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First known male of *Enicoscolus* (Diptera: Bibionidae), with a redescription of *E. brachycephalus*

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Abstract

A male of *Enicoscolus* is described for the first time. *Enicoscolus brachycephalus* is redescribed based on two males and one female of *E. brachycephalus* from Mexico, found in the collection of the American Museum of Natural History, New York. The general pattern of the male terminalia is similar to other Bibionini. Sternite 9 is largely fused to the gonocoxites, which slightly projects distally to the hypandrial plate. The gonostyles are simple, rounded at the apex, differing from the usual *Bibiodes* bifid pattern or the curved gonostyle found in most *Bibio* species. A pair of aedeagal plates — the tegmen and the genital rod — follow the general pattern of Bibionomorpha species. The position of *Enicoscolus* is as the sister group of *Bibionellus*.

Key words: Diptera, Bibionidae, *Enicoscolus*, Neotropical Region, Phylogeny

Introduction

Enicoscolus was first described by Hardy (1961) for two species from Mexico, *E. dolichocephalus* and *E. brachycephalus*, known from a single female each. Shortly after, Hardy (1962) described *E. collessi* from Australia based on a single female specimen from Queensland. Little was published on the genus, other than its inclusion in catalogues (Hardy, 1966, 1989), until a third Neotropical species, *E. hardyi*, was added by Fitzgerald (1997), based on a single female from western Brazil.

Enicoscolus was included together with *Bibiodes* and *Bibionellus* in the subtribe Bibiodina, in the phylogenetic classification of the Bibionidae (Pinto and Amorim, 2000). These three genera, together with *Bibio*, belong in the monophyletic tribe Bibionini. The Dilophini (including only *Dilophus*) and the Bibionini compose the subfamily Bibioninae.

One female and two male specimens from Mexico in the American Museum of Natural History (AMNH) entomological collection enables the first description of the male of

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E. brachycephalus and a redescription of the species. This helps the discussion of the position of *Enicoscolus* among the remaining Bibionini genera. All measurements are given in millimeters.

Enicoscolus Hardy, 1961

Enicoscolus Hardy, 1961: 81. Type-species, *E. dolichocephalus* Hardy, by original designation. Distribution: Australia (Queensland), Papua New Guinea, Indonesia (Irian Jaya), Mexico, Brazil (State of Mato Grosso).

Diagnosis. Vein R_5 considerably reduced, Sc largely interrupted apically, m-cu lost, CuA_1 not reaching the wing margin, and A_1 completely absent (Pinto and Amorim, 2000).

Enicoscolus brachycephalus Hardy, 1961
(Figures 1–9)

Enicoscolus brachycephalus Hardy, 1961: 82, figs. 2a–e (head, legs, thorax, wing). Type-locality: Mexico, Morelos, Tepotzlan. Distribution: central and southern Mexico.

Material examined. Two males, MEXICO, State of Morelos, Cuernavaca, x.1965, N.L.H. Kraus col.; 1 female, MEXICO, State of Oaxaca, Oaxaca, Base San Felipe Mt., Sept. 16–17, 1947, B. Malkin (AMNH).

Diagnosis. Wings fumose, basal interruption of CuA_1 longer than in *E. dolichocephalus*, rostrum not very elongated.

Redescription

Female. Total length 5.98, wing length, 4.27, wing width, 1.83, mesonotum length, 1.95. Head shining blackish brown, scutum and abdomen dark brown. Pleural sclerites lighter than scutum, legs shining brown, lighter to the apex. Wings fumose.

Head. Slightly elongated, rostrum slightly projected, mouthparts in a ventro-anterior position relative to the head length. Eyes strongly dichoptic, hemispherical. Antenna quite short, 0.37, flagellum 6-segmented, distal four flagellomeres short, rather clavate, flagellomeres 4 and 5 nearly fused. Maxillary palpus elongated, 0.59, 5-segmented, palpomeres 2–3 with a mesal constriction, palpomere 3 with dorsal sensorial setae, last palpomere thin and elongated. Ocelli on a tubercle, with scattered post-ocellar setae, no particularly developed setae on occiput.

Thorax. Mesonotum elongated, antepronotum and scutum with some scattered setae developed into small spines. No setae on pleural sclerites except for 11–14 anepisternals and 2–4 setulae on mesepisternum.

