Revision of the genus *Phylloclusia* (Diptera: Clusiidae: Clusiinae)

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Abstract—The Oriental clusiine genus *Phylloclusia* Hendel, 1913 is redefined and revised, with four new species (*P. hendeli* **sp. nov.**, *P. darlingi* **sp. nov.**, *P. nigroscutellum* **sp. nov.**, and *P. lanceola* **sp. nov.**) described from Sri Lanka, Taiwan, Indonesia, Malaysia, and the Philippines. *Phylloclusia* is established as the sister genus to the Japanese, Afrotropical, and Australian *Tetrameringia* McAlpine, 1960 on the basis of newly recognized male and female genitalic synapomorphies. An identification key and illustrations for the six species of *Phylloclusia* are provided.

Résumé—Le genre de clusiine Oriental *Phylloclusia* Hendel, 1913 est redéfini et révisé et quatre nouvelles espèces (*P. hendeli* **sp. nov.**, *P. darlingi* **sp. nov.**, *P. nigroscutellum* **sp. nov.**, et *P. lanceola* **sp. nov.**) sont décrites en provenance du Sri Lanka, de Taiwan, de l'Indonésie, de la Malaisie et des Philippines. De nouvelles synapomorphies génitaliques chez les deux sexes indiquent que *Phylloclusia* est le genre sœur du groupe Japonais, Afrotropical et Australien *Tetrameringia* McAlpine, 1960. Une clef d'identification ainsi que des illustrations sont fournies pour les six espèces de *Phylloclusia*.

Introduction

The Oriental genus *Phylloclusia* Hendel, 1913 (Diptera: Clusiidae: Clusiinae), which previously included only the Taiwanese *P. steleocera* Hendel and the Japanese *P. quadrivittata* Sueyoshi, is here redefined on the basis of the following synapomorphies: one pair of lateral scutellar bristles; anterior dorsocentral bristle no more than half length of posterior dorsocentral; posterior 1/3 of scutum shiny between dorsocentral bristles; frons shiny, slightly constricted posteriorly, and with anterior margin produced as an elevated ridge (Fig. 25); lower 3/4 of face brown (sometimes appearing as a central spot); notum elongate with postpronotum bulging (Figs. 1–6) (less so in *P. lanceola* **sp. nov.**). *Phylloclusia* species are slender and yellow with dark stripes and spots and are among the largest Clusiidae (4.5–7.3 mm in length). They also have very long prescutellar acrostichal bristles and no dorsal preapical tibial bristles, and most have a laterally compressed arista (also found in the European *Hendelia beckeri* Czerny), a long triangular first flagellomere, yellow bristles, and a carinate face (Fig. 25).

Phylloclusia is here treated as the sister group to the genus *Tetrameringia* McAlpine, 1960 (from eastern Australia, Japan, Madagascar, Malawi, and South Africa) on the basis of the following genitalic synapomorphies: posterior margin of male sternite 6 setose (Fig. 9); surstylus small, thin, and subtriangular; inner surface of surstylus without basal projection; distiphallus broken medially and reflexed (Fig. 7) (a similar distiphallus is found in some *Clusia* Haliday, 1838); ventral shield of phallapodeme raised from shaft (almost entirely reversed in *P. quadrivittata*); spermatheca pigmented, irregularly shaped, and with minute transverse grooves (Figs. 22–24) (smooth and spherical in *T. borealis* Sueyoshi); spermathecal

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duct with subbasal attachment to spermatheca. Externally, both genera differ from other Clusiidae by having inclinate anterior fronto-orbital bristles, two pairs of dorsocentral bristles, a well-developed postvertical bristle, one pair of vibrissae, a small M_{1+2} ratio (1.9–2.5), bristles on the posterodorsal surface of the fore femur and no interfrontal or dorsal preapical tibial bristles. Most species in these genera also usually lack a subnotal stripe and have an irregular row of ventral ctenidial bristles on the male fore and mid femora. *Tetrameringia* is defined solely on the basis of four pairs of fronto-orbital bristles.

Little is known of the biology of *Tetrameringia* and *Phylloclusia*, but *P. darlingi* **sp. nov.** has been collected in a log emergence trap, and specimens of *Tetrameringia* have been collected around creeks and small streams in shaded areas (McAlpine 1960). We have collected Australian *Tetrameringia* by sweeping over a moist stream bed in an otherwise dry forest. Immature stages are unknown.

Materials and methods

Material from the following institutions was examined:

BLKU	Biosystematics Laboratory, Graduate Institute of Social and Cultural Studies, Kyushu University, Fukuoka, Japan
BMNH	The Museum of Natural History, London, United Kingdom
DEI	Deutsches Entomologisches Institut, Eberswalde, Germany
MCZC	Museum of Comparative Zoology, Cambridge, Massachusetts, United States of America
NHMW	Naturhistorisches Museum, Vienna, Austria
ROME	Insect Collection, Royal Ontario Museum, Toronto, Ontario, Canada
TAUI	Tel Aviv University, Tel Aviv, Israel
USNM	National Museum of Natural History, Washington, District of Columbia, United States of America
ZMUC	Zoologisk Museum, Copenhagen University, Copenhagen, Denmark

Specimen preparation and terminology follow Lonsdale and Marshall (2006). The M_{1+2} ratio is defined as the length of the ultimate section of wing vein M divided by the length of the penultimate section and is presented as a range showing the lowest and highest values.

The phylogenetic hypothesis for *Tetrameringia* (represented as a single operational taxonomic unit) and *Phylloclusia* was generated through analysis of the morphological character matrix in Table 1 using Phylogenetic Analysis Using Parsimony (PAUP) version 4.0b10 (Swofford 2003), with a simple heuristic search and all characters unweighted. The outgroup to *Phylloclusia* and *Tetrameringia* was a hypothetical ancestor (removed from the final cladogram) characterized by plesiomorphic states polarized through comparison with all other clusiid genera, treating *Clusia* and *Allocluisia* Hendel, 1917 as the immediate outgroups. Trees were drawn with the aid of Winclada® (Nixon 2002), using ACCTRAN optimization.

Phylloclusia Hendel, 1913

Phylloclusia Hendel, 1913: 78. Melander and Argo, 1924: 33 (family revision). Frey, 1960: 11 (Indoaustralian family revision). Soós, 1964: 5 (family key).

Type species: *Phylloclusia steleocera* Hendel, 1913 (by monotypy)

Diagnosis

Presutural intra-alar bristle weak to well developed. Two postsutural dorsocentral bristles (rarely with strong setula in front of anterior dorsocentral bristle), with anterior dorsocentral bristle (at most) half length of posterior dorsocentral one. One pair of strong lateral scutellar bristles. Posterior 1/3 of scutum shiny between dorsocentral rows. Three fronto-orbital bristles (reclinate with anterior bristle inclinate). Notum elongate with postpronotum bulging. Dorsal preapical tibial bristles absent. M_{1+2} ratio 1.9–2.5. Frons narrowing posteriorly, shiny, and usually with shallow anterior ridge (Fig. 25). Face mostly brown. Sternites 6 and 7 (left lateral on annulus) with several bristles along posterior margin (Fig. 9); hypandrial bristles absent (Fig. 7); shield of phallapodeme elevated from shaft; basiphallus with simple articulation to distiphallus. Spermatheca (2) pigmented, and usually irregularly shaped and minutely grooved transversely (Figs. 22–24); spermathecal duct usually with subbasal attachment to spermatheca.

