



Mathias JASCHHOF and Raphael K. DIDHAM

**Rangomaramidae fam. nov. from New Zealand
and implications for the phylogeny of the Sciaroidea
(Diptera: Bibionomorpha)**

Abstract. Rangomaramidae, a new family of Diptera-Bibionomorpha, is described from New Zealand, containing a single new genus, *Rangomarama*, with five new species: *R. edwardsi*, *humboldti*, *leopoldinae*, *matilei*, and *tonnoiri*. Adult morphology of Rangomaramidae ('long-winged fungus gnats') is described and information given on their distribution and biology. Rangomaramidae is hypothesized to be the sister group to the Cecidomyiidae. The origin and evolution of Rangomaramidae are discussed in the context of previous hypotheses on the phylogenetic relationships within the Sciaroidea. Present data suggest that the few modern species of Rangomaramidae described here represent a relict of a lineage of sciaroid Diptera that evolved in Gondwana during the Jurassic period.

Key words. Diptera, Sciaroidea, phylogeny, Rangomaramidae, new family, *Rangomarama*, new genus, new species, New Zealand

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Rangomaramidae fam. nov. from New Zealand and implications for the phylogeny of the Sciaroidea (Diptera: Bibionomorpha)

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Introduction

Within Bibionomorpha (Diptera: 'Nematocera'), Sciaroidea is by far the most diversified clade, yet the phylogenetic relationships among the constituent taxa are still poorly understood. Sciaroidea is used here in the sense of WOOD & BORKENT (1989) and MATILE (1997) to include the gall midges (Cecidomyiidae), the true fungus gnats (Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplattidae, Lygistorrhinidae, and Mycetophilidae), and the black fungus gnats (Sciaridae). All of these families are widely accepted to be monophyletic (HENNIG 1954, 1973, TUOMIKOSKI 1966, MATILE 1990, 1997). However, clear family delimitation has proven elusive for a number of described genera in Sciaroidea. Among the extant sciaroids having uncertain positions within the family classification are those of the genera *Colonomyia* COLLESS, *Ohakunea* EDWARDS, *Pterogymnus* FREEMAN, and within the *Heterotricha* LOEW-group s. str. (CHANDLER in print). Some of these taxa are known from both fossil and extant species, and their enigmatic relationships to other sciaroids are the main reason for the ongoing debate on the higher-level systematics within the Sciaroidea. One of the difficulties in classifying these flies is their rarity, both in their natural environment and as specimens in museum collections, resulting in considerable lack of information on larval morphology and biology, as well as a shortage of adult specimens available for more detailed comparative analyses. The most widely accepted phylogenetic hypothesis for the evolution of the Sciaroidea (MATILE 1990, 1997) is based on both larval and adult morphological characters, with additional arguments derived from larval biology.

In this paper, we describe five new species of sciaroid Diptera from New Zealand, belonging to a new and phylogenetically interesting family of Sciaroidea that we have named Rangomaramidae. The new findings appear to be extraordinary for several reasons. First, adult morphology in the five new species is so different from that found in other sciaroids, that it is impossible to place them in any of the existing families. Second, the flies in question are not at all rare within their wide natural range. The fact that they have been overlooked up to this point is a clear indication that New Zealand's sciaroid fauna is far from exhaustively studied (see TONNOIR & EDWARDS 1927). Third, as discussed below, the new taxa may shed more light on the relationship between fungus gnats and gall midges and on the unresolved question of the sister group of the Cecidomyiidae.

Nowadays the recognition of a new family taxon among the insects must be considered an exceptional event (EARLY et al. 2001), all the more so if based on the discovery of a true relict group that may be a pivotal link in the evolutionary diversification of its clade. Within the Diptera, the most recently described family is the Axiniidae, an Australasian family of small muscoid flies presumed to parasitize other land arthropods or gastropods (COLLESS 1994). We reiterate COLLESS' (1994: 471) caution that the erection of a new family is not to be undertaken lightly, but in the case of Rangomaramidae we see no plausible alternative. Our findings clearly show that the sciaroid faunas of the southern hemisphere, in particular, offer valuable new data to revitalise the phylogenetic discussion. Given that many primitive Sciaroidea have been found in southern temperate regions, including New Zealand, there is a strong need to build a broader capacity for sciaroid research in this part of the world.