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A REVIEW OF THE GENUS *FORCIPOMYIA* (DIPTERA: CERATOPOGONIDAE) FROM EGYPT WITH DESCRIPTION OF A NEW SPECIES

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ABSTRACT. The eight species of the genus *Forcipomyia* found in Egypt are reviewed and a key to the adults is given. One new species, *F. (Lepidohelea) marsafae* is described and *F. (L.) pulcherrima* Santos Abreu is newly recorded from Egypt. New distribution records are included for some of the other species.

Key words: *Forcipomyia marsafae, F. pulcherrima,* taxonomy, keys, distribution, biting midges, Egypt.

Introduction

In Egypt, the taxonomy and distribution of biting midges of the genus *Forcipomyia* Meigen have been poorly understood. Carter (1919) described the male and female as well as the immature stages of *Forcipomyia psilonota* (Kieffer) from Accra (Gold Coast), Ghana, and this species was later recorded from Egypt (Kieffer, 1925). Ingram & Macfie (1924) provided descriptions and keys to the African species of *Forcipomyia* Meigen including *F. biannulata* Ingram & Macfie, a species subsequently found in Egypt. Keiffer (1925), in his contribution to the family Chironomidae of Egypt treated the Ceratopogonidae as a subfamily of the Chironomidae. He described four *Forcipomyia* species and gave keys for their recognition. Macfie (1924) identified two new species, *Forcipomyia egypti* [now *F. psilonota* (Kieffer)], and *F. nilotheres*, [now *F. fuliginosa* (Meigen)] as Egyptian species. The Ceratopogonidae of Egypt were revised by Macfie (1943) and he described *Forcipomyia moascari* [now *F. murina* (Winnertz)] from Egypt. Steyskal & El-Bialy (1967) listed 46 Egyptian biting midges belonging to 10 genera in the family. In this list, *Forcipomyia* Meigen was represented by 7 species. In their world list of Ceratopogonidae, Borkent & Wirth (1997) listed *F. hathor* and *F. indocera* under *F. psilonota* (Kieffer), *F. moascari* and *F. sate* under *F. murina* (Winnertz), and transferred *Apelma nilicola* Kieffer to *Forcipomyia.* Their action resulted in reducing the number of Egyptian species of *Forcipomyia* to six: *F. biannulata* Ingram & Macfie, *F. fuliginosa* (Meigen), *F. murina* (Winnertz), *F. nilicola* (Kieffer), *F. psilonota* (Kieffer), and *F. urnigera* Kieffer.

In an attempt to better understand the *Forcipomyia* of Egypt, field collections were made from two different localities, El-Bustan (Beheira), and Marsafa (Qalyubiya) during 1998. This effort resulted in new distributional data, one new species, *Forcipomyia marsafae,* and one new record, *F. pulcherrima* Santos Abreu. Both species belong to the subgenus *Lepidohelea* and now

eight species of *Forcipomyia* are known from Egypt. Table I summarises the distribution of *Forcipomyia* species occurring in Egypt.

Table I. List of *Forcipomyia* species recorded from Egypt with their distribution and references

Species	Distribution	References
Subg. *EUPROJOANNISIA* Brethes		
psilonota (Kieffer), 1911	Maadi (Cairo)	(Kieffer, 1925)
	Moascar (Ismailia)	(Macfie, 1943)
	El Bustan (Beheira)	(Coll. M. Ghonaim)
Subg. *FORCIPOMIYA* Meigen		
biannulata Ingram & Macfie, 1924	Moascar (Ismailia)	(Macfie, 1943)
	El Bustan (Beheira)	(Coll. M. Ghonaim)
nilicola (Kieffer), 1925	Maadi (Cairo)	(Kieffer, 1925)
urnigera Kieffer, 1925	Maadi (Cairo)	(Kieffer, 1925)
Subg. *LEPIDOHELEA* Kieffer		
marsafae, sp. nov.	Marsafa (Qalyubiya)	(Coll. M. Ghonaim)
pulcherrima Santos Abreu, 1918	Marsafa (Qalyubiya)	(Coll. M. Ghonaim)
Subg. *MICROHELEA* Kieffer		
fuliginosa Meigen 1818	Nile at Asyut (Asyut)	(Macfie, 1924)
	El Bustan (Beheira)	(Coll. M. Ghonaim)
Subg. *SYNTHYRIDOMYIA* Saunders		
murina (Winnertz), 1852	Guyot gardens (Suez)	(Kieffer, 1925)
	Sidi Gaber (Alexandria)	(Kieffer, 1925)
	Moascar (Ismailia)	(Macfie, 1943)

