Redescription of the enigmatic *Thoracotropis cypriformis* Freeman (Diptera, Mycetophilidae)

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ABSTRACT. Redescription of the enigmatic *Thoracotropis cypriformis* Freeman (Diptera, Mycetophilidae). The Chilean species *Thoracotropis cypriformis*, type species of the monotypic genus *Thoracotropis*, is redescribed based on the only known specimen, the holotype. Habitus, head, wing venation, and male terminalia are illustrated. Comments are made on the diagnostic features of the genus and on its position in the subfamily to which it is usually assigned, the Leiinae.

KEYWORDS. Mycetophilidae; redescription; taxonomy; *Thoracotropis*.

RESUMO. [Redescrição do enigmático gênero *Thoracotropis cypriformis* Freeman (Diptera, Mycetophilidae)]. A espécie chilena *Thoracotropis cypriformis*, espécie-tipo do gênero monotípico *Thoracotropis*, é redescrita com base no único exemplar conhecido, o holótipo. *Habitus*, cabeça, venação alar e terminália do macho são ilustrados. Comentários são feitos sobre as características diagnósticas do gênero e sua posição na subfamília na qual ele é normalmente incluído, Leiinae.

PALAVRAS-CHAVE. Mycetophilidae; redescrição; taxonomia; *Thoracotropis*.

Thoracotropis Freeman, 1951 was described based on a single species from Chile – *T. cypriformis* – known from a single male specimen. The genus can be separated from other mycetophilids based on the reduced mouth parts, with two segmented palpus, and a some curious thoracic traits, as the mesonotum laterally compressed, quite strongly arched.

Freeman (1951) included the genus in the Mycetophilidae "Leiini" (= Leiinae; *e.g.*, Väisänen 1984; Matile 1993; Chandler 2009), a tribe encompassing 32 recent genera and almost 560 species worldwide (Edwards 1925; Hackman *et al*. 1988; Søli 1997; Kurina 2004; Oliveira & Amorim 2012). *Thoracotropis* has R_1 length less than twice r-m length (hence, longer than in other leiines and shorter than in other gnoristines) and a rather longitudinal r-m, two features used by Edwards (1925) to delimit Leiinae. A sinuous CuA (*i.e.*, CuA_2 of Vockeroth 2009) has been also taken more recently as diagnostic for the subfamily (Baxter & Poinar 1994; Jaschhof & Kallweit 2009). In a recent discussion about the limits of the Leiinae (Jaschhof & Kallweit 2009) *Thoracotropis* was considered a leiine genus with a sinuous CuA. A detailed reexamination of the holotype of *T. cypriformis*, however, revealed that CuA is neither sinuous nor even slightly sinuous (Fig. 6), raising some doubts about its inclusion in the subfamily or at least in a higher clade of the Leiinae.

Indeed, not all genera of Leiinae have the features proposed to be diagnostic for the subfamily. Actually, there is a recurrent discussion about the composition of the subfamily (*e.g.*, Väisänen 1986; Søli 1997; Søli *et al*. 2000; Hippa *et al*. 2005; Jaschhof & Kallweit 2009). The problem of the monophyly of the Leiinae in a wider sense is being addressed in a phylogenetic study of the Leiinae (Oliveira & Amorim, unpublished data). The purpose of this paper is to redescribe the holotype of *Thoracotropis cypriformis*, kept in the collection of the Natural History Museum, London (NHM) and to consider the problem of its inclusion in the Leiinae.

METHODS

Photographs were taken in the Sackler Biodiversity Imaging Lab at the Natural History Museum, London with a Zeiss SV11 stereomicroscope and Zeiss Axioskop coupled with Cannon EOS 450D camera. Extended depth of field images were obtained using Helicon Focus v. 5.2 software. The illustration of the male terminalia was prepared with the help of a camera lucida and the Adobe Illustrator CS software.

Morphological terms follow Søli (1997) and Amorim & Rindal (2007). Abbreviations used are: ae, aedeagus; ce, cercus; gcap, gonocoxal apodeme; dorsal proj, gonostyle dorsal projection: gcx, gonocoxite; gs, gonostyle; par, parameres; par proj, paramere projection; ventral proj, gonostyle ventral projection.

Thoracotropis Freeman 1951

Thoracotropis Freeman, 1951: 81. Type-species, *T. cypriformis* Freeman (orig. des.).

Diagnosis. Three ocelli, lateral ones almost touching eye margins. Mouthparts reduced, palpus two segmented.

Mesonotum laterally compressed, dorsally arched. Laterotergite bare. Medial fork complete, r-m almost longitudinal, M_4 and CuA not sinuous. Male gonostylus digitiform, flattened, main body with an inner-apically bare tooth and a dorsal, well developed bare hook projecting meso-caudally at its distal third. Parameres with a pair of very long, thin, curved processes projecting well beyond apex of the terminalia.

