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## Monograph

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# Taxonomic revision of the genus *Loboscelidia* Westwood, 1874 (Hymenoptera: Chrysididae: Loboscelidiinae) from Vietnam

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**Abstract.** The taxonomy of Loboscelidiinae in Vietnam is revised, with 16 new species being described: *Loboscelidia bachmaensis* sp. nov., *L. barbata* sp. nov., *L. cilia* sp. nov., *L. convexa* sp. nov., *L. cucphuongensis* sp. nov., *L. cuneata* sp. nov., *L. do* sp. nov., *L. flavipes* sp. nov., *L. glabra* sp. nov., *L. komedai* sp. nov., *L. mediata* sp. nov., *L. parallela* sp. nov., *L. piriformis* sp. nov., *L. squamosa* sp. nov., *L. vang* sp. nov. and *L. vietnamensis* sp. nov. In total, 24 species of *Loboscelidia* are recognized in the fauna of Vietnam. Keys to Indo-Chinese male and world female of *Loboscelidia* are provided. A brief observation of the foraging behavior of *L. squamosa* sp. nov. is also reported. Host-carriage and subsequent host egg burying are considered primary nesting behaviors of solitary wasps.

**Keywords.** Loboscelidiinae, taxonomy, Oriental Region, parasitoid, foraging behavior.

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## Introduction

Loboscelidiinae Ashmead, 1903 are rare and morphologically peculiar wasps in the family Chrysididae Latreille, 1802. The subfamily contains two genera; *Loboscelidia* Westwood, 1874 and *Rhadinoscelidia*

Kimsey, 1988. The genus *Loboscelidia* is found in the Oriental and Australian Regions, and 51 species have been described until date (Yao *et al.* 2010; Kimsey 2012; Li & Xu 2017). They are characterized by a number of unusual morphological features; e.g., the vertex is prolonged posteriorly into a neck-like projection fringed with ribbon-like setae, and the tegula is very large, covering both wing bases (Kimsey 2012). *Loboscelidia* can be distinguished from *Rhadinoscelidia* by the forewing venation extending into the basal one-third to one-half of the wing (considerably less than the one-fourth in *Rhadinoscelidia*), the vertex being convex or flat behind the ocelli (sharply declivitous in *Rhadinoscelidia*), ribbon-like setae on the gena, and the cervical expansion being unseparated (absent and separated in *Rhadinoscelidia*) (Kimsey & Bohart 1991; Kimsey 2018).

The biology of the genus is poorly known; however, some studies have suggested that they are egg parasitoids of stick insects (Phasmida), such as the Amiseginae Mocsáry, 1890 subfamily (Hadlington & Hoschke 1959; Heather 1965). Many studies have considered that their strange morphology implies their myrmecophily (Fouts 1922; Riek 1970; Krombein 1983). The discovery of *Rhadinoscelidia lixa* Hisasue & Mita, 2020 at the nest entrance of an ant species, *Carebara diversa* (Jerdon, 1851) (Hymenoptera: Formicidae), supports this idea (Hisasue & Mita 2020). In addition, some characteristics, such as frontal projection, ribbon-like setae, and other setae specialization, can be compared to those of other parasitic wasps in the cryptic habitat.

In Vietnam, eight species have been recorded in previous studies (Maa & Yoshimoto 1961; Kimsey 1988, 2012). This number is small compared to that in relatively well-studied areas, such as Thailand and China (Kimsey 2012), but, as Kimsey (2012) mentioned, this may be due to their limited collections and study area. In this paper, we describe 16 new species from Vietnam and provide keys to males of Indo-Chinese species of *Loboscelidia* and to females of world species. In addition, we briefly discuss their morphological diversity and foraging behavior.

## Material and methods

The specimens examined are deposited at the Vietnam National Museum of Nature, Hanoi, Vietnam (VNMN), Canadian National Insect Collection, Ottawa, Ontario, Canada (CNC) and the National Museum of Natural History, Washington, DC, USA (USNM). Images of the holotypes of *Loboscelidia laminata* Kimsey, 2012 and *Loboscelidia pecki* Kimsey, 2012 were also examined. These were obtained from the digital collections of CNC. The images of the types in the VNMN were taken using a Sony  $\alpha$ 7R IV digital camera with a Canon MP-E 65 mm lens and edited with Adobe Photoshop CC. Photos of the behavior were taken with an Olympus Stylus TG-5 Tough. Specimens were measured using an ocular micrometer. The distribution map was produced with SimpleMappr (Shorthouse 2010).

Morphological terms follow those used by Kimsey (1988, 2012), frontal line by Lanes *et al.* (2020), except head length, head width, supraclypeal area and median tooth of tarsal claw. Measurements follow those used by Kimsey (1988, 2012) except width of cervical expansion and length of median tooth of tarsal claw. *Loboscelidia* has a variety of setae of taxonomic importance. The following five types of setae are used in descriptions: simple (Fig. 1A), cuneate (Fig. 1B), scale-like (Fig. 1C), forked (Fig. 1D) and ribbon-like seta (Fig. 1E). The following abbreviations and indices are used: maximum length of the median ocellus diameter (MOD); minimum length of the postocellar line (POL); minimum length of the ocello-ocular line (OOL); lateral ocellar line (LOL; shortest distance between the inner margins of the median and lateral ocelli); flagellomere 1 to 11 (F1–F11); and abdominal tergite 1 to 5 (T1–T5). The following abbreviations are used in the material data: Malaise trap (MT), yellow pan trap (YPT), and flight intercept trap (FIT).

Observation of parasitic behavior was conducted in the accommodation of the Cuc Phuong NP. A female *Loboscelidia* obtained from the field was released into the 90-mm petri dish together with soil



on the bottom (Fig. 30) where we put an egg of an unidentified *Oxyartes* Stål, 1875 (Lonchodidae: Necrosciinae) on the soil.

## Results

### *Taxonomic account*

Class Insecta Linnaeus, 1758  
 Order Hymenoptera Linnaeus, 1758  
 Suborder Apocrita Latreille, 1810  
 Superfamily Chrysidoidea Latreille, 1802  
 Family Chrysididae Latreille, 1802  
 Subfamily Loboscelidiinae Ashmead, 1903

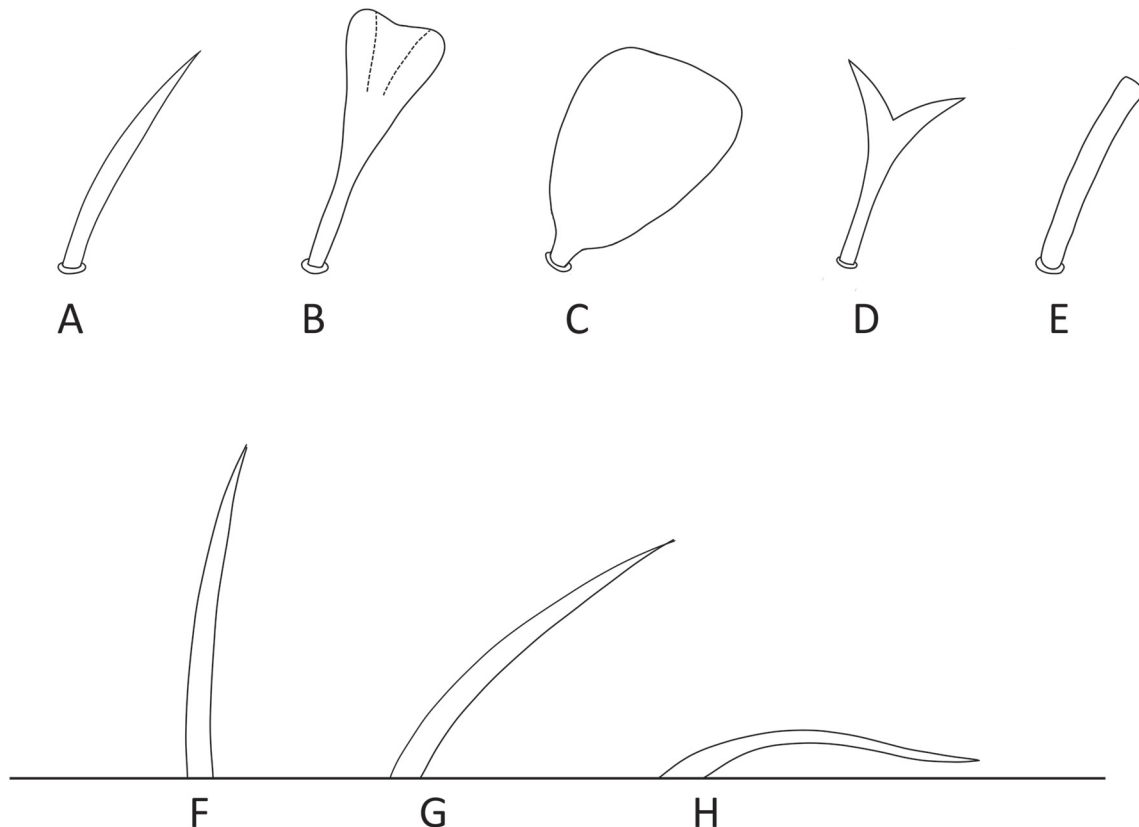
Genus *Loboscelidia* Westwood, 1874

*Loboscelidia* Westwood, 1874: 171. Type species: *Loboscelidia rufescens* Westwood, 1874: 172.

*Loboscelidoidea* (sic!) Rye, 1876: 365. Invalid emendation of *Loboscelidia*.

*Lacomerista* Cameron, 1910: 21. Type species: *Lacomerista rufescens* Cameron, 1910: 22  
 (= *Loboscelidia nixonii* Day, 1978: 29]. Synonymized by Evans 1964: 17.

*Scelidoloba* Maa & Yoshimoto, 1961: 529. Type species: *Scelidoloba antennata* Fouts, 1922.  
 Synonymized by Day 1978: 29.



**Fig. 1.** Pilosity of *Loboscelidia* Westwood, 1874. **A–E.** Patterns of setae. **F–H.** Inclination of setae. **A.** Simple setae. **B.** Cuneate setae. **C.** Scale-like setae. **D.** Forked setae. **E.** Ribbon-like setae. **F.** Erect. **G.** Suberect. **H.** Decumbent.

## Diagnosis

Frontal projection rectangular or triangular in frontal view; behind ocelli with or without transverse depression; cervical expansion trapezoid or cuboid in dorsal view, convex or flattened in lateral view; ribbon-like setae extending from adjacent to eye to apex of cervical extension of head; scape 2–4.5 times as long as wide, usually with flange on ventral margin; F11 about as long as F2 (males); F2–10 as wide as or wider than long (females); F11 flattened (females) or cylindrical (males); lateral margin of pronotum parallel or more commonly diverging posteriorly in dorsal view; dorsolateral surface of pronotum carinate or rounded; mesopleuron usually with scrobal sulcus; scutum usually with notauli; notauli usually reaching posterior margin; scutellum trapezoid or subtriangular; forewing A vein present, usually cu-a vein present, venation extending 0.3–0.5 times as long as forewing length; femora and tibiae usually with transparent flange; dorsolateral surface of hindcoxa usually with carinae.

## Description

**HEAD.** Head shape kite-like or rhomboid; frontal projection rectangular or triangular in frontal view; frons granulate or smooth, usually with low ridge extending from vertex along inner eye margin; frons usually without carinae and wrinkles towards median ocellus, usually without frontal line; spraclypeal area usually with transverse carinae; apical margin of mandible acute (female) or rounded (male); temple shorter or longer than MOD; POL longer or as long as MOD; OOL longer than MOD; LOL usually shorter than half of MOD; behind ocelli with or without transverse depression; cervical expansion trapezoid or cuboid in dorsal view and convex or flattened in lateral view; scape usually with longitudinal grooves; scape 2–4.5 times as long as wide, usually with a flange on ventral surface; F2–10 1.5–3.0 times as long as wide, F11 about as long as F2 (males); F2–10 as wide as or wider than long (females); F11 flattened (females) or cylindrical (males).

**MESOSOMA.** Mesosoma polished; anterior margin of pronotum usually linear, sometimes depressed; dorsolateral surface of pronotum carinate or rounded; notauli converging posteriorly or parallel, usually reaching posterior margin; tegula very large, covering both wing bases and extending back to posterior margin of scutellum; scutellum punctured and rugose or smooth, usually with lateral carinae; metanotum with or without medial ridge; mesopleuron usually with scrobal sulcus, strongly or weakly depressed; propodeum usually slightly rounded in lateral view, with propodeal angle, usually without transverse carina above foramen; upper area of propodeum usually without transverse carina.

**LEGS.** Legs usually polished; femora with flanges; tibiae with or without flanges; dorsolateral surface of tibiae usually with longitudinal carinae; dorsolateral surface of hindcoxa usually with longitudinal carinae, rarely absent; shape of hind femur variable, basally stout, apparently wider than distal part (Fig. 2A), or moderately stout, as wide as distal part (Fig. 2B), or simple and not stout, as wide as distal part (Fig. 2C–D); outer margin of hindfemur usually flat (Fig. 2A–B, D), rarely swollen in median part (Fig. 2C); ventral margin of hindfemur usually flat (Fig. 2A–B), sometimes swollen (Fig. 2C–D); tarsal claw of hindleg usually with a median tooth (Fig. 25A–H, J–K, M–Q), rarely without tooth (Fig. 25I, L); median tooth usually not extending half of tarsal claw (Fig. 25A, C–H, M–O, Q).

**WINGS.** Forewing membrane usually maculate, with A, Cu+M, M, R1, R, cu-a, and Rs vein (Fig. 3A–B); forewing venation developed to half of forewing (Fig. 3A); A usually half as long as Cu+M (Figs 4G, 10E), sometimes as long as Cu+M; M usually curved (Fig. 3A), rarely straight or M vein absent (e.g., *L. fulgens* Kimsey, 2012, *L. reducta* Maa & Yoshimoto, 1961); R1 usually 0.3–1.0 times as long as R, rarely absent; cu-a usually 0.4–1.0 times as long as R (Figs 5G, 7F), sometimes absent (Figs 12E, 17G, 21F); Rs usually more than 2.5 times as long as R.

**METASOMA.** Metasoma polished; five visible segments in males. Females similar to male, four segments visible.

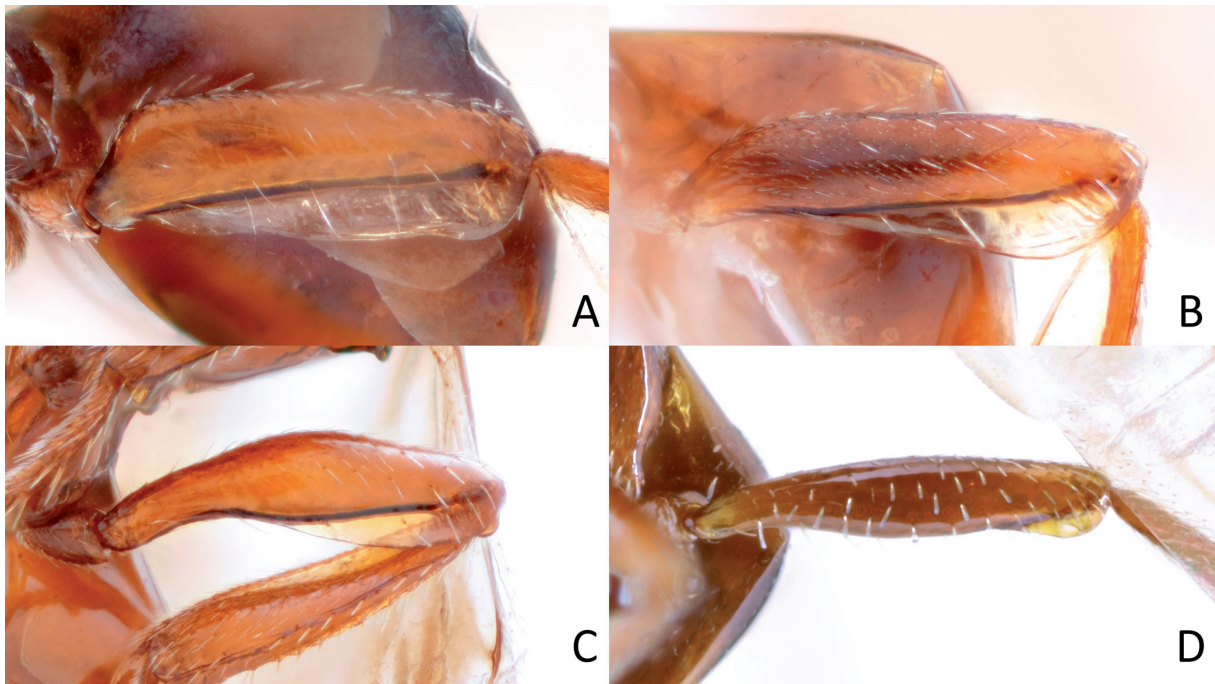
**PILOSITY.** Eye usually without setae, rarely with sparse erect simple or scale-like setae; frontal projection usually with dense erect simple setae, sometimes with cuneate or scale-like setae; clypeus usually with sparse erect simple setae; lower gena with sparse suberect simple or cuneate setae; gena with ribbon-like setae; temple usually with sparse simple setae, sometimes with cuneate setae; cervical expansion with sparse simple setae and ribbon-like setae; antenna with sparse simple or cuneate setae; anterolateral margin of pronotum with ribbon-like setae, longer than those on gena; dorsal surface of pronotum usually with sparse simple or suberect cuneate setae, rarely with forked setae; propleuron sometimes with cuneate setae; scutum with sparse simple or suberect cuneate setae; tegula usually with sparse simple or cuneate setae, rarely with forked setae; mesopleuron usually with sparse cuneate setae; metanotum rarely with forked setae; propodeum with sparse simple setae or suberect cuneate setae in lateral view; apical half of coxae with sparse suberect simple or cuneate setae; femora usually with sparse simple and cuneate setae; tibiae with dense simple or cuneate setae.

### Distribution

Australia; Brunei; China (Mainland China, Hainan Island); India; Indonesia (Borneo Island, Java Island, Sula Islands, Sulawesi Island); Japan (Iriomote Island); Laos; Malaysia (Malay Peninsula, Borneo Island); Papua New Guinea (New Guinea, New Britain Island); Philippines (Basilan Island, Luzon Island, Mentawai Islands, Mindanao Island, Palawan Island, Sibuyan Island); Singapore; Sri Lanka; Taiwan; Thailand; Vietnam.

### Host

*Acrophylla* sp. (Phasmatidae: Phasmatinae) (Riek 1970); *Anchiale austrotessulata* Brock & Hasenpusch, 2007 (as *Ctenomorphodes tessulata* (Gray, 1835)) (Phasmatidae: Phasmatinae) (Hadlington & Hoschke 1959; Heather 1965).



**Fig. 2.** Hindfemora of *Loboscelidia* Westwood, 1874. **A.** *L. vietnamensis* sp. nov. **B.** *L. parallela* sp. nov. **C.** *L. fulgens* Kimsey, 2012. **D.** *L. mediata* sp. nov.

*Loboscelidia asiana* Kimsey, 1988

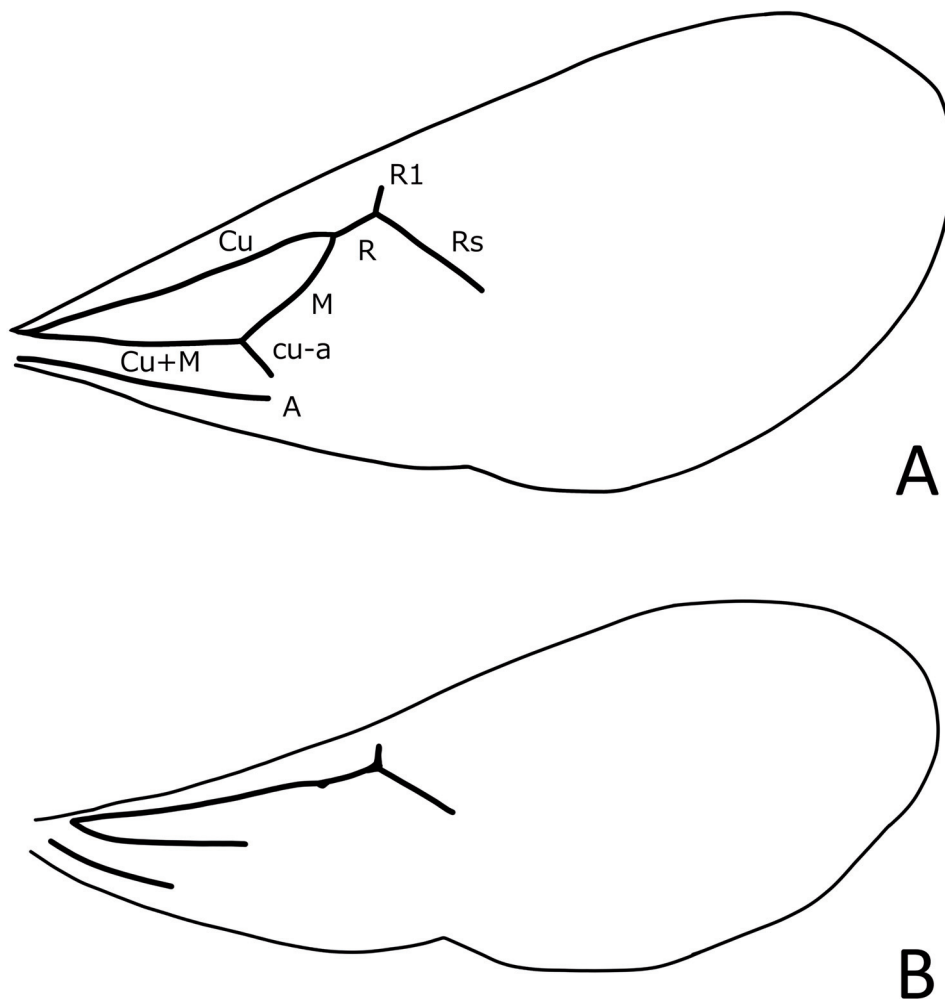
*Loboscelidia asiana* Kimsey, 1988: 68. Holotype ♂; Viet Nam: Dalat (BPBM).

**Remarks**

*Loboscelidia asiana* resembles *L. barbata* sp. nov. and *L. sisik* Kimsey, 2012 in having the following characteristics: scale-like setae on the lower gena and a dark brown body color. However, it can be distinguished by the following characteristics: frontal projection is triangular (rectangular in *L. barbata* sp. nov.); scape striated (smooth in *L. sisik*) and more than 3.5 times as long as wide (less than 3.0 times as long as wide in *L. sisik*); scrobal sulcus absent (present in the other two species); M vein curved (nearly straight in other two species); and Rs 1.5 times as long as R (more than twice as long as the R in other two species).

**Distribution**

Vietnam (Southern Vietnam) (Fig. 26).



**Fig. 3.** Forewing venation of *Loboscelidia* Westwood, 1874. **A.** *L. barbata* sp. nov. **B.** *L. fulgens* Kimsey, 2012.

*Loboscelidia bachmaensis* sp. nov.

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Figs 4, 25A

**Etymology**

The species epithet is named after the type locality, “Bạch Mã”.

**Type material**

**Holotype**

VIETNAM • ♂; Thua Thien Hue Province, Bach Ma NP, 19 km point; 16.192° N, 107.849° E; 3–6 Aug. 2016; T. Mita and Y. Komeda leg.; YPT; VNMN.

**Paratypes**

VIETNAM • 2 ♂♂; same collection data as for holotype; VNMN.

**Description**

**Male** (Fig. 4A)

MEASUREMENTS. Body length 2.7 mm; forewing length 2.7 mm.

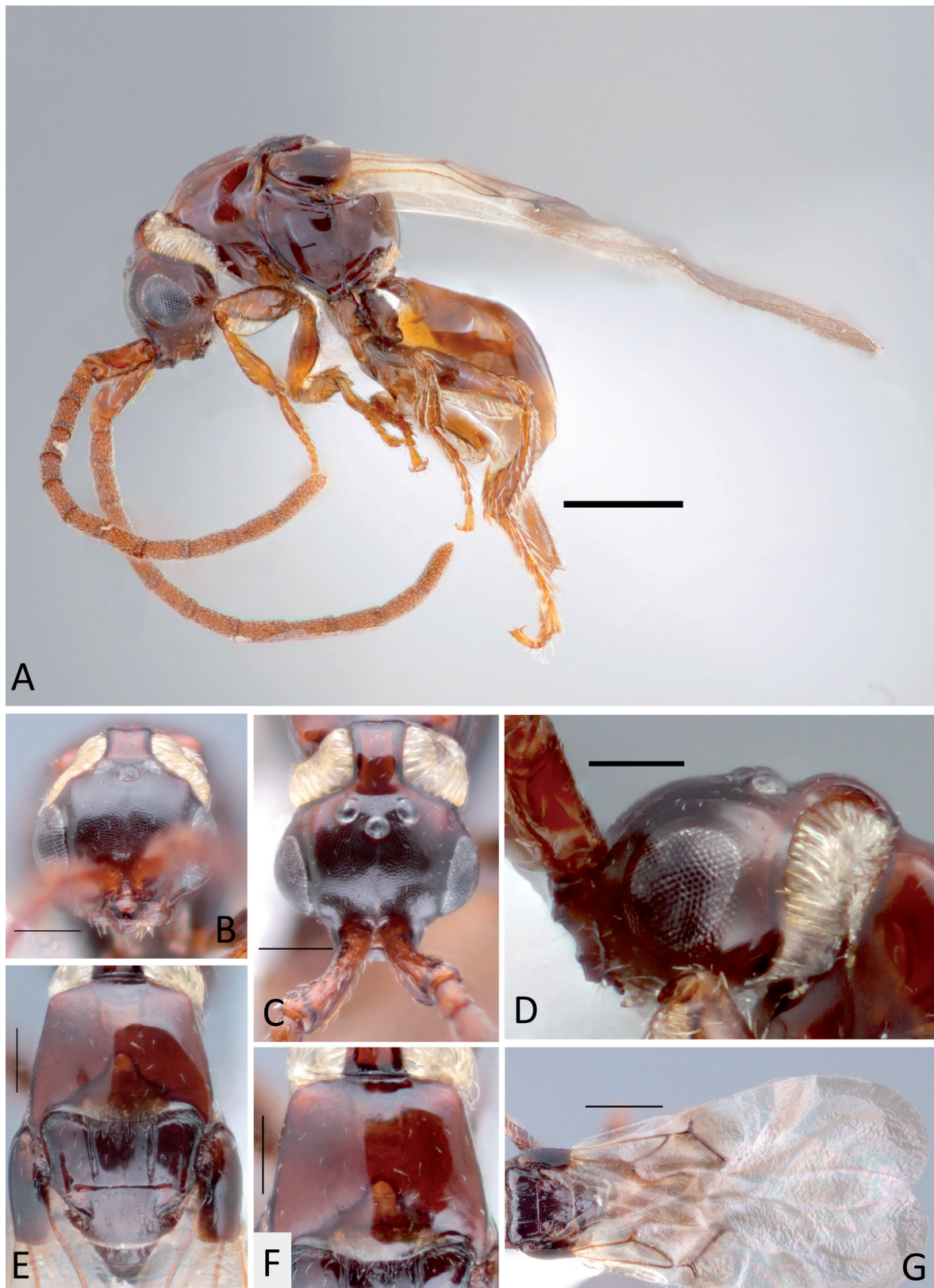
HEAD. Head (Fig. 4B–D) 1.5 times as long as high; 1.2 times as long as wide; inner ocular length 0.66 times as long as head width; frontal projection rectangular in frontal view (Fig. 4B); apical margin of frontal projection straight; lower part of frontal projection shorter than upper part (Fig. 4D); frons granulate, finely microstriate (Fig. 4C); frons with low ridge extending from median ocellus along inner orbit of eye (Fig. 4C); spraclypeal area with transverse carinae (Fig. 4B); temple 0.80 times as long as MOD (Fig. 4C); POL 0.8 times as long as MOD; OOL 1.2 times as long as MOD; LOL 0.2 times as long as MOD; behind ocelli without transverse depression (Fig. 4C); cervical expansion convex in lateral view (Fig. 4D); basal part of cervical expansion constricted weakly in dorsal view (Fig. 4C); scape 2.1 times as long as wide; scape with longitudinal grooves; F1 1.4 times as long as wide; F2 1.6 times as long as wide; F11 3.2 times as long as wide; relative length of F1–F11: 1.0: 1.1: 1.2: 1.2: 1.2: 1.2: 1.3: 1.3: 1.3: 1.8.