Materials and Methods

Adult midges attracted to light were collected with an aspirator by the method described by Ingram & Macfie (1922). Occasionally, a small hand net was also used to collect swarming adults. Samples were preserved in 70% ethyl alcohol to which a drop of glycerol was added to prevent any shrinkage. Specimens were mounted in phenol balsam mixture using the method described by Wirth & Marston (1968). The body length was measured from the

anterior margin of the thorax to the posterior end of the abdomen, excluding the head (Carter et al., 1920). Examination and measurements of samples were carried out under a stereodissecting binocular microscope. The terminology used follows that of Blanton & Wirth (1979).

Key to species from Egypt

1. Fourth and 5th palpal segments incompletely fused, immovable; small, unmarked, brownish midges; TR greater than 1.0 ..... *F. (Euprojoannisia) psilonota* (Kieffer)
-- Fourth and 5th palpal segments distinctly separated, articulated; size, color, and TR various 2
2. Palpus with 3rd segment broadly swollen to past middle, usually nearly to tip, with sensory pit deep, extending nearly to base of segment; slender, hyaline, peglike, sensory spines present on surface near sensory pore; TR usually less than 0.5; large species ..... *F. (Microhelea) fuliginosa* Meigen
-- Palpus various, 3rd segment rarely swollen past midlength and not bearing peglike sensory spines on surface near sensory pore; TR usually more than 0.5; size various 3
3. Small grayish or brownish, unmarked species; TR usually greater than 2.0; antenna short, proximal segments subspherical, gradually more elongated distally; one spermatheca present ..... *F. (Synthyridomyia) murina* (Winnertz)
– Larger species, often with conspicuous markings on body, legs or wings; TR usually about 1.0 (0.5- 1.5); 2 well-developed spermathecae present 4
4. Body usually with conspicuous, numerous, flattened scales in addition to normal setae and hairs; male genitalia with parameres not joined or fused at bases, gonostylus elongate, sinuate with distinct distal expansion 5
– Body usually without scales, or if present they are usually not broad; male genitalia with parameres joined or fused at bases, gonostylus not expanded distally 6
5. Tibiae and metatarsi with long bristles; wing with a few macrotrichia especially on the distal third ..... ***F. (Lepidohelea) marsafae,*** sp. nov.
– Tibiae and metatarsi without long bristles; wing totally covered with macrotrichia ..... *F. (Lepidohelea) pulcherrima* Santos Abreu
6. Empodium absent, wing with 2nd radial cell obliterated ..... *F. (Forcipomyia) nilicola* (Kieffer)
-- Empodium present, 2nd radial cell well-developed 7
7. TR less than 1.3, wing with a pale yellow spot, enveloping 2/3 of 2nd radial cell ..... *F. (Forcipomyia) biannulata* I. & M.
-- TR more than 2.0; wing without pale spots ..... *F. (Forcipomyia) urnigera* Kieffer

***Forcipomyia (Lepidohelea) marsafae* Ghonaim, Ibrahim & Ali, sp. nov. (Fig. 1)**

Type locality: Egypt: Qalyubiya: Marsafa.

Measurements/ratios	**Female** *(n=1)*	**Male** *(n=5)*
Body length	2.1mm	2.1-2.3 mm
Wing length	0.9mm	1.3-1.6 mm
Wing breadth	0.36mm	0.39-0.44mm
Antennal ratio	0.76	0.77-0.79
Palpal ratio	2.8	3.3-4.3
Costal ratio	0.66	0.39-046
Tarsal ratio	0.76	0.78-0.91

Head: Head dark brown. Eyes bare (Fig. 1A), broadly contiguous above in both sexes. Palpus (Fig. 1D, E) with deep rounded sensory pit, broader in female. Antenna (Fig. 1B, C) in female brown, flagellomeres (2-8) slightly constricted apically, subequal, last segment moderately long. In male, whorls on flagellomeres 1–10 each with about 12 hairs, the last flagellomere more flattened with a blunt apical nipple.

