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Three new records of lignicolous freshwater hyphomycetes from Mainland China

M. Jiang[1,2], M. Wongsawas[1], H.K. Wang[1*], F.C. Lin[1*] and Y.C. Liang[2]

[1]Biotechnology Institute, Zhejiang University, Hangzhou 310029, P.R. China
[2]Department of Plant Pathology, Shandong Agricultural University, Taian 271018, P.R. China

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Three species of lignicolous freshwater hyphomycetes, *Brachydesmiella biseptata*, *Dictyosporium digitatum* and *Xylomyces giganteus* are described and illustrated from wood submerged in freshwater collected in Zhejiang Province, P.R. China. They are all reported as new records for Mainland China.

Key words:
freshwater hyphomycetes, *Brachydesmiella biseptata*, *Dictyosporium digitatum* and *Xylomyces giganteus*

Introduction

The important role of higher fungi in freshwater ecosystems is in the utilization of dead plant material as sources of nutrients and also responsible for the biodegradation of organic materials in aquatic habitats, particularly plant materials in the form of leaf litter and other plant debris (Shearer, 1993). Several studies on the diversity of freshwater fungi had previously been carried out in temperate regions but recently there had been more studies in tropical regions and subtropical regions and a number of novel taxa have been discovered in the last decade (Shearer *et al.*, 2007, Luo, *et al.*, 2004a, 2004b). There are some researches working on freshwater fungi who have been carried out in mainland China in recent years e.g. Yang and Ding (1986), Yang and Ding (1988), Zhu *et al.* (1991), Liu *et al.* (1992) Zhu and Yu (1992), Yu *et al.*, (1998), Cai (2002), Cai *et al.* (2002), Yin (2003), Luo, *et al.*(2004a, 2004b).

We are currently studying the biodiversity of freshwater fungi on submerged wood in Zhejiang Province, P.R. China. In the course of this work, three interesting freshwater hyphomycetes species, *Brachydesmiella biseptata*

*Corresponding author: Hong Kai Wang; e-mail: hkwang@zjuem.zju.edu.cn,
Fu Cheng Lin; e-mail: fuchenglin@zju.edu.cn

G. Arnaud ex S. Hughes (Hughes, 1961), *Dictyosporium digitatum* J.L. Chen, C.H. Hwang & Tzean (Chen *et al.*, 1991) and *Xylomyces giganteus* Goh, W. H. Ho, K. D. Hyde & K. M. Tsui (Goh *et al.*, 1997) were found. These three species have not previously recorded in Mainland China.

Materials and methods

Wood samples which submerged for several months were randomly collected from two streams at Nine Creeks, West Lake District, Hangzhou City and Songyang County, Lishui City, Zhejiang Province, P.R. China, in September and October 2007, respectively. Samples were placed separately in snap lock plastic bags with sterile moist paper towels, incubated at room temperature and examined within one month. Thirty conidia or chlamydospores of each fungus were measured at their widest point. The range between minimum and maximum values is provided. All observations and photographic documentations were made with material mounted in water and examined under an Olympus BX-51 microscope equipped with an Olympus DP-50 digital camera system. Herbarium specimens have been deposited at Biotechnology Institute, Zhejiang University, P.R. China.

Results and discussions

Brachydesmiella biseptata G. Arnaud ex S. Hughes, Can. J. Bot. 39: 1095 (1961).

Colonies effuse or in small group, glistening, black. Conidiophores scattered or in small groups, smooth, thick-walled, pale brown, cylindric-clavate, narrower at the basal part, flexuous, rarely branched, with 0-2 septa. Conidiogenous cells integrated, polyblastic, sympodially proliferating, with 1-4 conspicuously thickened conidial scars which are 2-3 µm in diam. Conidia solitary, more or less ellipsoidal, 3-celled, 36.7-47.2 x 15.7-24.9 µm (average 42.6 x 19.5 µm, n=30), unequally coloured, the terminal cell short, triangular, thin-walled, subhyaline, verrucose, 3.9-6.5 x 3.9-5.5 µm (average 5.1 x 4.6 µm, n=30), the central cell 27.5-36.7 x 15.7-24.9 µm (average 32 x 19.5µm, n=30), brown to dark brown, thick-walled, smooth, the basal cell 3.9-6.5 x 3.9-6.5 µm (average 5.5 x 5.2 µm, n=30), trapezoid, thin-walled, subhyaline, verrucose, base obconically truncate, with a hilum 2.6-3.9 µm (average 3.2 µm, n=30) in diam. (Figs 1-7).

