

EMPIDINE DANCE FLIES FROM SINGAPORE AND SOUTHERN MALAYSIA (DIPTERA: EMPIDIDAE: EMPIDINAE)

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ABSTRACT. – Five new species belonging to the *Empis* (*Coptophlebia*) *hyalea*-group are described, namely *E. (C.) neesoonensis*, new species, *E. (C.) producta*, new species, *E. (C.) tortuosa*, new species, *E. (C.) trisetata*, new species and *E. (C.) verruca*, new species. A key to all known species of the group is provided for Singapore and Southern Malaysia.

KEY WORDS. – Diptera, Empididae, Empidinae, *Empis* (*Coptophlebia*) *hyalea*-group, new species, Oriental region, Singapore, Malaysia, key to species.

INTRODUCTION

The *Empis* (*Coptophlebia*) *hyalea*-group was recently recognised as a monophyletic group within the tribe Empidini of the subfamily Empidinae (Daugeron, 2002). Since this first publication on the group, forty-four species were described from the Afrotropical (Central African Republic, Ivory Coast and Guinea), Oriental and Australasian (China, Indonesia, Japan, Laos, Malaysia, New Caledonia, Papua New Guinea, Singapore, Thailand and Vietnam) regions (Daugeron & Grootaert, 2003a, b, 2005). Although the group is represented worldwide, it seems to be much more diversified in tropical and subtropical areas of the Oriental and Australasian regions where it is the main representative of the tribe Empidini. A cladistic analysis recognised six main smaller taxonomic units within the group (Daugeron & Grootaert, 2005). In this paper we continue our taxonomic inventory of the *E. (C.) hyalea*-group in Southeast Asia with the description of five new species recently collected in Singapore and southern Malaysia.

MATERIALS AND METHODS

This study is mainly based on material preserved in alcohol and collected by one of us (P.G.) during several field trips in Malaysia and Singapore (2000, 2002, 2003). The material is deposited in the Royal Belgian Institute of Natural Sciences

(KBIN-IRScNB), the Raffles Museum of Biodiversity Research (ZRC), and the Muséum national d'Histoire naturelle, Paris (MNHN).

The morpho-anatomical terms follow McAlpine (1981), Sinclair et al. (1994), Cumming et al. (1995) and Daugeron (1997). However, there is a need to refer to the detailed diagnosis recently given for the *E. (C.) hyalea*-group (Daugeron & Grootaert, 2005) as several characters, common to most species, are not repeated in the descriptions proposed here. The abbreviations used in the figures are as follows: cerc, cercus; ej ap, ejaculatory apodeme; epn, epandrium; hyp, hypandrium; ph, phallus.

TAXONOMY

Empis (*Coptophlebia*) *neesoonensis*, new species
(Figs. 1A, 2)

Material examined. – Holotype - male, Singapore, Nee Soon, primary rain forest, sample 22054, coll. P. Grootaert, 4 Dec.2002 (ZRC).

Paratype – 1 female with same data (ZRC).

Other material – 1 male in bad condition (head missing), Singapore, NUS campus, sample 23082, coll. P. Grootaert, 22 Nov.2003 (KBIN-IRScNB).

Etymology. – The name of the species is derived from the type-locality.

Diagnosis. – Small blackish species with all bristles black, wing clear with median veins almost not visible, fore tibia deformed with about 6 spine-like anterodorsal bristles in basal half not longer than tibia depth.

Description. – **Male – Head.** Occiput, antenna dark brown, second and third flagellomeres aristiform. Face blackish. Palpus apparently brown. Labrum length about twice head height.

Thorax brown, scutum subshiny. Acrostichals missing; dorsocentrals uniserial ending with 1 strong, long bristle in prescutellar depression. **Legs** (Fig. 1A) brown. Left mid and hind legs missing. All femora with rather short bristles. Fore tibia deformed, somewhat S-shaped with about 6 spine-like anterodorsal bristles in basal half; first fore tarsomere with 1 strong, long anterolateral bristle at base. Mid tibia with 3 strong, rather long dorsal bristles (at basal quarter, about at middle, at tip); first mid tarsomere with 1 strong, long anterodorsal bristle at apical tip. Hind tibia swollen apically with strong, long dorsal bristles, several distinct ventral bristles at apical half; hind tarsus swollen, first four tarsomeres

