MONOGRAPH



# Review of the odd chrysidid genus Loboscelidia Westwood, 1874 (Hymenoptera, Chrysididae, Loboscelidiinae)

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#### Abstract

The chrysidid genus *Loboscelidia* is reviewed and 11 new species are described, including *L. cinnamonea* (Borneo), *L. fulgens* (Viet Nam), *L. fulva* (Thailand), *L. incompleta* (India), *L. kafae* (Borneo), *L. laminata* (Viet Nam), *L. meifungae* (Borneo), *L. nasiformis* (Thailand), *L. nitidula* (Thailand), *L. pecki* (Viet Nam), and *L. sisik* (Borneo). A key to males of the species of *Loboscelidia* is given.

#### Keywords

Viet Nam, Borneo, Thailand, India, Sri Lanka, Philippines, Australia

## Introduction

Loboscelidiinae is one of the smaller subfamilies in the family Chrysididae. The subfamily contains two genera, *Loboscelidia* Westwood, 1874 and *Rhadinoscelidia* Kimsey, 1988. As of the publication of Kimsey and Bohart (1991), *Loboscelidia* contained 30 species and *Rhadinoscelidia* one species. Since then four *Loboscelidia* and two *Rhadinoscelidia* species have been added (Kojima and Ubaidillah 2003, Terayama et al. 1998,

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Xu et al. 2006). An additional 11 new *Loboscelidia* species are described below. This study focuses on males and their characteristics as the systematics of the group is focused primarily on this sex due to the rareness of females in collections and the strong sexual dimorphism between males and females.

The subfamily is primarily south Asian with four northern Australian species. Every major south Asian island may have at least one endemic species of *Loboscelidia*, and every new intensive collecting effort using Malaise traps or flight-intercept traps turns up new species. Thus, the loboscelidiine fauna appears to be largely under-sampled.

Loboscelidiines are among the most aberrant-looking and highly modified chrysidids, and as a result their actual family and even superfamily placement has varied considerably over the years. These are small-bodied, non-metallic brown wasps, with a superficial resemblance to members of the family Diapriidae (see Fig. 1). In fact Westwood (1874) originally described *Loboscelidia* as a species of diapriid (Superfamily Proctotrupoidea). Ashmead (1902) then moved the genus to the family Figitidae (Superfamily Cynipoidea). Maa and Yoshimoto (1961) then moved the genus *Loboscelidia* into its own family, Loboscelidiidae (Superfamily Bethyloidea). Finally, after making a detailed analysis of the metasomal morphology Day (1978) concluded that the group actually belonged in the family Chrysididae (Superfamily Chrysidoidea).

Loboscelidiines are characterized by a number of unusual features (Figs 1, 2). The antennae insert horizontally on a shelf-like extension in the middle of the face (the shelf-like extension is termed the frontal projection below); the vertex is prolonged posteriorly into a neck-like projection fringed with ribbon-like setae; the pronotum is not freely hinged to the scutum and has a short line of ribbon-like setae along the anterolateral corner; the tegula is very large, covering both wing bases, and is held in place by a ridge on the mesopleuron; the mesopleuron is smooth without sculpturing, except for a shallow, trough-like scrobal sulcus in some species, the propodeum lacks a dorsal surface and has an ear-like lateral projection over the spiracle, and the forewing lacks a stigma, costal and subcostal veins.

Distinctions between *Loboscelidia* and *Rhadinoscelidia* have been summarized in Kimsey and Bohart (1991). Briefly *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 one-fourth in *Rhadinoscelidia*), vertex convex or flat behind the ocelli, not sharply declivitous as in *Rhadinoscelidia*, and cervical expansion continuous with head, without discrete posterior expansion and with well-developed genal and cervical fringe. Cervical expansion basally constricted and shield-like posteriorly, with small discontinuous genal and cervical fringes in *Rhadinoscelidia*.

Members of the genus *Loboscelidia* are strongly sexually dimorphic, which has led to confusion over generic placement and sex associations. The genus *Scelidoloba* Maa & Yoshimoto, 1961 was erected for what turned out to be female *Loboscelidia* (Day 1978). Males have five external metasomal segments and a long slender flagellum. Females are heavier bodied than the males, with a shorter, broader flagellum and an externally four-segmented metasoma. It's not clear how many characteristics are shared between the two sexes as fewer than 15% of specimens in collections are female and more than one



**Figure 1.** Habitus photograph of male *Loboscelidia* sp. in Queensland, Australia. Photo courtesy of Alex Wild; myrmecos.net.

species may be present in a single locality. However, the sexes do seem to share some modifications of the wing venation (presence and shape, or absence of the medial vein), shape of the frontal projection, and presence or absence of the scrobal sulcus and notauli.

Little is known of the biology of the Loboscelidiinae. Specimens are rare in collections. However, this situation is probably more a reflection of collecting techniques used and sites visited than any indication of abundance. Malaise trapping in Thailand as part of the National Science Foundation funded TIGER project has yielded more than 100 *Loboscelidia* specimens, more than all other museum holdings. The small number of female *Loboscelidia* collected relative to males may be due to their differing habits. Males may be more frequently caught in traps because they tend to frequent low vegetation and the surface of leaf litter searching for females. Females may spend most of their time in cryptic situations, for example under bark or in the leaf litter, searching for hosts.

The morphology of the female ovipositor and mandibles closely resembles that of the Amiseginae, suggesting that loboscelidiines, like amisegines parasitize walking stick eggs. There is one report of an unidentified species of *Loboscelidia* reared from the eggs of the phasmatid *Acrophylla* sp. (Riek 1970). It is also possible, given the structural modifications of the group, including the leg and antennal flanges, the very large tegula and the tegular clip that *Loboscelidia* females at least may search for walking stick eggs in ant nests. Fouts (1922) suggested that the group is myrmecophilous based on the odd morphology. Walking stick eggs may be collected by ants because of the egg's strong resemblance to seeds.



**Figure 2.** Diagram of lateral views of male *Loboscelidia pecki*. **A** Head, antenna removed. **B** Habitus of body. **C** Hindleg: (**a**) tubular part of femur width (**b**) femoral flange width (**c**) femoral flange length (**d**) femoral length. Abbreviations: **HL** = head length **HW** = head breadth **M+Cu** = media + cubital veins **M** = medial vein **cu-a** = cubital-anal cross vein **R** = radial vein **RI** = first radial branch **Rs** = radial sector **SS** = scrobal sulcus.

## Materials and methods

Specimens were borrowed from the following museums, and type repositories are indicated by the acronyms: AEI – American Entomological Institute, Gainesville, Florida); ANIC – Australian National Insect Collection; BME – Bohart Museum of Entomology, University of California, Davis, USA; BMNH – The Natural History Museum, London, UK; BPBM – Bishop Museum, Honolulu, Hawaii, USA; CAS – California Academy of Sciences, San Francisco, USA, CNC – Canadian National Insect Collection, Ottawa, Ontario, Canada; CSIRO, Canberra, Australia, Australian National Insect Collection; MNHN – Museum National d'Histoire Naturelle, Paris; QSBG – Chiang Mai Royal Botanical Garden, Chiang Mai, Thailand; ROM – Royal Ontario Museum, Toronto, Canada; UCR – Entomological Research Museum, University of California, Riverside, USA, and USNM – U.S. National Museum, Washington, D.C., USA.

Additional type repositories include: CASB - Institute of Zoology, etc.; Institute of Zoology, Beijing, China; MZB – Museum Zoologicum Bogoriense Cibinong, Indonesia; NMNS – National Museum of Natural Science, Taichung, Taiwan; OUMNH – Oxford University Museum of Natural History, Oxford, UK; QDPI – CSIRO Long Pocket Laboratories, Indooroopily, Queensland, Australia; SCAC – Hymenoptera Collection, South



Figure 3. Distribution map of the genus Loboscelidia in south Asia and Australia.

China Agricultural University, Guangzhou, and ZFCL – Hymenoptera Collection, Zhejiang University, Hangzhou, China.

Morphological terminology follows that used by Kimsey and Bohart (1991) and is further described in Fig. 2. The hindwing lacks venation, so wing vein characters are only for the forewing. Wing veins are given in the text as abbreviations: Cu = cubital vein, cu-a = cubital-anal cross vein, M = medial vein, R = radial vein, Rs = radial sector, R1 = first radial branch. Scrobal sulcus refers to the transverse trough on the mesopleuron below the forewing ending in the scrobe adjacent to the metapleuron. The shape of the frontal projection is determined viewed in front view. It is considered triangular if the ventral angle of the projection ends in a point or the flat surface is less than one-tenth the length of the upper surface. The projection is considered rectangular if it is a true rectangle or rhomboid. Head length versus width is measured from the apex of the cervical extension to the furthermost point of the frontal projection and across the widest part of the head in lateral view. Antennal articles are measured at the point of greatest breadth and compared with the total length of the article. Wing veins are compared relative to the length of R1. Pronotal dimensions are measured from the medial length of the pronotum in dorsal view to the distance between the apices of the posterolateral angles. The length of a leg flange is measured from the basal joint to the apex of the segment along the ventral margin. The relative width of leg flanges are measured across the broadest part of the flange relative to the tubular part of the segment at the same point.

## Key to males of the species of Loboscelidia

1	M vein incomplete medially or absent (as in Figs 24, 26, 28, 35)2
- 2	M vein incomplete medially. Rs twice as long as R (Fig. 28): India
-	incompleta sp. n.
_	M vein absent, Rs less than twice as long (as in Fig. 26) or $2.5 \times$ as long as R <b>3</b>
3	Propodeum broadly angulate dorsomedially in posterior view; Borneo
_	Propodeum flat to gently convex dorsally in posterior view
4	Fore, mid and hindtibiae without measurable flanges (Fig. 46); Laos, Viet Nam; Thailand
_	Fore, mid and hindtibiae with flanges $0.9 \times$ as long and $0.3-1.0 \times$ as wide as tubular part of respective tibia
5	Rs less than 1.5× as long as R, A less than 0.5× as long as Cu+M (Fig. 27); Viet Nam <i>fulgens</i> sp. n.
-	Rs more than twice as long as R, A $0.9-1.1 \times$ as long as Cu+M; China
6	Gena and often leas with scattered scale-like setae (as in Fig. 16) 7
-	Gena and legs with scattered scate-like setae (as in Fig. 10)
7	M straight medially (Fig. 36); scape less than 3× as long as broad; Borneo sisik Kimsey sp. n.
_	M curved submedially; scape more than 3× as long as broad; Viet Nam
8	Vertex extension flattened in lateral view, not depressed behind ocelli (as in Fig.
	11); foretibia without transparent flange, except in <i>nitidula</i> (as in Fig. 45)9
_	Vertex extension convex in lateral view, depressed behind ocelli (as in Fig. 4); foretibial flange usually present
9	Tibial flanges well-developed (as in Fig. 45); scrobal sulcus present10
_	Tibial flanges represented by posterior ridge or absent (as in Fig. 42); scrobal sulcus absent
10	Rs 3.2–4.0× as long as R; R1 and cu-a shorter than R (Fig. 33); Thailand
_	Rs 2.5–3.0× as long as R or shorter; R1 and cu-a as long as R; Taiwan
11	Propodeum without transverse subapical carina: cu-a less than 0.3x as long as
	R; legs smooth, not striate; Borneo, Sumatrabrunnea Fouts
-	Propodeum with transverse subapical carina; cu-a more than $0.5 \times$ as long as
	R; legs extensively longitudinally striate (Fig. 42); Borneo, Malaysia, Singa-
12	pore, sumatra maculipennis Fouts M straight medially (as in Fig. 27)
- -	M curved submedially

Scutum without notauli (as in Fig. 22)
Scutum with notauli (as in Figs 21, 23)
twice as wide as tubular part of tibia; Australiamaculata Kimsey Hindfemoral flange twice as wide as tubular part of femur; hindtibal flange as
wide as tubular part of tibia; Australia
as long as broad or shorter; cu-a $0.3 \times$ as long or longer than R (as in Fig. 27)16
Scrobal sulcus absent; scape 3.5× as long or longer as broad; cu-a absent 17
Face frontal projection rhomboid or rectangular in front view; Rs $3.0 \times$ as long as R (Fig. 27); midtibial flange more than half as long and wide as tubu-
lar part of tibia (Fig. 39); Ihailand, Sumatra
Face frontal projection triangular in front view; Ks 2.5× as long as broad of shorter (Fig. 31); midtibial flange absent or less than half as long and wide as
tubular part of tibia (Fig. 43); Borneo
Rs more than twice as long as R, more than 0.8× as long as M+Cu; Java
Rs less than twice as long as R. A $0.5-0.7x$ as long as M+Cu: Philippines
defecta Kieffer
Scutum without notauli or notauli about half as long as scutum (as in Figs 22, 23).
Scutum with notauli 0.7–1.0× scutal length
Scutum without notauli; face with frontal projection rhomboid in front
view (as in Fig. 20); flagellomeres I-II each less than twice as long as broad; Australiaaustralia Kimsey
Scutum with notauli about half as long as scutum; face with frontal projec- tion linear to broadly triangular or V-shaped in front view (as in Fig. 19);
Exercibia without transparent flange: hindfemoral flange half as wide as femure
Rs more than 3x as long as R: New Britain
Foretibia with transparent flange; hindfemoral flange as wide as femur; Rs
less than 3× as long as R; New Britainparva Maa & Yoshimoto
Frontal projection nearly linear in front view (as in Fig. 18); cu-a as long as R
Frontal projection rectangular, rhomboid (as in Fig. 20) (extremely elongate
in <i>nasiformis</i> ) or triangular (as in Fig. 19); cu-a shorter than R or absent 23
Foretibial flange half as wide as tubular part of tibia; midtibial flange half as long and half as wide as tubular part of tibia; New Guinea <i>novoguineana</i> Kimsey
Foretibial flange as wide as tubular part of tibia; midtibial flange 1.5× as long and as wide as tibia tubular part of; Australia
Face with frontal projection elongate and nasiform; head nearly 3× as long as broad (Fig. 13); Thailand

-	Face with frontal projection rectangular to triangular; head twice or less as
	long as broad
24	cu-a less than 0.2× as long as R or absent
_	cu-a 0.2–0.4× as long as R
25	R1 as long as R, Rs 3× as long as R (Fig. 34); Viet Nam pecki sp. n.
_	R1 absent or less than 0.4× as long as R, Rs less than 2.2× as long as R (Fig.
	25); Thailand, Borneo, Singapore, Malaya cinnamonea sp. n.
26	Midfemoral flange 0.3× as long as femur; R1 less than 0.3× as long as R and
	A vein as long as Cu+M; Chinasinensis Kimsey
_	Midfemoral flange 0.4-1.0× as long as femur; R1 0.4–1.0× as long as R and
	A vein shorter than Cu+M, except in <i>indica</i>
27	R1 reaching R at nearly right angle; pronotal length 0.4–0.6× width across
	posterolateral angles or shorter; Chinalevigata Yao, Liu & Xu
_	R1 reaching R at obtuse angle; pronotal length greater than 0.6× width across
	posterolateral angles
28	Scrobal sulcus absent
_	Scrobal sulcus present (as in Fig. 2)
29	Propodeum with transverse subapical carina; metanotum less than 0.3× as
	long as scutellum; Borneo, Sula Isnixoni Day
_	Propodeum without transverse subapical carina; metanotum more than 0.3×
	as long as scutellum
30	Scape more than $3.0 \times$ as long as broad; hindtibial flange wider than tubular
	part of tibia; Philippines
_	Scape less than $3.0 \times$ as long as broad; hindtibial flange narrower than tubular
	part of tibia; Borneo, Sula Is rufescens Westwood
31	Frontal projection triangular (as in Fig. 19)
_	Frontal projection rhomboid or rectangular (as in Fig. 20)
32	Rs more than 3.0× as long as R; flagellomere I less than twice as long as broad;
	Laos, Sumatralaotiana Kimsey
_	Rs 2.5-3.0× or less as long as R; flagellomere I twice or more as long as
	broad
33	Flagellomere XI more than 4.0× as long as broad
_	Flagellomere XI 4.0× or less as long as broad
34	Scape less than 3× as long as broad; forefemoral flange half as wide as tubular
	part of femur; hindtibial flange as wide as tubular part of tibia or narrower;
	Philippinesnigra Fouts
_	Scape more than 3× as long as broad; forefemoral flange as wide as tubular
	part of femur; hindtibial flange twice as wide as tubular part of tibia; Sri
	Lanka
35	Hindtibial flange less than 1.5× as wide as tubular part of tibia; flagellomere
	XI less than 3× as long as broad; Philippines scutellata Fouts

-	Hindtibial flange more than 1.5× as long as wide as tubular part of tibia;
	flagellomere XI more than 3× as long as broad
36	Hindtibial flange 2.0–2.5× as wide as tubular part of tibia (as in Fig. 41);
	Singapore
_	Hindtibial flange less than twice as wide as tubular part of tibia (as in Fig. 40);
	Borneo, Sulawesi sarawakensis Kimsey
37	Scape 3.9–4.1× as long as broad, flagellomere XI 3.9–4.1× as long as broad;
	Philippines
_	Scape less than 3.8× as long as broad; flagellomere XI less than 3.8× as long
20	as $Droad$
38	Foretibial flange narrower than tubular part of tibia (as in Fig. 40)
-	Foretibial flange as wide or wider than tubular part of tibia (as in Fig. 41)40
39	Rs twice as long as R; scape 3× as long as broad; flagellomere I twice as long
	as broad; Sri Lanka atra Krombein
-	Rs 3× as long as R; scape less than 3× as long as broad; flagellomere I less than
	twice as long as broad; Viet Nam, Thailand laminata sp. n.
40	Fore and midtibial flanges as wide as or narrower than tubular part of respec-
	tive tibiae; Thailand, Laos, Viet Nam, Malaya, Borneo kafae sp. n.
_	Fore and midtibial flanges more than 1.2× as wide as tubular part of respec-
	tive tibiae
41	A longer than Cu-M; Rs less than 3.0× as long as R; pronotum rounded later-
	ally; India <i>indica</i> Kimsey
_	A shorter than Cu-M; Rs 3.4× as long as R; pronotum with carinate lateral
	edge; Borneo, Thailand pasohana Kimsey

## **Species treatments**

## Loboscelidia antennata Fouts

http://species-id.net/wiki/Loboscelidia\_antennata

Loboscelidia antennata Fouts 1922: 622. Holotype female; Singapore (USNM).

**Material studied.** Singapore (USNM); Indonesia: West Kalimantan, Gunung Palung National Park (1 female, ROM); 2 female specimens were examined including the holotype.

**Diagnosis.** The male of this species is unknown, but *antennata* may very well prove to be the female of *brunnea* Fouts, based on the triangular frontal projection, flattened cervical expansion, curved medial vein and lack of a scrobal sulcus.

#### Loboscelidia asiana Kimsey

http://species-id.net/wiki/Loboscelidia\_asiana

Loboscelidia asiana Kimsey 1988: 68. Holotype male; Viet Nam: Dalat (BPBM).

#### Material studied. Only the holotype was seen.

**Diagnosis.** The most distinctive feature of *Loboscelidia asiana* is the presence of spatulate or leaf-like setae on the gena, a character shared only with *sisik* (as in fig. 16). However, *asiana* can be distinguished from *sisik* by the submedially curved medial vein (nearly flat in *sisik*), scape striate and more than 3.5× as long as broad (smooth and less than 3× as long as broad in *sisik*) and no scrobal sulcus (present in *sisik*).

#### Loboscelidia atra Krombein

http://species-id.net/wiki/Loboscelidia\_atra

*Loboscelidia atra* Krombein 1983: 52. Holotype male; Sri Lanka: Sabaragamuwa Prov., Ratnapura Dist., Sinharaja Jungle (USNM).

#### **Material studied.** Only the holotype was seen.

**Diagnosis.** This is one of several species with a well-developed, complete scrobal sulcus. A combination of features will separate *atra* from these other species, including the rectangular frontal projection (in lateral view), scape more than  $3 \times$  as long as broad, cu-a vein less than half as long as R, Rs twice as long as R, and metanotum half as long as the scutellum.

#### Loboscelidia australis Kimsey

http://species-id.net/wiki/Loboscelidia\_australis Figure 22

Loboscelidia australis Kimsey 1988: 69. Holotype male; Australia: NSW (AEI).

**Material studied.** Australia: New South Wales, Queensland; two specimens were seen including the holotype.

**Diagnosis.** This is one of three species (including *maculata* and *ora*), all Australian, that lack notauli (as in Fig. 22). *L. australis* can be distinguished from these by the submedially curved medial vein, rectangular frontal projection, pronotum with sharp lateral fold or ridge, flagellomere XI less than 3× as long as broad, and fore and midtibial flanges less than 0.5× as long as their respective tibial lengths.

## Loboscelidia bakeri Fouts

http://species-id.net/wiki/Loboscelidia\_bakeri Figure 24

Loboscelidia bakeri Fouts 1922: 620. Syntype males (not females) (3); Borneo: Sandakan (USNM).

**Material studied.** Malaysian Borneo, Sabah, Sandakan (2 males, USNM), Kinabalu National Park Poring Hot Springs (2 males including two syntypes, CNC, USNM).

**Diagnosis.** *Loboscelidia bakeri* can be immediately distinguished from all other *Loboscelidia* species by the distinctively dorsomedially up-domed propodeum. It is also one of four species, including *fulgens, reducta* and *ganxiensis* that lack a medial vein (as in Fig. 24).

## Loboscelidia brunnea Fouts

http://species-id.net/wiki/Loboscelidia\_brunnea

Loboscelidia brunnea Fouts 1922: 626. Holotype male (not female); Borneo: Sandakan (USNM).

Material studied. Malaysian Borneo, Sabah; only the holotype was seen.

