



***Sarcophaga (Hoa) flexuosa* Ho (Diptera: Sarcophagidae): association of sexes using morphological and molecular approaches, and a redefinition of *Hoa* Rohdendorf**

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Abstract

Sarcophaga flexuosa Ho, 1934 is the type species of the currently monotypic genus-group taxon *Hoa* Rohdendorf, 1937, which here is considered a subgenus of *Sarcophaga* Meigen, 1826. Using DNA sequences of mitochondrial genes (cytochrome oxidase I and cytochrome b), we positively identify, for the first time, the female of *S. (H.) flexuosa*. The female is described, the male is redescribed, and both sexes are illustrated using a combination of line drawings, photographs and scanning electron microscopy images. It is argued from the morphology of the male terminalia that *Sarcophaga flexuosa* is the sister taxon of *Sarcophaga basiseta* Baranov, 1931, and the subgenus *Hoa* is redefined to include both of these species.

Key words: Sarcophagidae, *Sarcophaga*, *Hoa*, COI, Cytb

Introduction

The species *Sarcophaga flexuosa* Ho, 1934 was described based on 45 male specimens with type locality Beijing, China. When Rohdendorf (1937) soon after published his monograph on the Palaearctic Sarcophaginae, he established the genus *Hoa* with *H. flexuosa* as the type and only included species. Since its original description, this species has appeared in the literature mainly through brief citations and catalogue entries, without any detailed study, and the female has remained unknown (Rohdendorf 1937, Koe 1975, Lopes *et al.* 1977, Fan 1992, Fan & Pape 1996, Pape 1996, Ye 1998, Ji *et al.* 2011). The taxon *Hoa* has been treated as a monotypic genus by several authors (e.g., Lopes *et al.* 1977, Fan 1992, Ye 1998), while Pape (1996) gave it rank as subgenus under his broad concept of *Sarcophaga* Meigen (*sensu lato*). Recognising females in the large genus *Sarcophaga* is very important, and is convenient not only for identifying species but for ecological studies (e.g., Bänziger & Pape 2004) as well as cladistic analyses (e.g., Giroux *et al.* 2010). Since the terminalia of adult males often exhibit the most reliable characters for identifying individual sarcophagids, and the male terminalia also provide important characters for phylogenetic reconstruction (Giroux *et al.* 2010), scanning electron microscopy (SEM) is utilized to achieve more precise morphological details of the male terminalia. The primary aims of this article are to: (i) describe the previously unknown female and redescribe the male of *S. (H.) flexuosa*; (ii) provide detailed documentation through photographs, SEM and illustrations of the adult morphology; (iii) provide the first molecular data (COI and Cytb gene sequences) for *S. (H.) flexuosa*; and finally (iv) provide the first explicitly cladistic hypothesis of the sister-taxon of *S. (H.) flexuosa*, thereby redefining the genus-group taxon *Hoa* Rohdendorf, 1937.

Material and methods

Collection, identification, illustration and morphological study. Specimens of *S. (H.) flexuosa* were collected by funnel trap kits and sweeping on the campus of Beijing Forestry University, Beijing, and Weifang City,