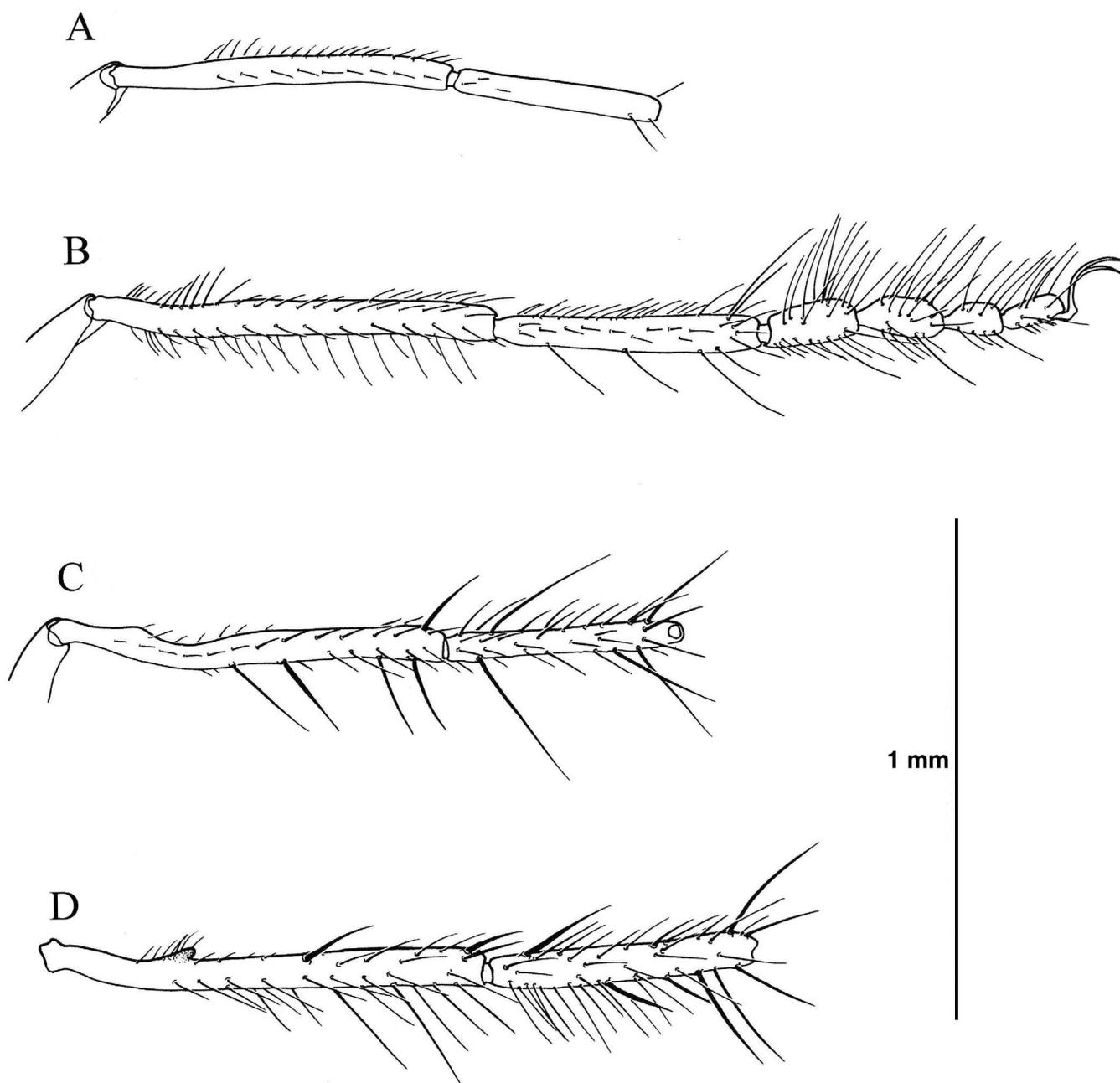


Fig. 1. Male fore leg in frontal view: A, tibia and first tarsomere of *E. (C.) neesoonensis*; B, tibia and tarsus of *E. (C.) producta*; C, tibia and first tarsomere of *E. (C.) tortuosa*; D, tibia and first tarsomere of *E. (C.) verruca*.

with long dorsal bristles. *Wing* (length = 2.2 mm) clear. Discal cell and median veins almost not visible. A1 abbreviated. Halter brown. *Abdomen* brown, sternites with pair of distinct bristles posteriorly. *Hypopygium* (Fig. 2). Epaudrium triangular with strong, long bristles at tip. Hyandrium pointed. Phallus thin.

Female similar to male except for the following characters: palpus almost yellow. Dichoptic with all ommatidia of the same size. Fore femora with distinct dorsal pennation at base; first fore tarsomere with short dorsal pennation. Mid and hind femora with long dorsal and ventral pennation. Mid tibia with distinct dorsal pennation and some distinct ventral pennate bristles at base. Hind tibia with long dorsal and ventral pennation.

Remarks. – *Empis neesoonensis* belongs to the *E. jacobsoni* clade as defined recently (Daugeron & Grootaert, 2005). Within this clade *E. neesoonensis* seems to be closely related to *E. cameronensis* (Malaysia) and differs from this species by the following characters: smaller species; anterodorsal spine-like bristles of fore tibia shorter than tibia depth; first mid tarsomere not whitish; median veins almost not visible; epandrium rather pointed at tip, not rounded, with ventral bristles less numerous basally.

***Empis (Coptophlebia) producta*, new species**
(Figs. 1B, 3, 4, 5)

Material examined. – Holotype - male, Singapore, Pulau [= Island] Ubin, Chek Jawa, sample 22059, coll. P. Grootaert, 11 Dec.2002 (ZRC).

Paratypes – 3 males with same data, 1 male, Singapore, Pulau [= Island] Ubin, 11 Dec.2002, mangrove, sample 23119, coll. P. Grootaert (ZRC); 35 males, Singapore, Pulau [= Island] Ubin, sample 23080, coll. P. Grootaert, 19 Nov.2003 (ZRC, KBIN-IRScNB, MNHN).

Etymology. – From the Latin word *productus* in reference to the dorsal part of the epandrium that is considerably produced posteriorly.

Diagnosis. – Medium-sized blackish species with all bristles black, fore tibia deformed with row of anterodorsal spine-like bristles on basal third, first fore tarsomere elongated, following three tarsomeres swollen with numerous long, fine dorsal bristles, wing with visible veins, epandrium produced posterodorsally.

Description. – **Male – Head.** Occiput dark brown blackish, antenna black, first flagellomere somewhat conical, second

