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Descriptions of the immature stages of *Dampfomyia* (*Coromyia*) *beltrani* (Vargas & Díaz-Nájera) (Diptera: Psychodidae), with notes on morphology and chaetotaxy nomenclature

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Abstract

All immature stages of the phlebotomine sandfly *Dampfomyia* (*Coromyia*) *beltrani* (Vargas & Díaz-Nájera) [= *Lutzomyia (Coromyia) beltrani*, *sensu* Young & Duncan 1994] are described and illustrated based on reared specimens from founder females collected from the type-locality in Veracruz, Mexico. These represent the first description of egg, and the third of larva instars and pupa of a species of the subgenus *Coromyia*, only preceded by *Da. vespertilionis* (Fairchild & Hertig) and *Da. isovespertilionis* (Fairchild & Hertig). Some morphological nomenclature clarifications are suggested toward the standardization of immature descriptions, which, in turn, would allow detection of homologies for future integration of these developmental stages characters into a phylogenetic analyses.

Key words: juvenile Diptera, egg-shell ultrastructure, larva, pupa, sand flies, Phlebotominae, Neotropical region, Mexico

Introduction

Immature stages of phlebotomine sand flies have been the subject of few studies. This is likely due to the difficulty of finding them in their natural microhabitats and also because it is quite difficult to breed them in a laboratory (Ward 1972; Bettini 1988, 1989, 1991; Killick-Kendrick 1977, 1999; Ghosh *et al.* 1991; Feliciangeli 2004). As a consequence, the systematics and taxonomy of Phlebotominae are currently based exclusively on adult morphology. Due to this limitation, the two main classificatory systems rely on traditional adult characters proposed by Lewis *et al*. (1977) and later revised by Young & Duncan (1994), and that with a phylogenetic approach employed by Galati (1995, 2003). In some other lower Diptera (e.g. Simuliidae and Culicidae) the characters of immature stages have been shown to be relevant in the taxonomy of the group as immatures seem more conservative and rich in characters that could reinforce phylogenetic analysis (*e.g*., Craig 1983, Oosterbroek & Courtney 1995, Palmer & Yeates 2000, Sallum *et al*. 2000, Meier & Lim 2009).

Most studies on immature stages of phlebotomine in the New World have been conducted in Central and South America. The greatest proportion, as well as the oldest of these studies have come from researchers in Brazil (*e.g*., Barretto 1941; Mangabeira1942; Forattini 1973; Ward 1972, 1976a, b; Feliciangeli *et al*. 1993; Leite & Williams 1996, 1997; Fausto *et al*. 1992, 2001; Pessoa 2000, 2001, 2008), but also in Panama (Hanson 1968), Peru (Pérez & Ogozuku 1997) and in Colombia (Cazorla *et al.* 2010). In contrast, no studies of immature phlebotomine sand flies have been carried out in Mexico. To date, a total of 45 phlebotomine species have been recorded from Mexico, and from these, at least one immature stage is known for only 17 species; however, these descriptions are from studies where material was obtained from other countries including Panama (Hanson 1968), Brazil (Barretto 1941, Leite & Williams 1996, 1997) and Colombia (Cazorla *et al*. 2010).

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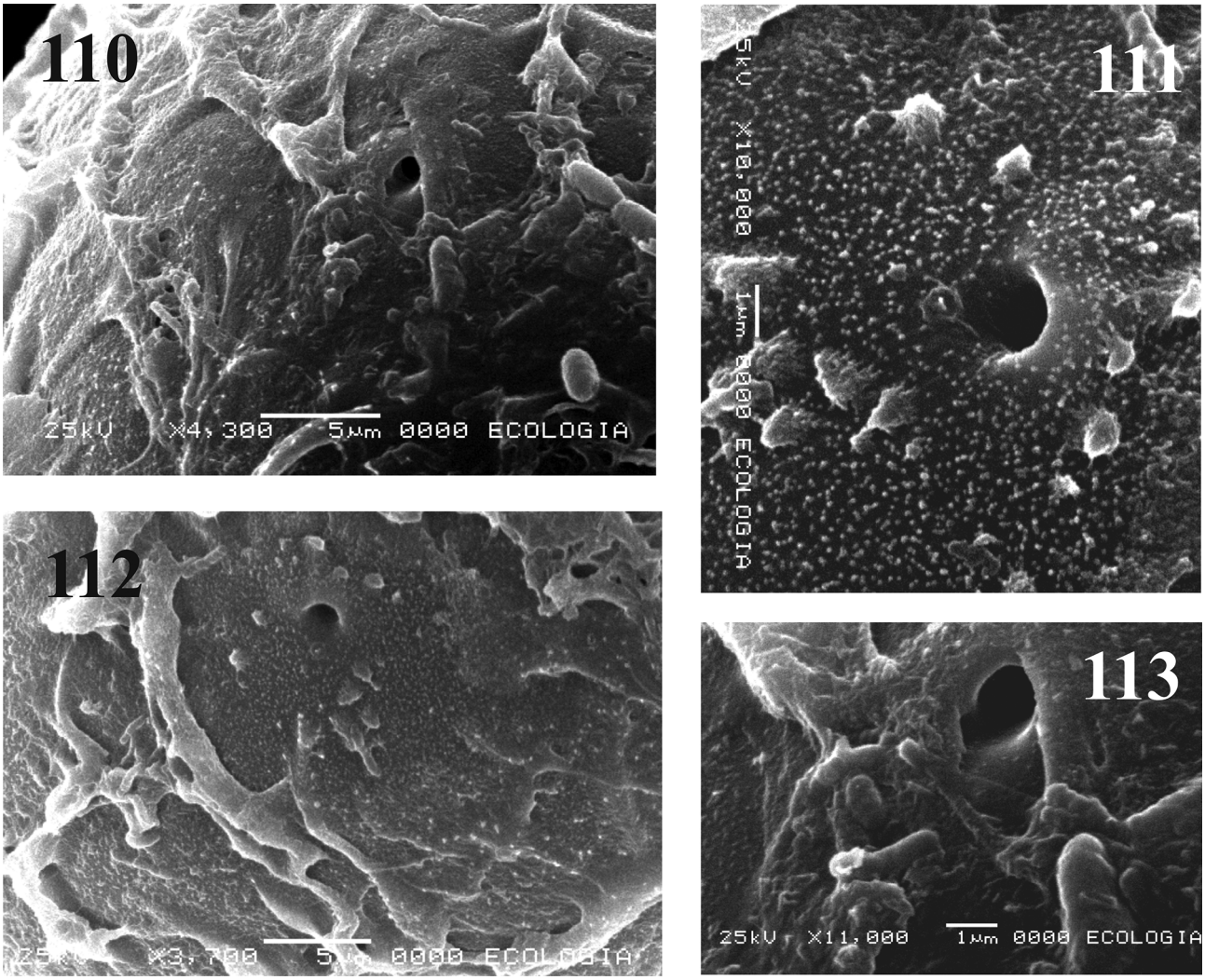

FIGURES 110–113. *Da. beltrani* egg micropyle.

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