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Table 1. Character matrix for the species of *Phylloclusia* and *Tetrameringia* (represented by a single operational taxonomic unit; characters are listed in Table 2).

	1234567890	1234567890	1234567890	123
Ancestor	0000000000	0000000000	0000000000	000
Tetrameringia	0100000000	0000000010	0000011111	111
P. lanceola	0011000010	1111000010	0100011111	???
P. hendeli	1011111111	1111000001	1111111111	???
P. quadrivittata	1011111111	1111110000	001110?110	???
P. steleocera	1011111111	1111110000	11?????????	???
P. nigroscutellum	1011111111	1111111?1	10?????????	???
P. darlingi	1011111111	1111111101	1011111111	111

Table 2. Character list for *Phylloclusia* and *Tetrameringia* (the plesiomorphic state is listed first).

External characters		
1	Bristles	Dark brown to black
		Yellow
2	Number of fronto-orbital bristles	Three
		Four
3	Anterior dorsocentral bristle	3/5 length of posterior dorsocentral bristle
		Half length of posterior dorsocentral bristle or less
4	Number of lateral scutellar bristles	Two
		One
5	Arista	Filamentous
		Laterally compressed
6	First flagellomere	Ovate
		Elongate, pointed
7	First flagellomere	Yellow or with infuscation around base of arista
		With strong dorsal stripe
8	Frons	Sides parallel
		Sides narrowing posteriorly
9	Frons	Flat
		Produced into ridge anteriorly
10	Face	Flat
		With median carina
11	Face	Variable, but not as below
		Brown ventrally and medially, sometimes forming spot
12	Thorax	Not elongate
		Elongate
13	Postpronotum	Small
		Bulging
14	Scutum	Evenly setulose postsuturally
		Bare between dorsocentral bristles
15	Scutum	Univittate, or bivittate with stripes wide
		If bivittate, stripes very thin
16	Scutum	Univittate, or bivittate with stripes undivided
		Stripes bifid, sometimes separated at base
17	Scutum	If with bifid scutal stripes, inner branch well developed
		If scutal stripes bifid, inner branch sometimes reduced, leaving only one well defined stripe outside dorsocentral row

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Table 2 (*concluded*).

18	Scutum	Without chevron-shaped presutural spot
		With chevron-shaped presutural spot
19	Scutellum	Striped
		Evenly coloured
20	Pleuron	Without stripes
		With vertical stripe
21	Katatergite	Yellow
		Brown
22	Tergite 1	Yellow
		Brown
Male terminalia		
23	Epandrium	Rounded
		Sides nearly parallel
24	Cerci	Rounded
		Long and relatively thin
25	Surstylus	Straight
		Elbowed or bent
Synapomorphies of *Phylloclusia* + *Tetrameringia*		
26	Bristles on posterior margin of male sternite 6	Absent
		Present
27	Surstylus	Broad and rounded
		Small and thin
28	Surstylus	With basal spur on inner surface
		Inner surface lacking basal spur
29	Distiphallus	Entire and straight
		Medially broken and reflexed
30	Ventral shield of phallapodeme	Flush with shaft
		Raised from shaft
31	Spermatheca	Smooth
		Covered with numerous minute transverse grooves
32	Spermatheca	Spherical
		Irregular in shape
33	Spermathecal duct	With basal attachment to spermatheca
		With sub-basal attachment to spermatheca

Generic description

General

Length 4.5–7.3 mm. Body long and slender; yellow with brown pattern; postpronotum bulging and notum elongate (Figs. 1–6). Angular extension on outer surface of pedicel acute with apex rounded; inner surface of pedicel with projection obtuse and broadly rounded. Arista black and sparsely plumose (Fig. 1) or laterally compressed (Fig. 25). Frons shiny, narrowing posteriorly, and with shallow anterior ridge (usually not extending to lateral margin). Clypeus slightly sunken. Gena and parafacial shiny. Face mostly brown. Vein dm-cu perpendicular to long axis of wing. M_{1+2} ratio 1.9–2.5. Wing clear, sometimes lightly infuscated distally or medially.

Chaetotaxy

Bristles yellow or black. Fronto-orbital bristles reclinate with anterior bristle inclinate (Fig. 25). Ocellar bristle well-developed. Postvertical bristle well-developed to absent. Pedicel with one outstanding dorsal bristle (almost as long as first flagellomere) and one smaller ventral bristle (similar to some *Hendelia* Czerny, 1903 and *Clusiodes* Coquillett, 1904). Two postsutural dorsocentral bristles, with anterior dorsocentral bristle (at most) half length of posterior dorsocentral (closely set near posterior margin of scutum). Presutural intra-

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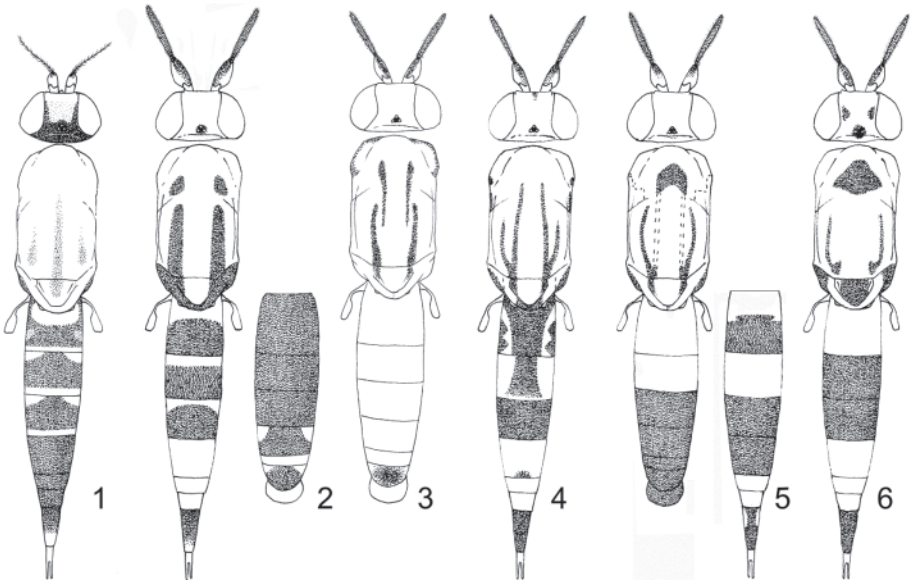
Figs. 1–6. 1, *Phylloclusia lanceola* sp. nov., female. 2, *P. hendeli* sp. nov., female and male abdomen; 3, *P. quadrivittata* Sueyoshi, male; 4, *P. steleocera* Hendel, female; 5, *P. darlingi* sp. nov., male and female abdomen (the dotted line indicates the pattern that is restricted to the female); 6, *P. nigroscutellum* sp. nov., female.



alar bristle weak to well-developed. Usually one pair of long acrostichal bristles between level of anterior and posterior dorsocentral bristles. One strong pair of lateral scutellar bristles. Tibiae without dorsal preapical bristles. Male: venter of fore and mid femora with irregular (to scattered) row of short bristles between anterior and posterior rows of ctenidial bristles.