Specimen examined: HZJUFM9, on submerged wood.
Collection location: Songyang County, Lishui City, Zhejiang Province.

Other known distribution: Canada, France, United Kingdom (Hughes, 1961; Ellis, 1971), New Zealand (Hughes, 1971), Costa Rica (Morris, 1972), Japan, Thailand, Uganda (Sivichai *et al.*, 1998), Hungary (Magyar, 2006) and United States (Raja *et al.*, 2007).

Note: Morphological characteristics of the present fungus accorded well with the description of *B. biseptata*, the type species of genus *Brachydesmiella* Arnaud, reported by Hughes (1961, 1971), Sivichai *et al*. (1998) and Magyar (2006). Although, the colour of conidia central cell of this present fungus is much paler. However, the size and number of septa of its conidia are clearly similar to those of *B. biseptata* (Hughes, 1971; Sivichai *et al*., 1998; Magyar, 2006).

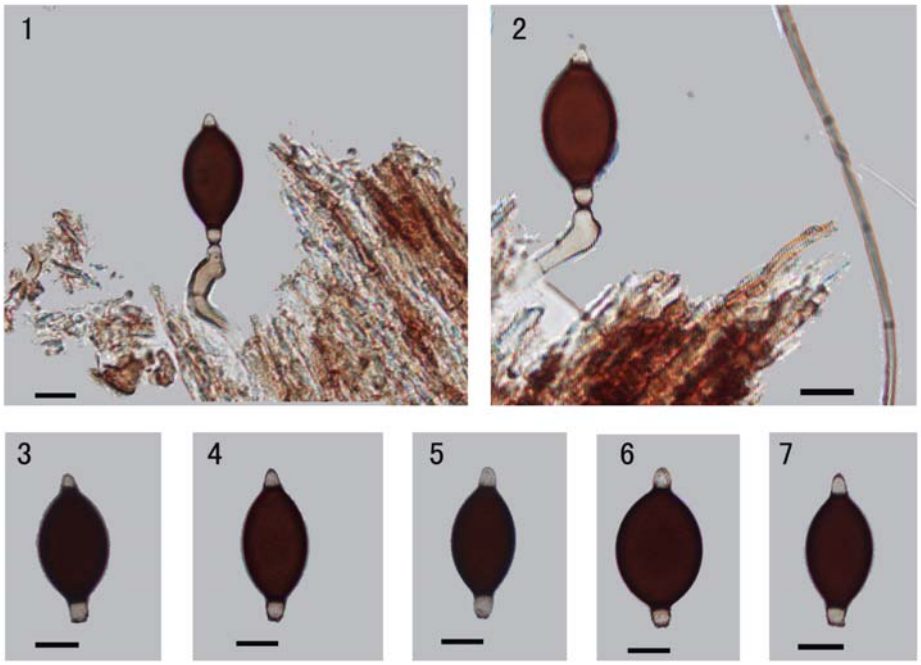

Fig. 1-7. *Brachydesmiella biseptata* 1-2. Conidiophore and developing condia. 3-7 Conidia. Bars: 1-7 = 20 µm.

Dictyosporium digitatum J.L. Chen, C.H. Hwang and S.S. Tzean, Mycological Research 95: 1146 (1991).

Colonies sporodochial, black, scattered, punctiform, pulvinate. Conidiophores micronematous, simple or branch, smooth, hyaline to brown, often constricted at the septa. Conidia solitary, cheiroid, 57.7-89.2 x 31.5-47.2 µm (average 74.4 x 37.3 µm, n=30), pale to medium reddish brown,

complanate, consisting of 6-8 parallel, tightly appressed arms which are flattened in one plane, each arm with terminal cells of each arm are provided with a hyaline, thin-walled, straight or curled appendage, total number of conidia cells 67-99. (Figs 8-14).

Specimen examined: HZJUFM10, on submerged wood.
Collection location: Songyang County, Lishui City, Zhejiang Province.

