



## Molecular confirmation of *Gyroporus lacteus* and typification of *Boletus cyanescens*

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### Abstract

*Gyroporus lacteus* is fully described based on recent collections from sandy areas in Italian littoral woods consisting of *Pinus pinea* and *Quercus ilex*. Lévillé's plate 9 (1–2) (in *Annls Sci. Nat., Bot.*, 1848) is selected as a lectotype and a recent sequenced collection as an epitype. Its independent position from *Gyroporus cyanescens* is supported by phylogenetic analyses of the nuclear ribosomal internal transcribed spacer (ITS) and the nuclear ribosomal large subunit (LSU) regions. In addition, *Gyroporus cyanescens* is typified by selecting Bulliard's Plate 369 (in *Herbier de la France* 8, 1788) as a lectotype and a sequenced collection as an epitype.

**Key words:** Basidiomycota, Boletales, Gyroporaceae, rDNA, Sclerodermatineae, Taxonomy

### Introduction

The *Sclerodermatineae* Binder & Bresinsky, also called the sclerodermatoid fungi (Watling 2006), is a suborder within the large, and ecologically important order *Boletales* E.-J. Gilbert (Binder & Bresinsky 2002), which includes the boletoid genera *Boletinellus* Murrill, *Phlebopus* (R. Heim) Singer, and *Gyroporus* Qué. and some gasteroid genera such as *Scleroderma* Pers., *Astraeus* Morgan, *Calostoma* Desv., *Pisolithus* Alb. & Schwein., *Tremellogaster* E. Fisch., and *Diplocystis* Berk. & M.A. Curtis (Louzan *et al.* 2007; Wilson *et al.* 2011, 2012). The sclerodermatoid fungi are commercially important as ectomycorrhizal partners of many forest trees, and some, especially *Pisolithus* and *Scleroderma*, have been utilized for inocula in forestry practice (Turjaman *et al.* 2005; Watling 2006, 2008; Sebastiana *et al.* 2013).

In particular, the genus *Gyroporus*, typified by *Boletus cyanescens* Bull., is circumscribed by fleshy small to medium-sized epigeal basidiomes, minutely velvety to floccose-scaly pileus often becoming shaggy, firm and leathery, villose-pruinose to velvety stipe often with horizontal fissures or cracks, sometimes with a ring-like zone and internally with large and distinct chambers or totally hollow, white then straw-color, free tubes, minute, simple pores, white then lemon-yellow, white or pallid context, unchanging or strongly turning light blue to violaceous on handling due to the presence of gyrocyanins (Besl *et al.* 1973; Gill & Steglich 1987), mild taste, lemon-yellow spore-print, shortly ellipsoid adaxially applanate, smooth spores, whitish to pale straw-yellow, cyanophilic, without iodine reactions and rarely exceeding 11 µm in length, usually 4-spored basidia, pileipellis a cutis of repent to erect hyphae, cheilocystidia and pleurocystidia present, clamp-connections usually present; ontogenetic development gymnocarpic (hymenophore naked), metavelangiocarpic (development of the hymenophore enclosed in hyphal growth from all tissues of the basidiomes) or pileoangiocarpic (hymenophore at first enclosed in outgrowths of the pileus) (Reijnders 1963; Singer 1986; Watling 2008). The development of the stipe tissue is very unusual, since instead of being composed of hyphae running lengthwise, the hyphae are arranged transversely, enveloping a stuffed, floccose area that gradually disintegrates, ultimately producing a central cavity. The growth is terrestrial, in ectomycorrhizal symbiosis with deciduous trees (*Fagaceae*) and conifers (*Pinaceae*) (Agerer 1999; Raidl *et al.* 2006; Watling 2006, 2008; Wilson *et al.* 2012). *Gyroporus* is a small genus probably encompassing no more than 20 species—Index Fungorum (<http://www.indexfungorum.org/>, accessed 22 May 2015) lists 68 validly published names—scattered throughout temperate and