Male abdomen

Tergites 1 and 2 fused; sternite 1 reduced to thin, weakly sclerotized band; tergites 3–6 and sternites 2–5 complete. Sternite 5 approximately half as long as wide. Abdomen encircled by annulus composed of sternites 6–8; sternite 8 setose and dorsal with right lateral extension; sternite 7 left lateral between sternites 6 and 8 and heavily sclerotized anteriorly; sternite 6 fused to sternite 7 along anterior margin, attached to sternite 8 ventrally by weakly sclerotized section (connection sometimes also confluent with part of sternite 7) and heavily sclerotized anteriorly. Spiracles in membrane ventral to tergites 1–5, dorsolaterally between sternites 7 and 8, and ventrally between sternites 6 and 8. Epandrium broadly rounded or with sides somewhat parallel. Surstylus 1/3 to 1/2 length of epandrium and minutely setulose (Figs. 7 and 8). Cerci thinnest basally, and deeply emarginate or small and rounded. Hypandrium with one pair of arms articulating with subepandrial sclerite, which in turn articulates with epandrium; hypandrial bristles absent (Fig. 7). Phallapodeme long and thin with shield raised usually from shaft. Pregonite ovate and setulose. Postgonite small and lobate with several distal bristles; sometimes fused to pregonite. Basiphallus with simple articulation to distiphallus. Epiphallus small and finlike. Distiphallus elongate with central flexure dividing distal and basal sections; lateral lobe sometimes present.

Female abdomen

Abdomen elongate and narrow along entire length. Cerci at least 10 times longer than wide. Internal genitalia only dissected for *P. darlingi* (see description), owing to availability of material.

Key to the species of *Phylloclusia*

1. Bristles black. Arista filamentous (Fig. 1). First flagellomere small and rounded. Frons with sides nearly parallel (slightly narrowing posteriorly). Head slightly rounded and swollen so that eyes do not reach posterior margin. Face flat. Wing with spot around dm-cu. M_{1+2} ratio 2.5–2.6. Notum yellow with

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katatergite light brown; scutum sometimes with faint central stripe. Frons dark brown along posterior and posterolateral margins. Cerci small and rounded. Surstylus with slight anterior arc (Fig. 11). Sri Lanka . . . . . *P. lanceola* **sp. nov.**

— Bristles yellow. Arista laterally flattened (Fig. 25). First flagellomere large and attenuate. Frons narrowing posteriorly. Eyes reaching posterior margin of head (Figs. 2–6). Face with shallow median carina. Wing clear around dm-cu. M_{1+2} ratio 1.9–2.0. Notum vittate and maculate. Frons almost entirely yellow. Cerci long and thin. Surstylus curved anteriorly, sometimes strongly elbowed or transverse (Figs. 13, 16, 19). Southeast Asia and Japan 2

2. Scutellum brown with lateral corners yellow (Fig. 6). Frons with one pair of lateral spots. Wing dark on distal 1/3 (excluding apex past insertion of R_{2+3} with costa), fading posterior to M_1. Borneo . . . . . *P. nigroscutellum* **sp. nov.**

— Scutellum yellow with lateral corners brown (Figs. 2–5). Frons yellow, sometimes with small anteromedial spot. Wing clear or dusky along anterodistal margin 3

3. Scutal stripes nearly half as wide as scutellum and broken at suture (Fig. 2). Anatergite brown. First flagellomere approximately 2/3 length of arista. The Philippines, Taiwan . . . . . *P. hendeli* **sp. nov.**

— Scutal stripes thin, sometimes bivittate or confluent with presutural spot. Anatergite yellow (at least in part). First flagellomere less than half length of arista 4

4. Scutum with thick chevron-shaped presutural spot (Fig. 5). Postpronotum entirely yellow. Fore tarsi yellow on at least basal segment. Indonesia, Malaysia, the Philippines, Thailand . . . *P. darlingi* **sp. nov.**

— Scutum without any medial presutural markings. Postpronotum with small posterior spot or with anterior and lateral margins brown. Fore tarsi entirely brown 5

5. Scutum with two distinct pairs of overlapping stripes (Fig. 3). Anterior and lateral margins of postpronotum brown. Fore tibia yellow. Frons yellow. Japan . . . . . *P. quadrivittata* Sueyoshi

— Scutum with two pairs of postsutural stripes connected at base (Fig. 4). Posterior corner of postpronotum brown. Fore tibia brown. Frons with faint anteromedial infuscation. Taiwan . . . *P. steleocera* Hendel

Species descriptions (in alphabetical order)

Phylloclusia darlingi sp. nov.

(Figs. 5, 16–18, 24)

Description (Fig. 5)

Male

Body length 4.8–7.3 mm (both sexes). Bristles yellow (anterior dorsocentral and acrostichal bristles brown in Indonesian and Malaysian specimens). Anterior dorsocentral bristle half length of posterior dorsocentral. Acrostichal bristle well developed. Postvertical and ocellar bristles well developed. Scutum yellow with one thin pair of postsutural stripes that curve outside dorsocentral rows anteriorly and continue onto sides of scutellum posteriorly; presuturally with thick central spot (usually chevron-shaped, but sometimes circular with posterior "tail" (Thailand)). Katatergite brown and anatergite yellow with thin brown stripe below scutellum. Pleuron and legs mostly yellow; brown spot on anterior surface of katepisternum, sometimes forming complete stripe from top of anepisternum to dorsal half of mid coxa (Thailand); coxa and meron white; fore tarsus sometimes brownish from tip of tarsomere 2 to apex (Indonesia). Head mostly yellow with ocellar tubercle brown, first flagellomere brown anterodorsally, face dirty yellow to yellow (black in Thailand male) and clypeus recessed with upper margin sometimes brown. Abdomen brown with tergites 1–3, cerci, and surstylus yellow. Wing clear.

Female

As described for male except as follows: bristles entirely yellow; scutum with one pair of notopleural spots that continue laterally onto anterior half of anepisternum and dorsal half of anterior surface of katepisternum; inner branch of scutal stripe present and extending to presutural spot; fore tarsus with tarsomeres 2–5 entirely brown (tarsomere 1 sometimes brown distally); back of head with spot below ocellar tubercle; abdomen yellow, with tergites 2, 4, and 5 and median stripe on tergite 8 black.