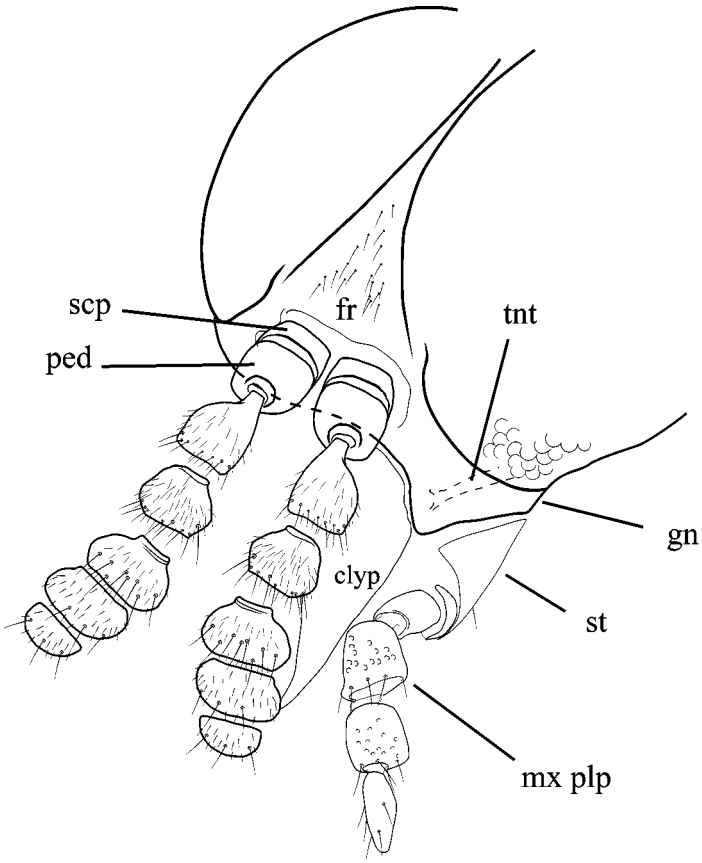

FIGURE 1. *Enicoscolus brachycephalus*, male, head. Abbreviations: clyp, clypeus; fr, frons; gn, gena; mx plp, maxillary palpus; ped, pedicel; scp, scape; st, stipes; tnt, tentorium.

Legs. Front leg more developed and mid and hind legs, coxa large, femur strongly inflated, tibia with mucron projected beyond insertion of the tarsus, tibial spur present. Mid and hind coxae short, compared with fore coxa, mid and hind tibial spurs well developed. Mid femur and tibia slightly clavate. Hind femur and tibia elongated, femur slightly inflated, tibia clavate, hind first tarsomere slightly enlarged at the apex, as noted by Fitzgerald (1997). Leg measurements. Front leg, coxa, 0.63; femur, 0.80; tibia, 0.71; tarsus, 1.39; first tarsomere, 0.56. Mid leg, coxa, 0.44; femur, 0.76; tibia, 0.63; tarsus, 1.15; first tarsomere, 0.37. Hind leg, coxa, 0.27; femur, 1.17; tibia, 1.15; tarsus, 1.15; first tarsomere, 0.39.

Wing. Membrane fumose, Sc incomplete, M_{1+2} very short, nearly fused to Rs, base of CuA_1 largely interrupted, fork of Rs displaced to the apex, as in other Bibionini. Macrotrichia dorsally on R_1 and on distal section of Rs.

Abdomen. Tergites and sternites sclerotized, but slightly reduced in size, membrane reticulate.

