype of *H. moffartsi* (MFNB) with the genitalia illustrations of *M. grvida* (Itoh 2002), verifying the synonymy proposed by this author (Itoh 2002). Also, the syntype of *H. moffartsi* (MFNB) is designated as lectotype herein.

### Distribution

Indonesia (Sumatra).

**Species included in Morphotype IV “*Bidentata*”**

The group is composed of seven species, which are characterized by antenna 10-segmented, pronotal surface densely punctate (distance between punctures equal or smaller than diameter of a puncture), and male and female genitalia as specified above.

***Miridiba bidentata*** (Burmeister, 1855)

Figs 9–10, 73

*Ancylonycha bidentata* Burmeister, 1855: 316 (type loc.: Ula-Liman-Manis, Sumatra).

*Lachnosterna convexa* Sharp, 1881: 228.

*Holotrichia behrensi* Brenske, 1892: 165.

*Holotrichia bidentata* – Brenske 1894b: 278 (combination). — Dalla Torre 1912: 201 (catalogue).

*Lachnosterna convexa* – Arrow 1944: 636 (as synonym of *H. bidentata*).

*Miridiba bidentata* – Matsumoto 2011: 3, figs 2, 4, 6–7, 13 (combination).

*Holotrichia behrensi* – Matsumoto 2016: 3, figs 1–3 (as synonym of *H. bidentata*).

**Diagnosis**

External morphology of adult of *M. behrensi* (Fig. 73). Body size 19.8–20.5 mm. Dorsal surface glabrous. Clypeus shorter than frons, moderately concave, oblique lateral sides, anterior edge deeply emarginate at middle. Frons with strong carina interrupted at middle. Pronotum with anterior margin glabrous, strongly flanged, thinner at middle and absent at lateral ends; posterior margin glabrous; lateral margins glabrous, moderately crenulated with anterolateral part gently flexed upwards; anterior angles obtuse and marked, not projected forward, posterior angles obtuse and strongly rounded. Prosternal process arrowhead-shaped. Scutellum glabrous, heart-shaped. Elytra more densely punctate at base than at apices; epipleuron glabrous. Foretibia with dorsal carina moderately developed; insertion of inner spur closer to third outer tooth than second one. Meso- and metatibia with transverse carina interrupted at middle and complete, respectively, inner margin of dorsal surface with small spines. Prepygidium irregularly punctate, anterior area finely wrinkled with small punctures among wrinkles, posterior area coarsely punctate, glabrous. Pygidium surface with scattered punctures irregularly distributed, surface glabrous, at most with short setae in each puncture hardly visible, with pubescence on apical margin. Ventrites conspicuously punctate. Ventrite 2 with pubescence, short, reclined, thick and whitish. Ventrites 3 and 4 glabrous. Ventrite 5 moderately depressed at posterior half, with pubescence longer and punctures denser at depressed area. Male genitalia as described in morphotype IV “*Bidentata*”. Parameres (Fig. 9) with dorsal branch narrowed at apex, with a rounded tip curved downward. Ventral branches with elevations as waves at outer margin, apices expanded. Endophallus (Fig. 10) without raspulae, with two strong spines at distal end and other four smaller along sack. Apophysis of temones short with distal ends extend laterally surrounding endophallus partially (T-shaped) (Fig. 10). Female unknown.

**Material examined**

**Lectotype of *M. behrensi*** (here designated)

INDONESIA • ♂; “Sumatra, Ula-Liman-manis 600 D. Behrens”; “Coll. Brenske”; “Syntypus *Holotrichia behrensi* Brenske, 1892 labelled by MNHUB 2015”; “Lectotype *Miridiba behrensi* (Brenske, 1892) Chuan-bu Gao & Coca-Abia det. 2017”; MFNB.

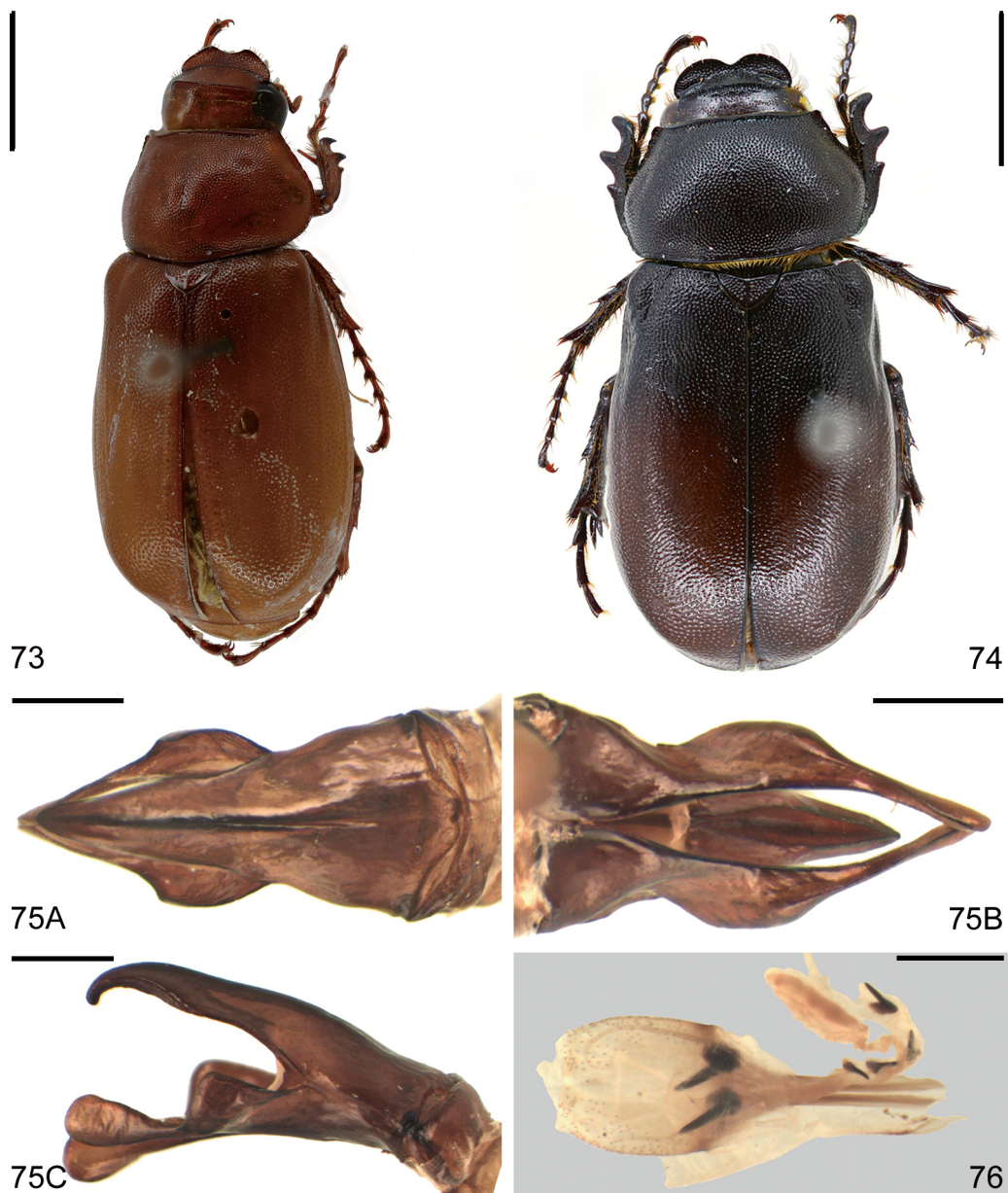
**Paralectotype of *M. behrensi*** (here indicated)

INDONESIA • ♂; “Sumatra, Ula-Liman-manis”; “*Behrensi* Brsk.”; “Coll. Brenske”; “es Ex. gleicht in Halsschildform der | Type, welche *Behrensi* Brsk. = *convexa* Sharp”; “Syntypus *Holotrichia behrensi*

Brenske, 1892 labelled by MNHUB 2015”; “Paralectotype *Miridiba behrensi* (Brenske, 1892) Chuanbu Gao & Coca-Abia det. 2017”; MFNB.

**Other material**

UNKNOWN DATA • 1 ♂ of *Ancylonycha bidentata*; MLUH.



**Figs 73–76.** 73. *Miridiba behrensi* Brenske, 1892, lectotype, ♂ (MFNB), habitus in dorsal view. 74–76. *M. saigonensis* (Moser, 1912), lectotype, ♂ (MFNB). 74. Habitus in dorsal view. 75. Parameres in dorsal (A), ventral (B) and lateral (C) views. 76. Endophallus and temones in ventral view. Scale bars: 73–74 = 5.0 mm; 75–76 = 1.0 mm.



**Remarks**

Matsumoto (2011) studied a series of male and female specimens collected from Malaysia, Thailand and Sumatra, and identified them as *Holotrichia bidentata*. Although the type specimens were not inspected, Matsumoto (2011) transferred this species to *Miridiba*. Later, Matsumoto (2016) synonymized *Holotrichia behrensi* Brenske, 1892 with *Miridiba bidentata* after studying the types of *H. behrensi* only. We have examined a male specimen, preserved in collection MLUH with the genitalia in poor condition, identified as *H. bidentata* by an old handwritten label. Burmeister (1855) described this species from Java as belonging to *Ancylonycha*. The fact that the type locality (Java) does not appear on any labels, and the identification on the old handwritten label is *H. bidentata* and not *A. bidentata* casts doubt on whether it is a type specimen. Thus, we consider that the specimen of *H. bidentata* from MLUH is not a type. Then, it is not possible to confirm or reject the transfer of *H. bidentata* to the genus *Miridiba* (Matsumoto 2011), or the synonymy of *H. behrensi* with *A. bidentata* (Matsumoto 2016) until types of *A. bidentata* are studied. Therefore, we maintain the taxonomic status of *H. bidentata* and *M. behrensi* as currently established (Matsumoto 2011, 2016). We establish the genital morphotype IV “*Bidentata*” based on male characters of *M. behrensi*. On the other hand, we have studied two male syntypes of *H. behrensi* from MFNB and they show features that characterize the genus *Miridiba*. Moreover, we designate them as lectotype and paralectotype herein.

**Distribution**

Indonesia (Java, Sumatra).

*Miridiba laosana* (Moser, 1912)

*Holotrichia laosana* Moser, 1912: 439 (type loc.: Tonkin, Laos).

*Holotrichia laosana* – Frey 1970: 249 (in key).

*Miridiba laosana* – Coca-Abia 2008: 680, 683 (combination; type material; in key).

**Diagnosis**

External morphology of adult (Coca-Abia 2008). Dorsal surface glabrous. Clypeus with anterior edge depressed at middle and elevated. Pronotum with anterior margin strongly flanged; posterior margin finely flanged except at middle; lateral margin weakly serrated with few setae; anterior angles almost right, not projected forward or upward, posterior angles obtuse and strongly rounded. Elytra with shiny appearance, weakly punctate, almost without punctures at apices, elytral apices strongly truncate. Foretibia with carina moderately developed. Meso- and metatibiae with transverse carina interrupted at middle, inner margin of dorsal surface with few small spines. Pygidium glabrous, with pubescence on apical margin. Male genitalia: parameres very similar to those of *M. behrensi*, with dorsal branch narrowed at apex. Ventral branches with elevations as waves at outer margin, apices expanded. Endophallus with spines thicker and stronger at proximal half. Female genitalia not studied.

**Remarks**

Coca-Abia (2008) studied the species and designated lectotype and paralectotype (MFNB) (these types were lost on the way back to MFNB). This species shows features of external morphology and genitalia that characterize the morphotype IV “*Bidentata*”. Hence, this species is included in this genital morphotype.

**Distribution**

Laos.

*Miridiba longula* (Moser, 1912)

*Holotrichia longula* Moser, 1912: 442 (type loc.: Cochinchina, Vietnam).

*Miridiba longula* – Keith 2006: 45 (combination). — Coca-Abia: 681, 683, fig. 18 (type material; in key).

**Diagnosis**

External morphology of adult (Coca-Abia 2008). (Type specimen without head and pronotum). Elytra shiny, glabrous and disperse punctures, weakly punctate at apices. Pygidium with pubescence only on apical margin. Meso- and metatibiae with complete transverse carina, inner margin of dorsal surface without spines. Male genitalia: parameres (Coca-Abia 2008: fig. 18) with dorsal branch wide at all its length with sutural scar at middle. Ventral branches symmetrical, thin, without wavy elevations at outer margin, widened apices with rough appearance. Female unknown.

**Remarks**

This species was transferred to *Miridiba* by Keith (2006) and the holotype was indicated by Coca-Abia (2008). However, Moser (1912) did not indicate how many specimens he studied, so the indication that the specimen was a holotype by Coca-Abia (2008) was not correct (Art. 73.1 ICZN) (this specimen indicated as holotype was lost on the way back to MFNB). *Miridiba longula* shows features of the external morphology and genitalia that characterize morphotype IV “*Bidentata*”. Hence, this species is included in this genital morphotype.

**Distribution**

Vietnam.

*Miridiba malaccensis* (Moser, 1912)

*Holotrichia malaccensis* Moser, 1912: 441 (type loc.: Malacca, Malaysia).

*Miridiba malaccensis* – Matsumoto 2011: 1, figs 1, 10, 12 (combination).

**Diagnosis**

See Moser (1912) and Matsumoto (2011).

**Remarks**

Matsumoto (2011) transferred this species to *Miridiba* based on several non-type specimens from Malaysia. We were unable to examine type specimens and it is not possible to confirm or disprove the transfer of *H. malaccensis* to the genus *Miridiba* (Matsumoto 2011) until the types are studied. Then, we consider the taxonomic status of *H. malaccensis* as it is currently established (Matsumoto 2011) and, according to figures of the male genitalia (Matsumoto 2011: fig. 12), we include this species in the morphotype IV “*Bidentata*”.

**Distribution**

Malaysia (Malacca).

*Miridiba saigonensis* (Moser, 1912)

Figs 11, 74–76

*Holotrichia saigonensis* Moser, 1912: 440 (type loc.: Ho Chi Minh City, Vietnam).

*Holotrichia saigonensis* – Frey 1970: 249 (in key).

*Miridiba saigonensis* – Keith 2006: 45 (combination). — Coca-Abia 2008: 682.

