

CUNOMYIA, A DISTINCTIVE NEW HILARINE FLY GENUS FROM THE TASMANIAN WORLD HERITAGE AREA (DIPTERA: EMPIDIDAE)

by Daniel J. Bickel

(with two text figures)

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Cunomyia unica gen. & sp. nov. (Diptera: Empididae: Empidinae: Hilarini) is described from sites in western Tasmania. This monotypic genus is distinguished from other genera in the tribe Hilarini by the following combination of characters: vein R_{4+5} unbranched, Sc incomplete, terga 7 and 8 not reduced or modified, so that the hypopygium is positioned upright at end of abdomen, not lying forward, and the male cercus divided into a cercal plate and digitiform clasping section. *Cunomyia* is considered primitive with respect to other Hilarini, on the basis of its clasping cercus and postabdominal structure.

Keywords: *Cunomyia*, Diptera, Empididae, Hilarini, morphology, Tasmania.

INTRODUCTION

Throughout the world, flies of the tribe Hilarini (Diptera: Empididae: Empidinae) can be seen flying back and forth above the surface of ponds, lakes and streams. This low, cruising flight is a type of aerial swarming conducted by males to attract mates. Morphologically, the most readily observable character of the Hilarini is the enlarged basitarsus on the male foreleg, which produces silk for wrapping prey or debris to present as “nuptial gifts” to females (Eltringham 1928).

The Tasmanian Hilarini are poorly known, with only 11 described species. Nine of these were described in White’s 1916 paper, a work that currently serves as the basic taxonomic reference for the entire Australian fauna (White 1917). However, the Tasmanian fauna, like that of other southern temperate regions, is very rich, and more than 100 species have been separated from collections. These will be treated in future revisions of the entire Australian fauna (also see Bickel 1996).

The present paper describes a distinctive new hilarine genus, *Cunomyia*, from montane sites in western Tasmania, almost all of which are in the Tasmanian World Heritage Area.

MATERIALS AND METHODS

Morphological terminology follows McAlpine (1981) except for that of the male terminalia, which is based on Cumming *et al.* (1995). Measurements are in millimetres and were made on representative dry specimens. The position of features on elongate structures, such as leg segments, is given as a fraction of the total length, starting from the base. The relative lengths of the podomeres are representative ratios and not measurements, and are presented in the following formula and punctuation: trochanter + femur; tibia; tarsomere 1/ 2/ 3/ 4/ 5.

The following abbreviations and terms are used: MSSC – Male secondary sexual character(s), the non-genital characters found only on male body; I, II, III –

pro-, meso-, metathoracic legs; C – coxa; T – tibia; F – femur; ac – acrostichal setae; ad – anterodorsal; av – anteroventral; dc – dorsocentral setae; dv – dorsoventral; pd – posterodorsal; pv – posteroventral; t – tarsus; t_{1-5} – tarsomeres 1 to 5. Institutional abbreviations are as follows: Australian Museum, Sydney (AMS); Australian National Insect Collection, CSIRO, Canberra (ANIC); Illinois Natural History Survey, Urbana, Illinois (INHS); Museum of Victoria, Melbourne (MVM).

Genus *Cunomyia* gen. n.

Etymology

Cunomyia is a combination of the Latin “cuua”, meaning cradle, and “myia”, Greek for fly, referring to the type locality in Cradle Valley, Tasmania. The gender is feminine.

Type species

Cunomyia unica sp. n. (fig. 1).

Diagnosis

Rather large, black flies; body length 7.0–8.0 mm.

Head: ocellar triangle on raised spheroidal mound totally separating vertex from frons; frons narrower than ocellar triangle, with 7–8 short hairs along lateral margins; palp straight and strap-like; scape and pedicel setose (fig. 2A); first flagellomere conical, tapering, with short 2-articulated apical style, but without apical spine.

