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## Systematics and Phylogeny of *Leptomorphus* Curtis (Diptera: Mycetophilidae)

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## Abstract

The world fauna of the genus *Leptomorphus* Curtis, 1831 is revised and a phylogeny of species relationships, based on morphological characters, is presented. An updated genus diagnosis and description are given. Species descriptions, diagnoses, illustrations of general habitus, wings, male genitalia and distributions are provided for 37 valid species, along with a key to adults.

Twelve new species are described; *L. amorimi* Borkent, **n. sp.**, *L. brandiae* Borkent, **n. sp.**, *L. crassipilus* Borkent, **n. sp.**, *L. eberhardi* Borkent, **n. sp.**, and *L. waodani* Borkent, **n. sp.**, from the Neotropical realm, *L. furcatus* Borkent, **n. sp.**, and *L. perplexus* Borkent, **n. sp.**, from the Nearctic realm, *L. mandelai* Borkent, **n. sp.**, and *L. stigmatus* Borkent, **n. sp.**, from the Afrotropical realm, and *L. tabatius* Borkent, **n. sp.**, *L. tagbanua* Borkent, **n. sp.**, and *L. titiwangsensis* Borkent, **n. sp.**, from the Oriental realm. Type specimens were studied for all but three species (*L. ornatus*, *L. subforcipatus* and *L. talyshensis*). *Leptomorphus elegans* Matile and *L. lepidus* Matile are considered junior synonyms of *L. gracilis* Matile, **n. syns.**, and *L. ypsilon* Johannsen is a junior synonym of *L. hyalinus* Coquillett, **n. syn.** Lectotypes are designated for *L. magnificus* (Johannsen), *L. neivai* Edwards, and *L. walkeri* Curtis and a neotype is selected for *L. bifasciatus* (Say). This study brings the total number of extant *Leptomorphus* species to 45, including eight, unique (based on figures and descriptions), recently described Oriental and northwestern Australasian species (Papp & Ševčík 2011), for which material was unavailable for this study. The phylogenetic analysis in this study supports the monophyly of *Leptomorphus*. The western Nearctic species, *L. perplexus*, is the sister group to the remaining species, which fell into four major monophyletic species groups (*L. ornatus* Brunetti group, *L. grjebinei* Matile group, *L. walkeri* group, *L. furcatus* group). The monophyletic relationships within each group are also discussed. The clades found in this study do not support the arrangement of species in to the *Leptomorphus* subgenera recognized by previous classifications.

**Keywords:** Taxonomy, Sciophilinae, Sciophilini, new species, morphology, Fungus gnats, distribution, genus revision

## Introduction

The genus *Leptomorphus* Curtis, 1831 (Diptera: Mycetophilidae) is found worldwide, with the exception of Antarctica, and previous to this study, contained 36 extant and three fossil species. The extant species are distributed as follows: ten species are known in the Afrotropical (Matile 1977, 1997), seven in the Palearctic (Matile 1988, Zaitzev & Ševčík 2002), eight in the Oriental (Colless & Liepa 1973, Papp & Ševčík 2011), two in the northwestern Australasian (Papp & Ševčík 2011), three in the Neotropical (Papavero 1978), and six in the Nearctic (Laffoon 1965).

Members of *Leptomorphus* are some of the largest and most robust mycetophilids, ranging in body length from 6–14mm. They also exhibit a range of colour from yellow and orange-red to dark brown or black with bright blue iridescence. They can be easily separated from other Mycetophilidae based on a number of characters (see generic diagnosis below).

## Taxonomic history

*Leptomorphus* was described by Curtis (1831) for a single species (*L. walkeri* Curtis) from the United Kingdom. Shortly thereafter, Walker (1848) erected the genus *Diomonus* for a single new species (*D. nebulosus* Walker) from North America and noted that the wings of *Diomonus* were identical to *Leptomorphus* except that  $R_4$  was present. Over the following 77 years nine species were validly assigned to, or transferred into, these two genera (see below). Though there was some further discussion of the similarity between these genera (Johannsen 1910) they remained separate, and were even placed in different subfamilies of Mycetophilidae by Johannsen (1910, 1912). Two species originally described in *Leptomorphus* during this time were subsequently moved to other genera; *L. parvula* Coquillett (1901: 597) was moved to *Allocotocera* Mik, and *L. elongatus* Walker (1848: 87) was synonymized with *Neuratelia nemoralis* (Meigen).

Edwards (1925) synonymized the two genera because he felt that there was no difference between them, other than the presence of  $R_4$  in *Diomonus*. At the same time, Edwards (1925) placed *Leptomorphus* in the tribe Sciophilini where it has remained since (although some authors have ranked this tribe as the subfamily Sciophilinae s.s. (e.g. Tuomikoski 1966, Väisänen 1984, Chandler 2009)). Most authors have followed this synonymization; however, Matile (1977) gave *Diomonus* subgeneric status and questioned the validity of the synonymization.