Thorax: Wing (Fig. 1F, G) with dense macrotrichia; 1st radial cell obsolete but 2nd radial cell well formed; markings distributed as follows: one spot in middle of cell r5; small spot on each extremity of veins M_1, M_2, CuA_1, and CuA_2. Halters with pale yellowish knobs. Legs in both sexes distinctly banded with yellow and dark brown colors; femora, tibiae, and tarsi densely clothed with scales; distal 3rd of femora, tibiae, and 1st tarsomere provided with very long bristles as follows: 2 on femora, 5 on tibiae, 3 on 1st tarsomeres, in addition to shorter spines (Fig. 1H); coxae of all legs yellowish; femora with broad dark brown band at base, apex and knees usually yellow; hind tibia with basal third dark, apical 2/3 yellow with medial moderately sized dark brown band so that tibia divided into 4 nearly equal areas; 1st, 2nd tarsomeres dark brown but extremities are yellow, 4th tarsomere more infuscated.

Abdomen: Spermathecae (Fig. 1I) two, subspherical, nearly equal, highly chitinized measuring 0.18 x 0.26 mm, with short necks. Male genitalia (Fig. 1J): Gonocoxite dark brown, slightly paler at apex, more diverging posteriorly; gonostylus pale brown with distal extremity greatly narrowed; aedeagus partly chitinized in ventral view, with stirrup-like portion basally; parameres long, stout, chitinized rods, tapering distally; not enfolded in aedeagus.

Holotype: ♂, EGYPT: Qalyubiya: Marsafa, 17.iii.1998, Coll. M. Ghonaim. Deposited in Division of Plant Industry, Gainesville, Florida (DPI). *Allotype:* 1♀, same data as the holotype. *Paratypes:* 4♂, same data as holotype. In Author's collection.

Etymology: Forcipomyia marsafae is named after the type locality.

Distribution and habitat: Egypt. Males of *Forcipomyia marsafae* were noticed swarming at dusk along the edges of streams and small canals. The potential breeding sites were the rotten banana stems, spread in the area. It is

likely to be widespread in other areas where similar habitats are encountered.

Discussion: Forcipomyia marsafae belongs to the subgenus *Lepidohelea* on the basis of having conspicuous numerous, flattened scales spread all over the body, in addition to normal setae and hairs. The male genital parameres are not joined or fused at bases, and gonostylus is elongate, sinuate and with distinct distal expansion (Wirth & Ratanaworabhan, 1978). This new species is apparently closely related to *F. (Lepidohelea) pulcherrima* Santos Abreu but differs in its darker color, having more scattered macrotrichiae, smaller oval female spermathecae, having rather long and strong bristles on femora, tibiae, and 1st, 2nd tarsomeres of all legs, and stouter gonocoxite without folds. The more divergent distal end of the gonostylus is not expanded, and the basal part of parameres is more inflated.

2. *Forcipomyia (Lepidohelea) pulcherrima* Santos Abreu (Fig. 2)

Forcipomyia pulcherrima Santos Abreu, 1918. Mem. Real Acad. Ciencias Artes Barcelona, 14(2): 272. Type locality: Spain: Canary Islands.
Forcipomyia formosae (Kieffer), 1922. Ann. Soc. Scien. Linn. Lyon, 68: 153. (*Lepidohelea*). Taiwan.
Forcipomyia lepidota Ingram & Macfie, 1924. Ann. Trop. Med. Parasit., 18: 566. Ghana.
Forcipomyia ornatipes (Kieffer), 1921. Ann. Soc. Entomol. France, 90: 1. [(*Lepidohelea*, preoccupied by *Forcipomyia ornatipes* (Kieffer), 1918)]. Cameroon.
Forcipomyia variegata Goetghebuer, 1933. Rev. Zool. Bot. Afr., 24: 133. Zaire.