Thorax: mesonotum anterior of posterior slope covered with field of uniform short setae obscuring the distinction between setal rows, except for the 3–4 longer posterior dc setae bordering mesonotal depression; laterotergite bare of setae; scutellum with 4–5 pairs of marginal setae.

Legs: Tl with anteroapical comb of 8–10 short, even setae; male It_1 distinctly swollen with dense ventral vestiture (MSSC); FII and FIII with anterior, av, and posterior subapical setae.

Wing: broad with well-developed anal lobe; costa circumambient, although narrowing markedly past vein M_1 at wing apex, and reduced in thickness along posterior

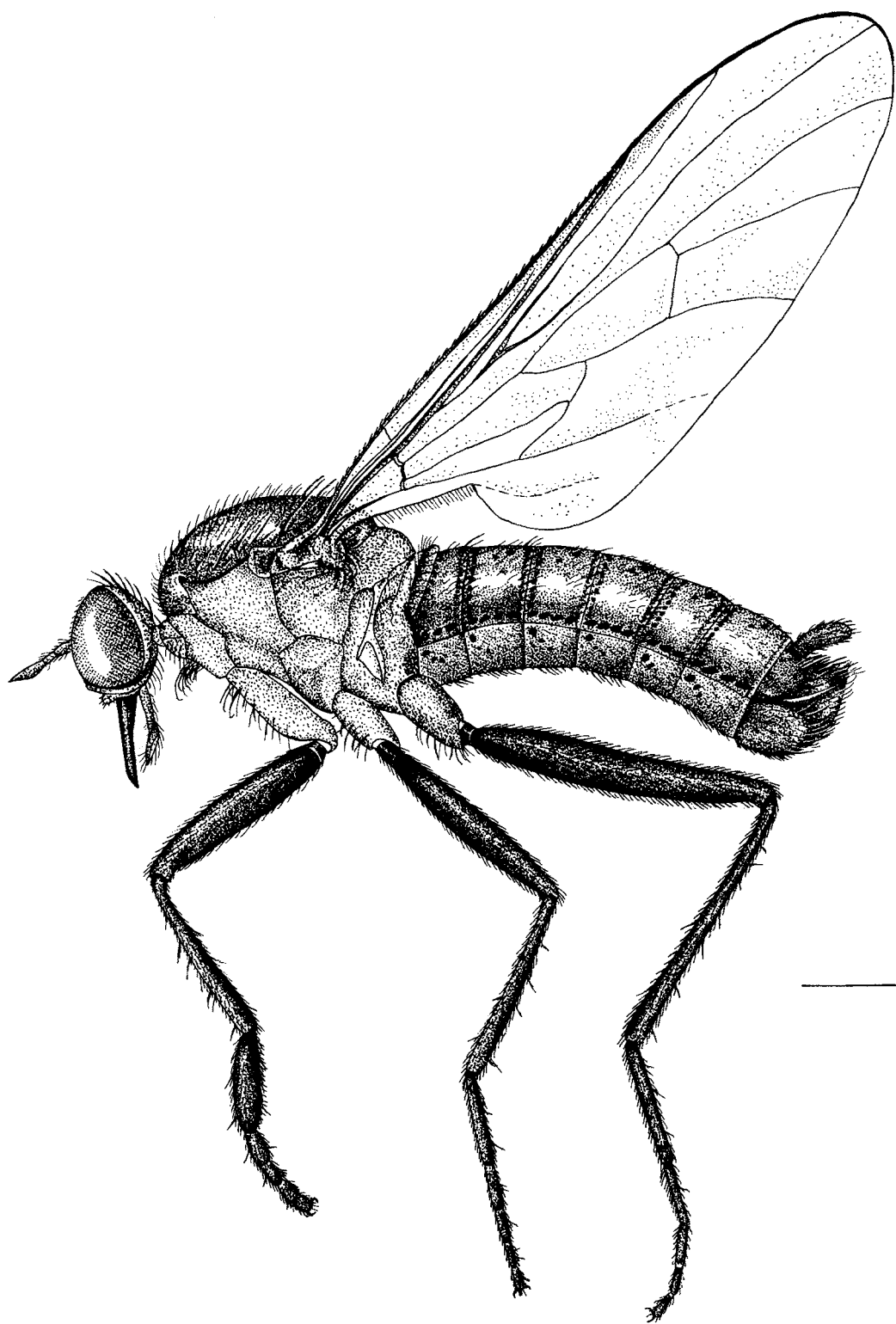


FIG. 1 — *Cunomyia unica*, male, habitus. Scale line = 1.0 mm.