MESOSOMA. Pronotum 0.81 times as long as posterior width of pronotum (Fig. 4F); posterior width of pronotum 1.2 times as wide as anterior width and as wide as head width; dorsolateral surface of pronotum carinate (Fig. 4A); notauli of scutum slightly convergent to posterior, not reaching posterior margin (Fig. 4F); median part of scutellum polished (Fig. 4E); posterior part of scutellum rugose; scrobal sulcus present, weakly depressed (Fig. 4A); metanotum with three ridges; metanotum 0.39 times as long as scutellum (Fig. 4E); propodeal angle weakly developed; propodeum without transverse carina above foramen.

WINGS. Forewing with M curved (Fig. 4G); cu-a 0.37 times as long as R; A extending half of Cu+M; R1 0.67 times as long as R; Rs 2.8 times as long as R.

LEGS. Tibiae smooth; flange on forefemur 0.61 times longer, 0.89 times wider than tubular part of forefemur; flange on foretibia 0.42 times longer, 0.50 times wider than tubular part of foretibia; flange on midfemur 0.76 times longer, 0.70 times wider than tubular part of midfemur; flange on midtibia 0.76 times longer, 0.67 times wider than tubular part of midtibia; hindcoxa dorso-laterally carinate; basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur smooth; flange on hindfemur 0.74 times longer, 1.2 times wider than tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia





**Fig. 4.** *Loboscelidia bachmaensis* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Mesosoma, dorsal view. **F.** Pronotum, dorsal view. **G.** Forewing. Scale bars: A, G = 0.5 mm; B–F = 0.2 mm.

0.79 times longer, 2.0 times wider than tubular part of hindtibia; hindtarsal claw with tooth reaching  $\frac{1}{3}$  of hindtarsal claw.

**PILOSITY.** Lower gena with sparse decumbent simple and cuneate setae (Fig. 4D); scape with sparse decumbent simple and simple setae; pedicel with sparse decumbent cuneate setae; dorsal surface of pronotum with sparse decumbent cuneate setae (Fig. 4F); forefemur with sparse decumbent and suberect simple setae; hindtibia with sparse decumbent cuneate setae.

**COLORATION.** Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae white.

#### **Female**

Unknown.

#### **Distribution**

Vietnam (Central Vietnam) (Fig. 26).

#### **Remarks**

This species closely resembles *L. vietnamensis* sp. nov. in having the following characteristics: weakly convex cervical expansion, F11 3.0 times as long as wide, and a polished scutellum. However, *L. bachmaensis* sp. nov. can be distinguished by the following characteristics: frontal projection equal to shorter than upper part in lateral view (longer than above in *L. vietnamensis* sp. nov.); temple 0.80 times as long as MOD (0.3–0.6 times longer than in *L. vietnamensis* sp. nov.); POL shorter than MOD (longer than MOD in *L. vietnamensis* sp. nov.); tooth of hindtarsal claw reaching  $\frac{1}{3}$  of hindtarsal claw (less than  $\frac{1}{4}$  in *L. vietnamensis* sp. nov.).

#### ***Loboscelidia barbata* sp. nov.**

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Figs 3A, 5, 25B

#### **Etymology**

Named after the Latin ‘*barbata*’, meaning ‘beard’, referring to the scale-like setae on the lower gena.

#### **Type material**

##### **Holotype**

VIETNAM • ♂; Thua Thien Hue Province, Bach Ma NP, pheasant trail; 16.231° N, 107.852° E; 4 Aug. 2016; T. Mita leg.; VNMN.

##### **Paratypes**

VIETNAM • 9 ♂♂; same collection data as for holotype; VNMN • 1 ♂; same collection data as for holotype but 15 Sep. 2022; VNMN • 1 ♂; same locality data as for holotype; 16 Sep. 2022; Y. Hisasue leg.; VNMN • 4 ♂♂; Thua Thien Hue Province, Bach Ma NP, Stone Sign; 16.194° N, 107.865° E; 2 Aug. 2016; T. Mita leg.; VNMN • 1 ♂; Vinh Phuc Province, Tam Dao District, Tam Dao NP; 21.453° N, 105.648° E; 4 Aug. 2016; K. Tsujii leg.; VNMN.

#### **Description**

##### **Male** (Fig. 5A)

**MEASUREMENTS.** Body length 3.8–5.2 mm; forewing length 3.4–5.0 mm.

**HEAD.** Head (Fig. 5B–D) 1.8–1.9 times as long as high, 1.2–1.4 times as long as wide; inner ocular length 0.58 times as long as head width; frontal projection rectangular in frontal view (Fig. 5B); apical margin of frontal projection depressed (Fig. 5C); frons rugose, with low ridge extending from vertex along inner orbit of eye (Fig. 5C); frons with indistinct wrinkles towards median ocellus (Fig. 5C); frons with frontal line (Fig. 5C); spraclypeal area with transverse carinae (Fig. 5B); ftemple 0.50–0.71 times as long as MOD (Fig. 5C); POL 1.3–1.4 times as long as MOD; OOL 1.4–1.5 times as long as MOD; LOL 0.42–0.43 times as long as MOD; behind ocelli without transverse depression (Fig. 5C); cervical expansion convex in lateral view (Fig. 5D); cervical expansion with longitudinal furrow (Fig. 5C); basal part of cervical expansion constricted weakly in dorsal view (Fig. 5C); scape 2.9–3.2 times as long as wide; scape with longitudinal grooves; scape with transparent flange; F1 2.0–2.3 times as long as wide; F2 2.2–2.3 times as long as wide; F11 3.8 times as long as wide; relative length of F1–F11: 1.2: 1.2: 1.1: 1.1: 1.1: 1.0: 1.1: 1.0: 1.1: 1.1: 1.5.

**MESOSOMA.** Pronotum 0.79–0.81 times as long as posterior width of pronotum (Fig. 5E); posterior width of pronotum 1.5–1.6 times as wide as anterior width and 1.2 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 5A); notauli of scutum slightly curved, reaching posterior margin (Fig. 5F); scutellum punctured (Fig. 5F); scrobal sulcus present, weakly depressed (Fig. 5F); metanotum punctured, without ridge, 0.37–0.42 times as long as scutellum (Fig. 5F); propodeal angle strongly developed; upper area of propodeum without transverse carina; propodeum without transverse carina above foramen.

**WINGS.** Forewing (Fig. 5G) with M curved; cu-a 0.88–0.92 times as long as R; A longer than Cu+M; R1 0.43–0.54 times as long as R; Rs 2.4–2.8 times as long as R.

**LEGS.** Tibiae carinate; flange on forefemur 0.59–0.63 times longer, 0.90–1.1 times wider than tubular part of forefemur; flange on foretibia 0.57–0.58 times longer, 0.86–1.0 times wider than tubular part of foretibia; flange on midfemur 0.50–0.71 times longer, 0.70–0.80 times wider than tubular part of midfemur; flange on midtibia 0.62–0.68 times longer, 0.71–1.0 times wider than tubular part of midtibia; dorsolateral margin of hindcoxa with longitudinal carinae; basal part of hindfemur producing; hindfemur basally stout, slightly wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur carinate; flange on hindfemur 0.58–0.74 times longer, 0.91–0.92 times wider than tubular part of hindfemur; flange on hindtibia 0.75–0.83 times longer, 0.96–1.1 times wider than tubular part of hindtibia.

**PILOSITY.** Spraclypeal area with sparse decumbent and suberect cuneate setae (Fig. 5B); temple with sparse decumbent cuneate setae (Fig. 5C); lower gena with sparse decumbent scale-like setae (Fig. 5D); hypostoma with sparse decumbent scale-like setae; scape with sparse decumbent simple and cuneate setae; pedicel with sparse decumbent simple and cuneate setae; scutellum without setae (Fig. 5F); forecoxa with sparse decumbent cuneate setae; foretrochanter with sparse decumbent cuneate setae; forefemur with sparse decumbent cuneate setae; foretibia with sparse decumbent cuneate setae; midcoxa, midtrochanter, midfemur and midtibia with sparse decumbent cuneate setae; hindcoxa, hindtrochanter, hindfemur and hindtibia with sparse decumbent cuneate setae.

**COLORATION.** Body reddish brown to blackish brown; antenna blackish brown; legs blackish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

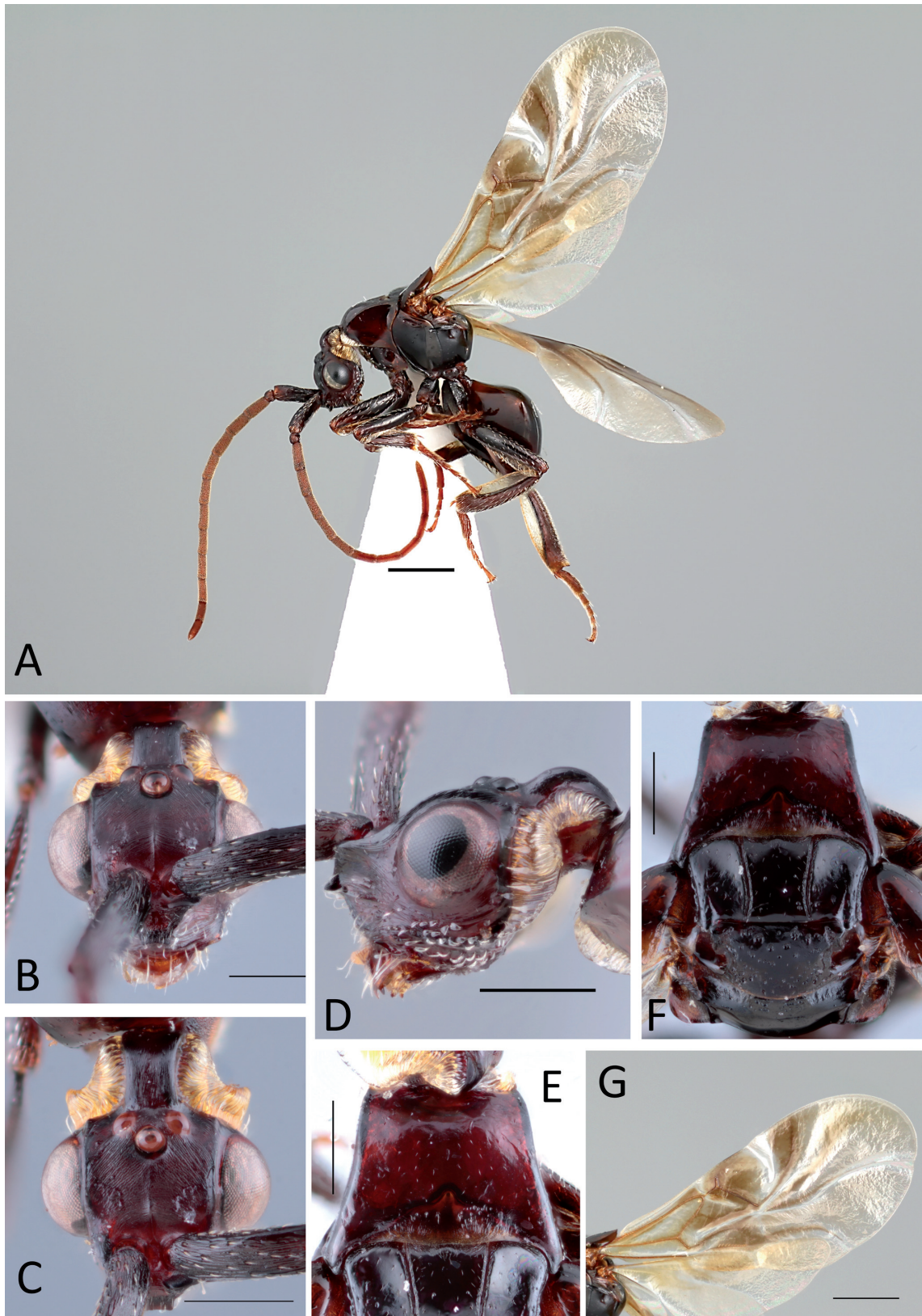
#### **Female**

Unknown.

#### **Distribution**

Vietnam (Northern Vietnam, Central Vietnam) (Fig. 26).





**Fig. 5.** *Loboscelidia barbata* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. **G.** Forewing. Scale bars: A = 1 mm; B–G = 0.5 mm.

## Remarks

*Loboscelidia barbata* sp. nov. resembles *L. convexa* sp. nov. and *L. sisik* in having the following characteristics: reddish brown (*L. convexa* sp. nov.) to dark brown (*L. sisik*) body color, scale-like setae on the lower gena, and cervical expansion with longitudinal furrow (*L. convexa* sp. nov.). However, *L. barbata* sp. nov. can be distinguished by the following characteristics: rectangular frontal projection (triangular in *L. sisik*); strongly convex cervical expansion (weakly convex in *L. sisik*); cervical expansion with longitudinal furrow (*L. sisik* without longitudinal furrow); scape 2.9 times as long as wide (twice as long as wide in *L. sisik*); pronotum 0.80 times as long as posterior width (0.70 times as long as the posterior width in *L. convexa* sp. nov.); metanotum that 0.40 times as long as scutellum (more than 0.50 times as long as the scutellum in *L. convexa* sp. nov.); midtibial flange present (*L. sisik* absent); and longer A vein longer than Cu + M (as long as Cu + M in *L. sisik*).

## *Loboscelidia cilia* sp. nov.

urn:lsid:zoobank.org:act:600A8093-65A6-425E-B4E7-8FA7A7531515

Figs 6, 25C

## Etymology

Named after the Latin ‘*cilia*’, meaning ‘eyelash’, referring to the conspicuous setae on the eye.

## Type material

### Holotype

VIETNAM • ♂; Thua Thien Hue Province, Bach Ma NP, 19 km point; 16.198° N, 107.860° E; 2 Aug. 2016; T. Mita leg.; VNMN.

## Description

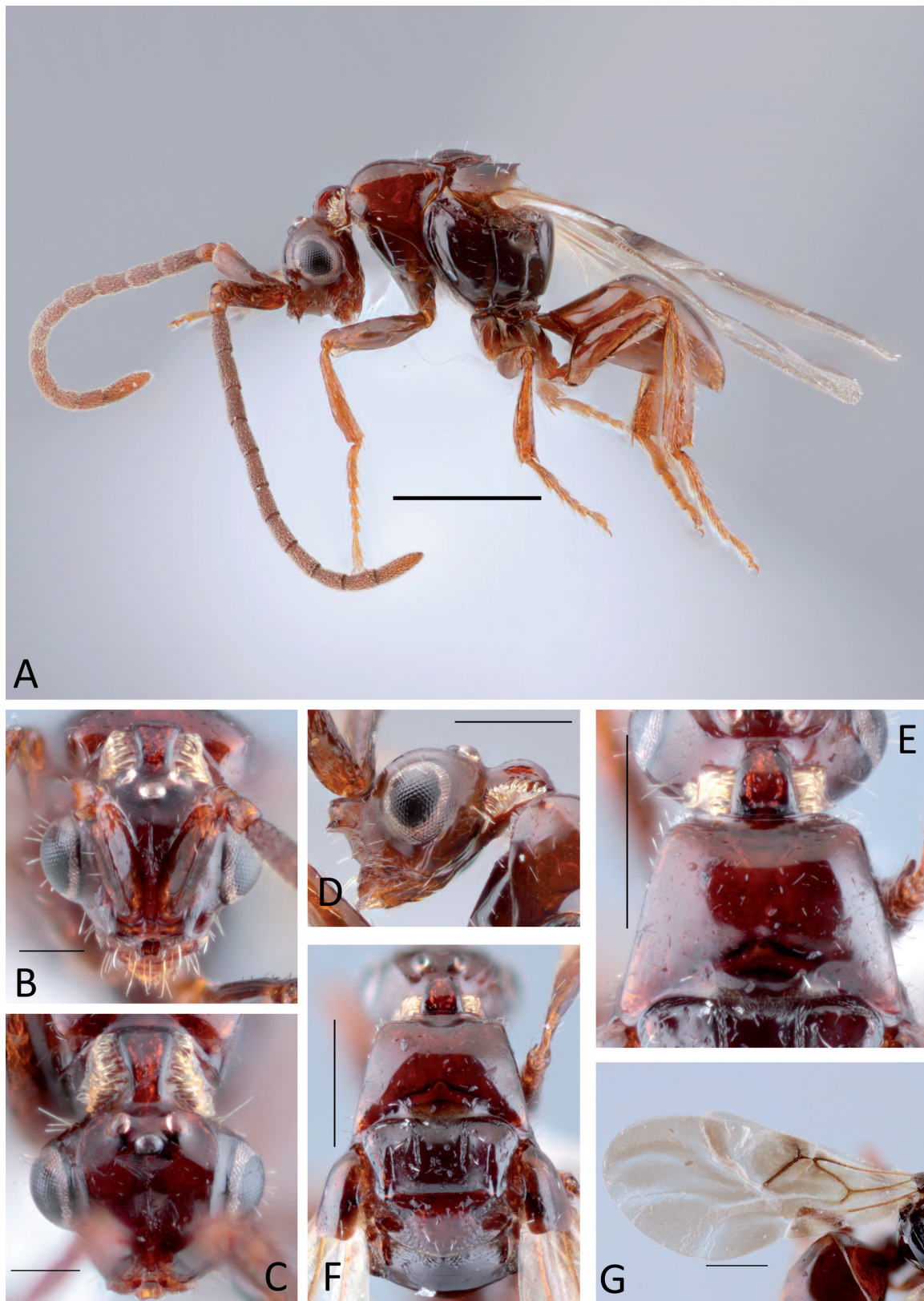
### Male (Fig. 6A)

MEASUREMENTS. Body length 3.1 mm; forewing length 3.0 mm.

HEAD. Head (Fig. 6B–D) 2.0 times as long as high, 1.2 times as long as wide; inner ocular length 0.66 times as long as head width; frontal projection rectangular in frontal view (Fig. 6B); frons polished and unpunctured, with high ridge extending from behind posterior ocellus along inner orbit of eye (Fig. 6C); frons with distinct frontal line (Fig. 6C); spraclypeal area with transverse carinae (Fig. 6B); temple 2.0 times as long as MOD (Fig. 6C); POL 1.1 times as long as MOD; OOL 1.8 times as long as MOD; LOL 0.5 times as long as MOD; behind ocelli with transverse depression (Fig. 6C); cervical expansion strongly convex in lateral view (Fig. 6D); basal part of cervical expansion constricted strongly in dorsal view (Fig. 6C); scape 3.5 times as long as wide; scape smooth, without longitudinal grooves; scape with transparent flange, 0.7 times as long as tubular part of scape, 0.14 times as wide as tubular part of scape; F1 2.3 times as long as wide; F2 2.5 times as long as wide; F11 3.1 times as long as wide; relative length of F1–F11: 1.1: 1.1: 1.1: 1.1: 1.1: 1.0: 1.0: 1.0: 1.0: 1.1: 1.5.

MESOSOMA. Pronotum 0.68 times as long as posterior width of pronotum (Fig. 6E); posterior width of pronotum 1.4 times as wide as anterior width and 1.1 times as wide as head width; dorsolateral surface of pronotum rounded (Fig. 6F); notauli of scutum slightly curved, not reaching posterior margin (Fig. 6F); scutum between notauli punctured (Fig. 6F); scutellum punctured, with lateral carina (Fig. 6F); scrobal sulcus present, deeply depressed (Fig. 6A); apico-lateral area of scutellum without longitudinal carina (Fig. 6F); metanotum with medial ridge, 0.44 times as long as scutellum (Fig. 6F); propodeal angle strongly developed; upper area of propodeum without transverse carina; propodeum without transverse carina above foramen.





**Fig. 6.** *Loboscelidia cilia* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. **G.** Forewing. Scale bars: A, D–G = 0.5 mm; B–C = 0.2 mm.

WINGS. Forewing (Fig. 6G) with M curved; cu-a 1.2 times as long as R; A as long as Cu+M; R1 as long as R; Rs 4.3 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.29 times longer, 0.73 times wider than tubular part of forefemur; flange on foretibia 0.51 times longer, 0.33 times wider than tubular part of foretibia; flange on midfemur 0.27 times longer, 0.40 times wider than tubular part of midfemur; flange on midtibia 0.42 times longer, 0.33 times wider than tubular part of midtibia; hindcoxa 1.7 times as long as hind trochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; flange on hindfemur 0.69 times longer, 0.67 times wider than tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia 0.54 times longer, as wide as tubular part of hindtibia.

METASOMA. Lateral margin of T1 with low ridge.

PILOSITY. Frons with sparse erect simple setae (Fig. 6C); eye with sparse erect simple setae (Fig. 6B–C); temple with sparse erect simple setae (Fig. 6C); lower gena with sparse erect simple setae (Fig. 6D); scape with sparse suberect and erect simple setae (Fig. 6B); pedicel with sparse erect simple setae; dorsal part of pronotum with sparse decumbent and erect simple setae; scutum with sparse erect simple setae; tegula with sparse erect simple setae; lateral side of scutellum with sparse decumbent simple setae; midtibia with sparse erect simple setae; hindtibia with sparse erect simple setae; lateral margin of T2 with sparse erect simple setae.

COLORATION. Body reddish brown; antenna reddish brown; legs reddish brown; ribbon-like setae yellowish brown; ribbon-like setae yellow.

#### **Female**

Unknown.

#### **Distribution**

Vietnam (Central Vietnam) (Fig. 26).

#### **Remarks**

*Loboscelidia cilia* sp. nov. resembles *L. reducta* and *L. cinnamonea* Kimsey, 2012 in having the following characteristics: strongly convex cervical expansion, with transverse carina behind ocelli, without tibial flanges. However, *L. cilia* sp. nov. can be distinguished by the following characteristics: erect setae on the eye (without setae in the other two species); complete M vein (absent in *L. reducta*); and cu-a and R1 present (cu-a absent in the other two species, R1 absent in *L. cinnamonea*).

#### *Loboscelidia convexa* sp. nov.

urn:lsid:zoobank.org:act:F7440305-3E38-42DE-BEC6-74CDC8F64B4B

Figs 7, 25D

#### **Etymology**

Named after the Latin ‘*convexa*’, meaning ‘convex’, referring to the distinctly convex cervical expansion.

#### **Type material**

##### **Holotype**

VIETNAM • ♂; Bac Kan Province, Ba Be NP; 22°24'42.24" N, 105°37'42.55" E; 2 Jul. 2014; T. Mita leg.; VNMN.

**Description****Male** (Fig. 7A)

MEASUREMENTS. Body length 4.0 mm; forewing length 4.0 mm.

HEAD. Head (Fig. 7B–D) 1.8 times as long as high, 1.1 times as long as wide; inner ocular length 0.57 times as long as head width; frontal projection rectangular in frontal view (Fig. 7B); apical margin of frontal projection depressed (Fig. 7C); frons with transverse microstriae, with high ridge extending from vertex along inner orbit of eye (Fig. 7C); frons with indistinct wrinkles towards median ocellus (Fig. 7C); frons with frontal line; spraclypeal area with transverse carinae (Fig. 7B); temple 0.73 times as long as MOD (Fig. 7C); POL 1.1 times as long as MOD; OOL 1.3 times as long as MOD; LOL 0.33 times as long as MOD; behind ocelli with transverse depression (Fig. 7C); cervical expansion strongly convex in lateral view, with longitudinal grooves (Fig. 7D); basal part of cervical expansion constricted weakly in dorsal view (Fig. 7C); scape 2.8 times as long as wide; scape with longitudinal grooves; scape with transparent flange; F1 1.8 times as long as wide; F2 2.0 times as long as wide; F11 3.6 times as long as wide; relative length of F1–F11: 1.2: 1.1: 1.1: 1.1: 1.1: 1.1: 1.1: 1.1: 1.0: 1.0: 1.4.

MESOSOMA. Pronotum 0.71 times as long as posterior width and convex in lateral view (Fig. 7E); posterior width of pronotum 1.5 times as wide as anterior width and 1.1 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 7A); notauli of scutum slightly curved, reaching posterior margin (Fig. 7F); scutellum punctured, with lateral carina (Fig. 7F); scrobal sulcus present, weakly depressed (Fig. 7A); metanotum without ridge, 0.61 times as long as scutellum (Fig. 7F); propodeal angle weakly developed; propodeum with transverse carina above foramen.

WINGS. Forewing (Fig. 7G) with M curved; cu-a 0.72 times as long as R; A extending Cu+M; R1 0.64 times as long as R; Rs 2.4 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.65 times longer, 1.1 times wider than tubular part of forefemur; flange on foretibia 0.67 times longer, 0.83 times wider than tubular part of foretibia; flange on midfemur 0.72 times longer, as wide as tubular part of midfemur; flange on midtibia 0.76 times longer, 0.83 times wider than tubular part of midtibia; hindcoxa 2.5 times as long as hind trochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur smooth; flange on hindfemur 0.79 times longer, 1.3 times wider than tubular part of hindfemur; flange on hindtibia 0.83 times longer, 1.1 times wider than tubular part of hindtibia.

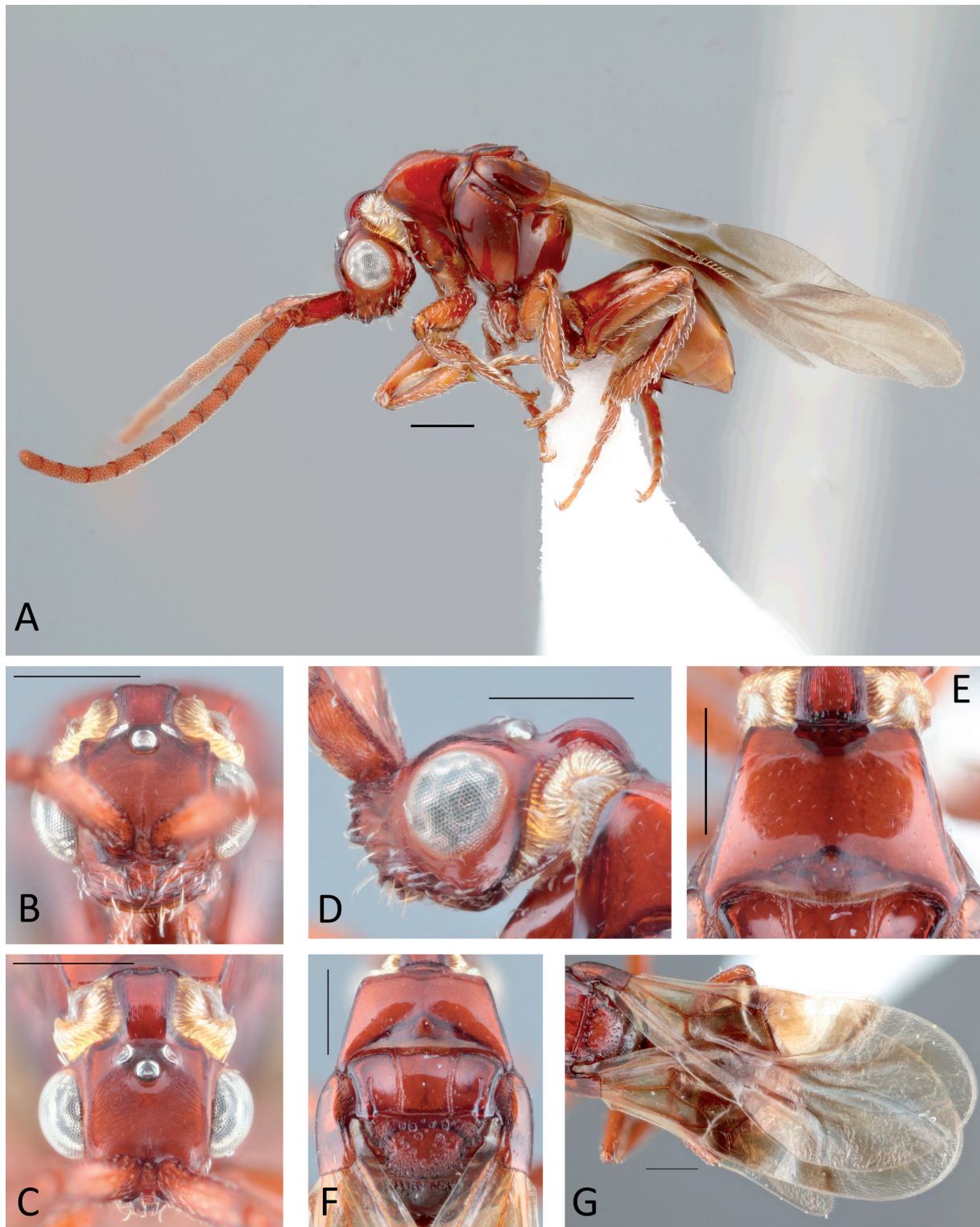
PILOSITY. Spraclypeal area with sparse suberect cuneate setae (Fig. 7C); temple with sparse decumbent cuneate setae; lower gena with sparse decumbent cuneate setae (Fig. 7D); hypostoma with sparse decumbent and suberect simple cuneate setae; propleuron with sparse decumbent cuneate and scale-like setae (Fig. 7A); forecoxa and foretrochanter with dense decumbent cuneate setae; foretibia with sparse decumbent suberect simple and cuneate setae; midcoxa and midtrochanter with dense decumbent cuneate setae; midtrochanter with sparse decumbent cuneate setae; midfemur with sparse decumbent and suberect simple cuneate setae; hindcoxa and hindtrochanter with sparse decumbent cuneate setae; hindfemur and hindtibia with sparse decumbent and suberect simple and cuneate setae.