Other known distribution: Taiwan (Chen *et al.*, 1991), Australia (Goh *et al.*, 1999 and Vijaykrishna and Hyde, 2006), Brunei Darussalam (Goh *et al.*, 1999), Hong Kong (Goh *et al.*, 1999; Tsui *et al.*, 2000, 2001; Ho *et al.*, 2001, 2002) Seychelles (Goh *et al.*, 1999) and Thailand (Goh *et al.*, 1999; Sivichai *et al.*, 2002).

Note: The morphological characteristics of the present fungus agreed well with the description of *D. digitatum* reported by Chen *et al*. (1991) and Goh *et al*. (1999). They were several reported of the genus *Dictyosporium* Corda, excepted *D. digitatum*, in China including; *D. australinse, D. canisporum, D. heptasporum, D. lakefuxianensis, D. musae, D. polystichum, D. schizostachyfolim, D. solani, D. taishanensis, D. tetraploides, D. tetrasporum, D. triramosum, D. yunnanensis* and *D. zeylanicum* (Yin, 2003; Zhao and Zhang, 2003a, 2003b; Luo *et al*. 2004a; Cai *et al*., 2006; Cai and Hyde, 2007).

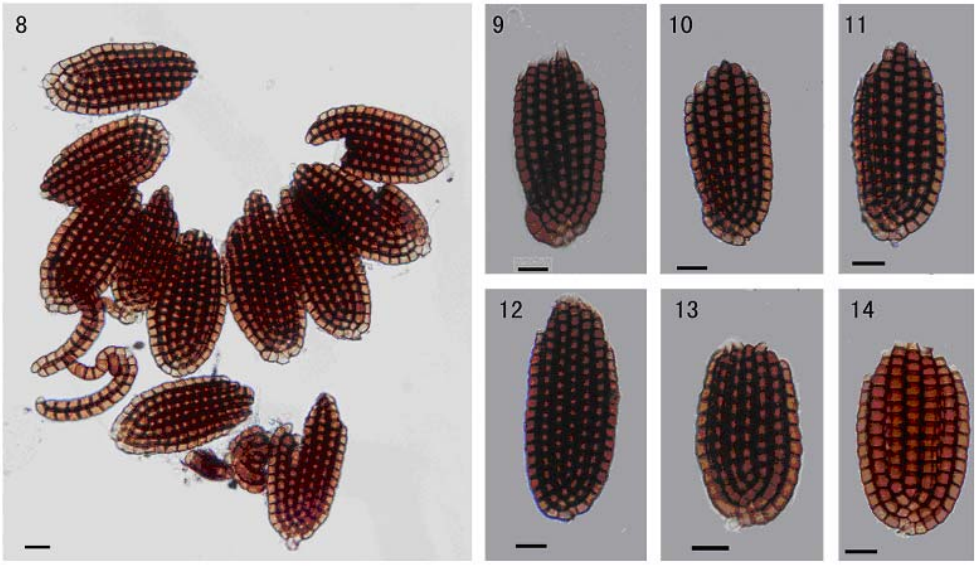

Fig. 8-14. *Dictyosporium digitatum* 1-14. Conidia. Bars: 8-14 = 20 μm.

Xylomyces giganteus Goh, W. H. Ho, K. D. Hyde & K. M.Tsui, Mycological Research 101: 1323 (1997).

Colonies on natural substratum effuse, thin, brown. Mycelium mostly immersed and partly superficial, composed of branched, septate, dematiaceous, anastomosing hyphae. Stromata lacking. Setae and hyphopodia absent. Conidiophores and conidia not developed. Chlamydospores narrowly fusiform or long-fusiform, intercalary, straight or curved, solitary or in chains, occasionally branched, 999.4–2,314.4 x 32.8-47.2 µm (average 1,416.6 x 38.8 µm, n=30), with 20-85 septa, constricted at the septa, brown to mid brown, uniform in colour or end cells paler, thick-walled with scarce irregular longitudinal striations. (Figs 15-20).

Specimen examined: HZJUFJ13, on submerged wood.
Collection location: Nine Creeks, West Lake District, Hangzhou City, Zhejiang Province, P.R. China.