Measurements/ratios	**Female** *(n=3)*	**Male** *(n=5)*
Body length	1.9-2.1 mm	2.0-2.2 mm
Wing length:	1.2-1.3 mm	1.2-1.48 mm
Wing breadth	0.44-0.49 mm	3.5-0.39 mm
Antennal ratio	0.67-0.7	0.77-0.82
Palpal ratio	2.6-2.7	3.1-3.9
Costal ratio	4.3-0.48	0.44-0.46
Tarsal ratio	0.72-0.8	0.73-0.82

Head: Dark brown. Eye (Fig. 2A) bare, broadly contiguous above in both sexes. Palpus (Fig. 2D, E) similar in both sexes; sensory pit small, deep, rounded, last 2 segments rather broadly united. Antenna (Fig. 2B, C) brown; female flagellomeres 1-8 bearing long slender spines; whorls of about 12 hairs; flagellomeres forming an almost continuous series; flagellomeres 2-8 slightly constricted apically, but not clearly flask-shaped. Male antenna with large plume, distal half pale brown, the last flagellomere with a blunt apical nipple.

Thorax: Dark brown. Wings (Fig. 2F, G) pale faint gray with ill-defined spots arranged as follows: 2 spots on anterior half, one spot on 2nd radial cell, 2nd spot large, diffuse on apical fourth, along margin, on posterior half, 4 ill-defined spots, on apex of M1, M2, CuA1, CuA2, between fork of CuA, and in the anal angle. Female wing darkest anteriorly at junction of 1st, 3rd radial veins with costa, 2nd radial cell large, short, bifurcation of Cu vein slightly proximal to level of the end of costa. Male wing lighter in color, appearing

pale with darker spots, fringe long, 1st radial cell obsolete, bifurcation of CuA slightly distal to level apex of costa. Legs (Fig. 2H) in both sexes conspicuously banded with yellow and dark brown colors, femora, tibiae, tarsi densely clothed with scales, coxae of all legs dark brown, femora with broad dark brown band at base and apex, knees usually yellow, hind tibia with basal third dark, apical 2/3 yellow with medial narrow dark brown band, so segment divided into 4 nearly equal areas, 1st tarsomere with basal 2/3 dark, apical third yellow, tarsomeres 2-4 more or less infuscated, dark brown in middle, 5th entirely yellow, TR about 0.7 - 0.82. Claws small.

Abdomen: Spermathecae (Fig. 2I) two, pyriform, highly chitinized with proximal conical portion. Male genitalia: (Fig. 2J) gonocoxite dark brown, slightly paler at apex, gonostylus pale brown with distal extremity greatly expanded, parameres apparently partly enfolded on aedeagus, difficult to see, long, stout, chitinized rods, tapering distally; aedeagus partly chitinized in ventral view, with basal, stirrup-like portion bearing median ventral process and a distal, shuttle-like structure.

Specimens examined: EGYPT: Qalyubiya: Marsafa, 84♂, 3♀, II, III, IV, 1998, Coll. M. Ghonaim.

Distribution and habitat: Egypt. This species was collected alongwith *F. marsafae* in similar habitat.

Discussion: Forcipomyia (Lepidohelea) pulcherrima Santos Abreu from Egypt is nearly identical to that described by Ingram & Macfie (1924) except for the following: Last flagellomere of male nearly equal to the penultimate one or is only a little longer, relative length of flagellomeres 9-13: 31-81-44-27-30; macrotrichiae less dense and restricted to the distal portion of the wing; gonocoxite with a mesal sinusoid fold posteriorly, and the median ventral process of aedeagus smaller.