**Diagnosis.** Four *Loboscelidia* species, *brunnea, maai, nitidula* and *maculipennis*, have a strongly flattened cervical expansion. *L. brunnea* can be distinguished from these by the extreme reduction of cu-a, Rs vein less than 3.5× as long as R, the legs coarsely striate, and hindtibial posterior margin essentially ecarinate.

#### Loboscelidia castanea Krombein

http://species-id.net/wiki/Loboscelidia\_castanea

*Loboscelidia castanea* Krombein 1983: 54. Holotype male; Sri Lanka: Sabaragamuwa Prov., Ratnapura Dist., Sinharaja Jungle (USNM).

Material studied. Sri Lanka, Sabaragamuwa Prov.; only the holotype was seen.

**Diagnosis.** This is one of the species with a complete scrobal sulcus and triangular frontal projection. It shares a long scape (more than 3× as long as broad) with one of these, *laotiana. L. castanea* can be distinguished from these species and *laotiana* by a combination of characters, including cu-a less than 0.5× as long as R, A 0.6× as long as Cu+M, flagellomere I shorter than II, flagellomere XI more than 4× as long as broad, and the fore, mid and hindfemoral flanges as broad as the tubular part of the respective femora.

#### Loboscelidia cervix Maa & Yoshimoto

http://species-id.net/wiki/Loboscelidia\_cervix Figure 23

*Loboscelidia cervix* Maa and Yoshimoto 1961: 546. Holotype male; New Britain: Vudal, near Keravat (BPBM).

Material studied. New Britain: near Keravat only the holotype was seen.

**Diagnosis.** This is one of two species, including *parva*, known from New Britain. Both have the notauli not reaching the posterior margin of the scutum (Fig. 23) and the frontal projection sublinear in front view. *L. cervix* can be distinguished from *parva* by the shorter scape  $(2.6-2.8 \times \text{ as long as broad in$ *cervix* $, 3.0-3.1 \times in$ *parva*), Rs more than  $3 \times$  as long as R (less than  $3 \times \text{ in parva}$ ), cu-a longer than R (shorter in *parva*) and partial scrobal sulcus (absent in *parva*). The Australian species *ora* is the only other *Loboscelidia* with long cu-a longer than R.

#### Loboscelidia cinnamonea sp. n.

urn:lsid:zoobank.org:act:E5Ā2B8FA-4264-468B-B3A5-B52456903906 http://species-id.net/wiki/Loboscelidia\_cinnamonea Figures 4, 25, 37

**Type material.** Holotype male: Thailand: **Chiang Mai Pr.**, Doi Chiangdao NP, Pha Tang substation, 526 m, 19°24.978"N 98°54.886"E, Malaise trap, 3-9/v/2008, Jugsu & Watwanich, T5802 (QSBG).

Paratypes (25 males): 3 males, same data as type; 1 male: Doi Chiangdao NP, 491 m, 19°24.278'N 98°55.311'E, Malaise trap, 15–21/v/2008, Jugsu & Watwanich, T5815; 1 male: Doi Chiangdao NP, Pha Tang substation, 491 m, 19°24.278'N, 98°55.311'E, Malaise trap, 9-15/v/2008, Jugsu & Watwanich, T5812; 2 males: Doi Chiangdao NP, Huai Na Lao, 500m, 19°24.731'N, 98°55.315'E, YPT 5-6/ v/2008, Jugsu & Watwanich, T5806; 1 male: Doi Chiangdao NP, Huai Na Lao, 500m, 19°24.731'N, 98°55.315'E, YPT 9-10/v/2008, Jugsu & Watwanich, T5811; 1 male: Doi Chiangdao NP, Huai Na Lao, 500m, 19°24.731'N, 98°55.315'E, YPT 4-5/v/2008, Jugsu & Watwanich, T5805; 2 males: Lampang Pr., Chae Son NP, Doi Laan, 18°51.815'N, 99°22.122'E, 1413 m, Malaise trap, 9-15/v/2008, Kwannui & Sukpeng, T5292; 1 male: Chae Son NP, 18°49.894'N, 99°28.354'E, 467 m, Malaise trap, 23–30/v/2008, Kwannui & Sukpeng, T5305; 1 male: Chae Son NP, 18°50.012'N, 98°28.656'E, 419 m, pan trap, 7-8/v/2008, Kwannui & Sukpeng, T5304; 3 males: Chae Son NP, 18°49.894'N, 99°28.354'E, 467 m, Malaise trap, 1-7/v/2008, Kwannui & Sukpeng, T5309; 1 male: Chanthaburi Pr., Khao Khitchakut NP, Khao Prabaht peak, 12°50.45'N, 102°09.81'E, 875 m, Malaise trap, 20–27/ ii/2009, Suthida & Charoenchai, T4045; 1 male: Khao Khitchakut NP, Khao Prabaht peak, 12°50.45'N, 102°09.81'E, 875 m, Malaise trap, 6-13/ii/2009, Suthida



Figures 4–13. Lateral view of male *Loboscelidia* head, with basal antennal segments.

& Charoenchai, T4039; 1 male: **Trang Prov.**, Khaeochong Mt, 75 m, 7°33.038'N, 99°47.369'E, Malaise, 28/iv-2/c/2005; 2 males: near Nam Tock Ton Prov., Khoa Chong Mt.,140 m, 7°32.015'N, 99°47.036'E, iv/2005 and ii/2005; 1 male: **Phetch-abun Pr.**, Nam Nao NP, 16°43.695'N, 101°33.797'E, 921 m, Malaise trap, 5-12/v/2007, L. Janteab, T2657; 1 male: **Kanchanaburi Pr.**, Khuean Srinagarindra NP,

14°38.136'N, 98°59.837'E, 210 m, pan trap, 21-22/viii/2008, Chatchawan, T3438; 1 male: **Sakon Pr.**, Nakhon Phu Phan NP, 17°03.543'N, 103°58.452'E, 8-14/vii/2006, MT, W. Kongnara, T197; 1 male: **Suphan Buri Pr.**, Khao Yai NP, Kong Geo waterfalls, 900 m, 30/vi/1990, J. Heraty, H90/108. Paratypes are deposited in QSBG and BME.

Additional non-type specimens (27) were seen from: Borneo: north, Tawa, Quoin Hill (1 male, BPB); Sabah: Kinabalu Nat. Park, Poring Hot Springs (4 males, CNC); Sarawak: sw Gunung Buda, 64 km s Limbang (BME); W. Kalimantan: Gunung Palung Nat. Pk. (3 males, ROM, BME); E. Kalimantan: Kac. Pujungan, Kayan-Mantarang Nat. Res. (1 male, ROM); West Java: Gede-Pangrango Nat. Park, Situ Gunung (2 males, ROM, BME); Sumatra: Aceh, Gunung Leuser Nat. Pk. (1 male, ROM); Malaysia: Selangor (1 male, UCR); Pahang: Kuala Tahan, Taman Negara Nat. Park (1 male, UCR); Malaya: 10 mi e Gombak (1 male, UCR); Thailand: Mae Hong Son, Namtok Mae Surin Nat. Pk (1 male, QSBG); Nakon Si Thammarat:Namtok Yong Nat. Pk. (1 male, UCR); Trang: Forest Res. Sta. Khao Chong (1 male, UCR); Singapore (7 males, BPBM, UCR).

**Diagnosis.** *L. cinnamonea* is most similar to *nasiformis*, as both share an arched medial vein, rectangular frontal projection, complete notauli, without a scrobal sulcus and the cu-a vein reduced to a tiny stub or absent. It can be distinguished from *nasiformis* by the more typical frontal projection, fore and midtibiae without discrete, measureable flanges, R1 obsolescent and Rs 3× or more as long as R.

Male description. Body length 2.0–3.0 mm; forewing length 2.5–3.5 mm. Head (Fig. 4): length twice breadth in side view; eye asetose; frontal projection rectangular in front view; frons smooth, not microstriate; frons with low ridge extending from vertex along inner eye margin; vertex without transverse fovea, cervical expansion strongly curved in profile; gena without scale-like setae; scape smooth, length 3.9 breadth; flagellomere I length 2× breadth; flagellomere II length 2.3× breadth; flagellomere XI length 5× breadth. Mesosoma: pronotal length 0.9× breadth, without lateral carina, pronotum narrower than head width; scutum with notauli reaching posterior margin; scutellum with sublateral carina, without fine dense striae laterally; metanotum without medial ridge, impunctate laterally, 0.4× as long as scutellum; mesopleuron without scrobal sulcus; propodeum without transverse dorsal carina; legs (Fig. 37) smooth, polished; forefemoral flange 0.4 x femur length, flange maximum width equal to width of tubular part of femur; foretibial flange absent; midfemoral flange 0.6× femur length, flange maximum width 0.6× width of tubular part of femur; midtibial flange absent; hindfemoral flange 0.9× femur length, flange maximum width 0.7× width of tubular part of femur; hindtibial flange as long as tibia, flange maximum width 0.8× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa without longitudinal carina on inner medial surface; forewing (Fig. 25) R1 length 0-0.2× R length; cu-a length 0.1 × R length; Rs length twice R length; Cu+M length 0.4-0.6 × A length; medial vein curved submedially. Color: body reddish brown to dark orange; wing membrane brown-tinted, with untinted areas adjacent to vein remnants; veins brown.

Female. Unknown.

Etymology. The species name is Latin for brown as in the spice, cinnamon.

#### Loboscelidia collaris Fouts

http://species-id.net/wiki/Loboscelidia\_collaris

Loboscelidia collaris Fouts 1922: 627. Holotype male (not female); Singapore (USNM).

**Material studied.** Indonesia: W. Kalimantan: Gunung Palung Nat. Pk (14 males, ROM; E. Kalimantan: Kac. Pujungan, Kayan-Matanrang Nat. Res. (3 males, ROM, BME); 38 km n alikpapan, Sambojal2 (1 male, ROM); Sumatra: Aceh, Gunung Leuser Nat. Park, Ketambe Res. Sta. (7 males, ROM, BME); Malaysia: Sabah, Mt. Kinabalu N.P., Poring Hot Spgs (2 males, CNC); Sarawak: Gunung Mulu National Park (4 males, BME, ROM); Selangor: 16 mi e Gombak, Univ. Malaya Forest (1 male, UCR); Singapore: (1 male, USNM), Timah Nat. Res. (1 male, CNC);; Thailand: Chaiyaphum,Tat Tone NP (1 male, QSBG); Trang: Near Nam Tock Tjon Prov., Khoa Chong Mt. (3 males, CNC); Phattalung Nam Tok Phrai Wan (1 male, UCR); 40 specimens were examined including the holotype.

**Diagnosis.** This is another species with a complete scrobal sulcus and triangular frontal projection. Male *collaris* can be distinguished from species with these traits by the combination of the pronotum with a sharp crease or ridge dorsolaterally, scape less than 3× as long as broad, flagellomeres I and II more than twice as long as broad, flagellomere XI 3.5–4.0× as long as broad, and the fore, mid and hindfemoral flanges as long as the femora.

#### Loboscelidia defecta Kieffer

http://species-id.net/wiki/Loboscelidia\_defecta

Loboscelidia defecta Kieffer 1916b: 18. Syntype male, female; Philippines: Palawan (Insel Palavan), Puerto Princesa (MNHN, lost?).

**Material studied.** Viet Nam: Karyu Danar (1 male, BPBM), Thailand: Mae Hong Son Pr., Namtok Mae Surin NP (1 male, BME); Nakhon Si Pr., Thammarat Namtok Yong (1 male, QSBG); Surat Thani Pr., Khao Sok Np, Klong Morg unit (1 male, BME); Chiang Mai Pr., Doi Chiangdao NP (1 male, QSBG); Malaysia: Sarawak, Gunung Lulu National Park (1 male ROM); 6 specimens were seen that appear to fit the original description.

**Diagnosis.** The types of *defecta* are apparently lost. However, based on Kieffer's (1916a) illustration it is one of the species that lacks a cu-a vein. In the same paper Kieffer attributed *defecta* and *inermis* to a 1915 paper he gives in the 1916a paper as "Philippine J. Sci. v. 10 p?", but there was evidently no paper published by Kieffer in 1915 in volume 10 of this journal. Instead, *defecta* Kieffer and *inermis* Kieffer were

published as new species one month after the 1916a paper (1916b). The 1915 date may have been a mistake on his part caused by delays in publication of the description paper in the Philippine Journal of Science.

#### Loboscelidia fulgens sp. n.

urn:lsid:zoobank.org:act:229B3296-7FD3-49E4-8626-590CD8CDC23E http://species-id.net/wiki/Loboscelidia\_fulgens Figs 5, 26, 38

**Type material.** Holotype male: Viet Nam: Tuyen Quang Prov., 360 m, Na Hang Reserve, 16–20 May 1997, FIT, S. B. Peck, 97-10 (CNC). Paratypes: 3 males same data as holotype; 1 male: 20-24 May 1997, 97-13; 1 male: 300 m, 97-17; 1 male: Ha Tinh, Huong Son, 450 m, 18°22'N 105°13'E, 22 April-1 May 1998, L. Herman, LT (BME, CNC).

**Diagnosis.** This is one of four species, including *bakeri*, *guangxiensis* and *reducta* that completely lack a medial vein. *L. fulgens* can be separated from *guangxiensis* in males by the shorter Rs vein, 1.5× as long as R, versus twice as long in *guangxiensis*, and having well-developed tibial flanges, which are lacking in *reducta*. *L. fulgens* can be immediately distinguished from *bakeri* by lacking the uniquely up-domed propodeum characteristic of *bakeri*.

Male description. Body length 1.5-2.0 mm; forewing length 2.0-2.5 mm. Head (Fig. 5): length 1.8× height in side view; eye asetose; frontal projection rectangular in front view; frons smooth, not microstriate; frons with low ridge extending from vertex along inner eye margin; vertex with transverse fovea, posterior expansion strongly curved in profile; gena without scale-like setae; scape striate, length 2.9× breadth; flagellomere I length 2× breadth; flagellomere II length  $1.8 \times$  breadth; flagellomere XI length  $3 \times$  breadth. Mesosoma: pronotal length 0.8× breadth, without lateral carina, narrower than head in dorsal view; scutum with notauli reaching posterior margin; scutellum with fine dense striae laterally; metanotum with medial ridge, impunctate laterally, 0.4× as long as scutellum; mesopleuron without scrobal sulcus; propodeum without transverse dorsal carina; legs (Fig. 38) smooth, polished; forefemoral flange 0.5× femur length, flange maximum width 0.6× width of tubular part of femur; foretibial flange 0.5× tibial length, flange maximum width 0.4 x width of tubular part of tibia; midfemoral flange absent; midtibial flange 0.6× femur length, flange maximum width 0.5× width of tubular part of tibia; hindfemoral flange 0.8× femur length, flange maximum width 0.6× width of tubular part of femur; hindtibial flange 0.8× femur length, flange maximum width 0.7× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa without longitudinal carina on inner medial surface; forewing (Fig. 26) R1 length 0.4× R length; cu-a absent; Rs length 1.4× R length; Cu+M length 0.6× A length; medial vein present, flat medially. Color: body brown to reddish brown; wing membrane brown-tinted, untinted along vein remnants; veins brown.

Etymology. The species name, *fulgens*, refers to the shining integument (Latin, adj).

### Loboscelidia fulva sp. n.

urn:lsid:zoobank.org:act:4719E8B5-6A56-4325-AEE0-4DD9DB50BC1D http://species-id.net/wiki/Loboscelidia\_fulva Figs 6, 27, 39

**Type material.** Holotype male: Thailand: Nan Prov., Doi Phu Kha NP, 19°12'418"N, 101°4'809"E, 1326 m, MT, 15-22 Sept. 2007, Charoen & Nikom, T3217 (QSBG).

**Diagnosis.** *L. fulva* is one of five species with a straight medial vein, including *meifungae, maculata, ora* and *defecta*. It can be distinguished from *ora* and *maculata* by having notauli, from *defecta* by having the cu-a vein one-half or more as long as R and Cu+M as long as A, and from *meifungae* by the rectangular frontal projection, Rs about 3× as long as R and the scutellum coarsely areolate (smooth to longitudinally striate in *meifungae*).

Male description. Body length 2.5 mm; forewing length 3.0 mm. Head (Fig. 6): length 1.6× height in side view; eye asetose; frontal projection rectangular in front view; frons with lateral ridge adjacent to eye margin; vertex without transverse fovea, posterior expansion strongly curved in profile; frons without carina or ridge extending from vertex along inner eye margin; gena without scale-like setae; scape smooth, length 2.7× breadth; flagellomere I length 1.6× breadth; flagellomere II length 1.7× breadth; flagellomere XI length 3.5-4.0× breadth. Mesosoma: pronotal length 0.8× breadth, with lateral carina, as wide as head in dorsal view; scutum with notauli reaching posterior margin; scutellum posteriorly coarsely rugose; metanotum with three medial ridges, impunctate laterally, 0.4× as long as scutellum; mesopleuron with scrobal sulcus; propodeum without transverse dorsal carina; legs (Fig. 39) smooth, polished; forefemoral flange 0.5× femur length, flange maximum width 0.5× width of tubular part of femur; foretibial flange 0.6× tibial length, flange maximum width 0.8× width of tubular part of tibia; midfemoral flange 0.6× femur length, flange maximum width 0.6× of tubular part of femur; midtibial flange 0.8× femur length, flange maximum width 0.7 of tubular part of tibia; hindfemoral flange 0.8× femur length, flange maximum width 0.6× of tubular part of femur; hindtibial flange as long as tibia, flange maximum width 1.2× of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa with longitudinal carina on inner medial surface; forewing (Fig. 27) R1 length 0.6× R length; cu-a length 0.6× R length; Rs length 3.1× R length; Cu+M as long as A ; medial vein flat. Color: body dark reddish brown; wing membrane brown-tinted, untinted along vein remnants.

Female. Unknown.

Etymology. The species name, *fulva*, refers to the brown body color (Latin, *f*.).

## Loboscelidia guangxiensis Xu

http://species-id.net/wiki/Loboscelidia\_guangxiensis

Loboscelidia guangxiensis Xu et al. 2006: 208. Holotype male; China: Guangxi Prov., Jiuwandashan (ZFCL).

Material studied. None; published distribution: China: Guangxi, Guangdong.

**Diagnosis.** This is one of five species, including *incompleta*, *bakeri*, *reducta* and *fulgens*, which have the medial vein partial or absent and cu-a less than 0.2× R or absent. It can be distinguished from these species by Rs more than twice as long as R and R1 more than 0.5× as long as R, flagellomeres I and II twice as long as broad, flagellomere XI less than 3× as long as broad and the hindtibial flange less than half as wide as the tubular part of the tibia.

#### Loboscelidia halimunensis Kojima

http://species-id.net/wiki/Loboscelidia\_halimunensis

*Loboscelidia halimunensis* Kojima (in Kojima and Ubaidillah), 2003: 203. Holotype male; Indonesia: West Java, Gunung Halimun National Park, Cikaniki (MZB, lost?).

## Material studied. None

**Diagnosis.** This is another of the species with a flat medial vein. *Loboscelidia halimunensis* and *defecta* both lack a cu-a vein. The two species can be separated by the longer Rs vein in *halimunensis* (more than 2× as long as R, versus less than 2× in *defecta*) and pronotum as long as broad or broader (longer than broad in *defecta*). Despite contacting the authors the type could not be located.

#### Loboscelidia incompleta sp. n.

urn:lsid:zoobank.org:act:0C00BA0E-657A-4E11-B707-BD33618B892B http://species-id.net/wiki/Loboscelidia\_incompleta Figures 8, 28

**Type material.** Holotype male: India: Tamil Nadu, Nilgiri Hills, v/1961, P. S. Nathan (CNC).

**Diagnosis.** The most distinctive and unique feature of this species is the medially incomplete medial vein. Among the species that lack a medial vein entirely, including *bakeri*, *fulgens*, *reducta* and *guangxiensis*, *incompleta* can be distinguished by the Rs vein twice as long as R (1.5× or less in the other species). It does share the fore and midtibial flanges lacking as in *reducta*.

Male description. Body length 2.5 mm; forewing length 3 mm. Head (Fig. 8): length 2× height in side view; eye asetose; frontal projection rectangular in front view; frons with lateral ridge adjacent to eye margin; vertex without transverse fovea, posterior expansion strongly curved in profile; frons without carina or ridge extending from vertex along inner eye margin; gena without scale-like setae; scape longitudinally striate, length 4× breadth; flagellomere I length 2.4× breadth; flagellomere II length 2.2× breadth; flagellomere XI length 3.2× breadth. Mesosoma: pronotal length 1.1× breadth, with lateral carina, nearly as broad as head; scutum with notauli reaching posterior margin; scutellum and metanotum smooth, polished, impunctate; metanotum one-third as long as scutellum propodeum without transverse dorsal carina; mesopleuron without scrobal sulcus; legs polished; forefemoral flange 0.2× femur length, flange maximum width 0.9× width of tubular part of femur; foretibial flange 0.6× femur length, flange maximum width 0.3× width of tubular part of tibia; midfemur without flange; midtibial flange 0.7× tibia length, flange maximum width 0.3× width of tubular part of tibia; hindfemoral flange 0.3× femur length, flange maximum width 0.7× width of tubular part of femur; hindtibial flange 0.7× as long as tibia, flange maximum width 0.5× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa with/without longitudinal carina on inner medial surface; forewing (Fig. 28) R1 length 0.3× R length; cu-a length absent; Rs length 2.2× R length; Cu+M 0.5× as long as A; medial vein submedially curved, incomplete medially. Color: reddish brown; wing membrane brown-tinted, paler along vein remnants, veins brown.

**Etymology.** The name refers to the medially interrupted medial vein of the forewing (Latin)

#### Loboscelidia indica Kimsey

http://species-id.net/wiki/Loboscelidia\_indica

Loboscelidia indica Kimsey 1988: 69. Holotype male; India: Nilgiri Hills (CNC).

