



## *Cibaomyces*, a new genus of Physalacriaceae from East Asia

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### Abstract

A new genus in Physalacriaceae, *Cibaomyces*, typified by *C. glutinis*, is described using morphological and molecular evidence. *Cibaomyces* is morphologically characterized by the combination of the following characters: basidioma small to medium-sized, collybioid to tricholomatoid; pileus viscid; hymenophore sinuate to subdecurrent, relatively distant, with brown lamellar edge; stipe sticky and densely covered with felted squamules; basidiospores thin-walled, ornamented with finger-like projections; cystidia nearly cylindrical, thin-walled, often heavily incrustated. Molecular phylogenetic analyses using DNA nucleotide sequences of the internal transcribed spacer region and the large subunit nuclear ribosomal RNA loci indicated that *Cibaomyces* was related to *Gloiocephala*, *Laccariopsis* and *Rhizomarasmius*. A description, line drawings, phylogenetic placement and comparison with allied taxa are presented.

**Key words:** Basidiomycetes·distribution·new taxa·taxonomy

### Introduction

During our study of the fungi in the Physalacriaceae in East Asia (Wang *et al.* 2008; Yang *et al.* 2009; Qin *et al.* 2014; Tang *et al.* 2014), we have found collections with echinate basidiospores, which are very similar to the species of *Oudemansiella* sect. *Dactylosporina* (Cléménçon 1979: 77) Pegler & T.W.K. Young (1987: 598) (Yang *et al.* 2009; Qin *et al.* 2014), a group of fungi mostly distributed in South and Central America and often treated as a separate genus, namely, *Dactylosporina* (Cléménçon) Dörfelt (1985: 236) (Petersen & Hughes 2010), or as a subgenus of *Oudemansiella* (Cléménçon 1979). Although the European *Mycenella kuehneri* Romagnesi (1941: 63) [= *Oudemansiella kuehneri* (Romagn.) Singer (1962: 59)] was also treated as in the genus *Dactylosporina* by Petersen & Hughes (2010), the molecular phylogenetic evidence for the inclusion of the European or additional Northern Hemispheric species is still unavailable.

In this study, we used morphological data together with DNA nucleotide sequence analysis of the internal transcribed spacer (ITS) region and the large subunit nuclear ribosomal RNA (nrLSU) to assess the phylogenetic position of the East Asian collections with echinate basidiospores, because both morphological and molecular evidence is important for the understanding of the evolutionary relationship of agarics (Moncalvo *et al.* 2002; Binder *et al.* 2006; Matheny *et al.* 2007; Yang 2011). Our analysis indicated that the samples are not close to the species of section *Dactylosporina*. Rather, they represent a discrete lineage, closely related to the genera *Gloiocephala* Masee (1892: 33), *Laccariopsis* Vizzini (2012: 396) and *Rhizomarasmius* R.H. Petersen (2000: 333). Our results are reported herein.

### Materials and methods

#### Sampling

Materials were collected by the authors from both China and Japan during 2011–2013 in forests dominated by

shape of cheilocystidia, the absence of pleurocystidia, and basidiospores with loosely arranged spines (Pegler & Young 1987; Singer 1964, 1986; Petersen & Hughes 2010; Wartchow *et al.* 2010). In addition, the pileus and stipe of *Cibaomyces* are usually sticky with brown to dark brown substances exuded from the upper part of the cystidia. The caulocystidia of *Oudemansiella* sect. *Dactylosporina* are usually arranged in fascicles, while those of *Cibaomyces* are evenly distributed on the surface of the stipe. Furthermore, our molecular analysis indicated that *Cibaomyces* has no close evolutionary relationship with *Oudemansiella* sect. *Dactylosporina* (Fig. 1; Table 2). Geographically, the known distribution range of sect. *Dactylosporina* is restricted to Central and South America (Singer 1964, 1986; Pegler & Young 1987; Halling & Mueller 1999; Wartchow *et al.* 2010). Although Petersen and Hughes (2010) included a European taxon, *Mycenella kuehneri*, in *Dactylosporina*, its systematic position was not elucidated by molecular-phylogenetic data.

The large echinate basidiospores of *Mycenella kuehneri* are comparable to those of *Cibaomyces*. However, it differs phenotypically from *Cibaomyces glutinis* by the very small mycenoid basidioma with a dry pileus 1.2–1.4 cm in diameter, the clavate, fusiform to lageniform hymenial cystidia without any incrustations, and basidiospores with more numerous and more densely arranged spines (Boekhout & Bas 1986; Pegler & Young 1987; Petersen & Hughes 2010). Whether *Mycenella kuehneri* belongs to *Cibaomyces* is an open question.

In the Physalacriaceae, the basidiospores of the genus *Rhodotus* Maire are also similar to those of *Oudemansiella* sect. *Dactylosporina* (Petersen & Hughes 2010; Tang *et al.* 2014). However, *Rhodotus* has, among other features, basidioma growing on exposed rotten wood and producing chlamydospores and distinctly smaller basidiospores measuring 5–7 × 4.5–6.5 µm with obtuse warts 0.5–1.5 µm in height and 0.5–1 µm in width (Horak 1968; Pegler & Young 1975; Krieglsteiner 1979; Kühner & Romagnesi 1984; Noordeloos 1995; Sundberg *et al.* 1997; Tang *et al.* 2014). Molecular phylogenetic analysis indicated that *Rhodotus* is distinct from *Cibaomyces*, and clustered in different major groups (Fig. 1; Petersen & Hughes 2010).

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