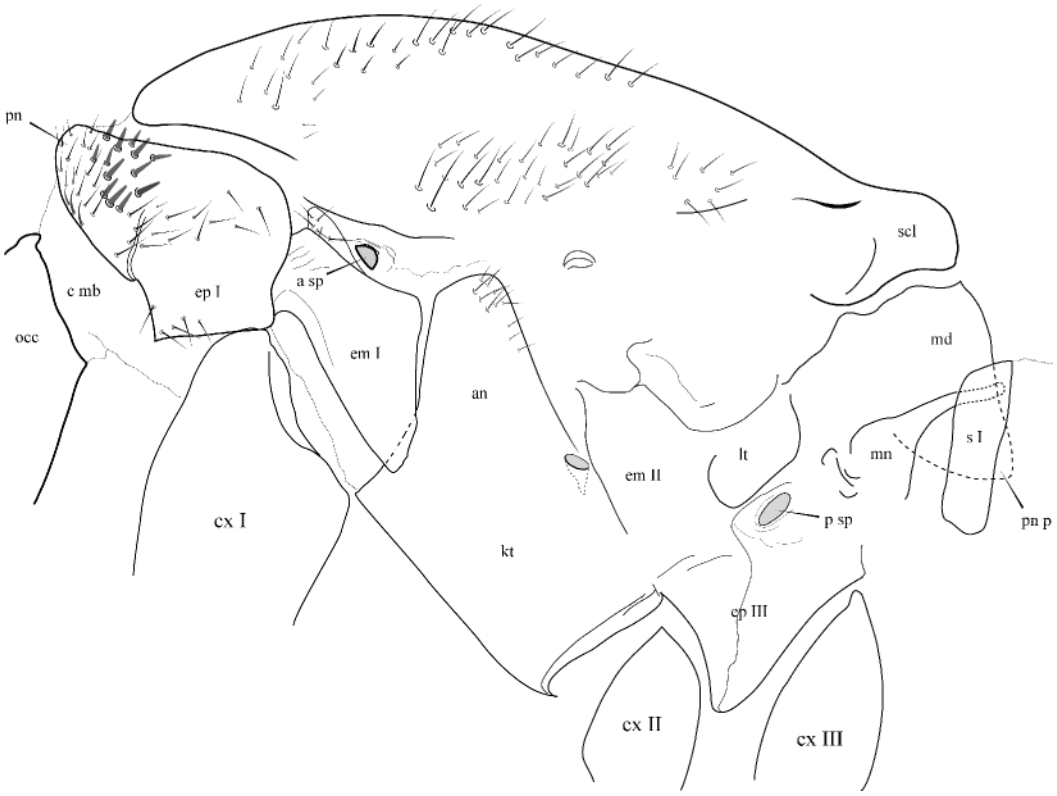

FIGURE 2. *Enicoscolus brachycephalus*, male, thorax. Abbreviations: a sp, anterior spiracle; an, anepisternum; c mb, cervical membrane; cx, coxa (I–III); em I, proepimeron; em II, mesepimeron; ep I, proepisternum; ep III, metepisternum; kt, katepisternum; lt, laterotergite; md, mediotergite; mn, metanotum; occ, occiput; p sp, posterior spiracle; pn, pronotum; pn p, postnotal phragma; s I, sternite I; scl, scutellum.

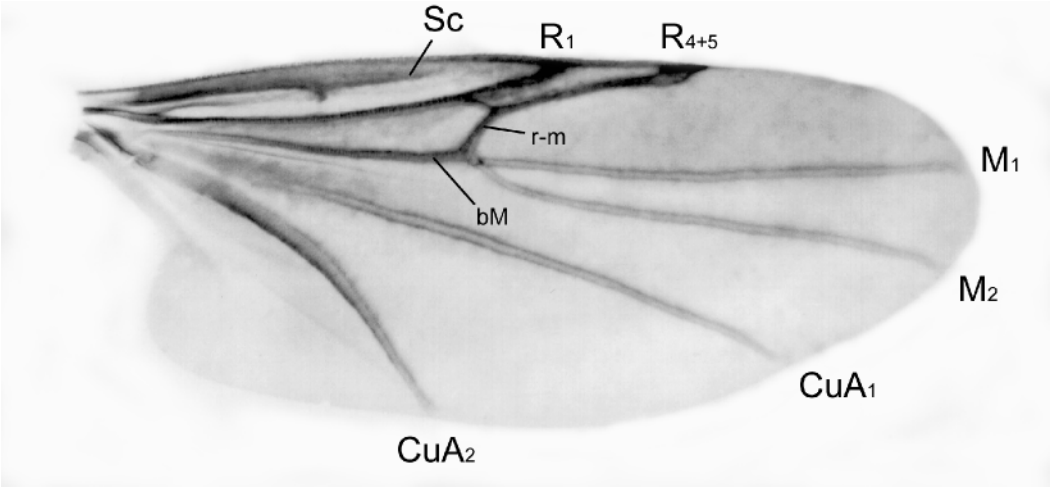

FIGURE 3. *Enicoscolus brachycephalus*, male, wing.