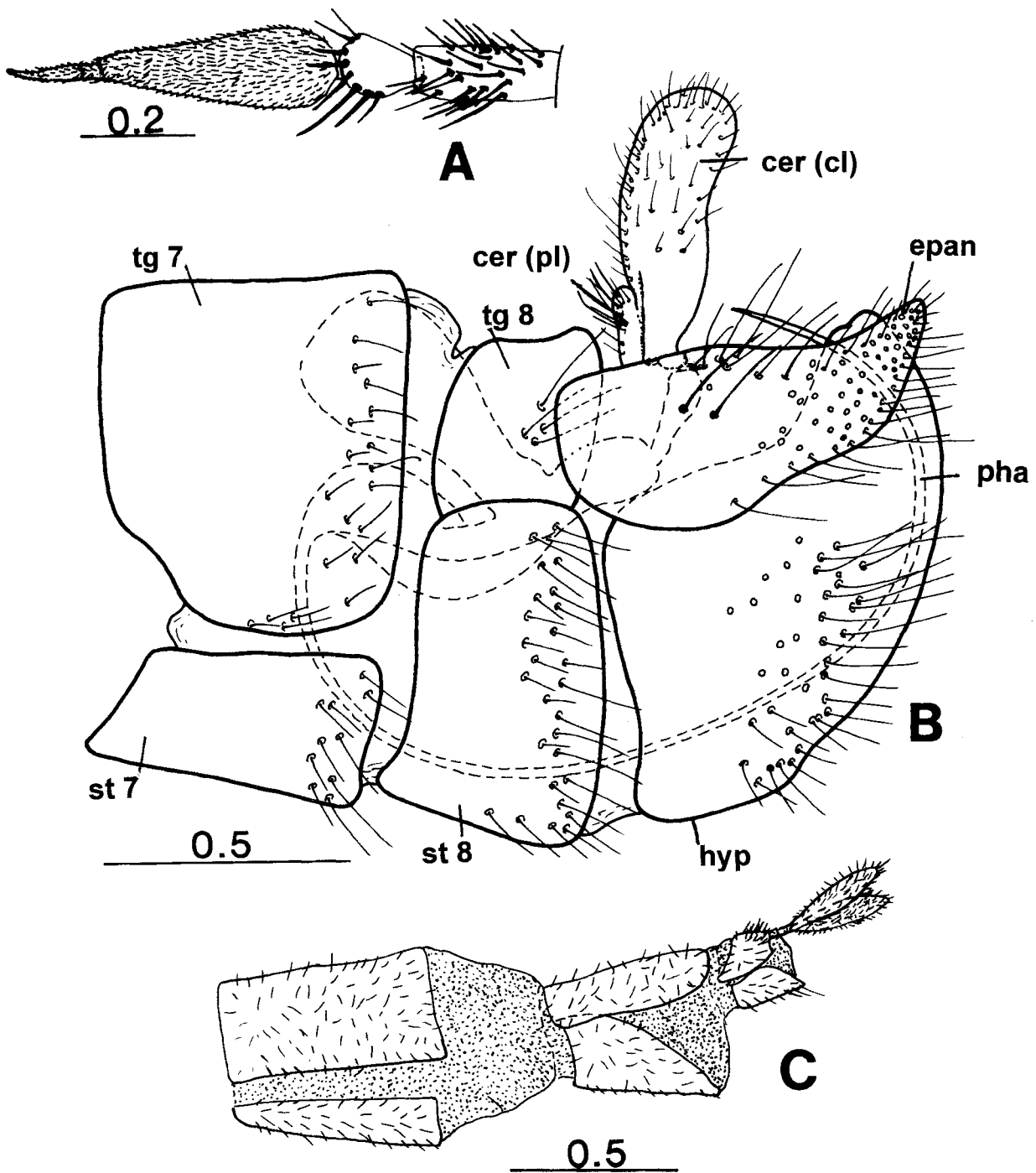


FIG. 2 — *Cunomyia unica*: (A) male antenna, left lateral. (B) hypopygium, left lateral. (C) female oviscapt, left lateral. Legend: *cer (cl)* - claspig cercus; *cer (pl)* - cercal plate; *epan* - epandrium; *pha* - phallus; *tg* - tergum; *st* - sternum.

wing margin; *Sc* incomplete; R_1 distally swollen near join with costa; R_{4+5} unbranched; CuA_2 , which closes cell cup, strongly recurrent.

Abdomen: both terga 7 and 8 well developed, so that hypopygium positioned upright at end of abdomen, not flexed forward (fig. 2B); sternum 8 not ventrally supporting hypopygium; male cercus divided into short basal cercal plate and digitiform claspig cercus; hypandrium keel-like; phallus elongate and conforming to hypandrium; abdomen telescoping; oviscapt relatively unmodified, with well-developed terga and sterna on segments 8–10, and with apical blade-like cerci (fig. 2C).

Remarks

Cunomyia is a monotypic genus known only from Tasmania. It possesses the following characters, which clearly place it in the tribe Hilarini (Bickel 1996): laterotergite bare, tibia I with anteroapical comb of 8–10 short setae, male basitarsus I enlarged or swollen, hypandrium forming a curved convex hood over the phallus, costa circumambient, but reduced in thickness along posterior margin, vein R_1 distinctly swollen before it joins the costa.

Cunomyia is distinguished from other hilarine genera by the following combination of characters: vein R_{4+5} unbranched, *Sc* incomplete, terga 7 and 8 not reduced or