Male terminalia (Figs. 16–18)

Annulus well developed. Epandrial width 4/5 height, length 3/5 height, and base narrow. Surstylus truncate, 2/5 length of epandrium, sharply bent anteriorly with ventromedial lobe, and minutely setose distally. Cerci as long as epandrium and deeply emarginate. Hypandrial arm 4/5 length of phallapodeme and ventral lobe minute. Phallapodeme long and slender with head atrophied. Pregonite elongate, 3/5 length of phallapodeme, covered with minute bristles

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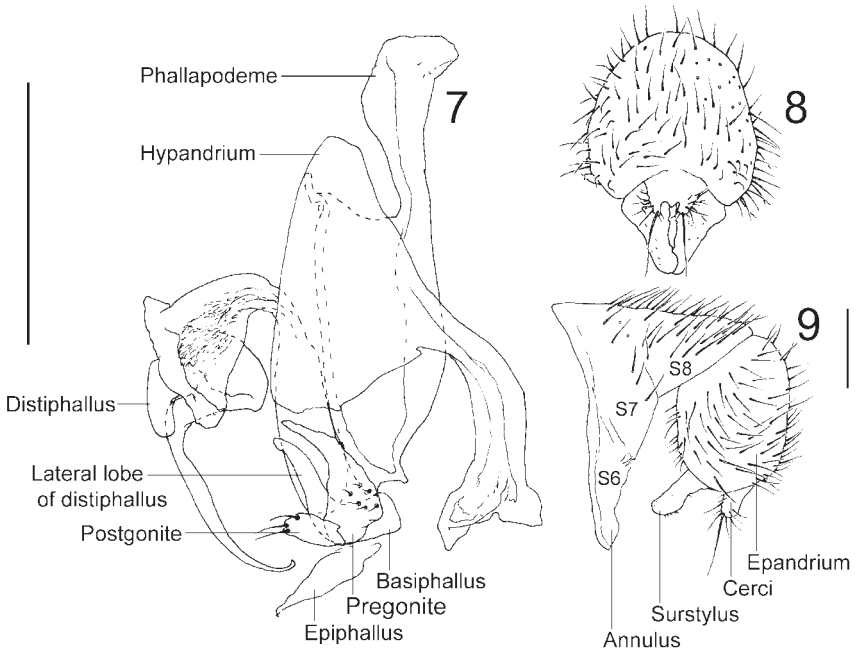
Figs. 7–9. *Tetrameringia ustulata* McAlpine, male terminalia. 7, Internal genitalia, left lateral view. 8, External terminalia, left lateral view. 9, External terminalia, posterior view (S7–S9, sternites S7–S9). Scale bars = approximately 0.2 mm.



distally and membranous basally. Postgonite small, globular, fused to pregonite, and with several well-developed bristles. Distiphallus as described for *P. hendeli*, but distal segment not as thin, and lateral lobe poorly sclerotized, broadly rounded, and narrowed at base.

Female terminalia (Fig. 24)

Ventral receptacle saclike distally and recurved ventrally; spermathecae (2) pigmented, irregular in outline, minutely grooved transversely, and with minute basal papillae; spermathecal duct approximately 10 times length of spermatheca and with subbasal attachment to spermatheca.

Etymology

The specific name refers to the collector of the ROME material (including the holotype), Dr. D.C. Darling.

Type material

Holotype: INDONESIA. East Kalimanto, Kac. Pujungan Kayan-Mentarang Nature Reserve, vi–xii.1993, D.C. Darling, log emergence trap, 2°52′N, 115°49′E, 378 m (1 ♂, ROME). **Paratypes: INDONESIA.** Same collection as holotype (1♂, ROME), East Kalimanto, 38 km north of Balikpapan, Samboja I., D.C. Darling, Rosichon I, Satrisno, 1–31.v.1992, Wanarisct Res. Stn., 60 m, 1°2′S, 117°2′E, km 6, logged forest 1967, Malaise trap head (1 ♀, ROME). **MALAYSIA.** Sabah, Belukar, Ramidi, Labuk Rd., 20.viii.1965, G.R. Conway (1 ♀, BMNH). **THE PHILIPPINES.** Palawan, Mantalingajan, Pinigisan, 600 m, 22.ix.1961, Noona Dann Exp. 61–62, caught in Malaise traps inside forest (1 ♂, ZMUC). **THAILAND.** South Khao Namkhang N.P., 80 km south of Hat Yai, 23.x.2002, A. Freidberg (1 ♂, TAUI).

Comments

Phylloclusia darlingi, like *P. quadrivittata*, *P. steleocera*, and *P. nigroscutellum*, has thin scutal stripes that extend onto the scutellum and, like the latter species, has a presutural spot and a yellow first tergite. Unlike *P. nigroscutellum*, however, the frons is entirely yellow, female tergites 2, 4, and 5 are brown (not tergites 3 and 4), and the scutellum is yellow centrally.

The male genitalia of *Phylloclusia darlingi* are characteristic in that the cerci are quite elongate, the surstylus is sharply elbowed, the head of the phallapodeme is reduced, the lateral lobe of the distiphallus is broad and rounded,

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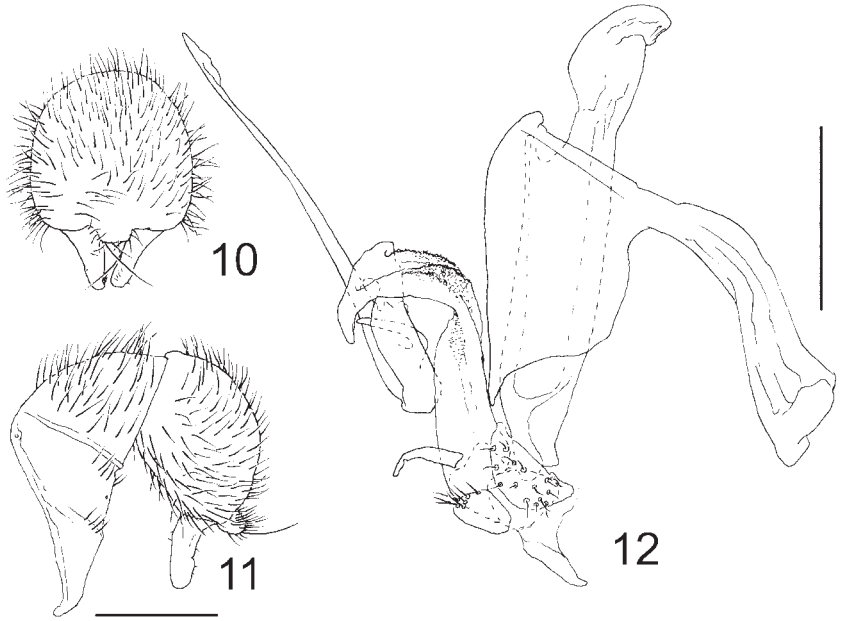
Figs. 10–12. *Phylloclusia lanceola* sp. nov., male terminalia, 10, External terminalia, posterior view. 11, External terminalia, left lateral view. 12, Internal genitalia, left lateral view. Scale bar for Figures 10 and 11 = approximately 0.2 mm. Figure 12 scale bar = approximately 0.1 mm.



the postgonite is elongate, and the lateral lobe of the hypandrium is highly reduced.

