

New species of the *Empis (Coptophlebia) hyalea*-group (Diptera: Empididae: Empidinae) from Guangdong province in China

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Abstract

Seven new species belonging to the *Empis (Coptophlebia) hyalea*-group are described from China (Guangdong province): *E. donga* sp. nov., *E. lamellornata* sp. nov., *E. liuxihensis* sp. nov., *E. nanlinga* sp. nov., *E. pedispinosa* sp. nov., *E. tibiaculata* sp. nov. and *E. xui* sp. nov. In this country the group is presently known through 16 species from four provinces (Guangdong, Hainan, Hubei and Yunnan).

Key words: Taxonomy, Diptera, Empididae, Empidinae, *Empis (Coptophlebia) hyalea*-group, new species, Oriental region, China.

Introduction

Empidine dance flies (Diptera: Empididae) are usually known to be well adapted to temperate areas. However some groups of species are especially diversified in subtropical or tropical areas. The *Empis (Coptophlebia) hyalea*-group is an example of species group showing a large diversification in the Oriental and Australasian regions. This group is presently extensively studied from a taxonomic, phylogenetic, and biogeographic point of view with several papers either already published (DAUGERON, 2002; DAUGERON & GROOTAERT, 2003a) or in progress of publication (DAUGERON & GROOTAERT, 2003b). The aim of this fourth paper is to complete our taxonomic knowledge on this group through the description of seven new species from China.

Materials and methods

This study is based on material preserved in alcohol and collected in the Guangdong Province by two of us (P.G. and D.Y.) during a field mission (March 2003) in three national parks or reserves, namely the Liuxihe and Shimentai National Forest Parks, and the Nanling National Nature Reserve. The material is deposited in the Royal Belgian Institute of Natural Sciences (KBIN-IRScNB) and the China Agricultural University (CAU, Beijing).

The morpho-anatomical terms follow MCALPINE (1981), SINCLAIR et al. (1994), CUMMING et al. (1995) and DAUGERON (1997). Several characters, common to most species of the *E. (C.) hyalea*-group, were recently

given in a detailed diagnosis of the group (see DAUGERON & GROOTAERT, 2003b) and therefore are not repeated in the descriptions proposed here.

Taxonomic account

Empis (Coptophlebia) donga sp. nov. (Fig. 1)

Type material. Holotype, male, Guangdong province, Nanling National Nature Reserve, along stream near entrance NP, 26.iii.2003, sample 23008, P. GROOTAERT (CAU). Paratypes: 1 male with same data; 1 male with same data but sample 23010; 1 male, Yingde, Shimentai National Forest Park, 28.iii.2003, sample 23016, P. GROOTAERT, (KBIN-IRScNB);

Etymology. The name of the species is derived from the province Guangdong.

Diagnosis. Medium-sized blackish brown species with all bristles black, mid femur with very strong, long ventral bristles at basal half. This species belongs to the *E. (C.) nahaeoensis* clade (for the definition of this clade see DAUGERON & GROOTAERT, 2003b).

Male

Head. Occiput blackish, antenna dark brown, third flagellomere rather styliform. Face blackish. Palpus dark brown. Labium with short bristles. Labrum length 1.4x head height.

Thorax blackish. Prosternum with at least 2 distinct fine bristles. Acrostichals apparently uniserial, dorsocentrals uniserial ending with 2 strong, long bristles in pre-scutellar depression.

Legs dark brown. First fore tarsomere somewhat swollen, ventrally covered with short bristly-hairs, with a distinct posterior bristle at basal ¼, a distinct apical circlet of bristles. Mid femur with 2 ventral rows of very strong, long bristles at basal half; mid tibia with a ventral row of strong to spine-like bristles, 3 strong, long dorsal bristles; first three mid tarsomeres with strong, short ventral bris-

