



## The genus *Campanella* (Marasmiaceae, Agaricales): a new species and a new combination and species status

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### Abstract

*Campanella keralensis* sp. nov. is described from Kerala State, India and is assigned to subsection *Aerugineae* of section *Campanella*. Comprehensive description, photographs and comparisons with phenetically similar taxa are provided. *Campanella simulans* var. *bispora* is elevated to the status of species.

**Key words** – Basidiomycota – biodiversity – systematics – taxonomy

### Introduction

*Campanella* Henn. (Marasmiaceae, Agaricales, Basidiomycota) is a predominantly tropical/subtropical genus currently comprising about thirty seven species (<http://www.speciesfungorum.org>). The genus is characterized by small, lignicolous and pleurotoid basidiomata with a distinctive hymenophore composed of vein-like or ridge-like anastomosing lamellae (Singer 1975, 1986). Microscopically the genus is characterized by gelatinized trama; smooth, hyaline and inamyloid basidiospores and a pileipellis showing Rameales-structure or asterostromelloid layer (Singer 1975, 1986). Several species showing basidiospores with lateral bulges or irregular or angular outline previously included in this genus have, subsequently, been transferred to *Tetrapyrgos* Horak (Horak 1986). While some molecular phylogenetic studies have shown that *Campanella* and *Tetrapyrgos* were distinct, monophyletic sister clades (Moncalvo et al. 2002, Aime & Phillips-Mora 2005, Matheny et al. 2006), according to Wilson & Desjardin (2005) and Nakasone et al. (2009), *Campanella eberhardtii* (Pat.) Singer appears to be phylogenetically distant from both *Campanella* and *Tetrapyrgos*.

During our studies on the agarics of the Silent Valley National Park in Kerala State, India, we came across a species of *Campanella* that is described here as new. Also, a taxon previously described from Kerala State as *Campanella simulans* var. *bispora* (Manimohan & Leelavathy 1988) is elevated here to the status of species.

### Materials & Methods

Conventional morphology-based taxonomic methods were employed for this study. Microscopic observations were made on material stained with 1% aqueous solutions of both Congo red and phloxine and mounted in 3% aqueous KOH. Melzer's reagent was used to observe whether the basidiospores and tissues were amyloid. For evaluation of the range of spore-size, 20 basidiospores each from one specimen of each collection cited were measured. Color codes used in

the description are from Kornerup & Wanscher (1978). The examined collections are deposited at Kew (Mycology) Herbarium and the Kew accession numbers (e.g., K(M) 191675) are indicated.

## Results and Discussion

### Taxonomy

*Campanella keralensis* V.A. Farook & Manim., **sp. nov.**  
MycoBank MB 809073

Fig. 1

Etymology – The specific epithet refers to Kerala State, India where this species was first observed.

Characterized by small, sessile, pleurotoid basidiomata with a bluish gray to greenish gray pileus, greenish white to grayish white lamellae, ellipsoid and smooth basidiospores, flexuoso-cylindric cheilocystidia with a subcapitate apex and flexuoso-fusoid pleurocystidia often with a subcapitate apex. Differing from *Campanella aeruginea* Singer in having flexuoso-cylindric cheilocystidia with subcapitate apex, larger basidiospores and dicotyledonous host.

