



Ophiocordyceps xuefengensis sp. nov. from larvae of *Phassus nodus* (Hepialidae) in Hunan Province, southern China

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Abstract

An entomogenous taxon, associated with larvae of *Phassus nodus* (Hepialidae) collected from Xuefeng Mountains, Hunan Province, China, was found to be a new species, *Ophiocordyceps xuefengensis* sp. nov. It differs from similar species in having long stromata, without a sterile apex, narrow asci, long ascospores and by its occurrence on *Phassus nodus* in living root or trunk of *Clerodendrum cyrtophyllum*. Combined sequence data from the 5.8S-ITS rDNA, nrSSU, EF-1 α , and RPB1 gene loci also confirmed the distinctiveness of this new species. It is presently the world's largest known *Cordyceps sensu lato* species.

Key words: entomogenous fungi, new species, phylogenetic analyses, traditional Chinese medicine

Introduction

The genus *Cordyceps* Fr. (*Clavicipitaceae*, *Hypocreales*, *Ascomycota*) has been recently divided and placed into three families and four genera—*Metacordyceps* (*Clavicipitaceae*), *Elaphocordyceps* (*Ophiocordycipitaceae*), *Ophiocordyceps* (*Ophiocordycipitaceae*) and *Cordyceps* (*Cordycipitaceae*) (Sung *et al.* 2007a). Most species in *Cordyceps sensu lato* are pathogenic on insects and spiders, although a few grow on *Elaphomyces* spp. (soil fungi). Many *Cordyceps* species are used in traditional Chinese medicines in China, Japan, Korea and other eastern Asian countries (Wen *et al.* 2012).

Cordyceps sensu lato is one of the most important genera of invertebrate pathogens (Hywel-Jones 2001) with more than 530 species (www. Indexfungorum.org, December 25, 2012). Although many *Cordyceps* species have been transferred to *Ophiocordyceps*, many species have yet to be restudied. Kirk *et al.* (2008) suggested that there are 140 *Ophiocordyceps* species, and 153 species were listed by Sung *et al.* (2007a). There are more than 175 epithets assigned to *Ophiocordyceps* in Index Fungorum (www. Indexfungorum.org, December 25, 2012), however, some of them have been synonymised with other genera. Most species of *Cordyceps sensu lato* have been identified from insects on leaves or in soil, 50 species are known to parasitize insects in dead wood, while a few species are known from insects in living tree trunks (Kobayasi & Shimizu 1983, Samson *et al.* 1985).

In this study, a new *Ophiocordyceps* species was found parasitizing *Phassus nodus* Chu & Wang collected from the living root or trunk of the medicinal plant *Clerodendrum cyrtophyllum* Turcz. in the Xuefeng Mountains of Hunan Province in south China. This species is morphologically distinct from all other *Cordyceps sensu lato* species and combined multi-gene analysis also shows it to differ. The new species, *Ophiocordyceps xuefengensis*,