Other known distribution: Australia (Goh *et al.*, 1997; Vijaykrishna and Hyde, 2006), South Africa (Goh *et al.*, 1997), United Kingdom (Goh *et al.*, 1997; Hyde and Goh, 1999) and Brunei Darussalam (Fryar *et al.*, 2004a, 2004b)

Note: Morphological characteristics of the present fungus accord with the description of *X. giganteus* reported by Goh *et al*. (1997), except for the number of cell and the length of chlamydospore of the present fungus are much greater. However, the other characteristics of its are similar to those of *X. giganteus* (Goh *et al*., 1997).

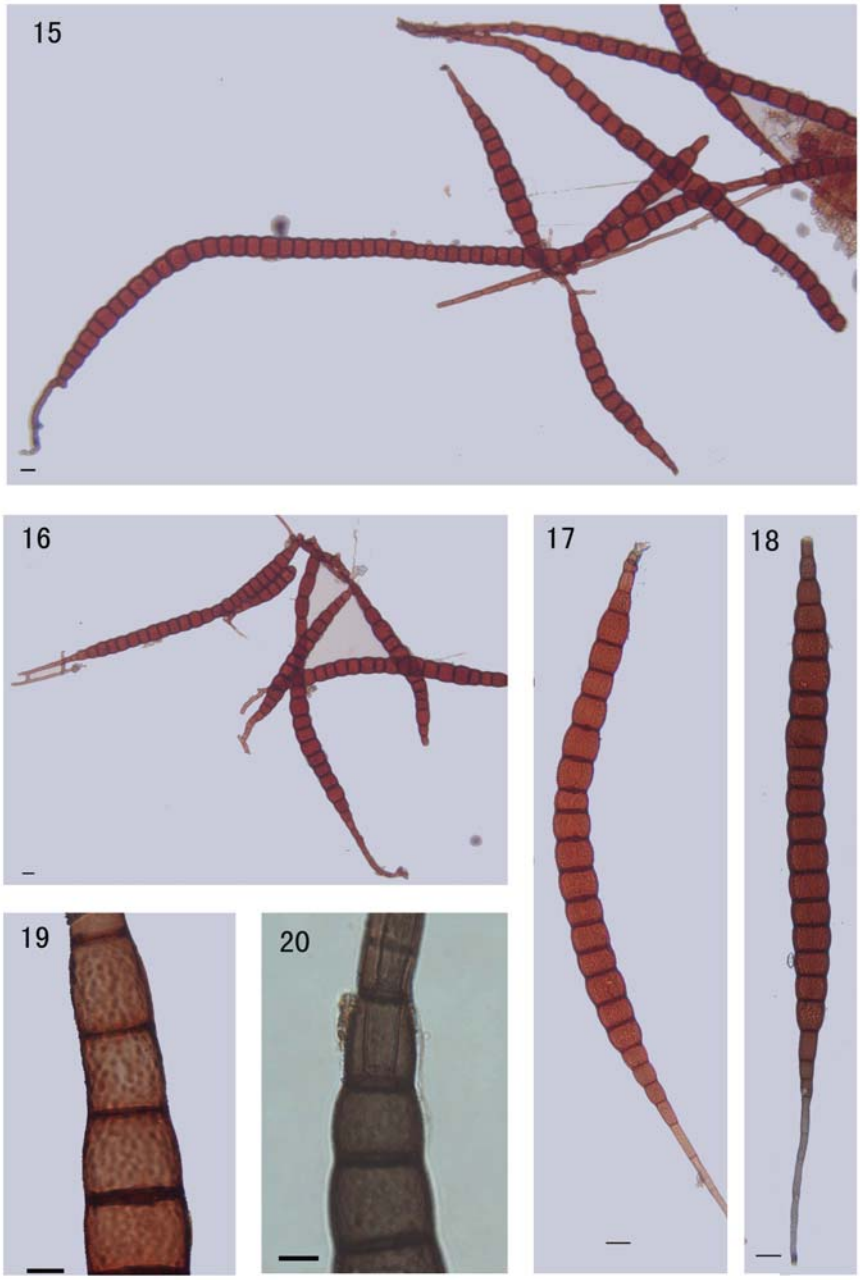

Fig. 15-20. *Xylomyces giganteus*. 15-18. Chlamydospores. 19. Close-up of a chlamydospore wall with longitudinal surface striations. 20. Close-up the end of a chlamydospore with a mucilaginous coating. Bars: 15-18 = 50 μm, 19-20 = 20 μm.

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