Material studied. India: Nilgiri; only the holotype was seen.

**Diagnosis.** *L. indica* is one of two species described from India, including *incompleta*. It is also one of the dozen or so species with a scrobal sulcus and rectangular frontal projection. It can be distinguished from them by the combination of the Rs less than 3× as long as R, A as long or longer than Cu+M, scape less than 3× as long as broad, flagellomeres I and II twice or more as long as broad, and fore, mid and hindtibial flanges 1.5× or more as wide as the tibiae.

#### Loboscelidia inermis Kieffer

http://species-id.net/wiki/Loboscelidia\_inermis

Loboscelidia inermis Kieffer 1916:15. Syntype females (males?); Philippines: Mindanao, Butuan (MNHN, lost?).

**Material studied.** No reliably identified specimens have been seen. However, according to Kieffer's (1916) illustration *inermis* has a well-developed cu-a vein, unlike *defecta*, which lacks cu-a, or cu-a is represented by a very short stub.

#### Loboscelidia kafae sp. n.

urn:lsid:zoobank.org:act:09492B77-D0B2-401F-94AA-863039EF6EA8 http://species-id.net/wiki/Loboscelidia\_kafae Figures 9, 29, 40

**Type material.** Holotype male: Thailand: Chiang Mai Pr., Doi Phahompok NP, Mae Fang Hot spring, 569m, 19°57.961'N 99°09.355'E, Malaise trap, 7–14/iv/2008, K. Seesom, T6085 (QSBG).

Paratypes (52 males): 2 males: same data as holotype; 1 male: 14-21/ix.2007, P. Wongchai, T6168; 2 males:, 7-14/viii/2007, P. Wongchai, T6144, 6111; 1 male: Doi Phaluang, 1449 m, 20°1'06N, 99°09.581'E, 21-28/ix/2007, P. Wongchai, T6165; 1 male: 28/iv-7/v/2008, K. Seesom, T6084; 1 male: Doi Chiangdao NP, 19°24.278'N, 98°55.311'E, 491 m, 18-25/ix/2007, Jugsu & Watwanich, T5696; 1 male: Doi Chiangdao NP, 19°24.419'N, 98°55.237'E, 549 m, MT, 21-28/viii/2007, Jugsu & Watwanich, T5676; 1 male: Doi Chiangdao NP, Pha Tang, 19°24.978'N, 98°54.886'E, 526 m, Malaise trap, 4-11/ix/2007, Jugsu & Watwanich, T5682; 1 male: Doi Chiangdao NP, 549 m, 19°42.419'N 98°55.237'E, Malaise trap, 10–17/xii/2007, Jugsu & Watwanich, T5723; 1 male: Haui Na Lao, 500 m, 19°24.731'N, 98°55.315'E, Malaise trap, 15–21/v/2008, Jugsu & Watwanich, T5817; 1 male: Huai Nam Dang NP, 19°18.803'N, 98°36.396'E, Malaise trap, 21-28/ix/2007, Anuchart & Thawatchai, T5507; 1 male: Thung Buatong viewpoint, 19°17.6'N, 93°36.0'E Malaise trap, Anuchart & Thawatchai, 14-21/viii/2007, T5472; 1 male: Chiang Pr., Huai Nam Dang NP, Thung Buatong, 19°17.056'N, 98°36.029'E, Malaise trap, 21–28/viii/2007, Anuchart & Thawatchai, T5471; 1 male: Doi Chiangdao NP, 19°24.419'N, 98°55.237'E, 549 m, malaise trap, 14-21/viii/2007, Jugsu & Watwanich, T5673; 1 male: Kamphaeng Pr., Phet Mae Wong NP, 306 m, 16°02.233'N, 99°13.096'E, pan trap, 9–10/viii/2007, Srilopien & Phumirate, T3769; 1 male: Lampang Pr., Chae Son NP, 18°49.894'N, 99°28.354'E, 467 m, Malaise trap, 1-7/v/2008, Kwannui & Sukpeng, T5309; 1 male: 21-30/v/2008, T5305; 1 male: Chae Son NP, Doi Laan, 18°51.815'N, 99°22.122'E, 1413 m, Malaise trap, 9–15/ v/2008, Kwannui & Sukpeng, T5292; 1 male: Kanchanaburi Pr., Khuean Srinagarinda NP, 14°38.123'N, 98°59.657'E, Malaise trap, Somboon & Daorueng, T3462; 1 male: 7-14/v/2009, T4747; 1 male: 201 m, 23-30/iv/2009, T4744; 1 male: 13-20/xi/2008,

Somboon & Daorueng, T4423; 1 male: 6–13/xi/2008, Somboon & Daorueng, T4420; 1 male; 14°38.312'N, 98°59.643'E, 210 m, Malaise trap, Somboon & Daorueng, T3465; 1 male: Huay Mae Kamint, 14°38.441'N, 98°58.889'E, 240 m, Malaise trap, 7–14/v/2009, Somboon & Daorueng, T4740; 1 male: Nakhon Si Thammarat Pr., Namtok Yong NP, 8°10.434'N, 99°44.508'E, Malaise trap, 8–15/vii/2008, 80 m, U. prai, KT3083; .1 male: 8°14.262'N, 99°48.289'E, Malaise trap, 21–28/vii/2008, 966m, Palboon, T3108; 1 male: 8°16.959'N, 99°39.149'E, Malaise trap, 22-29/vii/2008; 1 male: road to Khao Mhen, 150 m from Nern466, 8°16.959'N, 99°39.149'E, 499 m, Malaise trap, 8–15/ vi/2008, S. Samnaokan, T3095; 1 male: Chaiyaphum Pr., Tat Tone NP, 16°0.792'N, 101°58.472'E, Malaise trap, 19-26/v/2007, Jaruphan & Budsawong, 648 m, 2575; 2 males: Petchaburi Pr., Kaeng Krachan NP, 12°47.831'N, 99°27.369'E, Malaise trap, 970 m, 8-15/viii/2008, Sirichai & Chusak, T4346; 1 male: 12°47.963'N, 99°27.188'E, Malaise trap, 5–12/ix/2008, Sirichai & Prasit, T4375; 1 male: 12°50.177'N, 99°28.098'E, Malaise trap, 735 m, 18–25/i/2009, Sirichai, T4406; 1 male: 12°48.107'N, 99°26.669'E, Malaise trap, 3-10/iv/2009, Sirichai, T4687; 1 male: 12°49.302'N, 99°22.263'E, Malaise trap, 254/iii-3/iv/2009, Sirichai, T4739; 1 male: 12°50.177'N, 99°20.688'E, Malaise trap, 735 m, 25/v-1/vi/2009, Sirichai, T5259; 2 males: Pa La-U waterfall, 12°32.154'N, 99°28.098'E, Malaise trap, 26/ix-3/x/2008, Akaradate & Thongbai, T4518; 1 male: 12°32.154'N, 99°28.098'E, Malaise trap, 4-11/xii/2008, Thongbai, T4553; 1 male: Pa La-U/Huai Palao Forest Unit 3, 12°32.149'N, 99°28.265'E, Malaise trap, 18–25/i/2009, Thongbai, T4566; 1 male: 12°32.149'N, 99°28.265'E, Malaise trap, 4–11/i/2009, Thongbai, T4562; 2 males: Phetchabun Pr., Nam Nao NP, 16°43.695'N, 101°33.797'E, 921 m, Malaise trap, 5–12/v/2007, L. Janteab, T2657; 2 males: 16°43.687'N, 101°33.797'E, 754 m, Malaise trap, 19–26/v/2007, N. Hongyothi, T2662; 1 male: Mae Hong Son Pr., Namtok Mae Surin NP, 228 m, 19°21.593'N, 97°59.254'E, Malaise trap, 11-18/ xi/2007, M. Namadkum, T5930; 1 male: 19°20.616'N, 97°59.003'E, Malaise trap, 11-18/xi/2007, 334 m, A. Kamkhun, T5934; 1 male: Sakon Nakhon Pr., Phu Phan NP, 17°03.488'N, 103°58.497'E, Malaise trap, 8–14/vii/2006, S. Tongboonchai, T199; 1 male: Prachuab Khiri Khan Pr., Khao Sam Roi Yot NP, 12°13.417'N, 99°56.153'E, Malaise trap, 31/viii-7/ix/2008, Sorat, Yai & Amnad, T4078; 1 male: Bar Hua Tan Thaeo, 12°13.059'N, 99°58.384'E, Malaise trap, 2–9/xi/2008, Yai & Amnad, T4128; 1 male: Phitsanulok Pr., Thung Salaeng Luang NP, 16°52.046'N, 100°49.067'E, Malaise trap, 501 m, 16–23/iv/2007, Pongpitak, T5207 (BME, QSBG).

Additional non-type specimens were seen from Laos (Phongsaly Prov., Ban Sano Mai) (22 males, CNC, BME); Vientiane Prov., Ban Van Eue (1 male, BPBM); Malaysia: Malaya, 13 mi e Gombak (1 male, UCR); Sarawak: Gunung Mulu NP (1 male, ROM) and Borneo: West Kalimantan Gunung Palung Nat Pk. (14 males, BME, ROM) E. Kalimantan: Kac. Plujungan, Kayan Metarang Nat. Res. (1 male, ROM); Viet Nam: Tuyen Quang Prov., Na Hang Res. (2 males, CNC); Thailand: Phitsanulok Pr., Thyng Salaeng Luang (1 males, BME, QSBG); Kanchanaburi: Khuean Srinagarinda NP (1 male, QSBG); Suphanburi Pro., Pu Toei NP (1 male, QSBG).

**Diagnosis.** L. *kafae* is one of the many species that have a submedially curved medial vein. Males have a short flagellomere I (less than twice as long as broad), which is also found in *pasohana* and *laminata*. It can be distinguished from these two species by flagellomere XI 4× as long as broad (shorter in the other species), the fore and midtibial flanges as broad as the tibiae and the hindtibial flange twice as broad (narrower in various combinations in the other species).

Male description. Body length 2.0-2.5 mm; forewing length 2.5-3.0 mm. Head (Fig. 9): length 1.9× height in side view; eye asetose; frontal projection rectangular in front view; frons smooth; vertex without transverse fovea, posterior expansion convex in profile; frons with low ridge extending from vertex along inner eye margin; gena without scale-like setae; scape smooth, length 3× breadth; flagellomere I length 1.6× breadth; flagellomere II length 2× breadth; flagellomere XI length 4.5× breadth. Mesosoma: pronotal length 0.8× breadth, with sharp lateral fold; scutum with notauli reaching posterior margin; scutellum with fine dense striae sublaterally; metanotum with medial ridge, densely, finely striate on either side, one-third as long as scutellum; mesopleuron with scrobal sulcus; propodeum without transverse dorsal carina; legs (Fig. 40) smooth, polished; forefemoral flange 0.7× femur length, flange maximum width 0.9× width of tubular part of femur; foretibial flange 0.7× femur length, flange maximum width 1.2× width of tubular part of tibia; midfemoral flange 0.8× femur length, flange as wide as tubular part of femur; midtibial flange 0.7× tibial length, flange as wide as tubular part of tibia; hindfemoral flange 0.9× femur length, flange maximum width as wide as tubular part of femur; hindtibial flange as long as femur, flange maximum width 2× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa without longitudinal carina on inner medial surface; forewing (Fig. 29) R1 length 0.5× R length; cu-a 0.5× R length; Rs length 2.6× R length; Cu+M length 0.5× A length; medial vein submedially curved. Color: body brown; wing membrane lightly brown-tinted along veins and vein remnants, veins brown.

Female. Unknown.

**Etymology.** The species name refers to the coffee brown coloration (Thai for coffee, noun).

#### Loboscelidia laminata sp. n.

urn:lsid:zoobank.org:act:30E0EEB4-A91F-49CE-9CEA-E86A911F785A http://species-id.net/wiki/Loboscelidia\_laminata Figures 10, 30, 41

**Type material.** Holotype male: Viet Nam: Tuyen Quang Prov., 360 m, Na Hang Reserve, 16–20 May 1997, FIT, S. B. Peck, 97-10 (CNC). Paratypes (17 males): 6 males, same data as holotype; 6 males, 20-24 May 1997, rainforest, FIT 97-13; 5 males, 97-12 (BME, CNC).

**Diagnosis.** *L. laminata* most closely resembles *kafae* as discussed under that species. However, *laminata* can be distinguished by flagellomere II less than twice as long as broad, flagellomere XI less than  $3.5 \times$  as long as broad, and the fore and midtibial flanges narrower than the respective tibiae.

Male description. Body length 2.0–2.5 mm; forewing length 2.5–3.0 mm. Head (Fig. 10): length 1.8× height in side view; eye asetose; frontal projection rectangular in front view; frons with lateral ridge adjacent to eye margin; vertex without transverse fovea, posterior expansion shallowly curved in profile; frons with low ridge extending from vertex along inner eye margin; gena without scale-like setae; scape smooth, length 2.6× breadth; flagellomere I length 1.7× breadth; flagellomere II length 1.8× breadth; flagellomere XI length 4× breadth. Mesosoma: pronotal length 0.8× breadth, with/out lateral carina, nearly as wide as head in dorsal view; scutum with notauli reaching posterior margin; scutellum with fine dense striae; metanotum with three medial ridges, impunctate laterally; mesopleuron with scrobal sulcus; propodeum without transverse dorsal carina; legs (Fig. 41) coarsely/smooth, polished; forefemoral flange 0.6× femur length, flange maximum width 0.8× width of tubular part of femur; foretibial flange 0.6× femur length, flange maximum width 0.7× width of tubular part of tibia; midfemoral flange 0.6× femur length, flange maximum width 0.8× width of tubular part of femur; midtibial flange 0.8× femur length, flange maximum width 0.4× width of tubular part of tibia; hindfemoral flange 0.8× femur length, flange maximum width 0.9× width of tubular part of femur; hindtibial flange 0.9× as long as tibia, flange maximum width 1.1× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa with longitudinal carina on inner medial surface; forewing (Fig. 30) R1 length 0.8× R length; cu-a length 0.5× R length; Rs length 3.2× R length; Cu+M 0.5× as long as A; medial vein submedially curved. Color: dark brown to yellowish brown; wing membrane brown-tinted, untinted along vein remnants; veins brown.

Etymology. The name refers to the large lamellae or flanges on the legs (Latin).

#### Loboscelidia laotiana Kimsey

http://species-id.net/wiki/Loboscelidia\_laotiana Figure 19

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

**Material studied.** Laos: Vientiane Prov, Ban Van Eue (2 males, BPBM, BME); Viet Nam: Fyan (1 male, BME); Malaysia: Sabah: Kinabalu Nat. Pk. (3 males, USNM); Indonesia: Sumatra, Aceh: Mt. Leuser Nat. Pk., Ketambe Res. Sta (1 male, ROM); 7 specimens were seen including the holotype.

**Diagnosis.** *L. laotiana* is one of the species with a scrobal sulcus and a triangular frontal projection (Fig. 19). It can be distinguished from the others by the combination of the Rs 3× or more as long as R, scape striate and more than 3× as long as broad, flagellomeres I and II less than twice as long as broad, flagellomere XI less than 3× as long as broad, fore and midfemoral flanges as wide as the tubular part of the respective femora and the hindtibial flange twice as wide as the tubular part of the tibia.

#### Loboscelidia levigata Yao, Liu & Xu

http://species-id.net/wiki/Loboscelidia\_levigata

*Loboscelidia levigata* Yao et al. 2010: 528. Holotype male; China: Guangdong Prov., Chebaling National Nature Reserve (SCAC).

## Material studied. None.

**Diagnosis.** *L. levigata* is one of three species described from southeastern China, including *sinensis* and *striolata*. It can be distinguished from these by the rectangular frontal projection, and in males R1 as long as R (shorter in *sinensis* and *striolata*) and Rs 3× as long as R, as opposed to 2.5× or shorter in *sinensis* and *striolata*. It can be distinguished from other *Loboscelidia* species by R1 reaching R at a right angle.

#### Loboscelidia maai (Lin)

http://species-id.net/wiki/Loboscelidia\_maai

- Scelidoloba maai Lin 1964: 238. Holotype female (not male); Taiwan: Paomingszu, 2 km s Keelung City (NMNS).
- *Loboscelidia artigena* Lin 1964: 243. Holotype male; Taiwan: Paomingzu, 2 km s Keelung City (NMNS). Possible synonymy with *maai* suggested by Day (1979). New synonymy herein.
- Loboscelidia latigena Lin 1964: 241. Holotype male; Taiwan: Tsaoshan, 20 km nw Taipei city (NMNS). Synonymized by Kimsey and Bohart 1991.

#### Material studied. None.

**Diagnosis.** This is one of four species, including *brunnea*, *maculipennis* and *nitidula*, with the cervical expansion of the vertex flat in profile. *L. maai* males can be distinguished from these species by having the scape less than  $2.5 \times$  as long as broad, the presence of a scrobal sulcus, and the tibial flanges wider than the tubular part of the respective tibiae.

#### Loboscelidia maculata Kimsey

http://species-id.net/wiki/Loboscelidia\_maculata

*Loboscelidia maculata* Kimsey 1988: 72. Holotype male; Australia: Queensland, 7 km sw Bellenden (ANIC).

**Material studied.** Australia: Queensland: 7 km sw Bellenden (1 male, ANIC); Mossman Gorge (2 males, CNC); 3 specimens were seen including the holotype.

**Diagnosis.** This is one of the five species with a medially flat medial vein as discussed under *defecta*. Of these, only *defecta* and *ora* have been described from Australia.

*L. maculata* can be distinguished from *defecta* by the lack of notauli (shared with *ora*), and the fore and hindtibial flanges twice as wide as the tubular part of the respective tibiae (narrower in *defecta* and *ora*).

## Loboscelidia maculipennis Fouts

http://species-id.net/wiki/Loboscelidia\_maculipennis Figures 11, 17, 20, 41

Loboscelidia maculipennis Fouts 1922: 625. Holotype male (not female); Borneo: Sandakan (USNM).

Loboscelidia carinata Fouts 1922: 626. Holotype male (not female); Singapore (USNM). Synonymized by Day (1979).

**Material studied.** Singapore: coll. Baker (1 make, BME), Sungei Bulch (1 male, BME); Indonesia: W. Kalimantan: Gunung Palung Nat. Pk. (6 males, ROM, BME); E. Kalimantan: Kac. Pujungan, Kayen-Mentarang Nat. Res (1 male, ROM), Sumatra: Aceh, Mt. Leuser (1 male, ROM); 12 males were seen including the holotypes of *maculipennis* and *carinata*.

**Diagnosis.** This is one of four species with a strongly flattened cervical expansion (Fig. 11) as discussed under *brunnea*. *L. maculipennis* males can be distinguished from the other three by cu-a as long as R, Rs vein 4× or longer than R, leg integument smooth (Fig. 41), and hindtibial posterior margin with 2 parallel carinae.

## Loboscelidia meifungae sp. n.

urn:lsid:zoobank.org:act:D05A300F-E49B-476E-98D4-970C53404F6B http://species-id.net/wiki/Loboscelidia\_meifungae Figures 12, 30, 42

**Type material.** Holotype male: Borneo: Sarawak, sw Gunung Buda, 64 km s Linbang, 4°13'N, 114°56'E, 8–15 Nov. 1996, MT, Heydon & Fung (BME). Paratypes (44): 10 males, same data as holotype; 10 males: 16–28 Nov. 1996; 11 males: 22-28 Nov. 1996, MT, Heydon & Fung; 1 male: November 1996, Heydon & Fung; 1 male: 18 Nov. 1996, Heydon & Fung; 1 male: 23 Nov. 1996; Heydon & Fung; 1 male: Buda Camp, sw Gunung Buda, 64 km s Linbang, 4°11'N, 114°56'E, 4 Nov. 1996, MT, Heydon & Fung; 4 males: Malaysia: Sabah, Kinabalu NP, 800m, Poring Hot Springs Langanan Creek, 22/viii/1988, A. Smetana, B-138; 1 male: Poring Hot Springs, 520 m, 9/v/1987, A. Smetana; 1 male: 480–510 m, 30.viii/1988, A. Smetana, B163; 1 male: 510 m, 13/v/1987; 1 male: Kipungit Creek, 550 m, 26/viii/1988, A. Smetana; 1 male: Liwagu River Trail, 1550 m, 12/viii/1988, A. Smetana, B107 (BME, CNC).

**Diagnosis.** This species belongs in the group of species having a flat medial vein and notauli, including *defecta* and *fulva*. It can be distinguished from other members

of the group by the triangular frontal projection, presence of a scrobal sulcus, cu-a present (shared with *fulva*) and midtibial flange absent.

Male description. Body length 2.0–4.0 mm; forewing length 2.5–4.5 mm. Head (Fig. 12): length  $1.8-2.0 \times$  height in side view; eye asetose; frontal projection triangular in front view; frons smooth to microstriate; vertex without transverse fovea, posterior expansion strongly curved in profile; frons without discrete carina or ridge extending from vertex along inner eye margin; gena without scale-like setae; scape with some striae, length 2.1–2.5× breadth; flagellomeres I and II length twice breadth; flagellomere XI length 4× breadth. Mesosoma: pronotal length 0.7-0.8× breadth, with lateral carina; scutum with notauli reaching posterior margin; scutellum with sublateral carina, with fine dense striae laterally; scrobal sulcus represented by series of pits; metanotum with medial ridge, impunctate laterally; propodeum without transverse dorsal carina; legs (Fig. 42) smooth, polished; forefemoral flange 0.5–0.7× femur length, flange maximum width  $0.8-1.0 \times$  width of tubular part of femur; foretibial flange  $0.6-0.9 \times$  femur length, flange maximum width 1.0–1.5 x width of tubular part of tibia; midfemoral flange 0.7–0.9× femur length, flange maximum width as wide as tubular part of femur; midtibial flange 0.7× femur length, flange maximum width 1.2× width of tubular part of tibia; hindfemoral flange 0.9× femur length, flange maximum width as wide as tubular part of femur; hindtibial flange 0.9× femur length, flange maximum width 1.7× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa without longitudinal carina on inner medial surface; forewing (Fig. 30) R1 length 0.5–0.7× R length; cu-a length 0.4–0.5× R length; Rs length 2.5–3.0× R length; Cu+M length 0.7–0.9× A length; medial vein submedially curved. Color: body brown to reddish brown; wing membrane brown-tinted, paler along vein remnants.