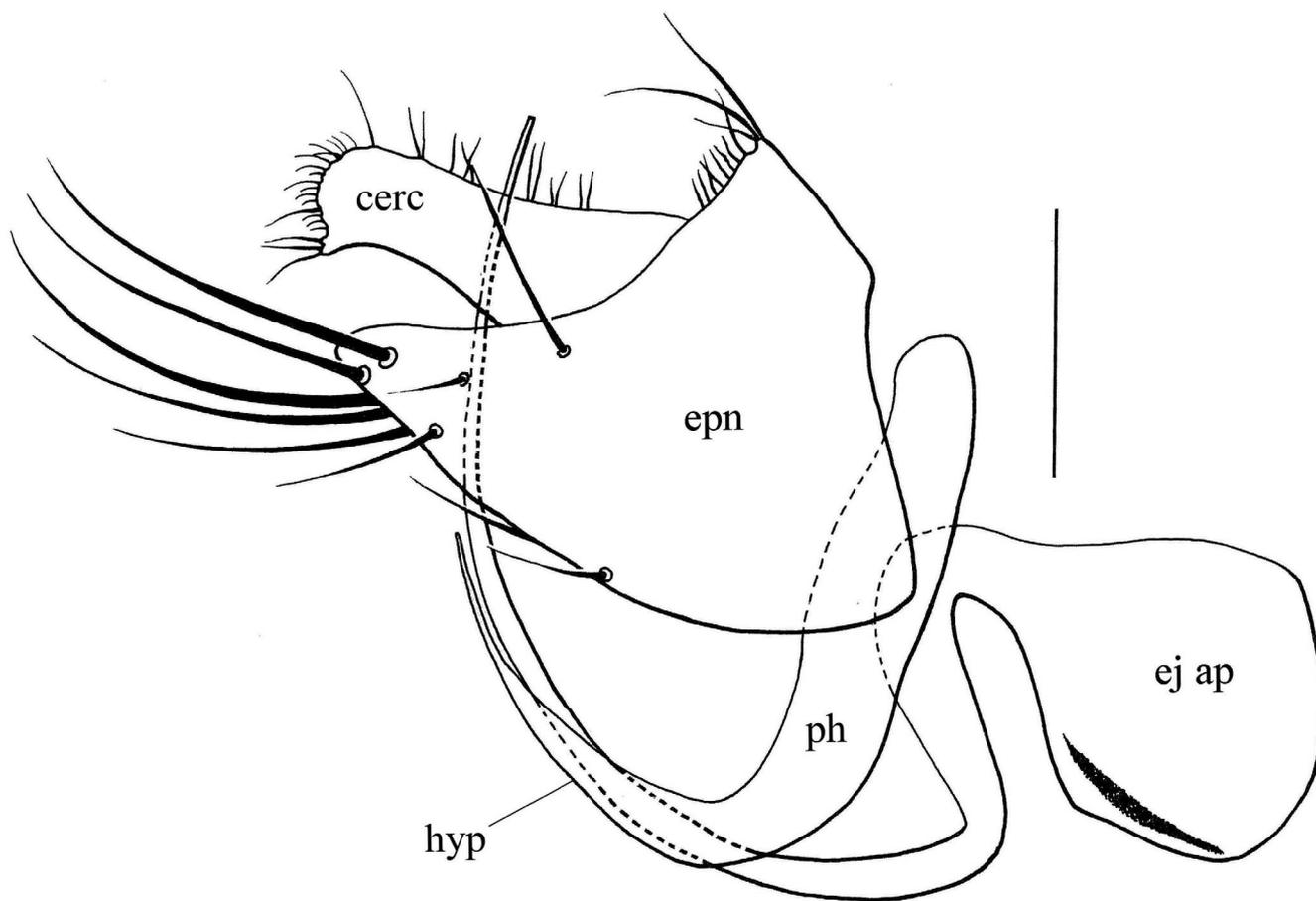


Fig. 2. Male hypopygium of *E. (C.) neesoonensis*, lateral view. Scale = 4.2 mm.

and third flagellomeres aristiform. Palpus brown, labrum length 1.5x head height. *Thorax* blackish. Dorsocentrals uniserial ending with 2 strong, long bristles in prescutellar depression. *Legs* (Fig. 1B). Fore tibia deformed with row of anterodorsal spine-like bristles on basal third ending in 2-4 longer bristles (well visible in anterior view); first fore tarsomere elongated, almost as long as the following four tarsomeres together, with 1 distinct anterolateral and posterodorsal bristles at base and at tip respectively; following three tarsomeres swollen with numerous long rather fine dorsal bristles, 1 strong, long ventral bristle. Mid tibia with 3 strong, long ventral and dorsal bristles; first mid tarsomere with 1 strong, long posterodorsal bristle at base and at tip. Hind tibia and tarsus with several strong, long postero- and anterodorsal bristles, hind tarsus somewhat thick. *Wing* (length = 2.4 mm) feebly tinged with brown, all veins well visible except M1, A1 abbreviated. Halter dark brown. *Abdomen* dark brown, paler, with distinct short bristles at base. *Hypopygium* (Fig. 4). Epandrium rather truncate at tip, projected posterodorsally, with row of very strong, long bristles on the dorsal margin, several shorter, finer bristles at tip. Hypandrium somewhat rounded at tip. Phallus rather long, narrowed at tip.

Female unknown.

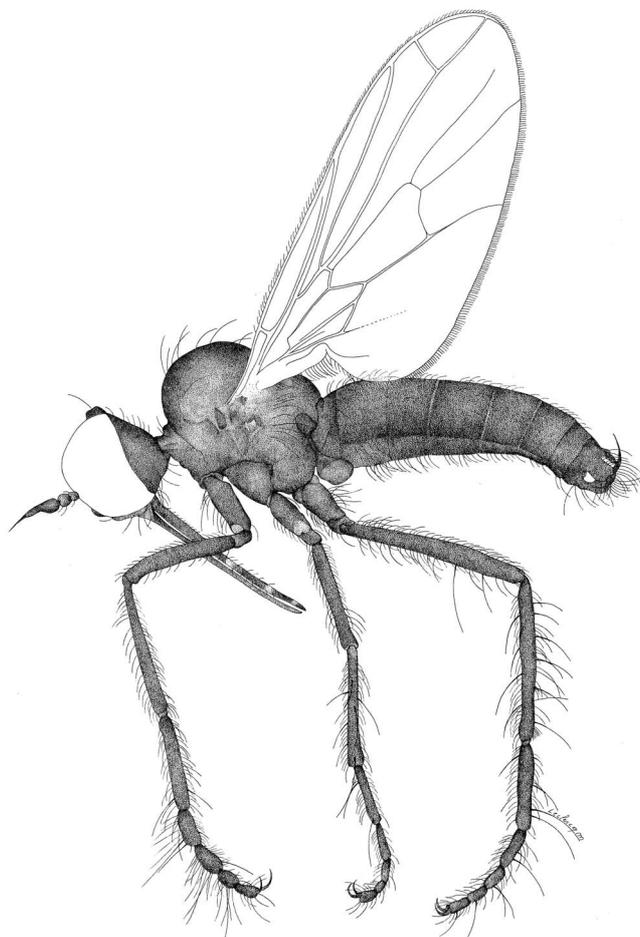


Fig. 3. Habitus of *E. (C.) producta*, male.