Phylloclusia hendeli sp. nov.

(Figs. 2, 13–15, 25)

Description (Figs. 2, 25)

Male

Body length 5.3 mm. Bristles yellow. Anterior dorsocentral bristle half length of posterior dorsocentral bristle, sometimes with relatively well-developed setula in front of anterior dorsocentral bristle (absent unless otherwise stated in descriptions). Acrostichal bristle much larger than surrounding notal setulae. Postvertical and ocellar bristles well developed. Scutum yellow with one pair of relatively wide lateral stripes reaching midpoint of presutural region (broken at transverse suture). Laterotergites brown. Pleuron yellow with stripe from anterior half of anepisternum to midpoint of katepisternum. Legs yellow with fore tarsi brown. Head predominantly yellow; face with large dark brown spot; anterior margin of frons sometimes with small faded spot; dorsal margin of first flagellomere with stripe; ocellar spot wide and circular. Abdomen yellow with tergites 1–4 brown, sternite 8 brown dorsally, and tergite 5 with wide central stripe (tapering anteriorly). Wing lightly clouded around tip of R_{2+3}.

Female

As described for male except as follows: pleural stripe curving onto lateral surface of katepisternum; abdomen yellow, with tergite 8 (excluding posterior margin) and posterior 3/4 of tergites 2–4 brown.

Male terminalia (Figs. 13–15)

Annulus well developed. Sides of epandrium slightly rounded, width subequal to length, and length 7/10 height. Surstylus subtriangular, angled anteriorly, and nearly 1/3 height of epandrium. Cerci 2/5 height of epandrium and deeply forked. Hypandrial arm long and arcuate, ventral lobe triangular. Phallapodeme well developed. Pregonite large, ovate, and minutely setulose centrally. Postgonite closely associated with pregonite and with several well-developed distal bristles. Basiphallus small and weakly attached to membranous epiphallus. Distiphallus elongate with stout basal section and lateral lobe absent.

Etymology

The specific name honours Dr. F. Hendel, the author of several papers on the Clusiidae, including that first describing *Phylloclusia*.

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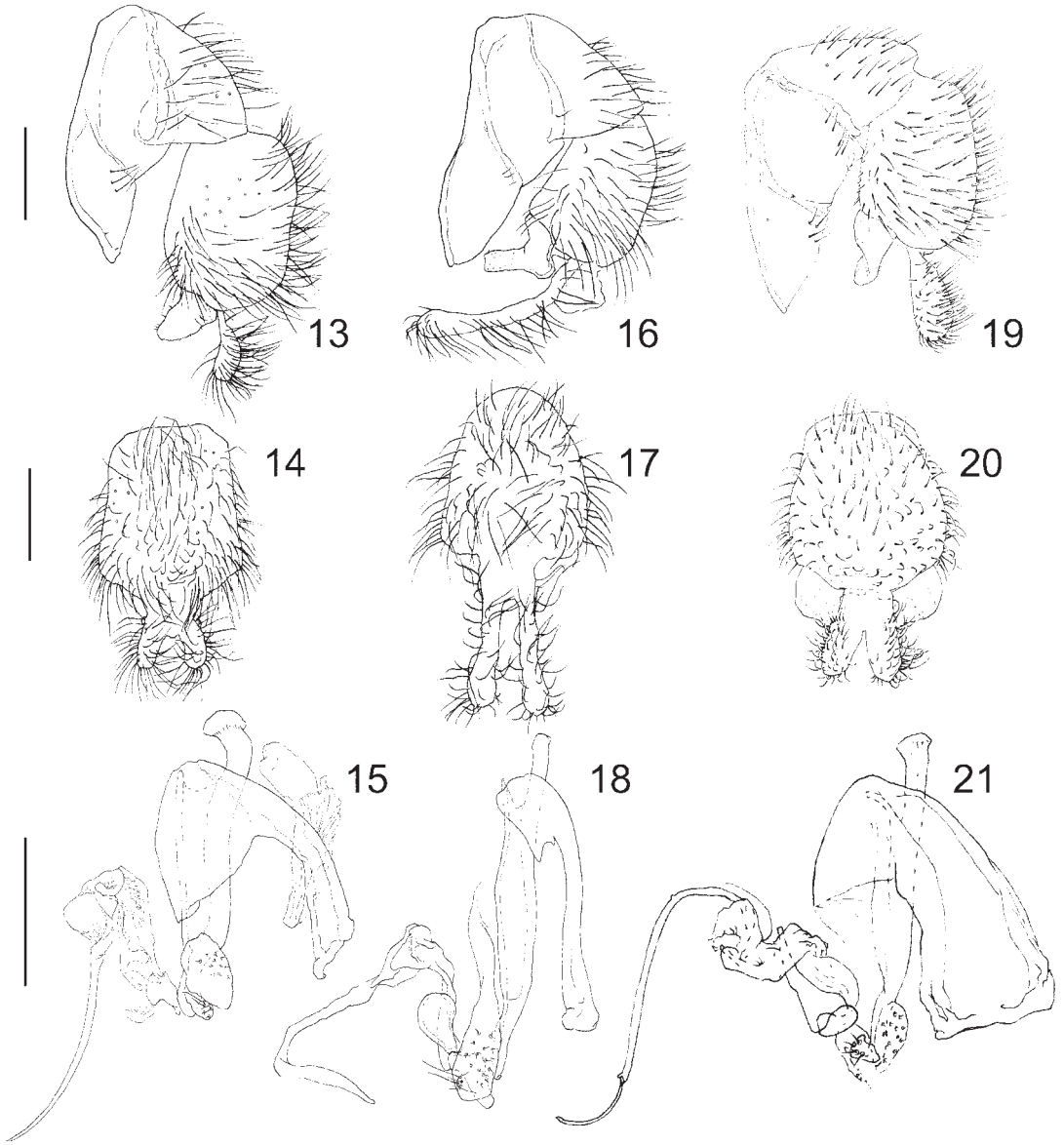
Figs. 13–21. 13–15, *Phylloclusia hendeli* sp. nov., male terminalia. 13, External terminalia, left lateral view. 14, External terminalia, posterior view. 15, Internal genitalia, left lateral view. 16–18, *P. darlingi* sp. nov., male terminalia. 16, External terminalia, left lateral view. 17, External terminalia, posterior view. 18, Internal genitalia, left lateral view. 19–21, *P. quadrivittata* Sueyoshi, male terminalia. 19, External terminalia, left lateral view. 20, External terminalia, posterior view. 21, Internal genitalia, left lateral view. Scale bars = approximately 0.2 mm.