### Diagnosis

External morphology of adult (Fig. 74). Body size 22–25 mm. Dorsal surface glabrous. Clypeus with conspicuous punctures, concave, shorter than frons, arcuate laterally, anterior edge strongly emarginate at middle. Frons with punctures similar to those of clypeus; surface depressed laterally, depressions without punctures; frontal carina sharp. Anterior pronotal margin glabrous, strongly flanged, narrowed at middle and at lateral ends; posterior margin glabrous, moderately flanged except at middle; lateral margins glabrous, moderately elevated, sinuate and smooth at anterior half, posterior half moderately serrated; anterior angles sharp, not projected forward, posterior angles obtuse and rounded. Pronotal surface with strong and deep punctures, each one with a tiny bulge hardly visible. Prosternal process pentagon-shaped. Scutellum without punctures at middle line. Elytral surface with punctures regularly distributed, each one with a tiny bulge hardly visible; apical callus well definite; epipleuron with sparse setae at basal part and membrane. Foretibia with moderate dorsal carina. Meso- and metatibia with transverse carina interrupted and complete respectively; inner margin of dorsal surface with few spines. Prepygidium with pubescence short but conspicuous; punctures irregularly distributed, posterior area with strong punctures bearing short setae, anterior area with punctures thinner than those on posterior one. Pygidium irregularly punctate; punctures thinner at anterior and posterior margins than at middle; surface without conspicuous pubescence, at most with short setae in each puncture, apical margin with long pubescence. Ventrites 1 and 2 with conspicuous short pubescence reclined and regularly distributed. Ventrites 3 and 4 with inconspicuous pubescence. Ventrite 5 moderately depressed at posterior half where shows punctures irregularly distributed and sparse long pubescence; anterior half with thin and dense punctures uniformly distributed and without conspicuous pubescence. Ventrite 6 moderately bulging anteriorly; strong and deep punctures; wrinkled appearance; conspicuous pubescence irregularly distributed. Male genitalia: dorsal branch (Fig. 75) of parameres symmetrical, narrowing towards distal end, with a rounded tip curving downward; sutural scar completely fused. Ventral branches with elevations as waves at outer margin, apices expanded. Phallobase shorter than parameres. Endophallus (Fig. 76) strongly armed with long spines at distal end; proximal end with smaller spines. Temonies short, T-shaped, with distal ends of apophysis extended laterally surrounding endophallus partially, (Fig. 76). Female genitalia as described for morphotype IV “*Bidentata*” (Fig. 11).

### Material examined

#### Lectotype (here designated)

VIETNAM • ♂; “Saigon” [Ho Chi Minh City]; “Donckier leg.”; “Coll. Brenske”; “*Holotrichia saigonensis* Type ♀ Mos”; “*H. saigonensis* Mos.”; “Syntype *Holotrichia saigonensis* Moser 1912 labelled by MFNB 2017”; “♂”; “Lectotype *Miridiba saigonensis* (Moser, 1912) Chuan-bu Gao & Coca-Abia det. 2017”; MFNB.

#### Paralectotype (here indicated)

VIETNAM • ♂; “Cochinchina” [southern of current Vietnam]; “*Holotrichia saigonensis* Type ♂ Mos”; “*H. saigonensis* Mos.”; “SYNTYPE *Holotrichia saigonensis* Moser 1912 labelled by MFNB 2017”; “Paralectotype *Miridiba saigonensis* (Moser, 1912) Chuan-bu Gao & Coca-Abia det. 2017. *Miridiba behrensi* Chuan-bu Gao & Coca-Abia det. 2017”; MFNB.

#### Other material

VIETNAM • 2 ♂♂, 6 ♀♀ (identified as *M. behrensi* herein); Cochinchina; MFNB • 3 ♂♂ (identified as *M. behrensi* herein); Saigon; Donckier leg.; MFNB • 3 ♂♂ (identified as *H. saigonensis* herein); Saigon; Donckier leg.; Gao and Coca-Abia det.; MFNB • 1 ♂ (identified as *H. saigonensis* herein); Cochinchina; Gao and Coca-Abia det.; MFNB.

### Remarks

Moser (1912) described *Holotrichia saigonensis* with a series of specimens from Cochinchina. Keith (2006) transferred this species without studying the types nor giving any justification. After studying seventeen specimens (MFNB) including two types, we agree with the transfer of *H. saigonensis* to *Miridiba*. Features of external morphology and genitalia prove that this species belongs to this genus. Moreover, the parameres with one dorsal and two ventral branches allowing us include this species in genital morphotype IV “*Bidentata*”. On the other hand, we have designated two syntypes as lectotype and paralectotype. After comparing these two types of *M. saigonensis*, we have noted that they differ from each other. The differences between them lie in the clypeus (more concave and deeply emarginate in lectotype than in paralectotype), frons (surface depressed laterally in lectotype and without depressions in paralectotype), and parameres (dorsal branch flat and wider in the lectotype, in the paralectotype narrower and with a dorsal depression). In addition to that, we have compared the paralectotype of *M. saigonensis* with types of *M. behrensi* and they are very similar to each other. Currently, *M. behrensi* is a synonym of *M. bidentata* (Matsumoto 2016), but it is not possible to compare the paralectotype of *M. saigonensis* with *M. bidentata* until types are studied. Then, we only can assert that the paralectotype of *M. saigonensis* is very similar to *M. behrensi*. Moreover, four other specimens, of seventeen studied, differ from the lectotype of *H. saigonensis*, and are also identified as *M. behrensi* in this study. Male and female genitalia of *M. saigonensis* shows features that characterize morphotype IV “*Bidentata*”. Hence, this species is included in this genital morphotype.

### Distribution

Vietnam (Ho Chi Minh City).

### *Miridiba vethi* (Moser, 1917) Figs 77–78

*Holotrichia vethi* Moser, 1917: 90 (type loc.: Batoe Bara, Sumatra).

*Miridiba vethi* – Matsumoto 2017: 1, figs 1–6 (combination).

### Diagnosis

External morphology of adult (Fig. 77). Dorsal surface glabrous. Clypeus concave, shorter than frons, oblique laterally, anterior edge strongly emarginate at middle. Frons with sharp carina. Anterior pronotal margin glabrous, strongly flanged, narrowed at middle and at lateral ends; posterior margin glabrous, moderately flanged; lateral margins smooth, glabrous, moderately elevated at anterior half; anterior angles almost right and rounded, not projected forward; posterior angles obtuse and rounded. Pronotal surface densely punctate, each puncture with a tiny bulge hardly visible. Scutellum sparsely punctate. Elytral surface with punctures regularly distributed; each puncture with a tiny bulge hardly visible; apical callus well defined; epipleuron glabrous with membrane. Foretibia with a moderately developed dorsal carina; insertion of inner spur closer to third outer tooth than second one. Meso- and metatibia with transverse carina interrupted and complete respectively; inner margin of dorsal surface with few spines. Pygidium irregularly punctate; punctures thinner at anterior margin; surface without conspicuous pubescence, at most with tiny setae in each puncture hardly visible, apical margin with long pubescence. Ventrites 2, 3 and 4 without conspicuous pubescence, with small scales hardly visible. Ventrite 5 moderately depressed at posterior half with punctures uniformly distributed and long pubescence irregularly distributed on posterior half; anterior half without conspicuous pubescence. Ventrite 6 moderately bulging anteriorly; conspicuous pubescence irregularly distributed. Male genitalia (Fig. 78): dorsal branch of parameres thin and symmetrical, with sutural scar completely fused, triangular at proximal end, tapered with a rounded tip curving downward at distal end. Ventral branches with elevations as waves at outer margin, apices upward. Endophallus and temones not studied. Female genitalia:

median oviduct with wrinkled and hardened epithelium; elongate plates of gonopore fold with sensillae; conspicuous vestigial sternites placed ventrally at gonopore.

### Material examined

#### Lectotype (here designated)

SUMATRA • ♂; “Sumatra on Batoe Bara”; “*Holotrichia vethi* Mos Type ♂”; “Syntypus *Holotrichia vethi* Moser, 1917 labelled by MNHUB 2016”; “Lectotype *Miridiba vethi* (Moser, 1917) Chuan-bu Gao & Coca-Abia det. 2019”; MFNB.

#### Paralectotypes (here indicated)

SUMATRA • 1 ♂ (without head and pronotum); “Sumatra on Batoe Bara”; “Syntypus *Holotrichia vethi* Moser, 1917 labelled by MNHUB 2016”; “Paralectotype *Miridiba vethi* (Moser, 1917) Chuan-bu Gao & Coca-Abia det. 2019”; MFNB • 1 ♀; “Coll Nonfried Sumatra”; “*Holotrichia vethi* Mos Type ♀”; “Syntypus *Holotrichia vethi* Moser, 1917 labelled by MNHUB 2016”; “Chuan-bu Gao & Coca-Abia det. 2019”; MFNB.

### Remarks

Moser (1917) described *Holotrichia vethi* from Sumatra (Batoe Bara). Matsumoto (2017) transferred this species to *Miridiba* after studying three syntypes (two males and one female), and no lectotype was designated. After studying these three syntypes (MFNB), we agree with the transfer of *H. vethi* to *Miridiba* and designate the lectotype and two paralectotypes. Moreover, we confirm the similarities of *M. vethi* with *M. laosana*, *M. bidentata*, *M. malaccensis* and *M. waterstradti* (Matsumoto 2017). Just



**Figs 77–78.** *Miridiba vethi* (Moser, 1917), lectotype, ♂ (MFNB). 77. Habitus in dorsal view. 78. Parameres in dorsal (A) and lateral (B) views. Scale bars: 77 = 5.0 mm; 78 = 1.0 mm.

like the four species, *M. vethi* shows features that characterize morphotype IV “*Bilobata*”. Hence, we consider it to belong to this genital morphotype.

### Distribution

Indonesia (Sumatra).

### *Miridiba waterstradti* (Moser, 1912)

Figs 79–82

*Holotrichia waterstradti* Moser, 1912: 441 (type loc.: Brunei).

*Miridiba waterstradti* – Matsumoto 2011: 3, figs 3, 14 (combination).

### Diagnosis

External morphology of adult (Fig. 79). Body size 24–26 mm. Dorsal surface glabrous. Clypeus with conspicuous punctures, concave, shorter than frons, oblique laterally, anterior edge strongly emarginate at middle. Frons with punctures similar those of clypeus; frontal carina sharp, slightly bent backward and depressed at middle. Anterior pronotal margin glabrous, strongly flanged, narrowed at middle and lateral ends; posterior margin glabrous, finely flanged; lateral margins glabrous, smooth, moderately elevated at anterior half; anterior angles obtuse and rounded, not projected forward; posterior angles obtuse and marked. Prosternal process tongue-shaped. Scutellum without punctures at middle line. Elytral surface with punctures regularly distributed, each puncture with a tiny bulge; apical callus well definite; epipleuron glabrous. Foretibia with a moderately developed dorsal carina. Meso- and metatibia with a moderately developed transverse carina interrupted and complete, respectively; inner margin of dorsal surface with few small spines. Prepygidium with punctures irregularly distributed, more scattered at posterior margin; with pubescence short and decumbent, inconspicuous at posterior part. Pygidium irregularly punctate; surface without conspicuous pubescence, at most with tiny setae in each puncture hardly visible, apex with long pubescence. Ventricle 1 with posterior margin visible, enduring strong and short pubescence. Ventricle 2 with conspicuous short pubescence, decumbent and regularly distributed. Ventrites 3 and 4 without conspicuous pubescence. Ventricle 5 moderately depressed at posterior half; punctures and pubescence irregularly distributed; with a row of long pubescence at middle. Ventricle 6 moderately bulging anteriorly; conspicuous punctures and pubescence long and short irregularly distributed. Male genitalia: dorsal branch of parameres symmetrical, with sutural scar completely fused, cleft and a fan-shaped extension at distal end (Fig. 80A, C). Ventral branches close to each other, with elevations at outer margins little developed, apices upward, with a small membranous area close to phallobase (Fig. 80B). Phallobase shorter than paramere. Endophallus (Fig. 81) strongly armed with small spines at middle of sac; distal end with two strong spines at lateral sides of two placoid raspulae; proximal end with numerous acicular soft setae. Apophysis of temones short with ends extend laterally surrounding endophallus partially (T-shaped) (Fig. 81). Female genitalia as described for morphotype IV “*Bidentata*” (Fig. 82).

### Material examined

#### Lectotype (here designated)

BRUNEI • ♂; “N. Borneo Brunei Waterstradt S.”; “*Holotrichia waterstradti* Type ♂ Mos”; “SYNTYPE *Holotrichia waterstradti* Moser 1912 labelled by MFNB 2017”; “Lectotype *Miridiba waterstradti* (Moser, 1912) Chuan-bu Gao & Coca-Abia det. 2017”; MFNB.

#### Paralectotypes (here indicated)

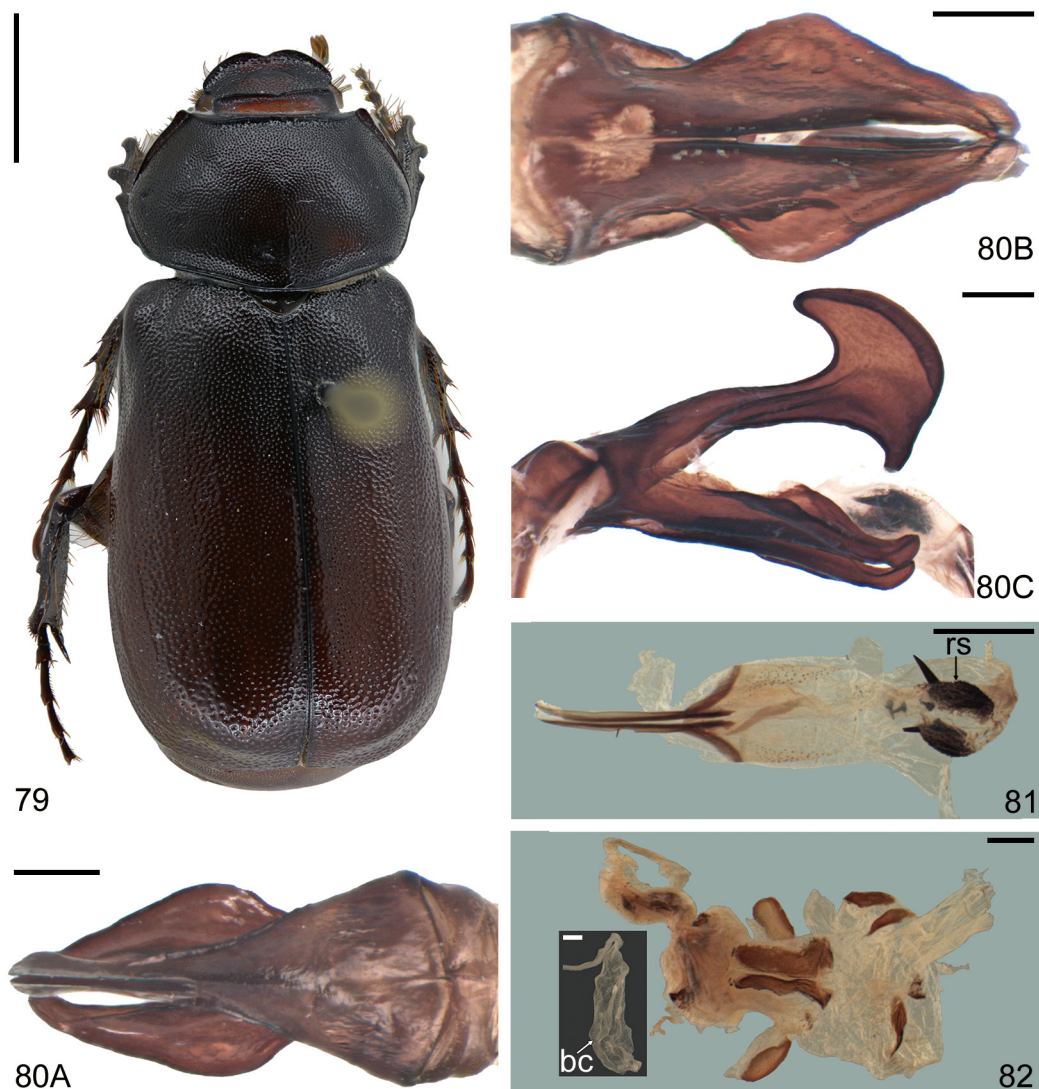
BRUNEI • 1 ♀; “N. Borneo Brunei Waterstradt S.”; “*Holotrichia waterstradti* Type ♀ Mos”; “SYNTYPE *Holotrichia waterstradti* Moser 1912 labelled by MFNB 2017”; “♀”; “Paralectotype



*Miridiba waterstradti* (Moser, 1912) Chuan-bu Gao & Coca-Abia det. 2017"; MFNB • 1 ♀; "N. Borneo Brunei Waterstradt S."; "SYNTYPE *Holotrichia waterstradti* Moser 1912 labelled by MFNB 2017"; "Paralectotype *Miridiba waterstradti* (Moser, 1912) Chuan-bu Gao & Coca-Abia det. 2017"; MFNB • 1 ♀; "*Waterstradti* Mos."; "N. Borneo Brunei Waterstradt S."; "SYNTYPE *Holotrichia waterstradti* Moser 1912 labelled by MFNB 2017"; "Paralectotype *Miridiba waterstradti* (Moser, 1912) Chuan-bu Gao & Coca-Abia det. 2017"; MFNB.

