



Immature stages of two species of *Evandromyia* (*Aldamyia*) and the systematic importance of larval mouthparts within Psychodidae (Diptera, Phlebotominae, Psychodinae)

FELIPE ARLEY COSTA PESSOA¹, MARLISSON AUGUSTO COSTA FEITOSA², ELOY GUILLERMO CASTELLÓN-BERMÚDEZ², CLAUDIA MARÍA RÍOS-VELÁSQUEZ¹ & RICHARD DOUGLAS WARD³

¹Biodiversidade em Saúde, Instituto Leônidas & Maria Deane - FIOCRUZ, Rua Terezina, 476, 69.057-070 Manaus – AM, Brazil.

E-mail: facpessoa@amazonia.fiocruz.br, crios@amazonia.fiocruz.br

²Coordenação de Pesquisas em Ciências da Saúde, Instituto Nacional de Pesquisas da Amazônia, Manaus, AM, Brazil.

E-mail: eloyc@inpa.gov.br

³School of Life Sciences, Centre of Applied Entomology and Parasitology Keele University, Staffordshire, UK.

E-mail: R.d.ward@bio.keele.ac.uk

Abstract

Phlebotomine sand flies (Diptera: Psychodidae) are vectors of *Leishmania*, *Bartonella* and several arboviruses. Sand fly taxonomy has been mainly based on adult morphological characters and few larval characters have been used. In this work the egg and all larval instars of *Evandromyia carmelinoi* (= *Lutzomyia carmelinoi* migonei group of authors) are described, as well as the fourth instar of *E. lenti*, two morphologically similar species. Scanning electron microscopy (SEM) and light microscopy were used to describe the species. The sand flies *E. carmelinoi* and *E. lenti* can be differentiated most readily by the antennae and the shoulder accessory b setae on the thoracic segments. Some information on the mouthpart morphology of Phlebotominae and Psychodinae that could be useful for future phylogenetic and systematic studies is also provided.

Key words: larva, chaetotaxy, larval ontogeny

Introduction

Phlebotomine sand flies (Diptera: Psychodidae) have medical and veterinary importance as the vectors of *Leishmania*, *Bartonella* and some arboviruses. As with many insect groups, the morphological characters used to distinguish sand fly species are those of the adults, the immature stages of most species being unknown and/or undescribed. The larval stages of less than 70 species of the 400 New World sand flies have been described, not always adequately (Young & Duncan 1994). In the past few decades, descriptions of larvae of many Neotropical species have been possible due to advances in rearing techniques. The larval description presented was based on chaetotaxy and some additional information on the antennal form (e.g. Barretto 1941; Hanson 1968; Ward 1976a; 1976b).

The use of scanning electron microscopy (SEM) improved the descriptions of New World larvae, allowing details of larval chaetotaxy (Leite & Williams 1996; 1997; Bahia *et al.* 2007); ontogeny (Secundino & Pimenta 2000); spiracles (Fausto *et al.* 1999; Pessoa *et al.* 2000); antennal, mouthpart sensillae and caudal setae (Pessoa *et al.* 2001). However descriptions of immature forms of sand flies are still limited to the references cited above. Larval characters have been used for phylogenetic approaches to the study of medically important insects, especially Culicidae (e.g. Judd 1996; Harbach & Kitching 1998) and Simuliidae (e.g. Cos-