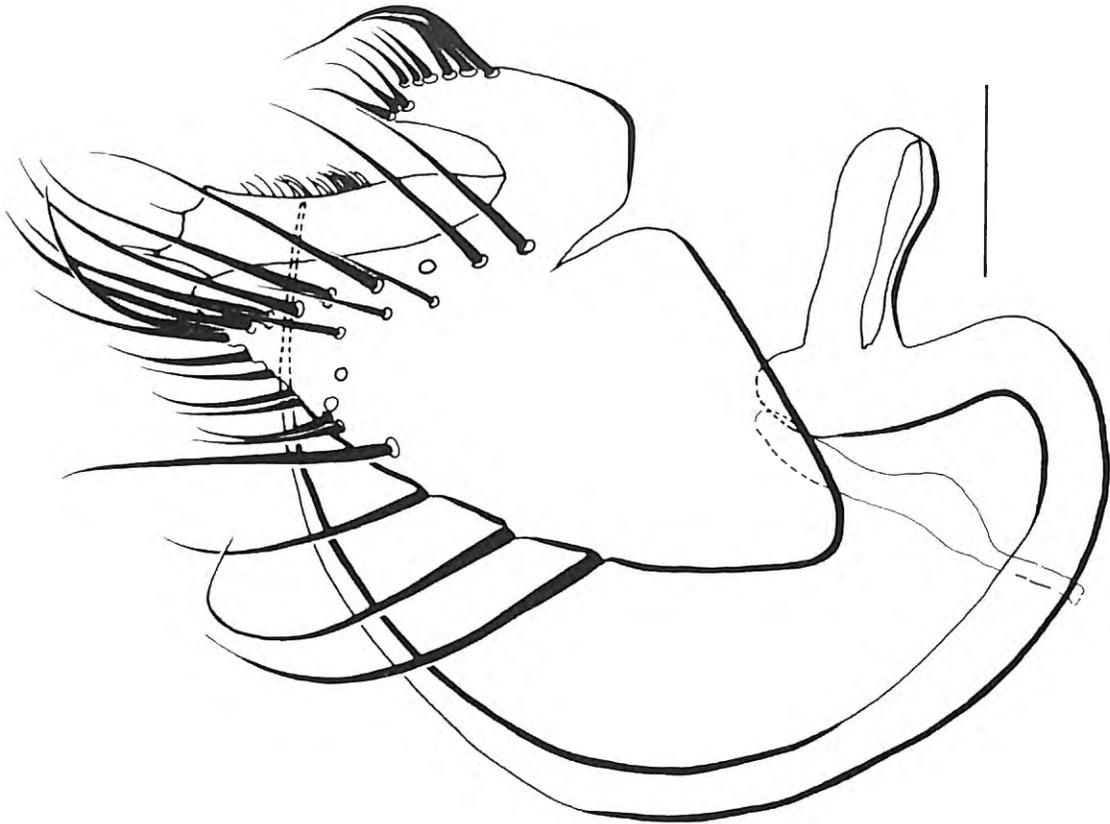


Fig. 1 — Male hypopygium of *E. (C.) donga* sp. nov. Scale = 0.1 mm.

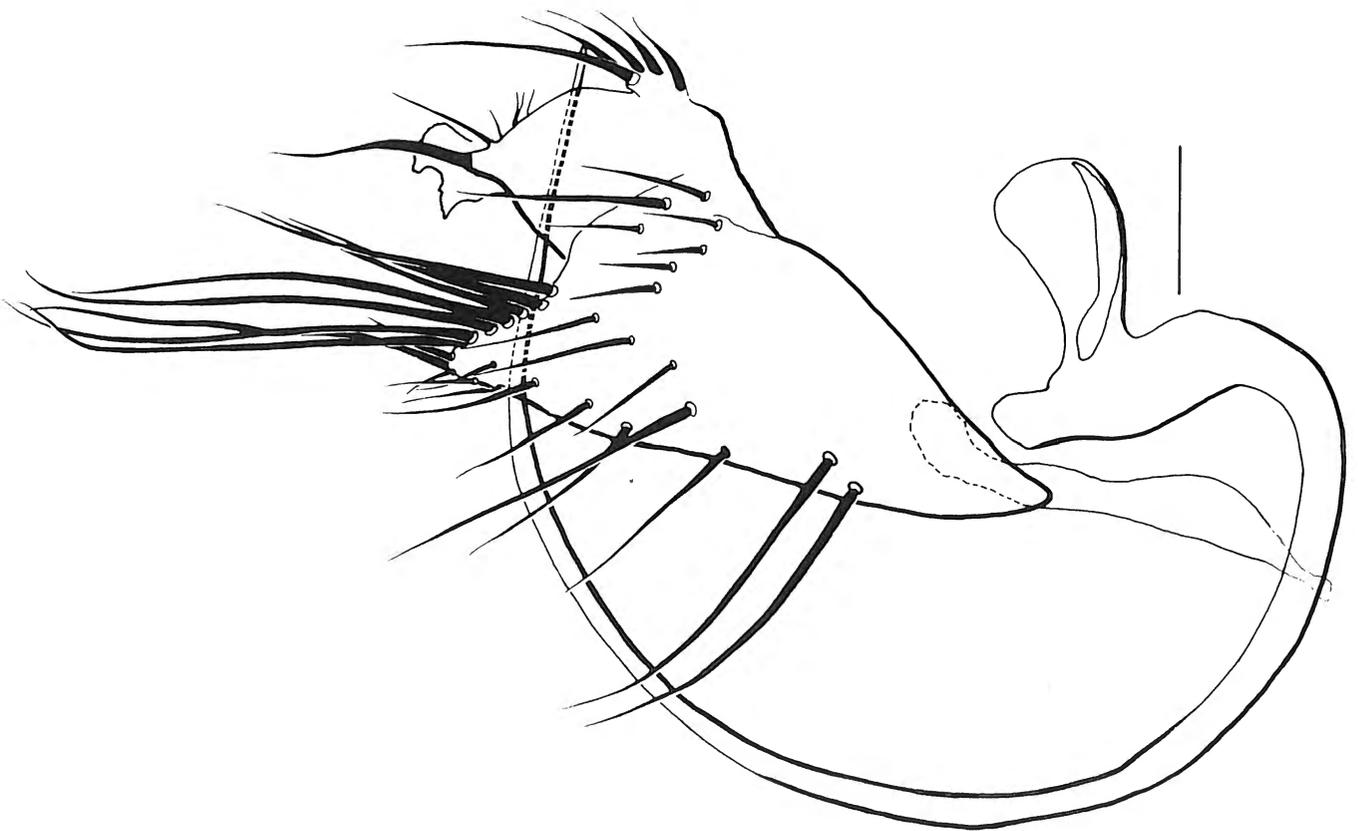


Fig. 2 — Male hypopygium of *E. (C.) lamellornata* sp. nov. Scale = 0.1 mm.

tles. Hind femur with strong, long dorsal and ventral bristles; hind tibia with numerous short ventral bristles, strong, long dorsals; first hind tarsomere somewhat swollen with 2 pairs of long dorsal bristles.