COLORATION. Body red; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

**Female**

Unknown.





**Fig. 7.** *Loboscelidia convexa* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. **G.** Forewing. Scale bars = 0.5 mm.

**Distribution**

Vietnam (Northern Vietnam) (Fig. 26).

**Remarks**

*Loboscelidia convexa* sp. nov. resembles *L. asiana*, *L. barbata* sp. nov. and *L. sisik* in having the following characteristic: scale-like setae on the lower gena. However, *L. convexa* sp. nov. can be distinguished by the following characteristics: lower gena bearing cuneate setae (with scale-like setae in other species); rectangular frontal projection (triangular in *L. asiana* and *L. sisik*); smooth cervical expansion with longitudinal furrow (without longitudinal furrow in *L. asiana* and *L. sisik*); and curved M vein (straight in *L. sisik*).

***Loboscelidia cucphuongensis* sp. nov.**

urn:lsid:zoobank.org:act:EA39FFB2-1727-4E81-9A8D-13920217A0D4

Figs 8, 25E

**Etymology**

Named after the type locality ‘Cuc Phuong National Park’.

**Type material****Holotype**

VIETNAM • ♂; Ninh Binh Province, Cuc Phuong NP; 20.360° N, 105.599° E; 23 Aug. 2019; R. Matsumoto leg.; VNMN.

**Paratypes**

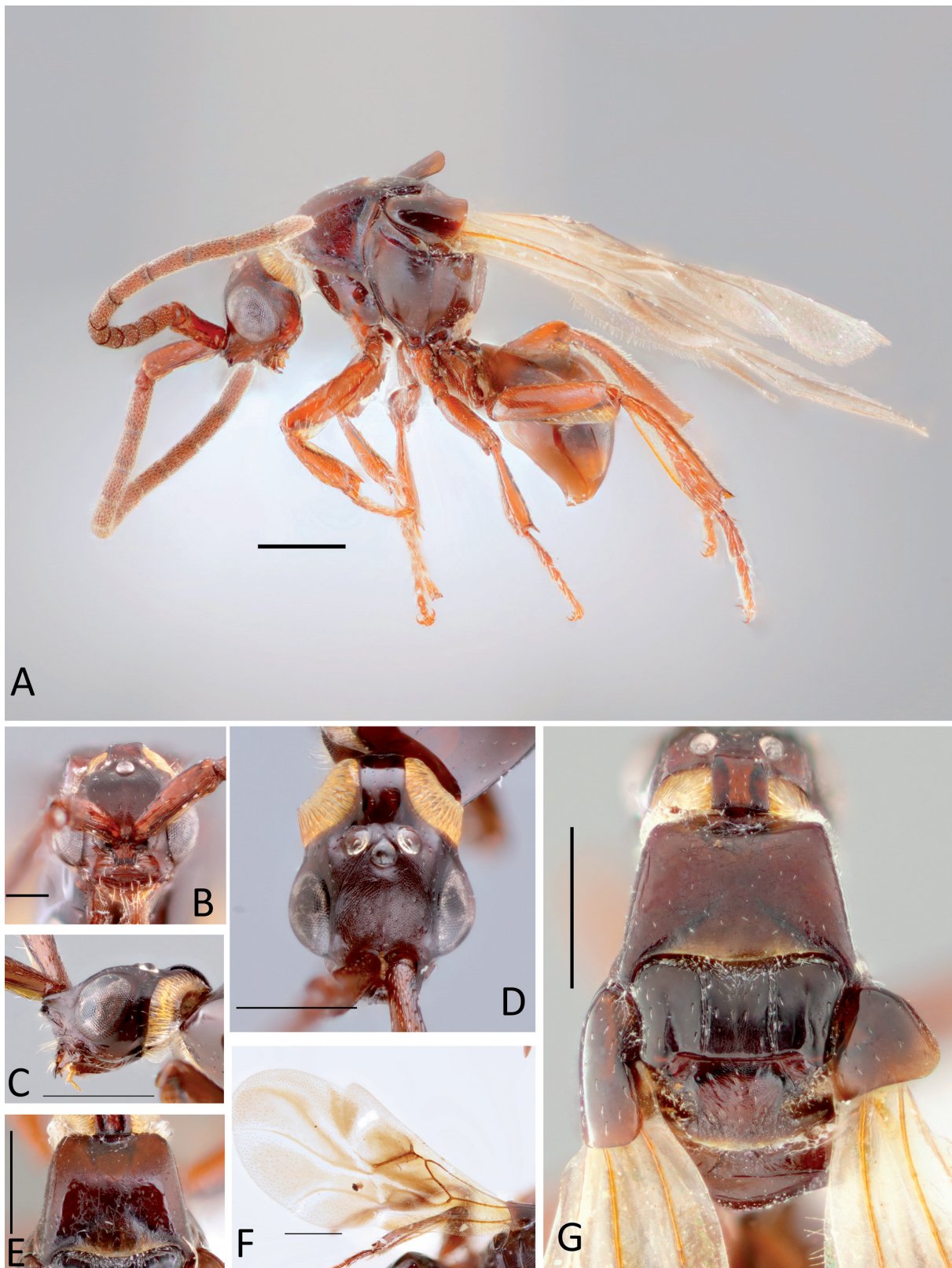
VIETNAM • 1 ♂; same locality data as for holotype; 11 Aug. 2016; T. Mita leg.; VNMN • 1 ♂; same locality data as for holotype; 23 Aug. 2019; T. Mita leg.; VNMN • 1 ♂; same locality data as for holotype; 22 Aug. 2019; Y. Komeda leg.; VNMN • 1 ♂; same locality data as for holotype; 28 Aug. 2019; Y. Hisasue; VNMN • 1 ♂; same locality data as for holotype; 29 Aug. 2019; N. Tsuji leg.; VNMN • 1 ♂; Bac Kan province, Ba Be NP; 22.4130° N, 105.6320° E; 280–600 m a.s.l.; 19–23 May 2019; A. Brunke and H. Schillhammer leg.; FIT; CNC • 1 ♂; Cuc Phuong NP; 20°20′57.48″ N, 105°35′46.48″ E; 390 m a.s.l.; 17–20 Jun. 2017; A. Brunke leg.; FIT; CNC • 1 ♂; Cuc Phuong NP; 20°21′14.40″ N, 105°35′9.60″ E; 390 m a.s.l.; 17 Jun. 2017; A. Brunke leg.; beating; FIT; CNC.

**Description****Male** (Fig. 8A).

MEASUREMENTS. Body length 3.2–4.5 mm; forewing length 3.2–4.2 mm.

HEAD. Head (Fig. 8B–D) 1.8–2.1 times as long as high, 1.3–1.4 times as long as wide; inner ocular length 0.56 times as long as head width; frontal projection rectangular in frontal view (Fig. 8B); frons granulate, with microstriae (Fig. 8D); frons with low ridge extending to vertex along inner orbit of eye (Fig. 8D); frons with indistinct wrinkles towards median ocellus (Fig. 8C); spraclepeal area with transverse carinae (Fig. 8B); temple 0.80–1.4 times as long as MOD (Fig. 8D); POL 1.1–1.4 times as long as MOD; OOL 1.3–1.5 times as long as MOD; LOL 0.29–0.50 times as long as MOD; behind ocelli without transverse depression (Fig. 8D); cervical expansion weakly convex in lateral view (Fig. 8C); basal part of cervical expansion parallel in dorsal view (Fig. 8D); scape 2.8–3.2 times as long as wide; scape with longitudinal grooves; scape with transparent flange; F1 2.0 times as long as wide; F2 1.8–2.0 times as long as wide; F11 2.9–3.2 times as long as wide; relative length of F1–F11: 1.1: 1.0: 1.0: 1.1: 1.1: 1.1: 1.0: 1.1: 1.0: 1.0: 1.3.





**Fig. 8.** *Loboscelidia cucphuongensis* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Forewing. **G.** Mesosoma, dorsal view. Scale bars: A, C–G = 0.5 mm; B = 0.2 mm.

MESOSOMA. Pronotum 0.85–0.86 times as long as posterior width of pronotum (Fig. 8E); posterior width of pronotum 1.2–1.6 times as wide as anterior width and as wide as head width; dorsolateral surface of pronotum carinate (Fig. 8A); notauli of scutum parallel, not reaching posterior margin (Fig. 8G); scutellum rugose, with lateral carina (Fig. 8G); scrobal sulcus present, strongly depressed (Fig. 8A); metanotum with four ridges, 0.39–0.40 times as long as scutellum (Fig. 8G); propodeal angle strongly developed; propodeum without transverse carina above foramen.

WINGS. Forewing (Fig. 8F) with M curved; cu-a 0.17–0.33 times as long as R; A extending half of Cu+M; R1 0.33 times as long as R; Rs 2.6–3.2 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.43–0.52 times longer, 0.67–0.90 times wider than tubular part of forefemur; flange on foretibia 0.44–0.60 times longer, 0.27–0.67 times wider than tubular part of foretibia; flange on midfemur 0.43–0.52 times longer, 0.32–0.88 times wider than tubular part of midfemur; flange on midtibia 0.56–0.64 times longer, 0.58–0.60 times wider than tubular part of midtibia; hindcoxa 2.0 times as long as hind trochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur carinate; flange on hindfemur 0.63–0.64 times longer, 0.76–1.1 times wider than tubular part of hindfemur; flange on hindtibia 0.74–0.77 times longer, 1.0–1.7 times as wide as tubular part of hindtibia.

PILOSITY. Lower gena with sparse decumbent simple and cuneate setae (Fig. 8C); scape with sparse decumbent and suberect simple setae; pedicel with sparse suberect simple setae; forefemur with sparse decumbent simple setae; midtrochanter with sparse decumbent cuneate setae; hindcoxa with sparse decumbent cuneate setae.

COLORATION. Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae yellow brown.

### Female

Unknown.

### Distribution

Vietnam (Northern Vietnam) (Fig. 26).

### Remarks

*Loboscelidia cucphuongsensis* sp. nov. resembles *L. cuneata* sp. nov., *L. maai* (Lin, 1964), *L. nitidula* Kimsey, 2012 and *L. pallarela* sp. nov. in having a parallel cervical expansion. However, *L. cucphuongsensis* sp. nov. can be distinguished by the following characteristics: forefemur bearing simple setae (with cuneate setae in *L. cuneata* sp. nov.); R1 less than 0.5 times as long as R (more than 0.5 times as long as R in other four species); cu-a less than 0.5 times as long as R (as long as R in *L. maai* and *L. nitidula*); and Rs about 2.5 times as long as R (more than 3.0 times as long as R in *L. nitidula* and *L. pallarela* sp. nov.).

### *Loboscelidia cuneata* sp. nov.

urn:lsid:zoobank.org:act:3F79CA71-7008-44DD-A6F7-619E71318F67

Figs 9, 25F

### Etymology

Named after the Latin ‘*cuneata*’, meaning ‘cuneate’, referring to the cuneate setae on the body.

## Type material

### Holotype

VIETNAM • ♂; Thua Thien Hue Province, Bach Ma NP, 19 km point; 16.198° N, 107.860° E; 2 Aug. 2016; T. Mita leg.; VNMN.

### Paratypes

VIETNAM • 3 ♂♂; same collection data as for holotype; VNMN • 3 ♂♂; Thua Thien Hue Province, Bach Ma NP, pheasant trail; 16.231° N, 107.852° E; 4 Aug. 2016; T. Mita leg.; VNMN • 1 ♂; Tuyen Quang province, Na Hang Reserve; 360 m a.s.l.; 16–20 May 1997; S.B. Peck leg.; FIT; CNC (paratype of *L. laminata*).

## Description

### Male (Fig. 9A)

MEASUREMENTS. Body length 2.8–3.3 mm; forewing length 2.8–3.3 mm.

HEAD. Head (Fig. 9B–D) 1.7–1.8 times as long as high, 1.2–1.3 times as long as wide; inner ocular length 0.57–0.58 times as long as head width; frontal projection rectangular in frontal view (Fig. 9B, D); apical margin of frontal projection depressed (Fig. 9D); frons granulate, finely microstriate (Fig. 9D); frons with low ridge extending from posterior ocellus along inner orbit of eye (Fig. 9D); spraclypeal area with transverse carinae (Fig. 9B); temple 0.98–1.1 times as long as MOD (Fig. 9D); POL 0.83–1.3 times as long as MOD; OOL 1.2–1.5 times as long as MOD; LOL 0.33–0.50 times as long as MOD; behind ocelli without transverse depression (Fig. 9D); cervical expansion weakly convex in lateral view (Fig. 9C); basal part of cervical expansion parallel in dorsal view (Fig. 9D); scape 3.1 times as long as wide, with longitudinal grooves; F1 1.7 times as long as wide; F2 1.7 times as long as wide; F11 2.9–3.4 times as long as wide; relative length of F1–F11: 1.1: 1.1: 1.0: 1.1: 1.1: 1.1: 1.1: 1.1: 1.3: 1.3: 1.6.

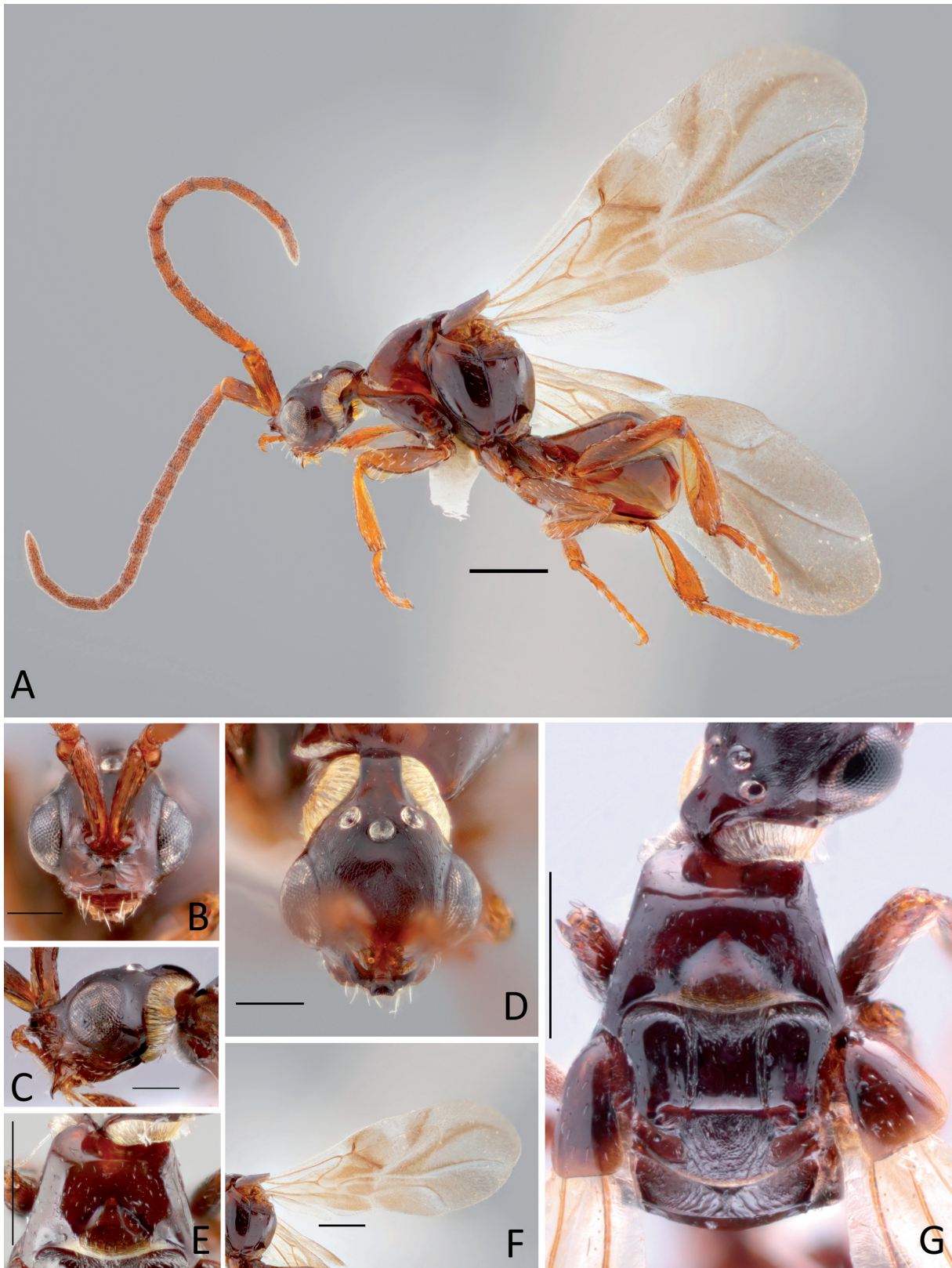
MESOSOMA. Pronotum 0.79–0.85 times as long as posterior width of pronotum (Fig. 9E); posterior width of pronotum 1.4–1.9 times as wide as anterior width and 1.1 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 9A); notauli of scutum slightly curved, not reaching posterior margin (Fig. 8G); scrobal sulcus present, strongly depressed (Fig. 9A); scutellum punctured and rugose (Fig. 9G); metanotum with medial ridge, 0.48–0.63 times as long as scutellum (Fig. 9G); propodeal angle strongly developed; propodeum without transverse carina above foramen.

WINGS. Forewing (Fig. 9F) with M curved; cu-a 0.31–0.40 times as long as R; A extending half of Cu+M; R1 0.7–1.0 times as long as R; Rs 2.9–3.2 times as long as R.

LEGS. Fore and hindtibiae carinate; flange on forefemur 0.42–0.54 times longer, as wide as tubular part of forefemur; flange on foretibia 0.50–0.60 times longer, 0.60 times wider than tubular part of foretibia; flange on midfemur 0.47–0.60 times longer, 0.88 times wider than tubular part of midfemur; flange on midtibia 0.43–0.62 times longer, 0.57–0.75 times wider than tubular part of midtibia; hindcoxa dorso-laterally carinate; basal part of hindfemur producing; hindfemur basally not stout, as wide as distal part; ventral margin of hindfemur slightly swollen; outer surface of hindfemur smooth; flange on hindfemur 0.69–0.75 times longer, 0.75–0.80 times wider than tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia 0.63–0.71 times longer, as wide as tubular part of hindtibia.

PILOSITY. Spraclypeal area with sparse erect cuneate setae (Fig. 9B); lower gena with sparse decumbent cuneate setae (Fig. 9C); hypostoma with sparse decumbent cuneate setae; scape with sparse decumbent and suberect simple and cuneate setae; pedicel with sparse erect simple and cuneate setae; propleuron with sparse erect cuneate setae (Fig. 9A); tegula with sparse decumbent and erect simple setae (Fig. 9G); metanotum with sparse suberect simple setae (Fig. 9G); forecoxa with sparse decumbent simple and





**Fig. 9.** *Loboscelidia cuneata* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, frontal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Forewing. **G.** Mesosoma, dorsal view. Scale bars: A, E–G = 0.5 mm; B–D = 0.2 mm.

cuneate setae; forefemur with dense decumbent simple and cuneate setae; apical part of foretibia with sparse decumbent cuneate setae; midcoxa with sparse decumbent cuneate setae; apical part of midtibia and hindtibia with sparse decumbent cuneate setae.

COLORATION. Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

#### **Female**

Unknown.

#### **Distribution**

Vietnam (Northern Vietnam, Central Vietnam) (Fig. 27).

#### **Remarks**

*Loboscelidia cuneata* sp. nov. resembles *L. cucphuongensis* sp. nov., *L. laminata* and *L. parallela* sp. nov. in having the following characteristics: reddish brown body color; weakly convex cervical expansion in lateral view; basal part of cervical expansion parallel in dorsal view (*L. cucphuongensis* sp. nov. and *L. parallela* sp. nov.); curved M vein; and Rs 3.0 times as long as R. However, *L. do* sp. nov. can be distinguished by the following characteristics: scape more than 3.0 times as long as wide (much less than 3.0 times as long as wide in *L. do* sp. nov. and *L. laminata*); scape with longitudinal grooves (smooth in *L. do* sp. nov. and *L. laminata*); *L. cuneata* sp. nov. has cuneate setae on the forefemur and all tibiae (simple setae in other species); R1 as long as R (much shorter than R in other three species); and scutellum rugose and punctured surface (polished and almost impunctured in *L. parallela* sp. nov. and *L. do* sp. nov.).

#### *Loboscelidia defecta* Kieffer, 1916

Fig. 10

*Loboscelidia defecta* Kieffer, 1916: 18. Syntype ♂; Philippines: Palawan (Insel Palavan), Puerto Princesa (MNHN).

#### **Material examined**

MALAYSIA • 1 ♂; Borneo, Sandakan; C.F. Baker leg.; USNM.

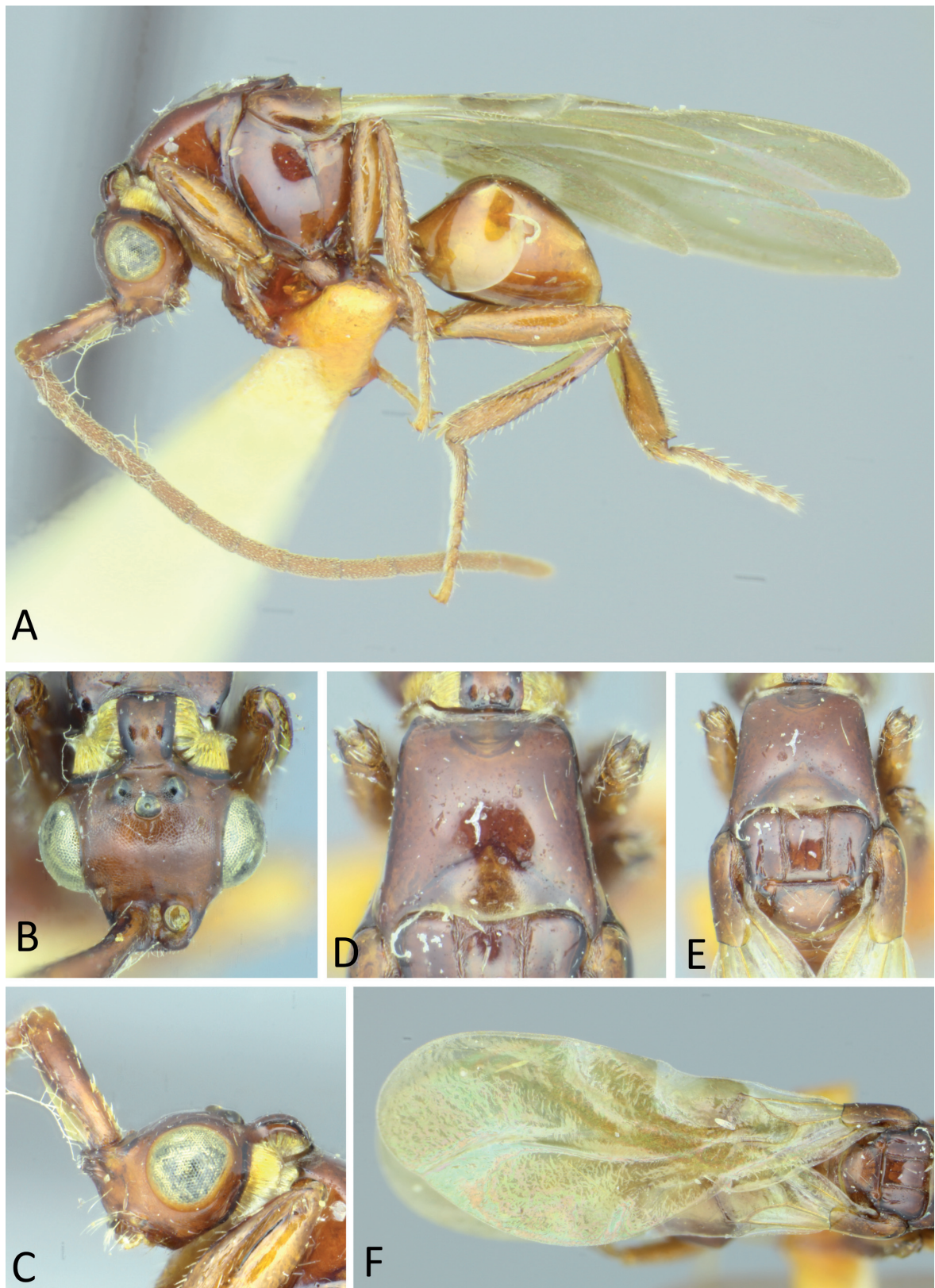
#### **Remarks**

*Loboscelidia defecta* resembles *L. fulgens*, *L. halimunensis* Kojima, 2003 and *L. reducta* in having the following characteristics: strongly convex cervical expansion (*L. reducta*); absent cu-a vein (*L. halimunensis* and *L. reducta*); hindfemur not stout basally, as wide as its distal part (*L. fulgens* and *L. reducta*); and swollen ventral margin of the hindfemur (*L. fulgens* and *L. reducta*). However, *L. defecta* can be distinguished by the following characteristics: frons microstriate (polished and impunctured in *L. reducta*); triangular frontal projection (rectangular in other three species); A 0.5–0.7 times as long as R (more than 0.8 times as long as in other species); Rs less than twice as long as R (more than twice as long as in *L. halimunensis*); and absent tibial flanges (present in *L. fulgens*) (Kimsey 2012).

#### **Distribution**

Malaysia; Philippines; Thailand; Vietnam (Southern Vietnam) (Kimsey 2012).





**Fig. 10.** *Loboscelidia defecta* Kieffer, 1916, ♂ (USNM). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, lateral view. **D.** Pronotum, dorsal view. **E.** Mesosoma, dorsal view. **F.** Forewing. Not to scale.

*Loboscelidia do* sp. nov.

urn:lsid:zoobank.org:act:40BF901C-8D8D-4051-B7F6-1669ABD7E85A

Fig. 11, 25G

**Etymology**

The specific name is derived from the Vietnamese word, ‘do’ for ‘red’, referring to the reddish body color.

**Type material**

**Holotype**

VIETNAM • ♂; Bac Kan Province, Ba Be NP; 22°24′43.34″ N, 105°36′54.76″ E; 4 Jul. 2014; K. Tsujii leg.; VNMN.

**Paratypes**

VIETNAM • 1 ♂; same collection data as for holotype; VNMN • 1 ♂; Bac Giang Province, Tay Yen Tu NR; 21°10′52.33″ N, 106°43′24.3″ E; 7 Jul. 2014; T. Mita leg.; VNMN.

**Description**

**Male** (Fig. 11A)

MEASUREMENTS. Body length 3.3–3.9 mm; forewing length 3.3–3.7 mm.