Type material

Holotype: TAIWAN ["Formosa"]. Hassenza, 27.vi.1934, L. Gressitt (1♂, MCZC). **Paratypes: THE PHILIPPINES.** Tawi Tawi, Tarawakan north of Batu Batu, Noona Dann Exp. 61–62, caught in Malaise traps, 25.x.1961 (1 ♀, ZMUC), 30.x.1961 (1 ♀, ZMUC). **TAIWAN ["Formosa"].** Same collection as holotype (1 ♂, MCZC), Wushe (Jenai), 1000 m, Taichung 45 km east, Rte.14, 5.x.1993, F. Kaplan and A. Freidberg (1 ♂, TAUI). **Additional material examined: THE PHILIPPINES.** Tawi Tawi, Tarawakan north of Batu Batu, 13.xi.1961, Noona Dann Exp. 61–62, caught in Malaise traps (1 ♂, ZMUC).

Comments

Phylloclusia hendeli differs from congeners in having one pair of wide, interrupted scutal

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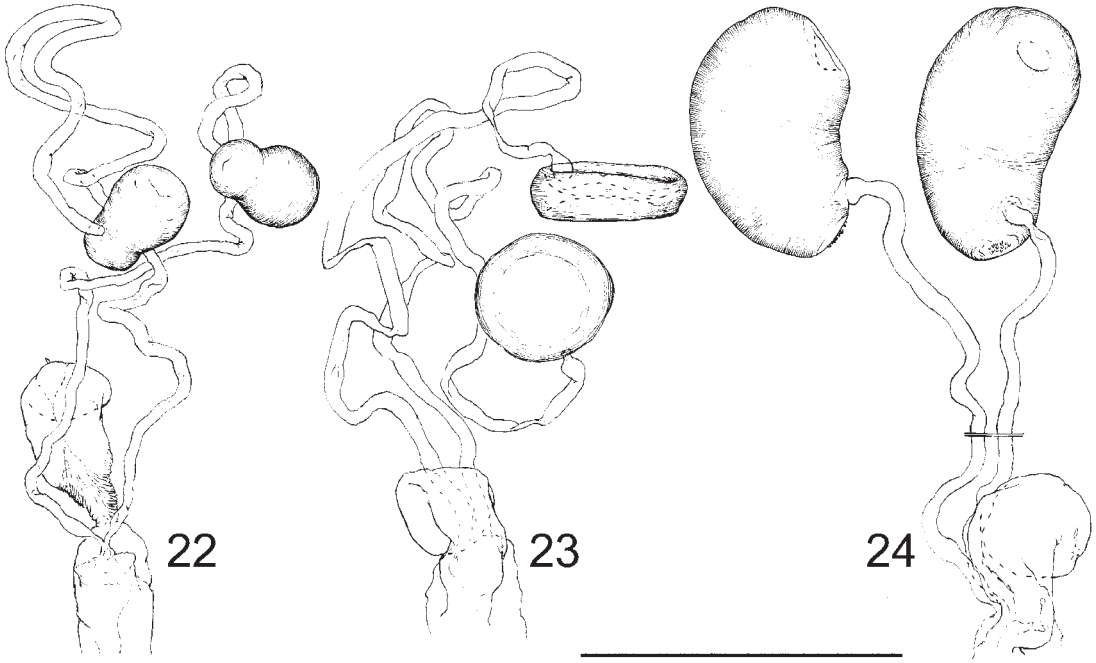
Figs. 22–24. Internal genitalia of female. 22, *Tetrameringia pubescens* McAlpine. 23, *T. ustulata* McAlpine. 24, *Phylloclusia darlingi* sp. nov. Scale bar = approximately 0.2 mm.



stripes and a large first flagellomere (approximately 2/3 the length of the arista).

The nontype male from the same locality as one of the paratype females largely agrees with the above description, but the cerci are longer, the first flagellomere is smaller, the wing spot is slightly wider, and the body is paler (the anatergite is yellow, the pleural stripe is broken medially, and the legs and abdomen are yellow, excluding several brown spots on the epandrium and annulus).

Phylloclusia lanceola sp. nov.

(Figs. 1, 10–12)

Description (Fig. 1)

Male

Body length 4.5–5.3 mm (both sexes). Bristles black. Anterior dorsocentral bristle 2/5 length of posterior dorsocentral bristle with well-developed setula in front of anterior dorsocentral bristle. Acrostichal bristle small and weak. Postvertical and ocellar bristles thin, but nearly as long as anterior fronto-orbital bristle. Arista filamentous and sparsely plumose. Notum yellow with katatergite light brown. Pleuron, coxae, and basal half of femora white with brown subnotal stripe (anepisternum marginally and outer margins of anepimeron brown); dorsal apex of hind femur with light brown spot; base of hind tibia light brown; remainder of leg light yellow. Head yellow in part; frons brown along posterior and posterolateral margins; back of head with dorsal margin and one pair of stripes radiating from foramen brown; lower half of face black, blending into brown anterior region on gena; upper margin of clypeus brown; head otherwise light yellow below antenna. Head slightly rounded and swollen so that eyes do not reach posterior margin of head. Wing dark on distal 1/5 (excluding apical margin) and around intersection of M_1 and dm-cu (spot transverse and elongate).

Female

As described for male except as follows: anterior margin of frons not produced; first flagellomere with poorly defined transverse spot at base of arista; gena with thin yellow stripe on ventral margin and black emarginate spot; dorsal half of back of head dark brown; notum with one pair of faint postsutural stripes outside dorsocentral rows, and with one thin

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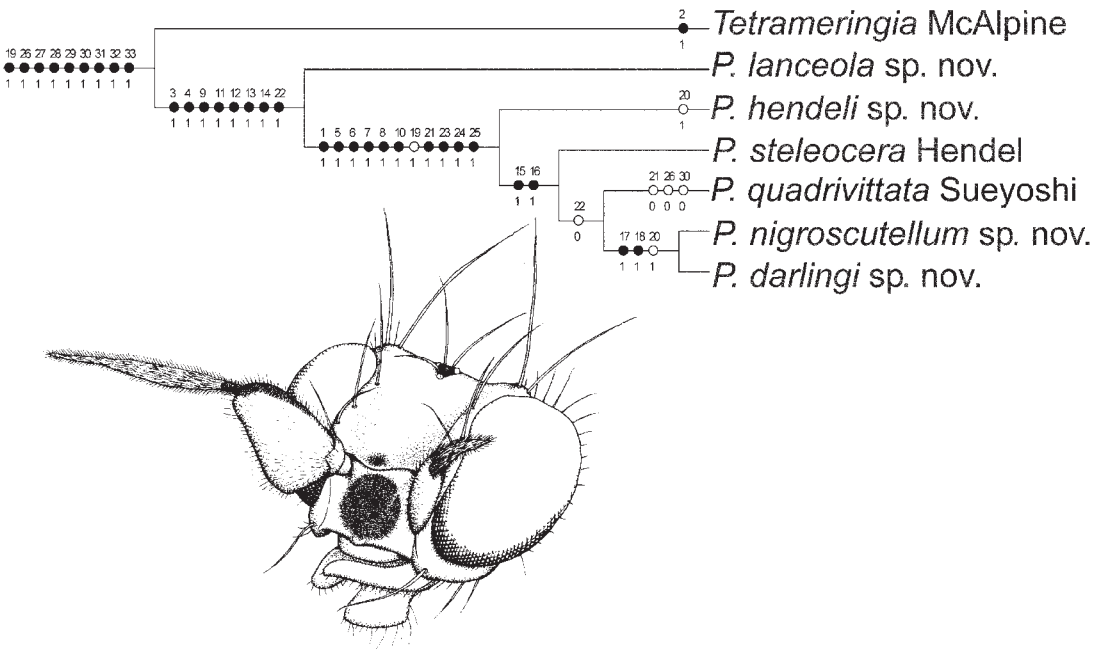
Fig. 25. Phylogenetic hypothesis for *Phylloclusia* Hendel and *Tetrameringia* McAlpine (represented by a single operational taxonomic unit). Calculated by PAUP version 4.0b10 (Swofford 2003) from the matrix shown in Table 1, using a simple heuristic search with all characters unweighted (length = 35 steps, consistency index = 0.94, retention index = 0.94), and using the command "condense collapse = minbrlen". The solid circles denote unique characters and the open circles denote homoplasies or character reversals. Inset: Head of *P. hendeli* sp. nov. Head width = 1.8 mm.