Wing (Length = 3 mm) tinged with brown, apical part of A1 almost entirely obliterated. Halter dark brown.

Abdomen brown. Numerous short bristles on the first two tergites, distinct dorsal and lateral bristles at the posterior margin of tergites. Sternites with a distinct pair of bristles. Tergite and sternite 8 with several strong, long posteromarginal bristles.

Hypopygium (Fig. 1). Cercus without a strong, long lateral bristle usually characteristic of most species of the *E. (C.) nahaeoensis* clade, with an internal bristled lobe. Epandrial lamellae narrowly separated mediodorsally, not fused with cercus anterodorsally, projected posterodorsally, with strong, long ventral bristles at base. Hypandrium considerably reduced, entirely membranous ventrally. Phallus yellowish, long, fine apically.

Female unknown.

***Empis (Coptophlebia) lamellornata* sp. nov.**
(Fig. 2)

Type material. Holotype male, Guangdong province, Liuxihe National Forest Park, 20.iii.2003, sample 23020, P. GROOTAERT (CAU). Paratypes: 6 females with same data (KBIN-IRScNB).

Etymology. From the Latin *lamella* and *ornatus* meaning *lamella* and *ornament* respectively, on account of the presence of very long bristles on the epandrial lamellae.

Diagnosis. Medium-sized brownish species with all bristles black, cercus with a characteristic strong, long lateral bristle, epandrium with several very long dorsal bristles apically. This species belongs to the *E. (C.) nahaeoensis* clade.

Male

Head. Occiput, antenna dark brown, first flagellomere somewhat lengthened, 4x the pedicel length, third flagellomere aristiform. Face blackish. Palpus dark brown with 1 distinct bristle at tip. Labium brownish with short bristles. Labrum length 1.6x head height.

Thorax dark brown. Proepisternum and prosternum with 1 and 5 distinct bristles respectively. Acrostichals biserial, fine, short, dorsocentrals uniserial, longer, ending with 2 strong, long bristles in prescutellar depression.

Legs brownish. Fore tibia with several distinct rather fine, short bristles; first three fore tarsomeres with 1 strong antero- and posteroventral bristle. Mid femur with strong, long ventral bristles, especially anteriorly, at basal half. Mid tibia with a dorsal row of 3-4 strong, long bristles, an anteroventral row of 7 stronger bristles; first mid tarsomere with a strong, long bristle apically; first four mid tarsomeres with a strong spine-like short anteroventral bristle apically. Hind femur with numerous

distinct dorsal bristles; hind tibia with rows of strong, long dorsal bristles; first hind tarsomere swollen with long dorsal bristles.

Wing (Length = 3 mm) clear. A1 complete. Halter brown.

Abdomen brown. First two tergites covered with numerous distinct bristles. Sternites with a distinct pair of posterior bristles. Tergite 8 with 2 strong, long posteromarginal bristles, sternite 8 with several strong, long posteromarginal bristles.

Hypopygium (Fig. 2). Cercus of complicated structure with 1 very strong, long lateral bristle at tip. Epandrium triangular with several strong, very long dorsal bristles apically, lamellae projected posterodorsally, narrowly separated mediodorsally, fused with cercus anterodorsally. Hypandrium considerably reduced, entirely membranous ventrally. Phallus yellowish, long, fine.

Female

Similar to male except for the following characters: darker; fore femur with a short ventral pennation, some short dorsal pennate bristles at basal half; fore tibia with a short dorsal and ventral pennation at apical half; mid and hind femora with a long ventral and dorsal pennation; mid tibia with a short dorsal pennation, a long ventral pennation at basal half; hind tibia with a ventral and dorsal pennation almost as long as tibia width; first hind tarsomere with 1-2 dorsal pennate bristles at base; wing tinged with brown.

***Empis (Coptophlebia) liuxihensis* sp. nov.**
(Fig. 3)

Type material. Holotype male, Guangdong province, Liuxihe National Forest Park, 20.iii.2003, sample 22020, P. GROOTAERT (CAU).

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

Diagnosis. Medium-sized blackish brown, spinose species with all bristles black, fore tibia deformed, epandrium characteristically pointed at tip. This species belongs to the *E. (C.) jacobsoni* clade (for the definition of this clade see DAUGERON & GROOTAERT, 2003b).

Male

Head. Occiput blackish, antenna dark brown, third flagellomere aristiform. Face blackish. Palpus dark brown. Labium blackish with short bristles. Labrum length 1.6x head height. *Thorax* blackish. Proepisternum and prosternum with a long bristle. Acrostichals biserial, distinct, dorsocentrals uniserial, longer, ending with 2 strong, long bristles in prescutellar depression. Other bristles as usual but stronger.