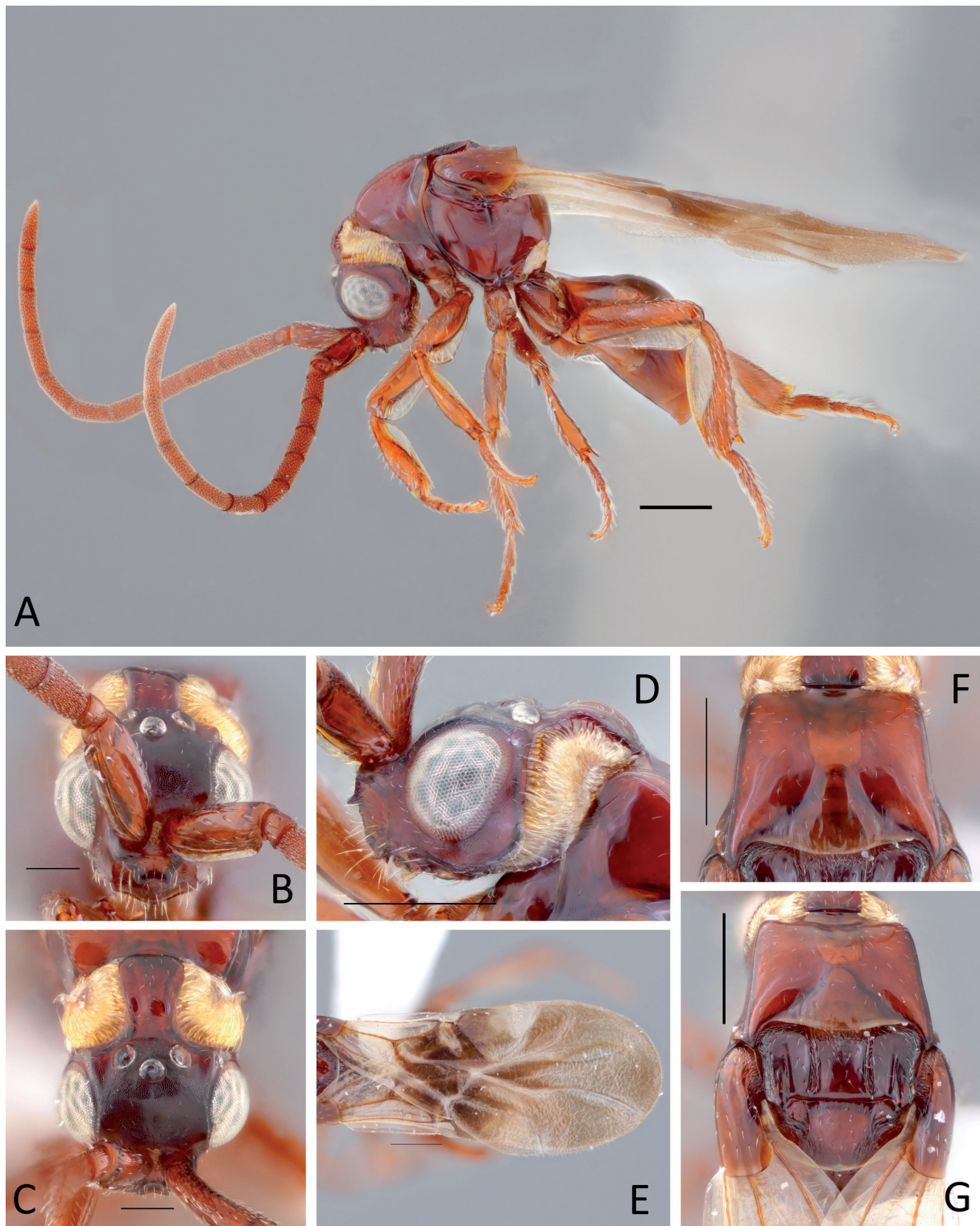
HEAD. Head (Fig. 11B–D) 1.9–2.3 times as long as high, 1.3 times as long as wide; inner ocular length 0.58–0.59 times as long as head width; frontal projection rectangular in frontal view (Fig. 11B); apical margin of frontal projection depressed (Fig. 11C); frons polished, with low ridge extending from vertex along inner orbit of eye (Fig. 11C); frons with indistinct carinae towards posterior ocelli (Fig. 11C); spraclepeal area without transverse carinae (Fig. 11B); temple 0.39–0.50 times as long as MOD (Fig. 11C); POL 0.85–1.1 times as long as MOD; OOL as long as MOD; LOL 0.17 times as long as MOD; behind ocelli without transverse depression (Fig. 11C); cervical expansion convex in lateral view (Fig. 11D); basal part of cervical expansion constricted weakly in dorsal view (Fig. 11C); scape 2.2–2.7 times as long as wide; scape with one longitudinal groove extending apical margin; scape with transparent flange, 0.85 times as long as tubular part of scape, 0.25 times wider than tubular part of scape; F1 1.8–2.0 times as long as wide; F2 1.7–2.1 times as long as wide; F11 3.4–3.9 times as long as wide; relative length of F1–F11: 1.0: 1.1: 1.1: 1.1: 1.1: 1.1: 1.1: 1.1: 1.2: 1.2: 1.6.

MESOSOMA. Pronotum 0.82 times as long as posterior width of pronotum (Fig. 11F); posterior width of pronotum 1.4 times as wide as anterior width and 1.1 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 11A); notauli of scutum slightly curved, reaching posterior margin (Fig. 11G); scutellum polished and inpunctured, with lateral carina (Fig. 11G); scrobal sulcus present, deeply depressed (Fig. 11A); metanotum with medial ridge, 0.44–0.47 times as long as scutellum (Fig. 11G); propodeal angle weakly developed; propodeum with transverse carina above foramen and not connected upper area.

WINGS. Forewing (Fig. 11E) with M curved; cu-a 0.29–0.40 times as long as R; A extending half of Cu+M; R1 0.60–0.71 times as long as R; Rs 2.7–3.3 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.71–0.77 times longer, 1.0–1.3 times wider than tubular part of forefemur; flange on foretibia 0.63–0.75 times longer, 1.3–2.0 times wider than tubular part of foretibia; flange on midfemur 0.72–0.76 times longer, 1.0–1.5 wider than tubular part of midfemur; flange on midtibia 0.74–0.76 times longer, 0.89–1.0 times wider than tubular part of midtibia; hindcoxa 2.0 times as long as hind trochanter; postero-lateral margin of hind coxa with longitudinal carinae;





**Fig. 11.** *Loboscelidia do* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Forewing. **F.** Pronotum, dorsal view. **G.** Mesosoma, dorsal view. Scale bars: A, E–G = 0.5 mm; B–D = 0.2 mm.



basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindtibia smooth; flange on hindfemur 0.60–0.85 times longer, 0.90–1.0 times wider than tubular part of hindfemur; flange on hindtibia 0.83–0.89 times longer, 1.8–2.0 times wider than tubular part of hindtibia; median tooth of tarsal claw far beyond half of tarsal claw (25G).

**PILOSITY.** Spraclypeal area with sparse erect simple setae (Fig. 11B); temple with sparse suberect simple setae (Fig. 11C); lower gena with sparse decumbent simple setae (Fig. 11D); frons with sparse decumbent simple setae (Fig. 11C); around spiracle of propodeum with sparse decumbent simple setae; forefemur and foretibia with dense decumbent simple setae; dorsal surface of forefemur, foretibia, midtibia and hindtibia with sparse suberect simple setae.

**COLORATION.** Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

#### **Female**

Unknown.

#### **Distribution**

Vietnam (Northern Vietnam) (Fig. 27).

#### **Remarks**

*Loboscelidia do* sp. nov. resembles *L. cuneata* sp. nov., *L. parallela* sp. nov. and *L. pecki* Kimsey, 2012 in the following characteristics: reddish brown body color; rectangular frontal projection; F1 and F2 nearly twice as long as wide; transverse carina absent behind ocelli; flat ventral margin of the hindfemur. However, *L. do* sp. nov. can be distinguished by the following characteristics: frons with setae (*L. cuneata* sp. nov. without setae); scape less than 3.0 times as long as wide (more than 3.0 times as long as wide in other species); femora with simple setae (*L. cuneata* sp. nov. with cuneate setae); basal of cervical expansion weakly constricted (other two species parallel); R1 vein less than 0.80 times as long as R (as long as R in *L. pecki*), and cu-a vein longer than 0.29 times as long as R (absent or slightly present in *L. pecki*).

#### *Loboscelidia flavipes* sp. nov.

urn:lsid:zoobank.org:act:7E033E15-9CF0-4E63-8F74-294C76C6C2EA

Figs 12, 25H

#### **Etymology**

Named after the Latin ‘*flava*’, meaning ‘yellow’, and ‘*pes*’, meaning ‘foot’, referring to the pale-yellow legs.

#### **Type material**

##### **Holotype**

VIETNAM • ♂; Ninh Binh Province, Cuc Phuong NP; 20°21′01.9″ N, 105°35′37.0″ E; 24 Jul. 2010; T. Mita leg.; VNMN.

#### **Description**

##### **Male** (Fig. 12A)

**MEASUREMENTS.** Body length 3.1 mm; forewing length 3.2 mm.

**HEAD.** Head (Fig. 12B–D) 2.0 times as long as high, 1.3 times as long as wide; inner ocular length 0.58 times as long as head width; frontal projection rectangular in frontal view (Fig. 12B); apical margin of frontal projection straight (Fig. 12C); frons granulate, finely microstriate (Fig. 12C); frons with low ridge extending from vertex along inner orbit of eye (Fig. 12C); spraclypeal area without transverse carinae (Fig. 12B); temple 0.80 times as long as MOD (Fig. 12C); POL as long as MOD; OOL 1.4 times as long as MOD; LOL 0.4 times as long as MOD; behind ocelli without transverse depression (Fig. 12C); cervical expansion convex in lateral view (Fig. 12D); basal part of cervical expansion parallel in dorsal view (Fig. 12C); scape 2.8 times as long as wide; scape with longitudinal grooves; scape with transparent flange; F1 1.9 times as long as wide; F2 1.8 times as long as wide; F11 3.6 times as long as wide; relative length of F1–F11: 1.2: 1.1: 1.1: 1.1: 1.0: 1.0: 1.1: 1.1: 1.2: 1.1: 1.7.

**MESOSOMA.** Pronotum 0.83 times as long as posterior width of pronotum (Fig. 12E); posterior width of pronotum 1.5 times as wide as anterior width and as wide as head width; dorsolateral surface of pronotum carinate (Fig. 12A); notauli of scutum slightly curved, reaching posterior margin (Fig. 12F); scrobal sulcus absent (Fig. 12A); scutellum polished and impunctured, without lateral carina (Fig. 12F); metanotum with two ridges, 0.43 times as long as scutellum (Fig. 12F); propodeal angle strongly developed; upper area of propodeum without transverse carina; propodeum without transverse carina above foramen.

**WINGS.** Forewing (Fig. 12G) with M curved; cu-a 0.50 times as long as R; A extending half of Cu+M; R1 0.42 times as long as R; Rs 3.6 times as long as R.

**LEGS.** Tibiae carinate; flange on forefemur 0.59 times longer, 1.3 times wider than tubular part of forefemur; flange on foretibia 0.42 times longer, 0.67 times wider than tubular part of foretibia; flange on midfemur 0.37 times longer, 1.6 times wider than tubular part of midfemur; flange on midtibia 0.50 times longer, 0.67 times wider than tubular part of midtibia; hindcoxa 1.9 times as long as hindtrochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur producing; hindfemur basally not stout, as wide as distal part; ventral margin of hindfemur flat; flange on hindfemur 0.66 times longer, as wide as tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia 0.80 times longer, 1.5 times wider than tubular part of hindtibia.

**PILOSITY.** Lower gena with sparse decumbent cuneate setae (Fig. 12D); hypostoma with sparse decumbent cuneate setae; foretibia with sparse decumbent and suberect simple and cuneate setae; midcoxa with sparse decumbent cuneate setae; midfemur and midtibia with sparse decumbent and suberect simple and cuneate setae; hindcoxa with sparse decumbent cuneate setae; hindfemur and hindtibia with sparse decumbent and suberect simple setae.

**COLORATION.** Body yellowish brown; antenna yellowish brown; legs yellowish brown; ribbon-like setae whitish yellow.

### **Female**

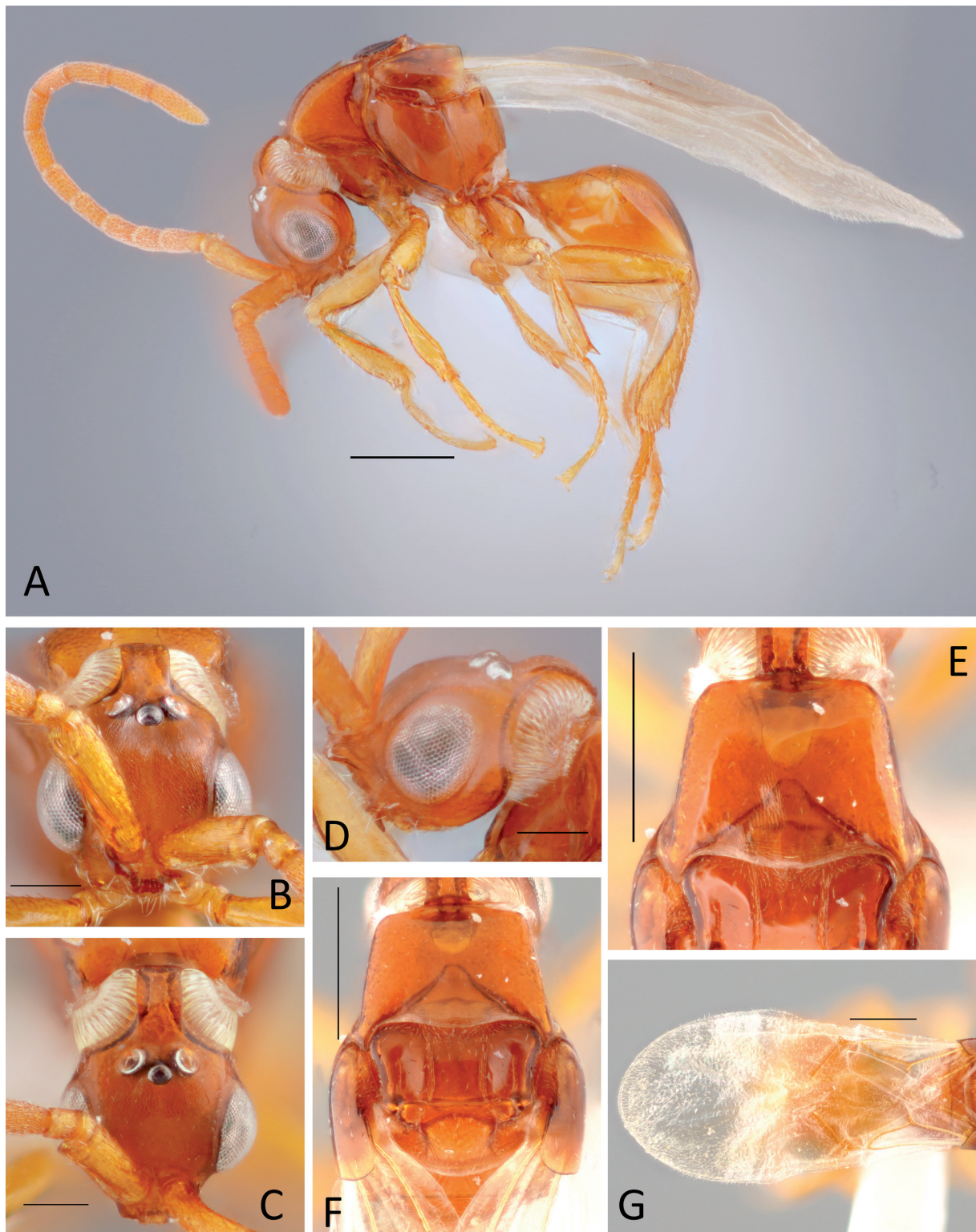
Unknown.

### **Distribution**

Vietnam (Northern Vietnam) (Fig. 27).

### **Remarks**

*Loboscelidia flapives* sp. nov. resembles *L. vietnamensis* sp. nov. and *L. bachmaensis* sp. nov. in having the following characteristics: frons microstriate; cervical expansion weakly convex; F1 less than twice as long as wide; and Rs more than 3.0 times as long as R (*L. vietnamensis* sp. nov.). However,



**Fig. 12.** *Loboscelidia flavipes* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. **G.** Forewing. Scale bars: A, E–G = 0.5 mm; B–D = 0.2 mm.



*L. flavipes* sp. nov. can be distinguished by the following characteristics: yellow body color (red or reddish brown in the other two species); temple more than 0.50 times as long as MOD (*L. vietnamensis* sp. nov. less than 0.30 times as long as R); POL as long as MOD (*L. vietnamensis* sp. nov. shorter than MOD, *L. bachmaensis* sp. nov. longer than MOD); pronotum narrower than head (wider than head in *L. bachmaensis* sp. nov.); and cu-a 0.50 times as long as R (nearly 0.30 times as long as R in other two species).

***Loboscelidia fulgens* Kimsey, 2012**

Figs 2C, 3B, 13, 25I

*Loboscelidia fulgens* Kimsey, 2012: 16. Holotype ♂; Vietnam: Tuyen Quang Province, Na Hang Nature Reserve (CNC).

**Material examined**

**Paratypes**

VIETNAM • 1 ♂; Ha Tinh province, Huong Son; 450 m a.s.l.; 18°22' N, 105°13' E; 22 Apr.–1 May 1998; L. Herman leg.; light trap; CNC • 1 ♂; Tuyen Quang province, Na Hang Reserve; 360 m a.s.l.; 16–20 May 1997; S.B. Peck leg.; FIT; CNC.

**Non-type**

VIETNAM • 5 ♂♂; Bac Giang Province, Tay Yen Tu NR; 21°10'52.33" N, 106°43'24.3" E; 9 Jul. 2014; T. Mita leg.; VNMN • 5 ♂♂; same locality data as for preceding but 21°11'3.65" N; 106°44'42.44" E; 10 Jul. 2014; K. Tsujii leg.; VNMN.

**Description**

**Male** (Fig. 13A)

MEASUREMENTS. Body length 2.4–3.1 mm; forewing length 2.7–3.2 mm.

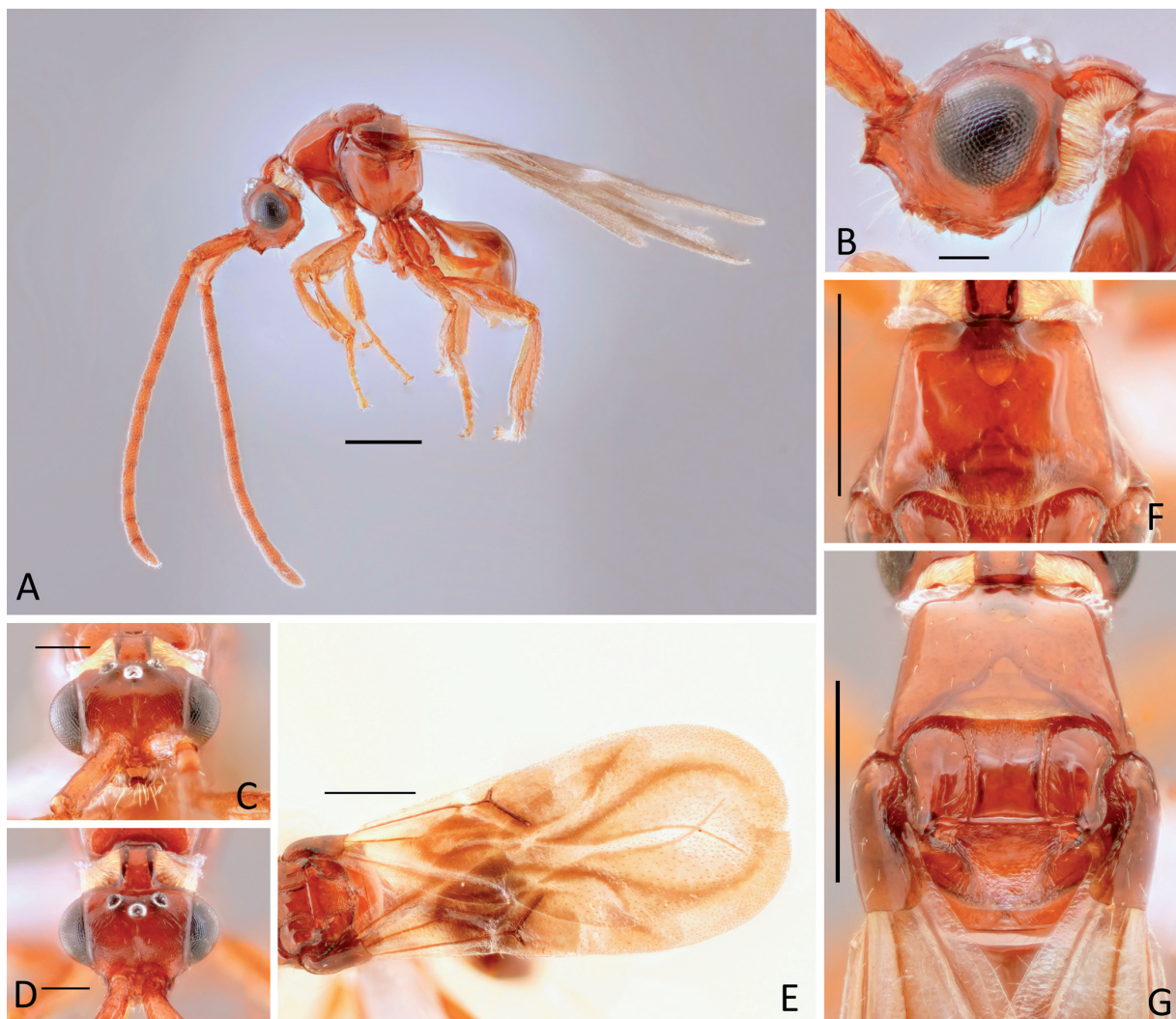
HEAD. Head (Fig. 13B–D) 1.8 times as long as high, 1.1 times as long as wide; inner ocular length 0.67 times as long as head width; frontal projection rectangular in frontal view (Fig. 13C); apical margin of frontal projection depressed (Fig. 13D); frons polished and unpunctured (Fig. 13D); frons with low ridge extending from median ocellus along inner orbit of eye (Fig. 13D); frons with indistinct carinae towards median ocellus (Fig. 13C); frons with distinct frontal line; spraclepeal area with transverse carinae; temple 0.64 times as long as MOD (Fig. 13D); POL 1.2 times as long as MOD; OOL as long as MOD; LOL 0.40 times as long as MOD; behind ocelli with transverse depression; cervical expansion convex in lateral view (Fig. 13B); basal part of cervical expansion constricted in dorsal view (Fig. 13D); scape 3.6 times as long as wide; scape with longitudinal grooves; F1 2.2 times as long as wide; F2 1.8 times as long as wide; F11 3.0 times as long as wide; relative length of F1–F11: 1.3: 1.1: 1.0: 1.0: 1.0: 1.1: 1.0: 1.1: 1.1: 1.1: 1.6.

MESOSOMA. Pronotum 0.81 times as long as posterior width of pronotum (Fig. 13F); posterior width of pronotum 1.3 times as wide as anterior width and 0.90 times as wide as head width; dorsolateral surface of pronotum rounded (Fig. 13A); notauli of scutum slightly curved, reaching posterior margin (Fig. 13G); scutellum polished, with lateral carina (Fig. 13G); apico-lateral area of scutellum without longitudinal carina (Fig. 13G); scrobal sulcus absent (Fig. 13A); metanotum with two ridges; metanotum 0.31 times as long as scutellum (Fig. 13G); propodeal angle weakly developed; propodeum without transverse carina above foramen.

WINGS. Forewing (Fig. 13E) with M absent; cu-a absent; A extending half of Cu+M; R1 0.33 times as long as R; Rs 1.7 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.35 times longer, as wide as tubular part of forefemur; flange on foretibia 0.34 times longer, 0.33 times wider than tubular part of foretibia; flange on midfemur 0.66 times longer, 0.70 times wider than tubular part of midfemur; flange on midtibia 0.58 times longer, 0.33 times wider than tubular part of midtibia; hindcoxa 2.3 times as long as hind trochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur simple; hindfemur basally not stout, as wide as distal part; ventral margin of hindfemur swollen; flange on hindfemur 0.48 times longer, as wide as tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia 0.54 times longer, 0.75 times wider than tubular part of hindtibia.

PILOSITY. Forecoxa with sparse decumbent simple setae; foretibia with sparse decumbent and erect simple setae; midcoxa with sparse decumbent simple setae; midfemur with sparse decumbent and suberect simple setae; midtibia with sparse decumbent and suberect simple setae; hindcoxa with sparse decumbent simple setae; hindfemur with sparse decumbent cuneate setae; hindtibia with sparse decumbent and suberect simple setae.



**Fig. 13.** *Loboscelidia fulgens* Kimsey, 2012, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, lateral view. **C.** Head, frontal view. **D.** Head, dorsal view. **E.** Forewing. **F.** Pronotum, dorsal view. **G.** Mesosoma, dorsal view. Scale bars: A, E–G = 0.5 mm; B = 0.1 mm; C–D = 0.2 mm.

COLORATION. Body yellowish brown; antenna yellowish brown; legs yellowish brown; ribbon-like setae whitish yellow.

#### Female

Unknown.

#### Distribution

Vietnam (Northern Vietnam, Central Vietnam) (Fig. 27).

#### Remarks

*Loboscelidia fulgens* shares a completely lacking M vein with *L. bakeri* Fouts, 1922, *L. guangxiensis* Xu, Weng & He, 2006 and *L. reducta*. However, *L. fulgens* can be distinguished from the three species by the following characteristics: head wider than posterior width of pronotum (narrower than posterior width of pronotum in *L. bakeri* and *L. reducta*); R1 0.30 times as long as R (more than 0.50 times as long as R in *L. guangxiensis*); a flange on hindtibia more than 0.50 times as wide as tubular part of hindtibia (less wide than hindtibia in *L. guangxiensis*); well-developed tibial flanges (lacking in *L. reducta*); and propodeum without a transverse carina (with the carina in *L. bakeri*).

#### *Loboscelidia glabra* sp. nov.

urn:lsid:zoobank.org:act:DA75CC25-7D50-4004-85C0-7AF48829DDE0

Figs 14, 25J

#### Etymology

Named after the Latin ‘*glaber*’, meaning ‘hairless’, referring to the eye without setae of the holotype.

#### Type material

##### Holotype

VIETNAM • ♀; Ninh Binh Province, Cuc Phuong NP; 24–25 Aug. 2019; Y. Hisasue *et al.* leg.; FIT; VNMN.

#### Description

##### Female (Fig. 14A)

MEASUREMENTS. Body length 3.6 mm; forewing length 2.7 mm.

HEAD. Head (Fig. 14B–D) 1.8 times as long as high, 1.4 times as long as wide; inner ocular length 0.67 times as long as head width; frontal projection rectangular in frontal view (Fig. 14B); apical margin of frontal projection depressed (Fig. 14C); frons granulate, microstriae (Fig. 14C); frons without ridge along inner orbit of eye (Fig. 14C); frons with distinct carinae towards median ocellus (Fig. 14C); spraclypeal area with transverse carinae (Fig. 14B); temple 1.1 times as long as MOD (Fig. 14C); POL 1.2 times as long as MOD; OOL 2.5 times as long as MOD; LOL 0.48 times as long as MOD; behind ocelli with transverse depression (Fig. 14C); cervical expansion weakly convex in lateral view (Fig. 14D); basal part of cervical expansion strongly constricted in dorsal view (Fig. 14C); scape 2.6 times as long as wide; scape longitudinally carinate, without flange; F1 0.88 times as long as wide; F2 0.63 times as long as wide; F11 0.82 times as long as wide; relative length of F1–F11: 1.8: 1.4: 1.0: 1.0: 1.0: 1.0: 1.2: 1.2: 1.2: 1.2: 2.2.

MESOSOMA. Pronotum 0.70 times as long as posterior width of pronotum (Fig. 14F); posterior width of pronotum 1.4 times as wide as anterior width and 1.3 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 14A); notauli parallel, reaching posterior margin (Fig. 14G); scutellum





**Fig. 14.** *Loboscelidia glabra* sp. nov., holotype, ♀ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Forewing. **F.** Pronotum, dorsal view. **G.** Mesosoma, dorsal view. Scale bars: A, E–G = 0.5 mm; B–D = 0.2 mm.

polished and punctured (Fig. 14G); scrobal sulcus present, weakly depressed (Fig. 14A); metanotum with medial ridge, 0.41 times as long as scutellum (Fig. 14G); propodeal angle weakly developed; propodeum without transverse carina above foramen.