Female. Unknown.

Etymology. This species is named after Mei Lin "Stella" Fung one of the collectors.

#### Loboscelidia nasiformis sp. n.

urn:lsid:zoobank.org:act:BD5AC828-B80E-45BB-8835-1D6EAFCFDAA4 http://species-id.net/wiki/Loboscelidia\_nasiformis Figures 13, 31, 43

**Type material.** Holotype male: Thailand: Petchaburi Prov., Kaeng Krachan NP, Pa La-U/Huai Palao Forest Unit 3, 12°32'149"N, 99°28'265"E, Malaise trap, 4-11/ i2009, Thongbai, T4562 (QSBG).

**Diagnosis.** The most distinctive and unusual feature of this species is the greatly elongate and nose-like frontal projection, which makes the head nearly 3× as long as broad in lateral view. Otherwise, *nasiformis* is closest to *cinnamonea*, with an arched medial vein, rectangular frontal projection (albeit greatly elongate in *nasiformis*), complete notauli, cu-a reduced to a tiny stub or absent, and no scrobal sulcus. Other than the elongate frontal projection, *nasiformis* can be separated from *cinnamonea* by the presence of fore and midtibial flanges (absent in *cinnamonea*).

Male description. Body length 2 mm; forewing length 2.5 mm. Head (Fig. 13): length 2.9× height in side view; eye asetose; frontal projection nasiform; frons smooth; vertex without transverse fovea, posterior expansion strongly curved in profile; frons without carina or ridge extending from vertex along inner eye margin; gena without scale-like setae; scape smooth, without striae, length 3.7× breadth; flagellomeres I and II length 2.2× breadth; flagellomere XI length 3.6× breadth. Mesosoma: pronotal length 0.9× breadth, without lateral carina; scutum with notauli reaching posterior margin; scutellum without sublateral carina, smooth laterally; metanotum without medial ridge, impunctate laterally; propodeum without transverse dorsal carina; legs (Fig. 43) smooth, polished; forefemoral flange 0.5× femur length, flange as wide as tubular part of femur; foretibial flange 0.6× femur length, flange maximum width 0.4× width of tubular part of tibia; midfemoral flange 0.5× femur length, flange maximum width 0.4× width of tubular part of femur; midtibial flange 0.6× femur length, flange maximum width 0.6× width of tubular part of tibia; hindfemoral flange 0.8× femur length, flange maximum width 0.5× width of tubular part of femur; hindtibial flange 0.8× femur length, flange maximum width 0.6× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa without longitudinal carina on inner medial surface; forewing (Fig. 31) R1 length 0.3× R length; cu-a absent; Rs length 2.6× R length; Cu+M length 0.5× A length; medial vein submedially curved. Color: body brown to reddish brown; wing membrane brown-tinted, paler along vein remnants.

Etymology. The species is named for the long, nose-like frontal projection (Latin)

## Loboscelidia nigra Fouts

http://species-id.net/wiki/Loboscelidia\_nigra

Loboscelidia nigra Fouts 1922: 621. Syntype males (not female); Philippines: Mindanao, Dapitan, Basilan (USNM).

Material studied. Philippines: Mindanao; only the two syntypes were seen.

**Diagnosis.** As discussed under *castanea* and *collaris*, *nigra* is one of seven species with a triangular frontal projection, complete scrobal sulcus and complete notauli. Dimensions of the antennal articles will separate *nigra* from these species; the scape is less than 3× as long as broad, flagellomeres I and II are 2.5× as long as broad or longer and flagellomere XI is 4.5× as long as broad.

## Loboscelidia nigricephala Kimsey

http://species-id.net/wiki/Loboscelidia\_nigricephala

*Loboscelidia nigricephala* Kimsey 1988: 72. Holotype male; Australia: Queensland, 21 km s Atherton (QDPI).

**Material studied.** Australia: Queensland: Mt. Lewis (1 male, CNC); 21 km s Atherton (1 male, QDPI); Hugh Nelson Range, s Atherton (1 male, BME); 3 males were seen, including the holotype.

**Diagnosis.** This is one of five species, including *cervix*, *novoguineana*, *ora* and *parva*, where the frontal projection is broadly flattened and nearly linear in front view. It can be distinguished from these species by the arched medial vein, cu-a as long as or longer than R, foretibial flange as wide as tubular part of tibia, and the mid and hindtibial flanges 1.5× as wide as tubular part of the tibiae or wider.

#### Loboscelidia nigricornis Fouts

http://species-id.net/wiki/Loboscelidia\_nigricornis

Loboscelidia nigricornis Fouts 1925: 517. Holotype male; Philippines: Mindanao, Surigao (USNM).

**Material studied.** Philippines: Mindanao I., Agusan, Esperanza Bagugan, Matibog Creek (1 male, BPBM); 6 specimens were seen including the otype series.

**Diagnosis.** This is one of several species with a flat medial vein and rectangular frontal projection. In males, the absence of cu-a and the scape more than  $3.3 \times$  as long as broad are characteristics *nigricornis* shares with *halimunensis*. *L. defecta* can be distinguished from *halimunensis* by Rs less than twice as long as broad (longer in *halimunensis*) and longer pronotum (1.2× as long as broad, versus as long as broad or broader in *halimunensis*).

#### Loboscelidia nitidula sp. n.

urn:lsid:zoobank.org:act:B9D54654-B75A-4659-A223-901AFCCDB5BD http://species-id.net/wiki/Loboscelidia\_nitidula Figures 32, 44

**Type material.** Holotype male: Thailand, Petchaburi Prov., Nam Nao NP, 16°43'687"N, 101°33'754"E, 924 m, MT, 5-12/v/2007, N. Hongyothi, T2656 (QSBG). Paratypes (21 males): 1 male: Kaeng Krachan NP, 16/road/stream, 12°48'189"N, 99°26'62"E, MT, 11–18/iii/2009, Sirichai & Prasit, T4685; 1 male: 12°50'177"N, 99°20'688"E, MT, 735 m, 27/xi-4/xii/2008, Sirichai, T4395; 2 males: Chang Mai Prov., Doi Inthanon NP, 7–12/v/1990, E. Fuller, MT; 1 male: Chiangdao NP, Huai Na Lao, 19°24'731"N, 98°55'315"E, 500 m, YPT, 6-7/ v/2008, Jugsu & Watwanich, T5808; 1 male: Sakon Nakhon Prov., Phu Phan NP, 14/vii/2006, 17°03'543"N, 103°58'452"E, MT 8-W, Kongnara, T197; 2 males: 17°03'543"N, 103°58'452"E, MT, 15–21/vii/2006, MT, S. Tongboonchai, T200; 3 males: 17°03'488"N 103°58'497"E, MT, 15–21/vii/2006, MT, S. Tongboonchai,

T205; 1 male: Nong Bua Prov., Lam Poo Phu Kao Phu, Phan Kham Nat. Pk., 16°49'N, 102°37'E, 208 m, 27/vii-2/viii/2006, MT, R. Singhatip, T85; 1 male: Nakhon Si Prov., Thammarat, Namtok Yong NP, 17°10'434"N, 99°44'508"E, 80 m, MT, 16–23/viii/2008, K. Uprai, T3548; 2 males: Kanchanaburi Prov., Khuean Srinagarindra NP, Huay Mae Kamint, 14°38'312"N, 98°5'643"E, 210 m, MT, 13–20/xi/2008, Somboon & Daorueng, T4424/4423; 1 male: Erawan NP, 100 m, 5/vii/1990, J. Heraty, 90/115; 1 male: Loei Prov., Phu Kradeung NP, 16°49'01"N, 101°47'62"E, 276 m, MT, 14–21/v/2008, T. Phatai, T5011; 1 male: Trang Prov., Nayong, 7 m, 20/ii/2005, 7°33'04"N, 99°49'37"E, MT, D. Lohman; 1 male: Khao Chong Mt. 75 m, 28/iv-2/v/2005, 7°33'38"N, 99°47'369"E, MT; 1 male: near Nam Tock Ton Prov., Khoa Chong Mt., 140 m, ii/2005, 7°32'15"N, 99°47'36"E, MT, D. Lohman (QSBG, BME, CNC).

**Diagnosis.** Four *Loboscelidia* species have a flattened cervical extension, including *brunnea*, *maculipennis* and *nitidula*. Of these four *L. nitidula* can be distinguished by presence of a scrobal sulcus, a medial metanotal ridge and a large foretibial flange (flange absent in the other species).

Male description. Body length 2.0-2.5 mm; forewing length 2.5-3.0 mm. Head: length 1.6× height in side view; eye asetose; frontal projection rectangular in front view; frons smooth, not microstriate; vertex without transverse fovea, posterior expansion convex in profile; frons with ridge extending from vertex along inner eye margin; gena without scale-like setae; scape striate, length 2.7 breadth; flagellomere I length 1.7× breadth; flagellomere II length 1.8× breadth; flagellomere XI length 5× breadth. Mesosoma: pronotal length 0.8× breadth, with fold between dorsal and lateral surfaces, as wide as head width in dorsal view; scutum with notauli reaching posterior margin; scutellum with fine dense striae laterally; metanotum with medial longitudinal striae, impunctate laterally,  $0.5 \times$  as long as scutellum; mesopleuron with scrobal sulcus; propodeum without transverse dorsal carina; legs (Fig.44) smooth polished; forefemoral flange 0.7× femur length, flange maximum width 0.8× width of tubular part of femur; foretibial flange 0.9× femur length, flange maximum width as wide as tubular part of tibia; midfemoral flange  $0.7 \times$  femur length, flange maximum width  $0.7 \times$  width of tubular part of femur; midtibial flange 0.8× femur length, flange maximum width 1.2× width of tubular part of tibia; hindfemoral flange as long as femur, flange maximum width 1.2× width of tubular part of femur; hindtibial flange as long as femur, flange maximum width 1.6× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa without longitudinal carina on inner medial surface; forewing (Fig. 32) R1 length 0.7× R length; cu-a length 0.6× R length; Rs length 2.9× R length; Cu+M length 0.6× A length; medial vein submedially curved. Color: body brown to reddish brown; wing membrane brown-tinted, darkest medially, lightest along vein remnants.

Etymology. The species name, *nitidula*, is Latin for shiny/polished (f.).

#### Loboscelidia nixoni Day

http://species-id.net/wiki/Loboscelidia\_nixoni

- *Laccomerista rufescens* Cameron 1910a: 23. Holotype male; Borneo: Kuching (BMNH). Nec Westwood 1874.
- Loboscelidia nixoni Day 1978: 29. Replacement name for Loboscelidia rufescens (Cameron 1910).

Material studied. Borneo; only the holotype of *rufescens* (Cameron) was seen.

**Diagnosis.** *L. nixoni* is another of the species characterized by having a curved medial vein, rectangular frontal projection, and no scrobal sulcus, as discussed under *philippinensis*. In this group *nixoni* differs from *nasiformis* and *cinnamonea* in having cu-a well-developed and half as long as R. It can be separated from *philippinensis*, and *levigata* by the combination of the scape and flagellomere XI less than twice as long as broad, flagellomeres I and II less than 1.7× as long as broad and hindtibial flange less than 0.7× as wide as tubular part of tibia.

#### Loboscelidia novoguineana Kimsey

http://species-id.net/wiki/Loboscelidia\_novoguineana

*Loboscelidia novoguineana* Kimsey 1988: 74. Holotype male; Papua New Guinea, East Highlands, Aiyura (BPBM).

**Material studied.** Papua New Guinea: Mt. Suckling (1 male, CNC); Ivimka Res. Station, Lakekamu Basin (3 males, BME); 5 males were seen, including the holotype.

**Diagnosis.** As discussed under *nigricephala*, *novoguineana* is one of five species with a wide flattened frontal projection. It can be distinguished from these species by the partial notauli, scrobal sulcus indicated by a scrobal pit or several pits, and the fore, mid and hindtibial flanges present and narrower than the respective tibiae. This is the only *Loboscelidia* species described from New Guinea but there surely must be more.

#### Loboscelidia ora Kimsey

http://species-id.net/wiki/Loboscelidia\_ora Figure 18

Loboscelidia ora Kimsey 1988: 73. Holotype male; Australia: Queensland, Bingil Bay (ANIC).

**Material studied.** Australia: Queensland: Cape Tribulation (1 male, CNC); Paluma (2 males, CNC, BME); Lacey's Creek, Mission Beach (1 male, CNC); 5 males were examined, including the holotype.

**Diagnosis.** *L. ora* can be distinguished from the other *Loboscelidia* species with an apically broad, flattened frontal projection (Fig. 18) by the nearly straight medial vein, cu-a longer than R, Rs more than twice as long as R, A as long or longer than Cu+M, and no notauli.

#### Loboscelidia parva Maa & Yoshimoto

http://species-id.net/wiki/Loboscelidia\_parva

Loboscelidia parva Maa and Yoshimoto 1961: 545. Holotype male; New Britain: Vunabakan, 10 km e Keravat (BPBM).

#### Material studied. New Britain; only the holotype was seen.

**Diagnosis.** As discussed under *cervix* and *ora*, *parva* is another of the species with a wide, broadly flattened frontal projection. *L. parva* can be distinguished from these species by the arched medial vein, scape 3× as long as broad, partial notauli, pronotum broader than long, and foretibia without a flange.

#### Loboscelidia pasohana Kimsey

http://species-id.net/wiki/Loboscelidia\_pasohana

Loboscelidia pasohana Kimsey 1988: 75. Holotype male; Malaysia: Negri Sembilan, Pasoh Forest Reserve (AEI).

**Material studied.** Malaysia: Negri Sembilan, Pasho Forest Reserve (1 male, AEI); Sarawak: Gunung Mulu NP (4 males, ROM, BME); Sabah: Mt. Kinabalu (2 males, BMNH); NP, Liwagu Rv. Tr. (1 male, CNC); Thailand: Petchaburi, Kaeng Krachan NP (4 males, QSBC); Chiang Mai: Doi Phahompok NP, Mae Fang Hotspring (1 male, QSBC); 12 specimens were seen including the type series.

**Diagnosis.** This a member of the large group of species with a rectangular frontal projection, submedially curved medial vein, complete scrobal sulcus and complete notauli. *L. pasohana* can be distinguished from the rest by the following combination of features: Rs nearly as long as R, cu-a half as long as R, flagellomeres I and II less than twice as long as broad, and fore, mid and hindtibial flanges 1.3–1.7× as wide as tubular part of respective tibiae.

#### Loboscelidia pecki sp. n.

urn:lsid:zoobank.org:act:1E7C3500-EE85-481C-AFA6-1DCB27E97A33 http://species-id.net/wiki/Loboscelidia\_pecki Figures 2, 14, 33

**Type material.** Holotype male: Viet Nam: Tuyen Quang Prov., 360 m, Na Hang Reserve, 16–20 May 1997, FIT, S. B. Peck, 97-10 (CNC).



**Figures 14–26**. Lateral view of male *Loboscelidia* head, with basal antennal segments. **17–19**. Front view of face with antennae removed **20** Dorsal view of thorax, with wings removed **21**, **22** Dorsal view of pronotum scutum and tegulae **23–26** Forewings.

Diagnosis. This species is characterized by the absence of the cu-a vein and having

a submedially curved medial vein, characters shared with *cinnamonea*. It can be distinguished from *cinnamonea* by Rs 3× as long or longer than R, scape 3× or shorter as long as broad, scrobal sulcus present and the fore and midtibiae without flanges.

Male description. Body (Fig. 2) length 2 mm; forewing length 2.5 mm. Head: length 2× height in side view (Fig. 14); eve asetose; frontal projection rectangular in front view; frons smooth, not microstriate; vertex without transverse fovea, posterior expansion strongly curved in profile; frons with ridge extending from vertex along inner eye margin; gena without scalelike setae; scape striate, length 2.9× breadth; flagellomere I length 2.2× breadth; flagellomere II length  $2\times$  breadth; flagellomere XI length  $4\times$  breadth. Mesosoma: pronotal length  $0.9\times$ breadth, with lateral fold separating dorsal from lateral surface, about as wide as head in dorsal view; scutum with notauli reaching posterior margin; scutellum with fine dense striae laterally; metanotum with three medial ridges enclosing roughened medial area, smooth laterally, 0.4- $0.5 \times$  as long as scutellum; mesopleuron with scrobal sulcus; propodeum without transverse dorsal carina; legs (Fig. 2) smooth, polished; forefemoral flange 0.6 x femur length, flange maximum width 0.8× width of tubular part of femur; foretibial flange 0.8× tibia length, flange maximum width 0.7 x width of tubular part of tibia; midfemoral flange 0.7× femur length, flange maximum width 0.7× width of tubular part of femur; midtibial flange 0.9× femur length, flange maximum width 0.7× width of tubular part of tibia; hindfemoral flange 0.8× femur length, flange maximum width 0.7× width of tubular part of femur; hindtibial flange equal to femur length, flange maximum width 1.3× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa without longitudinal carina on inner medial surface; forewing (Fig. 33) R1 length as long as R; cu-a length absent; Rs length 3.2× R length; Cu+M length 0.8× A length; medial vein present, submedially curved. Color: Body dark brown; wing membrane brown-tinted, paler along vein remnants, veins brown.

Etymology. The species is named after the collector, Stuart Peck.

## Loboscelidia philippinensis Fouts

http://species-id.net/wiki/Loboscelidia\_philippinensis

Loboscelidia philippinensis Fouts, 1922: 623. Syntype males (not females); Philippines: Mindanao, Iligan (USNM).

**Material studied.** Philippines: Mindanao (3 males, USNM, BME); the 2 syntypes were also seen.

**Diagnosis.** *L. philippinensis* is one of the group of species characterized by having a submedially curved medial vein, rectangular frontal projection, no scrobal sulcus, and cu-a vein present. It can be distinguished from the rest of the group by the short, broad head in side view (1.2-1.4× as long as high), flagellomere I is more than twice as long as broad and longer than flagellomere II, partial notauli, metanotum half as long or longer than scutellum, A shorter than Cu+M, and hindtibial flange as long as tibia and twice as wide as tubular part of tibia.



Figures 27–35. Male Loboscelidia forewings.

## Loboscelidia reducta Maa & Yoshimoto

http://species-id.net/wiki/Loboscelidia\_reducta Figures 15, 34, 45

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

Material studied. Dai Lanh, Nha Trang (1 male, BPBM); Thailand: Loei: Phu Kradueng NP (3 males, QSBC, BME); Phetchabun: Nam Nao NP (4 males, QSBC, BME); Prachuab Khiri Khan: Khao Sam Roi Yot NP, Laem Sala Beach (2 males, QSBC); Khonkaen: Nam Pong NP (1 male, QSBC); Sakon Nakon, Phu Phan NP (2 males, QSBC, BME), Mae Hong Son: Namtok Mae Surin NP (3 males, QSBC, BME); Chiang Mai: Huai Nam Dang NP (1 male, BME); Kanchanaburi: Khuean Srinagarindra NP, Tha Thung-na/Chong Kraborg (1 male, QSBC); 22 specimens were seen including the holotype.

**Diagnosis.** Loboscelidia reducta is one of the species, including *incompleta*, bakeri, *fulgens* and *ganxiensis*, that have a rectangular frontal projection (Fig. 15), complete notauli, greatly reduced or absent cu-a vein and no medial vein (Fig. 34). It can be distinguished from them by the absence of fore, mid and hindtibial flanges (Fig. 45). This species bears a superficial resemblance to species of *Rhadinoscelidia*.

#### Loboscelidia rufa Fouts

http://species-id.net/wiki/Loboscelidia\_rufa

Loboscelidia rufa Fouts 1925: 517. Syntype males; Philippines: Sibuyan (USNM).

**Material studied.** Philippines: Misamis Or., Mt. Empagatao (1 male, BPBM); Sibuyan (2 males, USNM); Three specimens were seen including the syntypes.

**Diagnosis.** This is another species in the group with complete notauli, scrobal sulcus and rectangular frontal projection. *L. rufa* can be separated from other members of the group by the combination of the hindtibial flange nearly twice as wide as the tubular part of the respective tibiae (shared with *kafae*), flagellomeres I and II twice as long as broad or longer, and midtibial flange as long and as wide as the tubular part of the tibia.

#### Loboscelidia rufescens Westwood

http://species-id.net/wiki/Loboscelidia\_rufescens

Loboscelidia rufescens Westwood 1874: 172. Syntype males (not females); "Sul" (Sula) Isl. (OUMNH).

**Material studied.** Indonesia: Sula Island, Malaysia: Sarawak; only the 2 syntype of *rufescens* Westwood were seen.

**Diagnosis.** *L. rufescens* is another of the species characterized by having a curved medial vein, rectangular frontal projection and no scrobal sulcus, as discussed under *philippinensis*. In this group *rufescens* differs from *nasiformis* and *cinnamonea* in having cu-a well-developed and half as long as R. It can be separated from *philippinensis*, and *levigata* by the combination of the scape and flagellomere XI less than twice as long as broad, flagellomeres I and II less than 1.7× as long as broad and hindtibial flange less than 0.7× as wide as tubular part of tibia.