Remarks. – This species belongs to the *E. jacobsoni* clade as defined recently (Daugeron & Grootaert, 2005). Within this clade it is closely related to *E. padangensis* (Indonesia: Sumatra) with fore tarsus distinctly less rounded than in this species. Both species occur in the same kind of coastal habitat, i.e. in mangroves (Fig. 5).

***Empis (Coptophlebia) tortuosa*, new species**
(Figs. 1C, 6A, B)

Material examined. – Holotype - male, Singapore, Nee Soon, sample 20030, coll. P. Grootaert, 5 Oct.2000 (ZRC).

Paratypes – 8 males, Singapore, Nee Soon, sample 25070, coll. P. Grootaert, 19 Apr.2005 (ZRC, KBIN-IRScNB, MNHN).

Etymology. – From the Latin word *tortuosus* in reference to the shape of bristles of the epandrium and male sternite 8.

Diagnosis. – Medium-sized brownish species, fore tibia strongly deformed at base, legs brownish with mid tarsus distinctly paler, hind tibia with a characteristic cluster of 4 very long ventral bristles basally, sternite 8 with numerous long, tortuous ventral bristles directed anteriorly, ventral margin of epandrium with a characteristic indentation subapically.

Description. – **Male – Head.** Occiput dark brown, antenna brownish, second and third flagellomeres aristiform. Face blackish. Palpus clear yellowish, labrum length 2.3 x head height. **Thorax.** Acrostichals and dorsocentrals broken but apparently uniserial. Proepisternum with 1 fine, short bristle, prosternum with 1 long lateral bristle. **Legs** (Fig. 1C) brown, mid tarsus almost yellowish. Fore tibia strongly deformed at base with 2 distinct anterodorsal bristle (at middle, at apical third), 2 rather strong, long posterolateral bristles; first fore tarsomere with 1 strong long antero- and posterolateral bristles, 1 strong, long posteroventral bristle. Mid femur with 2 long ventral bristles at middle; mid tibia with 2 and 3 strong, long ventral and dorsal bristles respectively; first mid tarsomere with 2 strong, long anterodorsal bristles. Hind tibia with a cluster of 4 very long ventral bristles basally, rather strong at base, finer at tip, 4 strong, long dorsal bristles (1 basally, 1 at apical third, 2 apically); hind tarsus somewhat swollen, first hind tarsomere almost as long as the following four tarsomeres together, with 3 strong, long dorsal bristles, following tarsomeres with 2 long dorsal bristles. *Wing* (length = 2 mm) feebly tinged with brown, discal veins almost not visible, A1 abbreviated. *Abdomen* brownish. Sternites with distinct pair of bristles posteriorly. Sternite 8 (Fig. 6A) with numerous strong, long, tortuous ventral bristles directed anteriorly. *Hypopygium* (Fig. 6B). Epandrium subtriangular, long, with a ventral indentation subapically, strong, long, more or less tortuous ventral bristles, 1 very strong bristle at tip, several strong, long dorsal bristles. Hypandrium somewhat elongated, fine at tip. Phallus somewhat recurved at tip

Female unknown.

Remarks. – This species belongs to the *E. hyalea* clade. Within this clade it probably forms a small monophyletic group with *E. vitisalutatoris* (Singapore) and *E. thiasotes* (Indonesia: Java) on the basis of the presence of a characteristic ventral indentation of the epandrium.

***Empis (Coptophlebia) trisetata*, new species**
(Fig. 7)

Material examined. – Holotype - male, Malaysia, Kota Tinggi, riverbed, sample 22041, coll. P. Grootaert, 11 Oct.2000 (KBIN-IRScNB).

Etymology. – From the Latin word *seta* in reference to the presence of three characteristic dorsal bristles on the male fore tibia.

Diagnosis. – Small-sized dark brown species with all bristles black, fore tibia with 3 distinct dorsal bristles, cercus with a characteristic ventral projection at tip.

Description. – **Male – Head.** Occiput dark brown blackish, antenna blackish, second and third flagellomeres aristiform. Labrum length about 1.5 times head height. **Thorax** dark brown with most bristles missing, dorsocentrals apparently uniserial. **Legs** brown. Fore tibia with 3 distinct dorsal bristles (at middle, at apical third, at apical quarter), the first two