WINGS. Forewing (Fig. 14E) with M curved; cu-a 0.51 times as long as R; A extending half of Cu+M; R1 0.63 times as long as R; Rs 2.9 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.69 times longer, 1.3 times wider than tubular part of forefemur; flange on foretibia 0.67 times longer, 1.8 times wider than tubular part of foretibia; flange on midfemur 0.66 times longer, 0.8 times wider than tubular part of midfemur; flange on midtibia 0.61 times longer, 1.6 times wider than tubular part of midtibia; hind coxa dorso-laterally carinate; basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur smooth; flange on hindfemur 0.52 times longer, as wide as tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia 0.73 times longer, 0.78 times wider than tubular part of hindtibia; hind tarsal claw without median tooth (Fig. 25J).

PILOSITY. Gena with sparse suberect simple setae (Fig. 14D); hypostoma with sparse suberect simple setae; scape and pedicel with sparse decumbent cuneate setae; dorsal and lateral surfaces of pronotum with sparse decumbent cuneate setae (Fig. 14F); propleuron with sparse suberect simple setae; scutum, mesopleuron and metanotum with sparse decumbent cuneate setae (Fig. 14A, G); tegula with sparse suberect simple setae (Fig. 14G); scutellum with sparse decumbent cuneate setae (Fig. 14G); dorsal surface of propodeum almost asetose; lateral and posterior parts of propodeum with sparse decumbent cuneate setae; forecoxa and foretrochanter with sparse suberect simple setae; foretibia with sparse decumbent and suberect simple and cuneate setae; midleg with sparse decumbent and suberect simple and cuneate setae; hindleg with sparse decumbent and suberect simple and cuneate setae.

COLORATION. Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

#### Male

Unknown.

#### Distribution

Vietnam (Northern Vietnam) (Fig. 27).

#### Remarks

*Loboscelidia glabra* sp. nov. resembles *L. antennata* Fouts, 1922 and *L. hei* Yao, Liu & Xu, 2010; however, *L. glabra* sp. nov. has eyes without setae (with erect setae in *L. antennata*); pronotum 0.80 times as long as wide (0.60 times as long as wide in *L. antennata*); shorter F11 0.80 times as long as wide (1.2 times as long as wide in *L. hei*); and a narrow hindtibial flange, 0.80 times as wide as the tubular part (as wide as the tubular part in *L. hei*).

#### *Loboscelidia kafeae* Kimsey, 2012

*Loboscelidia kafeae* Kimsey, 2012: 20. Holotype ♂; Thailand: Chiang Mai Province, Doi Phahompok NP Mae Fang Hot spring (QSBG).

#### Remarks

*Loboscelidia kafeae* resembles *L. pasohana* and *L. laminata* in having the following characteristics: F1 less than twice as long as wide and cu-a 0.50 times as long as R. However, *L. kafeae* can be distinguished

by the following characteristics: weakly convex cervical expansion (strongly convex in *L. pasohana*); F2 twice as long as wide (1.5 times as long as wide in *L. pasohana*); F11 that 4.0 times as long as wide (3.5 times as long as wide in other two species); F2 twice as long as wide (less than twice as long as wide in *L. laminata*); fore- and midtibial flanges as wide as the tubular part; and a hindtibial flange twice as wide as the tubular part (less than twice as wide as the tubular part in other two species) (Kimsey 2012).

### Distribution

Laos; Malaysia; Thailand; Vietnam (Northern Vietnam) (Kimsey 2012).

### *Loboscelidia komedai* sp. nov.

urn:lsid:zoobank.org:act:7D4199E6-8EAF-4828-B589-E46ABA1BB314

Figs 15, 25K

### Etymology

The specific name is in honor of Dr Yoto Komeda who collected the holotype of this new species.

### Type material

#### Holotype

VIETNAM • ♂; Thua Thien Hue Province, Bach Ma NP, rhododendron trail; 16.192° N, 107.849° E; 3 Aug. 2016; Y. Komeda leg.; VNMN.

#### Paratypes

VIETNAM • 1 ♂, same locality data as for holotype; 3–6 Aug. 2016; YPT; VNMN • 1 ♂; Thua Thien Hue Province, Bach Ma NP, phaesant trail; 16.231° N, 107.852° E; 4 Aug. 2016; T. Mita leg.; VNMN.

### Description

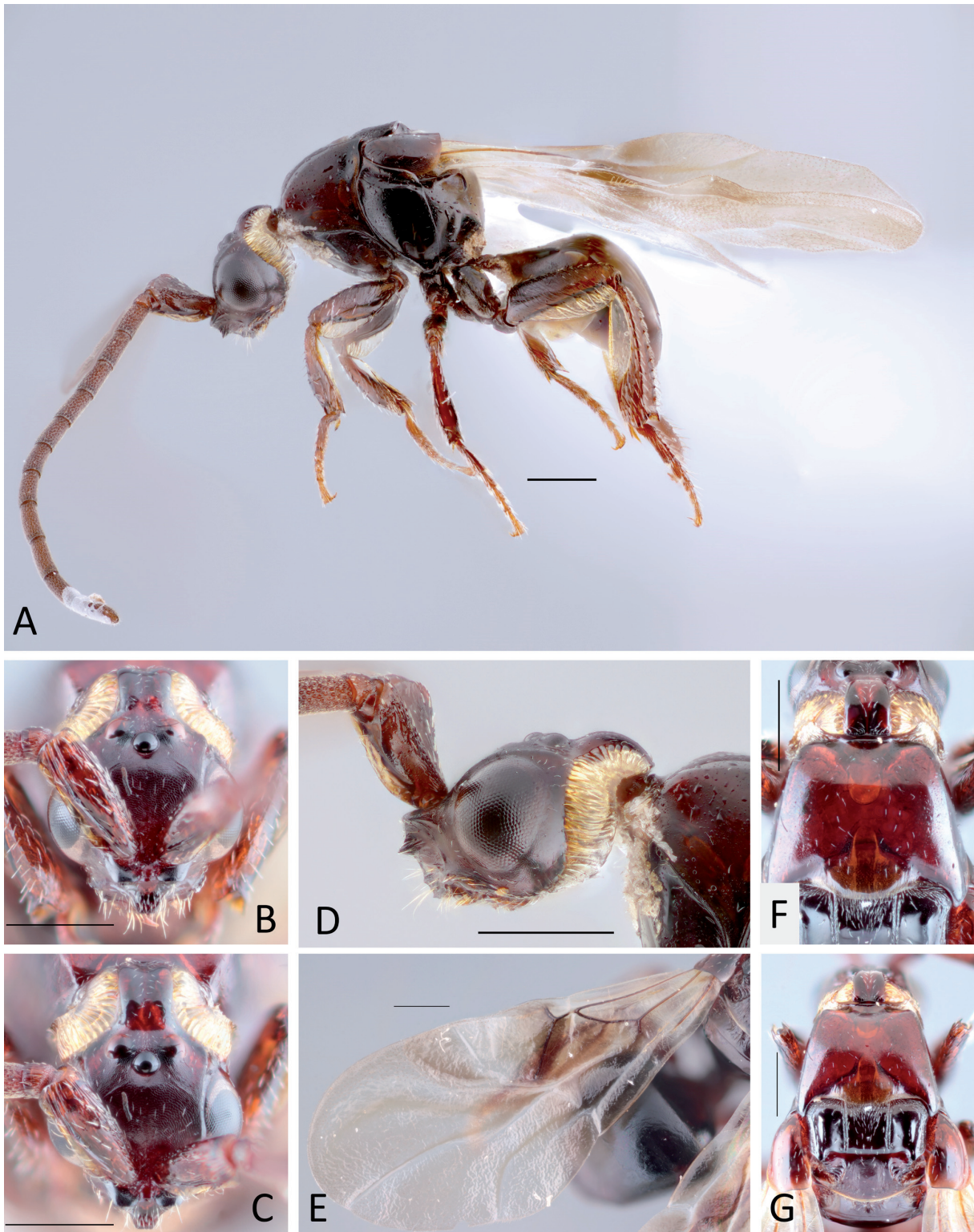
#### Male (Fig. 15A)

MEASUREMENTS. Body length 3.9–4.1 mm; forewing length 3.9–4.1 mm.

HEAD. Head (Fig. 15B–D) 1.8–1.9 times as long as high, 1.3 times as long as wide; inner ocular length 0.55–0.61 times as long as head width; frontal projection rectangular in frontal view (Fig. 15B); apical margin of frontal projection straight (Fig. 15C); frons granulate (Fig. 15C); frons with low ridge extending from vertex along inner orbit of eye; frons with indistinct carina towards median ocellus (Fig. 15C); spraclypeal area with transverse carinae (Fig. 15B); temple 0.43–0.86 times as long as MOD (Fig. 15C); POL 1.5–1.6 times as long as MOD; OOL 1.3–2.0 times as long as MOD; LOL 0.29–0.57 times as long as MOD; behind ocelli without transverse depression (Fig. 15C); cervical expansion weakly convex in lateral view (Fig. 15C); basal part of cervical expansion constricted weakly in dorsal view (Fig. 15C); scape 2.5–2.6 times as long as wide; scape with longitudinal grooves; F1 1.6–2.6 times as long as wide; F2 1.5–2.8 times as long as wide; F11 3.4–3.8 times as long as wide; relative length of F1–F11: 1.0: 1.0: 1.0: 1.0: 1.0: 1.0: 1.0: 1.4.

MESOSOMA. Pronotum 0.81–0.83 times as long as posterior width of pronotum (Fig. 15F); posterior width of pronotum 1.4–1.7 times as wide as anterior width and 1.1–1.2 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 15A); notauli of scutum slightly curved, reaching posterior margin (Fig. 15G); scutellum punctured and rugose; scrobal sulcus present, weakly depressed (Fig. 15G); metanotum with medial ridge (Fig. 15G), 0.39–0.46 times as long as scutellum; propodeal angle weakly developed (Fig. 15G); upper area of propodeum without transverse carina; propodeum without transverse carina above foramen.





**Fig. 15.** *Loboscelidia komedai* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, frontal view. **D.** Head, lateral view. **E.** Forewing. **F.** Pronotum, dorsal view. **G.** Mesosoma, dorsal view. Scale bars = 0.5 mm.

WINGS. Forewing (Fig. 15E) with M curved; cu-a 0.72–0.80 times as long as R; A extending half of Cu+M; R1 0.60–0.67 times as long as R; Rs 2.7–3.1 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.64–0.66 times longer, 0.70–0.92 times wider than tubular part of forefemur; flange on foretibia 0.50–0.63 times longer, 0.63–0.73 times wider than tubular part of foretibia; flange on midfemur 0.71–0.83 times longer, 0.75–1.0 times wider than tubular part of midfemur; flange on midtibia 0.58–0.68 times longer, 0.56–0.80 times wider than tubular part of midtibia; hindcoxa 1.8 times as long as hind trochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur smooth; flange on hindfemur 0.77–0.86 times longer, 0.79–0.9 times wider than tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia 0.67–0.75 times longer, 1.5–1.7 times wider than tubular part of hindtibia; median tooth of tarsal claw extending half of tarsal claw.

PILOSITY. Spraclypeal area with erect simple setae (Fig. 15B); lower gena with sparse decumbent simple setae; scape with sparse decumbent simple setae; dorsal and lateral surfaces of pronotum with sparse decumbent cuneate setae (Fig. 15F); forefemur with sparse decumbent and suberect simple setae; midfemur with sparse decumbent simple setae; midtibia with sparse decumbent simple setae; hindfemur with sparse decumbent simple setae; hindtibia with sparse decumbent simple setae; hindcoxa with sparse decumbent simple setae.

COLORATION. Body reddish brown to blackish brown; scutum, scutellum and metanotum blackish brown; ribbon-like setae yellowish brown; flanges yellowish brown.

#### **Female**

Unknown.

#### **Distribution**

Vietnam (Central Vietnam) (Fig. 28).

#### **Remarks**

This species resembles *L. sarawakensis* Kimsey, 1988 in having a darker body color, scrobal sulcus, and scape more than twice as long as wide. However, it can be distinguished by the following combination of characteristics: rectangular frontal projection (*L. sarawakensis* triangular); transverse depression absent behind ocelli (*L. sarawakensis* with transverse depression).

#### ***Loboscelidia laminata* Kimsey, 2012**

Fig. 16

*Loboscelidia laminata* Kimsey, 2012: 22. Holotype ♂; Vietnam: Tuyen Quang Province, Na Hang Reserve (CNC).

#### **Material examined**

##### **Paratype**

VIETNAM • ♂; Dai Lanh, N of Nha Trang; 30 Nov.–5 Dec. 1960; C.M. Yoshimoto leg.; CNC.

##### **Non-type**

VIETNAM • 1 ♂; Thua Thien Hue Province, Bach Ma NP, pheasant trail; 16.231° N, 107.852° E; 16 Sep. 2022; Y. Hisasue leg.; VNMN.



**Remarks**

*Loboscelidia laminata* resembles *L. bachmaensis* sp. nov., *L. kafeae* and *L. vietnamensis* sp. nov., in having the following characteristics: frons microstriate; weakly convex cervical expansion; the absence of transverse carina behind ocelli; the basally stout hindfemur; and the flat ventral margin of hindfemur. However, *L. laminata* can be distinguished by the following characters: F2 less than twice as long as wide (twice as long as in other species), F11 less than 3.5 times as long as wide (much longer than 4.0 times as long as in *L. kafeae*), fore- and midtibial flanges narrower than the tubular part (twice as



**Fig. 16.** *Loboscelidia laminata* Kimsey, 2012, holotype, ♂ (CNC). **A.** Lateral habitus. **B.** Forewing. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. Not to scale.



wide as the tubular part in *L. kafa*), cu-a 0.50 times as long as R (nearly 0.30 times as long as R in *L. bachmaensis* sp. nov. and *L. vietnamensis* sp. nov.).

### Distribution

Vietnam (Northern Vietnam, Central Vietnam, Southern Vietnam) (Fig. 28).

### *Loboscelidia laotiana* Kimsey, 1988

*Loboscelidia laotiana* Kimsey, 1988: 71. Holotype ♂; Laos: Vientiane Prov., Ban Van Eue (BPBM).

### Remarks

*Loboscelidia laotiana* has a triangular frontal projection, longer scape that is more than 3.0 times as long as it is wide, and a shorter F1 and F2 that are less than twice as long as they are wide, which it has in common with *L. asiana* and *L. vang* sp. nov. However, *L. laotiana* can be distinguished by the following characteristics: scale-like setae absent on the lower gena (present in *L. asiana*); an F11 that is less than 3.0 times as long as it is wide (3.5 times as long as in *L. vang* sp. nov.); scrobal sulcus present (absent in the other two species); a hindtibial flange that is twice as wide as the tubular part (0.55 times as wide as the tubular part in *L. vang* sp. nov.); a curved M vein (*L. vang* sp. nov. straight); and an Rs that is 3.0 times or more as long as R (nearly twice as long as R in *L. vang* sp. nov.).

### Distribution

Indonesia; Laos; Vietnam (Southern Vietnam) (Kimsey 2012).

### *Loboscelidia mediata* sp. nov.

urn:lsid:zoobank.org:act:6A304EBB-F336-4F03-99F8-5CB598F9DF78

Figs 2D, 17, 25L

### Etymology

Named after the Latin ‘*mediata*’, meaning ‘oblique’, referring to the unusual and deviant morphological characteristics of the genus *Loboscelidia*.

### Type material

#### Holotype

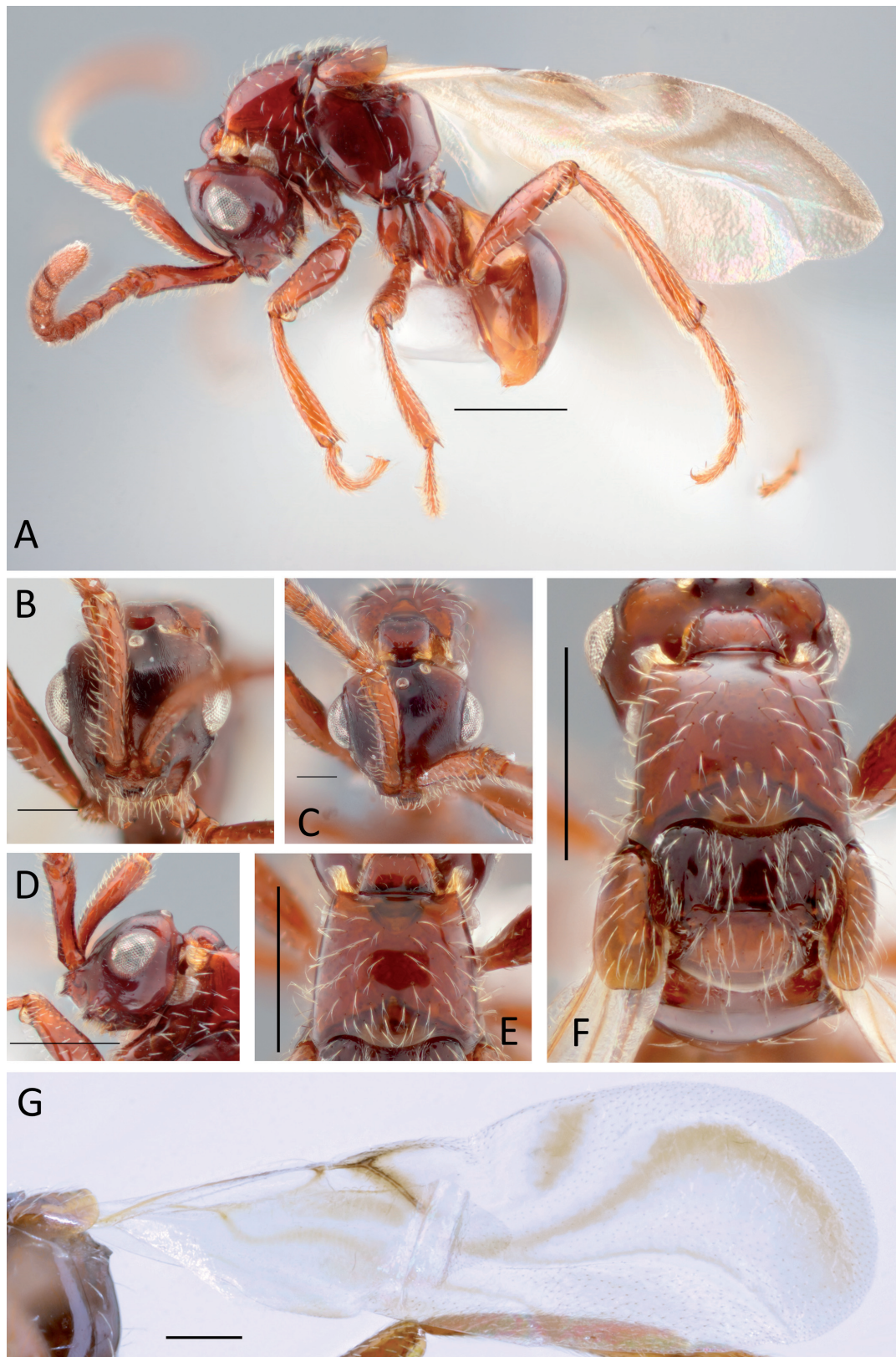
VIETNAM • ♂; Kon Tum Province, Chu Mom Ray NP, Bar Goc Station; 14.434° N, 107.720° E; 31 Apr.–4 May 2014; H.T. Pham; MT; VNMMN.

### Description

#### Male (Fig. 17A)

MEASUREMENTS. Body length 2.6 mm; forewing length 2.6 mm.

HEAD. Head (Fig. 17B–D) 1.7 times as long as high, 1.2 times as long as wide; inner ocular length 0.68 times as long as head width; frontal projection rectangular in frontal view (Fig. 17B); apical margin of frontal projection depressed (Fig. 17C); frons polished, with longitudinal striae (Fig. 17C); frons without ridge along inner orbit of eye (Fig. 17C); spraclepeal area with transverse carinae (Fig. 17B); temple 3.2 times as long as MOD (Fig. 17C); POL 1.7 times as long as MOD; OOL 2.4 times as long as MOD; LOL 0.57 times as long as MOD; behind ocelli with transverse depression (Fig. 17C); cervical expansion strongly convex in lateral view (Fig. 17D); basal part of cervical expansion strongly constricted in dorsal view (Fig. 17C); scape 4.4 times as long as wide; scape without longitudinal grooves; scape without



**Fig. 17.** *Loboscelidia mediata* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, frontal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. **G.** Forewing. Scale bars: A, D–G = 0.5 mm; B–C = 0.2 mm.

transparent flange; F1 2.2 times as long as wide; F2 2.3 times as long as wide; F11 2.3 times as long as wide; relative length of F1–F11: 1.7: 1.4: 1.2: 1.2: 1.0: 1.0: 1.0: 1.0: 1.0: 1.0: 2.3.

**MESOSOMA.** Pronotum 0.95 times as long as posterior width of pronotum (Fig. 17E); posterior width of pronotum 1.4 times as wide as anterior width and 0.80 times as wide as head width; dorsolateral surface of pronotum rounded (Fig. 17A); notauli of scutum straight, reaching posterior margin (Fig. 17F); scutellum polished (Fig. 17F); apico-lateral area of scutellum with longitudinal grooves (Fig. 17F); metanotum with two ridges; scrobal sulcus absent (Fig. 17A); metanotum 0.42 times as long as scutellum (Fig. 17F); propodeal angle weakly developed; propodeum without transverse carina above foramen.

**WINGS.** Forewing (Fig. 17G) with M curved; cu-a absent; A absent; R1 0.29 times as long as R; Rs 2.3 times as long as R.

**LEGS.** Tibiae smooth, without flanges; flange on forefemur 0.18 times longer, 0.60 times wider than tubular part of forefemur; flange on midfemur 0.16 times longer, 0.33 times wider than tubular part of midfemur; hindcoxa 2.3 times as long as hind trochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur simple; hindfemur basally not stout, as wide as distal part; ventral margin of hindfemur swollen; outer surface of hindfemur smooth; flange on hindfemur 0.20 times longer, 0.60 times wider than tubular part of hindfemur; tarsal claw of hindtibia with one tooth and not extending half of tarsal claw (Fig. 25L).

**PILOSITY.** Scape with sparse suberect cuneate and forked setae (Fig. 17B); pedicel with sparse suberect cuneate setae; gena and frontal projection with separate ribbon-like setae; dorsal surface of pronotum with sparse suberect and erect forked setae (Fig. 17E); dorso-frontal margin of pronotum with short ribbon-like setae; lateral surface of pronotum with sparse suberect and erect forked setae; propleuron with sparse suberect and erect forked setae; scutum with sparse suberect and erect forked setae (Fig. 17F); mesopleuron with sparse suberect and erect forked setae; tegula with sparse suberect and erect forked setae; scutellum with dense suberect forked setae; forecoxa with sparse decumbent simple and cuneate setae; foretrochanter with sparse suberect simple setae; midcoxa with sparse decumbent cuneate setae; midtrochanter with sparse suberect simple setae; hindcoxa with sparse decumbent cuneate setae; hindtrochanter with sparse decumbent cuneate setae.

**COLORATION.** Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

#### **Female**

Unknown.

#### **Distribution**

Vietnam (Central Vietnam) (Fig. 28).

#### **Remarks**

This species can be easily distinguished from other species by the shorter ribbon-like setae and forked setae, similar to another genus *Rhadinoscielidia*. We assigned this new species to *Loboscielidia* because it has the developed wing venation; however, other characteristics (e.g., long scape with dense erect or suberect setae; cervical expansion with shorter ribbon-like setae; pronotum with forked erect setae; and tibiae without flanges) are rather similar to those of *Rhadinoscielidia*.



*Loboscelidia parallela* sp. nov.

urn:lsid:zoobank.org:act:D512C463-0D4E-4D9F-98A2-3EC86F9D3141

Figs 2B, 18, 25M

**Etymology**

Named after the Latin '*parallela*', meaning 'parallel', referring to the parallel cervical expansion.

**Type material**

**Holotype**

VIETNAM • ♂; Bac Giang Province, Tay Yen Tu NR; 21°10'52.33" N, 106°43'24.3" E; 9 Jul. 2014; T. Mita leg.; VNMN.

**Paratype**

VIETNAM • 1 ♂; same collection data as for holotype; VNMN.

**Description**

**Male** (Fig. 18A)

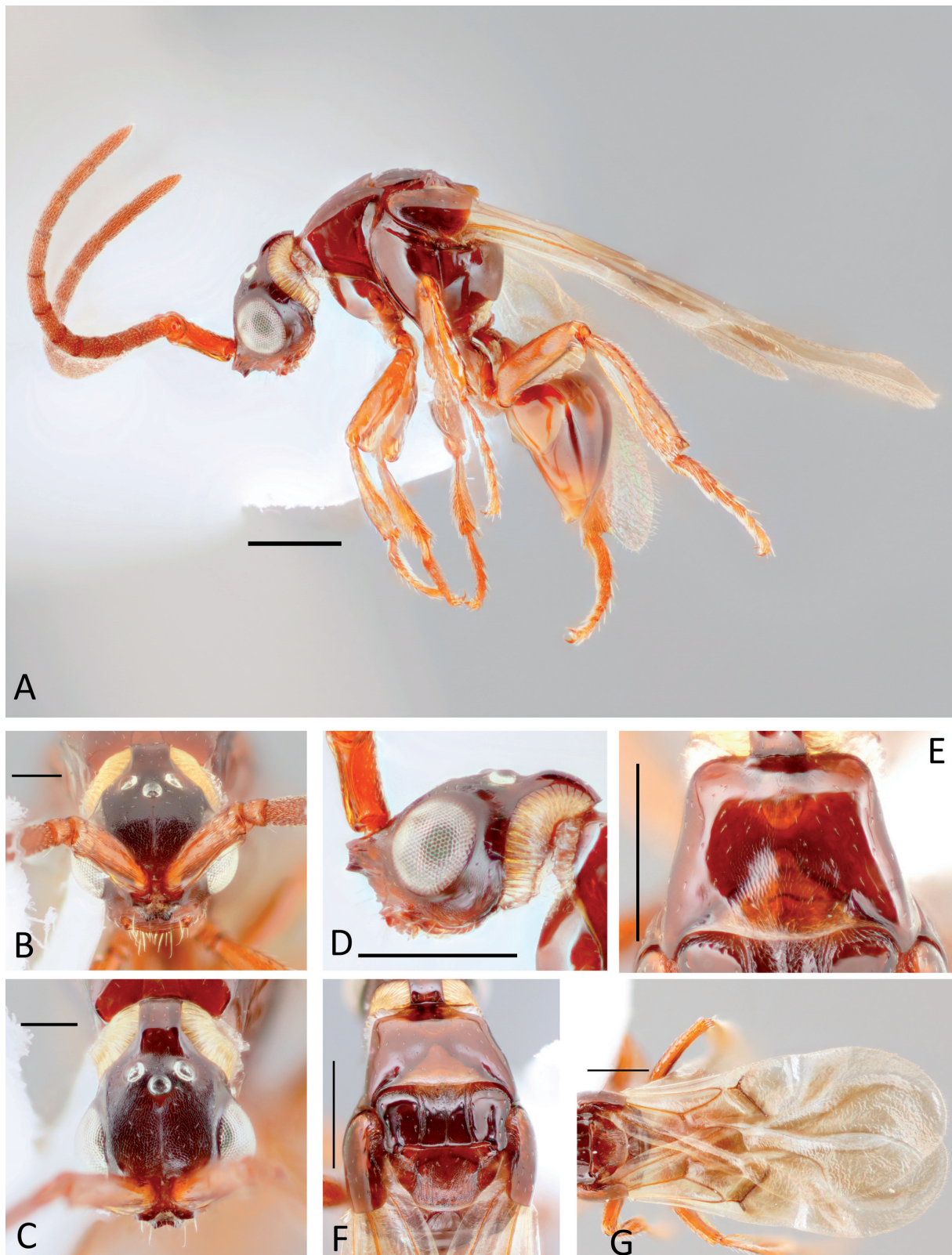
MEASUREMENTS. Body length 3.2 mm; forewing length 3.2 mm.

