



Lactarius subgenus *Russularia* (Russulaceae) in South-East Asia: 2. Species with remarkably small basidiocarps

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Abstract

This paper is the second in a series of biodiversity papers on *Lactarius* subgenus *Russularia* in tropical forests of Southeast Asia. This study is based on extensive mycological exploration, especially in Northern Thailand, during the past ten years. In this paper we consider some species that are characterized by remarkably small basidiocarps i.e. with an average pileus diameter that is smaller than 20 mm. One of the most common species in Northern Thailand with dwarf basidiocarps is *L. gracilis*, originally described from Japan. We introduce the new species *L. crenulatulus*, *L. perparvus* and *L. glabrigracilis* with morphological descriptions and illustrations. Molecular evidence based on the ITS sequence analysis supports the classification and novel status of the taxa. All species are associated with trees belonging to the Fagaceae. These are the first reported collections of small basidiocarps of *L.* subg. *Russularia* in Southeast Asia. In our paper we compare these new species with small basidiocarp with similar representatives from Europe and other Asian regions.

Keywords: milkcaps, taxonomy, molecular phylogeny

Introduction

In the recent classification of *Lactarius* Pers. (Buyck *et al.* 2010), three subgenera, *L.* subg. *Lactarius* (Fr. ex J. Kickx f.) Kauffman, *L.* subg. *Russularia* (Fr.) Kauffman and *L.* subg. *Plinthogalus* (Berk.) Hesler & A.H. Sm. were recognized. Among these three subgenera, *L.* subg. *Russularia* is assumed to be a taxonomically complex group which is widely distributed in temperate and tropical regions, but poorly represented in tropical Africa and South America (Verbeken 1996, Verbeken & Walley 2010; Wisitrassameewong *et al.* 2014). In Southeast Asia, 13 species have been reported in *L.* subg. *Russularia*, mainly from Indonesia (Verbeken *et al.* 2001), Southern China (Wang 2000, Wang & Liu 2002) and Malaysia and Thailand (Wisitrassameewong *et al.* 2014). Studies have also reported and described taxa from subg. *Russularia* in other regions of Asia, e.g. in Japan by Hongo (1957a, 1957b, 1971), in Papua New Guinea (Verbeken & Horak 2000), in the Himalaya region, India by Das *et al.* (2004) and Joshi *et al.* (2012). Chinese type specimens, including representatives of this subgenus, have been re-evaluated because European and American names were misapplied (Wang 2007). *L. squamulosus* Z.S. Bi & T.H. Li was considered a synonym of *L. gracilis* Hongo. Up to now all species known in Asia are endemic for the continent and the use of American and European names could not be justified.

Macromorphologically, most members of leave out subg. *Russularia* can be recognized by their dry pileus surface and colours that are typically dominated by shades of orange and reddish brown to brown. The latex color and color changes are not as variable as in the other subgenera of *Lactarius*, with most species having white or whitish and unchanging latex. In a few species however, the latex is yellow (Verbeken *et al.* 2001, Das *et al.* 2004) and in some the latex changes from white to cream or yellow. An exceptional species is *L. sulphureus* Verbeken & E. Horak from Java, Indonesia (but also occurring in Malaysia), that has abundant, spectacular, golden yellow latex (Verbeken *et al.* 2001). In some species, such as *L. stubbei* Wisitrassameewong & Verbeken, the color change only becomes visible when the latex is drying, then showing a clear pale yellow tinge (Wisitrassameewong *et al.* 2014). Spore ornamentation and pileipellis structure are microscopic characters that discriminate between species. The spore ornamentation is typically an incomplete to complete reticulum while spiny or obtuse isolated warts occur in some species. The pileipellis structure shows a wide variety,

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