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Abstract

A phylogenetic analysis of the Mycetophiliformia (= Sciaroidea) was performed to determine the relationships among its families and to place the following genera of uncertain position in the system: *Heterotricha*, *Ohakunea*, *Colonomyia*, *Freemanomyia*, *Rhynchoheterotricha*, *Chiletricha*, *Afrotricha*, *Anisotricha*, *Kenyatricha*, *Nepaletricha*, *Sciarosoma*, *Sciaropota*, *Insulatricha*, *Cabamofa*, *Rogambara*, and *Starkomyia*. *Eratomyia* **n. gen.** is described based on a new species from Ecuador. *Colonomyia brasiliana* **sp.n.** and *Colonomyia freemani* **sp.n.** are described respectively from southern Brazil and Chile. The male of *Cabamofa mira* Jaschhof is described for the first time. A total of 64 terminal taxa and 137 transformation series (with 202 characters) were included in the data matrix, with a number of new features from thoracic morphology. Willi Hennig's 1973 system for the higher Bibionomorpha was adopted using the name Mycetophiliformia for the Sciaroidea. The Mycetophiliformia are monophyletic. The family Cecidomyiidae appears as the sister group of the remaining Mycetophiliformia, followed by the Sciaridae. In the preferred topology, the Rangomaramidae appear as the group sister of a clade consisting of (Ditomyiidae + Bolitophilidae + Diadocidiidae + Keroplatidae) and of (Lygistorrhinidae + Mycetophilidae). The topology within the Rangomaramidae is (Chiletrichinae **subfam. n.** (Heterotrichinae **subfam. n.** ((Rangomaraminae + Ohakuneinae **subfam. n.**))). The Chiletrichinae include the genera *Kenyatricha*, *Rhynchoheterotricha*, *Insulatricha*, *Chiletricha*, and *Eratomyia* **n. gen.** Heterotrichinae and Rangomaraminae are monotypic. The subfamily Ohakuneinae includes *Ohakunea*, *Colonomyia*, *Cabamofa*, and *Rogambara*. The positions of *Freemanomyia*, *Loicia*, *Taxicnemis*, *Sciaropota*, *Starkomyia*, *Anisotricha*, *Nepaletricha*, and *Sciarosoma* are considered. *Afrotricha* might belong to the Sciaridae. The similarities used by many authors to gather the Sciaridae and Mycetophilidae in a clade are shown to be a combination of plesiomorphies and homoplasies.

Key words: Diptera, phylogeny, Bibionomorpha, Mycetophiliformia, Sciaroidea

Introduction

Amorim & Yeates (2006) revised the classification of the ealier groups of Diptera, formally eliminating the "Nematocera" and ranking its infraorders as suborders, among which are the Bibionomorpha. It is well accepted that most families of the Bibionomorpha together form a monophyletic group consisting of the Pachyneuridae, Bibionidae, Cecidomyiidae, Sciaridae, Rangomaramidae, Ditomyiidae, Bolitophilidae, Diadocidiidae, Keroplatidae, Lygistorrhinidae, and Mycetophilidae. The inclusion in this group of the Anisopodidae *s. l.*, however, has been more questionable. Some authors, such as Tuomikoski (1961), have proposed a separate clade, the Anisopodomorpha, for the family. Wood & Borkent (1989) interpreted some similarities in the mouthparts of the larvae to be shared, derived features with the Psychodidae and other families in the Psychodomorpha, whereas Woodley (1989) and Oosterbroek & Courtney (1995) accepted the family as the sister group of the Brachycera. The Scatopsoidea earlier were considered by Hennig (1973) to belong to the Bibionomorpha, and the Axymyiidae have been included in the group by most authors, but have been transferred to a separate taxon Axymyiomorpha. Whatever the included families, however, the monophyly of the group has never been clearly demonstrated. This paper addresses the relationships within a less inclusive sample of clades, usually referred to by Hennig (1954, 1973) as the Mycetophiliformia, or as the Sciaroidea by more recent authors (e.g., Wood & Borkent 1989, Chandler 2002, Hippa & Vilkamaa 2005, Jaschhof *et al.* 2005, Hippa & Vilkamaa 2006, Jaschhof 2006).

Unusual genera and relationships among the Mycetophiliformia

The phylogenetic relationships among families of the Mycetophiliformia have remained unsolved, despite the large recent effort after many decades of relatively minor interest on the subject. Not only is there conflict about the position of the Sciaridae and Cecidomyiidae in relation to other families of the group (Bolitophilidae, Ditomyiidae, Diadocidiidae, Keroplatidae, Lygistorrhinidae, Mycetophilidae, and Rangomaramidae),