HEAD. Head (Fig. 18B–D) 1.9 times as long as high, 1.3 times as long as wide; inner ocular length 0.61 times as long as head width; frontal projection rectangular in frontal view (Fig. 18B); apical margin of frontal projection depressed (Fig. 18C); frons granulate, with microstriae (Fig. 18C); frons with low ridge extending from vertex along inner orbit of eye (Fig. 18C); spraclypeal area with transverse carinae (Fig. 18B); temple as long as MOD (Fig. 18C); POL 1.2 times as long as MOD; OOL 1.7 times as long as MOD; LOL 0.2 times as long as MOD; behind ocelli without transverse depression (Fig. 18C); cervical expansion flattened in lateral view (Fig. 18D); basal part of cervical expansion parallel in dorsal view (Fig. 18C); scape 3.1 times as long as wide; scape with longitudinal grooves; scape with transparent flange; F1 2.0 times as long as wide; F2 1.8 times as long as wide; F11 3.3 times as long as wide; relative length of F1–F11: 1.2: 1.0: 1.1: 1.0: 1.0: 0.9: 1.1: 1.1: 1.1: 1.0: 1.5.

MESOSOMA. Pronotum 0.78 times as long as posterior width of pronotum (Fig. 18E); posterior width of pronotum 1.4 times as wide as anterior width and 1.1 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 18A); notauli of scutum slightly curved, reaching posterior margin (Fig. 18F); scutellum polished, with lateral carina (Fig. 18F); apico-lateral area of scutellum with longitudinal grooves (Fig. 18F); metanotum with two ridges (Fig. 18F); scrobal sulcus present, weakly depressed (Fig. 18A); metanotum 0.51 times as long as scutellum (Fig. 18F); propodeal angle weakly developed; upper area of propodeum without transverse carina; propodeum without transverse carina above foramen.

WINGS. Forewing (Fig. 18G) with M curved; cu-a 0.50 times as long as R; A extending half of Cu+M; R1 0.83 times as long as R; Rs 3.2 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.49 times longer, 0.85 times wider than tubular part of forefemur; flange on foretibia 0.35 times longer, 0.50 times wider than tubular part of foretibia; flange on midfemur 0.53 times longer, 0.85 times wider than tubular part of midfemur; flange on midtibia 0.59 times longer, 0.29 times wider than tubular part of midtibia; hindcoxa dorso-laterally carinate; basal part of hindfemur producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; flange on hindfemur 0.61 times longer, 0.80 times wider than tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia 0.68 times longer, 1.2 times wider than tubular part of hindtibia.



**Fig. 18.** *Loboscelidia parallela* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, frontal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. **G.** Forewing. Scale bars: A, E–G = 0.5 mm; B–D = 0.2 mm.

**PILOSITY.** Lower gena with sparse decumbent cuneate setae (Fig. 18D); scape with sparse decumbent and suberect simple setae; forecoxa with sparse decumbent cuneate setae; foretibia with sparse decumbent and suberect simple and cuneate setae; midcoxa with sparse decumbent cuneate setae; midfemur and midtibia with sparse decumbent and suberect simple and cuneate setae; hindcoxa with sparse decumbent cuneate setae; hindfemur and hindtibia with sparse decumbent and suberect simple and cuneate setae.

**COLORATION.** Body reddish brown; antenna reddish brown; legs yellowish brown; ribbon-like setae whitish yellow.

#### **Female**

Unknown.

#### **Distribution**

Vietnam (Northern Vietnam) (Fig. 28).

#### **Remarks**

*Loboscelidia parallela* sp. nov. resembles *L. cuneata* sp. nov. and *L. halimunensis*; however, it can be distinguished by the following characteristics: femora with simple setae (with cuneate setae in *L. cuneata* sp. nov.); flange of forefemur 0.85 times as wide as the tubular part (0.25 times as wide as the tubular part in *L. cuneata* sp. nov.); flange of foretibia 0.50 times as wide as the tubular part (1.5 times as wide as the tubular part in *L. cuneata* sp. nov.); and curved M vein (straight in *L. halimunensis*).

#### ***Loboscelidia pecki* Kimsey, 2012**

Fig. 19

*Loboscelidia pecki* Kimsey, 2012: 31. Holotype ♂; Vietnam: Tuyen Quang Province, Na Hang Nature Reserve (CNC).

#### **Remarks**

*Loboscelidia pecki* resembles *L. cinnamonea* and *L. vietnamensis* sp. nov. However, *L. pecki* can be distinguished by the following characteristics: scape 3.0 times or less as long as wide (3.9 times as long as wide in *L. cinnamonea*); scrobal sulcus present (absent in *L. cinnamonea*); and Rs at least 3.0 times as long as the R (twice as long as R in *L. cinnamonea*) (Kimsey 2012). *L. pecki* shares with *L. vietnamensis* sp. nov. the combination of the following characteristics: rectangular frontal projection; scape less than 3.0 times as long as wide; and Rs 3.2 times as long as R. However, *L. pecki* can be distinguished by the following characteristics: F11 4.0 times as long as wide (nealy 3.0 times as long as wide in *L. vietnamensis* sp. nov.); pronotum 0.9 times as long as posterior width (0.80 times as long as posterior width in *L. vietnamensis* sp. nov.); hindcoxa without lateral carina (with the lateral carina in *L. vietnamensis* sp. nov.); hindtibial flange 1.3 times as long as the tubular part (twice as long as the tubular part in *L. vietnamensis* sp. nov.); and lacking cu-a (present in *L. vietnamensis* sp. nov.).

#### **Distribution**

Vietnam (Northern Vietnam).

#### ***Loboscelidia piriformis* sp. nov.**

urn:lsid:zoobank.org:act:BFF0E445-90C3-4CFB-B3FE-5C6E866795DC

Figs 20, 25N

#### **Etymology**

Named after the Latin ‘*piri*’, meaning ‘pear’, and ‘*formis*’, meaning ‘shape’, referring to the head shape.





**Fig. 19.** *Loboscelidia pecki* Kimsey, 2012, holotype, ♂ (CNC). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, lateral view. **D.** Pronotum. **E.** Forewing. Not to scale.

**Type material****Holotype**

VIETNAM • ♀; Thua Thien Hue Province, Bach Ma NP, 19 km point; 16.198° N, 107.860° E; 3–6 Aug. 2016; T. Mita and Y. Komeda leg.; YPT; VNMN.

**Description****Female** (Fig. 20A)

MEASUREMENTS. Body length 4.2 mm; forewing length 3.6 mm.

HEAD. Head (Fig. 20B–D) 1.9 times as long as high, 1.4 times as long as wide; inner ocular length 0.66 times as long as head width; frontal projection rectangular in frontal view (Fig. 20B); apical margin of frontal projection depressed (Fig. 20B); frons rugose, with low ridge extending from vertex along inner orbit of eye (Fig. 20C); frons with distinct carinae towards posterior ocelli (Fig. 20C); spraclypeal area with transverse carinae (Fig. 20B); temple 2.8 times as long as MOD (Fig. 20C); POL 1.1 times as long as MOD; OOL 2.0 times as long as MOD; LOL 0.43 times as long as MOD; behind ocelli without transverse depression (Fig. 20C); cervical expansion flattened in lateral view (Fig. 20D); basal part of cervical expansion constricted strongly in dorsal view (Fig. 20C); scape 3.0 times as long as wide; scape with longitudinal grooves; scape with transparent flange, as long as tubular part of scape, 0.36 times as wide as tubular part of scape; F1 1.2 times as long as wide; F2 as long as wide; F11 as long as wide; relative length of F1–F11: 2.3: 1.5: 1.1: 1.1: 1.1: 1.1: 1.0: 1.0: 1.0: 1.0: 1.8.

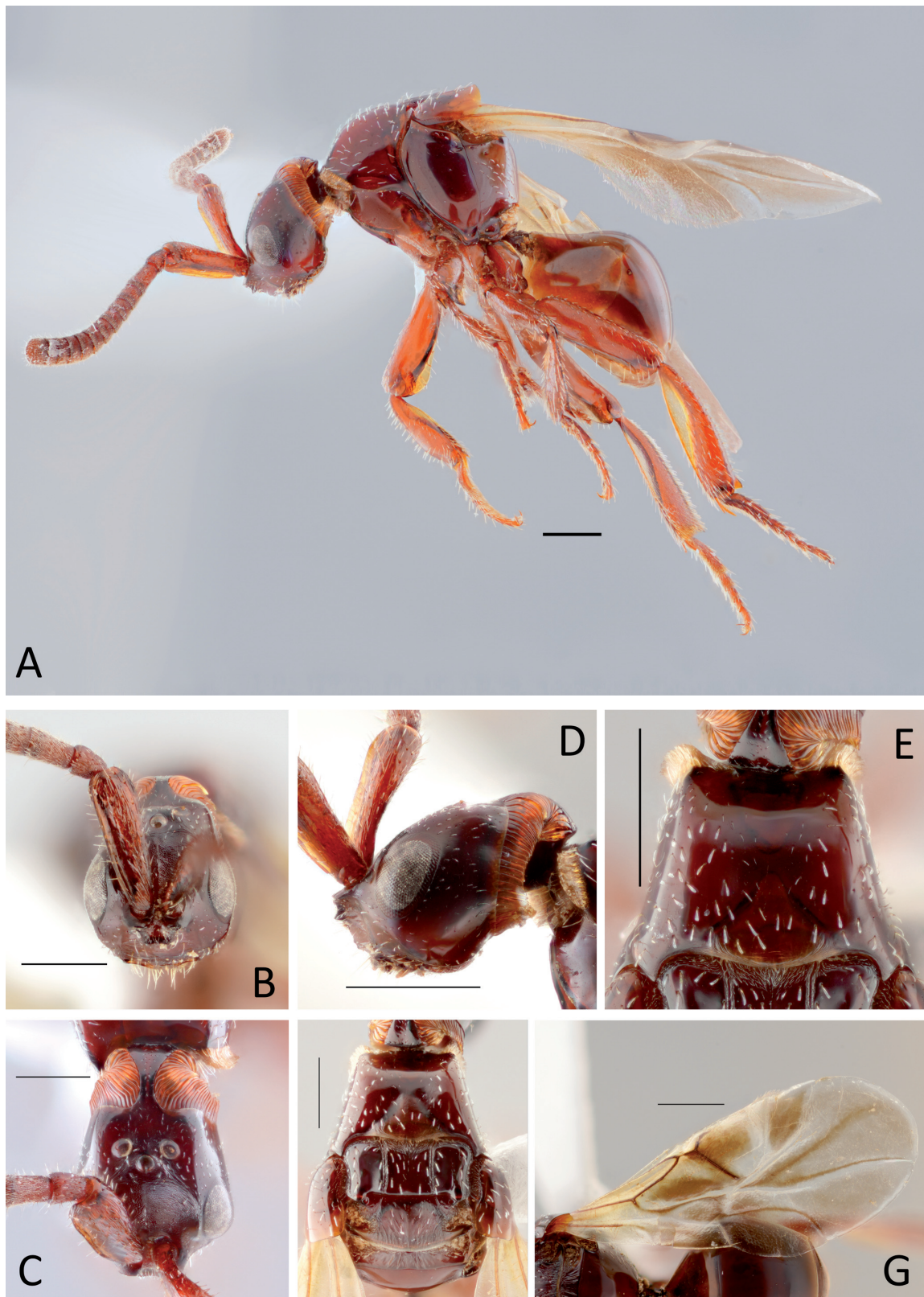
MESOSOMA. Pronotum 0.80 times as long as posterior width of pronotum (Fig. 20E); posterior width of pronotum 1.7 times as wide as anterior width and 1.2 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 20A); notauli of scutum slightly curved, reaching posterior margin (Fig. 20F); scutellum polished and punctured (Fig. 20F); apico-lateral area of scutellum without longitudinal grooves (Fig. 20F); scrobal sulcus absent (Fig. 20A); metanotum with four ridges, 0.44 times as long as scutellum; (Fig. 20F); propodeal angle weakly developed; propodeum without transverse carina above foramen.

WINGS. Forewing (Fig. 20G) with M curved; cu-a 0.20 times as long as R; A extending half of Cu+M; R1 0.50 times as long as R; Rs 2.8 times as long as R.

LEGS. Posterior portion of tibiae longitudinally carinate; flange on forefemur 0.47 times longer, 1.2 times wider than tubular part of forefemur; flange on foretibia 0.55 times longer, 0.57 times wider than tubular part of foretibia; flange on midfemur 0.51 times longer, 0.89 times wider than tubular part of midfemur; flange on midtibia 0.55 times longer, 1.2 times wider than tubular part of midtibia; hind coxa 1.5 times as long as hind trochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur smooth; flange on hindfemur 0.55 times longer, 0.75 tubular part of hindfemur; flange on hindtibia 0.82 times longer, 1.4 times wider than tubular part of hindtibia; hind tarsal claw without median tooth (Fig. 25N).

PILOSITY. Frons with sparse decumbent cuneate setae (Fig. 20C); spraclypeal area with sparse decumbent and simple and cuneate setae (Fig. 20B); eye with sparse erect simple setae (Fig. 20B); lower gena with sparse decumbent and simple and cuneate setae cervical expansion with sparse decumbent cuneate setae (Fig. 20D); hypostoma with sparse decumbent cuneate setae; scape with sparse suberect and erect simple setae; pedicel with sparse suberect and erect simple setae; F1 with sparse suberect and erect simple setae; dorsal part of pronotum with sparse suberect and erect cuneate setae; lateral surface of pronotum with sparse suberect and erect cuneate setae (Fig. 20A); scutum with sparse decumbent and suberect cuneate setae (Fig. 20F); mesopleuron with sparse decumbent cuneate setae (Fig. 20A); tegula





**Fig. 20.** *Loboscelidia piriformis* sp. nov., holotype, ♀ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. **G.** Forewing. Scale bars = 0.5 mm.



with sparse suberect and erect cuneate setae (Fig. 20F); scutellum with sparse decumbent and suberect cuneate setae (Fig. 20F); lateral surface of propodeum with sparse decumbent cuneate setae (Fig. 20A); forecoxa and foretrochanter with sparse decumbent and simple and cuneate setae; foretibia with dense suberect simple setae; midcoxa and midtrochanter with sparse decumbent simple and cuneate setae; midfemur with sparse decumbent and suberect simple and cuneate setae; midtibia with dense suberect simple setae; hindcoxa and hindtrochanter with sparse decumbent simple and cuneate setae; hindfemur with sparse decumbent and suberect simple and cuneate setae; hindtibia with dense suberect simple setae; lateral margin of T4 with sparse decumbent simple and cuneate setae.

**COLORATION.** Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

#### **Male**

Unknown.

#### **Distribution**

Vietnam (Central Vietnam) (Fig. 29).

#### **Remarks**

This new species can easily distinguished from other species by the pear-shaped head in the dorsal view (diamond- or kite-shaped in other species).

*Loboscelidia reducta* Maa & Yoshimoto, 1961

Fig. 21

*Loboscelidia reducta* Maa & Yoshimoto, 1961: 537. Holotype ♂; Viet Nam: Dai Lanh, n Nha Trang (BPBM).

#### **Material examined**

##### **Paratype**

VIETNAM • 1 ♂; Dai Lanh, N of Nha Trang; 30 Nov.–5 Dec. 1960; C.M. Yoshimoto leg.; USNM.

##### **Non-type**

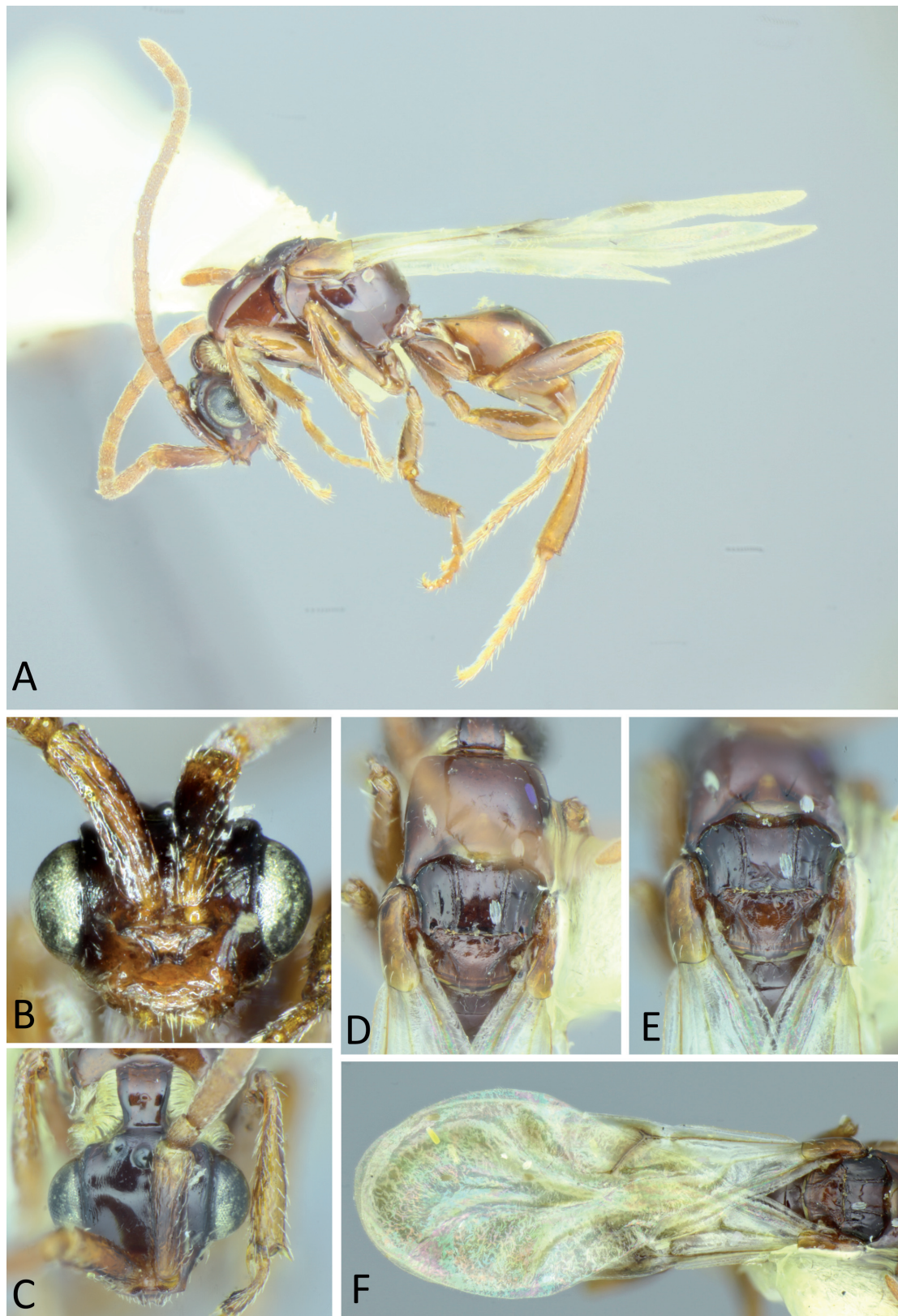
THAILAND • 1 ♂; Bangkok, Khao Yai NP, Moist Semi Evergreen Forest; alt. 780 m; 18–24 Apr. 1990; B.V. Brown leg.; MT; CNC.

#### **Remarks**

*Loboscelidia reducta* resembles *L. incompleta* Kimsey, 2012, *L. bakeri*, *L. fulgens* and *L. ganxingensis* in having the following characteristics: rectangular frontal projection, complete notauli; absent or reduced cu-a vein; and absent M vein. It also shares with *L. mediata* sp. nov. the following characteristics: frons polished and tibial flanges absent. However, *L. reducta* can be distinguished by the following characteristics: frons polished (microstriate in *L. bakeri*); behind ocelli with transverse depression (without transverse depression in *L. bakeri*); and tibial flanges absent (present in other species) (Kimsey 2012).

#### **Distribution**

Thailand; Vietnam (Central Vietnam).



**Fig. 21.** *Loboscelidia reducta* Maa & Yoshimoto, 1961, paratype, ♂ (USNM). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, frontal view. **D.** Pronotum, dorsal view. **E.** Mesosoma, dorsal view. **F.** Forewing. Not to scale.

*Loboscelidia squamosa* sp. nov.

urn:lsid:zoobank.org:act:748BCA32-71CC-4F1E-B37E-65254E040FBE

Figs 22, 25O, 29–30

**Etymology**

Named after the Latin ‘*squamosa*’, meaning ‘a scale’, referring to the scale-like setae on the body.

**Type material**

**Holotype**

VIETNAM • ♀; Thua Thien Hue Province, Bach Ma NP, 19 km point; 16.198° N, 107.860° E; 3–6 Jul. 2016; T. Mita and Y. Komeda leg.; YPT; VNMN.

**Paratypes**

VIETNAM • 1 ♀; Ninh Binh Province, Cuc Phuong National Park; 27 Aug. 2019; Y. Hisasue leg.; VNMN • 1 ♀; same locality as for preceding; 21 Aug. 2019; Y. Hisasue *et al.* leg.; FIT; VNMN.

**Description**

**Female** (Fig. 22A)

MEASUREMENTS. Body length 4.7 mm; forewing length 4.2 mm.

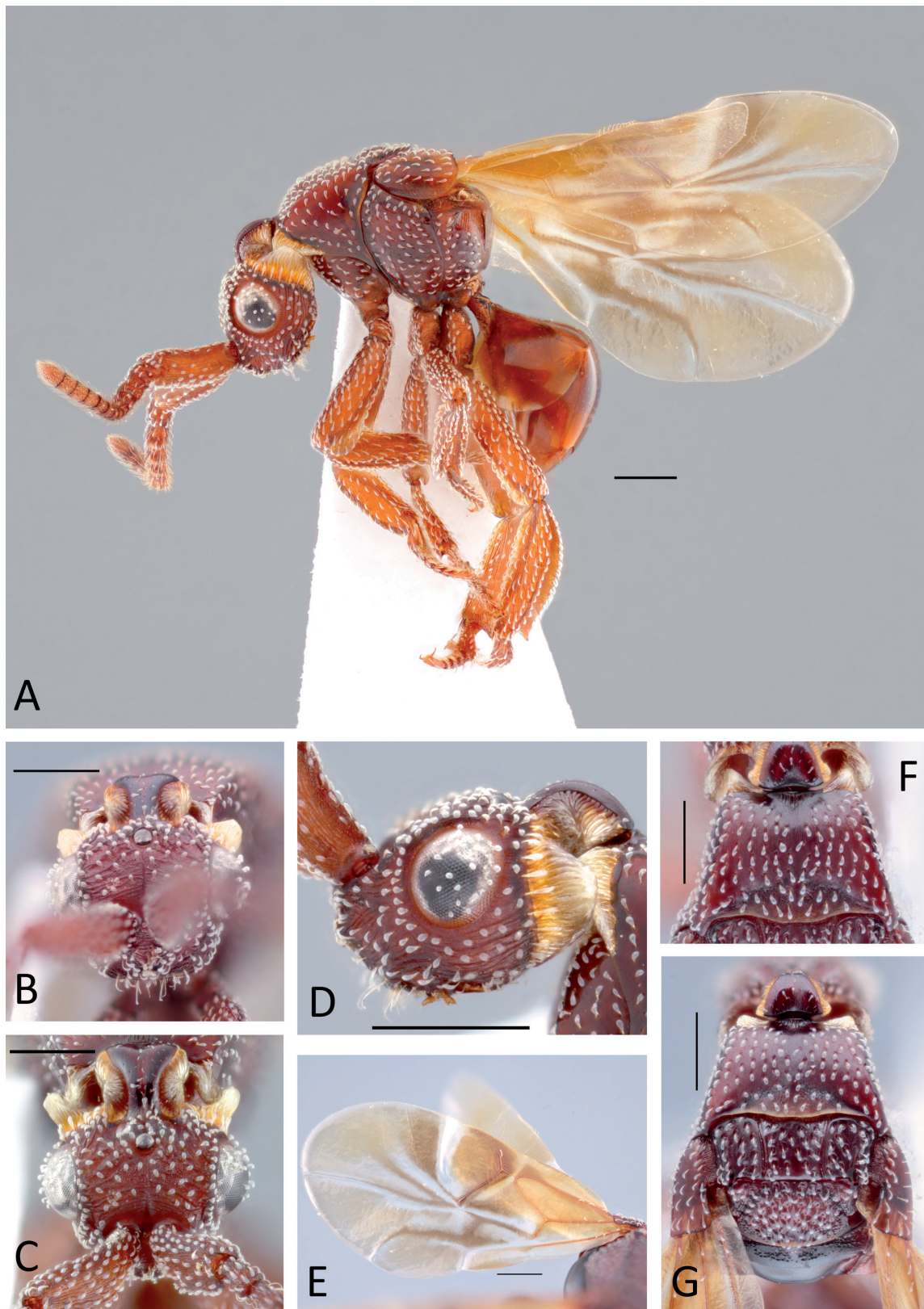
HEAD. Head (Fig. 22B–D) 1.7 times as long as high, 1.1 times as long as wide; inner ocular length 0.67 times as long as head width; frontal projection rectangular in frontal view (Fig. 22C); frons rugose, with transverse grooves (Fig. 22C); frons with low ridge extending from vertex along inner orbit of eye (Fig. 22C); spraclypeal area with transverse carinae (Fig. 22B); temple 0.67 times as long as MOD (Fig. 22C); POL 1.6 times as long as MOD; OOL 2.8 times as long as MOD; LOL 0.60 times as long as MOD; behind ocelli with transverse depression (Fig. 22C); cervical expansion convex in lateral view (Fig. 22D), with longitudinal grooves; basal part of cervical expansion constricted weakly in dorsal view (Fig. 22C); scape 3.2 times as long as wide; scape with longitudinal grooves; scape with transparent flange, 0.29 times as long as tubular part of scape, 0.67 times as wide as tubular part of scape; F1 1.4 times as long as wide; F2 1.1 times as long as wide; F11 1.1 times as long as wide; relative length of F1–F11: 2.0: 1.5: 1.3: 1.2: 1.1: 1.0: 1.0: 1.0: 0.8: 0.8: 1.1.

MESOSOMA. Pronotum 0.70 times as long as posterior width of pronotum (Fig. 22F); posterior width of pronotum 1.6 times as wide as anterior width and 1.1 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 22A); notauli of scutum slightly curved, reaching posterior margin (Fig. 22G); scutellum polished and punctured and rugose (Fig. 22G); apico-lateral area of scutellum punctured, without longitudinal carina (Fig. 22G); metanotum punctured, without ridge (Fig. 22G); scrobal sulcus present, weakly depressed (Fig. 22A); metanotum 0.39 times as long as scutellum (Fig. 22G); propodeal angle strongly developed; propodeum without transverse carina above foramen.

WINGS. Forewing (Fig. 22E) with M curved; cu-a 1.3 times as long as R; A extending Cu+M; R1 0.90 times as long as R; Rs 3.3 times as long as R.

LEGS. Femora and tibiae longitudinally carinate (Fig. 22A); tibiae without transparent flanges but transformed flattened toward ventral margin; flange on forefemur 0.61 times longer, as wide as tubular part of forefemur; flange on midfemur 0.67 times longer, 1.7 times wider than tubular part of midfemur; hind coxa 1.8 times as long as hind trochanter; hind coxa dorso-laterally carinate; basal part of hindfemur producing, strongly producing, simple; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur smooth; flange on hindfemur 0.49 times longer,





**Fig. 22.** *Loboscelidia squamosa* sp. nov., holotype, ♀ (VNMN). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, frontal view. **D.** Head, lateral view. **E.** Forewing. **F.** Pronotum, dorsal view. **G.** Mesosoma, dorsal view. Scale bars = 0.5 mm.

0.92 times wider than tubular part of hindfemur; hind tarsal claw with one median tooth, not reaching to tarsal claw (Fig. 25O).