Legs dark brown. Fore tibia deformed, S-shaped with 1 spine-like dorsal bristle at basal third and at middle; first fore tarsomere with a ventral row of 3 spines, 1 antero-dorsal spine apically. Mid tibia with a dorsal row of 4 spine-like bristles, 1 long spine-like posteroventral bristle

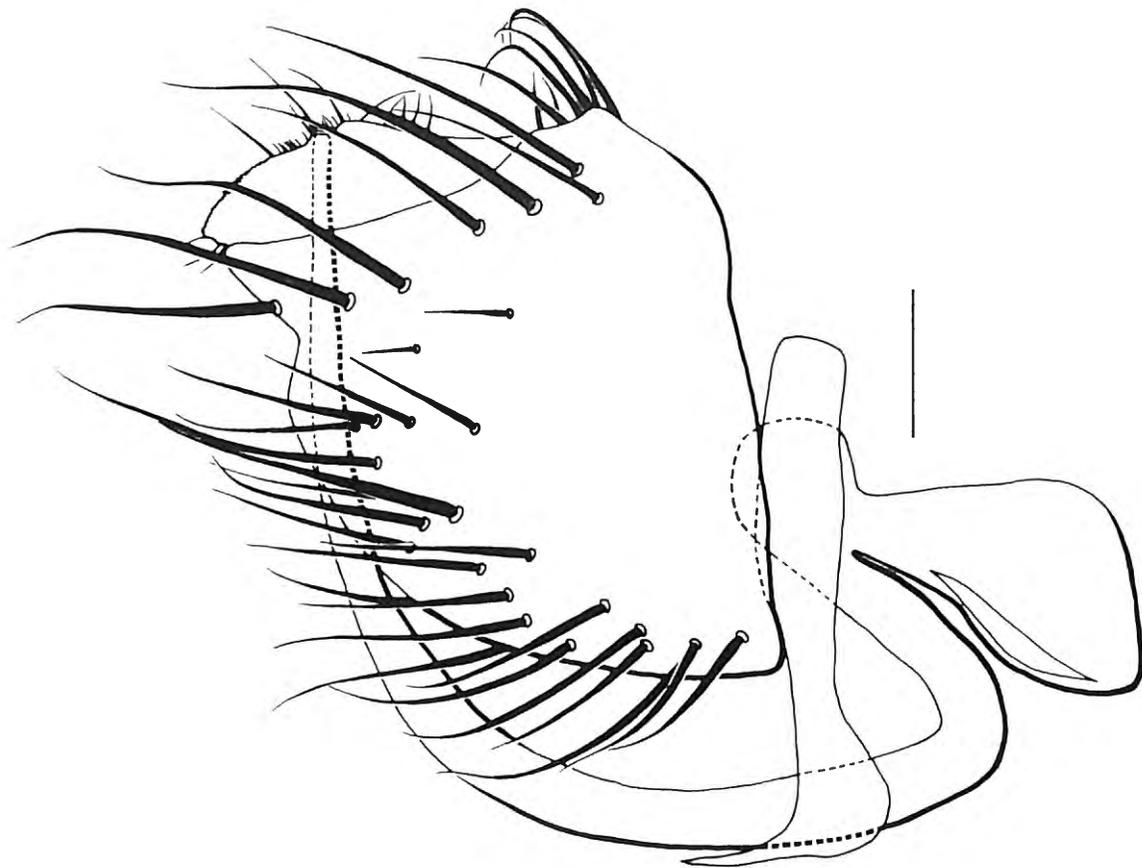


Fig. 3 — Male hypopygium of *E. (C.) liuxihensis* sp. nov. Scale = 0.1 mm.

at middle, 1 short spine-like anteroventral bristle at apical $\frac{1}{4}$, an apical circlet of strong, long bristles; first mid tarsomere with a posteroventral row of 3 long spines, 1 anteroventral spine at basal third, other spines as follows: 1 postero- and anterodorsal apically, 1 anteroventral apically, 1 ventral at basal third; following three mid tarsomeres with an apical circlet of strong bristles. Hind tibia with an antero- and posterodorsal row of strong, long bristles, 3 ventral spine-like bristles at apical half; first hind tarsomere rather long, not swollen, with numerous ventral spines, several strong, long dorsal bristles, an apical circlet of long spines; following three hind tarsomeres with a pair of long dorsal bristles, 3 ventral spines apically.

Wing (Length = 4 mm) tinged with brown, A1 feebly sclerotized, complete. Halter brown. *Abdomen* brown. Rather long bristles at base, on tergites laterally. Sternites with a distinct pair of posterior bristles. Tergite 8 with a pair of strong, long posteromarginal bristles, sternite 8 with several strong, long posteromarginal bristles.

Hypopygium (Fig. 3). Epandrium characteristically pointed at tip with a dorsal row of strong, long bristles, numerous strong, long ventral bristles. Hypandrium pointed at tip. Phallus pale, rather thick.

Female unknown.

***Empis (Coptophlebia) nanlinga* sp. nov.**

(Fig. 4)

Type material. Holotype male, Guangdong province, Nanling National Nature Reserve, 26.iii.2003, sample 23011, P. GROOTAERT (CAU). Paratypes: 2 males and 6 females with same data (KBIN-IRScNB).

Other material. 1 female with same data (KBIN-IRScNB).

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

Diagnosis. Small-sized brownish to blackish species with all bristles black, third flagellomere styliiform, first four abdominal segments brown, remaining segments dark brown. This species belongs to the *E. (C.) nahaeoensis* clade.