Figures 36-46. Lateral view of male *Loboscelidia* fore (a), mid (b) and hind (c) legs.
#### Loboscelidia sarawakensis Kimsey

http://species-id.net/wiki/Loboscelidia\_sarawakensis

*Loboscelidia sarawakensis* Kimsey 1988: 75. Holotype male; Sarawak, 4<sup>th</sup> div., Gn. Lulu (BMNH).

**Material studied.** Malaysia: Sarawak: Gunung Mulu NP (3 males, ROM, BME); Mentawai Range (1 male, ROM); 4<sup>th</sup> div., Gunung Lulu (1 male, BMNH); 5 males were seen including the holotype.

**Diagnosis.** As discussed under *castanea* and *collaris*, *sarawakensis* is one of seven species with a triangular frontal projection, complete scrobal sulcus and complete notauli. *Loboscelidia sarawakensis* can be separated from other members of the group by the combination of scape less than 2.5× as long as broad, flagellomeres I and II twice as long as broad, flagellomere XI 3.3× as long as broad, metanotum 0.3× as long as scutellum, and fore, mid and hindtibial flanges as long as and at least as wide as tubular part of respective tibiae.

#### Loboscelidia scutellata Fouts

http://species-id.net/wiki/Loboscelidia\_scutellata

Loboscelidia scutellata Fouts 1922: 628. Syntype males (not females); Philippines: Mindanao, Basilan, Surigao (USNM).

#### Material studied. Only the 2 syntypes were seen.

**Diagnosis.** *L. scutellata* is another of the species with a complete scrobal sulcus and notauli, and a triangular frontal projection. Characteristics that separate this species from the rest include the scape striate and 2.5–2.7× as long as broad, flagellomeres I and II twice as long as broad, flagellomere XI 2.4× as long as broad, fore and midfemoral flanges less than half as long as femora, hindtibial flange as long as tibia and 0.6× as wide as tubular part of tibia.

#### Loboscelidia sinensis Kimsey

http://species-id.net/wiki/Loboscelidia\_sinensis

Loboscelidia sinensis Kimsey 1988: 76. Holotype male; China: Hainan Island, Tien Fong Mts. (ZFCL).

Material studied. Only the holotype was seen.

**Diagnosis.** This is the last of the species group discussed under *scutellata*. *Lobosce-lidia sinensis* can be distinguished from the rest by the short R1 vein (0.2× as long as R), A as long as Cu+M, scape twice as long as broad, flagellomeres I and II 2.5× as long as broad, and metanotum 0.3× as long as scutellum.

#### Loboscelidia sisik sp. n.

urn:lsid:zoobank.org:act:10FCFF3D-8DE8-4511-8671-85B5934C1A1D http://species-id.net/wiki/Loboscelidia\_sisik Figures 16, 35, 46

**Type material.** Holotype male: Borneo, W. Kalimantan, Gunung Palung Nat. Pk., 15 June-15 Aug. 1991, Darling, Ubaidillah (Rosichon), Sutrisno, 11S 910131 (MBBJ).

Paratype: 1 male, same data as holotype, 11S 910125 (BME).

**Diagnosis.** This species has a number of distinctive features that in combination will distinguish it from other *Loboscelidia*, including the scale-like setae on the head and legs and the scrobal sulcus reduced to a series of foveae.

Male description. Body length 3-4 mm; forewing length 3.5-4.5 mm. Head (Fig. 16): length 1.7× height in side view; eye asetose; frontal projection triangular in front view; frons smooth, not microstriate; vertex without transverse fovea, posterior expansion strongly convex in profile; frons with ridge extending from vertex along inner eye margin; gena without scale-like setae; scape smooth, not striate, length 1.8 breadth; flagellomere I length 1.8× breadth; flagellomere II length 2.8× breadth; flagellomere XI length 3.5× breadth. Mesosoma: pronotal length 0.8× breadth, with lateral carina, as wide as head in dorsal view; scutum with notauli reaching posterior margin; scutellum with scattered large punctures and fine dense striae posteriorly; metanotum medially finely, densely striate/punctate impunctate laterally. 0.3× as long as scutellum; mesopleuron with scrobal sulcus consisting of 3-4 large pits or foveae; propodeum without transverse dorsal carina; legs (Fig. 46) smooth, polished; forefemoral flange 0.7 x femur length, flange maximum width 0.6× width of tubular part of femur; foretibial flange 0.4× tibial length, flange maximum width 0.4 x width of tubular part of tibia; midfemoral flange 0.5× femur length, flange maximum width as wide as tubular part of femur; midtibial flange absent; hindfemoral flange 0.9× femur length, flange maximum width as wide as tubular part of femur; hindtibial flange 0.9 imestibial length, flange maximum width 0.6× width of tubular part of tibia; hindtibia with two longitudinal carinae on posterior margin; hindcoxa with longitudinal carina on inner medial surface; forewing (Fig. 35) R1 length 0.5× R length; cu-a length 0.7× R length; Rs length 2.3× R length; Cu+M as long as A; medial vein submedially curved. Color: body dark brown; wing membrane brown-tinted, darker along vein remnants.

Female. Unknown.

**Etymology.** The species name is Indonesian for scale, referring to the scale-like setae on the head and legs (noun).

#### Loboscelidia striolata Yao, Liu & Xu

http://species-id.net/wiki/Loboscelidia\_striolata

*Loboscelidia striolata* Yao, Liu & Xu, 2010: 528. Holotype male; China: Guangdong Prov., Nanking National Nature Reserve (SCAC).

#### Material studied. None.

**Diagnosis.** *L. striolata* may very well be part of the species group discussed under *castanea* and *collaris*, characterized by a triangular frontal projection, complete scrobal sulcus and complete notauli. However, the published description and images do not show the mesopleuron clearly enough to determine whether the scrobal sulcus is present or not. If it does have a scrobal sulcus then *striolata* may be synonymous with *sinensis*. Both *striolata* and *sinensis* share similar head, wing vein, flagellar and leg flange dimensions. They appear to differ in the dimensions of the scape, which 3× as long as broad in *striolata* and twice as long as broad in *sinensis* and possibly in the presence of the scrobal sulcus in *sinensis*.

Female. Unknown.

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RESEARCH ARTICLE



# A new species of Apechoneura Kriechbaumer (Hymenoptera, Ichneumonidae, Labeninae) from Colombia

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#### Abstract

A new species of the ichneumonid subfamily Labeninae, *Apechoneura seminigra* **sp. n.**, is described. Specimens were collected from the Amazon Rainforest of Colombia.

#### Keywords

Ichneumonoidea, Labenini, South America, Neotropics, nigricornis species-group, taxonomy

## Introduction

The Labeninae is a subfamily of Ichneumonidae containing approximately 150 described species classified in four tribes and 12 genera. Compared with other subfamilies, this group is quite well-known worldwide (Gauld 2000). The Labenini is a Gondwanan group comprising five genera: *Torquinsha* Gauld & Wahl and *Gauldi*-

anus Lanfranco which are both endemic to Chile; Labena Cresson from Australia, Neotropical and Neartic regions; Certonotus Kriechbaumer from the Australasian region; and Apechoneura which is found in tropical America. Because Certonotus shares several autapomorphies with Apechoneura (e.g. mesoscutal rugae), Apechoneura was considered part of Certonotus (Wahl, 1993), but after a phylogenetic study (Gauld and Wahl 2000), Apechoneura has been hypothesized as the sister group of the clade embracing Certonotus and Torquinsha. Some of the autapomorphies of Apechoneura are the presence of a highly raised interantennal lamella and a submetapleural carina lacking an anterior lobe, but with a median denticle. Apechoneura has 24 described species and 30 estimated (Gauld 2000; Yu et al. 2005). This genus has been found in Bolivia (Mocsary 1905; Townes and Townes 1966), Brazil (Kriechbaumer 1890; Mocsáry 1905; Townes and Townes 1966; Gauld 2000), Chile (Lanfranco 1980), Colombia (Enderlein 1919; Townes and Townes 1966; Gauld 2000; Herrera 2006), Costa Rica (Mocsáry 1905; Townes and Townes 1966; Gauld 2000; Gauld and Wahl 2000), Ecuador (Morley 1913; Townes and Townes 1966; Gauld 2000), Mexico (Hernández-Aguilar et al. 2000; Ruíz-Cancino et al. 2002), Nicaragua (Cameron 1886; Maes 1989), Panama (Cameron 1886; Townes and Townes 1966), Paraguay (Schrottky 1911; Cushman 1920; Townes and Townes 1966), Peru (Carrasco 1972; Mocsáry 1905; Gauld 2000) and Venezuela (Gauld 2000). Costa Rica and Brazil are the countries with the most species (17 and 6 respectively).

Three species of *Apechoneura* are found in Colombia (Yu et al. 2005): *A. longicauda* Kriechbaumer, 1890 (Enderlein 1919; Gauld 2000; Herrera 2006), *A. nigricornis* Mocsáry, 1905 (Townes and Townes 1966; Herrera 2006) and *A. nigritarsis* (Cameron, 1886) (Townes and Townes 1966; Herrera 2006). Another species, *A. tricoloripes* (Mocsáry, 1905), may also be present in Colombia because it occurs in Costa Rica (Mocsary 1905; Townes and Townes 1966; Gauld 2000), Paraguay (Cushman 1920; Townes and Townes 1966) and Brazil (De Santis et al. 1973). Gauld (2000) divided the genus into six species-groups; the species described here, like *A. nigricornis*, belongs to the *nigricornis* species-group.

#### Material and methods

During an undergraduate project focused on the subfamily Labeninae, 14 of the main entomological collections of Colombia were reviewed (view Appendix). The specimens described here are deposited in the insect collection of the Instituto de Ciencias Naturales (ICN), Universidad Nacional de Colombia, Bogotá, Colombia. The nomenclatural treatment, morphological terminology and taxonomic characters used here follow Gauld (1991, 2000). The species treated in this study were compared with the descriptions made by Brullé (1846), Cameron (1886), Cushman (1920), Gauld (2000), Kriechbaumer (1890), Mocsáry (1905), and Schrottky (1911).

## **Systematics**

#### Genus Apechoneura Kriechbaumer, 1890

#### Apechoneura seminigra Herrera, sp. n.

urn:lsid:zoobank.org:act:4CFB6077-71E1-42D0-92FB-77907767B3CC http://species-id.net/wiki/Apechoneura\_seminigra Figures 1–13

**Material examined.** HOLOTYPE: Female, Colombia, Amazonas: Parque Nacional Natural Amacayacu Caño Mata Matá, 3°41'N, 70°15'W, Malaise trap, Martin Kelsey: 200 m, II-III.1989 (ICN 083474). PARATYPES: 1 female, same data as holotype (ICN 083472); 1 female, same locality, 300 m, 1.III.1988, bosque de tierra firme (ICN 083471).

Non-type material: 1 male, same locality, bosque de várzea (ICN 083473).

**Diagnosis.** This species can be diagnosed from all other Neotropical *Apechoneura* by the combination of the following: head orange; mesosoma and legs mostly orange (hind leg partly black); metasoma black. Epicnemial carina absent. Metapleuron with a conspicuous sharp lateral denticle. Hind wing with first abscissa of  $Cu1 0.2 \times$  as long as *cu-a*.

Description. Female. Fore wing length 15.0 mm.

**Head.** Clypeus almost flat, with a weak transverse ridge near apex; malar space  $0.6\times$  as long as basal mandibular width; lower face at narrowest point  $0.9\times$  as wide as height from clypeofacial suture to level of insertion of antenna; hypostomal carina joined to occipital carina far from base of mandible; posterior ocellus separated from eye by  $1.3-1.5\times$  its own maximum diameter. Antenna with flagellomeres 1 and 2 sub-equal by length; subapical flagellomere slightly elongate.

**Mesosoma.** Pronotum with upper hind margin swollen, forming a small conical projection; scutoscutellar groove broad and shallow; scutellum with three evident rugae posteriorly; epicnemial carina absent (Figs 1, 3, 5); sternal region of mesothorax smooth and polished; metapleuron with a rather conspicuous sharp lateral projection near posterior end; submetapleural carina narrow with a distinct low median denticle (Fig. 1). Propodeum in profile more or less flat; anterior transverse carina complete laterally, separating area spiracularis from area lateralis, mediodorsally incomplete so area basalis is not enclosed posteriorly; area basalis slightly transverse; lateromedian longitudinal carina not present behind anterior transverse carina (Figs 7, 9).

**Legs.** Fore leg with tibia slightly inflated, tarsus with long hairs on inner surface; mid leg with tibia bearing several stout spines.

**Wings.** (Fig. 12) Fore wing with areolet large, anteriorly narrowly truncate, with 2m-cu joining it very slightly basal of middle; second discal cell short, with vein 1m-cu about half as long as abscissa of Cu1 between Rs&M and 1m-cu; hind wing with apical abscissa of Cu1 joining cu-a clearly closer to M than to 1A; first abscissa of Cu1  $0.2\times$  as long as cu-a.



Figures 1–4. Habitus of *Apechoneura seminigra* sp. n. 1, 3 female, holotype 2, 4 putative male 1, 2 line drawings 3, 4 photographs.

**Metasoma.** Tergite 1 slender,  $3.5-4.0\times$  as long as posteriorly broad; sternite 1 short, reaching about 0.3-0.4 of length of tergite, with a median swelling centrally. Tergite 2  $1.9-2.3\times$  as long as posteriorly broad, with isolated pubescence; tergite 7 mediodorsally without an indentation posteriorly; tergite 8, in lateral view, tapered to a bluntly rounded apex, without a cornus, and with uniformly scattered pubescence; tergite 9 bearing long pubescence. Ovipositor, at rest extending beyond apex of metasoma by  $3.5-3.8\times$  the length of the metatibia.

**Color.** (Figs 3, 5, 7, 10) Head orange; flagellum predominantly black, two basal flagellomeres ventrally reddish. Mesosoma orange. Fore and mid legs orange; hind leg with coxa orange with a ventro-lateral black spot on the apex of the outer side, trochanter and trochantellus black except for some small orange spots, femur, tibia and tarsus black. Metasoma black, hypopygium centrally orange. Ovipositor sheath black except for subapical whitish wide band. Fore wing hyaline, with a distinctive apical black band; pterostigma black.

**Variation.** The female identified with the code ICN 083471 has the fore wing with the areolet petiolate.

**Putative Male.** Similar to female in structure, but smaller (fore wing length 10.0 mm). Hind wing with apical abscissa of Cu1 arising from M apical to junction of M + Cu1 with cu-a (Figs 11, 13). Antenna black with apical flagellomeres pale (Fig. 4). Metasoma mostly black, tergites 1–6 with a yellow triangular spot at posterior margin (Figs 4, 8). Metapleuron with denticle smaller and paler than in the female.



Figures 5–8. *Apechoneura seminigra* sp. n. 5, 7 female, holotype 6, 8 putative male 5, 6 Head, mesosoma and part of metasoma, lateral view 7, 8 head, mesosoma and part of metasoma, dorsal view.

**Specimen condition.** The male exemplar was deteriorated during the drawing process. Its antenna was broken and lost.

**Etymology.** The species name refers to its color (i.e. metasoma and most part of hind leg black).

**Remarks.** Apechoneura seminigra sp. n., just like A. nigricornis, lacks an epicnemial carina; this characteristic separates them from the rest of the species of the genus. As A. nigricornis, A. seminigra sp. n. possesses a conical projection on the metapleuron and lacks an indentation on tergite 7. However, the metasoma is orange in A. nigricornis and black in A. seminigra sp. n. Also, in the hind wing, the first abscissa of Cu1 is  $0.4 \times$  as long as cu-a in A. nigricornis and 0.2 in A. seminigra sp. n. Although these two species are rather similar morphologically, the difference in color



Figure 9. Apechoneura seminigra sp. n., female, holotype - propodeum, dorsal view.



Figures 10-13. Wings of Apechoneura seminigra sp. n. 10, 12 female, holotype; 11, 13 putative male.

pattern makes in this case their separation reliable. Gauld (2000) examined extensive material of *A. nigricornis* from Costa Rica but also some material from Brazil and Peru, and Herrera (2006) examined one specimen of *A. nigricornis* collected in Porce (Antioquia, Colombia) in 1998 and no color variation compared to the holotype of this species was found.

**Comments.** Apechoneura seminigra sp. n. is so far only known from Colombia, Amazonian Region, northwest of Leticia. According to Gauld (2000) there is significant sexual dimorphism in *Apechoneura* and the sex association is often difficult, in part because the male specimens are less frequently collected. Despite the differences between the female specimens and the male specimen of *Apechoneura seminigra* sp. n., especially in the hind wing venation, they are tentatively considered here as belonging to the same species, mainly because all the specimens were collected in the same exact locality, in two consecutive years.

#### Acknowledgements

Edgard E. Palacio loaned to me the specimens that during the study belonged to his personal collection and deposited them into the ICN insect collection. Thanks to Carlos E. Sarmiento (ICN) for housing the type material. Gloria Echeverri from the Herbarium of Universidad de Antioquia (HUA) made the drawings (except Figure 9). Luciana Bueno dos Reis Fernandes edited the figures. Thanks to Ricardo Callejas, Fernando J. Muñoz-Quesada, Fernando Fernández, John Alveiro Quiroz, Diego Campos, Allan H. Smith, Víctor Hugo González and Juan Manuel Vargas who advised me during my undergraduate project. Also special thanks to the two reviewers for their helpful comments.

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# Appendix

List of collections

- Instituto Humboldt (Acronym: IAvH-E)
- Insect Collection, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá (Acronym: **ICN**)
- Museo de Entomología "Francisco Luis Gallego", Universidad Nacional, sede Medellín. (Acronym: **UNCM**)
- Instituto de Biología, Universidad de Antioquia, Medellín. (Acronym: CEUA)
- Facultad de Agronomía, Universidad Nacional de Colombia; Bogotá (Acronym: **UNAB**)
- Museo de Historia Natural, Pontificia Universidad Javeriana; Bogotá (Acronym: **MUJ**)
- Corporación para Investigaciones Biológicas; Medellín (Acronym: CIB)
- Universidad Pedagógica Nacional; Bogotá (Acronym: UPNC)
- Edgard Palacio Insect Collection- Colección Personal; Bogotá (Acronym: EPIC)
- Museo Universidad La Salle, Bogotá. (Acronym: U La Salle)
- Colección Entomológica "Luis María Murillo", Instituto Colombiano Agropecuario, Tibaitabá. Bogotá (Acronym: **CELM**)
- Museo de Ciencias Naturales, Colegio San José. Medellín, Barrio Boston. (Acronym: CSJ)
- Colección entomológica Piedras Blancas (Comfenalco) (Acronym: CEPB)
- Colección personal del profesor Oscar E. Ortega M. (Oficina- Unalmed) (Acronym: **OOCP**)

RESEARCH ARTICLE



# Revised concept of the genus *Euryporus* Erichson (Coleoptera, Staphylinidae, Staphylininae) and phylogenetic significance of Staphylinini from New Guinea

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#### Abstract

The Staphylinini rove beetle genus *Euryporus* Erichson from the subtribe Quediina is restricted to include only three species from the Western Palearctic region: *E. picipes* (Paykull, 1800), *E. aeneiventris* (Lucas, 1846), and *E. princeps* Wollaston, 1864. *Euryporus argentatus* Fauvel, 1881, *E. warisensis* Last, 1987 and *E. multicavus* Last, 1980, which do not even belong to the subtribe Quediina, are excluded from the genus. Of these, two were transferred to different genera: *Tympanophorus argentatus* (Fauvel, 1881), **comb. nov.**, from Sumatra; and *Hesperus warisensis* (Last, 1987), **comb. nov.**, from New Guinea. "*Euryporus" multicavus* could not be placed to any of the described genera of Staphylinini and is left as *incertae sedis* pending a broader study of the relevant fauna of this tribe in New Guinea and adjacent regions. The taxonomic history of *Euryporus* is reviewed, and an updated diagnosis of this genus is provided.

#### **Keywords**

Euryporus, Tympanophorus, Hesperus, Quediina, Anisolinina, Philonthina, Staphylinini, New Guinea

#### Introduction

An abundance of large and polyphyletic, poorly defined genera is a drawback of the current classification of the hyper-diverse rove beetle tribe Staphylinini (e.g., "*Quedius*-complex" discussed in Solodovnikov 2006). By including numerous unrelated species

together, such "genera" inhibit species discovery and taxonomic revisions, and they introduce "noise" in any evolutionary study of rove beetles. However, a number of monobasic or species-poor genera of Staphylinini suffer from the flawed definition too.

One such small genus that nevertheless turned out to be a taxonomic "waste basket" is *Euryporus* Erichson, 1839 from the subtribe Quediina. Prior to this paper *Euryporus* comprised three well-known species from the Western Palearctic region (*E. picipes* (Paykull, 1800) (Fig. 1), *E. aeneiventris* (Lucas, 1846), and *E. princeps* Wollaston, 1864), and three poorly known "exotic" species: *Euryporus argentatus* Fauvel, 1881 from Sumatra (Fig. 2), as well as *E. warisensis* Last, 1987 (Figs 3–7) and *E. multicavus* Last, 1980 (Figs 8–11) from New Guinea. Poor descriptions of these "exotic" species coupled with the unusual disjunct distribution of the genus cast strong doubts on the monophyly of *Euryporus* and triggered this study.

Examination of the relevant types made the misplacement of all three "exotic" species in *Euryporus* immediately obvious. But while the correct identity of *E. argentatus* and *E. warisensis* as members of the genera *Tympanophorus* Nordmann, 1837 and *Hesperus* Fauvel, 1874, respectively, also became clear, proper classification of *E. multicavus* faced a problem of poor generic limits in the subtribes Philonthina and Anisolinina, and even a problem of blurred limit between these subtribes (Schillhammer 2004). In such circumstances, a broader phylogenetic analysis embracing relevant lineages from these and related subtribes of Staphylinini would be required. For the poorly known fauna of New Guinea and adjacent regions such analysis was impossible without prior extensive taxonomic study of many species, which was far beyond the scope and goals of this paper. Therefore, *E. multicavus* is explicitly removed from *Euryporus* but left as *incertae sedis* within Staphylinini pending further study.