**PILOSITY.** Frons with dense decumbent scale-like setae (Fig. 22B); spraclypeal area with dense decumbent scale-like setae (Fig. 22B); eye with dense decumbent scale-like setae (Fig. 22B); temple with dense decumbent cuneate and scale-like setae (Fig. 22D); lower gena with dense decumbent scale-like setae (Fig. 22D); cervical expansion with dense decumbent scale-like setae (Fig. 22C); hypostoma with dense decumbent cuneate and scale-like setae; scape with dense decumbent cuneate setae; pedicel with dense decumbent cuneate setae; F1 with dense decumbent cuneate setae (Fig. 22A–B); dorsal surface of pronotum with dense decumbent cuneate setae (Fig. 22F); lateral surface of pronotum with dense decumbent cuneate setae (Fig. 22A); propleuron with dense decumbent cuneate setae (Fig. 22A); scutum with dense decumbent cuneate setae (Fig. 22F); mesopleuron with dense decumbent cuneate setae (Fig. 22A); tegula with dense decumbent cuneate setae (Fig. 22G); scutellum with dense decumbent cuneate setae (Fig. 22G); lateral surface of propodeum with dense decumbent cuneate setae (Fig. 22A); legs with dense decumbent scale-like setae (Fig. 22A); lateral margin of T4 with sparse decumbent cuneate and scale-like setae.

**COLORATION.** Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

#### **Male**

Unknown.

#### **Distribution**

Vietnam (Northern Vietnam, Central Vietnam) (Fig. 29).

#### **Host**

*Oxyartes* sp. (Lonchodidae: Necrosiinae) based on the foraging behavior of a female.

#### **Remarks**

This new species can be easily distinguished from any other species by the dense scale-like setae on the body. A paratype female (Cuc Phuong, 21 August 2019) was collected by FIT at night (9 p.m.). The female attacks the eggs of *Oxyartes* sp. and buries them in the soil. Details of the foraging behavior are provided in the discussion.

#### ***Loboscelidia vang* sp. nov.**

urn:lsid:zoobank.org:act:7FEE8B5C-8DED-4602-9418-E60F91693BC3

Figs 23, 25P

#### **Etymology**

The specific name is derived from the Vietnamese word ‘vàng’ meaning ‘yellow’, referring to the yellowish body color.

#### **Type material**

##### **Holotype**

VIETNAM • ♂; Bac Giang Province, Tay Yen Tu NR; 21°10'52.33" N, 106°43'24.3" E; 8 Jul. 2014; K. Tsujii leg.; VNMN.

##### **Paratype**

VIETNAM • 1 ♂; same collection data as for holotype but 9 Jul. 2014; T. Mita leg.; VNMN.

## **Description**

### **Male** (Fig. 23A)

MEASUREMENTS. Body length 3.1 mm; forewing length 3.2 mm.

HEAD. Head (Fig. 23B–D) 1.8 times as long as high, as long as wide; inner ocular length 0.61 times as long as head width; frontal projection triangular in frontal view (Fig. 23B); apical margin of frontal projection depressed (Fig. 23C); frons polished and unpunctured; frons with low ridge extending from vertex along inner orbit of eye (Fig. 23C); frons with distinct carinae towards median ocellus (Fig. 23C); frons with indistinct frontal line (Fig. 23C); spraclypeal area with transverse carinae (Fig. 23B); temple 1.6 times as long as MOD (Fig. 23C); POL 1.4 times as long as MOD; OOL 0.96 times as long as MOD; LOL 0.40 times as long as MOD; behind ocelli with transverse depression (Fig. 23C); cervical expansion strongly convex in lateral view (Fig. 23D); basal part of cervical expansion strongly constricted in dorsal view (Fig. 23C); scape 3.8 times as long as wide; scape with longitudinal grooves; scape with transparent flange; F1 1.8 times as long as wide; F2 1.7 times as long as wide; F11 3.5 times as long as wide; relative length of F1–F11: 1.0: 1.2: 1.1: 1.1: 1.1: 1.1: 1.1: 1.2: 1.2: 1.2: 1.7.

MESOSOMA. Pronotum 0.81 times as long as posterior width of pronotum (Fig. 23F); posterior width of pronotum 1.5 times as wide as anterior width and as wide as head width; dorsolateral surface of pronotum carinate (Fig. 23A); notauli of scutum parallel, reaching posterior margin (Fig. 23G); scutellum polished and punctured (Fig. 23G); apico-lateral area of scutellum without longitudinal grooves (Fig. 23G); metanotum with medial ridge (Fig. 23G); scrobal sulcus present, strongly depressed (Fig. 23A); metanotum 0.52 times as long as scutellum (Fig. 23G); propodeal angle weakly developed; propodeum without transverse carina above foramen.

WINGS. Forewing (Fig. 23E) with M straight; cu-a absent; A extending Cu+M; R1 0.44 times as long as R; Rs 1.9 times as long as R.

LEGS. Tibiae carinate; flange on forefemur 0.53 times longer, 0.85 times wider than tubular part of forefemur; flange on foretibia 0.40 times longer, 0.43 times wider than tubular part of foretibia; flange on midfemur 0.49 times longer, as wide as tubular part of midfemur; flange on midtibia 0.72 times longer, 0.25 times wider than tubular part of midtibia; hindcoxa 2.2 times as long as hind trochanter; hindcoxa dorso-laterally carinate; basal part of hindfemur strongly producing; hindfemur basally stout, apparently wider than distal part; ventral margin of hindfemur flat; outer surface of hindfemur smooth; flange on hindfemur 0.43 times longer, 0.83 times wider than tubular part of hindfemur; flange on hindtibia 0.57 times longer, 0.55 times wider than tubular part of hindtibia; hind tarsal claw with one median tooth, reaching tarsal claw (Fig. 25).

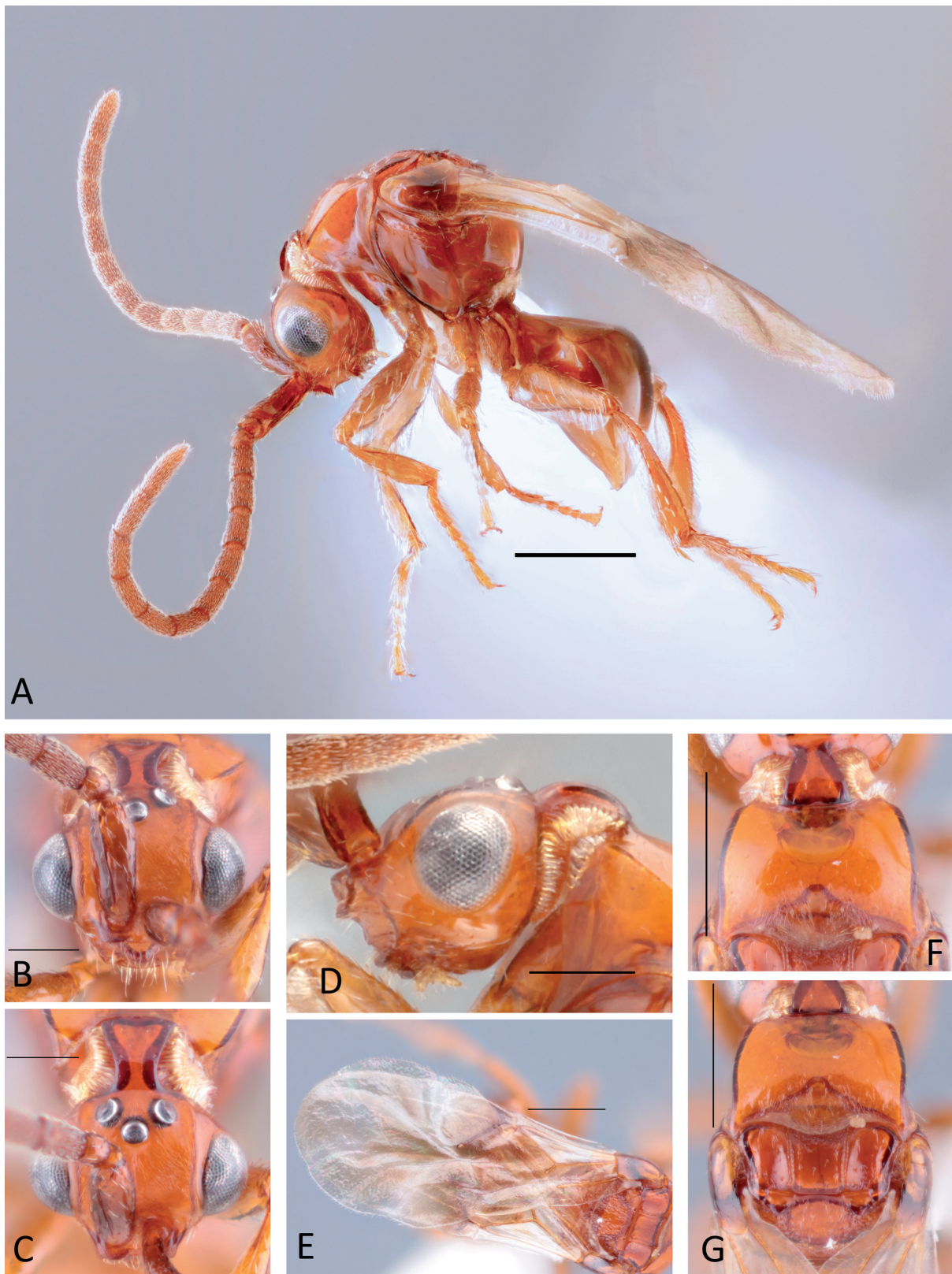
PILOSITY. Lower gena with sparse suberect simple setae (Fig. 23D); cervical expansion without setae (Fig. 23C); scape with sparse suberect simple setae; pedicel with sparse suberect simple setae; lateral surface of pronotum with sparse suberect simple setae (Fig. 23A); forecoxa and foretrochanter with sparse suberect simple setae; foretrochanter with sparse suberect simple setae; midcoxa and midtrochanter with sparse suberect simple setae; midfemur and midtibia with sparse decumbent and suberect simple and cuneate setae; hindcoxa with sparse decumbent simple setae; hindtrochanter with sparse suberect simple setae; hindfemur and hindtibia with sparse decumbent and suberect simple and cuneate setae.

COLORATION. Body yellowish brown; antenna yellowish brown; legs yellowish brown; flanges yellowish brown; ribbon-like setae whitish yellow.

### **Female**

Unknown.





**Fig. 23.** *Loboscelidia vang* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, frontal view. **C.** Head, dorsal view. **D.** Head, lateral view. **E.** Forewing. **F.** Pronotum, dorsal view. **G.** Mesosoma, dorsal view. Scale bars: A, E–G = 0.5 mm; B–D = 0.2 mm.

### Distribution

Vietnam (Northern Vietnam) (Fig. 29).

### Remarks

*Loboscelidia vang* sp. nov. resembles *L. collaris* Fouts, 1922 in having the following characteristics: yellowish brown body color; basal part of cervical expansion strongly constricted in dorsal view; and carinated dorso-lateral surface of pronotum. However, it can be distinguished by the following characteristics: rectangular frontal projection (triangular in *L. collaris*); scape more than 3.5 times as long as wide (less than 3.0 times as long as wide in *L. collaris*); F1 and F2 less than twice as long as wide (more than twice as long as wide in *L. collaris*); temple longer than MOD (shorter than MOD in *L. collaris*); and straight M vein (curved in *L. collaris*).

### *Loboscelidia vietnamensis* sp. nov.

urn:lsid:zoobank.org:act:B71E7738-E5FB-4D91-9643-EF4752F3472A

Figs 2A, 24, 25Q

### Etymology

The specific named after the type country, ‘Vietnam’.

### Type material

#### Holotype

VIETNAM • ♂; Thua Thien Hue Province, Bach Ma NP, 19 km point; 16.198° N, 107.860° E; 3–6 Aug. 2016; T. Mita and Y. Komeda leg.; YPT; VNMN.

#### Paratype

VIETNAM • 1 ♂; Ninh Binh Province, Cuc Phuong NP; Y. Komeda leg.; VNMN.

### Description

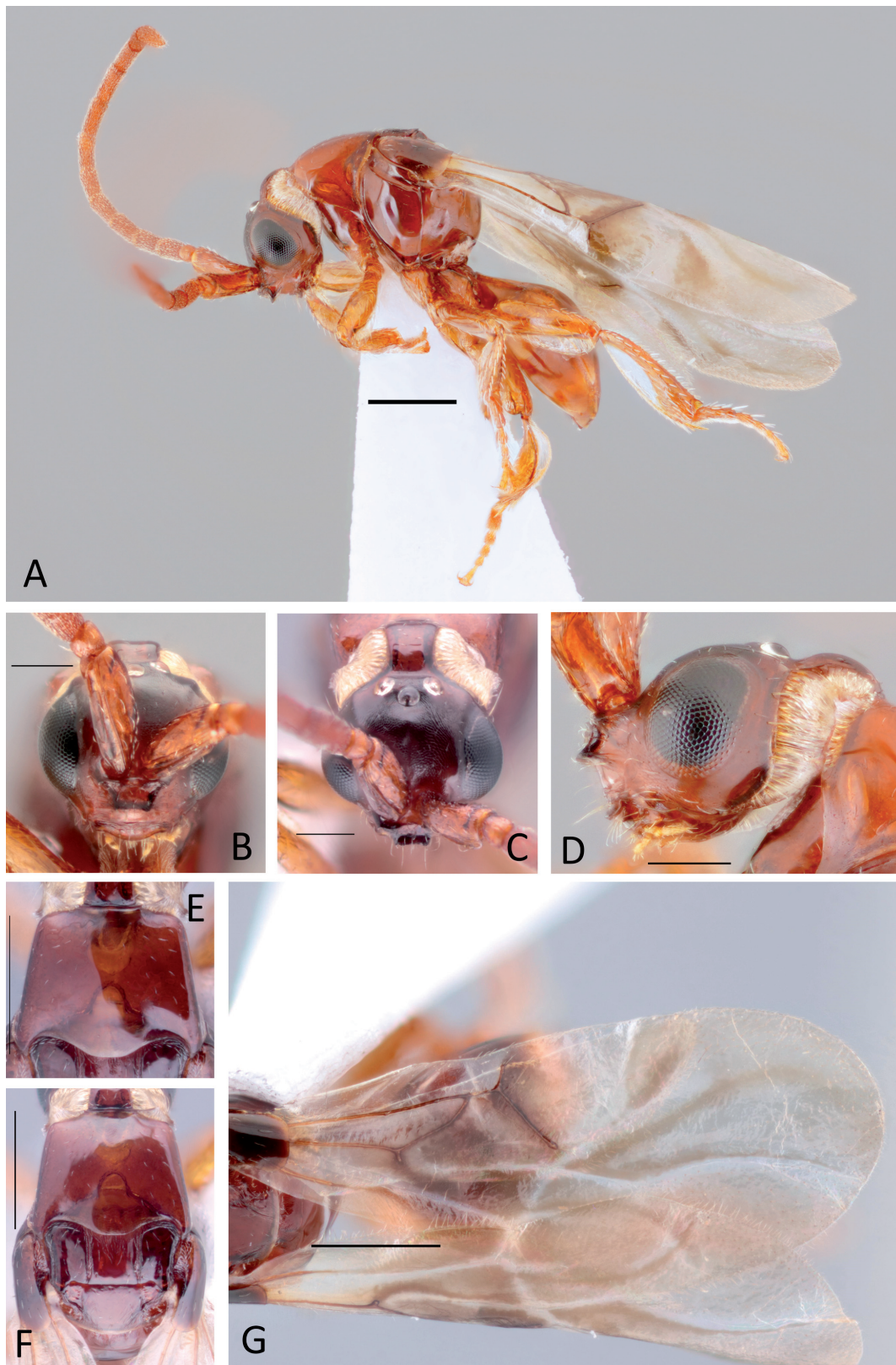
#### Male (Fig. 24A)

MEASUREMENTS. Body length 3.05 mm; forewing length 2.8 mm.

HEAD. Head (Fig. 24B–D) 1.8 times as long as high; 1.2–1.3 times as long as wide; inner ocular length 0.59 times as long as head width; frontal projection rectangular in frontal view (Fig. 24B); apical margin of frontal projection depressed; lower part of frontal projection longer than upper part (Fig. 24D); frons granulate, finely microstriate (Fig. 24C); frons with low ridge extending from median ocellus along inner orbit of eye (Fig. 24C); spraclypeal area with transverse carinae (Fig. 24B); temple 0.24–0.30 times as long as MOD (Fig. 24C); POL 1.2–1.3 times as long as MOD; OOL 1.3–1.7 times as long as MOD; LOL 0.33–0.38 times as long as MOD; behind ocelli without transverse depression (Fig. 24C); cervical expansion convex in lateral view (Fig. 24D); basal part of cervical expansion constricted weakly in dorsal view (Fig. 24C); scape polished, 2.5 times as long as wide; scape without longitudinal grooves (Fig. 24B); F1 1.8–2.0 times as long as wide; F2 2.0 times as long as wide; F11 3.2–3.3 times as long as wide; relative length of F1–F11: 1.0: 1.0: 1.0: 1.1: 1.1: 1.1: 1.1: 1.1: 1.0: 1.6.

MESOSOMA. Pronotum 0.76 times as long as posterior width of pronotum (Fig. 24E); posterior width of pronotum 1.4–1.6 times as wide as anterior width and 1.1–1.2 times as wide as head width; dorsolateral surface of pronotum carinate (Fig. 24A); notauli of scutum parallel, not reaching posterior margin (Fig. 24F); scutellum polished, with lateral carina (Fig. 24F); scrobal sulcus present, strongly depressed; metanotum with medial low ridge; metanotum 0.42–0.50 times as long as scutellum (Fig. 24F); propodeal angle weakly developed; propodeum without transverse carina above foramen.

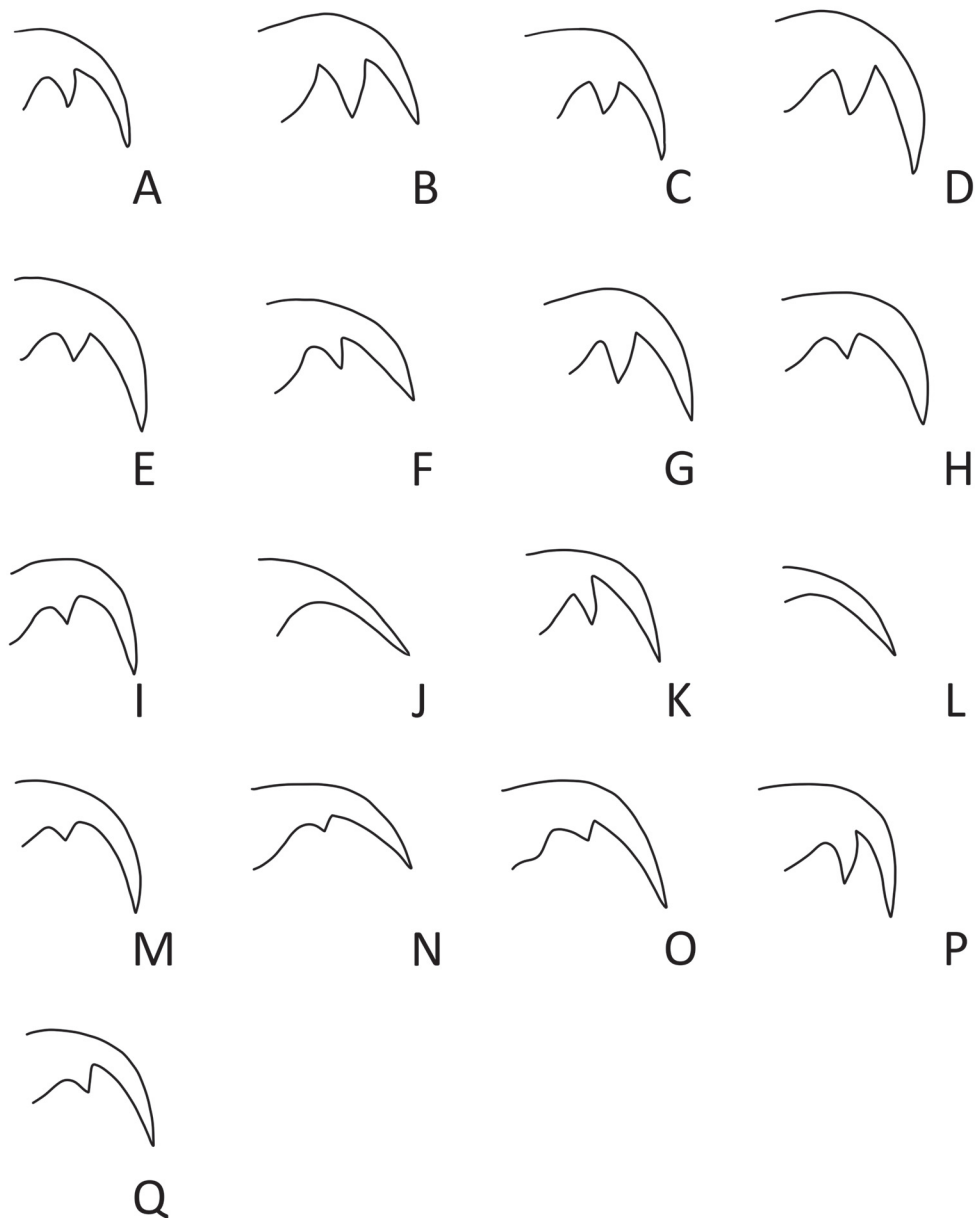




**Fig. 24.** *Loboscelidia vietnamensis* sp. nov., holotype, ♂ (VNMN). **A.** Lateral habitus. **B.** Head, dorsal view. **C.** Head, frontal view. **D.** Head, lateral view. **E.** Pronotum, dorsal view. **F.** Mesosoma, dorsal view. **G.** Forewing. Scale bars: A, E–G = 0.5 mm; B–D = 0.2 mm.

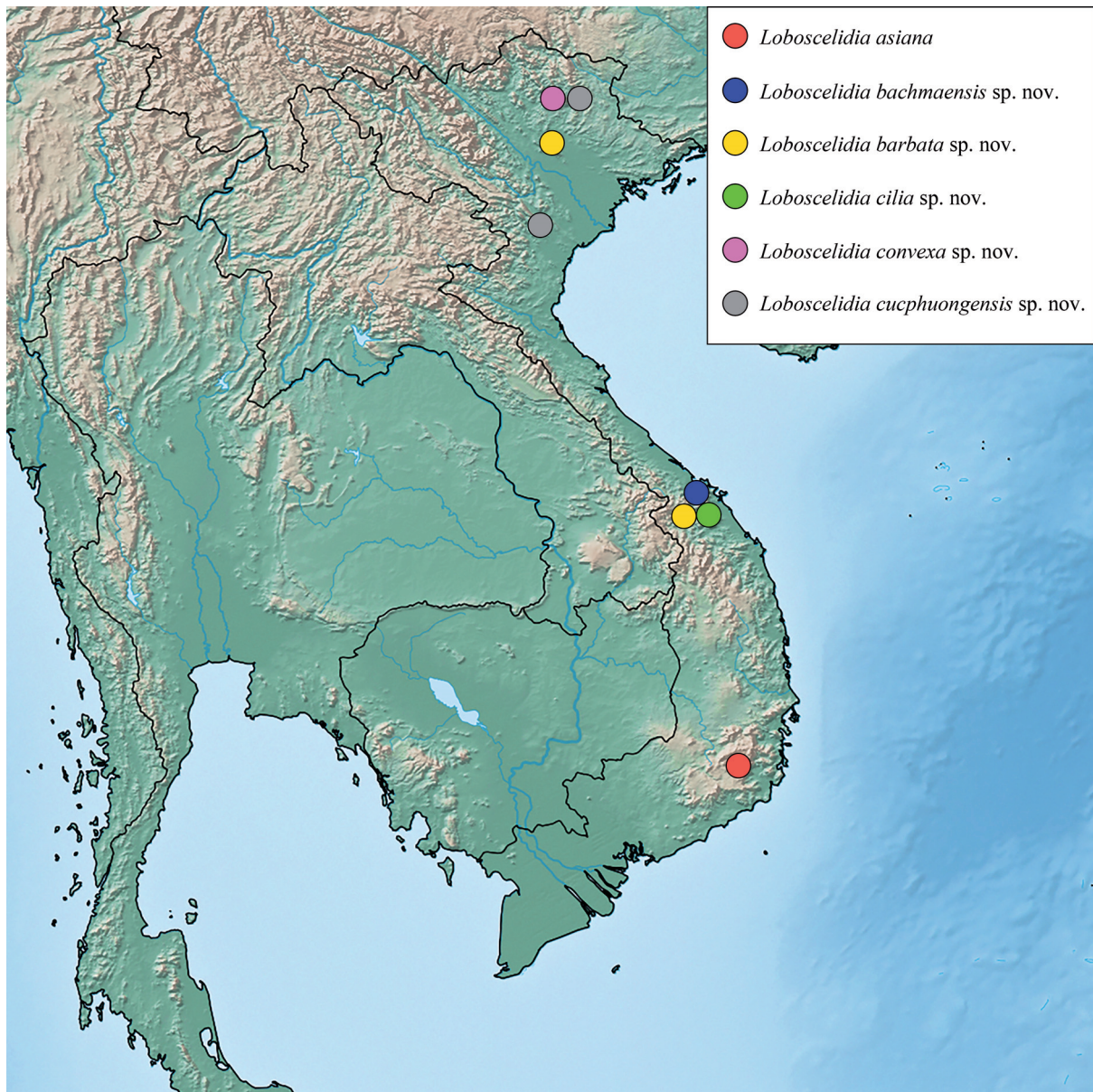


WINGS. Forewing (Fig. 24G) with M curved; cu-a 0.33–0.60 times as long as R; A extending half of Cu+M; R1 0.83–0.90 times as long as R; Rs 3.0–3.2 times as long as R.



**Fig. 25.** Hind tarsal claw of *Loboscelidia* Westwood, 1874. **A.** *L. bachmaensis* sp. nov. **B.** *L. barbata* sp. nov. **C.** *L. cilia* sp. nov. **D.** *L. convexa* sp. nov. **E.** *L. cucphuongensis* sp. nov. **F.** *L. cuneata* sp. nov. **G.** *L. do* sp. nov. **H.** *L. flavipes* sp. nov. **I.** *L. fulgens* Kimsey, 2012. **J.** *L. glabra* sp. nov. **K.** *L. komedai* sp. nov. **L.** *L. mediata* sp. nov. **M.** *L. parallela* sp. nov. **N.** *L. piriformis* sp. nov. **O.** *L. squamosa* sp. nov. **P.** *L. vang* sp. nov. **Q.** *L. vietnamensis* sp. nov.

LEGS. Tibiae carinate; flange on forefemur 0.56–0.60 times longer, as wide as tubular part of forefemur; flange on foretibia 0.55–0.72 times longer, 0.63–1.0 times wider than tubular part of foretibia; flange on midfemur 0.78–0.84 times longer, 1.1 times wider than tubular part of midfemur; flange on midtibia 0.70–0.88 times longer, 0.75–0.86 times wider than tubular part of midtibia; hindcoxa dorso-laterally carinate; basal part of hindfemur producing, strongly producing, simple; hindfemur basally stout; ventral margin of hindfemur flat; outer surface of hindfemur smooth; flange on hindfemur 0.78–0.94 times longer, 0.79–0.89 times wider than tubular part of hindfemur; outer surface of hindtibia smooth; flange on hindtibia 0.74–0.80 times longer, 1.5–2.0 times wider than tubular part of hindtibia.