modified, so that hypopygium is positioned upright at end of abdomen, not lying forward, and male cercus divided into short basal plate and a longer digitiform clasp section. The morphological and phylogenetic significance of the unmodified abdominal terga and the divided cercus will be discussed below. However, it should be noted that *Cunomyia* is distinctive and somewhat isolated within the Hilarini. Its relationships are unclear and, although it is only known from Tasmania, it is not necessarily most closely related to other Gondwanan taxa.

Two other genera in the Hilarini also have R_{4+5} unbranched:

(1) *Atrichopleura* Bezzi includes described species from South Africa, South America, New Zealand (although both Collin [1933] and Smith [1969] suggested that the two New Zealand species might represent a distinct genus), and undescribed species from Australia. Many Australian species have a short and somewhat curved proboscis. *Atrichopleura* has well defined ac and dc setae and a hypopygium flexed over the postabdomen, so that both terga 7 and 8 are somewhat reduced in size. By comparison, *Cunomyia* has a large field of short, undifferentiated thoracic setae and an erect hypopygium, with unmodified terga 7 and 8.

(2) *Hybomyia* Plant is known from a single New Zealand species. In this genus, both veins R_{4+5} and M are unbranched. As well, the proboscis is short and the thorax has well-defined ac and dc setae (Plant 1995).

Cunomyia unica sp. n. (figs 1, 2)

Type material

Holotype, ♂, paratypes, ♂, ♀; Tasmania: Cradle Valley, 13.i.1923, A. Tonnoir; Paratypes, ♂, same but 10.i.1923; ♀, same but 23.i.1923 (ANIC).