### Remarks

Moser (1912) described *Holotrichia waterstradti* from a series of specimens from Borneo (Brunei) collected by Waterstradt. Matsumoto (2011) transferred this species based on a non-type male specimen from the westernmost part of Borneo Island. After studying four type specimens (MFNB) (one male



**Figs 79–82.** *Miridiba waterstradti* (Moser, 1912). **79–81.** Lectotype, ♂ (MFNB). **79.** Habitus in dorsal view. **80.** Parameres in dorsal (A), ventral (B) and lateral (C) views. **81.** Endophallus and temones in dorsal view. **82.** Paralectotype, ♀ (MFNB), genitalia in dorsal view. Scale bars: 79 = 5.0 mm; 80–82 = 1.0 mm.

and three females), we agree with the transfer of *H. waterstradti* to *Miridiba*. Moreover, male and female genitalia allow us to consider this species to belong to morphotype IV “*Bidentata*”. We designate lectotype and paralectotypes of *M. waterstradti* herein.

### Distribution

Borneo (Brunei, Mt Bawang).

### *Species included in Morphotype V “Sinensis”*

The group is composed of four species, which are characterized by antenna 10-segmented, pronotal surface densely punctate (distance between punctures smaller than diameter of puncture), pronotal lateral margins glabrous and smooth except at middle where is moderately serrated with short pubescence, and male and female genitalia as specified above.

#### *Miridiba sinensis* (Hope, 1842) Figs 12–13, 83

*Holotrichia sinensis* Hope, 1842: 60 (type loc.: China).

*Ancylonycha sinae* Blanchard in Milne-Edwards *et al.*, 1850: 139.

*Rhizotrogus cribellatus* Fairmaire, 1891: 200.

*Holotrichia dalatensis* Frey, 1970: 249, 264 (new combination; new synonym).

*Holotrichia sinensis* – Reitter 1902: 173. — Chang 1964: 146, 149, figs 40–41 (species list; in key). — Smetana & Král 2006: 219 (catalogue).

*Miridiba sinensis* – Nomura 1977: 88 (combination). — Li *et al.* 2015: 523, 533, figs 6, 12, 18, 24, 39–40 (redescription; in key). — Bezděk 2016: 272. — Gao *et al.* 2018: 16 (catalogue); 2019: 462 (species list; in key).

*Ancylonycha sinae* – Burmeister 1855: 316 (synonym). — Smetana & Král 2006: 219 (catalogue).

*Rhizotrogus cribellatus* – Keith 2006: 43 (synonym).

### Diagnosis

External morphology of adult (Fig. 83). Body size 20.0–23.5 mm. Dorsal surface glabrous. Clypeus with conspicuous punctures, flat, shorter than frons, oblique laterally, anterior edge strongly emarginate at middle. Frons with punctures similar to those of clypeus; frontal carina developed. Anterior pronotal margin glabrous, regularly flanged; posterior margin not flanged, glabrous; anterior angles almost right, posterior angles obtuse, vertices rounded. Prosternal process with two-pointed ends. Scutellum densely punctate and glabrous. Elytral surface with punctures regularly distributed; each puncture with a tiny bulge; epipleuron with pubescence on basal half. Foretibia with strong dorsal carina. Meso- and metatibia with transverse carina complete, inner margin of dorsal surface with spines. Metafemora with long pubescence on anterior and posterior margins. Prepygidium with definite punctures and inconspicuous pubescence. Pygidium irregularly punctate; surface glabrous, at most with a tiny seta on each puncture hardly visible, apex with pubescence. Ventrite 2 with conspicuous short decumbent pubescence regularly distributed. Ventrites 3 and 4 with inconspicuous pubescence. Ventrite 5 with punctures and stiff pubescence irregularly distributed. Ventrite 6 moderately bulging at anterior part, punctures and pubescence (long and short) irregularly distributed. Male genitalia: paramere (Fig. 12) moderately curved downward, with two dorsal branches bilaterally asymmetrical, each one with an inner expansion. Endophallus (Fig. 13) with a raspula at distal end with strong setae; proximal end with acicular soft setae. Temonos (Fig. 13) and female genitalia (Fig. 14) described at morphotype V “*Sinensis*”.

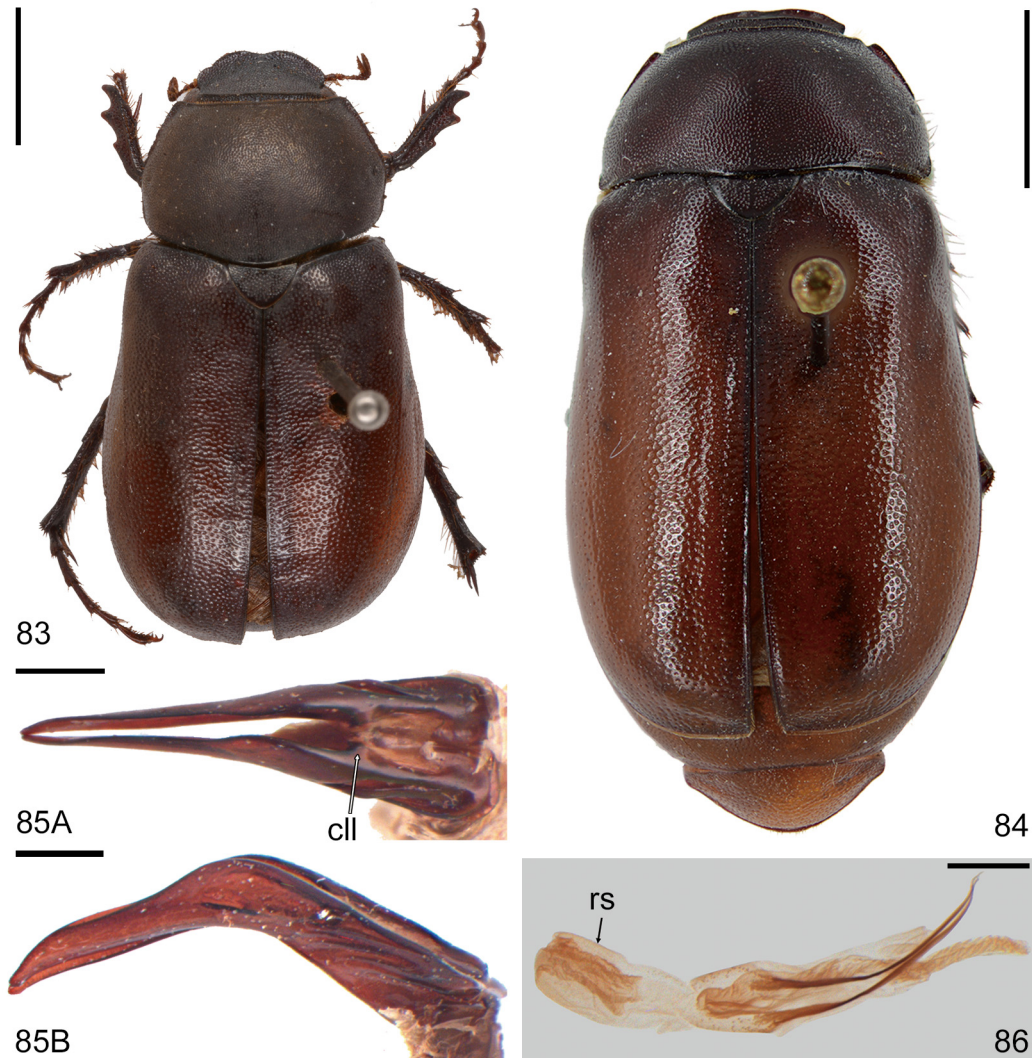
**Material examined**

**Lectotype of *M. sinensis*** (here designated)

CHINA • ♂; “China” [rounded label]; “Dr Cantor” [written on the back of the label] [Guangzhou]; “60.15 E.I.C.”; “Type” [rounded label]; “*sinensis* Hope”; “Lectotype *Miridiba sinensis* (Hope, 1842) CH. Bu Gao & M. Coca-Abia, det. 2017”; BMNH.

**Lectotype of *R. cribellatus*** (here designated)

CHINA • ♂; “Kiukiang” [Jiujiang]; “July 1887, A. E. Pratt”; “Muséum Paris 1906 Coll. Léon Fairmaire”; “*Rhizotrogus cribellatus* Fairm. Kiukiang”; “*Miridiba sinensis* (Hope) D. Keith det. 2005”; “Lectotype *Miridiba cribellatus* (Fairmaire, 1891) CH. Bu Gao & M. Coca-Abia, det. 2017”; MNHN.



**Figs 83–86.** **83.** *Miridiba sinensis* (Hope, 1842), lectotype, ♂ (BMNH). Habitus in dorsal view. **84–86.** *M. pseudosinensis* Keith, 2010, holotype, ♂ (DKC). **84.** Habitus in dorsal view. **85.** Parameres in dorsal (A) and lateral (B) views. **86.** Endophallus (everted) and temones in dorsal view. Scale bars: 83–84 = 5.0 mm; 85–86 = 1.0 mm.

**Paralectotype of *R. cribellatus*** (here indicated)

CHINA • ♀; same collection data as for lectotype of *R. cribellatus*; MNHN.

**Holotype of *M. dalatensis*** (here labelled)

VIETNAM • ♀; “VIETNAM: Dalat 6 Km S., 1400-1500 m”; “9 VI – 7 VII 1961”; “Vietnam Dalat (Ardoin)”; “Type *Holotrichia dalatensis* n sp. det G. Frey 1969”; “Type”; “Holotype *Miridiba dalatensis* (Frey, 1970) Chuan-bu Gao & Coca-Abia det. 2017”; NHMB.

**Other material**

CHINA • 2 ♂♂, 1 ♀; China; BMNH • 1 ♀; Fuzhou; Jun. 1935; M.S. Yang leg.; BMNH • 4 ♂♂, 1 ♀; Hongkong; 29–31 May 2019; IZCAS.

**Remarks**

Hope (1842) described briefly *Holotrichia sinensis* with specimens from Chusan and Canton sent to England by Dr Cantor. Subsequently, Hope (1843, 1845) republished the species a little more detailed. Burmeister (1855) included this species in *Ancylonycha* and synonymized *Ancylonycha sinae* Blanchard, 1850 with *A. sinensis*. Later, Reitter (1902) described the subgenus *Pledina* considering *H. sinensis* as the type species, remaining as *H. (Pledina) sinensis* until Nomura (1977) transferred it to *Miridiba*. We have studied four specimens of *H. sinensis* (BMNH) (three males and one female, including a male type), and have verified that these specimens show features that characterize *Miridiba*. However, male genitalia shows features not shared with species belonging to other genital morphotypes of *Miridiba*. Hence, we describe the male genitalia morphotype V “*Sinensis*” based on this species. On the other hand, Keith (2006) synonymized *Rhizotrogus cribellatus* Fairmaire, 1891 with *M. sinensis* transferring it to *Miridiba*. We have studied two type specimens (male and female) of *R. cribellatus* (MNHN) and have confirmed the synonymy. Besides, after studying the unique type specimen (female) (NHMB) used by Frey (1970) to describe *Holotrichia dalatensis*, and comparing its external morphology and female genitalia with that of *M. sinensis*, we have concluded that the features that characterize *M. sinensis* are also present in *M. dalatensis*. Therefore, we transfer *H. dalatensis* to *Miridiba* and synonymize it with *M. sinensis*. The female genitalia of morphotype V “*Sinensis*” is described based on *H. dalatensis* type. Hope (1842, 1843, 1845) never indicated how many specimens of *H. sinensis* were studied; in case other types are found, this unique syntype of *M. sinensis* is designated as the lectotype. We also designate the lectotype of *M. cribellatus*, which was not designated before, and a paralectotype is indicated. Moreover, the unique specimen of *M. dalatensis* used by Frey (1970) in describing *H. dalatensis* is a holotype by monotypy, and is labelled as holotype.

**Distribution**

China (Guangdong, Guangxi, Fujian, Hongkong, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Zhejiang), Vietnam.

*Miridiba axanensis* Keith, 2020

*Miridiba (Pledina) axanensis* Keith, 2020: 2, figs 4–7 (type loc.: Vietnam, Quang Nam, Tay Giang, Mt Axan).

**Diagnosis**

See Keith (2020).

### Remarks

Keith (2020) described *Miridiba (Pledina) axanensis* based on the male holotype and two paratypes (one male and one female). The characters antenna 10-segmented, pronotal surface densely punctate and collum with a membranous area in dorsal view (Keith 2020: figs 4–6), similar to other species of the morphotype V “*sinensis*”, allow us to include *M. axanensis* in this morphotype V. On the other hand, in this species the lateral fusion of dorsal and ventral branches is partial. The lateral membrane joins the proximal part of the branches, showing the distal ends separated at lateral view.