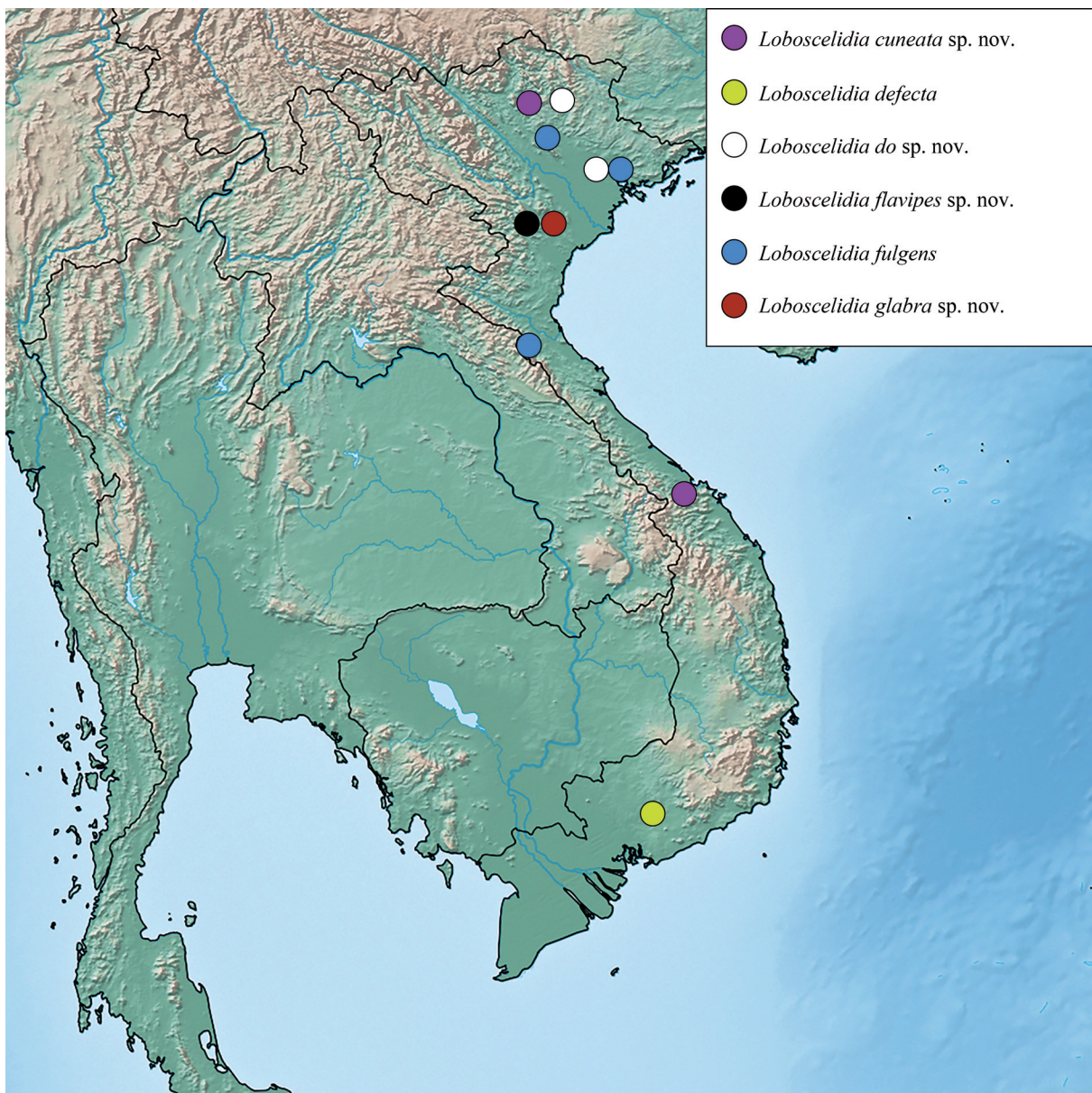


**Fig. 26.** Distribution map of *Loboscelidia* spp. in Vietnam. *L. asiana* Kimsey, 1988 (red circle). *L. bachmaensis* sp. nov. (dark blue circle). *L. barbata* sp. nov. (yellow circles). *L. cilia* sp. nov. (green circle). *L. convexa* sp. nov. (pink circle). *L. cucphuongensis* sp. nov. (gray circles).



**PILOSITY.** Temple with sparse decumbent simple setae (Fig. 24D); cervical expansion with sparse decumbent and suberect simple setae; scape with sparse decumbent and suberect simple setae; pedicel with sparse suberect simple setae; dorsal part of pronotum with sparse decumbent and suberect simple setae (Fig. 24A, F); lateral part of propodeum with sparse decumbent and suberect simple setae; forefemur with sparse decumbent and suberect simple setae; hindcoxa with sparse decumbent cuneate setae.

**COLORATION.** Body reddish brown; antenna reddish brown; legs reddish brown; flanges yellowish brown; ribbon-like setae whitish yellow.



**Fig. 27.** Distribution map of *Loboscelidia* spp. in Vietnam. *L. cuneata* sp. nov. (purple circles). *L. defecta* Kieffer, 1916 (gold circle). *L. do* sp. nov. (white circles). *L. flavipes* sp. nov. (black circle). *L. fulgens* Kimsey, 2012 (light blue circles). *L. glabra* sp. nov. (brown circle).



**Female**

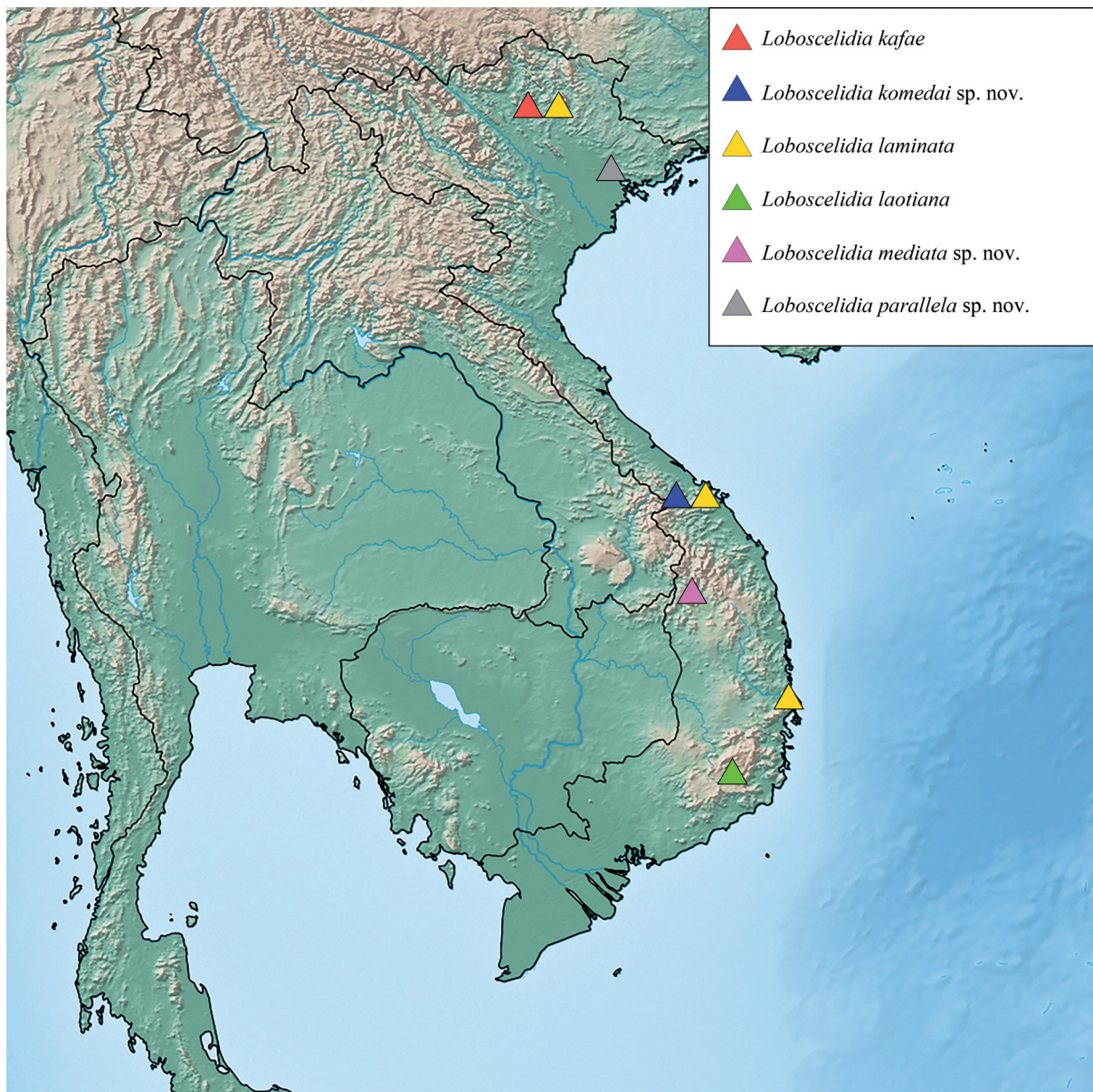
Unknown.

**Distribution**

Vietnam (Northern Vietnam, Central Vietnam) (Fig. 29).

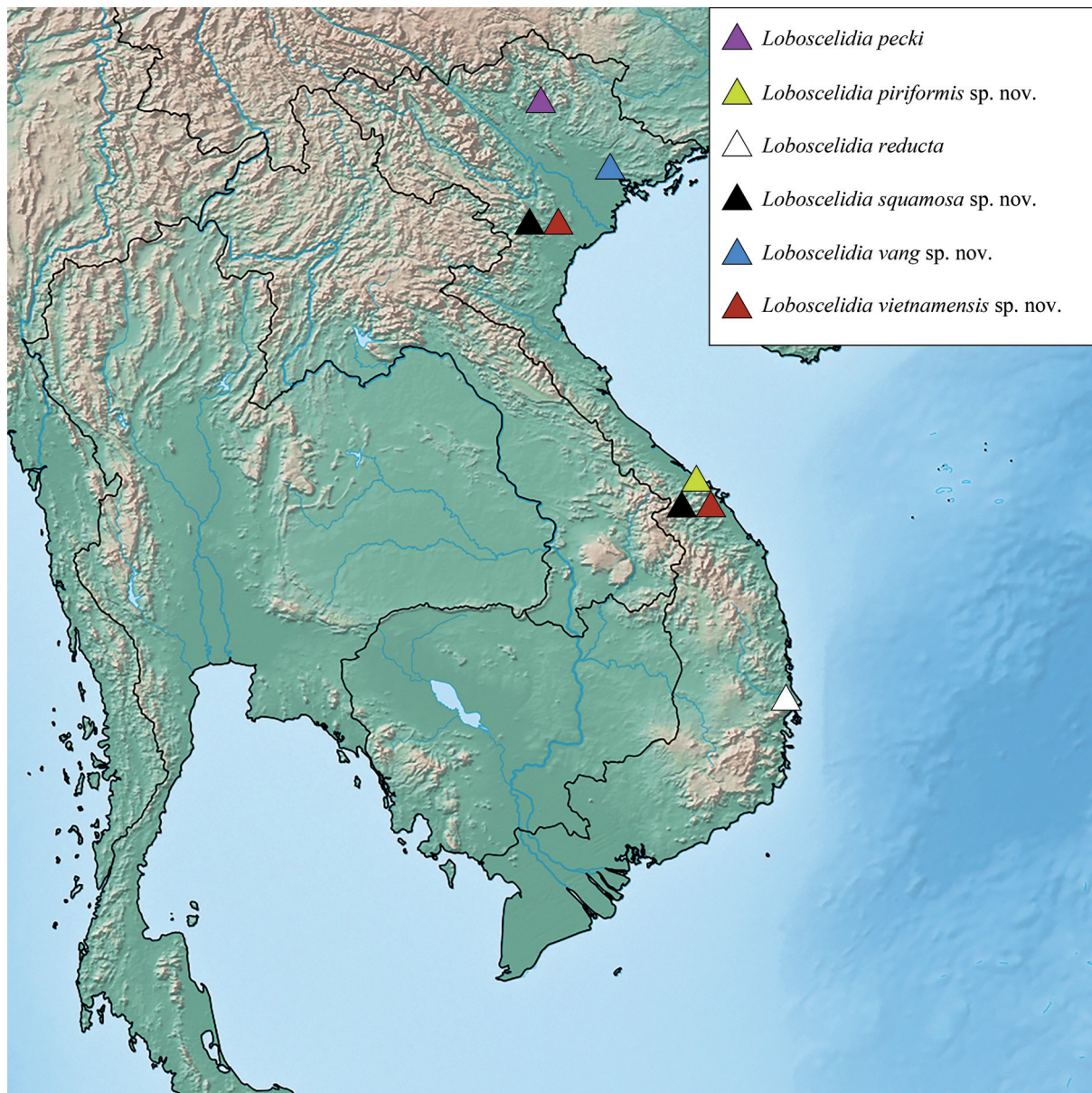
**Remarks**

This species closely resembles *L. bachmaensis* sp. nov.; however, it can be distinguished by the following combined characteristics: frontal projection longer than above in lateral view (equal to shorter than



**Fig. 28.** Distribution map of *Loboscelidia* spp. in Vietnam. *L. kafee* Kimsey, 2012 (red triangle). *L. komedai* sp. nov. (dark blue triangle). *L. laminata* Kimsey, 2012 (yellow triangles). *L. laotiana* Kimsey, 1988 (green triangle). *L. mediata* sp. nov. (pink triangle). *L. parallela* sp. nov. (gray triangle).





**Fig. 29.** Distribution map of *Loboscelidia* spp. in Vietnam. *L. pecki* Kimsey, 2012 (purple triangle). *L. piriformis* sp. nov. (gold triangle). *L. reducta* Maa & Yoshimoto, 1961 (white triangle). *L. squamosa* sp. nov. (black triangles). *L. vang* sp. nov. (light blue triangle). *L. vietnamensis* sp. nov. (brown triangles).

above in *L. bachmaensis* sp. nov.); shorter temple, about 0.20 times as long as MOD (0.80 times as long as MOD in *L. bachmaensis* sp. nov.); pronotum as long as head width (much wider than head in *L. bachmaensis* sp. nov.); tooth of hindtarsal claw less than 0.2 times as long as hindtarsal claw (longer than 0.4 times as long as hindtarsal claw).

#### **Key to males of Indo-Chinese *Loboscelidia***

1. M vein absent (Fig. 3B); Rs much less than twice as long as R ..... 2
- M vein complete (Fig. 3A); Rs twice or more longer than R ..... 3

2. Head wider than posterior width of pronotum; hindtibia with well-developed flange .....	<i>L. fulgens</i> Kimsey, 2012
– Head narrower than posterior width of pronotum; hindtibia without flange .....	<i>L. reducta</i> Maa & Yoshimoto, 1961
3. Eye with erect setae (Fig. 6B); fore- and midtibiae without distinct flange (Fig. 6A) .....	<i>L. cilia</i> sp. nov.
– Eye without erect setae; fore- and midtibiae with developed flanges (Figs 9A, 11A) .....	4
4. Pronotum and legs always with scale-like setae (Figs 5A, D, 7A, D) .....	5
– Pronotum and legs without scale-like setae (Fig. 24D) .....	7
5. Lower gena with cuneate setae (Fig. 5A, D) .....	<i>L. convexa</i> sp. nov.
– Lower gena with scale-like setae (Fig. 7A, D) .....	6
6. Scape much longer than 3.0 times as long as wide; scrobal sulcus absent ...	<i>L. asiana</i> Kimsey, 1988
– Scape nearly 3.0 times as long as wide; scrobal sulcus present (Fig. 7A) .....	<i>L. barbata</i> sp. nov.
7. Cervical expansion strongly flattened in lateral view, not depressed behind ocelli; propodeum with transverse subapical carina .....	8
– Cervical expansion not flattened at least curved in lateral view (Figs 18D, 24D); propodeum without transverse subapical carina .....	9
8. Scrobal sulcus absent; foretibia without flange .....	<i>L. maculipennis</i> Fouts, 1922
– Scrobal sulcus present; foretibia with flange, as wide as tubular part of foretibia .....	<i>L. nitidula</i> Kimsey, 2012
9. Frontal projection elongate and nasiform; head nearly 3.0 times as long as wide .....	<i>L. nasiformis</i> Kimsey, 2012
– Frontal projection not elongate and rectangular to triangular (Fig. 23D); head twice or less as long as broad .....	10
10. Tibiae without flanges (Fig. 10A), if narrow flanges present, it is much less than 0.2 times as wide as tubular part of tibiae .....	11
– Tibiae with more or less developed flanges, more than 0.3 times as wide as tubular part of fore tibia .....	12
11. Temple as long as MOD (Fig. 10B, D); pronotum much longer than wide .....	<i>L. defecta</i> Kieffer, 1916
– Temple much longer than MOD; pronotum as long as or shorter than wide .....	<i>L. cinnamonea</i> Kimsey, 2012
12. Scrobal sulcus absent (Fig. 12A) .....	<i>L. flavipes</i> sp. nov.
– Scrobal sulcus present (Fig. 13A) .....	13
13. Vertex behind ocelli strongly depressed (Figs 6C, 7C, 13C, 21C, 23C); cervical expansion strongly curved (Figs 6D, 7D, 13A, 21D, 23D) .....	14
– Vertex behind ocelli not depressed (Figs 15C, 18B, 24D); cervical expansion weakly curved (Figs 15D, 18A, 24D) .....	17
14. Frontal projection rectangular; Rs more than 3.5 times as long as R .....	<i>L. pasohana</i> Kimsey, 1988
– Frontal projection triangular (Fig. 23B–C); Rs less than 3.5 times as long as R .....	15



15. Temple longer than MOD (Fig. 23C); scape 3.8 times as long as wide; M straight; cu-a absent ..... *L. vang* sp. nov.  
 – Temple shorter than MOD; scape 2.5 times as long as wide; M curved; cu-a present ..... 16
16. Body reddish brown; Rs 2.5 times as long as R ..... *L. sarawakensis* Kimsey, 1988  
 – Body brownish yellow; Rs 3.0 times as long as R ..... *L. collaris* Fouts, 1922
17. Scape polished, usually without longitudinal grooves (Figs 11A, 16C, 24B); F1 less than or twice as long as wide ..... 18  
 – Scape rugose, with longitudinal grooves (Figs 8B, 9A); F1 usually more than twice as long as wide ..... 22
18. F11 4.0 times as long as wide (Fig. 16B) ..... 19  
 – F11 less than 3.5 times as long as wide (Figs 4A, 11A, 24A) ..... 20
19. Scape 3.0 times as long as wide; F2 twice as long as wide; fore- and midtibial flanges as wide as tubular part; hindtibial flange twice as wide as tubular part ..... *L. kafea* Kimsey, 2012  
 – Scape 2.6 times as long as wide; F2 less than twice as long as wide; fore- and midtibial flanges narrower than tubular part (Fig. 16A); hindtibial flange as wide as tubular part (Fig. 16A) ..... *L. laminata* Kimsey, 2012
20. LOL less than 0.2 times as long as MOD (Fig. 11C); foretibial flange much wider than tubular part (Fig. 11A); hindtibial flange much wider than tubular part of hindfemur ..... *L. do* sp. nov.  
 – LOL more than 0.3 times as long as MOD; foretibial flange less than tubular part (Figs 4A, 24A); hindtibial flange less than tubular part ..... 21
21. Temple 0.8 times as long as MOD (Fig. 4C); F1 and F2 much less than twice as long as wide; tooth of hindtarsal claw less than 0.2 times as long as hindtarsal claw ..... *L. bachmaensis* sp. nov.  
 – Temple less than 0.3 times as long as MOD (Fig. 24C); F1 and F2 nearly twice as long as wide; tooth of hindtarsal claw longer than 0.4 times as long as hindtarsal claw ..... *L. vietnamensis* sp. nov.
22. cu-a absent or less than 0.2 times as long as R (Fig. 19E) ..... *L. pecki* Kimsey, 2012  
 – cu-a 0.2–0.6 times as long as R ..... 23
23. Frontal projection triangular ..... 24  
 – Frontal projection rectangular (Figs 8C, 9D, 15C, 18C) ..... 25
14. Fore- and midfemoral flanges less than tubular part; hindtibial flange as long as tubular part; hindtibial flange 0.6 times as wide as tubular part ..... *L. scutellata* Fouts, 1922  
 – Fore- and midfemoral flanges as wide as tubular part; hindtibial flange 0.67 times as long as tubular part; hindtibial flange twice as wide as tubular part ..... *L. laotiana* Kimsey, 1988
25. M vein straight ..... *L. fulva* Kimsey, 2012  
 – M vein curved (Fig. 26B) ..... 26
26. Body blackish brown; basal part of cervical expansion constrict (Fig. 15C); median tooth of tarsal claw extending half of tarsal claw (Fig. 25K) ..... *L. komedai* sp. nov.  
 – Basal part of cervical expansion subparallel (Figs 8C, 9D, 18C); median tooth of tarsal claw distinctly shorter than half of tarsal claw (Fig. 25E–F, M) ..... 27

27. Pronotum, propleuron and forefemur with cuneate setae; Cu+M as long as A (Fig. 9F) ..... *L. cuneata* sp. nov.  
 – Pronotum, propleuron and forefemur with normal setae; Cu+M less than A (Figs 8F, 18G) ..... 28
28. Frontal ridge distinct; R1 less than 0.5 times as long as R (Fig. 8F); Rs less than 3.0 times as long as R ..... *L. cucphuongensis* sp. nov.  
 – Frontal ridge indistinct; R1 about as long as R (Fig. 18G); Rs more than 3.0 times as long as R ..... *L. parallela* sp. nov.

**Key to females of world *Loboscelidia***

1. Ribbon-like setae on gena and frontal projection separated (Fig. 17D); fore wing without A vein; all tibiae without flanges ..... *L. mediata* sp. nov.  
 – Ribbon-like setae on gena and frontal projection not separated (Figs 14D, 20D, 22D); fore wing with A vein; tibiae with flanges ..... 2
2. Body covered with dense decumbent scale-like setae (Fig. 22A); eye with scale-like setae ..... *L. squamosa* sp. nov.  
 – Body without dense scale-like setae, if the body with scale-like setae, eye without scale-like setae (Figs 14D, 20D) ..... 3
3. Head pear-shaped in dorsal view (Fig. 20C) ..... *L. piriformis* sp. nov.  
 – Head diamond or kite-shaped in dorsal view (Fig. 14C) ..... 4
4. Eye with erect setae ..... 5  
 – Eye without setae (Fig. 14B) ..... 6
5. Head, dorsal of pronotum, scutum, and mesoscutellum with dense erect or suberect normal setae; behind ocelli strongly depressed; cervical expansion convex ..... *L. antennata* Fouts, 1922  
 – Head, dorsal of pronotum, scutum, and mesoscutellum with sparse decumbent or suberect normal or cuneate setae; behind ocelli weakly depressed; cervical expansion flattened ..... *L. maai* (Lin, 1964)
6. R1 vein 0.3 times as long as R vein; cu-a vein as long as R vein ..... *L. ora* Kimsey, 1988  
 – R1 vein longer than half of R vein; cu-a vein much shorter than R vein (Fig. 13E) ..... 7
7. F11 0.80 times as long as wide (Fig. 14A); POL longer than MOD; flange of hindtibia as wide as tubular part (Fig. 14A) ..... *L. glabra* sp. nov.  
 – F11 2.3 times as long as wide; POL shorter than MOD; flange of hindtibia 0.8 times as wide as tubular part ..... *L. hei* Yao, Liu & Xu, 2010

***Egg-carrying and burying behavior of *Loboscelidia squamosa* sp. nov.***

During the field survey at Cuc Phuong NP in 2019, we fortunately obtained a living female (paratype) of *L. squamosa* sp. nov. We released her into a plastic container with soil on the bottom (Fig. 30) and put an egg of an unidentified *Oxyartes* (Lonchodidae: Necrosciinae) on the soil. At first, she carried the egg to a different location (Fig. 30A). Then she punctured the egg with her mandible and laid her own egg in the small hole (Fig. 30B). Next, she left the parasitized egg and walked around the area searching for a suitable location. Then she carried the egg again (Fig. 30C) and moved it to a small depression in the soil (Fig. 30D). She moved her head into the depression for a while, expanding the hole. This behavior probably helped provide enough space for the parasitized egg. She dragged the parasitized egg into the hole and carried a small soil clump and stuffed it into the entrance using her forelegs and



sometimes mid-legs (Fig. 30E). This behavior continued until the entrance was completely concealed (Fig. 30F). According to the observation, the specialized head structure and body setae should be useful for a series of behavior in the soil. We kept the parasitized egg for 1 year, but the offspring did not hatch from it.



**Fig. 30.** Foraging behavior of *Loboscelidia squamosa* sp. nov. **A.** Female carrying the egg of *Oxyartes* sp. **B.** Female laying her egg in the stick insect egg. **C.** Female carrying the parasitized egg. **D.** Female dragging the egg into the soil depression. **E.** Female burying the egg with soil. **F.** Female by the side of the hidden host egg.



## Discussion

During the investigation of the chrysidid fauna in Vietnam, we only collected 70 specimens of *Loboscelidia*. This number represents 18% of all individuals of *Loboscelidia* reported so far. In this study, 16 new species were added to *Loboscelidia*, bringing the total number to 24 in Vietnam. In Vietnam, wasps were collected from six sites mainly in Northern and Central Vietnam, which is still insufficient compared to China and Thailand, where more than 20 sites were surveyed. However, our results indicated that the potential species diversity of the genus could be much higher than currently understood. As pointed out by Kimsey (2012), each species was found in a very limited area; thus, the species composition was different between Northern and Southern Vietnam from our field surveys and literature records. Only one species (*L. laminata*) was obtained from both regions, also only four species were obtained from the northern and central regions (Figs 26–29). However, our field surveys in this study were limited to the Northern and Central parts of Vietnam, lacking the southern part of Vietnam (Figs 26–29).

Females in this subfamily are extremely rare compared to males, but several individuals were collected using flight intercept traps (FIT) and yellow pan traps (YPT). Males are more likely to be collected by net sweeping and Malaise traps because they search for females in the lower layers of the ground (Kimsey 2012), but since no males were obtained using FIT and only a few using YPT, males may be more active in the lower vegetation than on the litter surface, where females are expected. Loboscelidiinae are suggested to be associated with ants according to field observations and morphological specialization (Kimsey 2012; Hisasue & Mita 2020). However, having specialized setae is a widespread trend in soil and litter arthropods, such as *Strumigenys* F. Smith, 1860 ants (Hymenoptera: Formicidae), oribatid mites (Acari: Oribatidae), Entiminae Schöenherr, 1826 weevils (Coleoptera: Curculionidae), and Colydiinae Billberg, 1820 beetles (Coleoptera: Zopheridae) (Ferris 1934).

For egg parasitoids of stick insects in Chrysididae, only a few observations of the foraging behavior have been documented, and these are all from Amiseginae: *Myrmecomimesis* spp. straddles the host egg and punctures a small hole with her mandibles and lays eggs (Readshaw 1965), and *Amisega* sp. and *Nipponosega yamanei* Kurzenko & Lelej, 1994 transport the host egg (Windsor *et al.* 1996; Mita 2021). Host carriage is also well known in the bethylid genera *Cephalonomia* Westwood, 1833, *Epyris* Westwood, 1832, *Goniozus* Förster, 1856 and *Muellerella* Saussure, 1892 (Rubink & Evans 1979; Rosenheim 1987; Collatz & Steidle 2008), and is common in other lower Aculeata Latreille, 1802, such as Ampulicidae Shuckard, 1840, Scoliidae Latreille, 1802 and Tiphidae Leach, 1815 (Iwata 1971; Gess 1984; O'Neill 2001). It is noteworthy that the behavior of *L. squamosa* sp. nov. appears to include a more developed foraging sequence, which can be compared to the hunting and nesting behavior of solitary wasps (Bohart & Menke 1976; Iwata 1971; O'Neill 2001), since it builds the 'nest' and finally plugs with soil.

In some newly described species (such as *Loboscelidia mediata* sp. nov.), the basally constricted cervical expansion and discontinuous ribbon-like setae between cervical expansion and gena are shared with *Rhadinoscelidia*. However, we assign *L. mediata* sp. nov. to the genus *Loboscelidia* because the forewing venation extends into half of the wing. Due to sexual dimorphism, the identification of conspecific sexes has been a challenge for researchers (Maa & Yoshimoto 1961; Kimsey 2012). Kimsey (2012) suggested a combination of sexes based on some characteristics (wing venation, frontal projection, scrobal sulcus, and notauli) as shared modifications. However, when the number of species increased, further evaluation is required because of the presence of multiple species showing the same characteristics (e.g., *Loboscelidia bachmaensis* sp. nov. and *L. vietnamensis* sp. nov., *L. cuneata* sp. nov. and *L. parallela* sp. nov.). This difficulty is particularly due to the lack of knowledge of female morphology. As is often the case with Chrysoidea and other Aculeata wasps showing pronounced sexual dimorphism (Hardy & Mayhew 1998; Pilgrim & Pitts 2006; Alencar *et al.* 2018; Azevedo *et al.* 2018;

Narita & Mita 2021; Olmi *et al.* 2021), the generic placement and sex associations of Loboscelidiinae based on morphological characteristics remain critical problems. More intensive field studies and a molecular approach are needed to build a comprehensive taxonomic framework that connects missing morphological and ecological links.

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