Dissertation Title	Taxonomy and Phylogeny of Ophiocordycipitaceae and a Noval Family Polycephalomycipitaceae
Author	Yuanpin Xiao
Degree	Doctor of Philosophy (Biosciences)
Advisor	Asst. Prof. Siraprapa Mahanil, Ph. D.
Co-Advisor	Assoc. Prof. Kevin David Hyde, Ph. D.

ABSTRACT

A novel family, Polycephalomycetaceae, is segregated from Ophiocordycipitaceae to accommodate three genera, *Polycephalomyces*, *Perennicordyceps*, and *Pleurocordyceps*, based on morphologic and phylogenetic analyses. Most species in this family have a vast range of hosts since they parasitize insects and hyperparasite fungi. The sexual morph of Polycephalomycetaceae is characterized as producing stromatic ascomata, long stipe, thick peridium, and cylindrical secondary spores. Meanwhile, its asexual morph is described as having a colony on the host surface or synnemata with stipes on the host, one or two types of phialides, and cylindrical to fusiform conidia. Moreover, these three genera have formed an independent clade, distinct from the other genera of Ophiocordycipitaceae, while also having a close relationship with Clavicipitaceae.

Polycephalomyces is indicated as the type genus as it is the oldest genus name in the family. All the species of the novel family are in the table listed with the main morphological characters. Six novel species including *Polycephalomyces albiramus*, *Pleurocordyceps parvicapitata*, *Pleurocordyceps lanceolatus*, *Pleurocordyceps nutantis*, *Pleurocordyceps aurantiacus* and *Pleurocordyceps marginaliradians* are introduced in this study based on morphologic and phylogenetic analyses. One new combination *Perennicordyceps elaphomyceticola* and four new hosts are recorded in this study.

Ophiocordycipitaceae is a family in the Hypocreales order and comprises eight genera, *Drechmeria*, *Harposporium*, *Hirsutella*, *Hymenostilbe*, *Ophiocordyceps*, *Paraisaria*, *Purpureocillium*, and *Tolypocladium*, with numerous entomopathogenic and mycoparasitic fungi. However, the relationship of the genera in Ophiocordycipitaceae has not been investigated since the latter was established. The classification of Ophiocordycipitaceae genera or species has been problematic and challenging due to their complex morphologic details and insufficient molecular data. Thus, in this study the taxonomic and phylogenetic relationships of the genera were revised based on morphologic and multi-gene phylogenetic analysis. Type and new species illustrations are provided.

35 novel species are introduced in this study based on morphology and phylogenetic analyses: *Polycephalomyces albiramus*, *Pleurocordyceps parvicapitata*, *Pleurocordyceps lanceolatus*, *Pleurocordyceps nutantis*, *Pleurocordyceps aurantiacus*, *Pleurocordyceps marginaliradians*, *Ophiocordyceps oecophyllae*, *Ophiocordyceps neoacicularis*, *Ophiocordyceps unicistroma*, *Ophiocordyceps divitis*, *Ophiocordyceps biculcitulistipita*, *Ophiocordyceps thanathonensis*, *Ophiocordyceps yuntaiensis*, *Ophiocordyceps neocylindrocpora*, *Ophiocordyceps pseudoformicarum*, *Ophiocordyceps mandariniae*, *Ophiocordyceps fusiformispora*, *Ophiocordyceps vespae*, *Ophiocordyceps pseudoelongata*, *Ophiocordyceps longisynnema*, *Ophiocordyceps karstii*, *Ophiocordyceps cossidarum*, *Ophiocordyceps sporangifera*, *Ophiocordyceps issidarum*, *Ophiocordyceps globiceps*, *Ophiocordyceps cylindrospora*, *Ophiocordyceps multibrachiata*, *Ophiocordyceps neoacicularis*, *Paraisaria tettigonia*, *Purpureocillium albosynnematum*, *Purpureocillium clavatsis*, *Tolypocladium cucullae*, *Tolypocladium neoophioglossoides*, *Tolypocladium cautis*, *Tolypocladium rutilum*, *Tolypocladium graciliscucullae* and *Tolypocladium roburstipitatum*. 27 reference specimens with each type species of genera are indicated with morphological descriptions and molecular data. Moreover, this study provides a nearly exhaustive list of the species in Ophiocordycipitaceae. A phylogenetic tree using a combined matrix of six genetic markers (ITS, nrSSU, nrLSU, tef-1α, rpb1 and rpb2) was

constructed explore the intergeneric relationships among these species and these are discussed.

Keywords: Ophiocordycipitaceae, Polycephalomycetaceae, Checklist, Phylogeny, Taxonomy, Genera, Species