

## *Forcipomyia (Trichohelea) aeronautica* Macfie (Diptera: Ceratopogonidae): further records from Brazil and new lepidopterous hosts

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**Abstract:** Female adults of *Forcipomyia (Trichohelea) aeronautica* Macfie from Brazil are reported from 14 new Nymphalidae (Lepidoptera) hosts: *Caligo eurilochus* (Cramer), *Opsiphanes invirae* (Hübner), *O. tamarindi* C. Felder & R. Felder, *O. quiteria* (Stoll), *O. cassina* C. Felder & R. Felder, *Selenophanes cassiope* (Cramer) (Brassoliniinae); *Archaeoprepona demophon* (Linnaeus), *Memphis leonida* (Stoll), *Zaretis itys* (Cramer) (Charaxinae); *Morpho helenor helenor* (Cramer), *Morpho achilles* (Linnaeus) (Morphinae); *Taygetis laches* (Fabricius), *T. thamyra* (Cramer) and *T. zippora* Butler (Satyrinae).

**Key words:** Diptera, Ceratopogonidae, *Forcipomyia aeronautica*, Lepidoptera, Nymphalidae, Brassoliniinae, Morphinae, Satyrinae, Pará, Brazil.

**Forcipomyia (Trichohelea) aeronautica Macfie (Diptera: Ceratopogonidae): nuevas citas de Brasil y nuevos huéspedes del orden Lepidoptera**

**Resumen:** Se confirma la presencia de *Forcipomyia (Trichohelea) aeronautica* Macfie en Brasil y se registran 14 nuevas especies de Nymphalidae (Lepidoptera) hospederas de hembras adultas de *Forcipomyia (T.) aeronautica*: *Caligo eurilochus* (Cramer), *Opsiphanes invirae* (Hübner), *O. tamarindi* C. Felder & R. Felder, *O. quiteria* (Stoll), *O. cassina* C. Felder & R. Felder, *Selenophanes cassiope* (Cramer) (Brassoliniinae); *Archaeoprepona demophon* (Linnaeus), *Memphis leonida* (Stoll), *Zaretis itys* (Cramer) (Charaxinae); *Morpho helenor helenor* (Cramer), *Morpho achilles* (Linnaeus) (Morphinae); *Taygetis laches* (Fabricius), *T. thamyra* (Cramer) y *T. zippora* Butler (Satyrinae).

**Palabras clave:** Diptera, Ceratopogonidae, *Forcipomyia aeronautica*, Lepidoptera, Nymphalidae, Brassoliniinae, Morphinae, Satyrinae, Pará, Brasil.

The genus *Forcipomyia* Meigen is remarkably diverse with 1,125 valid extant species presently recognized (Borkent, 2011). Undoubtedly, many more remain unnamed. The females of most species have biting mouthparts but, in spite of their nearly ubiquitous presence in terrestrial habitats throughout the world (Borkent *et al.*, 2009), we have few observations of their hosts. Aside from 21 species in the subgenus *F. (Lasiohelea)* Kieffer which feed on vertebrates, only 79 species, in five subgenera, have been recorded feeding on insects and arachnids as follows: one species of *F. (Euprojoannisia)* Bréthes on Lepidoptera larvae, 30 species of *F. (Microhelea)* Kieffer on Lepidoptera and Symphyta larvae, phasmids and Orthoptera, 21 species of *F. (Pterobosca)* Macfie on Odonata and Neuroptera wings, one species of *F. (Thyridomyia)* Saunders on Odonata wings, and 26 species of *F. (Trichohelea)* Goetghebuer on Lepidoptera, Neuroptera, Megaloptera and Odonata wings, arachnid abdomen (Araneae and Opiliones), and Coleoptera, Heteroptera and Diptera adults (Wirth, 1956, 1966; Tokunaga & Murachi, 1959; Clastrier & Delecólle, 1997; Borkent & Spinelli, 2007; Borkent *et al.*, 2009).

Of the 11 species of *F. (Trichohelea)* in the Neotropical Region (Borkent & Spinelli, 2007), host records are known for seven species. One of these, *F. aeronautica* Macfie, known from Venezuela to French Guiana, south to Brazil, has been recorded only from wings of Lepidoptera. Macfie (1935) found it on *Catoblepia xanthus* (Linnaeus) (Nymphalidae, Brassoliniinae) in Guyana, Wirth (1956) recorded it from "*Morpho patroclus agamedes*" [=?*Morpho achilles* ssp. (Linnaeus)] and *Morpho menelaus* (Linnaeus) (Nymphalidae, Morphinae) in Venezuela and French Guiana respectively, and Lane (1984), collecting for a single day at Belém, Pará, Brazil, found the midge on eight species of Lepidoptera, as follows: *Catoblepia berecynthia* Cramer (Nymphalidae, Brassoliniinae), *Morpho menelaus* (Linnaeus), *Morpho achilles* (Linnaeus) (Nymphalidae, Morphinae), *Haetera piera* (Linnaeus), *Taygetis andromeda* Cramer, *Euptychia hesione* (Sulzer), *Pierella hyalinus* (Gmelin) (Nymphalidae, Satyrinae), *Parides lysander* (Cramer) (Papilionidae), and *Eurybia halimede* Hübner (Riodinidae, Riodininae). Lane (1984) found no evidence of host specificity but noted the majority of hosts were large (wing length of over 20 mm), predominantly dark, slow flying, and more common in the darker areas of the forest.

