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Molecular phylogeny and taxonomy of *Fibroporia* (Basidiomycota) in China

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Abstract

Taxonomic and phylogenetic studies on the Chinese species of *Fibroporia* were carried out. *Fibroporia albicans* sp. nov. is described and illustrated on the basis of collections originating from Jiangxi and Xizang provinces, based on morphology and phylogenetic analysis of ITS rDNA sequences. Morphologically, it is characterized by resupinate, annual basidiocarps, white to cream-colored pore surface when fresh, becoming cream to cream-buff upon drying, small pores (6–8 per mm), presence of white to cream rhizomorphs, a dimitic hyphal system with clamped generative hyphae, fusoid cystidioles, and oblong to ellipsoid basidiospores; moreover, it causes a brown rot. Molecular data suggested a close relationship between *Fibroporia albicans* and *F. citrina*. Six species of *Fibroporia* form a monophyletic entity with 100% MP and 1.00 BPP supports. An identification key to the Chinese species of *Fibroporia* is provided.

Key words: brown-rot fungi; Fomitopsidaceae; ITS; polypore; taxonomy

Introduction

Fibroporia was described by Parmasto (1968) with *Polyporus vaillantii* DC. as the generic type, to accommodate species with fimbriate to rhizomorphic margin and ellipsoid and slightly thick-walled basidiospores, and proposed the following combinations: *Fibroporia vaillantii* (DC.) Parmasto, *F. gossypium* (Speg.) Parmasto, *F. destructor* (Fr.) Parmasto, *F. radiculosa* (Peck) Parmasto, and *F. overholtsii* (Pilát.) Parmasto. However, Ryvarden (1991) regarded the rhizomorphs as an adaptive character which is not enough to justify a generic separation, and treated *Fibroporia* as a synonym of *Antrodia*.

Antrodia P. Karst. (Karsten 1879) in a wide sense is a large, cosmopolitan genus with more than 45 species reported worldwide (Kirk *et al.* 2008), of which 22 have been recorded from China (Dai & Niemelä 2002; Dai & Penttilä 2006; Dai 2012; Cui 2013). Morphologically, *Antrodia* sensu lato is characterized by an annual to perennial growth habit, resupinate, effused-reflexed to pileate basidiocarps, a dimitic hyphal system with clamped generative hyphae, hyaline, thin-walled, and usually cylindrical to oblong-ellipsoid basidiospores which are negative in Melzer's reagent. In addition, they cause a brown rot (Ryvarden 1991; Ryvarden & Gilbertson 1993; Bernicchia & Ryvarden 2001; Núñez & Ryvarden 2001; Kim *et al.* 2003).

Phylogenetic analysis shows that *Antrodia* is polyphyletic, and closely related to other brown rot genera, such as *Fomitopsis* P. Karst., *Daedalea* Pers., and *Oligoporus* Bref. (Kim *et al.* 2003; Yu *et al.* 2010; Rajchenberg *et al.* 2011; Bernicchia *et al.* 2012; Cui 2013; Spirin *et al.* 2013). Taxa in *Antrodia* sensu lato have been distributed in three different genera: *Antrodia* sensu stricto, *Fibroporia* Parmasto and *Amyloporia* Bondartsev & Singer (Rajchenberg *et al.* 2011). Recent molecular studies support the separation of *Fibroporia* as a distinct genus from *Antrodia* (Kim *et al.* 2003; Rajchenberg *et al.* 2011; Bernicchia *et al.* 2012; Cui 2013; Ortiz-Santana *et al.* 2013; Spirin *et al.* 2013). In addition, *Fibroporia* is distinguished from *Antrodia* by the generative hyphae that do not possess irregularly thickened walls, distinct to slightly thick-walled basidiospores, and tetrapolar sexuality (usually homothallic or heterothallic bipolar in *Antrodia*) (Rajchenberg 2006; Bernicchia *et al.* 2012).

Taxonomy and phylogeny of brown-rot fungi in China have been carried out recently, and some new species have been described (Cui & Dai 2013; Li *et al.* 2013; Song *et al.* 2014). As a continuation of these surveys, an undescribed species of *Fibroporia* was identified based on morphological characters and ITS rDNA sequences.

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narrower basidiospores (4.5–6 × 2.5 µm, Ryvarden & Gilbertson 1993). Moreover, these two species are distinct from *F. albicans* according to the ITS-based phylogenetic data (Fig. 1).

Fibroporia bohemica Bernicchia, Vampola & Prodi was recently described from Bohemia in the western part of Czech Republic (Bernicchia *et al.* 2012). It has cream rhizomorphs, similar to those in *F. albicans*, but is easily separated by sulphur-yellow pore surface, larger pores (2–4 per mm), and narrower basidiospores (5–5.5 × 2.8–3 µm, Bernicchia *et al.* 2012). *Fibroporia radiculosa* is described from the United States, it can be easily separated from *F. albicans* in having distinct orange-yellow pore surface and rhizomorphs, larger pores (1–4 per mm) and larger basidiospores (6–8 × 3–4 µm, Gilbertson & Ryvarden 1986).

Key to known species of *Fibroporia* from China

1. Rhizomorphs bright yellow 2
1. Rhizomorphs white to cream 3
2. Pores 1–2 per mm ..... *F. radiculosa*
2. Pores 3–5 per mm ..... *F. citrina*
3. Generative hyphae dominant in trama ..... *F. gossypium*
3. Skeletal hyphae dominant in trama 4
4. Basidiospores 5–7 × 3–4 µm ..... *F. vaillantii*
4. Basidiospores 4–5.2 × 3–3.8 µm ..... *F. albicans*

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