median postsutural stripe continuing onto anterior half of scutellum; midleg coloured as hind leg; fore tarsi white; tergite 1 yellow medially; tergite 2 yellow posteriorly and with light-brown lateral spots; tergites 3 and 4 yellow along posterior and anterolateral margins; tergite 8 yellow posteriorly.

Male terminalia (Figs. 10–12)

Annulus well developed. Epandrium broadly rounded, as wide as long, and length 2/3 height. Surstylus half length of epandrium, thin along entire length, sparsely setulose on inner surface, and slightly arched. Cerci small and rounded, with one pair of longer medial bristles. Hypandrial lobe triangular with apex strongly tapered and hypandrial arm long and clavate. Phallapodeme well developed. Pregonite large, poorly sclerotized, ovate, and densely setulose. Postgonite ovate and approximately 2/3 size of pregonite. Basiphallus well developed. Epiphallus as large as pregonite (seen laterally) and heavily sclerotized distally. Lateral lobe of distiphallus small and fingerlike.

Etymology

The specific name refers to the shape of the distiphallus, from the diminutive form of the Latin noun *lancea*.

Type material

Holotype: SRI LANKA ["Ceylon"]. Kikilimane Mt., 29.vii.1924, Pres. by E. Brunetti (1 ♂, BMNH). **Paratype: SRI LANKA ["Ceylon"].** A.E. Stubbs and P.J. Chandler, Hakgula forest, 4 mi. south of Nuwara Eliya, 28.ii.1974 (1 ♂, BMNH), Northeast District, Hakgala Natural Reserve, 6–7.ii.1979, K.V. Krombein, P.B. Karunaratne, S. Siriwardane, and T. Gunawardane (1 ♀, USNM).

Comments

Phylloclusia lanceola differs from more derived *Phylloclusia* by having black bristles, a frons that is not strongly narrowed posteriorly, a flat face, a broadly rounded epandrium, small cerci, and a nearly straight surstylus. Despite these differences, this species is included in *Phylloclusia* because it has a short anterior dorsocentral bristle, one pair of lateral scutellar

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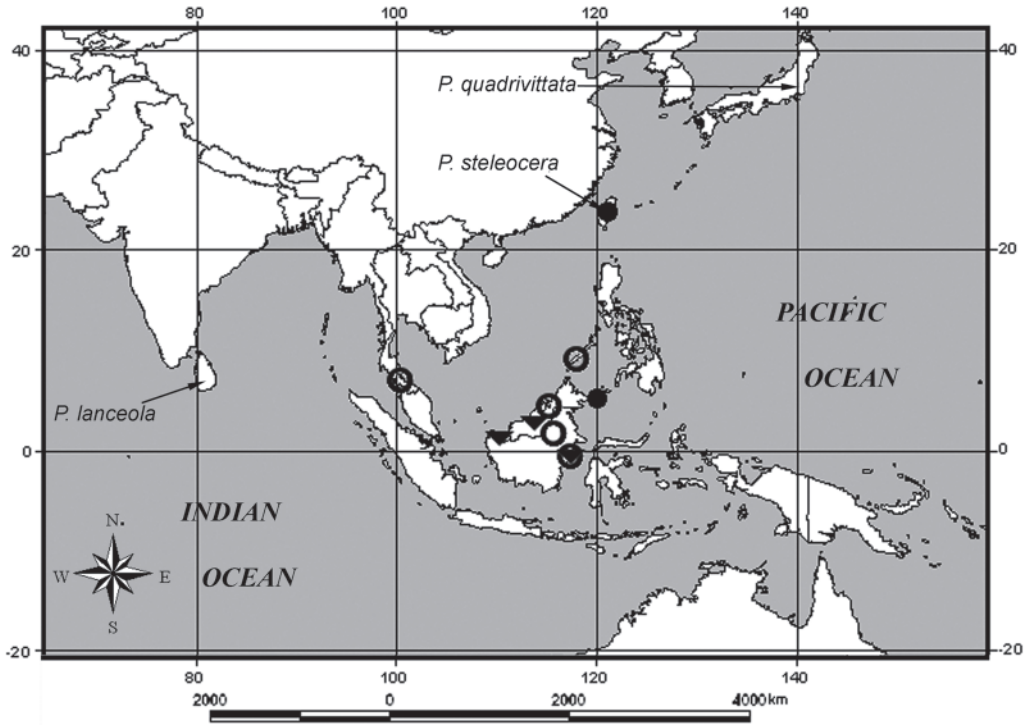
Fig. 26. Map showing the distribution of the species of *Phylloclusia* Hendel, 1913 (○, *P. darlingi*; ●, *P. hendeli*; ▼, *P. nigroscutellum*).



bristles, an elongate thorax and abdomen, a brown tergite 1 and face, and a medial ridge on the frons (albeit less developed).

Phylloclusia nigroscutellum sp. nov.

(Fig. 6)

Description (Fig. 6)

Female

Body length 4.5–5.3 mm. Bristles yellow. Anterior dorsocentral bristle half length of posterior dorsocentral bristle. Acrostichal bristle well developed. Postvertical and ocellar bristles well developed. Scutum yellow with one pair of thin postsutural stripes outside dorsocentral rows (curved inwards at base and isolated from margins of scutum) and with transverse presutural spot. Scutellum brown with lateral corners yellow. Katatergite and outer margin of anatergite brown (Indonesian specimen with stripe below scutellum). Pleuron yellow with strong vertical stripe on dorsal 3/5 of anterior surface of katepisternum. Legs yellow. Head predominantly yellow; first flagellomere with strong dorsal stripe; frons with one pair of lateromedial spots; face with large dark-brown quadrate spot on ventral 3/4; back of head with spot below ocellar tubercle; remainder of first flagellomere and head below antenna light yellow. Abdomen yellow with tergites 3, 4, and 8 black. Wing dark on distal 1/3 (excluding apex past insertion of R_{2+3} with costa) anterior to M_1.

