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

TING-CHI WEN¹, RU-CAI ZHU²*, JI-CHUAN KANG¹*, MING-HE HUANG¹, DIAN-BO TAN², HIRAN ARITYAWANSHA⁴, KEVIN D. HYDE⁴ & HAO LIU²

¹The Engineering and Research Center for Southwest Bio-Pharmaceutical Resources of National Education Ministry of China, Guizhou University, Guiyang 550025, Guizhou Province, P.R. China
* email: bceec.jckang@gzu.edu.cn
²Institute of Chinese Materia Medica, Hunan Academy of Chinese Medicine, Changsha, Hunan Province, P.R. China
* email: zrcsun@126.com
³Science and Technology Alumni Association in Dongkou County, Hunan Province, P.R. China
⁴Institute of Excellence in Fungal Research, and School of Science, Mae Fah Luang University, Chiang Rai 57100, Thailand

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-1α, 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,