### Distribution

Vietnam.

### *Miridiba pseudosinensis* Keith, 2010 Figs 84–86

*Miridiba pseudosinensis* Keith, 2010: 232, figs 1–3 (type loc.: Champassak, Laos).

### Diagnosis

External morphology of adult (Fig. 84). Body size 19.0 mm. Dorsal surface glabrous. Clypeus with conspicuous punctures, flat, shorter than frons, oblique laterally, anterior edge strongly emarginate at middle. Frons with punctures similar to those of clypeus; frontal carina developed. Anterior pronotal margin glabrous, regularly flanged; posterior margin not flanged, glabrous; lateral margins with anterior third elevated; anterior angles almost right and elevated, posterior angles obtuse and rounded. Prosternal process with two-pointed ends. Scutellum densely punctate and glabrous. Elytral surface with punctures regularly distributed, glabrous; epipleuron with setae at basal half. Foretibia with strong dorsal carina. Meso- and metatibia with transverse carina complete and inner margin of dorsal surface with spines. Pygidium irregularly punctate; punctures dense and deep; surface glabrous, at most with a tiny seta on each puncture hardly visible, apex with conspicuous pubescence. Ventrites 1 and 2 with decumbent conspicuous pubescence regularly distributed. Ventrites 3 and 4 with scattered thin punctures, glabrous. Ventrite 5 with strong punctures and long pubescence irregularly distributed on posterior half. Ventrite 6 with anterior margin moderately sharpened; punctures and pubescence (long and short) irregularly distributed. Male genitalia: paramere (Fig. 85) with two dorsal branches bilaterally symmetrical. Phallobase shorter than paramere. Endophallus (Fig. 86) without raspulae, with acicular soft setae. Apophysis of temones separated from each other at distal end (Fig. 86). Female unknown.

### Material examined

#### Holotype

LAOS • ♂; Champassak Prov., Dong Hua Xiao NBCA, 2 km S of Ban Nong Luang bank of Touay-Guai stream; 15°4' N, 106°13' E; 800 m a.s.l.; 1–5 Apr. 1998; O. Merkl and G. Csorba leg.; light trap No. 24; “*Miridiba Pseudosinensis* sp. nov. Det D. Keith and G. Sabatinelli det. 2009”; DKC.

#### Paratype

LAOS • 1 ♂; same collection data as for holotype; DKC.

### Remarks

Keith (2010) described *Miridiba pseudosinensis* with two specimens designated as holotype and paratype. This species shows features of external morphology, which characterize *Miridiba*. Besides, male genitalia shows features that characterize the morphotype V “*Sinensis*”. Hence, this species is included in this genital morphotype.



### Distribution

Laos (Champassak).

### *Miridiba quasisinensis* Keith, 2020

*Miridiba (Pledina) quasisinensis* Keith, 2020: 1, figs 1–3 (type loc.: Kon Tum, Ngoc Linh, Vietnam).

### Diagnosis

See Keith (2020).

### Remarks

Keith (2020) described *Miridiba (Pledina) quasisinensis* based on the male holotype and four paratypes (three male and one female). The characters antenna 10-segmented, pronotal surface densely punctate and collum with a membranous area in dorsal view (Keith 2020: figs 2–3), similar to *M. sinensis* and *M. pseudosinensis*, allow us to include *M. quasisinensis* in the morphotype V “*sinensis*”. In addition, the presence of a membranous lateral area joining the dorsal and ventral branches laterally proves the lateral fusion process of these branches. The fusion process is from partial in *M. axanensis* until the complete fusion observed in *M. quasisinensis* with membrane without sclerotization and *M. sinensis* and *M. pseudosinensis* completely sclerotized with scars.

### Distribution

Vietnam.

### *Species included in Morphotype VI “Borneensis”*

The group is composed of two species, which are characterized by antenna 10-segmented, pronotum with scattered punctures (distance between punctures greater than diameter of puncture), pronotal surface depressed just behind anterior margin, metacoxa with whitish scales, and male and female genitalia as specified above. Matsumoto (2005) transferred *Holotrichia borneensis* Moser, 1918 and *Holotrichia coxalis* Arrow, 1944 to the genus *Pentelia* Brenske, 1891. However, both species showed differences with *Pentelia descendens* (Sharp, 1881) (type of *Pentelia*) in the shape of parameres and antennal club. After studying type specimens of *P. borneensis* and *P. coxalis*, both species show features of external morphology that characterize the genus *Miridiba* (pubescence of the mentum, labrum shape, frontal carina, tuft at tarsal segments and carina on foretibiae). Hence, we transfer these two species to the genus *Miridiba*. On the other hand, the presence of genital characters not shared with other *Miridiba* species leads us to propose the morphotype VI “*Borneensis*”.

### *Miridiba borneensis* (Moser, 1918) comb. nov. Figs 15, 87

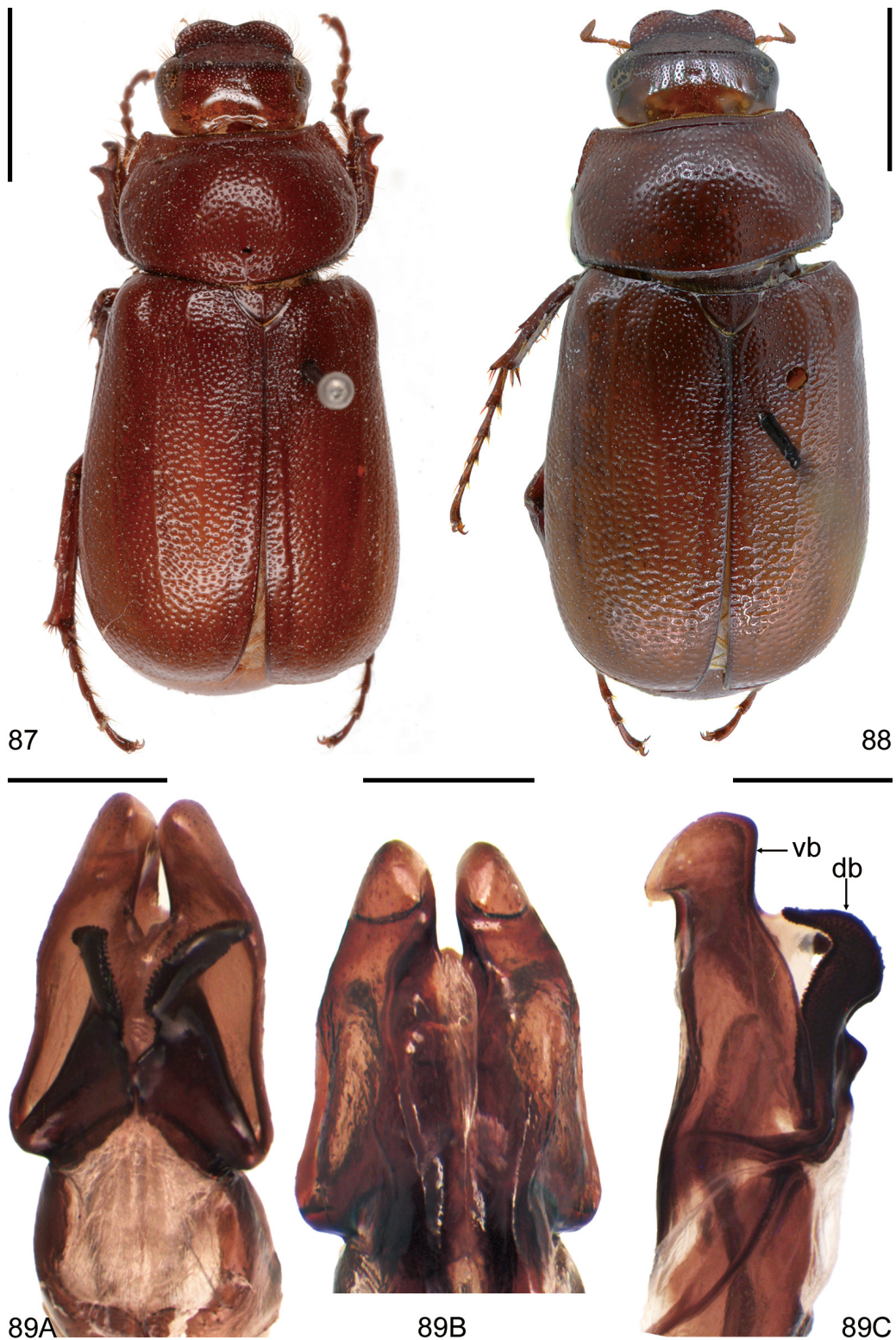
*Holotrichia borneensis* Moser, 1918: 317 (type loc.: Borneo, Malaysia).

*Pentelia borneensis* – Matsumoto 2005: 479, figs 2, 6, 12, 17, 22, 26, 30, 33, 37, 40 (combination).

### Diagnosis

External morphology of adult (Fig. 87). Body size 19.0 mm. Dorsal surface glabrous. Clypeus almost as long as frons, with conspicuous punctures, rounded laterally, anterior edge strongly emarginate at middle. Frons punctate; carina developed, blunt. Anterior pronotal margin glabrous, regularly flanged; posterior margin glabrous, with a row of punctures near each posterior angle; lateral margins serrated and pubescent; anterior angles almost right and elevated, posterior angles obtuse and rounded.





**Figs 87–89.** 87. *Miridiba borneensis* (Moser, 1918), lectotype, ♂ (MFNB). Habitus in dorsal view. 88–89. *M. coxalis* (Arrow, 1944), lectotype, ♂ (BMNH). 88. Habitus in dorsal view. 89. Parameres in dorsal (A), ventral (B) and lateral (C) views. Scale bars: 87–88 = 5.0 mm; 89 = 1.0 mm.

Prosternal process trapezoidal, sunk at middle. Scutellum irregularly punctate and glabrous. Elytral surface punctate, glabrous, costae weakly defined. Foretibia with dorsal carina moderately developed. Metatibia with transverse carina complete and inner margin of dorsal surface with few small spines. Pygidium with strong punctures irregularly distributed; surface glabrous, at most with a tiny seta on each puncture hardly visible, posterior margin with long pubescence on apex. Ventricle 1 not visible. Ventriles 2, 3 and 4 sparsely punctate, without conspicuous pubescence. Ventricle 5 with strong punctures and long pubescence irregularly distributed at posterior half. Ventricle 6 concave moderately bulging at anterior margin; punctures irregularly distributed and long pubescence near posterior margin. Male genitalia: parameres (Fig. 15) with dorsal branches wrinkled, separated from each other and convergent at distal end. Ventral branches elevated at middle and apices strongly curved downward. Parameres and phallobase joined by a membrane oval-shaped. Endophallus and female not studied.

### Material examined

#### Lectotype (here designated)

MALAYSIA • ♂; Borneo, Sarawak; Oct. 1911; Kling Kang leg.; “*Miridiba borneensis* Chuan-bu Gao det. 2018”; MFNB.

#### Other material

MALAYSIA • 1 ♂; Borneo; MFNB.

### Remarks

Moser (1918) described *Holotrichia borneensis* from Borneo (Sarawak) without specifying the number of specimens studied. Matsumoto (2005) transferred this species to the genus *Pentelia* (Brenske 1891). The first author of present paper has studied a syntype male of *H. borneensis* (MFNB), which is designated herein as lectotype of *M. borneensis*, just in case new syntype specimens are found in the future.

### Distribution

Malaysia (Borneo).

#### *Miridiba coxalis* (Arrow, 1944) comb. nov.

Figs 16–17, 88–89

*Holotrichia coxalis* Arrow, 1944: 637 (type loc.: Sarawak, Malaysia).

*Pentelia coxalis* – Matsumoto 2005: 483, figs 4, 9, 11, 16, 24, 27, 35, 41 (combination).

### Diagnosis

External morphology of adult (Fig. 88). Body size 22.0–19.8 mm. Dorsal surface glabrous. Clypeus as long as frons, rounded laterally, with conspicuous punctures, anterior edge strongly emarginate at middle. Frons with punctures more scattered than those of clypeus; carina moderately developed but sharp. Anterior pronotal margin glabrous, regularly flanged; posterior margin glabrous, with a row of punctures; lateral margins moderately serrated and with short pubescence; anterior angles almost right and moderately projected forward, posterior angles obtuse and rounded. Prosternal process rectangular with posterior margin moderately depressed. Scutellum scattered punctate and glabrous. Elytral surface glabrous, at most with a tiny seta on each puncture hardly visible, with striations weakly defined, punctures distributed between striations. Foretibia with dorsal carina moderately developed. Meso- and metatibia with transverse carina interrupted, inner margin of dorsal surface without spines. Pygidium with strong punctures irregularly distributed; surface glabrous, at most with a tiny seta on each puncture hardly visible, apical margin pubescent. Ventriles with short whitish scales. Ventriles 1 and 2 densely punctate; ventrite 3 and 4 more scattered punctate; ventrite 5 with strong punctures and long pubescence

irregularly distributed at posterior half; ventrite 6 concave moderately bulging at anterior part, punctures irregularly distributed and long pubescence on posterior margin. Male genitalia: parameres (Fig. 89) Dorsal branches wavy-shaped in lateral view; with margins serrated at distal half and apices divergent in dorsal view. Ventral branches stronger than dorsal ones; moderately depressed at distal third in lateral view, apices strong and curved downward; both branches joined to each other in ventral view, apices free, separate from each other and narrowed caudally. Dorsal and ventral branches joined by a membrane. Parameres and phallobase joined by a pentagon-shaped membrane. Endophallus (Fig. 16) with two spines at middle of sac and an area more sclerotized with soft sensillae. Apophysis of temones fused dorsally; distal ends extend laterally surrounding endophallus totally, form V-shaped plate in ventral position (Fig. 16). Female genitalia with plates of gonopore fold widened caudally (Fig. 17).

### Material examined

#### Lectotype (here designated)

MALAYSIA • ♂; “Quop, W. Sarawak G. E. Bryant 14.3.14” [Quop and Sarawak rivers 14 Mar. 1914]; “G. Bryant Coll. 1919-147”; “Type”; “Asis”; “*Holotrichia coxalis* Arrow Type”; “Lectotype *Miridiba coxalis* (Arrow, 1944) CH. Bu Gao & M. Coca-Abia det. 2017”; BMNH.