#### Material and methods

The paper is based on the material from the following institutions:

BPBM	Bernice P. Bishop Museum, Honolulu (S. Myers)
HNHM	Hungarian Natural History Museum, Budapest (G. Makranczy)
MMUE	Manchester Museum, the University of Manchester (D. Logunov)
NCBN	Netherlands Centre for Biodiversity Naturalis, the Netherlands (M.E.
	Gassó Miracle and A. van Assen)

Labels of the examined types are quoted verbatim; data from each label are separated by a slash [/].

Photos in Figs 3 and 8 were taken by the author with an MP-E 65 mm lens for Canon EOS 40D; those in Figs 2, 4–7, and 9–11 were taken by Ken Puliafico (Copenhagen) with a Leica DFC 420 camera attached to a Leica MZ16A microscope with the aid of Leica Application Suite (Leica Microsystems, 2003-2007) and Automontage

Pro (Synoptics Ltd, 1997–2004). The photo in Fig. 1 was produced and kindly provided by Harald Schillhammer (Vienna).

Correspondence of the locality names from old collection labels to modern toponyms was checked with the on-line resource (http://isodp.hof-university.de/fuzzyg/query/).

#### Genus Euryporus Erichson, 1839

http://species-id.net/wiki/Euryporus

#### **Type species.** Oxyporus picipes Paykull, 1800 (fig. 1).

**Taxonomic history.** The rove beetle genus *Euryporus* Erichson, 1839 was described by Nordmann (1837) as *Pelecyphorus* to include one European species *E. picipes* (Paykull, 1800) (Fig. 1). Since *Pelecyphorus* Nordmann, 1837 (nec *Pelecyphorus* Dejean, 1834) was a preoccupied name, Erichson (1839) replaced it with *Euryporus* and described the second species in the genus, *E. puncticollis* from North America (Erichson 1840). Soon, *E. aeneiventris* Lucas, 1846 and *E. princeps* Wollaston, 1864, both from the West Palearctic region were added (Lucas 1846; Wollaston 1864). Later Fauvel (1881, 1884) described *E. argentatus* Fauvel, 1881 and *E. flavipes* Fauvel, 1884, both from Sumatra. On the contrary, two species were removed from the genus: Sharp (1884) transferred Erichson's *E. puncticollis* to the genus *Tympanophorus* Nordmann, 1837, while Fauvel (1895) erected a new genus *Pammegus* (now with twelve species, in the subtribe Anisolinina) for his own species *E. flavipes*. Finally, Last (1980, 1987) described two more species in *Euryporus: E. multicavus* Last, 1980 and *E. warisensis* Last, 1987, both from Papua New Guinea.

As a result, the genus *Euryporus* included six species before this study (e.g., Herman 2001). Of them the type species *E. picipes* and two other West Palearctic species, *E. aeneiventris*, and *E. princeps*, are very similar to each other and rather well-known (e.g., Coiffait 1978, Assing and Schülke 2012). Examination of the type material for the "exotic" *E. argentatus*, *E. multicavus* and *E. warisensis* led to their exclusion from *Euryporus* as explained below.

**Updated diagnosis, composition and phylogenetic relationships.** Without the excluded taxa (see below), *Euryporus* comprises three species very similar to each other: *E. picipes* (Paykull, 1800) widely distributed in Europe (Fig. 1); the West Mediterranean *E. aeneiventris* Lucas, 1846; and *E. princeps* Wollaston, 1864, endemic to the Canary Islands. Male genitalia of all species were illustrated in Coiffait (1978).

Among other genera of the subtribe Quediina, *Euryporus* can be distinguished by the following combination of characters: fully developed infraorbital ridges; mandibles elongate with broad basal part but narrow and sharp apical portion; last segment of maxillary palps fusiform, slightly setose; last segment of labial palps enlarged, apically obliquely truncated, densely setose; first antennal segment elongate, as long as second and third antennal segments together; anterior tarsi narrow, not enlarged in both sexes; apical margin of abdominal sternite VIII in both sexes concave, in male without median incision. Other recent descriptions and synopses of the genus can be found in Coiffait (1978) and Assing and Schülke (2012).



Figure 1. Euryporus picipes, habitus.

For phylogenetic purposes adult (Solodovnikov 2006; Solodovnikov and Schomann 2009) and larval (Pietrykowska-Tudruj et al. 2011) morphology of *E. picipes* was scored in those character matrixes. The adult-based analysis (Solodovnikov and Schomann 2009) placed *Euryporus* in the subtribe Quediina (in the restricted sense of Chatzimanolis et al. 2010). Within Quediina, it may be related to the lineage formed by the genera *Anaquedius* Casey, 1915, *Hemiquedius* Casey, 1915, *Anchocerus* Fauvel, 1905, *Australotarsius* Solodovnikov et Newton, 2009, and *Acylophorus* Nordmann, 1837 (Solodovnikov and Schomann 2009; but see additional remarks about alternative hypotheses in Solodovnikov of Newton 2009). Although *Euryporus* was not included in the molecular study of

Chatzimanolis et al. (2010) because of unavailable DNA-quality material, the above mentioned lineage was recovered as monophyletic in the Bayesian analysis of that study. The larvae-based analysis (Pietrykowska-Tudruj et al. 2012) was inconclusive as far as sister relationships of *Euryporus* is concerned.

#### Species excluded from Euryporus

*Tympanophorus argentatus* (Fauvel, 1881), comb. n. http://species-id.net/wiki/Tympanophorus\_argentatus Figure 2

**Type material examined. Indonesia:** Holotype, female, "*Euryporus argentatus* Fvl. [in Fauvel's handwriting] / Suon Exp. Moeara Laboe 11/77 [circle label]/ Museum Leiden *Euryporus argentatus* det. Fauv. [pre-printed, partly handwritten curatorial label]/ *argentatus* Fauvel n. sp.[handwritten label]/ Holotype *Euryporus argentatus* Fauv. revised by A. Solodovnikov 2012 [red label]/*Tympanophorus argentatus* (Fauvel) A. Solodovnikov det. 2012" (NCBN).

*Comments.* In the original description of *Euryporus argentatus*, Fauvel (1881) clearly mentioned a single type specimen from "Moeara Laboe" [= Moearalaboeh, now Propinsi Jambi, Indonesia, 1°29'0"S, 101°3'0"E]. Based on the habitus (Fig. 2) and other diagnostic characters, the holotype and other specimens of *Euryporus argentatus* from the collection of NCBN are conspecific and can be clearly identified as a species of the genus *Tympanophorus* Nordmann, 1837. With the possible exception of *T. schenklingi* Bernhauer, 1912 from the Afrotropical region, *Tympanophorus* (e.g., illustrated redescription in Naomi 1983) is monophyletic (Schillhammer 2004).

It is noteworthy that long after the description of *E. argentatus*, Fauvel (1902) did recognize the correct affiliation of that species. In a short note on page 42 he mentioned "*Tympanophorus argentatus* Fvl. (*rugosus* Waterh.)", apparently meaning a synonymy of his species with *T. rugosus* (C. Waterhouse, 1884). This so vaguely annotated transfer of *E. argentatus* to *Tympanophorus* was overlooked by later authors. For example Herman (2001) lists both *Euryporus argentatus* Fauvel, 1881 as a valid species and "*Tympanophorus argentatus* Fauvel", erroneously, as *nomen nudum*. Synonymy of *Tympanophorus argentatus* (Fauvel, 1881) and T. *rugosus* (C. Waterhouse, 1884) remains to be verified.

#### Hesperus warisensis (Last, 1987), comb. n.

http://species-id.net/wiki/Hesperus\_warisensis Figures 3–7

**Type material examined. Papua New Guinea:** Holotype, female, "Holotype [red circular label]/ New Guinea Neth. Waris, S. of Hollandia, 450–500 m, VIII-16-23-1959/ T.C. Maa collector Bishop/ *Euryporus warisensis* sp. n. H.R. Last det., Holotype [H.R. Last's label]/ *Hesperus warisensis* (Last) A. Solodovnikov det. 2012" (BPBM).



Figure 2. Tympanophorus argentatus, holotype, habitus.

Although *E. warisensis* is strikingly different from the Palearctic *Euryporus* (cf. Figs 1 and 3), Last (1987) did not provide any justification for his generic placement. Based on the structure of head sutures (rudimentary infraorbital ridges, Fig. 5; present dorsal basal ridge on the neck), prothorax (laterally visible hypomera; superior marginal line turning downwards before anterior angles of pronotum, Fig. 6); anterior angles of pronotum not strongly protruding over anterior margin of prothorax), legs (lacking empodial setae) and other characters, *E. warisensis* is clearly not congeneric with *Euryporus* and in fact belongs to the subtribe Philonthina.

Because of its rather elongate mandibles and maxillary palps (Fig. 5), as well as habitus resemblance, *E. warisensis* could be associated with some species of *Hesperus* from New Guinea like *H. raynori* Last, 1987 and others. As pointed out in Schil-



Figures 3–7. *Hesperus warisensis,* holotype: 3 habitus 4 body in ventral view 5 head in ventral view 6 right side of pronotum in lateral view 7 left side of pronotum in lateral view. Blue arrow shows "fake" superior line of pronotum.

lhammer (2002) about *Hesperus* ["...this genus is a dumping ground for species matching a particular set of characters which can hardly suffice to justify a monogeneric treatment"], and demonstrated in the phylogenetic analysis (Li and Zhou 2011), this genus is not a monophyletic group and needs a revision. In such circumstances placement of *E. warisensis* in *Hesperus* is a practical solution pending further study. As far as I am aware (and personal communication of H. Schillhammer), the enlarged apical labial palpomeres of *E. warisensis* easily distinguish this species from any other known species of *Hesperus*.

It is noteworthy that on the left side of the pronotum (Fig. 7) the holotype of *Hesperus warisensis* displays a "fake" superior line extended towards anterior angles of pronotum, while the right side has no such structure (Fig. 6). Presumably, the left side of the pronotum in the holotype displays a slight teratology.

# Euryporus multicavus Last, 1980, non Euryporus, Staphylinini incertae sedis

http://species-id.net/wiki/Euryporus\_multicavus Figures 8–11

Type material examined. Papua New Guinea: Holotype, male, "New Guinea SE Kiunga, 1.VIII. 1969/ No. NGK-R. 1 leg. Dr. Ballogh/ Holotypus 1980 male [symbol] *Euryporus multicosus* [sic!] Last [standard HNHM curatorial label] / *Euryporus multicosus* [sic!] sp. n. H.R. Last det., Type male [symbol] [H.R. Last's label]" (HNHM); paratype, male, "New Guinea SE Kiunga, 23.VII-2.VIII.1969/ No. NGK-B.3. leg. Dr. Ballogh/ *Euryporus multicavus* sp. n. H.R. Last det., Paratype [H.R. Last's label]/ Staphylinini genus nov.? A. Solodovnikov det. 2012" (MMUE).

*Comments.* As in the above described case, *Euryporus multicavus* is strikingly different from the Palearctic *Euryporus* in habitus (cf. Figs 1 and 8), but Last (1980) did not explain why his species was assigned to that genus. Based on the structure of head (rudimentary infraorbital ridges (Fig. 11); present dorsal basal ridge on the neck), prothorax (superior marginal line inflected inwards under anterior angles of pronotum; pronotal hypomera visible from lateral view; anterior angles of pronotum not strongly protruding over anterior margin of pronthorax), legs (lacking empodial setae) and other characters, it is clear that *E. multicavus* is not congeneric with *Euryporus* and even does not belong to the subtribe Quediina. On the other hand, the combination of characters of that species does not allow its unambiguous placement in any of the currently recognized subtribes of Staphylinini.

Because of the short and stout labial palps with dilated last segment, shape of the mandibles (Fig. 11), strongly foveate surface of the apical abdominal segments, and the overall habitus (Fig. 8) remotely resembling *Tympanophorus*, I assume that *"Euryporus" multicavus* is phylogenetically close to the *Tympanophorus*-lineage of the subtribe Anisolinina (as defined in Schillhammer 2004). But the absence of the elevated ridge on the mesosternum, absence of empodial setae, sexually dimorphic sternite VII (with slight medio-apical incision in male) and strongly reduced para-



**Figures 8–11.** "*Euryporus*" *multicavus*, paratype: **8** habitus **9** body in ventral view **10** aedeagus in parameral view **11** head in ventral view.

mere of the aedeagus (Fig. 10), cast doubts on such affinity. At least the absence of empodial setae and extremely reduced paramere of the aedeagus are shared by "*Euryporus*" *multicavus* with several species from New Guinea described in the genera *Philonthus* and *Hesperus*. But, except *Hesperus warisensis* moved to that genus here, none of those species have robust and dilated labial palpi, and all of them differ from "*Euryporus*" *multicavus* in other details. It is possible that "*Euryporus*" *multicavus* represents a new genus whose description must be postponed until a more inclusive phylogenetic study of relevant lineages is performed. Such study should be based not only on an extensive taxonomic revision of the hitherto poorly described relevant species but also include additional material from the collections of Staphylinini from New Guinea and adjacent regions, which I am aware of and which have remained largely untouched by modern workers.

#### Acknowledgements

I am greatly obliged to the above mentioned institutional curators who provided the material under their care for this study. Productive discussions with Adam Brunke (Copenhagen) about characters and systematics of the problematic "*Euryporus*" and other Staphylinini helped to refine some thoughts for this paper. Special thanks are due to Harald Schillhammer (Vienna) for providing the excellent photo of *Euryporus picipes*, and, especially, for his helpful comments on an earlier version of the paper that sharpened the discussion about the affinities of *Euryporus warisensis* (Last) and *E. multicavus* Last. Finally, I am very thankful to Ken Puliafico (Copenhagen) for taking digital photos for the most of the illustrations.

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**RESEARCH ARTICLE** 



# A revision of the genus Mecistostethus Marseul (Histeridae, Histerinae, Exosternini)

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#### Abstract

We revise the genus *Mecistostethus* Marseul, sinking the monotypic genus *Tarsilister* Bruch as a junior synonym. *Mecistostethus* contains six valid species: *M. pilifer* Marseul, *M. loretoensis* (Bruch), **comb. n.**, *M. seagorum* **sp. n.**, *M. carltoni* **sp. n.**, *M. marseuli* **sp. n.**, and *M. flechtmanni* **sp. n.** The few existing records show the genus to be widespread in tropical and subtropical South America, from northern Argentina to western Amazonian Ecuador and French Guiana. Only a single host record associates one species with the ant *Pachycondyla striata* Smith (Formicidae: Ponerinae), but it is possible that related ants host all the species.

#### Keywords

Histeridae, Exosternini, Mecistostethus, myrmecophily, Neotropical Region

## Introduction

The genus *Mecistostethus* Marseul is one of the most extremely modified genera of Exosternini in the Neotropics. In fact, like another recently revised genus, *Kaszabister* Mazur (Dégallier et al. 2012), *Mecistostethus* has spent much of its taxonomic history placed in the subfamily Haeteriinae, a group principally composed of highly specialized myrmecophilous and termitophilous inquilines (Mazur 1984, 1997, Helava et

al. 1985). Its relationship with Exosternini has been recognized only recently (Mazur 2011), and still remains to be formally supported. *Mecistostethus* was described for a single species, *M. pilifer* Marseul from the 'Amazon' region, and it has remained monotypic since description. However, a close relative, *Tarsilister loretoensis* Bruch, another monotypic genus described in Haeteriinae, has remained unassociated (though their relationship was suggested by Helava et al. 1985). Here we formally synonymize these two genera, and present descriptions of several new species.

The morphology of *Mecistostethus* (Figs 1, 2) presents some extremely autapomorphic features. Principal among these is the very elongated mesometaventrite (from which the genus name, meaning 'very long chest', is derived). In the front the mesoventrite



Figure 1. Habitus photographs of *Mecistostethus carltoni* sp. n. A. Dorsal view B. Lateral view.



Figure 2. Scanning electron micrographs of *Mecistostethus flechtmanni* sp. n. illustrating generic characters.A Ventrolateral view B Front of head C Antennal club D Propygidium and pygidium.

is inflated and projects ventrad and anterad, concealing the base of the prosternal keel. Posteriorly the metaventral margin is broadly arcuate, projecting deeply into the first abdominal ventrite (Fig. 2A). Dorsally, the elytra show a strong medial depression across the posterior half. The body is generally broad, depressed and setose (Fig. 1A). All of these features are very atypical, even for the entire family, and have hindered understanding of relationships. Helava et al. (1985), in their revision of the genera of Haeteriinae, examined only *Tarsilister* and retained it within the subfamily, although they did resolve it as sister of all other haeteriine genera, citing several characters not shared with Haeteriinae as plesiomorphies (narrow antennal scape, tomentose antennal club, presence of tibial spurs, presence of fully articulated coxites with free styli in the females). Only very recent work comprehensively documenting morphological and molecular diversities of both the Exosternini and Haeteriinae (Dégallier et al. 2011; Caterino, Tishechkin, Dégallier, Gomy, and Mazur, in prep.) has produced sufficient character data to conclusively remove this taxon from Haeteriinae and place it unambiguously into Exosternini.

The habits of *Mecistostethus* are largely unknown. While the unusual morphology strongly suggests an inquilinous lifestyle, only a single host record supports this. This record comes from Bruch's (1932) description of *Tarsilister* (now *Mecistostethus*) *lore-toensis*, in which he reports the collection of the unique type in the larval chamber of a nest of *Pachycondyla striata* Smith (Hymenoptera: Formicidae: Ponerinae). The small number of additional specimens available for study have been collected by flight interception traps. Species of Ponerinae are relatively uncommon hosts of histerids in the neotropics, so it might be premature to assume they are the hosts of the other known species. But it is possible, and certainly merits further investigation.

#### Materials and methods

The morphological terminology used is that defined by Wenzel and Dybas (1941), supplemented by Helava et al. (1985), Ôhara (1994) and Lawrence et al. (2011). Following histerid conventions, total body length is measured from the anterior margin of the pronotum to the posterior margin of the elytra (to exclude preservation variability in head and pygidial extension), while width is taken at the widest point, generally near the elytral humeri. Conventional imaging was done using a Visionary Digital's 'Passport' portable imaging system, which incorporates a Canon 7D with MP-E 65mm  $1-5\times$  macro zoom lens. Images were stacked using Helicon Focus software (www. heliconsoft.com). SEM imaging was done on a Zeiss EVO 40 scope, and the specimen was sputter coated with gold. Photographs of all type specimens are available through the Encyclopedia of Life (www.eol.org).

Specimens from the following collections were studied:

- **CHND** The Nicolas Dégallier collection, Paris, France
- FMNH The Field Museum, Chicago, USA

MACN	Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Buenos
	Aires, Argentina
MEFEIS	Museu de Entomologia, Faculdade de Engenharia, Universidade Estadual
	Paulista, Ilha Solteira, Brazil
MNHN	Museum National d'Histoire Naturelle, Paris, France

#### Taxonomy

### Genus Mecistostethus Marseul, 1870

http://species-id.net/wiki/Mecistostethus

*Mecistostethus* Marseul 1870: 123. Type species *Mecistostethus pilifer* Marseul 1870: 123, by monotypy.

*Tarsilister* Bruch 1932: 278. Type species *Tarsilister loretoensis* Bruch 1932: 279, by original designation; NEW SYNONYMY.

**Diagnosis.** The genus *Mecistostethus* is easily recognized on the basis of numerous autapomorphies, most significantly the elevation of the mesoventrite as a strongly protruding keel (Fig. 2A) (as opposed to the typically coplanar meso+metaventrite and prosternum), as well as the posteriorly arcuate margin of the metaventrite, projecting deeply into the 1<sup>st</sup> abdominal ventrite (Fig. 2A). In addition the setose body (Fig. 1A–B), broadened tibiae (Fig. 2a), convex frons (Fig. 2B), and elytra which are depressed in the posterior third (Fig. 1B), completely lacking dorsal striae 3-5 and sutural stria combine to make this one of the most easily recognizeable New World Histerinae genera.