Male

Unknown.

Etymology

The specific name refers to the characteristic dark scutellum, derived from combining the Latin for "black" (*nigra*) with *scutellum*.

Type material

Holotype: MALAYSIA. Sarawak: 1st Division, Lubok Jita, 1°12′N, 110°48′E, 6–10.xi.1976, P.S. Cranston (1 ♀, BMNH). **Paratypes: INDONESIA.** East Kalimantan, Bukit Soeharto Experimental Forest, 60 km south of Samarinda, x.1993, per D.C. Darling (1 ♀, ROME). **MALAYSIA.** Sarawak: 4th Division, Niah, 9–17.x.1976, 3°49′N, 113°46′E, P.S. Cranston (1 ♀, BMNH).

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Comments

Phylloclusia nigroscutellum is easily recognized by a brown scutellum and spots on the frons and presutural scutum.

Phylloclusia quadrivittata Sueyoshi, 2006

(Figs. 3, 19–21)

Phylloclusia quadrivittata Sueyoshi, 2006: 21. *Sobarocephala* sp. 1 Sueyoshi *et al.*, 2003: 182 (Japanese family revision).

Description (Fig. 3)

Male

Body length 4.8 mm. Bristles yellow. Anterior dorsocentral bristle half length of posterior dorsocentral bristle. Acrostichal bristle well developed. Postvertical and ocellar bristles well developed. Thorax predominantly yellow, although anterior and lateral margins of postpronotum brown, scutum with two pairs of brown stripes (posterior pair continuing onto sides of scutellum and anterior pair inset), and anepisternum with small spot in posterodorsal corner. Legs yellow with fore tarsi brown. Head yellow with ocellar tubercle, facial spot, and dorsal stripe on first flagellomere brown. Abdomen yellow with dorsal spot on annulus. Wing with small anterodistal infuscation.

Female

Unknown.

Male terminalia (Figs. 19–21)

Annulus well developed. Epandrium nearly as wide as high, length 2/3 height, and basal margin slightly produced. Cerci 2/3 height of epandrium, narrowest basally, and deeply cleft apically. Surstylus nearly transverse, conspicuous posteriorly, almost half height of epandrium, with minute scattered setulae, and broadly subtriangular (seen posteriorly) with inner distal margin distinctly produced. Hypandrial complex similar to that of *P. hendeli*, except phallapodeme straight, lateral lobe of distiphallus present and broad, basal sclerite of distiphallus twisted medially, and distal sclerite of distiphallus longer.

Type material

Holotype: JAPAN. Fuybesawa, Kodomari Vil., Aomori Pref., Honshu, 3.viii.1996, M. Sueyoshi (1 ♂, BLKU).

Phylloclusia steleocera Hendel, 1913

(Fig. 4)

Phylloclusia steleocera Hendel, 1913: 78. Melander and Argo, 1924: 33 (family revision). Sasakawa, 1974: 155 (new distributional record).

Description (Fig. 4)

Female

Body length 5.6 mm. Bristles yellow. Anterior dorsocentral bristle half length of posterior dorsocentral bristle. Acrostichal bristle well developed. Postvertical and ocellar bristles well developed. Scutum predominantly yellow with one pair of thin dorsocentral stripes reaching level of postpronotum (bifid to midpoint of scutum), postpronotum with small posterior spot and lateral margin of notopleuron brown (continuing onto pleuron as subnotal stripe). Scutellum yellow with lateral margins brown. Katatergite brown and anatergite yellow with thin brown stripe below scutellum. Pleuron yellow with subnotal stripe on dorsal half of anepimeron (emarginate medially) and dorsal and posterior margins of anepisternum. Legs yellow with fore tibia and tarsi brown. Head predominantly yellow; first flagellomere with thin dorsal stripe; anterior margin of frons with short, thin stripe; head light yellow below antenna, excluding dark-brown quadrate spot on ventral 3/4 of face; ocellar tubercle brown. Abdomen partly yellow; tergites 1 and 2 with wide central stripe (narrowing posteriorly) and lateral margins brown (doubly sinuate on inner margin); tergite 3 with median stripe (not reaching posterior margin); tergites 4 and 8 brown; tergite 5 brown on posteromedial margin. Wing dusky around tip of R_{2+3}.

Male

Unknown.

Type material

Lectotype: TAIWAN ["Formosa"]. Kankau (Konshus), iv.1912, [red label:] ♀ lectotype *Phylloclusia steleocera* Hendel, 1913, det. O. Lonsdale (1 ♀, DEI). **Additional material examined: TAIWAN.** "Kosempo, Formosa, H. Sauter, 19.v.1911, Hendel (coll)" (1♀, NHMW).

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Comments

We here designate the examined syntype of *Phylloclusia steleocera* as the lectotype of the species and the remaining female type (same locality) as the paralectotype.

Phylogenetic analysis

Analysis of the character matrix shown in Table 1 produced one tree (Fig. 25) 39 steps in length (consistency index = 0.85, retention index = 0.86). *Phylloclusia* is a well-supported clade (characters 3, 4, 8, 11, 12, 13, 14, and 22) that forms a distinct monophyletic group with *Tetrameringia* (characters 19 and 26–33). *Phylloclusia lanceola* is basal in the genus; the remaining species form a clade defined by yellow bristles, a laterally compressed arista, an elongate pointed first flagellomere with a dorsal stripe, a median facial carina, a striped scutellum, a vertical stripe on the pleuron (lost in *P. quadrivittata* and *P. steleocera*), a brown katatergite, a more angulate epandrium, elongate cerci, and an elbowed surstylus (characters 1, 5, 6, 7, 8, 10, 19, 20, 21, 23, 24, and 25). Excluding *P. lanceola*, *Phylloclusia* species are also bivittate and, except in *P. hendeli*, the stripes are thin and forked along most of their length (characters 15 and 16). The inner fork of each stripe is absent (character 17) in *P. nigroscutellum* and some *P. darlingi*, which also have a yellow first tergite (character 22, reversal) and a characteristic presutural spot (character 18); these forks are separated from each other in *P. quadrivittata*.

Distribution

Phylloclusia is found in Japan, Taiwan, and Southeast Asia (Fig. 26), whereas *Tetrameringia* (also found in Japan) has a more southerly distribution, with species described from Madagascar, South Africa, Malawi, and eastern Australia (McAlpine 1960; Stuckenberg 1973; Barraclough 2000, 2002; Sueyoshi 2006). The basalmost *Phylloclusia* species (*P. lanceola,* with filamentous aristae) occurs in Sri Lanka, but the remainder of the genus is more easterly in distribution. The remaining species (with compressed aristae) occur mostly in and around Borneo, although the range of *P. hendeli* extends north into Taiwan, *P. darlingi* occurs west into Thailand, and *P. steleocera* and *P. quadrivittata* are known only from Taiwan and Japan, respectively.

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