#### Paralectotypes (here indicated)

MALAYSIA • 1 ♂; “Quop, W. Sarawak G. E. Bryant 11.IV.14” [11 Apr. 1914]; “♂”; “G. Bryant Coll. 1919-147”; “paralectotype *Miridiba coxalis* (Arrow, 1944) CH. Bu Gao & M. Coca-Abia det. 2017”; BMNH • 1 ♀; “Oxford Univ. Exp, BM Hobby & A.W. Moore, BM 1933-254”; “SARAWAK, foot of Mt. Dulit, Junction of rivers Tinjar & Lejok, 4.X.1932” [4 Oct. 1932]; “♀”; “Paralectotype *Miridiba coxalis* (Arrow, 1944) CH. Bu Gao & M. Coca-Abia det. 2017”; BMNH.

### Remarks

Arrow (1944) described *Holotrichia coxalis* from six specimens. Matsumoto (2005) transferred this species to the genus *Pentelia* without designating a lectotype. We have studied three syntypes (two males and one female) of *H. coxalis* (BMNH). They share features of external morphology with the genus *Miridiba*. Moreover, the male genitalia shows characteristic of morphotype VI “*Borneensis*”. Hence, this species is included in this genital morphotype. The three syntypes of *M. coxalis* (BMNH) are designated as lectotype and paralectotypes.

### Distribution

Malaysia (Sarawak).

### *Species included in Morphotype VII “Rugaticollis”*

The group is composed of two species, which are characterized by a dark reddish brown to black colour, antenna 10-segmented, male antennal club, at least, as long as funiculus; pronotal surface with coarse punctures densely distributed (distance between punctures equal or smaller than diameter of puncture); ventrite 1 visible; genital features as specified above in genital morphotype VII “*Rugaticollis*”.

#### *Miridiba rugaticollis* (Moser, 1913) comb. nov.

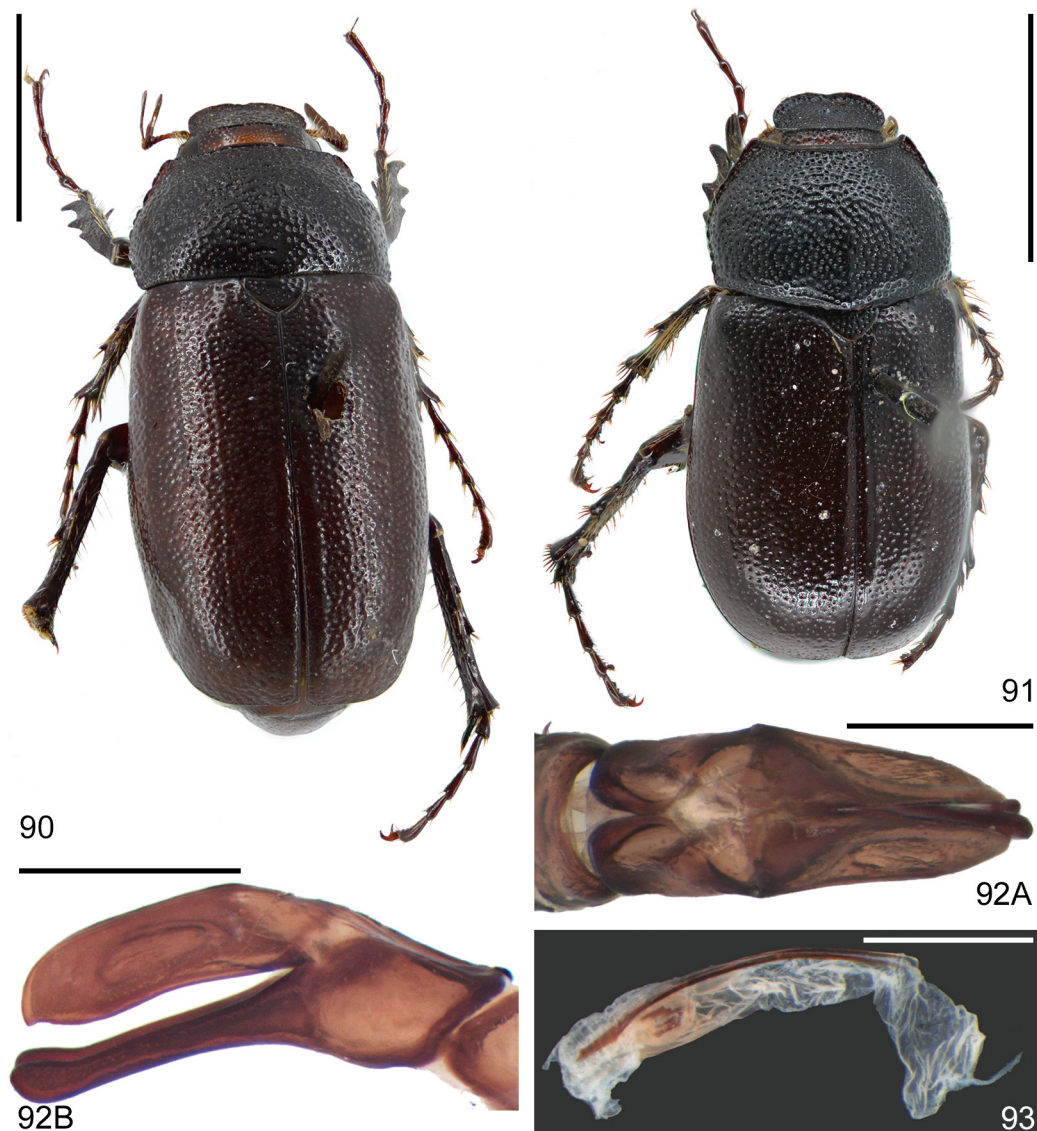
Figs 18–19, 90

*Holotrichia rugaticollis* Moser, 1913a: 53 (type loc.: Kanara, India).

*Holotrichia rugaticollis* – Frey 1971: 220–221, fig. 29a (in key).

### Diagnosis

External morphology of adult (Fig. 90). Body size 14.7 mm. Dorsal surface shiny, glabrous. Male antennal club longer than funiculus and scape. Clypeus longer than frons, almost flat, arcuate laterally, anterior edge emarginate at middle; surface with conspicuous and deep punctures. Frons with punctures similar to those of clypeus, wrinkled appearance; frontal carina blunt. Pronotal surface with strong and deep punctures, wrinkled appearance; anterior margin glabrous, widely flanged; posterior margin glabrous; lateral margins widely serrated with short setae, moderately elevated at anterior half; anterior angles almost right, posterior angles obtuse and marked. Prosternal process slender, apex spade-shaped. Scutellum glabrous, with punctures uniformly distributed. Elytral surface with punctures evenly distributed and softer than those of pronotum; glabrous, at most with short setae in each puncture hardly visible; epipleuron glabrous,



**Figs 90–93.** 90. *Miridiba rugaticollis* (Moser, 1913), lectotype, ♂ (MFNB). Habitus in dorsal view. 91–93. *M. nigrescens* (Moser, 1916), lectotype, ♂ (MFNB). 91. Habitus in dorsal view. 92. Parameres in dorsal (A) and lateral (B) views. 93. Endophallus and temones in lateral view. Scale bars: 90–91 = 5.0 mm; 92–93 = 1.0 mm.



with a few short setae at basal part. Foretibia with a dorsal carina moderately developed. Meso- and metatibia with transverse carina complete, inner margin of dorsal surface with a few spines. Prepygidium with punctures regularly distributed. Pygidium with punctures irregularly distributed, glabrous; apex with sparse and short pubescence. Ventrites 1 and 2 with conspicuous short pubescence reclined and regularly distributed. Ventrites 3 and 4 glabrous. Ventrite 5 moderately depressed at posterior half, with sparse long pubescence irregularly distributed. Ventrite 6 moderately bulging at anterior margin, with strong and deep punctures, wrinkled appearance; long pubescence on posterior margin. Male genitalia fits into morphotype VII "*Rugaticollis*". Parameres (Fig. 18) with notch of dorsal branch well developed and circular-shaped. Endophallus (Fig. 19) with an area of soft sensillae at distal half. Apophysis of temones (Fig. 19) separated from each other at both ends. Female genitalia unknown.

### Material examined

#### Lectotype (here designated)

INDIA • ♂; "Kanara"; "*Rugaticollis* Brensk"; "*Holotrichia rugaticollis* Type Mos"; "Syntypus *Holotrichia rugaticollis* Moser, 1913 labelled by MNHUB 2016"; "Lectotype *Miridiba rugaticollis* (Moser, 1913) Chuan-bu Gao & Coca-Abia det. 2017"; MFNB.

#### Paralectotype (here indicated)

INDIA • 1 ♂; "Kanara"; "*Rugaticollis*" [in red]; "Syntypus *Holotrichia rugaticollis* Moser, 1913 labelled by MNHUB 2016"; "Paralectotype *Miridiba rugaticollis* (Moser, 1913) Chuan-bu Gao & Coca-Abia det. 2017"; MFNB.

### Remarks

Moser (1913a) described *Holotrichia rugaticollis* from a series of specimens from Bombay (Kanara). We have studied two male type specimens (MFNB) (one of them heavily damaged), which show the external features that characterize the genus *Miridiba* and the morphotype VII "*Rugaticollis*". Hence, we transfer *H. rugaticollis* to *Miridiba* and to this genital morphotype. Moreover, we designate lectotype and paralectotype.

### Distribution

India (Kanara).

### *Miridiba nigrescens* (Moser, 1916) comb. nov. Figs 91–93

*Holotrichia nigrescens* Moser, 1916: 185 (type loc.: Madurai, India).

*Holotrichia nigrescens* – Frey 1971: 216, 220, figs 28a–b (in key).

### Diagnosis

External morphology of adult (Fig. 91). Body size 11.7–13.3 mm. Dorsal surface glabrous, at most with short setae in each puncture hardly visible. Male antennal club as long as funiculus. Clypeus shorter than frons, almost flat, arcuate laterally, anterior edge emarginate at middle; surface with conspicuous and deep punctures. Frons with punctures similar to those of clypeus; frontal carina blunt and curved backward. Pronotal surface with strong and deep punctures, wrinkled appearance; anterior margin glabrous, widely flanged; posterior margin with a row of punctures and very short pubescence; lateral margins widely serrated and with short setae, elevated at anterior half; anterior angles almost right, moderately projected forward, posterior angles obtuse almost right and marked. Prosternal process slender and sharp. Scutellum glabrous, with punctures uniformly distributed. Elytral surface shiny, with punctures evenly distributed and softer than those of pronotum; epipleuron glabrous, with a few

short setae at basal part. Foretibia with dorsal carina moderately developed. Meso- and metatibia with transverse carina complete and interrupted respectively, inner margin of dorsal surface with a few spines. Prepygidium with punctures regularly distributed, stronger at posterior margin. Pygidium with punctures irregularly distributed glabrous, at most with tiny setae in each puncture hardly visible; apex with sparse and short pubescence. Ventrites 1 and 2 with conspicuous decumbent short pubescence regularly distributed. Ventrites 3 and 4 glabrous. Ventrite 5 moderately depressed at posterior half, with a row of long setae. Ventrite 6 with strong and deep punctures, appearance wrinkled, moderately bulging at anterior margin, long pubescence near posterior margin. Male genitalia fits into morphotype VII “*Rugaticollis*” above described. Parameres (Fig. 92) with notch of dorsal branch moderately developed, only a small concavity at distal end. Ventral branches slightly longer than dorsal one and with apices moderately raised. Endophallus (Fig. 93) with an area of soft setae at distal half. Apophysis of temones (Fig. 93) separated from each other at both ends. Female genitalia not studied.

### Material examined

#### Lectotype (here designated)

INDIA • ♂; “Madura Ind. or” [Madurai, India]; “*nigrescens*” [in red]; “Syntypus *Holotrichia nigrescens* Moser, 1916 labelled by MNHUB 2016”; “Lectotype *Miridiba nigrescens* (Moser, 1916) Chuan-bu Gao & Coca-Abia det. 2017”; MFNB.

#### Paralectotypes (here indicated)

INDIA • 1 ♂; “Dekan India”; “*Holotrichia nigrescens* Type Mos”; “*nigrescens* Mos”; “Syntypus *Holotrichia nigrescens* Moser, 1916 labelled by MNHUB 2016”; “Paralectotype *Miridiba nigrescens* (Moser, 1916) Chuan-bu Gao and Coca-Abia det. 2017”; MFNB • 1 ♀; “Dekan India”, “*nigrescens*” [in red]; “Syntypus *Holotrichia nigrescens* Moser, 1916 labelled by MNHUB 2016”; “Paralectotype *Miridiba nigrescens* (Moser, 1916) Chuan-bu Gao & Coca-Abia det. 2017”; MFNB.

### Remarks

Moser (1916) described *Holotrichia nigrescens* from a series of specimens from Deccan and Madurai (India). We have studied three type specimens (MFNB) (two males and another one without abdomen that could be a female), which show external and genital features that characterize the genus *Miridiba* and the genital morphotype VII “*Rugaticollis*”. Hence, we transfer *H. nigrescens* to *Miridiba* and include it into this genital morphotype. Moreover, we designate lectotype and paralectotypes.

### Distribution

India (Deccan, Madurai).

### *Species included in Morphotype VIII “Scutata”*

The group is composed of two species, which are characterized by antenna 10-segmented, pronotal surface irregularly and scattered punctate (distance between punctures greater than diameter of puncture) and male and female genitalia as specified above.

#### *Miridiba scutata* (Reitter, 1902) comb. nov.

Figs 20–22, 94

*Holotrichia scutata* Reitter, 1902: 175 (type loc.: Hong Kong, China).

*Holotrichia scutata* Moser, 1909: 471 (primary homonym of *H. scutata* Reitter, 1902). syn. nov.

*Holotrichia scutulata* Dalla Torre, 1912: 206 (new name of *Holotrichia scutata* Moser, 1909). syn. nov.

*Miridiba lassallei* Keith, 2010: 237, figs 9–11 (type loc.: Nghia Lo, Vietnam). syn. nov.



*Holotrichia scutata* Reitter – Chang 1964: 149 (species list; in key).

*Holotrichia scutata* Moser – Smetana & Král 2006: 220 (catalogue).

*Holotrichia scutulata* Dalla Torre – Chang 1964: 149 (species list; in key). — Smetana & Král 2006: 220 (catalogue).