Male

Head. Occiput, antenna dark brown with third flagellomere styliiform. Face blackish. Palpus brown to blackish at tip. Labium brownish with short bristles. Labrum length about twice head height.

Thorax blackish. Prosternum with 2 long bristles. Acrostichals apparently biserial, rather fine, dorsocentrals



Fig. 4 — Male hypopygium of *E. (C.) nanlinga* sp. nov. Scale = 0.1 mm.

apparently irregularly biserial ending with 2 strong, long bristles in prescutellar depression.

Legs brown. Fore tibia with an anterodorsal row of distinct rather short bristles, an apical cirlet of strong bristles; first fore tarsomere with a row of strong, long anterodorsal bristles, a strong, long posteroventral and anterior bristle basally; first three fore tarsomeres with an apical cirlet of strong bristles especially a strong, long posteroventral. Mid femur with an antero- and posteroventral row of strong, long bristles at basal half; mid tibia with a strong, long bristle at basal third, 2 strong, long dorsal bristles (at apical $\frac{1}{4}$, near middle), an apical cirlet of spine-like bristles; first mid tarsomere with a strong, long posterodorsal bristle apically, a row of spine-like rather short ventral bristles, first four mid tarsomeres with an apical cirlet of distinct bristles. Hind femur with a row of strong, long posteroventral bristles; hind tibia with several antero- and posterodorsal strong, long bristles; first hind tarsomere with 2 dorsal pairs of strong, long bristles (apically and basally), several distinct ventral bristles.

Wing (Length = 3.5 mm) feebly tinged with brown. A1 complete. Halter brown.

Abdomen with first four segments brown, following segments dark brown. Numerous rather long bristles at base, distinct bristles at the posterior margin of tergites. Sternites with a pair of rather long distinct posterior bristles. Tergite 8 with 6 strong, long posteromarginal bristles. Sternite 8 with numerous strong, long posteromarginal bristles

Hypopygium (Fig. 4). Cercus with characteristic microspines on the dorsal margin. Epandrium more or less triangular, with a long posterodorsal projection, strong, long bristles with strong insertions on the dorsal margin, at tip, in the apical part of the ventral margin. Hypandrium considerably reduced, entirely membranous ventrally. Phallus yellowish, long, rather thick at base.

Female similar to male except for the following characters: fore femur with a short ventral pennation except basally or only with subpennate bristles; fore tibia with a short ventral (except basally) and dorsal (only apically) pennation or only with subpennate bristles; mid, hind femora with a long dorsal and ventral pennation; hind tibia with a short dorsal and ventral pennation except at



Fig. 5 — Male hypopygium of *E. (C.) pedispinosa* sp. nov., cercus and epandrium. Scale = 0.1 mm.

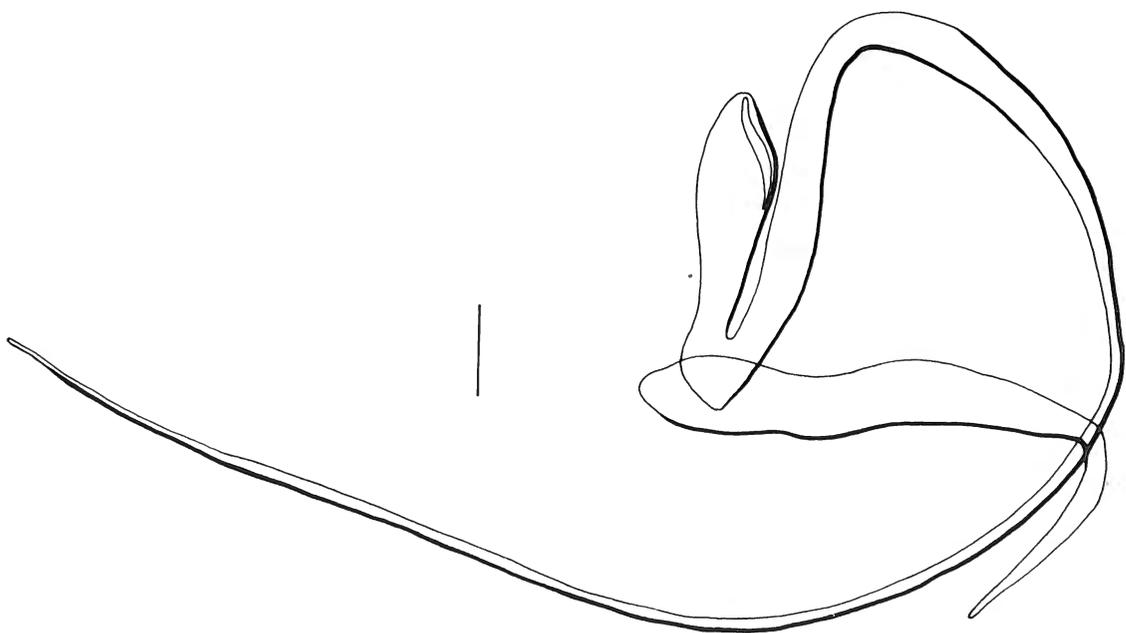


Fig. 6 — Male hypopygium of *E. (C.) pedispinosa* sp. nov., hypandrium and phallus. Scale = 0.1 mm.

tips, or only at apical half; mid tibia with short ventral pennate bristles at base, a short dorsal pennation; wing brown; abdomen evenly brown.

