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,