### Diagnosis

External morphology of adult (Fig. 94). Body size 14.0–16.0 mm. Dorsal surface glabrous. Clypeus rounded laterally, with conspicuous punctures, anterior edge emarginate at middle. Frons with carina moderately developed and blunt. Pronotal surface shiny, regularly punctate, with punctures closer together just behind anterior margin, glabrous, at most with a tiny seta on each puncture, anterior pronotal margin flanged, glabrous; posterior margin glabrous; lateral margins serrated and pubescent; anterior angles almost right not projected forward, posterior angles obtuse and marked. Scutellum without punctures and glabrous. Elytral surface glabrous, at most with a tiny seta on each puncture, with striations weakly defined, punctures distributed between striae; epipleuron glabrous, at most with few setae at base. Foretibia with dorsal carina moderately developed; insertion of inner spur closer third outer tooth than second one. Meso- and metatibia with transverse carina complete, inner margin of dorsal surface without spines. Pygidium with deep punctuation, surface with inconspicuous pubescence, margin pubescent. Ventrites with conspicuous punctures; ventrites 2, 3 and 4 glabrous, at most with a tiny seta in each puncture; ventrite 5 with long pubescence irregularly distributed at posterior half; ventrite 6 moderately bulging at anterior margin, with long pubescence on posterior margin. Male genitalia: parameres (Fig. 20) with dorsal and ventral branches joined laterally. Dorsal branches fused with apex asymmetrical, elevated and twisted. Ventral branches reduced, lightly sclerotized and fused by a ventral membrane. Endophallus (Fig. 21) with a raspula with soft setae and spines at distal end; with spines isolated at middle. Apophysis of temones (Fig. 21) long and separated from each other. Female genitalia (Fig. 22) as described above (morphotype VIII “*Scutata*”).

### Material examined

#### Lectotype of *M. scutata* (Reitter) (here designated)

CHINA • ♂; “Hong Kong”; “*scutata* Rtt”; “? SYNTYPE *Holotrichia scutata* Reitter, 1902 labelled by MFNB 2018”; “Lectotype *Miridiba scutata* (Reitter, 1902) Chuan-bu Gao & Coca-Abia det. 2019”; MFNB.

#### Lectotype of *M. scutata* (Moser) (here designated)

CHINA • ♂; “Hong Kong”; “Coll Brenske”; “*H. scutata* Type Mos”, “*scutata*” [label in pink]; “Lectotype *Miridiba scutulata* (Dalla Torre, 1912) Chuan-bu Gao & Coca-Abia det. 2019”; MFNB.

#### Holotype of *M. lassallei*

VIETNAM • ♂; “Nghia Lo ouest de Yen Bai” [Nghia Lo, west of Yen Bai]; “May 2004; Lassalle leg. Vietnam”; “D. Keith det. 2009”; DKC.

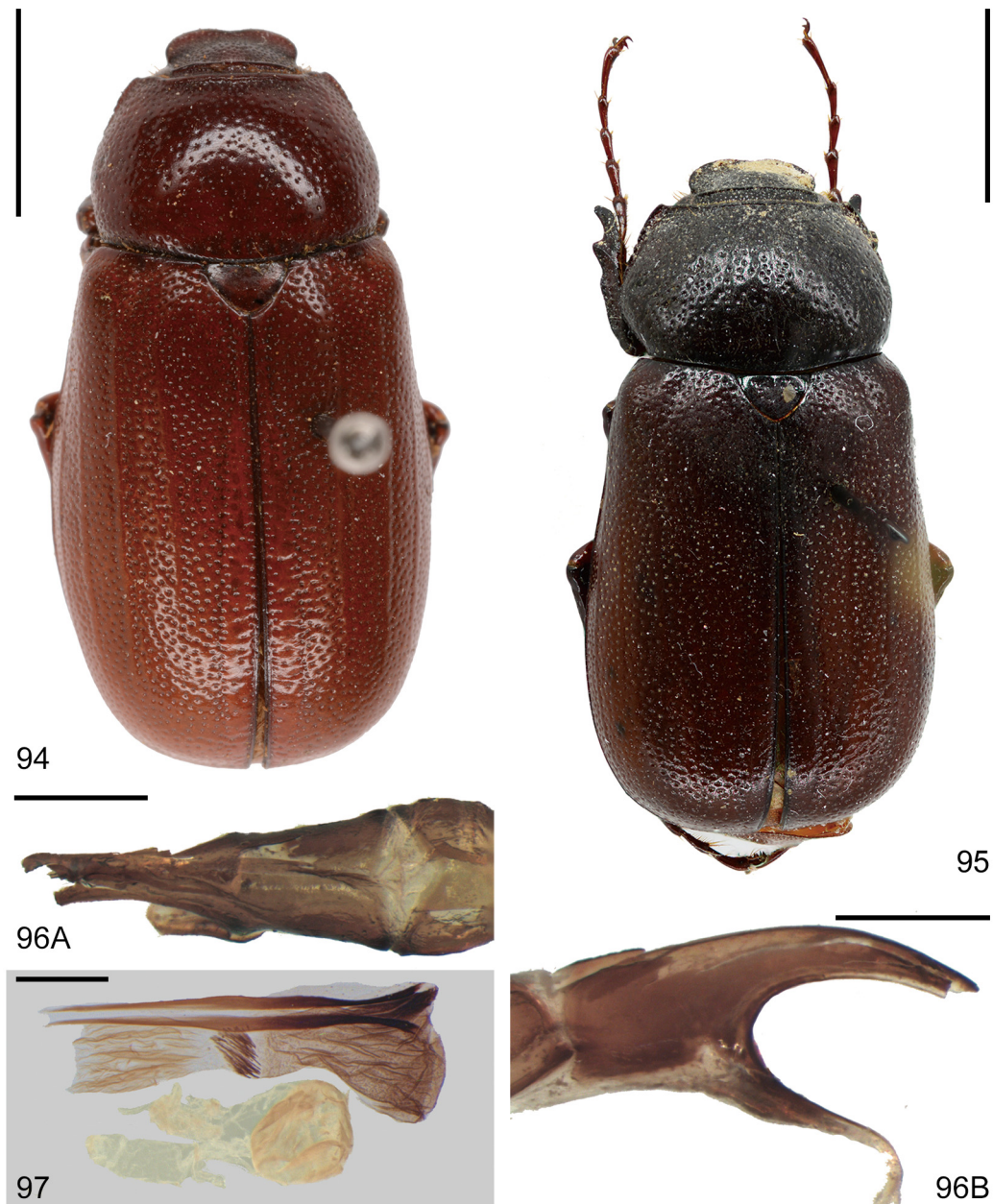
#### Other material

CHINA • 1 ♂, 1 ♀; Pipitz leg.; Coll. Brenske; MFNB.

### Remarks

Nonfried (1892) cited *Holotrichia scutata* Reitter, 1892 collected in Nienghali (Guangxi province of China), mentioning a publication, which, supposedly, contained the original species description. Unfortunately, we have not found this paper. Reitter (1902) described this species from Hong Kong without specifying the origin or number of specimens described. Later, Moser (1909), ignoring the existence of Brenske’s species and Reitter’s description, published another taxon named *Holotrichia scutata* Moser, 1909, also from Hong Kong. Soon after, Dalla Torre (1912) realized the primary homonymy

and proposed the name *Holotrichia scutulata* for *H. scutata* of Moser (1909). We have studied one type specimen of *H. scutata* Reitter, 1902 (MFNB), which shows external features that characterize the genus *Miridiba*. Hence, we transfer *H. scutata* Reitter, 1902 to *Miridiba* and establish the genital morphotype VIII “*Scutata*”. Besides, we have studied a type specimen of *Holotrichia scutulata* Dalla Torre, 1912 (MFNB), verifying the similarities of external morphology and male genitalia (parameres shape, sclerotized structures and sensillae in the endophallus) between both taxa, which confirm the synonymy



**Figs 94–97.** 94. *Miridiba scutata* (Reitter, 1902), lectotype, ♂ (MFNB). Habitus in dorsal view. 95–97. *M. schoolmeesteri* Keith, 2010, holotype, ♂ (DKC). 95. Habitus in dorsal view. 96. Parameres in dorsal (A) and lateral (B) views. 97. Endophallus and temones in lateral view. Scale bars: 94–95 = 5.0 mm; 96–97 = 1.0 mm.

of *H. scutulata* with *H. scutulata*. On the other hand, Keith (2010) described *Miridiba lassallei* based on a male specimen. According to the original description and illustrations (Keith 2010: figs 9–11), the characteristic shape of aedeagus, its asymmetry, the fusion and twist of dorsal branches, and fusion of ventral ones, distinguish it from other known *Miridiba* species. Nevertheless, after studying the holotype of *M. lassallei* (DKC), we have noted that the features of the external morphology and male genitalia that characterize *M. scutulata* (Reitter, 1902) are also present in *M. lassallei*. Therefore, we established the synonymy of *M. lassallei* with *M. scutulata*.

### Distribution

China (Guangxi, Hongkong), Vietnam (Nghia Lo).

### *Miridiba schoolmeesteri* Keith, 2010

Figs 95–97

*Miridiba schoolmeesteri* Keith, 2010: 239, figs 12–14 (type loc.: Mt Phu Tha Ca, Ha Giang, Vietnam).

### Diagnosis

External morphology of adult (Fig. 95). Body size 17.7 mm. Dorsal surface glabrous. Clypeus with conspicuous punctures, wrinkled appearance, flat, shorter than frons, arcuate laterally, anterior edge emarginate at middle. Frons flat, with punctures similar to those of clypeus; frontal carina moderately developed, blunt. Pronotal surface bulky with strong punctures irregularly distributed; anterior pronotal margin flanged, glabrous; posterior margin glabrous; lateral margins serrated with a few short setae, moderately elevated at anterior quarter, posterior half hidden beneath pronotal surface; anterior angles almost right, not projected forward, posterior angles obtuse and marked. Prosternal process with two-pointed ends. Scutellum sparsely punctate. Elytral surface with punctures regularly distributed, epipleuron glabrous. Foretibia with a dorsal carina moderately developed; insertion of inner spur closer to third outer tooth than second one. Meso- and metatibiae with transverse carina moderately developed, interrupted and complete respectively; inner margin of dorsal surface without spines. Prepygidium with punctures regularly distributed; each puncture with a tiny seta. Pygidium regularly punctate, umbilicate punctures; surface glabrous, at most with a tiny seta placed at anterior margin of each puncture, apex with long pubescence. Ventrites 2, 3 and 4 with pubescence hardly visible, decumbent and regularly distributed. Ventrite 5 with punctures uniformly distributed and sparse long pubescence. Ventrite 6 with punctures irregularly distributed and conspicuous pubescence on posterior margin. Male genitalia: it seems that parameres have one dorsal branch and two ventral branches short; a membranous area at distal part connects ventral branches with phallobase (Fig. 96). Endophallus (Fig. 97) with proximal end covered with conspicuous punctiform sensillae; distal part covered with delicate filiform sensillae; between proximal and distal parts an accumulation of spines. Apophysis of temones (Fig. 97) long and separated from each other. Female genitalia unknown.

### Material examined

#### Holotype

VIETNAM • ♂; “Ha Giang, Mt Phu Tha Ca; 1400 m a.s.l.; May 2004; Lassalle leg. Viet Nam sept”; “*Miridiba schoolmeesteri* sp nov. Keith det. 2009”; “Holotype”; DKC.

### Remarks

Keith (2010) described *Miridiba schoolmeesteri* based on a male holotype from Vietnam. After studying the holotype (DKC), we consider that features of external morphology and genitalia confirm that this species belongs to *Miridiba*. Although the aedeagus is damaged, the parameres seem to have one dorsal and two ventral branches, the ventral ones partially fused, and endophallus with raspulae at distal end and spines

isolated at middle, similar to that of *M. scutata*. These characteristics could suggest that *M. schoolmeesteri* belongs to morphotype VIII “*Scutata*”. Hence, we include *M. schoolmeesteri* in the morphotype VIII.

### Distribution

Vietnam.

### Species included in Morphotype IX “*Ciliatipennis*”

The group is composed of three species, which are characterized by antenna 9-segmented, pronotal surface densely punctate (distance between punctures shorter than diameter of puncture), and male and female genitalia as specified above.

*Miridiba ciliatipennis* (Moser, 1913) comb. nov.  
Figs 23, 98

*Holotrichia ciliatipennis* Moser, 1913b: 344 (type loc.: Vietnam).

*Holotrichia ciliatipennis* – Chang 1964: 146, 149–150, figs 54–55 (species list; in key).

*Neodontocnema ciliatipennis* – Frey 1970: 245, figs 1–2 (combination).



**Figs 98–99.** 98. *Miridiba ciliatipennis* (Moser, 1903), lectotype, ♂ (MFNB), habitus in dorsal view. 99. *M. brunneipennis* (Moser, 1916), lectotype, ♂ (MFNB), habitus in dorsal view. Scale bars = 5.0 mm.

**Diagnosis**

External morphology of adult (Fig. 98). Dorsal surface glabrous and densely punctate. Clypeus with anterior edge widely emarginate at middle and oblique laterally. Frontal carina developed and sharp. Anterior pronotal margin flanged, with a concavity moderately developed at each lateral end; posterior margin glabrous; lateral margins smooth, elevated laterally at anterior third; anterior angle acute; posterior angle obtuse and rounded. Scutellum densely punctate. Elytral surface with punctures more scattered than those on pronotum; epipleuron with long yellow setae along all its length. Foretibia with dorsal carina moderately developed. Meso- and metatibia with transverse carina interrupted at middle; inner margin of metatibial dorsal surface with two strong spines. Pygidium dense punctate and conspicuously pubescent; apex with long pubescence. Ventrites punctate and conspicuously pubescent. Ventrite 2 with short pubescence decumbent. Ventrites 3 and 4 with scattered pubescence at middle. Ventrite 5 with long pubescence on posterior half, irregularly distributed. Ventrite 6 with long pubescence along posterior margin. Male genitalia: parameres (Fig. 23) with dorsal branches of dorsal tubular complex sharp apically and with a tendency to converge (Fig. 23A), apices of ventral branches of dorsal tubular complex convergent (Fig. 23B) and curved ventrally (Fig. 23C); in lateral view, dorsal and ventral branches of dorsal tubular complex forming a semi-circular concavity (Fig. 23C). Ventral branches reduced. Phallobase longer than parameres. Endophallus, temones and female genitalia not studied.

**Material examined****Lectotype** (here designated)

VIETNAM • ♂; “Annam” [Centre of Vietnam]; “*Miridiba ciliatipennis* (Moser, 1913) CH. Bu Gao det. 2017”; MFNB.

**Paralectotype** (here indicated)

VIETNAM • 1 ♀; same collection data as for the lectotype; MFNB.

**Other material**

VIETNAM • 1 ♂, 1 ♀; Frey det.; MFNB.

**Remarks**

Moser (1913b) described *Holotrichia ciliatipennis* without indicating how many species he studied. Frey (1970) transferred this species to *Neodontocnema* Arrow, 1948 and illustrated the parameres only in dorsal view. The first author of the present paper has examined four specimens of *H. ciliatipennis* (MFNB) (3 males and 1 female, including two types), which show external and genital features that characterize *Miridiba*. However, male genitalia show features not shared with species belonging to other genital morphotypes of *Miridiba*. Hence, we transfer *H. ciliatipennis* to *Miridiba* and describe the male genitalia morphotype IX “*Ciliatipennis*” based on this species. Moreover, we designate lectotype and paralectotype.