***Empis (Coptophlebia) pedispinosa* sp. nov.**
(Figs 5, 6)

Type material. Holotype male, Guangdong province, Yingde, Shimentai National Forest Park, 28.iii.2003, sample 23016, P. GROOTAERT (CAU). Paratypes: 3 males, 1 female with same data; 1 male, 1 female, Yingde, Shimentai National Forest Park, 29.iii.2003, along road in forest, sample 23019, P. GROOTAERT, (KBIN-IRScNB).

Other material. 1 female in poor condition with same data as holotype (KBIN-IRScNB).

Etymology. From the Latin *pes* and *spinosa* meaning *leg* and *spinose* respectively.

Diagnosis. Medium-sized dark brown blackish species with all bristles black, spinose legs, fore tibia strongly deformed, mid tibia yellowish, male sternite 8 with long posterior bristles, phallus very long, hair-like. This species belongs to the *E. (C.) jacobsoni* clade.

Male

Head. Occiput blackish, antenna dark brown, third flagellomere aristiform. Face blackish. Palpus brown. Labium dark brown with short bristles. Labrum 1.6x head height.

Thorax blackish. Proepisternum with a distinct bristle, prosternum with a strong, long bristle. Acrostichals biserial, distinct, dorsocentrals uniserial, longer, ending with 2 strong, long bristles in prescutellar depression.

Legs dark brown, mid tibia brownish to yellowish apically. Fore tibia strongly deformed at basal half, with 2-3 spine-like anterodorsal bristles near middle, a spine-like anterior bristle at tip; first fore tarsomere long, with a long, rather fine posterior bristle at base, 1 long, rather fine dorsal bristle near middle, an apical circlet of long spine-like bristles; following three fore tarsomeres with a distinct apical circlet of bristles. Mid tibia with 3 strong, very long dorsal bristles (at basal ¼, near middle, apically), a strong, long posterodorsal bristle at middle, a long spine-like posterior bristle apically, a ventral row of 4-5 long spines at apical half; first mid tarsomere with an antero- and posteroventral spine-like bristle basally and apically, a strong, long anterodorsal bristle apically; following three mid tarsomeres with an anterodorsal and an antero- and posteroventral distinct bristle apically. Hind tibia with numerous rather fine, short ventral bristles, a strong, long ventral bristle at apical third, an antero- and posterodorsal row of strong, long bristles; first hind tarsomere with 4 strong, long dorsal bristles, about 8 spine-like ventral bristles; following three hind tarsomeres with a pair of long dorsal bristles apically.

Wing (Length = 4 mm) feebly tinged with brown. A1 abbreviated. Halter brown.

Abdomen dark brown to blackish. Tergites with distinct posterior bristles. Sternites with a pair of rather long bristles. Sternite 8 with numerous strong, long posteromarginal bristles.

Hypopygium (Figs 5, 6). Epandrium well developed in length, with a pair of distinct dorsal projections, numerous ventral bristles especially strong, long at base. Cercus somewhat massive with many short bristly-hairs. Hypandrium well developed, pointed at tip. Phallus pale, fine, excessively long, hair-like.

Female

Similar to male except for the following characters: fore tibia without spine-like bristles at middle; mid tibia entirely brown; mid femur with a distinct ventral pennation except apically and basally, some short pennate dorsal bristles; hind femur with a ventral and dorsal pennation as long as femur width; wing strongly tinged with brown.

***Empis (Coptophlebia) tibiaculata* sp. nov.**
(Fig. 7)

Type material. Holotype male, Guangdong province, Yingde, Shimentai National Forest Park, 28.iii.2003, sample 23016, P. GROOTAERT (CAU). Paratypes: 4 males with same data but 27.iii.2003, Ding YANG (CAU).

Etymology. From the Latin *tibia* and *maculata* meaning *tibia* and *spotted* respectively, on account of the presence of characteristic brown spots at the insertion of bristles of mid tibia.

Diagnosis. Medium-sized brown to blackish species with all bristles black, mid tibia pale with brown spots at the insertion of bristles. This species belongs to the *E. (C.) hyalea* clade (for the definition of this clade see DAUGERON & GROOTAERT, 2003b).

Male

Head. Occiput, antenna blackish, third flagellomere aristiform. Face black. Labium dark brown with short bristles. Labrum length about twice head height.

Thorax blackish. Proepisternum with 1-2 bristles, prosternum with 1 distinct bristle. Acrostichals uniserial to irregularly biserial, fine, rather short, dorsocentrals uniserial ending with 2 strong, long bristles in prescutellar depression.