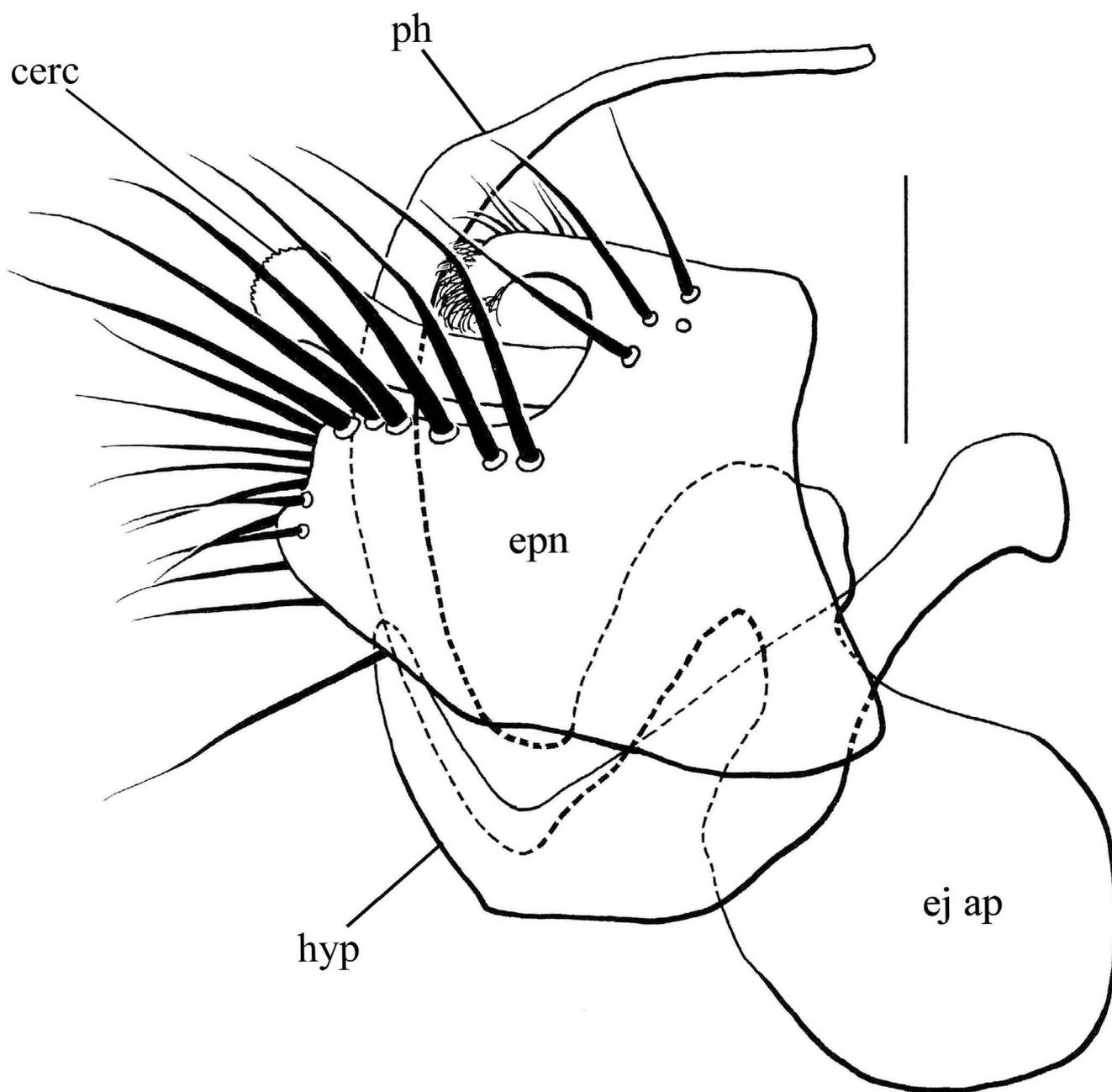


Fig. 4. Male hypopygium of *E. (C.) producta*, lateral view. Scale = 4.2 mm.

longer than tibia depth; first fore tarsomere with 1 strong, rather long anterolateral bristle at base, 1 strong anteroventral bristle at base. Mid femur with strong, long ventral bristles at basal half; mid tibia with 2 strong, long dorsal bristles (at basal and apical quarter), 1 strong, long ventral bristle at basal third; first mid tarsomere with 1 strong, long posterodorsal bristle apically. Hind tibia with row of strong, long dorsal bristles, several strong, rather long ventral bristles at apical half; hind tarsus swollen; first hind tarsomere with 2 pairs of strong, long dorsal bristles, following tarsomeres with distinct pair of dorsal bristles apically. *Wing* (length = 2 mm) feebly tinged with brown, A1 abbreviated. Halter brown. *Abdomen* brown. Sternites with distinct pair of bristles posteriorly. *Hypopygium* (Fig. 7). Cercus with a characteristic short ventral projection at tip. Epanthrium subtriangular with some strong bristles ventrally and at tip. Hypandrium short, pointed at tip. Phallus rather long, thin.

Female unknown.

Remarks. – The presence of characteristic dorsal bristles on the fore tibia indicates that this species is a possible member of the *E. hyalea* clade although the fore tibia is not distinctly deformed. Only the particular shape of cercus tip allows to be sure of the species identification.

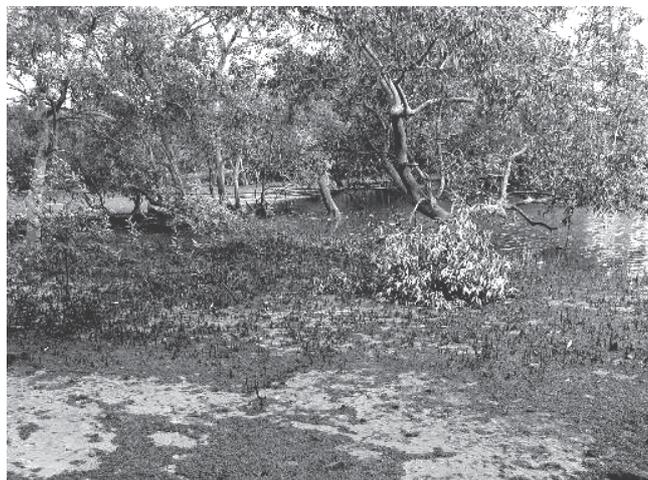


Fig. 5. Photographs showing the typical coastal habitat of *E. (C.) producta*: mangroves of Singapore (Pulau Ubin).

***Empis (Coptophlebia) verruca*, new species**
(Figs. 1D, 8)

Material examined. – Holotype - male, Singapore, Nee Soon, sample 22057, coll. P. Grootaert, 5 Oct.2000 (ZRC).

Paratypes – 1 male with the same data (ZRC); 6 males and 1 female, Singapore, Nee Soon, primary rain forest, sample 22054, coll. P. Grootaert, 4 Dec.2002 (ZRC, KBIN-IRScNB, MNHN); 1 male, Singapore, Nee Soon, sample 23102, coll. P. Grootaert, 3 Dec.2002 (ZRC).

