



Phylogenetic and morphological circumscription of the *Orbilbia aurantiorubra* group

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Abstract

The phylogeny of *Orbilbia aurantiorubra* and related species is inferred from ITS sequence data. *Orbilbia aurantiorubra* is redefined according to vital taxonomy. Integrated analyses of molecular and morphological data, and ecological (e.g. substrate) and geographical origin suggest the existence of three new species, which are described in this paper: *Orbilbia xanthoguttulata* from Europe, *O. succulenticola* from the Canary Islands, and *O. jugulospora* from Ethiopia (Africa) and Taiwan (Southeast Asia).

Key words: Biodiversity, Europe, Canary Islands, Orbiliomycetes, taxonomy

Introduction

The genus *Orbilbia* Fr. (*Orbiliaceae* Nannf.) was traditionally placed in the order *Helotiales* Nannf., and considered as a low diversity group (Spooner 1987). The advantages of using living cells (Baral 1992) for the taxonomic study of the *Orbiliaceae* have dramatically improved the knowledge of this family in the last two decades. Indeed, the family *Orbiliaceae* has undergone many changes since Baral & Marson (2001) introduced the genus *Hyalorbilia*, based on a small group of species previously included in *Orbilbia*. Thus, in 2001 the *Orbiliaceae* comprised two genera and ~35 spp. (Kirk *et al.* 2001). In 2003 the family was segregated from the *Leotiomycetes* to constitute an order and class of its own, the *Orbiliales* and *Orbiliomycetes* (Eriksson *et al.* 2003). Further molecular studies found that this class formed an early diverging major clade within *Pezizomycotina* (Spatafora *et al.* 2006).

Thus far, *Orbilbia* is represented by ca. 58 species worldwide, principally wood-saprobic fungi, particularly common in temperate regions (Kirk *et al.* 2008, Cannon & Kirk 2007). However, the forthcoming world monograph of Orbiliomycetes (Baral *et al.* in prep.) will recognize about 400 species within this genus, most of which are adapted to semihumid to arid, subtropical to tropical environments. Despite this considerable increase in species number, there is still a substantial lack of knowledge concerning host or habitat preferences and biogeography for many of the recognized species. Not surprisingly, this current lack of elementary data has impeded the assessment of many important aspects bearing on the evolutionary biology and systematic of this group.

Orbilbia aurantiorubra Boud. is easily recognizable by its bright orange-red apothecia, and geniculate based helicoid spores containing narrowly tear-shaped spore bodies. It is briefly described by Boudier (1907) and appears in his *Icones mycologicae* (Boudier 1904–10). This species tolerates desiccation, and occurs throughout the year on different substrates in temperate, continental to Atlantic areas of Europe and West Africa (rarely in Mediterranean areas), between 0–1650 m (Baral *et al.* ined.). Specimens related to *O. aurantiorubra* have ascospores variation between (7.5–)8–14.5(–16) × 1.1–1.8 μm and spore bodies between (1.8–)2.5–4.5(–5.5) × (0.5–)0.7–1.1(–1.3) μm. Some variation in spore dimensions correlated with host or geographical origins in *O. aurantiorubra* were noticed (Karasch *et al.* 2005, Priou 2005, Spooner 2001). Species considered as widespread fungi, usually showed a restricted distribution after taxonomical review (Stadler *et al.* 2004; Baral 1984). The correlation between ascospore size and host has been evidence for species differentiation (Petrini *et al.* 1987). Generally, morphological variation observed in species can

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