Additional material

Tasmania: 31 ♂, 6 ♀, 11 km WSW of Daisy Dell, Cradle Mt–Lake St Clair Natl Park, 950 m, malaise trap, 1–8.i.1992 (INHS); ♂, Pelion Hut, 3 km S of Mt Oakleigh, 41.50'S 146.03'E, 860 m, 30.xi.1990–8.i.1991, malaise trap; ♂, 21 km S of Wilmot, 650 m, 30.i.1967; ♂, Hartz Mountains, 9.xii.1922; 3 ♂, Mt Field Natl Park, 18–21.xii.1922, 21.i.1949; ♂, Mt Field Natl Park, Lake Dobson, 22.i.1948 (ANIC); 2 ♂, 2 ♀, Mt Field Natl Park, Wombat Moor, 42.41'S 146.37'E, 1090 m, alpine herbfield, 25.i.1989, yellow pans; ♂, Pencil Pine Ck, N of Cradle Mt, 41.38'S 145.54'E, 800 m, montane forest, 30.i.1989, yellow pans; ♂, Hanson Peak, nr Cradle Mt, 1200 m, 30.i.1989, alpine herbfield (AMS); 3 ♂, Hastings Caves, Hot Springs Ck, 14.xi.1972, at light (MVM).

Description

Male: length: 7.0–7.8; wing: 5.7–6.0 x 2.3 (fig. 1); large black empidid flies, with black setae unless otherwise noted; characters noted in generic description are not repeated.

Head: spheroidal, with convex post-cranium; post-cranium, vertex, frons, and face brown-black with some grey pruinosity; dorsal and ventral post-occiput covered with short setae; distinct row of postorbitals evident, culminating in 3–4 pairs of stronger postvertical setae; ocellar triangle with pair of long diverging ocellar setae

anteriad of lateral ocelli; slightly notched laterad of antennae; face as wide as frons; palp black and setose and slightly clavate; proboscis dark brown, elongate, length about head height, and projecting ventrally; antenna (fig. 2A) black; scape about twice as long as pedicel; scape and pedicel setose; first flagellomere conical, tapering, and with short 2-articulated apical style.

Thorax: mostly black with dark metallic green reflections, pleura and humeral area covered by dense grey pruinosity; 1 postalar seta, 1 long and 1 short postsutural supra-alar setae; and 2 presutural intra-alar setae present; notopleuron with 4 strong setae among shorter hairs; postpronotum with strong posterior seta and field of 7–8 weaker anterior setae; prothoracic collar (pronotum) with row of short setae; proepisternum with field of lateral hairs and with anterior fan of 10–12 long setae; laterotergite and remainder of pleura bare of setae; scutellum with some supernumerary setae; metanotum broad and slightly bulging.

Legs: black, but coxae covered with dense grey pruinosity and concolorous with pleura; CI with long anterior setae and hairs, and CII and CIII with stronger lateral setae; all tarsi with strong black claws and large yellowish pulvilli; I: 3.5; 3.7; 1.5/ 0.5/ 0.3/ 0.2/ 0.4; FI with only short vestiture; TI with 3–4 pairs of short ad-pd setae, and anteroapical comb of 8–10 short, even setae; II: 3.6; 3.0; 1.5/ 0.7/ 0.4/ 0.2/ 0.5; FII with short vestiture and with stronger anterior, av, and posterior subapical setae; TII with 4–5 irregular ad-pd setal pairs, and some short ventral setae along length; III: 5.5; 4.7; 2.0/ 1.2/ 0.7/ 0.4/ 0.6; FIII with short hairs and with stronger subapical anterior, posterior, av and pv setae; TIII with 7–8 irregular ad-pd setal pairs, and some short ventral setae; IIIIt₁ with 1–2 short dorsal setae.

Wing: membrane smoky; costa demelanised along posterior wing margin; brownish stigma present under distal R_1 ; costa haired, but other veins bare; A_1 present distally only as weak fold; A_2 present only as trace; anal angle well developed; lower calypter yellowish with yellow setae; halter yellow.

