Submersisphaeria bambusicola sp. nov. from bamboo in Hong Kong

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A new *Submersisphaeria* species found from collections of fungi on bamboo in Hong Kong is described. This fungus has affinities with *Submersisphaeria aquatica*, but differs in having long-pedicellate asci and unicellular ascospores. This new taxon is compared with *S. aquatica*, *Annulatascus velatisporus* and *Ascotaiwania lignicola*.

Key words: *Annulatascaceae*, taxonomy.

Introduction

During a study of the fungal diversity on bamboo in Hong Kong, a new *Submersisphaeria* species on dead culms of *Arundinaria hindsii*, from Mt. Lung Fu Shan Country Park, Hong Kong was collected and identified. Hyde (1996) established a monotypic genus, *Submersisphaeria*, which is typified by *S. aquatica* K.D. Hyde. Characteristics salient to *Submersisphaeria* include immersed or erumpent ascomata, short pedicellate asci with a massive, refractive apical ring, and brown, bicellular ascospores with granular contents and a single central septum which is slightly constricted (Hyde, 1996). In the specimens from Mt. Lung Fu Shan, apart from the long pedicellate asci and unicellular ascospores, all other characters are consistent with those in *Submersisphaeria*. It is, therefore, necessary to extend the generic concept of *Submersisphaeria*, and a new species, *S. bambusicola* is introduced to accommodate the specimen.

Materials and methods

Dead culm samples of *Arundinaria hindsii* were collected from Lung Fu Shan Country Park, Hong Kong Island, and returned to the laboratory where they were incubated in polythene bags lined with moistened tissue. Material was examined for bambusicolous fungi after 3 days and 1 week. Single-spore isolation was attempted, but the ascospores failed to germinate on PDA at

room temperate. All microscopic measurements were taken from specimen mounted in water.

Taxonomy

Submersisphaeria bambusicola D.Q. Zhou and K.D. Hyde, **sp. nov.**

(Figs. 1-15)

Etymology: From bamboo and the Latin *cola* meaning living on bamboo.

Ascomata 420-580 μm diam., 350-540 μm alta, globosa vel subglobosa, immersa, ostiolata, periphysata, solitaria. *Peridium* 50-60 μm crassum, nigrum, e textura angulari compositum. *Paraphysibus* 4-8 μm, crassis, septatis, numerosis et angustatis. *Asci* 235-290 × 10-12 μm, octospori, cylindrici, leptodermi, longum pedicellati, apparatu apicale praediti. *Ascosporae* (26-)28-36 × 6-8(-10) μm, uniseriatae, unicellulae, fusiformes-ellipsoideae, fuscusa.