Legs. All coxae brownish; fore legs brownish; mid, hind femora yellowish to brownish; mid tibia pale with distinct brown spots at the insertion of bristles; mid, hind tarsi brownish; hind tibia brownish to yellowish at base. Fore tibia not really deformed, only feebly S-shaped with a stronger short anterodorsal bristle near middle; first fore tarsomere rather long with a strong, long posterodorsal bristle basally, a strong, long anterodorsal bristle at middle, a strong, long anteroventral bristle apically. Mid femur with a posteroventral row of strong, long bristles especially at basal half; mid tibia with 3 strong, long dorsal bristles (at basal third, near middle, apically), a

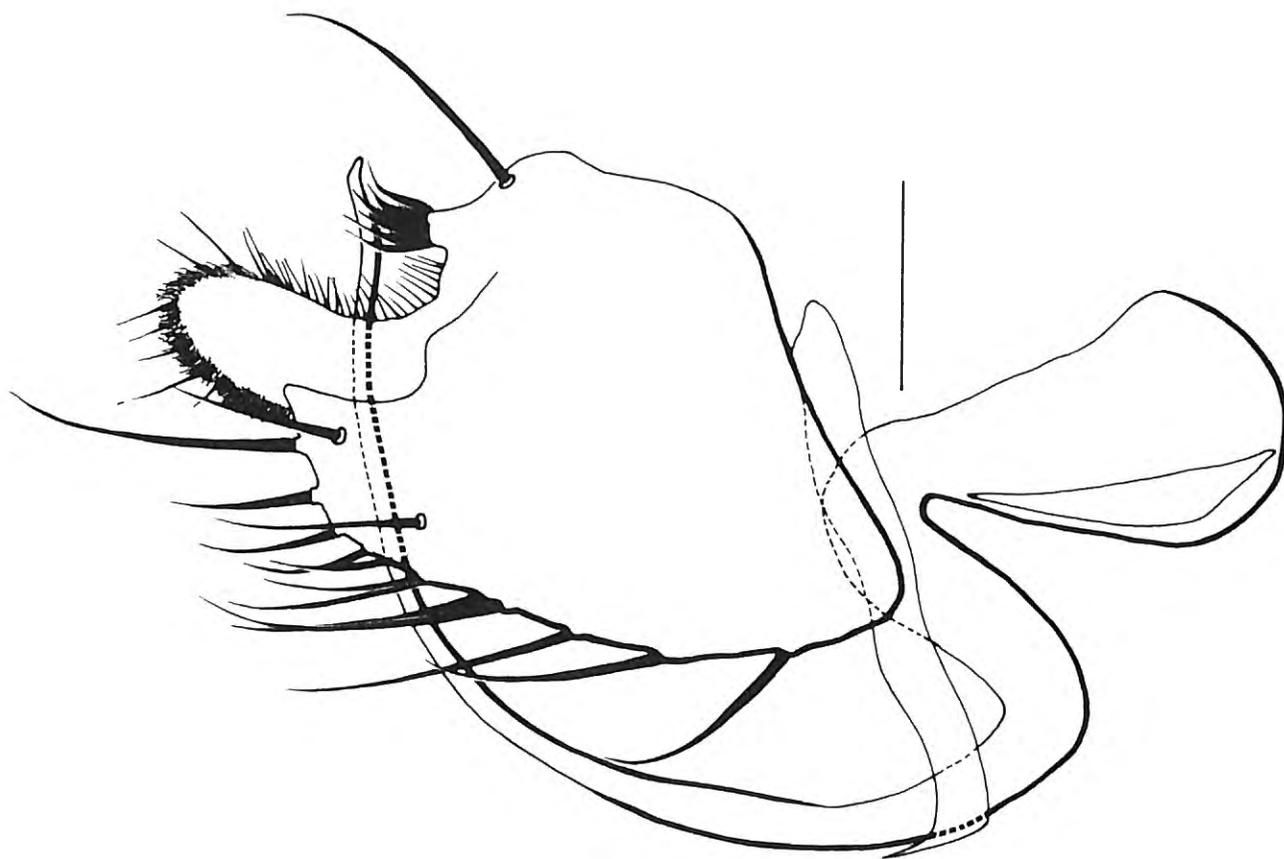


Fig. 7 — Male hypopygium of *E. (C.) tibiaculata* sp. nov. Scale = 0.1 mm.