Female terminalia. Three rounded, sclerotized spermathecae, T8+9 rather reduced in size, membranes on segment 8 well developed, gonapophyses 8 lobose, with more concentrated and elongated setae, genital furca weakly sclerotized, T10 and S10 not strongly sclerotized but present, cercus elongated, covered with setae and microtrichia, 1-segmented.

Male. Smaller in size than females, total length, 3.54, wing length, 2.93, wing width, 1.10, mesonotum length, 1.10. Head shining dark blackish brown, scutum and abdomen dull blackish brown. Pleural sclerites dark brown, legs shining brown, slightly lighter to the apex. Head more rounded, not particularly elongated (Figure 1), holoptic, eyes touching in the middle, ocelli on a small tubercle, rostrum only slightly projected. Last palpomere not so elongated than in females, antenna clavate, flagellum 5-segmented. Thorax mostly blackish (Figure 2), general shape of legs as in females (Figure 4). Leg measurements. Front leg, coxa, 0.52; femur, 0.54; tibia, 0.59; tarsus, 1.02; first tarsomere, 0.37. Mid leg, coxa, 0.22; femur, 0.49; tibia, 0.27; tarsus, 0.80; first tarsomere, 0.27. Hind leg, coxa, 0.22; femur, 0.76; tibia, 0.80; tarsus, 0.85; first tarsomere, 0.32. Wing (Figure 3), no dorsal or ventral macrotrichia on wing veins. Male terminalia. Gc fused to S9 to form a single plate, distal end of Gc slightly projected distally to S9, Gs simple, parameres absent (Figures 5–8), T9+10 present, relatively small, cerci present, lobose.

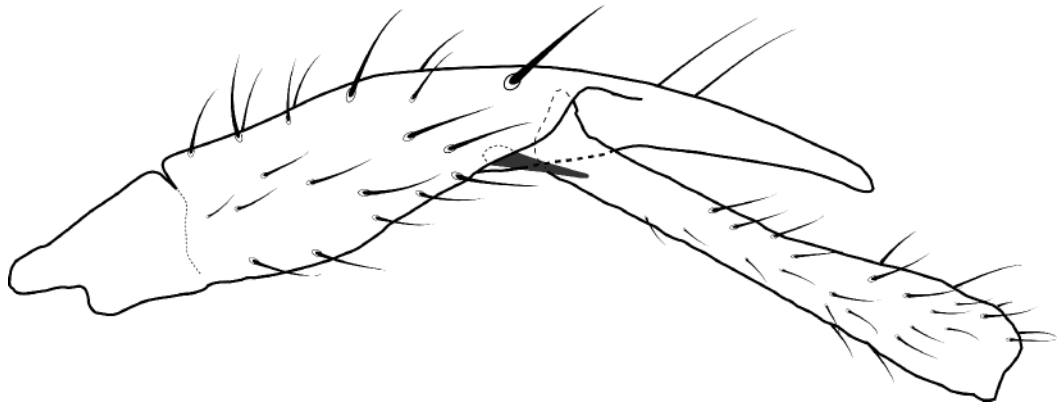

FIGURE 4. *Enicoscolus brachycephalus*, male, front leg.

Discussion

Enicoscolus brachycephalus and *E. dolichocephalus* largely overlap in their distribution in Mexico. *Enicoscolus dolichocephalus* is easily distinguished from *E. brachycephalus* by an elongated rostrum, as observed by Hardy (1961) and confirmed by Fitzgerald (1997). Moreover, *E. brachycephalus* has the base of CuA_1 more detached from CuA than *E. dolichocephalus*. Both males studied here fit well in the description of *E. brachycephalus* and are considered to be conspecific with the female holotype.