Species included. Only the type-species of the genus is known.

Thoracotropis cypriformis Freeman, 1951

(Figs. 1–10)

Thoracotropis cypriformis Freeman, 1951: 81, figs. 156 (♂ terminalia), 292 (wing). Type-locality: Chile, Chiloé, Ancud. Holotype ♂, NHM.

Labels. The labels of the holotype are: "*Thoracotropis* / *cypriformis* [hw] / Freeman. / HOLOTYPE" [printed on a red label]" // [male terminalia on a microslide attached to a pinned plastic stripe]" // "HOLO- / TYPE" [printed in black on a rounded label with red border]" // "Ancud / 17–19.xii.1926." // "S. Chile: / Llanquihue Prov. / F. & M. Edwards / B.M. 1927–63." // "BMNH(E) # / # 254350".

Redescription of the holotype. Male (habitus, Fig. 1). **Head** (Figs. 2–4)**.** Predominantly yellowish; brownish on postgena and occiput. Three ocelli, lateral ones almost touching eye margins, median ocellus smaller than lateral ones. Mouthparts reduced; palpus yellowish, two segmented, basal palpomere large, wide, distal palpomere short, about half the length of the basal one. Face and clypeus yellow, pubescent. Antennae yellow, scape and pedicel pretty short, flagellomeres cylindrical, longer than wider, close to each other, first flagellomere slightly shorter than second one. **Thorax** (Figs. 4–5). Scutum with a light yellow stripe anteriorly continuing along paraalars, two brownish bands along the dorsocentrals and two short brown bands above wings; laterally compressed, arched, bearing dense rows of acrostichals, dorsocentrals, and slightly stronger supra–alars and prescutellars. Scutellum brown, with one pair of long scutellar bristles and several pairs of shorter setae medially. Mediotergite yellowish, with thin brown medial line, bare, curved in profile. Pleural sclerites dark brown, except for yellow dorsal margin of mesepimeron and laterotergite. Pleural membrane light brown. Pronotum with two long and five shorter setae. Anepisternum and katepisternum bare, katepisternum twice as high as anepisternum, bluntly pointed ventrally. Mesepimeron not reaching ventral margin of thorax, bare. Laterotergite bare. Haltere pedicel yellowish, knob light brownish. Legs light yellow, except for tibiae and tarsi brownish, mid coxae dark brown basely and brown hind coxa on basal two thirds. Tibiae with short bristles. Tibial spurs 1:2:2, brownish, almost twice the length of tibial apex width, inner spur of hind tibia only slightly longer than outer one. **Wing** (Fig. 6). Membrane translucent, dense and regularly covered with microtrichia. R_1, R_5 and all posterior veins except M_{1+2} with dorsal macrotrichia. Sc very short, ending free, sc–r absent. R_5 ending before wing apex, C extending about half the distance between R_5 and M_1. First sector of Rs perfectly transverse, short, devoid of setae. R_1 1.9X the length of r-m, reaching C at apical third of wing; R_4 absent; R_5 gently curved anteriorly on distal half, reaching C almost at level of apex of M_1; r–m long, only slightly oblique, well sclerotized. M_{1+2} length about 0.6X median fork length; M_1 and M_2 slightly divergent, complete. First sector of CuA 1.2X longer than second sector, cubital fork at level of origin of M_{1+2}, second sector gently curved along its length, not sinuous. A_1 quite weakly sclerotized, not produced on distal half. **Abdomen** (Fig. 1). Slender, covered with long, yellow setae, T1 dark brown, T2–T6 brown, with a wide anterior yellow band not reaching the margins laterally, T7–T8 brown with a basal band yellow; S1 brown, S2–S6 dark brown, yellow mesally; S7–S8 light brown, with yellowish mesal band (Freeman 1951: 82). **Terminalia** (Figs. 7–10). Gonocoxites setose, not too elongate, extending mesally, but with a deep median suture, with no distal extension beyond level of insertion of gonostyles. Gonostyles digitiform, flattened, main body with setae spread basally, setulose apically, with an inner apically bare tooth, a dorsal, well developed bare hook projecting meso-caudally at its distal third. Gonocoxal apodeme well developed; parameres well developed, involving the aedeagus, with a rounded apex setulose apically, with a pair of very long, thin, curved processes projecting well beyond apex of the terminalia; aedeagus bifid at apex. Cercus membranous and setose. T9 fairly narrow.

Comments. Information about T9 follows the original description of Freeman (1951: 82). The male terminalia mounting, however, is in a pretty bad state. The dorsal part of the terminalia was removed, so details on the epandrium cannot be properly verified.