**Distribution**

Vietnam, Thailand.

*Miridiba siamensis* Keith, 2004

*Miridiba siamensis* Keith, 2004: 11, figs 2–3 (type loc.: Na Haeo, Loei, Thailand).

*Miridiba siamensis* – Coca-Abia 2008: 682, 684 (in key).

**Diagnosis**

See Keith (2004).



### Remarks

Keith (2004) described *Miridiba siamensis* from only one male specimen. Unfortunately, we were unable to study the holotype. However, according to the original description, this species shows features of the external morphology that characterize the genus *Miridiba*, such as labrum strongly depressed at middle, frons with developed carina, foretibia with a row of longitudinal pubescence and apices of first-four segments of fore- and mesotarsi with a tuft of setae ventrally. On the other hand, the author illustrated the male genitalia in lateral and dorsal views (Keith 2004: figs 2–3). According to the illustrations (Keith 2004: fig. 2), the parameres in lateral view could have the dorsal tubular complex characteristic of morphotype IX. The upper part shows divergent branches in dorsal view (Keith 2004: fig. 3), and the lower part shows short ventral branches pubescent with apical ends curved ventrally (Keith 2004: fig. 2). Besides, dorsal tubular complex forms a soft concavity, typical of this genital morphotype at distal end. Unfortunately, Keith (2004) did not illustrate the parameres in ventral view, and it is not possible to tell whether the ventral branches under the dorsal tubular complex are present, or not. In our opinion, the morphology of the parameres shows features that characterize the genital morphotype IX “*Ciliatipennis*”. Hence, we consider *Miridiba siamensis* should be included in this genital morphotype. Nevertheless, the holotype must be studied to confirm this consideration.

### Distribution

Thailand.

#### *Miridiba xingkei* Gao & Fang, 2018

*Miridiba xingkei* Gao & Fang in Gao *et al.*, 2018: 6, figs 3, 6 (type loc.: Xishuangbanna, Yunnan Province, China).

*Miridiba xingkei* – Gao *et al.* 2019: 462 (species list; in key).

### Diagnosis

See Gao *et al.* (2018).

### Remarks

Gao *et al.* (2018) described *Miridiba xingkei* based on the male holotype and thirteen paratypes (4 males and 9 females) conserved in IZCAS and NWFU of China. This species shows features that characterize genital morphotype IX “*Ciliatipennis*”. The parameres have the characteristic dorsal tubular complex (Gao *et al.* 2018: figs 3g–i) with dorsal and ventral branches (upper and lower parts) (Gao *et al.* 2018: fig. 3h) forked at distal end (Gao *et al.* 2018: fig. 3g), showing in lateral view the distinctive concavity at distal end (Gao *et al.* 2018: fig. 3h). On the other hand, the ventral branches appear reduced but obvious, fused laterally to dorsal tubular complex forming an apparent lateral scar (Gao *et al.* 2018: figs 3h–i). According to these features, we include *M. xingkei* in the genital morphotype IX “*Ciliatipennis*”.

### Distribution

China (Yunnan).

### *Species incertae sedis*

#### *Miridiba aequabilis* (Bates, 1891)

*Lachnosterna aequabilis* Bates, 1891: 75 (type loc.: Sichuan Province, China).



*Holotrichia (Pledina) aequabilis* – Dalla Torre 1912: 200 (combination; catalogue). — Chang 1964: 146, 149–150, figs 50–51 (species list; in key). — Smetana & Král 2006: 219 (catalogue).

*Miridiba aequabilis* – Coca-Abia 2008: 676 (combination). — Bezděk 2016: 271 (catalogue). — Gao *et al.* 2018: 12 (catalogue); 2019: 461 (species list).

### Diagnosis

See Bates (1891).

### Remarks

Unfortunately, we were unable to study any type specimens of this species. The first author of this paper has examined all specimens in IZCAS collection illustrated and identified as *M. aequabilis* by Chang (1964), concluding that these specimens are *M. frontalis* and not *M. aequabilis*. The original description (Bates 1891) showed that species is bearing strong, sharp frontal carina and 9-segmented antennae with 3 lamellae, which have significant similarities with those of *L. sinensis* and *L. castanea*. Therefore, this species is confirmed to belong to *Miridiba*. Nevertheless, it is necessary to study types of *M. aequabilis* to confirm the assertion and to include it in a genital morphotype.

### Distribution

China (Sichuan).

*Miridiba brunneipennis* (Moser, 1916) comb. nov.

Fig. 99

*Holotrichia brunneipennis* Moser, 1916: 186 (type loc.: Juranda, India).

### Diagnosis

External morphology of adult (Fig. 99). Antenna 10-segmented. Dorsal surface glabrous, densely punctate. Clypeus shorter than frons, with conspicuous punctures, oblique laterally, anterior edge strongly emarginate at middle. Frons with punctures similar to those of clypeus; strong frontal carina. Pronotal surface densely punctate (distance between punctures smaller than diameter of puncture); anterior pronotal margin glabrous, regularly flanged; posterior margin glabrous; lateral margins smooth, moderately elevated at anterior half; anterior angles sharp and not projected forward, posterior angles obtuse and rounded. Prosternal process with two-pointed ends. Scutellum densely punctate, glabrous. Elytral surface glabrous and punctate, without striations defined, epipleuron with short pubescence on basal half. Foretibia with strong dorsal carina. Meso- and metatibia with transverse carina interrupted, and inner margin of dorsal surface with sharp spines. Pygidium glabrous, with deep punctures irregularly distributed, apex with short pubescence. Ventrites 1 and 2 densely punctate, with conspicuous decumbent pubescence regularly distributed. Ventrites 3 and 4 with a transversal row of short and robust pubescence arranged at middle of sternites. Ventrite 5 with strong punctures and long pubescence irregularly distributed on posterior half. Ventrite 6 concave moderately bulging anteriorly, punctures unevenly distributed and with long pubescence on posterior margin. Female unknown.

### Material examined

**Lectotype** (here designated)

INDIA • ♂; “Juranda; Ind. or” [India]; “*Holotrichia brunneipennis* Type Mos”; “*brunneipennis* Mos”; “*BRUNNEIPENNIS* Mos”; “Typus”; “Lectotype *Miridiba brunneipennis* (Moser, 1916) Chuan-bu Gao and Coca-Abia 2017”; MFNB.

### Remarks

Moser (1916) described *Holotrichia brunneipennis* from Juranda (India). We have studied a male type specimen conserved in MFNB, which shows external features that characterize the genus *Miridiba*. Hence, we have transferred *M. brunneipennis* to *Miridiba*. Unfortunately, we were unable to study the male genitalia because this type specimen only conserves the ninth genital segment, which does not allow us to assign it to any genital morphotype. Therefore, *M. brunneipennis* is considered as species incertae sedis within the genus *Miridiba*. The syntype specimen is designated as lectotype.

### Distribution

India.

### *Miridiba enigmatica* Keith, 2020

*Miridiba (Pledina) enigmatica* Keith, 2020: 4, figs 8–10 (type loc.: Mt Axan, Tay Giang, Quang Nam, Vietnam).

### Diagnosis

See Keith (2020).

### Remarks

According to the original descriptions (Keith 2020), this species shows features that characterize *Miridiba* on head (punctures, frontal carina, labrum); legs (longitudinal carina of foretibia; tufts of first four tarsomeres) and genitalia (parameres with branches). Unfortunately, we were unable to study the types and the male genitalia illustrated by Keith (2020) does not allow us to assign this species to any genital morphotype. Therefore, *M. enigmatica* is considered as species incertae sedis within the genus *Miridiba*.

### Distribution

Vietnam.

### *Miridiba lamellata* Gao & Fang, 2019

*Miridiba (Pledina) lamellata* Gao & Fang in Gao *et al.*, 2019: 459, figs 1–18 (type loc.: Gui Yang city, Guizhou Province, China).

### Diagnosis

See Gao *et al.* (2019).

### Remarks

Gao *et al.* (2019) described *Miridiba (Pledina) lamellata* based on the male holotype only, deposited in the collection of Shenyang Agricultural University of China. This species was included in the subgenus *Pledina* based on the antenna 10-segmented (Gao *et al.* 2019), without specifying the features of *M. lamellata* shared with *M. sinensis* (type species of *Pledina*), which would justify considering this new species in the subgenus. We have studied herein *M. sinensis* that, together with *M. pseudosinensis*, *M. axanensis* and *M. quasisinensis*, constitute the morphotype V “*Sinensis*”, candidate to be subgenus *Pledina* (see Discussion and Conclusions), and we have not found enough similarities to consider *M. lamellata* belonging to morphotype V “*Sinensis*”. The antenna 10-segmented, the only character considered by Gao *et al.* (2019) to classify this new species in the subgenus *Pledina*, is shared by many other *Miridiba* species, those included herein in morphotypes II to VIII, and even by many other species of *Holotrichia*. Therefore, this character is not enough to consider *M. lamellata* belonging to *Pledina*.

In addition to that, this new species can be separated from *M. sinensis* by the branches of parameres and setae on mentum and pygidium (Gao *et al.* 2019: figs 9, 14–17), both species are so different that *M. lamellata* cannot be considered belonging to *Pledina*. Likewise, the mentum and labrum of *M. lamellata* differ from those of *Miridiba*. Unlike *Miridiba*, the new species has the mentum with sparse pubescence on the anterior part, and the labrum more strongly depressed at its ventral part than at dorsal one (Gao *et al.* 2019: figs 5, 9). Therefore, the second author of this paper has doubts about inclusion of *M. lamellata* in the genus *Miridiba*. However, taking into account that the first author of this paper is one of the authors of the species and the second author has not studied it, *M. lamellata* is considered a species incertae sedis of *Miridiba*.

### Distribution

China (Guizhou).

### Key to the species of *Miridiba* Reitter, 1902

The species considered incertae sedis as well as *M. brancucci*, *M. malaccensis* and *M. newari* are not included in this key because of lack of sufficient information about diagnostic characters.

1. Antennae 9-segmented (genital morphotypes I, IX) ..... 2
  - Antennae 10 segmented (genital morphotypes II-VIII) ..... 31
2. Dorsal pubescence present. At least some part of dorsum (head, pronotum or elytra) with pubescence ..... 3
  - Dorsum glabrous, at most, with tiny setae in each puncture, hardly visible even at high magnification ..... 13
3. Only some part of the dorsum with pubescence (pronotum, or head and elytra) ..... 4
  - Dorsal pubescence present on whole dorsum (head, pronotum and elytra) ..... 6
4. Pronotum with pubescence arranged in a tuft in the centre of the surface. Head and elytra glabrous ..... *M. sus* (Moser, 1912)
  - Head and elytra pubescent. Pronotal surface glabrous ..... 5
5. Long pubescence on frons and basal part of elytra. Pronotum with lateral margins smooth .....
  - ..... *M. frontalis* (Fairmaire, 1886)
  - Strong pubescence on head and basal and lateral parts of elytra. Pronotum with lateral margins strongly serrated ..... *M. kuraruana* Nomura, 1977
6. Dorsal pubescence long, dishevelled ..... 7
  - Dorsal pubescence short and decumbent ..... 9
7. Clypeus with anterior edge almost straight ..... *M. trichophora* (Fairmaire, 1891)
  - Clypeus with anterior edge moderately emarginate ..... 8
8. Body length 16.3–20.5 mm. Anterolateral angles of pronotum weakly protuberant. Parameres with outer margin of the dorsal branches with two reflex points, and with a row of setae in dorsal view. Characters from Li *et al.* (2015) ..... *M. hirsuta* Itoh, 2001
  - Body length 14.1–15.5 mm. Anterolateral angles of pronotum moderately protuberant with obtusely curved anterior margin. Parameres with the tip of dorsal branches prolonged and smoothly curved downwardly below the ventral branches; parameres with dorsal branches smoothly curved and glabrous in dorsal view. Characters from Li *et al.* (2015) ..... *M. taipei* Wang & Li, 2015

9. Pronotum, elytra and scutellum with pubescence very short, observable with high magnification ...	<i>M. huesiotoi</i> Li & Yang, 2015
– Pubescence on pronotum, elytra and scutellum distinctly long .....	10
10. Pronotum with anterior margin moderately concave at lateral ends .....	<i>M. taoi</i> Li & Wang, 2015
– Pronotal anterior margin without concavities at lateral ends .....	11
11. Elytra irregularly pubescent, setae on basal part longer than those on elytral surface .....	<i>M. wangi</i> (Zhang, 1997)
– Elytra regularly pubescent on all surface .....	12
12. Ratio between dorsal and ventral branches of parameres 1.25. Tips of the dorsal branches of the parameres bent downward 55°. Characters from Gao <i>et al.</i> (2018). Dorsal surface of metatibia with spines equidistant and close to each other .....	<i>M. pilosella</i> (Moser, 1908)
– Ratio between dorsal and ventral branches of parameres 1.50. Tips of the dorsal branches of the parameres bent downward 30°. Characters from Gao <i>et al.</i> (2018). Dorsal surface of metatibia with spines not equidistant, distance between the last two spines, at least, three times greater than the distance between the anterior ones .....	<i>M. kuatunensis</i> Gao & Fang, 2018
13. Middle of anterior clypeal edge deeply emarginate .....	14
– Middle of anterior clypeal edge moderately emarginated, widely sinuous, or almost straight .....	16
14. Meso- and metatibiae with complete transverse carina. Dorsal branches of parameres abruptly curved downwardly, with long pubescence on dorsal surface. Ventral branches of parameres curved upwardly, with long pubescence on ventral surface .....	<i>M. hybrida</i> (Moser, 1912)
– Meso- and metatibiae with transverse carina interrupted. Dorsal branches of parameres almost straight or with additional apical extensions, without pubescence on dorsal surface. Ventral branches of parameres straight without pubescence .....	15
15. Anterior edge of clypeus depressed at middle, with the bottom of the depression flat, U-shaped. Dorsal branches of the parameres bearing long pubescence ventrally; without apical extensions .....	<i>M. bilobata</i> (Moser, 1913)
– Anterior edge of clypeus depressed at middle, with the depression V-shaped. Dorsal branches of parameres without pubescence; with two apical extensions projecting dorsally and ventrally. Characters Keith & Sabatinelli (2010) .....	<i>M. furcillata</i> Keith & Sabatinelli, 2010
16. Frontal carina moderately developed .....	17
– Frontal carina sharp and strongly developed .....	18
17. Posterior pronotal margin not flanged, glabrous. Foretibia with moderately developed dorsal carina. Meso- and metatibia with transverse carina interrupted at middle .....	<i>M. castanea</i> (Waterhouse, 1875)
– Posterior pronotal margin finely flanged and pubescent. Foretibia with developed dorsal carina. Meso- and metatibia with complete transverse carina .....	<i>M. hanoiensis</i> Keith, 2006
18. Pronotal anterior margin without concavities at lateral ends .....	19
– Pronotal anterior margin with concavities at lateral ends .....	22
19. Pronotal anterior margin glabrous. Epipleuron with long dense setae. Pygidium densely pubescent .....	20
– Pronotal anterior margin with short pubescence. Epipleuron with setae except on apex. Pygidium with pubescence only on apex or, at most, with short and sparse pubescence on disk .....	21