Description. Size range: Length 1.8-2.7mm; width 1.4-2.2mm; Body shape: Body elongate oval, moderately flattened, rufescent to rufo-piceous, variably microsculptured. Head: Frons strongly convex, with epistoma slightly declivous, disk setose, with or without granulate microsculpture; frontal stria outwardly arcuate and subcarinate when present, absent from some species; subraorbital stria present and continuous with sides of frontal stria; labrum about twice as wide as long, apical margin weakly emarginate; mandibles rather short, lacking subapical teeth; antennal scape elongate, slightly swollen subapically; antennal club oval, tomentose, lacking sutures or distinct annuli, with two small dorsal sensoria near apex of upper surface (Fig. 2C); submentum with sutures weakly impressed, bearing a few setae; mentum flat, nearly twice as broad as long, slightly tapered toward apex, apical margin shallowly emarginate; palpi elongate, with apical palpomeres acuminate. *Pronotum:* Pronotum with sides rounded, narrowed to apex, anterior emargination simple, prescutellar impression absent; pronotal discal gland openings small, annulate, situated about one-third from anterior margin (just beyond ends of recurved anterior submarginal stria, when present), approximately head-width apart; disk generally with punctures near sides and bearing setae variously arranged; marginal stria complete, free anteriorly, bearing 8-11 setae; lateral submarginal stria forming a shallow

depression close to marginal stria; anterior portion of marginal stria continuous with lateral submarginal stria; anterior submarginal stria sometimes present, with ends free and recurved posterolaterally. *Elytra*: Epipleuron lacking striae; dorsal elytral striae subcarinate and bearing setae; outer subhumeral stria complete, cariniform, forming a lateral elytral margin; inner subhumeral, 1st and 2nd dorsal striae more or less complete and convergent to posterolateral corner; other elytral striae absent. **Prosternum:** Prosternal lobe short, extending to hypomeron, with medial fragments of marginal stria in some; prosternal keel posteriorly emarginate, but covered by strongly produced mesoventral process; striae of prosternal keel present or absent. Mesoventrite: Mesoventrite strongly elevated (Fig. 2A), subacute anteriorly, projecting over base of prosternum; marginal mesoventral stria complete; mesometaventral stria present or absent. *Metaventrite*: Posterior margin of metaventrite strongly produced posterad. Abdomen: Abdominal ventrites smooth to faintly punctate; abdominal ventrites 2-5 with stria along posterior margin; propygidium short, flat, with two anteromedial gland openings and lateral marginal striae; pygidium rounded apically, setose, with fine marginal stria (Fig. 2D). Legs: Protrochanter with single seta; protibial margin even, bearing fine marginal spines; protibial spurs present, weak; protarsal setae expanded; male protarsal claws simple; meso- and metatibiae expanded, with even, weakly spinose margins; meso- and metatarsi with numerous ventral setae. *Male* (Fig. 5): Paired accessory sclerites present, weak and small; 8th tergite with broad basal and narrower apical emarginations, line of basal membrane attachment complete, just distad basal emargination, ventral apodemes widely separated along midline; 8th sternite with halves separated, apical guides moderately to strongly developed, narrowed apically; 9th tergite with strong ventrolateral apodemes, about one-third from apex; spiculum gastrale (S9) rather narrow, only slightly expanded at base, more weakly sclerotized along midline, with deep, narrow apical emargination, apical flanges not strongly developed; 10<sup>th</sup> tergite entire, not divided along midline; basal piece slightly elongate, from one-fourth to one-third tegmen length; tegmen narrow, variably expanded to apex, with basolateral carinae converging to delimit a ventral concavity, in some with a thin median keel within this concavity; median lobe from one-fourth to one-half tegmen length. *Female*: 8th tergite united, emarginate apically, with secondary apicolateral emarginations; 8th sternite divided into one central and two lateral plates, the basal baculi separate, articulated with the lateral plates; 9th sternite present as a median plate, with a sclerotized basal connection to sternite 8; 10th tergite present, undivided; valviferae enlarged at base, articulated with coxites; coxites about one-half length of valvifers, about twice as long as maximum (basal) width, with strong inner apical tooth and much weaker outer one; gonostylus present, setose; bursa copulatrix lumenous, without sclerites; spermatheca and associated glands not examined.

**Distribution.** The species are exclusively South American, but with scattered records from a surprising variety of biotopes, including Atlantic forests of Santa Catarina, Brazil, cerrado of Mato Grosso do Sul, lowland Amazonian forest of Ecuador and low to mid-elevations on the Guianan shield of French Guiana. **Remarks.** All recent collections have been through the use of flight interception traps, and consist solely of male specimens. Only two female specimens of the genus are known, both of *M. loretoensis* (Bruch).

### Key to species

1	Pronotum with detached anterior submarginal stria in addition to marginal stria (Figs 3A–C, 3F)
_	Anterior region of pronotum lacking anterior submarginal stria, with mar- ginal stria only (Figs 3D, E)
2	Prosternal striae present (Fig. 4A); anterior submarginal pronotal stria strong- ly recurved (Fig. 3A); body completely lacking microsculpture
_	Prosternal striae absent (Fig. 4B–D); anterior submarginal pronotal stria vari- able; microsculpture present at least on frons (usually on pronotum and parts of elytra as well)
3	Elytra with stria along apical margin; body larger, >2.5mm, piceous
	Eleter la lie estis dens aried married la deservellar 2 2 mar méreret 4
_	Elytra lacking stria along apical margin; body smaller, <2.2mm, rurescent4
4	elytron with 2 <sup>nd</sup> dorsal stria reaching basal margin; anterior submarginal stria of pronotum strong, with ends curved posterolaterally (Fig. 3F); lateral portion of pronotal disk with conspicuous punctures near edge
-	Elytron with 2 <sup>nd</sup> dorsal stria abbreviated just short of basal margin; anterior submarginal stria of pronotum weak, mostly transverse (Fig. 3C); lateral por-
	tion of pronotal disk lacking larger punctures M. pilifer Marseul
5	Lateral pronotal discal setae in single submarginal row (Fig. 3E)
	Lateral proportal discal actas not arganized in a single row (Fig. 2D)
_	<i>Laterar pronotar uscar setae not organized in a single row (Fig. 5D)</i>

#### Mecistostethus loretoensis (Bruch, 1932), comb. n.

http://species-id.net/wiki/Mecistostethus\_loretoensis Figs 3A, 4A, 7

Tarsilister loretoensis Bruch 1932: 279.

**Type material. Holotype**, of undetermined sex: «Tarsilister loretoensis Bruch (written by Bruch) C. BRUCH DETERM. (printed)» (label white with black frame) / «Nido de Pachycondyla striata F Sm» (handwritten) / «Typus» (handwritten) / «Est. Exp. Loreto (Misiones - Arg.) [27.32°S, 55.53°W] Dr. A.A. Oglobin» (printed) ; reverse: «20.ix.1931» (handwritten), MACN. Other material: 1 male, locality as for type, 15.VIII.1932, with *Pachycondyla striata*, MACN; 1 female: **BRAZIL: Sta. Catarina:** Nova Teutonia, 27°11'S, 52°23'W, Fritz Plaumann (no date), FMNH-INS0000069073.

**Diagnosis.** Length 2.4-2.6mm, width 2.0–2.1mm (n=3); body completely lacking microsculpture; frontal stria/carina complete; frons and epistoma without microsculpture; anterior submarginal pronotal stria long, ends strongly recurved (Fig. 3A); pronotum with >10 discal setae, scattered on disk without well-defined submarginal row (Fig. 3A); lateral pronotal punctures numerous and conspicuous; prosternal striae present (Fig. 4A); metaventral stria complete at middle (Fig. 4A); elytral stria 1 not continuous, effaced at middle (despite presence of setae); elytral stria 2 barely abbreviated at base; male not examined.

**Distribution.** Known from Atlantic forest areas of Santa Catarina, Brazil, and subtropical forests near the Rio Paraná in Misiones province, Argentina.

**Remarks.** The type collection from the nest of *Pachycondyla striata* (Ponerinae) provides the only known host record for this genus.

#### Mecistostethus seagorum sp. n.

urn:lsid:zoobank.org:act:8EA5060B-4C94-41F9-B46B-7753E0617623 http://species-id.net/wiki/Mecistostethus\_seagorum Figs 3B, 4C, 6A–B, 7

**Type material. Holotype** male: "**GUYANE FR:** Bélvédère de Saül, point de vue, 3°1'22"N, 53°12'34"W, piège vitre, 31 Nov 2010, SEAG" / "Caterino/Tishechkin Exosternini Voucher EXO-01295" / "HOLOTYPE *Mecistostethus seagorum* Caterino, Tishechkin & Dégallier"; deposited in MNHN. **Paratype** male, same locality as type, collected 2.ix.2010; deposited in CHND.

**Diagnostic description.** Length 2.7mm, width 2.2mm; frontal stria complete; frons and epistoma with microsculpture; anterior pronotal stria long, divergent (Fig. 3B); pronotum with ~10 setae on disk, arranged in a well-defined submarginal row (Fig. 3B); lateral pronotal punctures present, but extremely faint; pronotal microsculpture present on entire disk; prosternal striae absent (Fig. 4C); metaventral stria interrupted at middle (Fig. 4C); elytral microsculpture absent; elytral stria 2 complete, with numerous setae; elytral striae 1 and 2 reaching base; elytral stria 2 united with an apical marginal stria reaching nearly to suture; tegmen (Figs 6A–B) narrowed to base and apex, widest about one-fourth from apex, in lateral view nearly evenly curved to apex, with weak ventral swelling just basad midpoint, basoventral concavity occupy-ing less than basal third, poorly defined, lateral carinae rapidly weakened from base; median lobe relatively long, nearly one-half tegmen length.

**Distribution.** This species is only known from the type locality, in south-central French Guiana.



**Figure 3.** Pronota of all *Mecistostethus* spp. **A** *M. loretoensis* **B** *M. seagorum* **C** *M. pilifer* **D** *M. marseuli* **E** *M. carltoni* **F** *M. flechtmanni.* 

**Etymology.** This species name recognizes the impressive efforts of the Société Entomologique Antilles Guyane (SEAG) to inventory the rich insect biodiversity of the Guianas (http://insectafgseag.myspecies.info/)

#### Mecistostethus pilifer Marseul, 1870

http://species-id.net/wiki/Mecistostethus\_pilifer Figs 3C, 4B, 6C–D, 7

Mecistostethus pilifer Marseul 1870: 123

**Type material.** Lectotype male designated herein in order to fix the status of the name-bearing specimen: (barely legible green disk) "N[?], Mecistost. pilifer, Amazones, Bates, '69[5?]" / "TYPE" / "MUSEUM PARIS, COLL DE MARSEUL 1890" / "LECTOTYPE" / "Mecistostethus pilifer Marseul, 1870 Lectotype N. DÉGALLIER" / "LECTOTYPE Mecistostethus pilifer Marseul, M.S. Caterino & A.K. Tishechkin des. 2010"; MNHN.



**Figure 4.** Ventral views of *Mecistostethus* spp. showing striae. **A** Prosternum, meso- and metaventrites of *M. loretoensis* **B** Meso- and metaventrites of *M. pilifer* (identical in *M. marseuli & M. carltoni*) **C** Meso- and metaventrites of *M. seagorum* **D** Meso- and metaventrites of *M. flechtmanni*.

**Diagnosis.** Small, length 1.9mm, width 1.5mm; frontal stria/carina complete; frons and epistoma with microsculpture; anterior pronotal stria short, weak, barely divergent from margin (Fig. 3C); pronotum with >10 discal setae (despite many evidently broken off of type), with several scattered setae in addition to well-defined submarginal row (Fig. 3C); pronotal microsculpture gradually more conspicuous to front and sides, inconspicuous at base; lateral pronotal punctures absent (aside from setigerous punctures); prosternal striae absent (Fig. 4B); metaventral stria interrupted at middle (Fig. 4B); elytral microsculpture extremely faint, visible only near apex; elytra with stria 1 complete, bearing numerous setae, stria 2 barely abbreviated at base; aedeagus (Fig. 6C) relatively short, with sides rounded, almost evenly tapering basally and apically; tegmen quite flat, with apex only very weakly curved ventrad (Fig. 6D); basoventral concavity shallow but well defined, with basolateral carinae and fine ventral keel present; median lobe slightly over half tegmen length.

Distribution. This species is known only from the vague type locality: "Amazones".


Figure 5. Genital segments 8–10 of *Mecistostethus (M. carltoni* pictured, others essentially identical).
A Eighth tergite, dorsal view B Eighth sternite, dorsal view C Ninth and tenth tergites, dorsal view
D Ninth tergite, lateral view E Spiculum gastrale (ninth sternite), dorsal view.

# Mecistostethus marseuli sp. n.

urn:lsid:zoobank.org:act:C73F8B05-10C0-4AEB-8057-63792297A5C5 http://species-id.net/wiki/Mecistostethus\_marseuli Figs 3D, 4B, 6E–F, 7

**Type material. Holotype** male: "**GUYANE FR:** Itoupé, Mont tabulaire alt. 600m, 3°1.38'N, 53°5.73'W, piège d'interception 3, 23 Mar 2010 SEAG leg." / "Caterino/ Tishechkin Exosternini Voucher EXO-00498" / "HOLOTYPE *Mecistostethus marseuli* Caterino, Tishechkin & Dégallier"; deposited in MNHN.

**Diagnostic description.** Length 2.0mm, width 1.5mm; frontal stria largely effaced, not prominently carinate; frons and epistoma with microsculpture; anterior submarginal pronotal stria absent; pronotum with >10 discal setae, scattered on disk in addition to submarginal row (Fig. 3D); lateral pronotal punctures absent; pronotal microsculpture more conspicuous at sides, lacking at base; prosternal striae absent; metaventral stria interrupted at middle (Fig. 4B); microsculpture at apex of elytra conspicuous; elytral stria 1 complete, with numerous setae; elytral striae 1 and 2 abbreviated at base; tegmen (Figs 6E–F) widest near apex, tapering in basal two-thirds, basoventral concavity well developed, occupying basal three-fifths, delimited by strong basolateral carinae and with conspicuous fine median keel; tegmen with strong ventral swelling just apicad midpoint; median lobe only about one-fourth tegmen length.

**Distribution.** This species is only known from the type locality, in southeastern French Guiana.

**Etymology.** This species is named for French entomologist Sylvain Auguste de Marseul (1812–1890), whose superb work on the family Histeridae remains almost unequaled to this day.

#### Mecistostethus carltoni sp. n.

urn:lsid:zoobank.org:act:6E00C1D7-4A32-4555-B6D5-C3A81F5D9B1D http://species-id.net/wiki/Mecistostethus\_carltoni Figs 1, 3E, 4B, 6G–H, 7

**Type material. Holotype** male: "**ECUADOR**: Napo, Yasuní Res.Stn. on mid. Rio Tiputini, 0°40.5'S, 76°24'W. F.I.T.#M1, 7-13 Jul 1999. AKT # 080, C.Carlton & A.Tishechkin" / "LSAM 0012929" / "HOLOTYPE *Mecistostethus carltoni* Caterino, Tishechkin & Dégallier"; deposited in FMNH.

**Diagnostic description.** Length 1.8mm, width 1.4mm; frontal stria interrupted, effaced at middle, not prominently carinate; frons and epistoma with microsculpture; anterior submarginal pronotal stria absent (Fig. 3E); pronotum with <10 discal setae, arranged in submarginal row only (Fig. 3E); lateral pronotal punctures present, but extremely faint; lateral pronotal microsculpture discrete; prosternal striae absent (Fig. 4B); metaventral stria interrupted at middle (Fig. 4B); microsculpture at apex of elytra conspicuous; elytral stria 1 complete, with numerous setae; elytral striae 1 and 2 reach-



Figure 6. Aedeagi. A, B *M. seagorum*, dorsal and lateral views, respectively C, D *M. pilifer*, dorsal and lateral views (basal piece broken basally in type) E, F *M. marseuli*, dorsal and lateral views G, H *M. carltoni*, dorsal and lateral views I, J *M. flechtmanni*, dorsal and lateral views.

ing elytral base; tegmen (Figs 6G–H) widest just distad midpoint, weakly tapering in basal half, basoventral concavity moderately well developed, occupying basal half, with fine median keel; tegmen with moderate ventral swelling near midpoint, only weakly curved toward apex; median lobe only about one-fourth tegmen length.

**Distribution.** This species is known only from the type locality, in lowland Amazonian rainforest in eastern Ecuador.



**Figure 7.** Map showing all collecting localities. The exact type locality for *M. pilifer*, 'Amazones', is too imprecise to be mapped.

**Remarks.** This species is named in honor of Dr. Chris Carlton, director of the Louisiana State Arthropod Museum (LSAM), leader of the field trip on which the type of this species was caught, and AKT's doctoral advisor.

#### Mecistostethus flechtmanni sp. n.

urn:lsid:zoobank.org:act:3D9C9A02-30E1-4634-9458-ECDB14FF3EC0 http://species-id.net/wiki/Mecistostethus\_flechtmanni Figs 2, 3F, 4D, 6I–J, 7

**Type material. Holotype** male: "**BRAZIL: Mato Grosso do Sul**, cerradão fragment nr. Selviria at 20°20'10"S, 51°24'36"W, Window trap, ground level, trail 1, 17.xii.2010, C.A.H. Flechtmann" / "Caterino/Tishechkin Exosternini Voucher EXO-00644" / "HOLOTYPE *Mecistostethus flechtmanni* Caterino, Tishechkin & Dégallier", in ME-FEIS. **Paratypes** (3 males): same locality as type, collected 14.i.2011 and 28.i.2011 by CAH Flechtmann, and 31.xi-3.xii.2011 by MSC and AKT (DNA Voucher EXO-00933, extract MSC-2274), in MEFEIS, FMNH.

**Diagnostic description.** Length 1.8-2.0mm, width 1.4-1.6mm; frontal stria complete but weak at middle (Fig. 2B); frons and epistoma with microsculpture; anterior submarginal pronotal stria long, recurved posterad at apices (Fig. 3F); lateral pronotal punctures present; pronotum with <10 discal setae present on disk in addition to submarginal row (Fig. 3F); prosternal striae absent (Fig. 4D); metaventral stria interrupted at middle (Fig. 4D); microsculpture at apex of elytra conspicuous; elytral stria 1 complete, with few setae, mainly near apex; elytral stria 1 and 2 reaching elytral base; tegmen (Figs 6I–J) narrow, weakly tapered in basal half, constant in width in most of apical half, with shallow but strongly delimited basoventral concavity in just less than basal one-half; with very weak ventral swelling near midpoint; median lobe short, about one-fourth tegmen length.

**Distribution.** This species is known only from the type locality, collected in a fragment of «cerradão» forest close to the Paraná River in extreme eastern Mato Grosso do Sul. This forest is a relatively moist, taller and denser form of the cerrado subtropical biome.

**Remarks.** This species is named for the collector of most of the type series, and our gracious host during a productive visit to the site, Dr. Carlos Flechtmann of Universidade Estadual Paulista (Department of Plant Protection, FEIS/UNESP, Ilha Solteira campus).

# Discussion

It is remarkable how few specimens of *Mecistostethus* have come to light, just over 10 in the 140 years since it was first discovered. This suggests a highly cryptic and unusual habit. While myrmecophily traditionally fell into this category, recent years of focused collecting by ourselves and colleagues has gradually produced a reasonable wealth of specimens for many formerly rare myrmecophilous histerids. *Mecistostethus*, however, remains among the exceptions. Many of the 'common' myrmecophiles have been revealed to have relatively common and abundant hosts, especially the neotropical army ants (Ecitoninae). The apparent association of *Mecistostethus* with *Pachycondyla* spp., which generally have much smaller colonies (da Silva-Melo and Giannotti 2010), more or less fits with this picture. Their colonies are more difficult to locate, and have received much less attention from collectors. It is hoped that focused future efforts will help fill in the intriguing picture of *Mecistostethus* biology.

#### Acknowledgments

We thank several colleagues who provided specimens, including Margaret Thayer, Al Newton, and James Boone (FMNH), Chris Carlton and Victoria Bayless (LSAM), Arturo Roig Alsina (MACN), and Thierry Deuve and Azadeh Taghavian (MNHN), as well as Stéphane Brûlé, Pierre-Henri Dalens, Eddy Poirier and Julien Touroult from SEAG. Thanks to Cécile Guitet (Natural and Cultural Patrimony Service), Frédéric Mortier (Parc Amazonien de Guyane), and Nicolas Surugue for permitting SEAG's collections during the Itoupé field excursion. We would especially like to thank Carlos Flechtmann and his students, Silvia Tanabe, Julius Cerqueira, and Bruno Ferreira for their generosity as hosts during our 2011 visit. This project was supported in part by National Science Foundation grant DEB 0949790 to MSC and AKT.

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SHORT COMMUNICATION



# Description of two new Stenohya species from China (Pseudoscorpiones, Neobisiidae)

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#### Abstract

Two new species of the genus *Stenohya* Beier, 1967 are described from China: *Stenohya pengae* **sp. n.** (male and female; type locality Daming Mountain, Nanning City, Guangxi Zhuang Autonomous Region) and *S. huangi* **sp. n.** (female; type locality Gushan Mountain, Fuzhou City, Fujian Prov.). The presence of *S. pengae* **sp. n.** in the tree crown of *Castanopsis fabri* represents a new habitat for Neobisiidae. A key and a distribution map of the Chinese *Stenohya* species are also provided.

#### Keywords

Pseudoscorpions, Neobisiidae, Stenohya, new species, China

# Introduction

*Stenohya* Beier, 1967 is a small Asian pseudoscorpion genus of the family Neobisiidae Chamberlin, 1930. At present it includes 12 species (Harvey 2011; Zhao et al. 2011), of which three have been reported from China: *S. chinacavernicola* Schawaller, 1995 (Sichuan Province), *S. curvata* Zhao et al., 2011 (Yunnan Province) and *S. xiningensis* Zhao et al., 2011 (Qinghai Province).

Damingshan National Nature Reserve is located in the midwest of Guangxi Zhuang Autonomous Region, lying on the Tropic of Cancer, and possesses a rich subtropical primeval forest, which is home to many rare animals and plants. Daming Mountains are densely covered by jungle, including trees of the families Fagaceae, Styracaceae, Daphniphyllaceae, Lauraceae and Ericaceae (Ding 1991). In 2011 we collected some *Stenohya* specimens living on the leaves of the tree *Castanopsis fabri* Hance, 1884 (Fagaceae) by sweeping vegetation with an entomological net. After examining the specimens in the laboratory, we found them to represent a new species, which is described here under the name *S. pengae* sp. n. When we examined the pseudoscorpions collected by Prof. Fusheng Huang from Gushan Mountain, Fujian Province, China, we found another new *Stenohya* species, which is also described and illustrated in this paper as *S. huangi* sp. n.