Holotype – K(M)191675

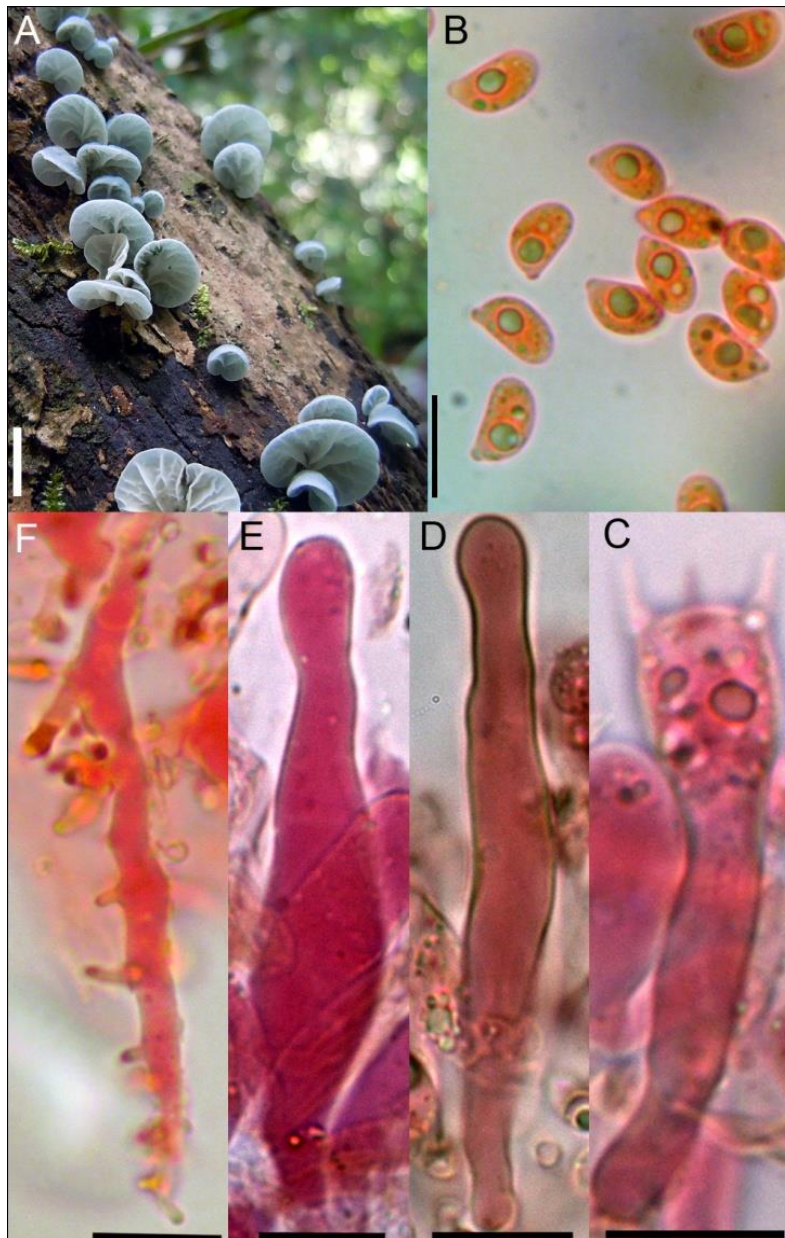
Basidiomata small, pleurotoid, lignicolous. Pileus 2–23 mm diam., cupulate-reniform, attached directly to substratum laterally, bluish gray (20E2, 21E2, 20F3) when young, becoming greenish gray (26E2, 26C2, 26B2, 27B2, 27C5) with age; translucent when wet, moist, surface tessellate showing the outline of lamellae, finely pruinose; margin slightly incurved when young, becoming straight or slightly upturned with age, entire. Pileal trama thin, up to 1 mm at the center, greenish white (25A2). Hymenophore consisting of lamellar veins or ridges radiating from a lateral point, up to 2 mm wide, greenish white to grayish white when young, pale cream with age, distant, forked and strongly anastomosing in mature ones, less so in young ones, cross-veining not reaching the level of radiating main lamellar veins; edge wavy to crisped, concolorous with the sides. Stipe absent. Odor and taste not distinctive. Spore print white.

Basidiospores 9–12 × 5–6 (10.76 ± 0.98 × 5.4 ± 0.45) µm, Q = 1.58–2.4, Qm = 1.99, ellipsoid to broadly ellipsoid, smooth, thin-walled, hyaline, inamyloid, with small guttules. Basidia 27–35 × 7–8 µm, clavate, 4-spored; sterigmata 4–7 µm long. Lamella-edge heteromorphous. Cheilocystidia 43–56 × 6–9 µm, flexuoso-cylindric with a subcapitate apex, sometimes irregularly branched at apex, thin- to slightly thick-walled, hyaline. Pleurocystidia rare and scattered, 44–52 × 7–10 µm, flexuoso-fusoid, rarely with a subcapitate apex, sometimes irregularly branched, thin-walled, hyaline. Hymenophoral trama irregular, strongly gelatinized; hyphae 2–5 µm wide, thin-walled, hyaline, inamyloid. Pileal trama loosely interwoven, strongly gelatinized; hyphae 2–5 µm wide, thin-walled, hyaline, inamyloid. Pileipellis an indistinct epicutis of closely interwoven hyphae with well-developed *Rameales*-structure; hyphae 2–6 µm wide, bearing a pale brown resinous encrustation. All hyphae with well-developed clamp connections.

