Aquatic fungi from North Maharashtra-XI

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Introduction

The “Submerged freshwater Hyphomycetes” is one of the ecological groups of freshwater mitosporic fungi, first addressed by Ingold (1975), represent a heterogeneous assemblage of fungi growing on submerged decaying plant materials. These fungi can be classified into two main types based on Park (1972), namely indwellers and immigrants. Species in several genera of freshwater mitosporic fungi like Aquaphila, Camposporidium, Canalisporium etc., can be classified as indwellers because they have been reported only from freshwater habitats. Whereas, species that belong to genera such as Delortia, Dictyosporium, Sporochisma, etc. can be classified as immigrants because they are reported from terrestrial as well as freshwater habitats. Goh and Tsui (2003) provide a key to some common genera of freshwater dematiaceous mitosporic fungi that have been reported from worldwide.

Recent biodiversity studies have revealed a number of undiscovered “Submerged freshwater Hyphomycetes” from different parts of the world (Su et al., 2011; Yang et al., 2012; Liu and Cai, 2013). The present paper deals with six species of fungi encountered on submerged woody debris in freshwater habitats. Among them Canalisporium pallidum Goh et al., and Delortia palmicola Pat. are new records for the fungi of India. Canalisporium caribense (Hol. Jech. & Mercado.) Nawawi and Kuthubudheen, Dictyosporium digitatum Chen et al., Sporoschisma saccadoi Mason and Hughes, and Sporoschisma uniseptatum Bhat and Kendrick are being recorded for the first time from Maharashtra state. The data provides information on the distribution of these fungi in India, apart from their description and illustrations.

Key Words: Freshwater, Hyphomycetes, submerged wood

Materials and Methods

Samples of submerged woody debris were collected randomly during 2012-13 from different lentic and lotic habitats from North Maharashtra region. The samples were placed in plastic bags. On returning to the laboratory, samples were incubated in plastic boxes and kept moist by spraying with distilled water and periodically examined for presence of fungal growth. Permanent voucher slides of fungi were prepared according to the method “double cover glass” provided by Volkmann-Kohlmeyer and Kohlmeyer (1996). Identifications of isolated fungi were confirmed with the help of Nawawi & Kuthubudheen (1989), Goh, et al., (1998), Goh and Hyde (1997), Chan et al., (1991), Goh et al., (1997), and Bhat and Kendrick (1993). Reports of fungi studied were confirmed with the help of Bilgrami et al., (1991), Jamaluddin et al., (2004) and relevant literature.

Systematic account

1) Canalisporium caribense (Hol.Jech. & Mer.) Nawawi & Kuthubudeen


Sporodochia: scattered, punctiform, pulvinate, granular, black, shining, up to 200 diam. Mycelium: mostly immersed in the
substratum, composed of irregularly branched, septate, smooth, subhyline to pale brown to brown hyphae 1.5-2.5 µm wide. Stromata: none or rudimentary consisting of irregularly branched, short, intertwined hyphae. Conidiophores: semi-macronematous to macronematous, mononematous, fasciculate, erect to ascending, unbranched to sparsely branched, hyaline to subhyaline, smooth up to 20 µm long x 2-3.5 µm wide. Conidiogenous cells: integrated, terminal, determinate, cylindrical and slightly vescculate. Conidial secession: schizolytic. Conidia: 25-39 µm long x 16-20 µm wide x 8-10 µm thick, acrogenous, solitary, one-cell thick and flattened, smooth, more or less ellipsoidal or obovoid in surface view, slightly curved, cylindrical or broadly clavate in lateral view, pale olivaceous or very pale olivaceous brown, muriform, mostly with a slightly curved column of vertical septa and 4-5 rows of transverse septa, occasionally one or two of the central rows of cells may have additional 1-2 vertical septa, septa unpigmented, thin and canals visible, basal cell cuneiform, 2.5-3.5 µm wide, thin-walled. Canals are also present in the transverse septa, only those on the concave side of the conidium, those on the convex side are not perforated.

Habitat: On submerged wood; Panzara River (Dahivel, Dist. Dhule), 26 January, 2013; Leg., B.D. Borse

Distribution in India: Maharashtra: Present work

Remarks: The present fungus is rare in occurrence. The descriptions and measurements of conidia and conidiophores are completely agreed with that of Canalisporium pallidum Goh, Ho & Hyde (1998). Therefore, it is assigned to that species. It is an addition to the fungi of India.

3) Delortia palmicola Pat.