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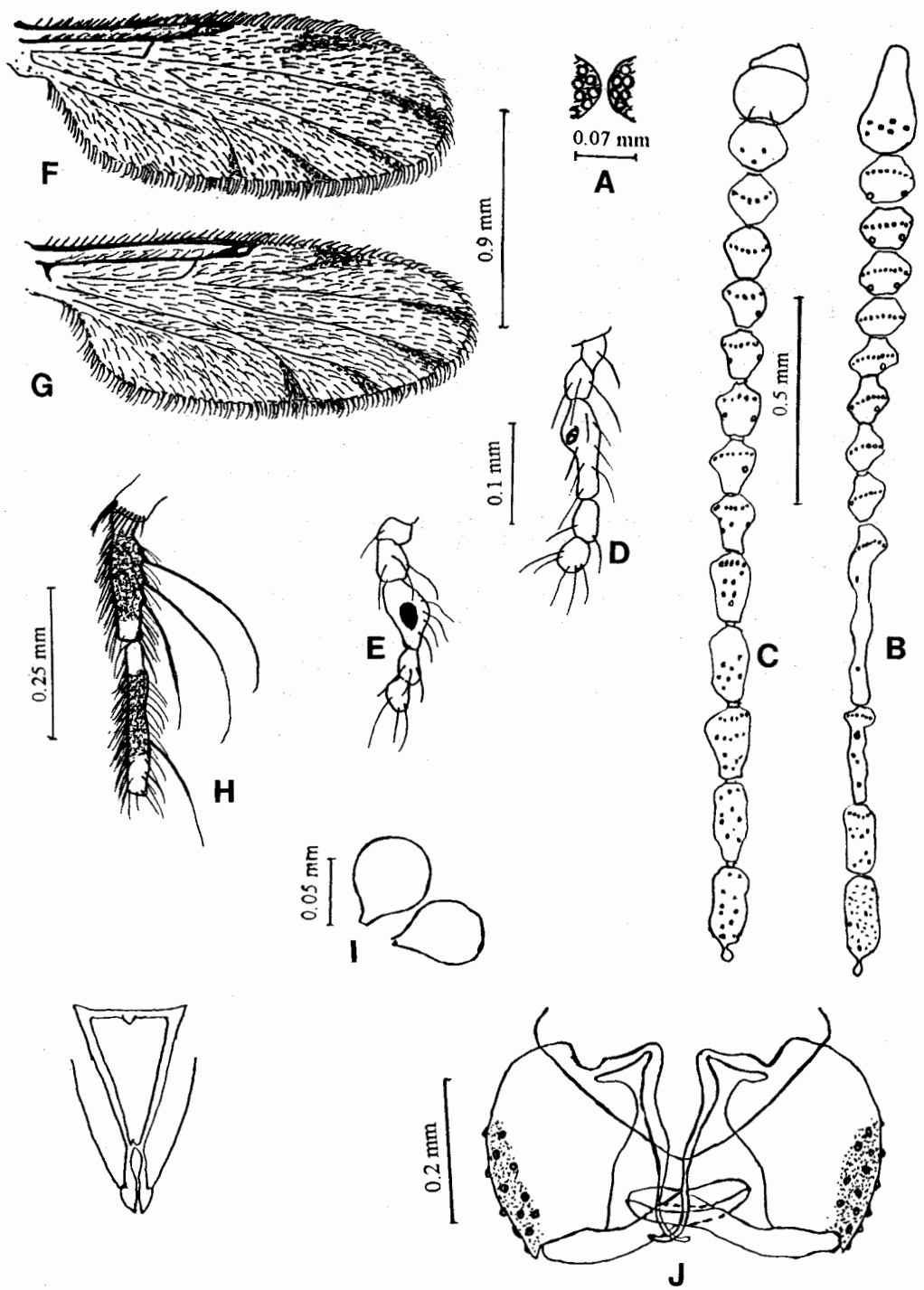

Fig. (1. A-J): *Forcipomyia (Lepidohelea) marsafae,* A, eyes ♂; B, antenna ♂; C, antenna ♀; D, palpus ♂; E, palpus ♀; F, wing ♀; G, wing ♂; H, hind 1st and 2nd tarsomeres; I, spermathecae; J, genitalia ♂.