20. Pronotal lateral margins pubescent. Metatibia with transverse carina interrupted at middle .....	
.....	<i>M. siamensis</i> Keith, 2004 (genital morphotype IX)
– Pronotal lateral margins glabrous. Metatibia with complete transverse carina .....	
.....	<i>M. xingkei</i> Gao & Fang, 2018 (genital morphotype IX)
21. Clypeus with anterior edge moderately emarginate. Mesotibia with transverse carina interrupted at middle .....	<i>M. coromandeliana</i> (Blanchard, 1850)
– Clypeus with anterior edge widely sinuous at middle. Mesotibia with transverse carina complete .....	<i>M. excisa</i> (Moser, 1913)
22. Pronotum with anterior margin pubescent .....	23
– Pronotum with anterior margin glabrous .....	27
23. Antennal club longer than funiculus; elytra with sparse long pubescence at humeral part .....	
.....	<i>M. recta</i> Keith & Sabatinelli, 2010
– Antennal club shorter than funiculus; elytra without pubescence at humeral part .....	24
24. Clypeal anterior edge arcuate or moderately emarginate. Metatibia with complete transverse carina .....	25
– Clypeal anterior edge widely wavy at middle. Metatibia with incomplete transverse carina .....	26
25. Parameres with ventral branches thin. Characters from Gao <i>et al.</i> (2018) .....	
.....	<i>M. tuberculipennis</i> (Moser, 1913)
– Parameres with ventral branches thick and expanded. Characters from Gao <i>et al.</i> (2018) .....	
.....	<i>M. obscura</i> Itoh, 1995
26. Pronotal posterior margin finely flanged. Frontal carina interrupted at middle .....	
.....	<i>M. imitatrix</i> (Brenske, 1899)
– Pronotal posterior margin not flanged. Frontal carina continuous .....	<i>M. abdominalis</i> (Hope, 1831)
27. Epipleuron of elytra partially pubescent .....	28
– Epipleuron of elytra with pubescence on full length .....	29
28. Metatibia with complete transverse carina .....	<i>M. thai</i> Keith, 2010
– Metatibia with interrupted transverse carina .....	<i>M. diversiceps</i> (Moser, 1912)
29. Metatibia with complete transverse carina .....	30
– Metatibia with interrupted transverse carina .....	
.....	<i>M. ciliatipennis</i> (Moser, 1903) (genital morphotype IX)
30. Dorsolateral margin of metatibia with one spine. Endophallus joined to temones at middle between proximal and distal ends. Dorsal branches of parameres bent downwards, apex curved inwards. Characters from Gao <i>et al.</i> (2018) .....	<i>M. youweii</i> Gao & Fang, 2018
– Dorsolateral margin of metatibia with two spines. Dorsal branches of parameres extended forwards. Endophallus joined to temones at proximal end. Characters from Gao <i>et al.</i> (2018) .....	
.....	<i>M. bannaensis</i> Gao & Fang, 2018
31. Pronotal surface densely punctate (distance between punctures equal or smaller than diameter of puncture) (genital morphotypes III, IV, V and VII) .....	32
– Pronotal surface scattered punctate (distance between punctures greater than diameter of puncture) (genital morphotypes II, VI and VIII) .....	46

32. Pronotal surface with strong and deep punctures and wrinkled appearance. Antennal club longer than funiculus or longer than stem (funiculus and scape) (genital morphotype VII) ..... 33  
 – Pronotal surface with fine and superficial punctures, without wrinkled appearance. Antennal club as long as or shorter than funiculus (genital morphotypes III, IV, V)..... 34
33. Antennal club longer than funiculus. Pronotal posterior margin with tiny pubescence and a row of punctures. Metatibia with transverse carina interrupted at middle. Dorsal branch of parameres with a notch moderately developed at distal end (Fig. 92B) ..... *M. nigrescens* (Moser, 1916)  
 – Antennal club longer than stem (funiculus and scape). Pronotal posterior margin glabrous, and not flanged. Metatibia with transverse carina complete. Dorsal branch of parameres with a strong notch at distal end (Fig. 18C) ..... *M. rugaticollis* (Moser, 1913)
34. Meso- and metatibia without spines on inner margin of dorsal surface ..... 35  
 – Meso- and metatibiae with spines developed to a greater or lesser extent on inner margin of dorsal surface ..... 38
35. Mesotibia with transverse carina interrupted at middle ..... 36  
 – Mesotibia with transverse carina complete ..... 37
36. Clypeus with bidentate appearance, anterior edge deeply emarginate at middle. Frons with strong carina interrupted at middle. Pygidium without ornaments. Parameres with dorsal branch narrowing strongly toward caudal end; ventral branches with elevations at outer margin (Fig. 9) .....  
 ..... *M. bidentata* (Burmeister, 1855) (genital morphotype IV)  
 – Clypeus without bidentate appearance, anterior edge moderately emarginate at middle. Frons with strong carina complete. Pygidium depressed at middle or with ornaments. Parameres with dorsal branches very short, almost fused except by a groove (Fig. 70) .....  
 ..... *M. dohrni* (Brenske, 1894) (genital morphotype III)
37. Parameres with dorsal branch wide at full length; ventral branches shorter than dorsal one (Coca-Abia 2008: fig. 18) ..... *M. longula* (Moser, 1912) (genital morphotype IV)  
 – Parameres with dorsal branch almost completely fused except at distal end; ventral branches much longer than dorsal ones (Itoh 2002) ..... *M. gravis* (Sharp, 1881) (genital morphotype III)
38. Parameres with dorsal and ventral branches completely (Figs 12C, 85B) or partially fused (Keith 2020: figs 2–3, 5–6) by a membrane in lateral view; collum with a membranous area in dorsal view (genital morphotype V) ..... 39  
 – Parameres with dorsal and ventral branches separated at lateral view, without collum ..... 42
39. Pronotal posterior margin glabrous ..... 40  
 – Pronotal posterior margin pubescent in front of scutellum ..... *M. quasisinensis* Keith, 2020
40. Parameres with dorsal and ventral branches completely (Figs 12C, 85B) fused in lateral view .... 41  
 – Parameres with dorsal and ventral branches partially fused (Keith, 2020: figs 5–6) by a membrane in lateral view ..... *M. axanensis* Keith, 2020
41. Pronotum with anterior third of lateral margin not elevated. Parameres moderately curved downward, with two dorsal branches bilaterally asymmetrical (Fig. 12A) ..... *M. sinensis* (Hope, 1842)  
 – Pronotum with anterior third of lateral margin moderately elevated. Parameres curved downward forty-five degrees, with two dorsal branches bilaterally symmetrical (Fig. 85) .....  
 ..... *M. pseudosinensis* Keith, 2010



42. Metatibia with transverse carina interrupted at middle ..... 43  
 – Metatibia with transverse carina complete ..... 44
43. Pronotal lateral margins moderately serrated and with few pubescence. Parameres with dorsal branch narrowing toward caudal end, with a rounded tip curving downward .....  
 ..... *M. laosana* (Moser, 1912) (genital morphotype IV)  
 – Pronotal lateral margins smooth and without pubescence. Parameres with dorsal branches wrinkled at distal end and shorter than ventral ones .....  
 ..... *M. leucophthalma* (Wiedemann, 1819) (genital morphotype III)
44. Clypeus with anterior edge strongly emarginate at middle, surface with lateral depressions. Pronotal lateral margins moderately serrated and with few pubescence. Dorsal branch of parameres narrowing towards distal end, with a rounded tip curving downward (Fig. 75) .....  
 ..... *M. saigonensis* (Moser, 1912) (genital morphotype IV)  
 – Clypeus with anterior edge emarginate at middle, without lateral depressions. Pronotal lateral margins smooth and without pubescence. Parameres with dorsal branch of different morphology ..... 45
45. Pronotal surface with non-confluent punctures (distance between punctures equal to diameter of puncture), with a bulge in each puncture. Dorsal branch of the parameres thin, with a rounded tip curving downward at caudal end (Fig. 78) ..... *M. vethi* (Moser, 1917) (genital morphotype IV)  
 – Pronotal surface with confluent punctures (distance between punctures smaller than diameter of puncture), without bulge in each puncture. Dorsal branch of parameres with a fan-shaped extension at caudal end (Fig. 80) ..... *M. waterstradti* (Moser, 1912) (genital morphotype IV)
46. Metacoxa with whitish scales. Parameres with ventral branches joined each other, forming up a tubular structure (genital morphotype VI) ..... 47  
 – Metacoxa with yellowish pubescence. Parameres with ventral branches separated each other, without forming up tubular structure (genital morphotype II, VIII) ..... 48
47. Pronotal surface depressed behind anterior margin. Foretibia with strong carina. Metatibia with transverse carina complete, with spines on inner margin of dorsal surface. Parameres (Fig. 15) .....  
 ..... *M. borneensis* (Moser, 1918)  
 – Pronotal surface with regular appearance, without depression behind anterior margin. Foretibia with carina moderately developed. Metatibia with transverse carina interrupted at middle, without spines on inner dorsal margin. Parameres (Fig. 89) ..... *M. coxalis* (Arrow, 1944)
48. Meso- and metatibiae with two spines on inner margin of dorsal surface (genital morphotype II) ...  
 ..... 49  
 – Meso- and metatibia without spines on inner margin of dorsal surface (genital morphotype VIII) ..... 50
49. Foretibia with developed carina. Mesotibia with transverse carina complete .....  
 ..... *M. herteli* (Frey, 1971)  
 – Foretibia with carina moderately developed. Mesotibia with transverse carina interrupted at middle .....  
 ..... *M. gressitti* (Frey, 1970)
50. Pronotal surface irregularly and coarsely punctate. Parameres (Fig. 96) .....  
 ..... *M. schoolmeesteri* Keith, 2010  
 – Pronotal surface regularly punctate and shiny. Parameres (Fig. 20) ..... *M. scutata* (Reitter, 1902)

## Discussion

In this study, nine species are transferred to *Miridiba* from *Holotrichia* (*M. gressitti*, *M. dalatensis*, *M. borneensis*, *M. coxalis*, *M. rugaticollis*, *M. nigrescens*, *M. scutata*, *M. ciliatipennis* and *M. brunneipennis*). Four junior subjective synonyms of *Miridiba pilosella* (= *Holotrichia formosana*), *Miridiba sinensis* (= *Holotrichia dalatensis*) and *Miridiba scutata* (= *Holotrichia scutulata*; = *Miridiba lassallei*) are proposed. *Miridiba frontalis* is resurrected as valid species. With the examination of male and female genitalia for *Miridiba* species, we establish nine genital morphotypes: Morphotype I “*Trichophora*”; morphotype II “*Gressitti*”; morphotype III “*Leucophthalma*”; morphotype IV “*Bidentata*”; morphotype V “*Sinensis*”; Morphotype VI “*Borneensis*”; morphotype VII “*Rugaticollis*”; morphotype VIII “*Scutata*” and morphotype IX “*Ciliatipennis*”.

Features of parameres provide characters at specific and higher taxonomic rank. In *Miridiba*, the shape of parameres is variable among genital morphotypical groups. There is a trend on parameres with four branches well-defined in the *Trichophora* group (I), to branches almost completely fused as in *Scutata* and *Ciliatipennis* groups (VIII and IX). As the other six morphotypical groups, the dorsal branches are well-defined but fused at proximal end in the *Gressitti* and *Leucophthalma* groups (II and III); the dorsal branches are completely or almost completely fused, forming an unique dorsal branch with a dorsal scar in the *Bidentata* and *Rugaticollis* groups (IV and VII); the dorsal and ventral branches are completely or partially fused laterally in the *Sinensis* group (V); and the ventral branches are fused at proximal end to form a tubular structures in the *Borneensis* group (VI). The epithelium of endophallus is covered with sensilla dense to a greater or lesser extent, spines in different shapes and position. The internal sensilla can be related to premating recognition of partner, and spines could anchor the endophallus in female genital chamber during mating. All internal structures mentioned above within endophallus correspond to species taxonomic rank and can apply to species identification. The anchorage point of the endophallus is usually located at the distal ends of temones, but in *M. thai* and *M. youweii* the endophallus is joined to temones at middle between proximal and distal ends. In most *Miridiba* species, temones are at the dorsal position, thickened to a greater or lesser extent at distal ends. However, occasionally, the distal ends can extend laterally surrounding the endophallus partially or completely until joined ventrally. In the last case, the ends are joined completely and the ventral structure could be homologous to V-shaped plate described by Sanmartín & Martín-Piera (2003) in Pachydeminae Reitter, 1902. Accordingly, the strong development of temones, the presence of armed apical membrane and the endophallus insertion point are distinguishable to *M. thai* and *M. youweii* from the other species of morphotype I. The lateral extension of distal ends of temones, partially surrounding the endophallus, is distinguishable to *M. bidentata*, *M. saigonensis* and *M. waterstradti* from the other species of morphotype IV and surrounding completely the endophallus is distinguishable to *M. coxalis* and possibly *M. borneensis* (morphotype VI), from the other *Miridiba* species. Therefore, the characters of temones are diagnostic to supra-specific taxonomic rank.

Female genitalia of *Miridiba* are studied and described herein in detail for the first time. The anal fold allows the rectum to project backwards as well as discharging faeces. The gonopore fold fits the opening and closing of gonopore and its approach to the vulva together with the sensory structures (Fig. 1). The function of gonopore are: 1) laying the eggs from the median oviduct; 2) to facilitate, through sensory styli and plates, the courtship and female choice, opening or closing the gonopore according to receptivity of the female and 3) folds, sternites and tergites keep the genital chamber and gonopore open in copulation. The genital chamber plays active roles in sexual selection by female choice in Melolonthinae (Eberhard 1992, 1993). The sclerotized degree of median oviduct and the shape and size of sensory structures of genital chamber are diagnostic in supra-specific taxonomic rank. The shape and length of spermatheca and spermathecal gland are variable among *Miridiba* species.

We establish nine genital morphotypes, which distinguish nine *Miridiba* species groups. Among all genital morphotypes, the most controversial is morphotype V “*Sinensis*”. Its distinctive male and female genital features could support the subgeneric status of *Pledina*. Nevertheless, a phylogenetic approach is necessary to test the monophyly of species groups and the phylogenetic relationships among them and *Miridiba* species. Only in this way, it will be possible to establish reliable taxonomic categories and verify the reality of *Pledina* and its taxonomic rank based on phylogenetic inference.

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