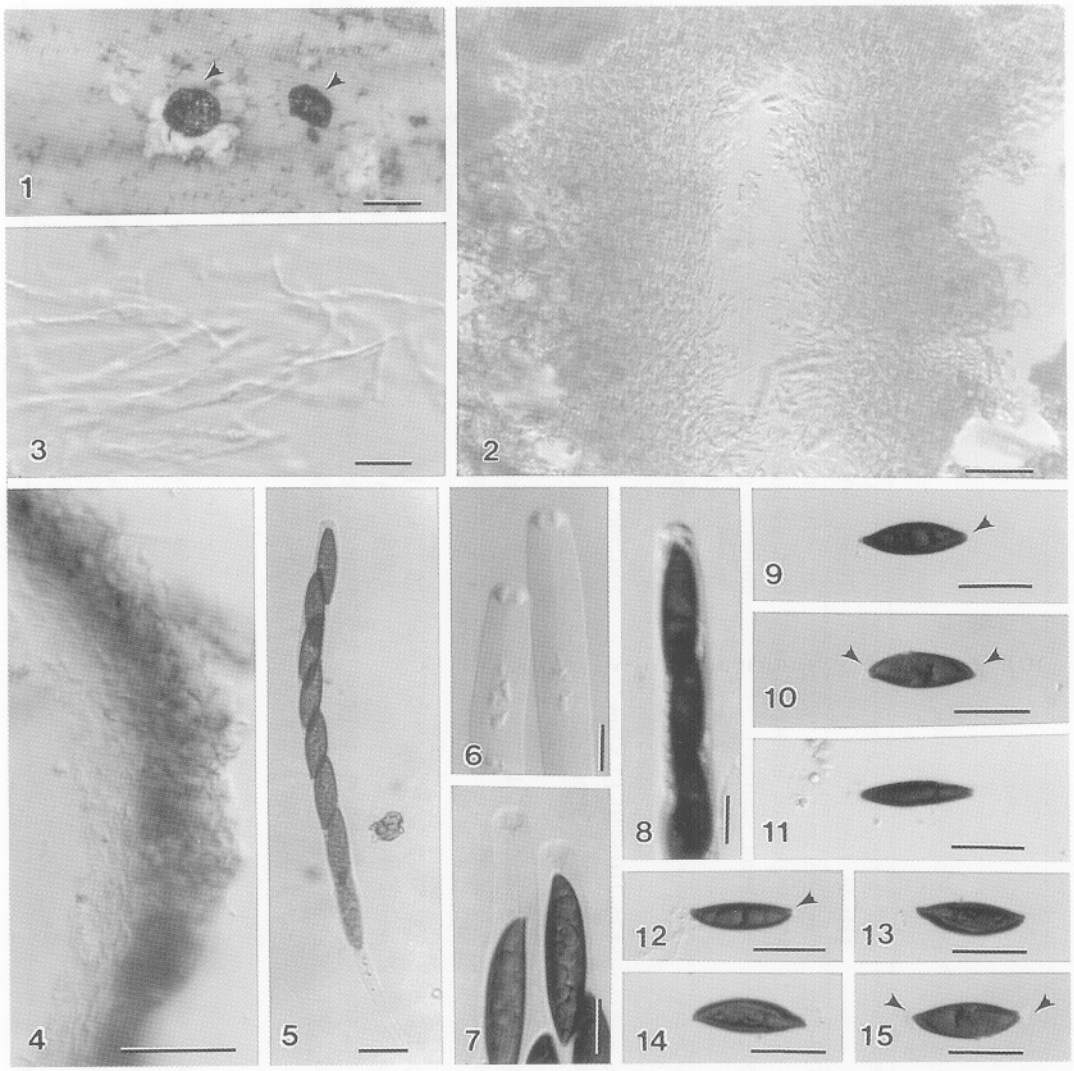
Ascomata deeply immersed in the host tissue, visible as a blackened cirrus of ascospores, 420-580 μm diam. ($\bar{x}$ = 506 μm, n = 15), 350-540 μm high ($\bar{x}$ = 424 μm, n = 15), globose or subglobose, solitary, with a central periphysate ostiolar canal up to 60 μm diam., 210 μm high (Figs. 1, 2). *Peridium* 50-60 μm thick, comprising a brown outer layer and a hyaline inner layer (Fig. 4). *Paraphyses* 4-8 μm diam. ($\bar{x}$ = 6 μm, n = 15), hypha-like, filamentous, septate, tapering, numerous (Fig. 3). *Asci* 235-290 × 10-12 μm ($\bar{x}$ = 258 × 11.6 μm, n = 50), 8-spored, cylindrical, thin-walled, with a long tapering pedicel, and a relatively massive, elongate, refractive, non-amyloid apical ring, 5 μm diam., 4 μm high (n = 10) (Figs. 5-8). *Ascospores* (26-)28-36 × 6-8(-10) μm ($\bar{x}$ = 31 × 7.5 μm, n = 50), uniseriate or partly overlapping uniseriate, unicellular, mostly inequilaterally ellipsoidal-fusiform, containing one lipid globule, smooth, dark brown, with hyaline germ pores at each end, and sometimes with thin, drawn-out sheath at each end (Figs. 9-15).

Anamorph: Unknown, as single-spore isolation failed to germinate in culture.

Material examined: HONG KONG, Hong Kong Island, Lung Fu Shan, on a dead culm of *Arundinaria hindsii*, 19 July 1998, *Dequn Zhou* [HKU(M) 9045, HOLOTYPE]; *ibid.* [HKU(M) 9353].

Discussion

Wong *et al.* (1998) introduced the *Annulatascaceae* to accommodate *Annulatascus* and *Annulatascus*-like species, as the apical ring in these species are similar and bipartite. In *Annulatascus*, ascomata are immersed to superficial and black, and paraphyses are septate and wide. Asci are cylindrical with a relatively massive refractive apical ring (Hyde, 1992). These fungi are mostly found in freshwater habitats, although terrestrial species have been collected on bamboo and palms in the tropics (Wong *et al.*, 1998). *Annulatascus*, *Aquaticola*, *Cataractispora*, *Clohiesia*, *Diluviocola*, *Fluminicola*, *Frondicola*,



Figs. 1-15. Photo-micrographs of *Submersisphaeria bambusicola* (from holotype). **1.** Ascomata immersed in host tissue, with black ascospore mass (arrowed). **2.** Vertical section through ostiolar canal. **3.** Paraphyses. **4.** Peridium. Note it comprises a brown outer layer and a hyaline inner layer. **5.** Ascus. **6-8.** Massive refractive apical rings of asci. **9-15.** Ascospores. Note the germ pores at each end and thin polar mucilaginous sheaths (arrowed). Bars: 1 = 500 µm; 3 = 50 µm; 4 = 40 µm; 5, 9-15 = 20 µm; 2, 6-8 = 10 µm.