DISCUSSION

The original position of *Thoracotropis* as a member of the Leiinae was more recently corroborated by Jaschhof & Kallweit (2009), even though there is not a phylogenetic analysis of the group. In Tozoni's (1998) phylogenetic study of the Mycetophilidae, she suggests that *Thoracotropis* would belong to the subfamily Gnoristinae, and fit in a clade with *Impleta* Plassmann and *Docosia* Winnertz. However, she also highlighted the need for a wider sampling of the Gnoristinae and the Leiinae to properly recover this part of the phylogeny of the family. Freeman (1951) actually mentioned the similarities between *Thoracotropis* and *Docosia* and the dissimilarities between *Thoracotropis* and the other Leiinae. Søli (1997) and Rindal *et al.* (2009) did not include the genus in their wider phylogenetic studies of the family.

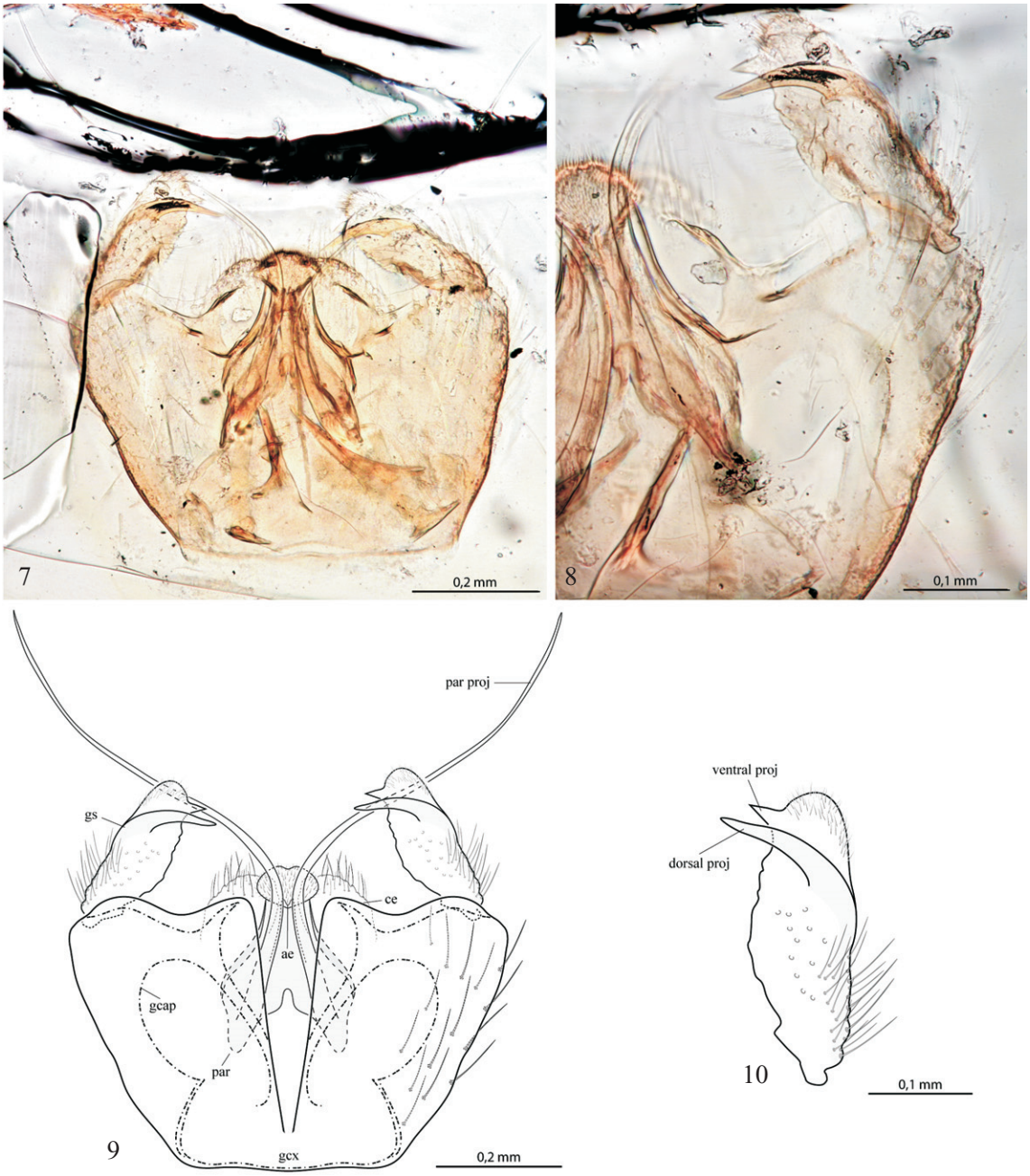
A better placement of *Thoracotropis* in the system of the Mycetophilidae is obviously dependent on the solution of the problem of the monophyly of Leiinae and its delimitation. There is still no agreement in the literature about the limits of the subfamily (Väisänen 1986; Søli 1997; Søli *et al*. 2000; Hippa *et al*. 2005; Jaschhof & Kallweit 2009) and