Abdomen: dark brown-black, and covered with grey pruinosity and black vestiture; terga with only moderately long setae along posterior margins; each tergum of preabdomen with four oblong depressions or abdominal plaques on lateral margin, with additional depressions on corresponding sterna; segment 7 with well-developed tergum and sternum, not differentiated from segments anteriad; tergum 8 only slightly reduced; sternum 8 unmodified; hypopygium (fig. 2B). Phallus along with oblong sperm pump internally extending into abdominal segments 7 and 8; epandrium setose, and distinct surstylus not evident.

Female: similar to male except as noted: frons wider, such that ocellar triangle not adjoining eyes; face and clypeus both wider; It₁ not swollen; oviscapt (fig. 2C).

Remarks

Cunomyia unica is known from late November to early February in western Tasmania. It has been collected in malaise traps, yellow pans, at light, and swept from vegetation in a variety of montane habitats, including streams in subalpine woodland, and alpine lakes, heath and herbfields. Its behaviour and swarming activity are unknown. The specific epithet *unica* refers to the genus currently comprising a unique species.

MORPHOLOGICAL NOTES

Two morphological characters of *Cunomyia* require further discussion.

(1) Cercus

In most members of the tribe Hilarini, the male cercus (= dorsal lamella in Chvála 1983) is rather small and desclerotised, and fused laterally with the surstylus (= bacilliform sclerite of Cumming & Sinclair) and epandrium (J. Cumming & B. Sinclair, pers. comm.). The cercus in the tribe Empidini, on the other hand, is often enlarged and functions as a clasping organ.

Cunomyia has an enlarged sclerotised male cercus, which is divided into a distinctive digitiform "clasping cercus" and smaller "cercal plate" (fig. 2B). Sinclair (1995) discussed a similar division of the cercus in the subfamily Clinocerinae, and considered this character state to be a synapomorphy for a major clade within that subfamily. Further, he noted that, although the male cercus is modified for clasping in the ground plan of the clade (Empidinae + Hemerodrominae), it remains undivided. Also, the clasping cercus of *Cunomyia* is erect while that of most Empidinae lies horizontally (B. Sinclair, pers. comm.). Therefore, the distinctly divided cercus in *Cunomyia* is seen as an independent development or homoplasy with the subfamily Clinocerinae. [Here it must be noted that the median surface of the clasping cercus in Clinocerinae has modified hairs (Sinclair 1995), which are absent on *Cunomyia*.] Possibly *Cunomyia* is basal within the Hilarini, sharing a clasping cercus with its sister group, the Empidini, but became divided secondarily in the genus.

(2) Male postabdomen

Most Hilarini have abdominal segments 2–6 with well-developed terga and sterna, while terga 7 and 8 are either reduced in size and/or partially desclerotised to allow the hypopygium to be flexed anteriorly. This is often marked by a distinct narrowing and flattening of the male postabdomen anterior of the hypopygium.

By contrast, in *Cunomyia* abdominal segment 7 is well developed and subequal with the pre-abdominal segments, and segment 8 is only slightly reduced in size but retains a well-sclerotised tergum. As a result, the *Cunomyia* hypopygium is unflexed and confined to the end of the abdomen, held in place by the collar-like segments 7 and 8 (figs 1, 2A). I have not seen other Hilarini with this structure, and regard this as a primitive condition. These two related characters can be stated in the following formula:

Character: plesiomorphic (ancestral) state; apomorphic (derived) state.

- (1) Abdominal terga 7 and 8: well-developed, sclerotised, collar like; reduced in size, desclerotised, and/or flattened.
- (2) Hypopygium: erect, unflexed and confined to end of abdomen; flexed anteriorly over terga 7 and 8.

SYSTEMATIC POSITION OF *CUNOMYIA*

Cunomyia is therefore presumed to be primitive with respect to other Hilarini in its clasping cercus and postabdominal structure. However, the entire tribe needs considerable redefinition at the generic level before its phylogenetic position can be ascertained.

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