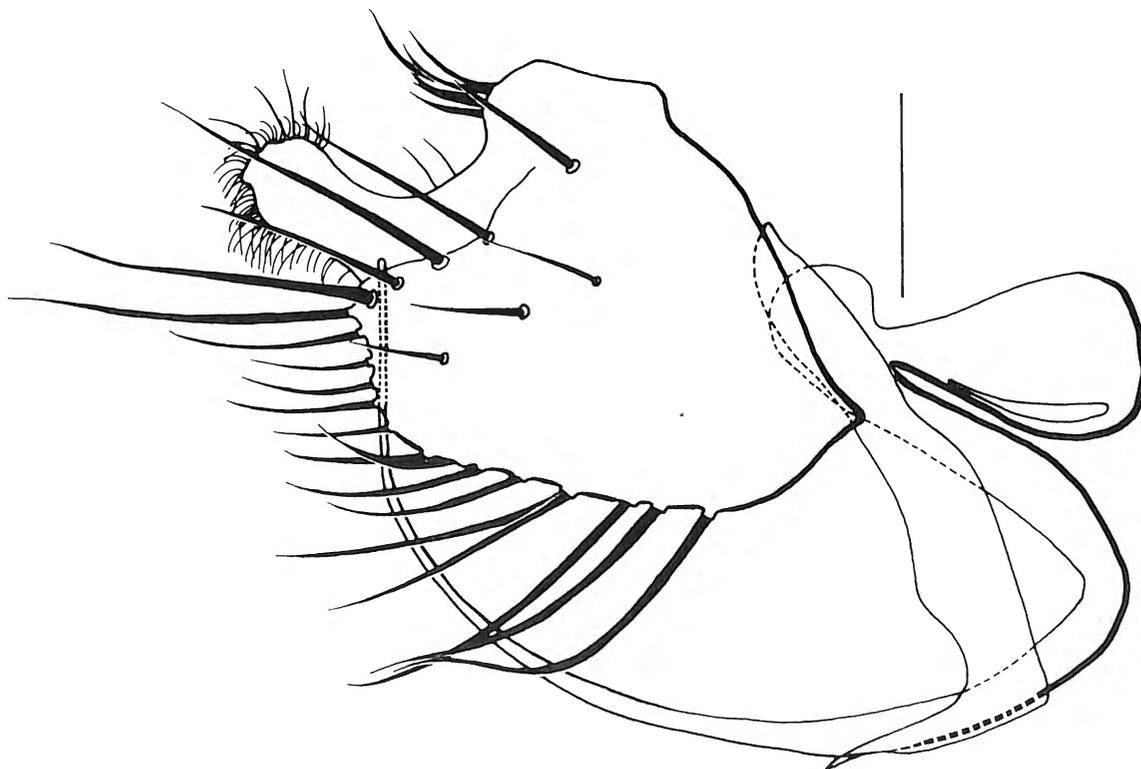


Fig. 8 — Male hypopygium of *E. (C.) xui* sp. nov. Scale = 0.1 mm.

strong, long antero- and posteroventral bristle at basal third, a strong, long anteroventral bristle at middle; first mid tarsomere with a strong, long dorsal bristle apically. Hind femur with a ventral row of rather fine, long bristles at apical half; hind tibia, first hind tarsomere with several strong, long antero- and posterodorsal bristles.

Wing (Length = 3 mm) rather clear. A1 abbreviated. Halter brown.

Abdomen brownish with distinct bristles at base, at the posterior margin of tergites. Sternites with a pair of rather long bristles at the posterior margin. Tergite 8 with 4 pairs of rather strong, long posteromarginal bristles, sternite 8 with numerous strong, long posteromarginal bristles.

Hypopygium (Fig. 7). Cercus with numerous short bristly-hairs apically, on the ventral margin, an internal comb of short bristles. Epandrium with a distinct posterodorsal projection bearing distinct bristles, pointed, somewhat projected posteriorly, with strong, long ventral bristles. Hypandrium short ventrally, pointed at tip. Phallus yellowish to pale.

Female unknown.

Empis (Coptophlebia) xui sp. nov.
(Fig. 8)

Type material. Holotype male, Guangdong province, Liuxihe National Forest Park; 20.iii.2003, sample 22020, P. GROOTAERT (CAU). Paratypes: 7 males, 5 females with same data; 4 females, 1 male with same data but sample 23020 (KBIN-IRScNB).

Etymology. This species is dedicated to Prof. Zaifu XU (South China Agricultural University, Guangzhou).

Diagnosis. Small-sized brownish species with all bristles black, mid tibia anteroventrally covered with numerous rather short bristles apically. This species belongs to the *E. (C.) hyalea* clade.

Male

Head. Occiput, antenna dark brown, third flagellomere aristiform. Face, palpus dark brown. Labium with short bristles. Labrum length 1.4x head height.

Thorax dark brown with blackish scutum. Proepisternum with a fine bristle, prosternum with a distinct bristle. Acrostichals biserial, short, dorsocentrals stronger, longer, ending with 2 strong, long bristles in prescutellar depression.

Legs brownish. Fore tibia deformed, somewhat S-shaped with a more distinct anterodorsal bristle near middle; first fore tarsomere with a strong, long anteroventral and posterior bristles at base; all fore tarsomeres with an apical circlet of distinct bristles. Mid femur with a posteroventral row of strong, long bristles; mid tibia anteroventrally covered with numerous rather short bristles apically, with 3 strong, long dorsal bristles, 2 strong, long ventral bristles; first mid tarsomere with a strong, long anterior bristle. Hind femur with numerous short dorsal bristles, longer posteroventral bristles; hind tibia with strong, long antero- and posterodorsal bristles; hind tarsus somewhat swollen; first hind tarsomere with 2 pairs of strong, long dorsal bristles; other hind tarsomeres with a distinct pair of dorsal bristles at apical third.

Wing (length = 2.66 mm) clear, A1 abbreviated. Halter brownish.

Abdomen brown. Distinct bristles at base, at the posterior margin of tergites. Sternites with a distinct pair of posterior bristles. Tergite 8 with 4 rather strong posteromarginal bristles, sternite 8 with several strong, long posteromarginal bristles.

Hypopygium (Fig. 8). Epandrium not pointed at tip, somewhat rectangular, with 2 strong, long bristles at the posterodorsal tip, several other strong, long bristles on the ventral margin. Hypandrium short ventrally, pointed at tip. Phallus pale, long, fine.

Female

Similar to male except for the following characters: a little darker in ground-colour; fore leg with short bristles; mid femur with a long dorsal pennation except apically, a distinct ventral pennation at apical half; hind femur with a long dorsal and ventral pennation except basally; hind tibia with a dorsal pennation almost as long as tibia width except basally and apically, a short ventral pennation; wing tinged with brown; abdomen with last four segments distinctly less dark.

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