Figs. 1–6. *Thoracotropis cypriformis* Freeman, holotype: 1, habitus, lateral view; 2, head, frontal view; 3, head, dorsal view; 4, head and thorax, dorsal view; 5, thorax, lateral view; 6, left wing.

only a phylogenetic analysis considering all putative leiine genera, manotines, gnoristines, and other outgroups could render a reliable solution. This study is still not available and the redescription of this genus is a way of providing information towards a better understanding of the subfamily.

In the original description of the genus, Freeman (1951: 81) mistakenly refers to only two ocelli. This feature varies among the Leiinae genera, so this may have led to misleading conclusions about the position of the genus. The mesonotum strongly arched and produced anteriorly is distinctive of the genus. The shape of the mesonotum is variable in the Mycetophilidae, but a mesonotum produced anteriorly is present in *Sceptonia* Winnertz and *Epicypta* Winnertz (Søli 1997) as well, so it is not informative enough whether or not to place the genus in Leiinae.

The *Thoracotropis* male terminalia is remarkable because of the long, thin paramere projections. The general structure of the male terminalia, with a narrow T9, digitiform gonostyle, and absence of spines in the gonocoxite, is plesiomorphic in mycetophilids and, in this sense, is more similar to the male terminalia of some Neotropical *Dziedzickia* Johannsen (Oliveira 2009) and *Tetragoneura* Winnertz (Freeman 1951) than to typical Leiinae genera, as *Paraleia* Tonnoir (Oliveira & Amorim 2012), *Paradoxa* Marshall, *Sigmoleia* Tonnoir &



Figs. 7–10. *Thoracotropis cypriformis* Freeman, holotype. Male terminalia. 7. Dorsal view. 8. Detail of the parameres, parameres projections, and gonostyle, dorsal view. 9. Dorsal view. 10. Detailed of the gonostyle projections, dorsal view.

Edwards, *Paracycloneura* Tonnoir & Edwards, *Waipapamyia* Jaschhof & Kallweit (Jaschhof & Kallweit 2009). If these features are not enough to include *Thoracotropis* in the gnoristines, they at least show that the genus does not belong to the core group of genera of leiines.

Wing features can also contribute to this discussion. Most leiines have R_1 typically short, as well as a sinuous CuA. Genera assigned to the subfamily with long R_1 and CuA not sinuous (or not even slightly sinuous) include, among others, *Aphrastomyia* Coher & Lane, *Docosia*, *Ectrepesthoneura* Enderlein, *Megophthalmidia* Dziedzicki, *Novakia* Strobl, *Tetragoneura* or, to a lesser extent, *Rondaniella* Johannsen and *Trichoterga* Tonnoir & Edwards. Despite its inclusion as Leiinae by Jaschhof & Kallweit (2009), *Thoracotropis* has R_1 much longer than typical leiines. The extension of r-m, on the other hand, a condition also seen in most leiines, is much longer in *Thoracotropis* than in typical gnoristines, what could suggests a position closer to the leiines.

It is worth noting that Matile (1993), while describing *Caledonileia* Matile, commented that this genus shares with other genera of Leiinae, *Thoracotropis* and *Sigmoleia*, the presence of only two palpomeres. Nevertheless, he noted that the

wings of *Sigmoleia* and *Caledonileia* are considerably different and that the number of ocelli is not the same in these two genera, the former with three, the latter with two. Matile (1993) also stressed that the wings of *Thoracotropis* and *Caledonileia* are relatively close and that both these two genera have two ocelli –information, as commented above, that was mistaken in Freeman's (1951) original description. Additionally, these three genera also share the loss of sc-r, a feature he recognized that is recurrent in the Mycetophilidae (Matile 1990), and could be misleading about the position of the genus.

Matile's (1993) conclusion is that an inference about the position of these genera would be premature before a phylogeny of the Leiinae. We hold here this position. A robust answer about the position of *Thoracotropis* is strictly dependent on recovering the Mycetophilidae phylogeny, defining the limits of the subfamilies. The problem of the monophyly of the Leiinae is being addressed in a phylogenetic study of the group (Oliveira & Amorim, unpublished data) but the detailed redescription here of the genus, including photos and illustrations, corrects some mistakes in its original description, a necessary step towards the solution of the problem of the position of this genus.

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