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On the nymphs of lantana lace bug *Teleonemia scrupulosa* Stål (Hemiptera: Heteroptera: Tingidae: Tinginae): ontogenetic features of integumentary structures highlighted

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Abstract

The five instars of *Teleonemia scrupulosa* Stål are described. The postembryonic ontogenetic development of integumentary structures is emphasized, with a discussion on its potential use in cladistic studies within Tingidae.

Key words: Description, morphology, ontogeny, postembryonic development

Introduction

Teleonemia scrupulosa Stål, 1873, a very common lace bug endemic of Mexico, was introduced worldwide as a biological control agent against the Spanish flag *Lantana camara* (Drake & Ruhoff, 1965). This lace bug can be diagnosed by the size and shape of the antennae, pronotum, hemelytra, areolas, and the color pattern on the posterior half of the hemelytra. *Teleonemia* Costa, 1864 comprises a large number of species (84 according to the last world catalog—Drake & Ruhoff, 1965), and remains unrevised since 1864. Thus, it is not surprising to find misidentifications associated with this widespread tingid.

The importance of the information on the morphological, physiological, and behavioral aspects of immature stages is widely recognized. Lace bug nymphs have been studied for more than a century, including phylogenetic analyses (Lee, 1969; Guilbert, 2004b), ontogenetic aspects (Pupedis *et al.*, 1985; Guilbert, 2008), chemical compounds (Aldrich *et al.*, 1991; Mason *et al.*, 1991), morphology (e.g., Guilbert, 2004a; Montemayor & Dellapé, 2010), histology (Livingstone, 1978; Scholze, 1992), and life-history notes and biological parameters (Drake, 1922; Tallamy & Denno, 1982). Despite the diversity of studies on lace bug nymphs, they are little considered in Tingidae systematics (Guilbert, 2005). Very few works include all instars (e.g., May, 1977), and there are also few papers focusing immatures of Neotropical species (e.g., Montemayor, 2009).

The life-history and immature morphology of *T. scrupulosa* were discussed by five different authors (Simmonds, 1929; Fyfe, 1937; Khan, 1945; Roonwal, 1952; Habeck *et al.*, 2001); but morphological aspects have been superficially described and only a few illustrations are available. Since then, *T. scrupulosa* nymphs were mentioned twice—Guilbert (2004b, 2008) used fifth instar characters in phylogenetic analyses, but no formal descriptions were provided.

Nymphal descriptions of this widespread lace bug could aid further reliable taxonomic identifications and provide a larger sample for upcoming phylogenetic analyses in this family. Furthermore, the ontogenetic steps of the integumentary projections could be more explored as phylogenetic characters, since fifth instars have been used more often for this purpose (Guilbert, 2005, 2008). The aim of this paper is to provide a rather complete and illustrated description of all five instars of *T. scrupulosa*, adding comments on the ontogenetic emergence of their integumentary projections.