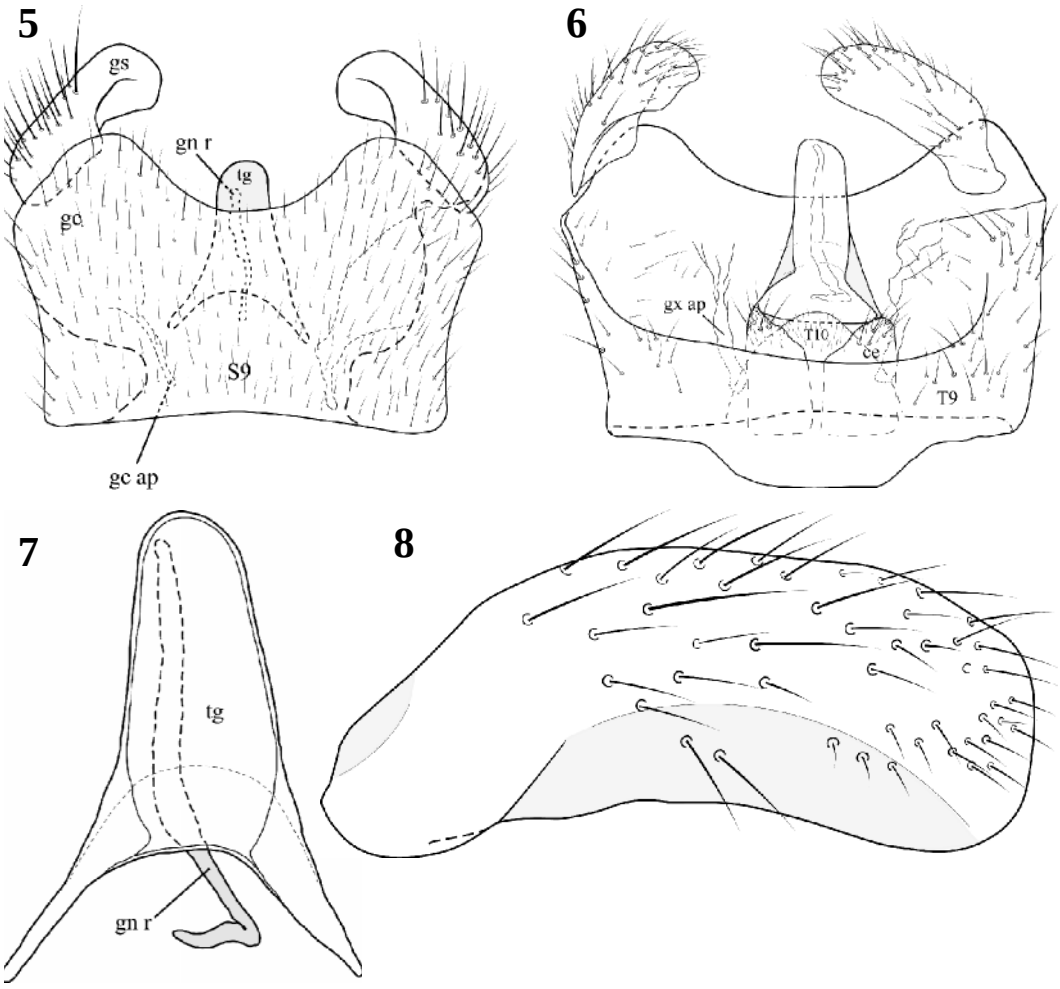

FIGURE 5–8. E. brachycephalus, male. 5. Male terminalia, ventral view. 6. Male terminalia, dorsal view. 7. Tegmen and genital rod. 8. Gonostyle. Abbreviations: ce, cercus; gc, gonocoxite; gs, gonostyle; gn r, genital rod; gx ap, gonocoxal apodeme; S9, sternite 9; T9, tergite 9; tg, tegmen.

The male terminalia of the Bibionidae, which has been very poorly considered in the literature, has some typical modifications, particularly the fusion of the gonocoxites to the sternite 9, therefore making the hypandrium unrecognizable as a separate plate. This fusion is especially well developed in the Bibioninae, but in some genera the gonocoxites retain a projection (to which the gonostyle articulate) distally to the mesal plate (S9 + Gc). In *Bibiodes* the gonostyles are well modified, strongly bifid, and parameres are present. In many species of *Bibio* the gonostyles are relatively short and curved inward, with the parameres preserved. The gonostyles of *Bibionellus* are relatively plesiomorphic among the Bibionini, with at most an apical tooth, but with no other distinctive features. In *Bibionellus*, a median projection named “mesosome” in the literature is homologous (with

some modifications) to the "edeagal plate" of other genera; the parameres are present and the genital rod is elongated, without major modifications (Pinto and Amorim, 1997).