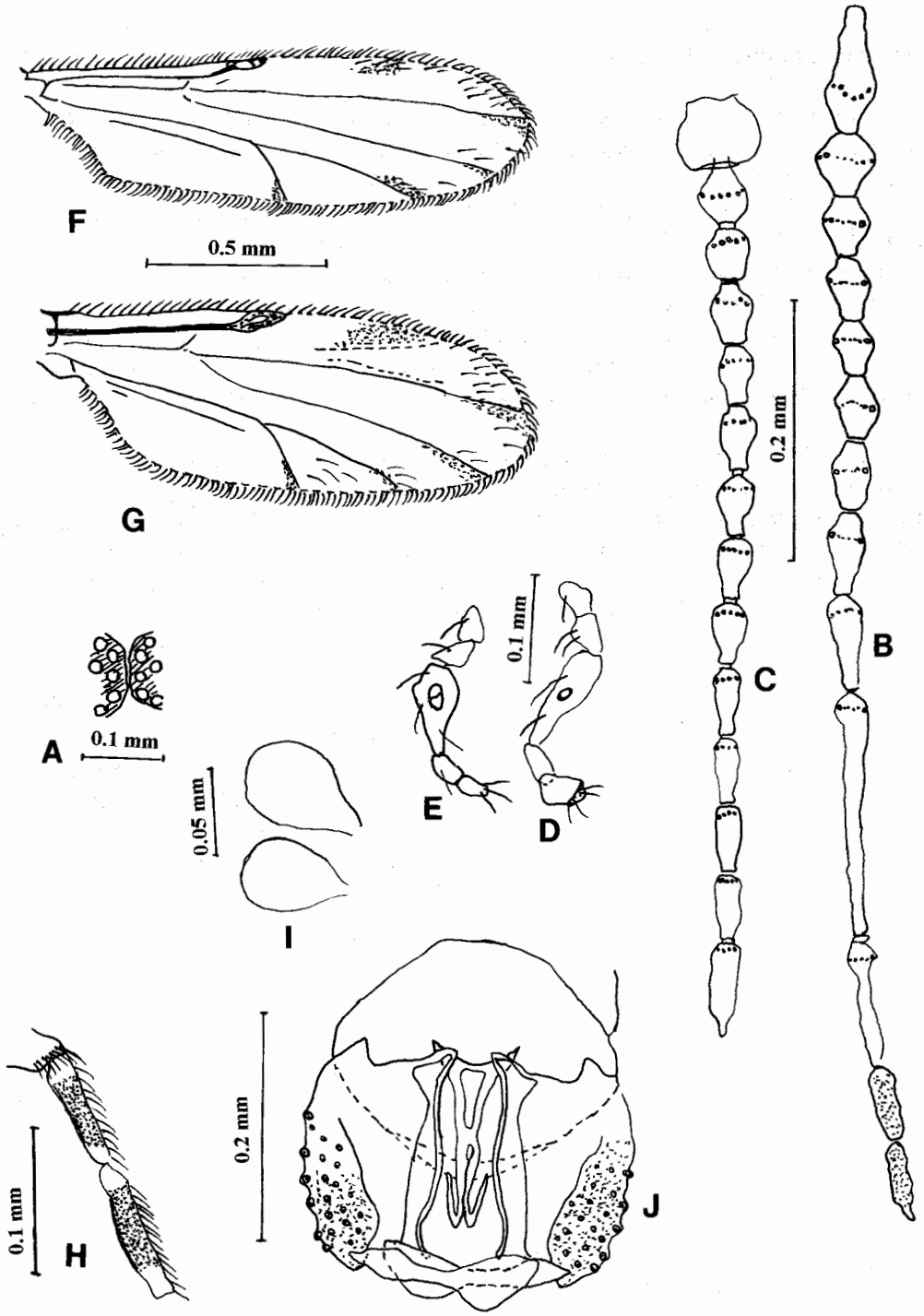

Fig. (2. A-J): *Forcipomyia (Lepidohelea) pulcherrima* Santos Abreu, A, eyes ♂; B, antenna ♂; C, antenna ♀; D, palpus ♂; E, palpus ♀; F, wing ♂; G, wing ♀; H, hind 1st and 2nd tarsomeres; I, spermathecae; J, genitalia ♂.