Conidiomata: sporodochial, tuberculiform, gelatinous and milky white when fresh, up to 1 cm diam. becoming much smaller, amber-coloured, hard and inconspicuous when dried, composed of hyaline, septate, branched hyphae embedded in a gelatinous matrix. Conidiophores: arise laterally as alternate or opposite branches of the vegetative hyphae near the surface of the sporodochium, multisepitate, hyaline thin-walled, determinate to indeterminate, 1.5-3 µm wide, up to 100 µm long, bearing terminal or lateral conidiogenous cells. Conidiogenous cells: integrated, terminal or lateral, slightly inflated, clavate to ampulliform, 8-13 x 4-5 µm, each producing a single conidium. Conidia: holoblastic, acrogenous, thin-walled, hyaline, surrounded by hyaline gelatinous sheath, (2-) 3 (-4) septate, 8-12 µm wide, tightly coiled, U- or horseshoe-shaped, 15-22 µm diam., the distal end rounded and the
proximal end somewhat towards a wide flat, thin-walled, basal scar ca. 1.5 μm diam.  

**Habitat:** On submerged decaying parts of palms; Girma River (Kalwan, Dist. Nashik), 13 May, 2013; Leg., B.D. Borse  

**Distribution in India:** Maharashtra: On submerged wood (BDB, Unpublished).

**Remarks:** The present fungus is occasional in occurrence. The descriptions and measurements of conidia and conidiophores are completely agreed with that of Delortia palmicola Pat. as provided by Goh and Hyde (1997). Therefore, it is assigned to that species. It is being reported for the first time from India.

4) **Dictyosporium digitatum** J.L. Chen, C.H. Hwang & Tzean  


**Colonies:** on natural substratum consisting of effuse, septae, branched grayish blue to dark blue mycelium and abundant sporodochia.  

**Sporodochia:** scattered or confluent, superficial or immersed in crevices, globose, subglobose, ellipsoidal, fusiform or irregularly shaped. **Conidiophores:** micronematous, simple or branched, smooth, hyaline or brown, often constricted at the septa. **Conidiogenous cells:** integrated, subglobose, doliiform, cuneiform, thin-walled, smooth, hyaline or brown, 4.2-10 μm long, 3.3-7.5 μm wide.  

**Conidia:** solitary, dry, holoblastic, chieroid, grayish orange to reddish golden or reddish brown, arm with (4)7-13(14) septa, septa usually constricted, cells 3-8.8 μm wide, terminal cell distinctly thin-walled, hyaline, digitate, straight or flexuous, incurved or even curved, total number of conidial cells (54) 57-88 (94).  

**Habitat:** On submerged decaying wood; Yashawant lake (Toranmal, Dist. Nandurbar) 12 June, 2012; Leg., S.Y. Patil  

**Distribution in India:** Karnataka: On submerged wood (Sudheep and Sridhar, 2011); Maharashtra: Present work  

**Remarks:** The present fungus is occasional in occurrence. The descriptions and measurements of conidia and conidiophores are completely agreed with that of Dcictyosporium digitatum Chen et al., (1991). Therefore, it is assigned to that species. It is being reported for the first time from Maharashtra state.

5) **Sporoschisma saccadoi** E.W. Mason & S. Hughes  


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flexuous, medium brown, smooth, up to 175 µm tall, 8-10 µm wide, up to 12.5 µm wide at the flared apex, 3-6-septate, regenerating precociously 2-3 times. **Conidiophores**: mononematous, differentiated, erect, straight or flexuous, 140-205 µm tall, 10-12.5 µm wide, 1-2-septate, unbranched, thick-walled, dark brown, arising from dark brown stromata up to 65 µm across. **Conidiogenous cells**: phialids, up to 160 µm long, terminal, integrated, thick-walled, dark brown, consisting of a slightly swollen ventre up to 22 µm wide and a tubular collarette 70-80 x 12-16.5 µm. **Conidia**: blastic-phialidic, cylindrical, truncate at both ends, 1-septate, very rarely 2-septate, thick-walled, verruculose, pale brown, 27-32 x 11-12.5 µm, often in slimy false chains of 10-15 conidia.

**Habitat**: On decaying twigs; Yashawant lake (Toranmal, Dist. Nandurbar) 12 June, 2012; Leg., B.D. Borse

**Distribution in India**: Karnataka: On submerged wood (Sudheep and Sridhar, 2011); Maharashtra: Present work

**Remarks**: The present fungus is occasional in occurrence. The descriptions and measurements of conidia and conidiophores are completely agreed with that of *Sporoschisma uniseptatum* Bhat & Kendrick (1993). Therefore, it is assigned to that species. It is being recorded for the first time from Maharashtra state.

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