Etymology. – From the Latin word *verruca* in reference to the presence of a tubercle on the male fore tibia.

Diagnosis. – Medium-sized brownish species with fore tibia deformed and bearing an anterodorsal tubercle at basal quarter.

Description. – **Male** – **Head.** Occiput dark brown blackish, antenna blackish, second and third flagellomeres aristiform. Palpus brown, labrum length almost twice head height. **Thorax** dark brown. Proepisternum with 1 fine, short bristle, proepisternum with 1 rather long bristle. Dorsocentrals uniserial, strong, long. **Legs** (Fig. 1D) brown. Fore tibia deformed at base with a characteristic anterodorsal tubercle at basal quarter, 1 rather strong dorsal bristle at middle, longer than tibia depth; first fore tarsomere with 1 strong, long anterolateral bristle at base, 1 strong, long dorsal bristle apically. Mid tibia with 3 strong dorsal bristles (at basal quarter, near middle, at tip), the last two long, 1 strong ventral bristle at basal third; first mid tarsomere with 2 strong, long dorsal and ventral bristles basally, 1 strong, very long posterodorsal bristle apically, following three mid tarsomeres with 1 strong, long dorsal bristle apically. Hind tibia with row of strong, long dorsal bristles; first hind tarsomere with pair of strong, long dorsal bristles apically, following four tarsomeres with pair of distinct dorsal bristles apically. *Wing* (length = 2.6 mm) feebly tinged with brown, A1 abbreviated. Halter brown. *Abdomen* brown. Sternites with pair of distinct bristles posteriorly. *Hypopygium* (Fig. 8). Epanthrium distinctly triangular with 3 strong, long bristles at tip. Hypandrium long, pointed at tip. Phallus somewhat narrowed apically.

Female similar to male except for the following characters: wing more distinctly brown. Fore femur distinctly paler than coxa and tibia; fore tibia with dorsal pennation as long as tibia depth; first fore tarsomere with short dorsal pennation except apically; mid femur, hind femur and tibia with long dorsal and ventral pennation; mid tibia with short dorsal pennation; first hind tarsomere with short dorsal pennation basally.

Remarks. – This species belongs to the *E. hyalea* clade. It can be distinguished from all other species by the presence of a characteristic tubercle on fore tibia.

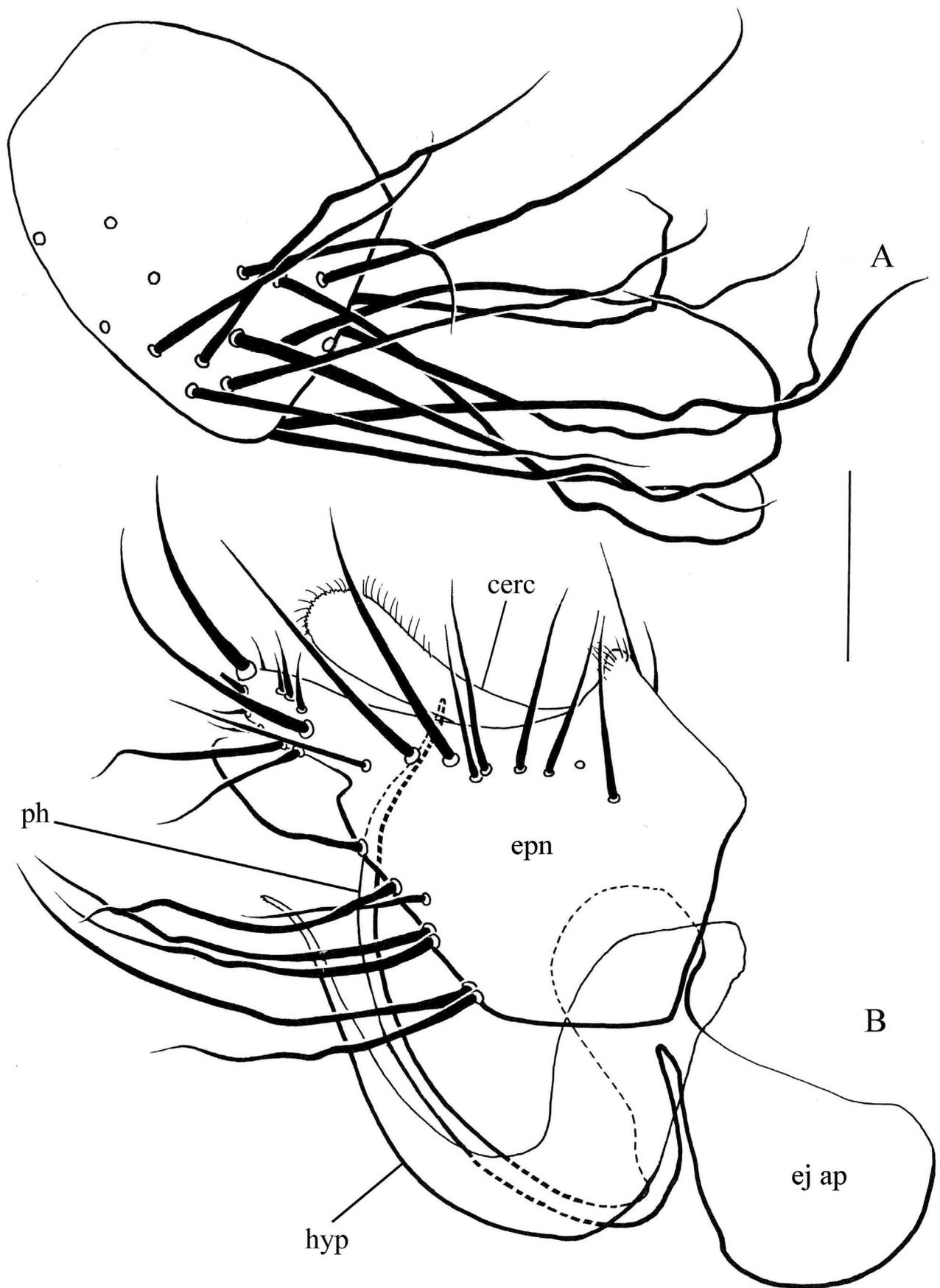


Fig. 6. Male postabdomen of *E. (C.) tortuosa*, lateral view: A, sternite 8; B, hypopygium. Scale = 4.2 mm.