Table 1. Comparison of *Submersisphaeria bambusicola* with similar species.

	Submersisphaeria bambusicola (this paper)	*Submersisphaeria aquatica* (Hyde, 1996)	*Annulatascus velatisporus* (Hyde, 1992)	*Ascotaiwania lignicola* (Sivanesan and Chang, 1992)
Ascomata	420-580 µm diam., 350-540 µm high, globose or subglobose, immersed, solitary	180-250 µm diam., globose or subglobose, immersed or erumpent, scattered	260-410 µm diam., 450 µm high, globose or subglobose, immersed or semi-immersed, solitary or mostly gregarious	300-600 µm diam., 190-350 µm, globose, partly to fully immersed, solitary to aggregated
Paraphyses	4-8 µm diam., hypha-like	3-4 µm diam., hypha-like	wide, septate, tapering	1 µm diam., filiform, deliqescing early
Asci	235-290 × 10-12 µm, cylindrical, long pedicellate, tapering	175-210 × 10-12.5 µm, cylindrical, short pedicellate	220-290 × 12-18 µm, cylindrical, peduncle tapering	234-290 ×13-19 µm, cylindrical, short pedicellate
Apical ring	5 µm diam., 4 µm high, massive, elongate, refractive, non-amyloid	6-7 µm diam., 4-5 µm high, refractive	7-8 µm diam., 4-5 µm high, large, elongate, nom-amyloid	7-9.2 µm diam., 3.3-6.7 µm high, distinct, wedge-shaped, non-amyloid
Ascospores	28-36 × 6-8 µm, unicellular, dark brown, with hyaline germ pores and thin, drawn-out sheath at each end	23-37 × 7.5-10 µm, bicellular, brown, with granular contents and hyaline germ pores at each end	26-42 × 9-12 µm, unicellular, hyaline, up to 3 septate, verrucolose, surrounded by a thin irregular sheath	42-55 × 8-13 µm, 7-septate, with larger, mid brown central cells and smaller hyaline to subhyaline end cells
Nutritional mode	Saprobic	Saprobic	Saprobic	Saprobic
Habitat	On terrestrial dead bamboo culm	On submerged wood in rainforest stream	On submerged wood in river	On terrestrial dead wood
Hosts	Decaying culms of *Arundinaria hindsii*	Decaying wood	Decaying wood	Decaying wood
Distribution	Hong Kong	Australia	Australia	Taiwan

Pseudoproboscispora and *Submersisphaeria* are the currently accepted genera in the *Annulatascaceae* (Hyde, *et al*., 1998; Wong *et al*., 1998, 1999; Ho, *et al*., 1999; Wong and Hyde, 1999). *Submersisphaeria* has dark brown ascospores and thus differs from other genera in the *Annulatascaceae* which all have hyaline ascospores (Hyde *et al*., 1998; Wong *et al*., 1998; Ho *et al*., 1999; Wong and Hyde, 1999). *Ascotaiwania* was recently excluded from the *Annulatascaceae* based on molecular studies (Ho *et al*., 1999; Ranghoo *et al*., 1999). *Ascotaiwania* resembles *Submersisphaeria* in several aspects, however, in *Ascotaiwania* the ascospores lacks germ pores, and with hyaline end cells (Sivanesan and Chang, 1992; Hyde, 1996).

Submersisphaeria bambusicola is consistent with the generic description of *Submersisphaeria*, especially in having subglobose, immersed ascomata, cylindrical, unitunicate and pedicellate asci, with a refractive, nom-amyloid apical ring and brown ascospores, with hyaline germ pores at each end (Hyde, 1996). *Submersisphaeria bambusicola* has long pedicellate asci and unicellular ascospores, which conspicuously differs from *S. aquatica*, the type species of *Submersisphaeria*. We believe that the characters, namely long pedicellate asci and unicellular ascospores, are not good enough to establish a new genus, which can distinguishes from *Submersisphaeria*. So the generic concept of *Submersisphaeria* should be widened to include *S. bambusicola*. *Submersisphaeria bambusicola* is saprobic and found on decaying bamboo culms in terrestrial habitat in Hong Kong whereas *S. aquatica* is saprobic on wood submerged in freshwater in Australia (Hyde, 1996).

Submersisphaeria bambusicola is compared with *S. aquatica*, *Annulatascus velatisporus* and *Ascotaiwania lignicola* in Table 1.

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