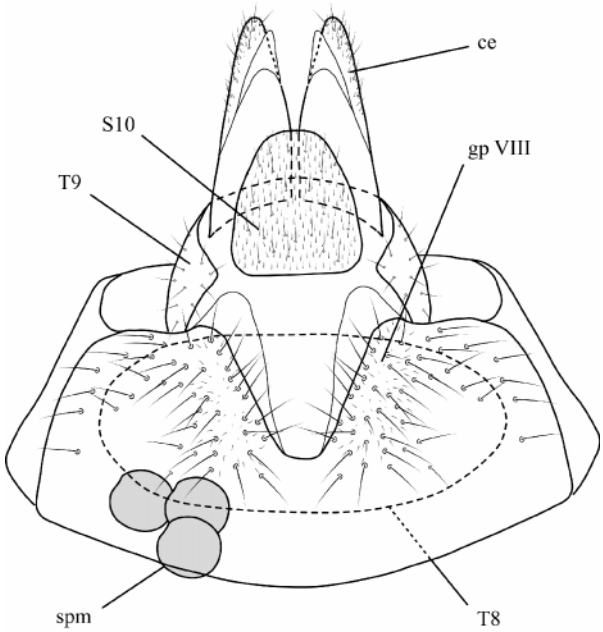

FIGURE 9. E. brachycephalus, male, female terminalia. Abbreviations: ce, cercus; gp VIII, gonapophysis 8; spm, spermathecae; T9, tergite 9; S10, sternite 10; T8, tergite 8.

In the male terminalia of *E. brachycephalus* the parameres are absent and the gonocoxal apodemes are well developed (Figures 5–8). Mesally two plates can be seen, one elongated, more dorsally in the terminalia, and another wider, more ventrally. These plates are also present, with some differences of shape, in species of most other Bibionomorpha, as Sciaridae, Cecidomyiidae, and Mycetophilidae. In Sciaridae they are referred to as *tegmen* (or genital plate) and *genital rod* (or aedeagus) (see Vilkamaa, 2000), but their homology is still quite obscure. They are more probably derived from modifications of the original aedeagus, which are more conservative in Pachyneuridae (e.g., Wood, 1991, figs. 7–8). In *E. brachycephalus*, the tegmen is elongated, with a wider base, and the genital rod is quite long. The gonostyle is claviform, only gently curved, with no kind of spines or bifurcations, not strongly curved inwards as in *Bibio*. This set of features of the male terminalia gives no ground for changing the previous hypothesis of *Enicoscolus* as the sister group of *Bibionellus* (Pinto & Amorim, 2000).

Enicoscolus shares many apomorphies with the remaining genera of Bibioninae (Pinto and Amorim, 2000). Some of the most easily observable features are the loss of R_4, r-m at most as long as the base of Rs, A_1 incomplete, males and females with 9 or less flagellomeres, flagellomeres short and compact, and reduction of the post-scutellar membrane. *Enicoscolus* shares with *Bibio*, *Bibiodes* and *Bibionellus* some features absent in *Dilophus*,

most conspicuously the typical mucron apically at the fore tibia, the loss of C beyond the apex of R_5, the reduction of the number of flagellomeres in males and females, and an antepronotum mesally more elongated. The reduction to 7 flagellomeres in males and 6 in females, as well as CuA_1 basally incomplete are synapomorphies shared by *Enicoscolus* with *Bibionellus* and *Bibiodes*. An incomplete Sc is still the only known apomorphic feature shared by *Enicoscolus* to *Bibionellus*, even though a simplification of the gonostyle could be assumed as a shared derived feature. It is interesting to note that the complete loss of Sc, which is clear in *E. collessi*, is not a synapomorphy of the genus, as pointed by Pinto & Amorim (2000), since *E. brachycephalus* preserve at least half of its length, so the loss of Sc should be considered autapomorphic for *E. collessi*.

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