Empis (Coptophlebia) vitisalutatoris
 Daugeron & Grootaert, 2005

This species was described from nine males (Daugeron & Grootaert, 2005: p. 367) collected mainly by one of us (P.G.) during two successive field trips (2002 and 2003) and also found in the collection of ZRC.

Material examined. – Holotype - male, Singapore, Pulau [= Island] Ubin, Chek Jawa, sample 22059, coll. P. Grootaert, 11 Dec.2002 (ZRC).

Paratypes – 3 males, with the same data; 1 male, Pulau [= Island] Ubin, Chek Jawa, mangrove, sample 22061, coll. P. Grootaert, 13 Dec.2002 (KBIN-IRScNB); 1 male, Singapore, Pulau [= Island] Ubin, Chek Jawa, sample 23080, coll. P. Grootaert, 19 Nov.2003 (KBIN-IRScNB); 1 male, Singapore, Pulau [= Island] Ubin, Chek Jawa, malaise trap sample 23097, coll. P. Grootaert., 2 Nov.2003 (MNHN); 1 male, Singapore, NUS campus, near woods King Edward VII Hall, sample 23093, coll. P. Grootaert, 30 Nov.2003 (MNHN); 1 male, Singapore, Nee Soon Forest, on *Vitis* flower, coll. D. H. Murphy, 8 Nov.1979 (ZRC).

Diagnosis. – Blackish species of middle size with clear wing, labrum more than twice head height, fore tibia strongly deformed at base, without anterodorsal spine-like bristles on basal half, wing rather clear with all veins well visible, sternite 8 with several long posterior bristles, epandrium indented ventrally, with 1 very strong bristle at tip, numerous strong

ventrals, 2 strong, long dorsals, hypandrium long with bristly hairs at tip.

Female unknown.

Key to species of the *Empis (Coptophlebia) hyalea*-group from Singapore and Southern Malaysia (males only)

1. Male fore tibia with several anterodorsal spine-like bristles on basal half 2
- Male fore tibia without anterodorsal spine-like bristles on basal half 3
2. Male fore tibia with anterodorsal spine-like bristles not longer than tibia depth, first fore tarsomere not elongated (Fig. 1A), wing pale with median veins almost not visible, epandrium not projected posterodorsally, without a dorsal row of very strong, long bristles (Fig. 2)
 *neesoonensis* (Singapore: Nee Soon: swamp forest)
- Male fore tibia with row of spine-like anterodorsal bristles ending with distinctly longer bristles, first fore tarsomere almost as long as the next four tarsomeres together (Fig. 1B, 3), median veins visible, epandrium projected posterodorsally, with a dorsal row of very strong, long bristles (Fig. 4)
 *producta* (Singapore: Pulau Ubin, Chek Jawa: mangrove)
3. Male fore tibia without tubercle 4
- Male fore tibia with an anterodorsal tubercle at basal quarter (Fig. 1D) *verruca* (Singapore: Nee Soon: swamp forest)