Here we report further records of *F. aeronautica* recently collected on 14 species of Nymphalidae, belonging to four subfamilies: *Caligo eurilochus* (Cramer), *Opsiphanes invirae* (Hübner), *O. tamarindi* C. Felder & R. Felder, *O. quiteria* (Stoll), *O. cassina* C. Felder & R. Felder, *Selenophanes cassiope* (Cramer) (Brassoliniinae); *Archaeopre-*

*pona demophon* (Linnaeus), *Memphis leonida* (Stoll), *Zaretis itys* (Cramer) (Charaxinae); *Morpho helenor helenor* (Cramer), *Morpho achilles* (Linnaeus) (Morphinae); *Taygetis laches* (Fabricius) *T. thamyra* (Cramer), *T. zippora* Butler (Satyrinae) (Tab. I). As such, *F. aeronautica* is known to feed on 22 species of Nymphalidae, one species of Riodinidae and one species of Papilionidae.

All the flies were females and were found on live butterflies, during day time (Tab. I) in the same locality, the "Natural Reserve Klagesi" (01° 09' 987" S, 48° 07' 796" W, 27 m), in the city of Santo Antonio do Tauá, State of Pará, Brazil. This locality is near the city of Belém referred above.

It is noteworthy that the flies were found not only on the wings (Fig. 1), but also on the thorax and abdomen of the butterflies (Tab. I). On the posterior area of each hind wing there is a group of long hairs (Fig. 1), among which some flies were found on some butterflies (Tab. I). There has been a question as to whether the females of some *Forcipomyia* species use their hosts to travel, rather than feeding (Orr & Cranston, 1997). Some of our specimens had large swollen abdomens, indicating the likelihood they were actively feeding on haemolymph of the butterflies.

As the observations were made on only a few occasions (Tab. I), it is probable that more extensive collections will show a wider range of hosts of *F. aeronautica* in the Amazon region. As found by Lane (1984), the species observed in the present work also were large butterflies with wing lengths of over 20 mm.

The identification of this species is somewhat uncertain. They have a costa ratio of 0.60-0.63 and therefore key to *F. opilionivora* (Lane) in the key by Marino & Spinelli (2004). However, other details, such as the mouthparts, do not match this species, known from a single specimen from Juquiá, São Paulo, Brazil, biting, as the name suggests, an opilionid. Although included in the key as having a smaller costa ratio, in fact this feature has not been described for *F. aeronautica*. It otherwise keys out successfully in Marino & Spinelli (2004). Wirth (1956) described the tarsal claws as unequal in *F. aeronautica* (they are equal in the specimens at hand), although Macfie (1935) did not mention this and the claw he drew matches our specimens. As such, we tentatively identify the specimens as *F. aeronautica*. Furthermore, it is worth noting that the relative lengths of flagellomeres 9-13 varied considerably in the 15 females, with an antennal ratio of 1.29-1.58 (n=8). Finally, we compared the material to specimens from Costa Rica, also collected from lepidopteran wings, and consider them conspecific.



Fig. 1. *Forcipomyia aeronautica* females on right (fore and hind) wings of *Taygetis laches*.

Table I. Collecting data of butterflies with females of *F. aeronautica*, including the anatomical region where the flies were found.

Lepidoptera species	Sex of butterfly	Collection hour	Date	Location of the midge
<i>Caligo eurilochus</i>	female	7:00h	27.V.2009	on wing, among hair pencil
<i>Opsiphanes invirae</i>	male	7:00h	25.IV.2009	on thorax
<i>Opsiphanes tamarindi</i>	male	7:30h	21.IV.2009	on thorax
<i>Opsiphanes quiteria</i>	male	7:00h	25.IV.2009	abdomen
<i>Opsiphanes cassina</i>	male	16:30h	27.IV.2009	Between thorax and abdomen
<i>Selenophanes cassiope</i>	female	6:30h	22.V.2009	on thorax
<i>Archeoprepona demophon</i>	male	12:25h	17.IV.2009	on wing, among hairs
<i>Memphis leonida</i>	male	7:30h	29.IV.2009	on wing, among hairs
<i>Zaretis itys</i>	male	17:30h	24.IV.2009	on wing
<i>Morpho h. helenor</i>	female	17:15h	29.IV.2009	on wing
<i>Morpho achilles</i>	female	9:30h	19.V.2009	on wing
<i>Taygetis laches</i>	male	11:00h	25.V.2009	on wing
<i>Taygetis thamyra</i>	female	---	19.VI.2008	on wing
<i>Taygetis thamyra</i>	male	12:30h	28.III.2009	on wing
<i>Taygetis zippora</i>	female	17:30h	26.V.2009	on wing

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