Known distribution – known only from the type locality.

Material examined – India, Kerala State, Palakkad District, Silent Valley National Park, Sairandhri Section, forest around the watch tower, on the bark of a fallen dicotyledonous tree, gregarious, 28 May 2013, V. Adnaan Farook (K(M)191675, holotype designated here).

Notes – In Singer's (1986) infrageneric classification, this species will be placed in sect. *Campanella* as metuloids are absent and the greening basidiomata indicate that it belongs to subsect. *Aerugineae* Singer. The South American species *C. aeruginea* Singer, the type species of the subsection, has ampullaceous cheilocystidia, smaller basidiospores and monocotyledonous hosts (Singer 1975). *Campanella aberrans* Singer, another greening species lacking metuloids from South America (Singer 1975), differs in having smaller basidiospores and no cystidia. *Campanella caesia* Romagn., yet another greening species devoid of metuloids, has cheilocystidia with diverticulate lower part and a hymenium devoid of pleurocystidia (Singer & Hausknecht 1990). *Campanella tristis* (G. Stev.) Segedin, a species described from New Zealand (Segedin 1993), also has greening basidiomata but that species has a lateral or eccentric stipe and a hymenium lacking



**Fig. 1** – *Campanella keralensis* (K(M)191675). A Basidiomata. B Basidiospores. C Basidium. D Cheilocystidium. E Pleurocystidium. F Pileipellis. – Bars = A 10 mm; B–H 10  $\mu$ m.

pleurocystidia. Among the four Asian species of *Campanella* (*C. boninensis* (S. Ito & S. Imai) Parmasto, *C. eberhardtii*, *C. junghuhni* (Mont.) Singer and *C. purpureobrunnea* Petch) redescribed by Parmasto (1981), only *C. eberhardtii* from Vietnam has greenish basidiomata. That species, however, has broadly fusoid, conical or subcylindric cheilocystidia with rounded blunt tip and monocotyledonous host.

***Campanella bispora* (Manim. & Leelav.) Manim., **comb. et stat. nov.****

Mycobank MB 809086

Basionym – *Campanella simulans* var. *bispora* Manim. & Leelav., Trans. Br. mycol. Soc. 91(4): 576 (1988).

Type – India, Kerala State, Wayanad District, Muthanga Forest, on dead twigs, 20 June 1985, P. Manimohan M296 (K(M)192117, holotype!).

Description and Figures – Manimohan & Leelavathy, Trans. Brit. Mycol. Soc. 91(4): 275–276 (1988).

*Campanella simulans* is currently considered as a species of *Tetrapyrgos*, a genus characterized by basidiospores that are tetrahedral in shape or have a distinct lateral bulge (Horak 1986). According to Singer (1945, 1975), at least some of the basidiospores in all collections, including the type, of *C. simulans* examined by him were very asymmetric with a bulge. The holotype of *Campanella simulans* var. *bispora* has smooth, ellipsoid basidiospores without any trace of lateral bulges and hence it can neither be considered as a variety of *C. simulans* nor be transferred to *Tetrapyrgos*. *Campanella bispora* differs from all other species of *Campanella* in having consistently bisporic basidia. As pointed out by Manimohan & Leelavathy (1988), *Favolaschia bispora* Holterm. may be an earlier name for this species but authentic material representing that name remains untraced. There is a recent record of this taxon from Madagascar (Eyssartier & Buyck 1999). In Singer's (1986) infrageneric classification of *Campanella*, this species can be assigned to section *Diplocystides* Singer.

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