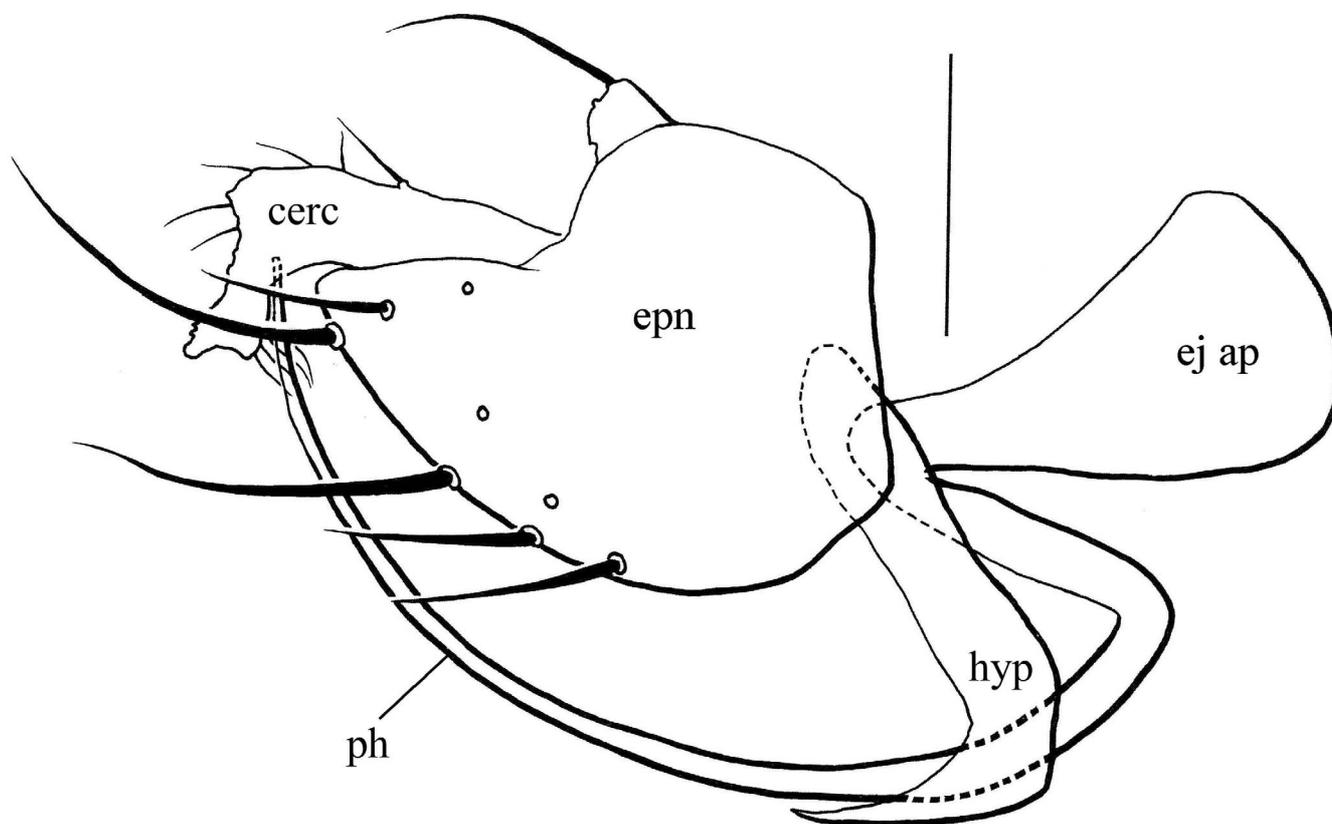


Fig. 7. Male hypopygium of *E. (C.) trisetata*, lateral view. Scale = 4.2 mm.

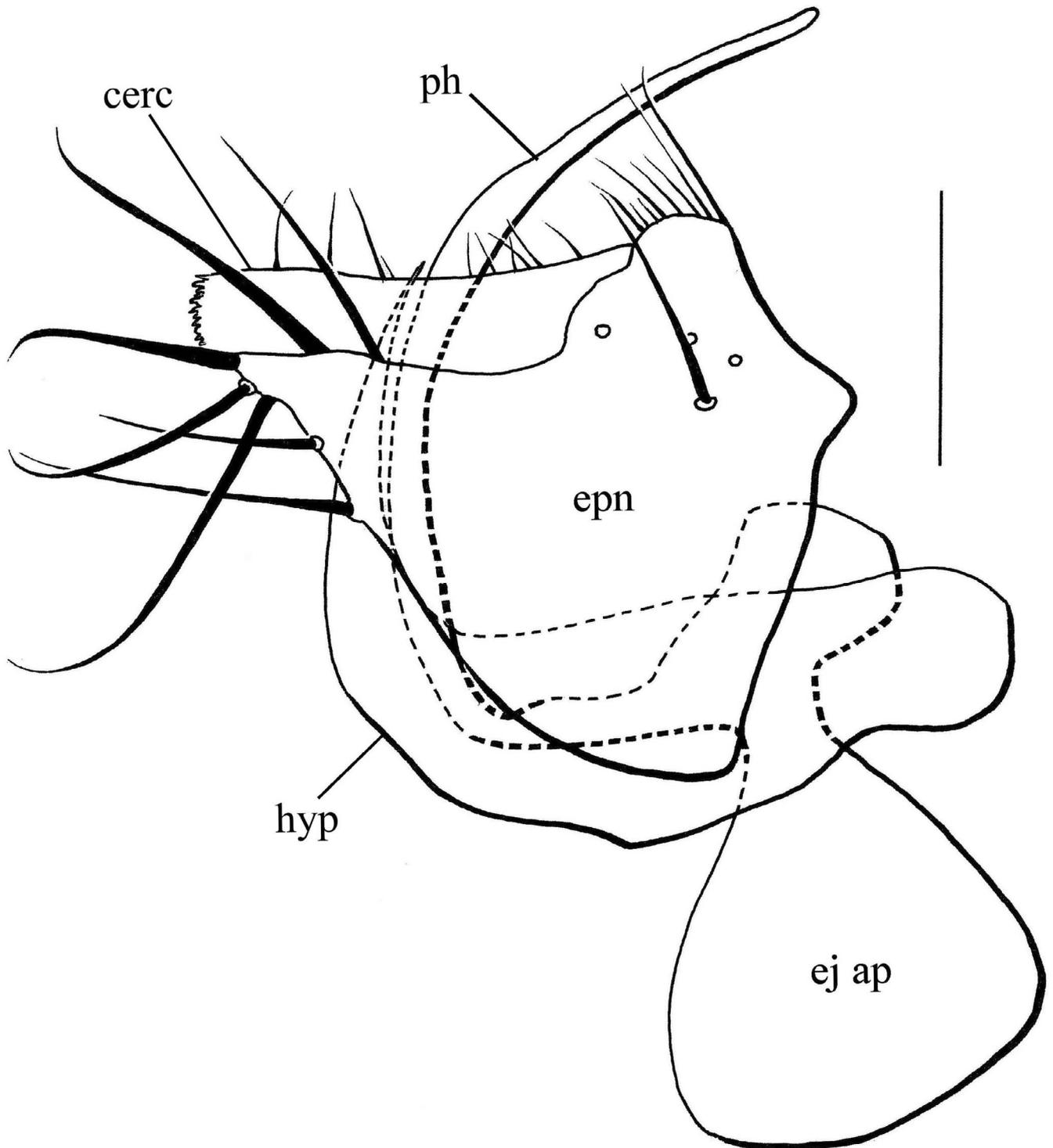


Fig. 8. Male hypopygium of *E. (C.) verruca*, lateral view. Scale = 4.2 mm.

4. Hind tibia without a cluster of 4 very long basoventral bristles, sternite 8 and epandrium with normal or only a few tortuous bristles 5
- Hind tibia with a cluster of 4 very long basoventral bristles, sternite 8 and epandrium with numerous very long, more or less tortuous bristles (Figs. 6A, B)
..... *tortuosa* (Singapore: Nee Soon: swamp forest)
5. Species of small size, fore tibia not distinctly deformed (in lateral view) with 3 distinct dorsal bristles (at middle, at apical third, at apical quarter)
..... *triseta* (Malaysia: Kota Tinggi: rain forest)
- Species of larger size, fore tibia distinctly deformed at base (in lateral view) with 1 distinct dorsal bristle at middle
.. *vitisalutatoris* (Singapore: Nee Soon: swamp forest; Pulau Ubin, Chek Jawa: rain forest)

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