



Phylogeny and diversity of the morphologically similar polypore genera *Rigidoporus*, *Physisporinus*, *Oxyporus*, and *Leucophellinus*

Fang Wu^a, Jia-Jia Chen^b, Xiao-Hong Ji^a, Josef Vlasák^c, and Yu-Cheng Dai^a

^aBeijing Advanced Innovation Center for Tree Breeding by Molecular Design, Beijing Forestry University, Beijing 100083, China; ^bCollege of Plant Protection, Nanjing Agricultural University, Nanjing, Jiangsu 210095, China; ^cBiology Center of the Academy of Sciences of the Czech Republic, Branišovská 31, CZ-370 05 České Budějovice, Czech Republic

ABSTRACT

Rigidoporus and its morphologically similar genera *Physisporinus*, *Oxyporus*, and *Leucophellinus*, which include some forest pathogens and medicinal species, are very important groups of wood-decaying fungi. Species of these genera have not only ecological functions, but also economic importance. Phylogenetic and taxonomic studies on taxa in these genera were carried out. Inferred from phylogenies based on DNA sequences of the nuc rDNA ITS1-5.8S-ITS2 (internal transcribed spacer [ITS]) and D1–D2 domains of nuc 28S rDNA, 36 species sampled that traditionally belong to *Physisporinus*, *Rigidoporus*, *Leucophellinus*, and *Oxyporus* are nested mostly in eight lineages. Of these lineages, five (including four genera of *Physisporinus*, *Emmia*, *Flaviporus*, and *Flavodon* and one taxon “*R. hypobrunneus*”) belong to Polyporales and three (including the genera *Rigidoporus*, *Bridgeoporus*, and *Leucophellinus*) belong to Hymenochaetales. *Rigidoporus* and *Oxyporus* are merged because the type species of both genera are nested in a single lineage within Hymenochaetales. Some taxon previously placed in *Ceriporia* and *Oxyporus* are transferred to *Emmia* and *Flavodon*, respectively, on the basis of current phylogeny. Utilizing a combination of the morphological and phylogenetic evidence, 16 new combinations in *Bridgeoporus*, *Emmia*, *Flaviporus*, *Flavodon*, *Rigidoporus*, and *Physisporinus* are proposed. Five new species, *Physisporinus crataegi*, *P. lavendulus*, *P. subcrocatus*, *P. tibeticus*, and *Rigidoporus submicroporus*, are recognized from China. Illustrated descriptions of these novel species are provided. Three taxa are treated at the generic level of *Physisporinus* because of limited samples.

ARTICLE HISTORY

Received 30 December 2016
Accepted 11 November 2017

KEYWORDS

Hymenochaetales;
phylogenetic analysis;
Polyporales

INTRODUCTION

Polypores in the genera *Rigidoporus* Murrill, *Physisporinus* P. Karst., *Oxyporus* (Bourdot & Galzin) Donk, and *Leucophellinus* Bondartsev & Singer are one of the most important groups of wood-decaying fungi, growing on substrates from living trees to rotten wood and playing a critical role in the forest ecosystem (Gilbertson and Ryvarden 1987; Dai 2012; Ryvarden and Melo 2014). In addition, some species in these genera have economic importance, as some species, e.g., *Rigidoporus populinus* (Schumacher) Pouzar, *Oxyporus sinensis* X.L. Zeng, and *R. microporus* (Sw.) Overeem, are forest pathogens on angiosperm trees (Sinclair et al. 1987; Dai et al. 2007; Rajchenberg and Robledo 2013). Other species, e.g., *O. corticola* (Fr.) Ryvarden and *R. ulmarius* (Sow.) Imazeki, have medicinal properties (Boulet 2003; Dai et al. 2009). Moreover, *R. ulmarius*, which produces basidiocarps up to 1.5 m in diam, and *Bridgeoporus nobilissimus* (W.B. Cooke)

Volk et al. (= *O. nobilissimus* W.B. Cooke), which has a basidiocarp up to 136 kg, are the largest basidiomycetes in Europe and North America, respectively (Gilbertson and Ryvarden 1987; Ryvarden and Melo 2014).

Rigidoporus, *Physisporinus*, *Oxyporus*, and *Leucophellinus* share similar morphological characters, including a monomitic hyphal structure, cyanophilous generative hyphae with simple septa, mostly broadly ellipsoid to globose basidiospores, and causing a white rot. These characters have resulted in a complex of species in which generic limits are difficult to define. Traditionally, *Oxyporus* is characterized by white to cream-colored and consistently corky basidiocarps, and usually the presence of hymenial cystidia. *Rigidoporus* has ochraceous to brownish and hard corky basidiocarps, and the presence of hyphoid cystidia. *Physisporinus* comprises seasonal and thin basidiocarps, which are soft or juicy when fresh but change to red or finally even to black and fragile when dry, and a lack of cystidia (Gilbertson and Ryvarden 1987; Dai 1998; Niemelä 2005;

CONTACT Yu-Cheng Dai  yuchengd@yahoo.com

Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/umyc.

 Supplemental data for this article can be accessed on the [publisher's Web site](#).

© 2018 The Mycological Society of America