#### Material and methods

The specimens are preserved in 75% alcohol and deposited in the Museum of Hebei University (MHBU). Permanent slide mounts were prepared by removing the chelicerae, pedipalps, leg I and leg IV from specimens with small needles and clearing overnight with lactic acid at room temperature. Drawings were made with the aid of a camera lucida mounted above the eyepiece of a compound microscope. Photographs were taken with a Leica M165 stereomicroscope. Terminology of trichobothria follows Chamberlin (1931). The term "rallum" (for flagellum) is adopted following Judson (2007). The following abbreviations are used in the text for the trichobothria: b = basal; sb = sub-basal; st = sub-terminal; t = terminal; ib = interior basal; isb = interior sub-basal; esb = exterior sub-terminal; et = exterior basal; esb = exterior sub-basal; esb = exterior sub-terminal; et = exterior terminal.

#### Key to the Chinese species of the genus Stenohya

1	Cave-living species, with single pair of eyes reduced to spots	
	S. chinacavernicola Schawaller, 1995	
_	Free-living species, with two pairs of eyes, anterior pair with lens and poste-	
	rior pair represented by eyespots or weak lenses2	
2	Trichobothria <i>it</i> and <i>et</i> at same level	
_	Trichobothrium <i>it</i> posterior to <i>et</i> , situated midway between <i>est</i> and <i>et</i> 3	
3	Male with slender pedipalps (femur 6.79–7.20, patella 6.17–6.25 times long-	
	er than broad)	
_	Male with less slender pedipalps (femur 5.00-6.42, patella 3.29-4.68 times	
	longer than broad)	
4	Movable chelal finger with more than 70 contiguous teeth; male sternites	
	V-X with a pair of medial discal setae; male chela with movable chelal finger	
	straight, hand without a spine	

# Stenohya pengae sp. n.

urn:lsid:zoobank.org:act:3E8D205C-B127-4BE0-AC87-B029B7F9719F http://species-id.net/wiki/Stenohya\_pengae Figs 1–8, 10–18

**Type material.** Holotype male (Ps.-MHBU-GX110521), China: Guangxi Province, Nanning City, Daming Mountain [23°08'N, 108°17'E], alt. 1250 m, 21 May 2011, Yan-qiu Peng leg. Tree-crown layer of *Castanopsis fabri*. Paratypes: 17 males and 25 females, same data as for holotype.

**Etymology.** The specific name is a patronym in honour of Ms Yan-qiu Peng, who collected the specimens.

**Diagnosis.** Movable cheliceral finger with one seta; movable chelal finger with 45–47 teeth; male pedipalpal chela 4.58–4.64 (female 4.09–4.25) times longer than broad; trichobothrium *it* halfway between *est* and *et*.

**Description of male** (Fig. 1). Colour mostly dark brown, pedipalps and legs reddish brown. Setae of body straight and acicular.

Carapace (Fig. 2) smooth, longer than broad, with a total of 34–36 setae, including 8 on anterior margin and 8 on posterior margin; paired lyrifissures near the eyes and posterior margin; epistome small and triangular; 4 eyes, anterior pair with well developed lens, posterior pair with weak lens.

Abdomen. Pleural membrane granulate. Tergal chaetotaxy: 6: 8: 8–10: 10–12: 10–11: 11–12: 11–12: 10–11: 10–11: 9–11: 6–8: 2, including at least 4 tactile setae on tergites V–XI. Anterior genital operculum (Fig. 16) with 23–24 setae; posterior genital sternite with 12–14 scattered setae and 2 lyrifissures; chaetotaxy of remaining sternites (IV–XI) 20–22: 22–24: 22–24: 20–24: 18–20: 19–22: 15–18: 8–10: 2, sternites VI–VIII (Fig. 14) with 13–15 medial discal setae.

Pedipalps (Fig. 4) smooth; apex of coxa rounded and with 5 setae; lateral face of coxa with 3–5 ordinary lyrifissures near margin of foramen, plus 1–3 dorsally and 2 curved posterior maxillary lyrifissures. Venom apparatus present only in fixed chelal finger, venom duct very short. Femur straight; patella claviform and internal face with a tubercle at base. Trichobothrial pattern (Fig. 8): *eb* and *esb* situated near base of finger, grouped very closely with *ib* and *isb*; *est*, *et* and *it* grouped together near finger tip; *ist* nearer to *it* than to *isb*; *b* and *sb* situated closer to each other in basal half, *st* and *t* close to each other in distal half of movable finger. Fixed chelal finger with 70–74 pointed teeth of unequal length, movable finger with about 45–47 teeth, which are pointed and of slightly unequal length in distal part, rounded in middle part and low in basal part, all teeth contiguous.



Figure 1. Stenohya pengae sp. n., dorsal view of male holotype.

Chelicera (Fig. 3). Palm with 7 setae (only one male with 7 on left and 8 on right cheliceral palm), movable finger with 1 sub-medial seta; fixed finger with 13–14 teeth; movable finger with 6–7 teeth; serrula exterior with 40–43 lamellae; serrula interior with 30–32 lamellae; galea (Fig. 10) elongated and divided into two main branches, each branch secondarily divided into 2 terminal branchlets; rallum (Fig. 13) of 6 blades, all blades with anteriorly-directed spinules except the basal-most blade, distalmost blade somewhat widened at its base and distinctly shorter than second blade .

Leg IV (Fig. 7). Tibia with 4 tactile setae (TS 0.14–0.26, 0.30–0.48, 0.62–0.74 and 0.86–0.96), basitarsus with 4 tactile setae (TS 0.13–0.15, 0.25–0.42, 0.62–0.67 and 0.84–0.87), telotarsus with 3 tactile setae (TS 0.10–0.14, 0.27–0.36 and 0.51–0.63). Subterminal setae bifurcate, dorsal branch also terminally bifurcate; arolium not divided, shorter than claws, which are slender and simple.

**Dimensions (in mm) and ratios (in parentheses).** Body length 3.3–3.6. Carapace 1.05–1.10/0.82–0.85 (1.28–1.29); diameter of anterior eye 0.10–0.11; diameter of posterior eye 0.10–0.12. Pedipalps: trochanter 0.60–0.70/0.25–0.32 (2.19–2.40), femur 1.80–1.90/0.25–0.28 (6.79–7.20), patella 1.75–1.85/0.28–0.30 (6.17–6.25), chela (with pedicel) 2.38–2.55/0.52–0.55 (4.58–4.64), chela (without pedicel) 2.18–2.40 (4.19–4.36), hand length (without pedicel) 0.95–1.05 (1.83–1.91), movable finger length 1.35–1.40 (1.33–1.42 times longer than hand without pedicel). Chelicera

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**Figures 2–9.** *Stenohya pengae* sp. n., male holotype (**2–7**) and *S. xiningensis* Zhao et al., 2011, male (9) **2** Carapace, dorsal view **3** Right chelicera **4** Coxa of right pedipalp, lateral view, showing lyrifissures **5** Pedipalp (minus chela), dorsal view **6** Chela, dorsal view **7** Leg IV **8** Fingers of right chela, lateral view, showing trichobothriotaxy and teeth; *S. xiningensis* **9** Coxa of right pedipalp, lateral view, showing lyrifissures. Scale bars: 1 mm (**5–7**); 0.5 mm (**2, 4, 8–9**); 0.4 mm (**3**).



**Figures 10–18.** *Stenohys pengae* sp. n. **10** Galea, male **11** Galea, female **12** Rallum, female **13** Rallum, male **14** Male sternites VI–VIII, with 13–15 medial discal setae **15** Coxa of right pedipalp, female, lateral view, showing lyrifissures **16** Genital sternites, male **17** Female sternites VI–VIII with 2 medial discal setae **18** Genital sternites, female. Scale bars: 1 mm (**14–15**); 0.5 mm (**16–18**); 0.05 mm (**10–13**).

0.55-0.60/0.30-0.32 (1.83-1.88), movable finger length 0.35-0.44. Leg I: femur 0.85-0.87/0.14-0.18 (4.83-6.07), patella 0.55-0.58/0.13-0.15 (3.87-4.23), tibia 0.60-0.65/0.10-0.11 (5.91-6.00), basitarsus 0.45-0.48/0.09-0.10 (4.80-5.00), telotarsus 0.50-0.52/0.09-0.10 (5.20-5.56). Leg IV: femur + patella 1.45-1.55/0.22-0.24 (6.46-6.59), tibia 1.10-1.15/0.13-0.15 (7.67-8.46), basitarsus 0.55-0.58/0.08-0.10 (5.80-6.88), telotarsus 0.65-0.70/0.08-0.10 (7.00-8.13).

**Description of female.** Like male, except as follows. Carapace with a total of 30–34 setae, including 6 setae on anterior margin and 6–8 setae on posterior margin. Tergal chaetotaxy: 6–10: 8–10: 9–10: 10–12: 11–12: 10–12: 11–13: 12–15: 11–13: 11–13: 6–8: 2, including at least 4 tactile setae on tergites IV–XI. Anterior genital sternite (Fig. 18) with 16–18 small marginal setae and 2 lyrifissures; posterior genital sternite with 28–32 marginal setae and 2 lyrifissures; chaetotaxy of remaining sternites (IV–XI) 24–30: 23–27: 22–26: 19–22: 20–21: 17–20: 15–19: 7–8: 2, sternites VI–VIII (Fig. 17) with a pair of medial discal setae, clearly longer than marginal setae.

Pedipalps. Lateral face of coxa with 3–5 ordinary lyrifissures at margin of foramen, plus 0–3 at dorsal margin and 2 curved lyrifissures; fixed chelal finger with 66–79 teeth, movable finger with about 45–55 contiguous teeth which are pointed and of slightly unequal length in distal half, rounded and low in basal half.

Chelicera. Palm with 7 setae (two females with 8 on left and 7 on right cheliceral palm, one female with 6 on left and 7 on right palm), movable finger with 1 sub-medial seta; serrula exterior with 34–36 lamellae; serrula interior with 28–33 lamellae; galea (Fig. 11) elongate and divided into three main branches, two of which are secondarily divided into 2 terminal branchlets; rallum (Fig. 12) of 8 blades.

**Dimensions (in mm) and ratios.** Body length ca. 3.9–5.0. Carapace 0.95–1.00/0.80–0.85 (1.15–1.28); diameter of anterior eye 0.11–0.13; diameter of posterior eye 0.12–0.14. Pedipalps: trochanter 0.53–0.55/0.25–0.30 (1.83–2.12), femur 1.40–1.45/0.24–0.28 (5.18–5.83), patella 1.10–1.15/0.28–0.30 (3.83–3.93), chela (with pedicel) 2.25–2.33/0.53–0.57 (4.09–4.25), chela (without pedicel) 2.10–2.18 (3.82–3.96), hand length (without pedicel) 0.85–0.95 (1.60–1.67), movable finger length 1.17–1.20 (1.26–1.38 times longer than hand without pedicel). Chelicera 0.70–0.75/0.35–0.40 (1.88–2.00), movable finger length 0.45–0.50. Leg I: femur 0.70–0.80/0.13–0.14 (5.38–5.71), patella 0.45–0.50/0.13–0.14 (3.46–3.57), tibia 0.50–0.55/0.09–0.10 (5.50–5.56), basitarsus 0.35–0.37/0.08–0.09 (4.11–4.38), telotarsus 0.43–0.45/0.09–0.10 (4.50–4.78). Leg IV: femur + patella 1.30–1.40/0.23–0.24 (5.65–5.83), tibia 1.10–1.15/0.13–0.14 (8.21–8.46), basitarsus 0.50–0.55/0.08–0.10 (5.50–6.25), telotarsus 0.60–0.65/0.08–0.10 (6.50–7.50).

**Distribution.** This species is known only from the type locality.

**Remarks.** Three *Stenohya* species have been previously recorded from China: *S. chi-nacavernicola* Schawaller, 1995, *S. curvata* Zhao et al., 2011 and *S. xiningensis* Zhao et al., 2011. *S. pengae* sp. n. can easily be separated from these species by its extremely slender pedipalpal segments, 4 well-developed eyes, the absence of a spine at the base of the male chelal hand, and the presence of medial discal setae on male sternites VI–VIII only.

The new species resembles *S. martensi* (Schawaller, 1987) in having slender pedipalps, but it can be distinguished from the latter by the movable cheliceral finger having only one seta (two in *S. martensi*), the movable chelal finger with 45–47 teeth (more than 80 in *S. martensi*) and the male pedipalpal chela 4.58–4.64 times longer than broad (6.2 times in *S. martensi*). *Stenohya caelata* (Callaini, 1990) and *S. kashmirensis* (Schawaller, 1988) differ from *S. pengae* sp. n. in having granules on the pedipalpal femur and patella, and the cheliceral palm with 5 or 6 setae. The new species can be easily distinguished from *S. mahnerti* Schawaller, 1994, *S. hamata* (Leclerc and Mahnert, 1988) and *S. gruberi* (Ćurčić, 1983) by the more slender pedipalpal femur and patella. *Stenohya heros* (Beier, 1943) has less slender pedipalp in female (femur 4.5 vs. 5.18–5.83 times, patella 3.2 vs. 3.83–3.93, chela (with pedicel) 3.3 vs. 4.09–4.25, movable finger 1.0 vs. 1.26–1.38 times longer than hand without pedicel). *Stenohya vietnamensis* Beier, 1967 and *S. lindbergi* (Beier, 1959) were both described from nymphs, but *S. vietnamensis* lacks an epistome and *S. lindbergi* has more teeth (78) on the movable chelal finger.

Specimens of *S. pengae* were found on the leaves of *Castanopsis fabri*, which represents an exceptional habitat for Neobisiidae. Neobisiidae generally live in leaf litter and soil, under rock, bark and in caves, although they have sometimes been found climbing young trees and shrubs (Weygoldt, 1969). Fourty-one specimens of *S. pengae* were collected by sweeping trees of *C. fabri* with an entomological net; only two were found on stone steps and these might have been dislodged from the trees. The collector also examined the tree bark and leaf litter around the trees, without finding any specimens of *S. pengae*.

Approximately 100 pseudoscorpion specimens were collected from Fujian and Guangdong provinces were extracted by beating shrubs, of which 74 (including 4 protonymphs, 2 deutonymphs, 11 tritonymphs and 57 adults) belong to the genus *Geogarypus* Chamberlin, 1930 (family Geogarypidae Chamberlin, 1930) and 22 tritonymphs belong to the genus *Bisetocreagris* Ćurčić, 1983 (family Neobisiidae). All of the *S. pengae* specimens were adults. Adis and Mahnert et al. (1988) found that *Brazilatemnus browni* Muchmore was bivoltine, with one generation occuring in the trunk/canopy habitat in April/May (during forest inundation) and the second in the forest floor in November/December (non-inundation period). It might therefore be interesting to look for *S. pengae* in both habitats at different times of the year.

#### Stenohya huangi sp. n.

urn:lsid:zoobank.org:act:AED176C9-840E-4C15-9981-8777D01C6632 http://species-id.net/wiki/Stenohya\_huangi Figs 19–28

**Type material.** Holotype female (Ps.-MHBU-FJ750224), China: Fujian Province, Fuzhou City, Gushan Mountain [26°04'N, 119°21'E], 24 February 1975, Fu-sheng Huang. Habitat unknown.



**Figure 19.** *Stenohya huangi* sp. n., dorsal view of female holotype (chelicerae, left palp and left leg IV removed).

**Etymology.** The specific name is a patronym in honour of Prof. Fu-Sheng Huang, who collected and donated the specimen.

**Diagnosis.** Species with slender pedipalps (femur 6.40, patella 5.25, chela with pedicel 4.87, chela without pedicel 4.57 times as long as broad) and slender legs IV (e.g. femur+patella 7.23 times as long as deep), with low numbers of the teeth (about 30) on movable chelal finger; trichobothria *it* and *et* at same level.

**Description of female (holotype)** (Fig. 19). Colour mostly yellow, setae of body straight and acicular.

Carapace (Fig. 20) smooth, with a total of 36 setae, including 6 on anterior margin and 8 on posterior margin; epistome small and triangular; 4 eyes, anterior pair with lens, posterior pair with weak lenses; lateral margins slightly convex.

Abdomen. Pleural membrane strongly granulate. Tergal chaetotaxy: 4: 12: 10: 10: 10: 11: 11: 11: 10: 9, including at least 4 tactile setae on tergites VI–XI; anterior genital sternite (Fig. 27) with 22 small marginal setae and 2 lyrifissures; posterior genital sternite with 20 marginal setae and 2 lyrifissures; sternal chaetotaxy (IV–XI): 27: 22: 22: 22: 24: 22: 19: 17:10, sternites VI–VIII (Fig. 28) with a pair of discal setae; anal cone with 2 dorsal and 2 ventral setae.

Pedipalps (Figs 21–22). Apex of coxa rounded and with 4 setae, lateral face of coxa with 2 ordinary lyrifissures at margin of foramen, and 2 curved lyrifissures. Anterior face



Figures 20–28. *Stenohya huangi* sp. n., female. 20 Carapace 21 Right pedipalp, dorsal view 22 Fingers of left chela, lateral view 23 Leg IV 24 Rallum 25 Galea 26 Left chelicera 27 Genital sternites 28 sternites VI–VIII, showing paired medial discal setae. Scale bars: 1 mm (20–21, 28); 0.5 mm (22–23, 26–27); 0.05 mm (24–25).

of femur with fine granulation; patella claviform, smooth; chelal fingers long and slender. Trichobothriotaxy: *est, et* and *it* grouped together distally; *ist* situated midway between *isb* and *it*, nearer to *it* than to *isb. eb* and *esb* situated on base of the hand, grouped very closely with *ib* and *isb*; *b* and *sb* closer to each other situated on the basal half, and *st* and



Figure 29. Distribution map of Chinese Stenohya species.

*t* closer to each other situated on the distal half of the movable finger. Fixed chelal finger with 63 pointed teeth of unequal length, movable finger with about 30 teeth which with 20 pointed teeth slightly unequal length in distal half, and 10 rounded teeth in basal half.

Cheliceral palm (Fig. 26) with 7 setae, movable finger with 1 sub-medial seta; fixed finger with 12 teeth; movable finger with 6 teeth; serrula exterior with 30 lamellae; serrula interior with 28 lamellae; galea (Fig. 25) elongated and divided into two main branches, each branch secondarily divided into 3 terminal branchlets; rallum of 8 blades (Fig. 24), all blades with anteriorly-directed spinules, the basalmost blade about half of the length of the others, distalmost blade distinctly shorter than second one and somewhat widened at its base.

Legs (Fig. 23). Tibia IV with 2 tactile setae (TS 0.70, 0.95), basitarsus IV with 2 tactile setae (TS 0.15, 0.81), and telotarsus IV with 2 tactile setae (TS 0.27, 0.61). Subterminal tarsal seta bifurcate; arolium not divided, shorter than slender and simple claws.

**Dimensions (in mm) and ratios (in parentheses).** Body length 4.2. Carapace 1.29/0.89 (1.45); diameter of anterior eye 0.10; diameter of posterior eye 0.09. Pedipalps: trochanter 0.59/0.26 (2.27), femur 1.58/0.25 (6.32), patella 1.38/0.26 (5.31), chela (with pedicel) 2.58/0.53 (4.87), chela (without pedicel) 2.42 (4.57), hand length (without pedicel) 1.04 (1.96), movable finger length 1.44 (1.38 times longer than hand without pedicel). Chelicera 0.67/0.38 (1.76), movable finger length 0.45. Leg I: femur 0.79/0.13 (6.08), patella 0.59/0.13 (4.54), tibia 0.63/0.10 (6.30), basitarsus 0.45/0.10 (4.50), telotarsus 0.43/0.10 (4.30). Leg IV: femur + patella 1.52/0.21 (7.24), tibia 1.22/0.12 (10.17), basitarsus 0.59/0.10 (5.90), telotarsus 0.79/0.10 (7.90).

**Distribution.** This species is known only from the type locality.

**Remarks.** S. huangi sp. n. is only known from the female, but it can be easily separated from most other species of this genus by the proportions of pedipalpal femur and patella (Table 1). Two species, S. xiningensis Zhao et al., 2011 and S. kashmirensis, are only known from males, while two others, S. lindbergi and S. vietnamensis are only known from nymphs. S. huangi differs from S. xiningensis by the arrangement of trichobothria on the fixed chelal finger: *it* and *et* are at the same level (Fig. 22) in S. huangi, whereas in S. xiningensis it lies about midway between *est* and *et* (Zhao et al. 2011: fig. 28). S. huangi differs from S. kashmirensis and S. lindbergi in having a lower number of teeth on the movable chelal finger (about 30, versus 70 in S. kashmirensis and 78 in S. lindbergi). Finally, the new species differs from S. vietnamensis in having an epistome.

In most Neobisiidae the lyrifissures near the trochanteral foramen of the pedipalpal coxa number 3 or 4 (Chamberlin 1931). Having examined the arrangements of lyrifissures in *S. pengae* sp. n., *S. huangi* sp. n., *S. curvata* and *S. xiningensis*, we found all of them have 2 lyrifissures in this position. The males of *S. pengae* sp. n. possess 4–5 lyrifissures behind the foramen and 2–3 dorsal lyrifissures, while females have 3–5 lyrifissures near the foramen and 0–3 dorsally (Fig. 15). Males of *S. curvata* have 7 lyrifissures near the foramen (Zhao et al. 2011: fig. 3) and females have 5, but there are no dorsal lyrifissures. The male of *S. xiningensis* (female unknown) has 6 foramenal lyrifissures and 1 dorsal lyrifissure (Fig. 9).

Species	Femur	Patella
S. caelata	4.50-4.64	3.63–3.64
S. chinacavernicola	5.70	4.75
S. curvata	5.00-5.24	3.29–3.33
S. gruberi	4.77	3.30
S. hamata	4.46-4.51	3.32–3.46
S. heros	4.50	3.20
S. huangi	6.32	5.31
S. mahnerti	4.60	3.00
S. martensi	5.00	3.90
S. pengae	5.18–5.83	3.83-3.93

Table 1. Proportions of femur and patella of pedipalps in females of Stenohya.

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