INTRODUCTION

The submerged aquatic Hyphomycetes is one of the ecological groups of freshwater mitosporic fungi, first addressed by Ingold (1975), represent a heterogenous assemblage of fungi growing on submerged decaying plant materials. Most of the species are found on woody litter blocked in fast-flowing streams or babbling brooks. These lignicolous, or to a lesser extent foliicolous, Hyphomycetes are nearly all dematiaceous and produced relatively thick-walled conidiophores and / or conidia. The conidiophores are distinctly macronematous, frequently in the form of long stipes; however, they may be solitary or synnematous. The conidiogenous loci may be denticulate, cicatrized, tretic or phialidic. Although some species may sporulate under submerged conditions, a vast number sporulate when the substrate are no longer under water. Incubation of such woody substrates in moist chambers yields a great number of different species. The conidia are capable of air dispersal or dispersed by some other mechanisms (Goh and Hyde (1996). Goh and Tsui (2003) provide a key to some common genera of submerged freshwater dematiaceous Hyphomycetes that have been reported from freshwater habitats worldwide.

We have been investigating diversity of freshwater Mitosporic fungi that decay woody debris submerged in the rivers, streams and lakes in the North Maharashtra region (India). Previous studies on the submerged freshwater Hyphomycetes from India were made by Natrajan and Udayian, 1978; Talde, 1981; Agarwal et al., 1991; Udayian 1991; Udayian and Hosagoudar 1991; Udayian and Manian 1991a; 1991b; Ramesh, 2002; Borse et al 2008, 2014; Shinde and Pawar, 2008, 2009; Patil and Borse 2012; Sridhar et al., 2010; 2011; Sudheep and Sridhar, 2011; Ghanwat and Reddy, 2011; Upadhyaya et al., 2012. The present article deals with two freshwater damatiaceous mitosporic species viz., Ellisembia adscendens (Berk.) Subramanian and Ellisembia repentioriunda Goh & Hyde which are described and illustrated in the present paper.

MATERIALS AND METHODS

Samples of various submerged woody debris supporting freshwater Mitosporic fungi were collected randomly during 2011-14 from different lentic and lotic habitats from North Maharashtra region. The samples were placed in plastic bags and sealed well in order to avoid moisture loss. On returning to the laboratory, samples with debris and fouling organisms were washed thoroughly with running tap water. Surface fouling organisms were scrapped off, following rinsing in tap water. The fresh samples were examined using a stereomicroscope for fungal growth. After initial observations, 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 Volkman-Kohlmeier and Kohlmeier (1996). Identification of isolated taxa were confirmed with the help of Goh and Hyde (1999). Reports of fungi studied were confirmed with the help of Bilgrami et al., (1991) and Jamaluddin et al., (2004).

Systematic account


The genus Ellisembia was proposed by Subramanian (1992), with Ellisembia coronata (Fuckel) Subramanian, as its type species. The genus is characterized by having, Conidiophores: simple, mononematous, brown, septate, proliferation none or percurrent and irregular. Conidia: gangliar, solitary, acrogenous, pseudoseptate, dry.

Type species: Ellisembia coronata (Fuckel) Subramanian

Habitat: Saprobic on plant debris.

Description: Based on Subramanian (1992).
   = *Sporidesmium adscendens* Berk., (1840).
   = *Clasterosporium adscendens* (Berk.) (1886).

**Colonies**: hairy, black. Mycelium: partly immersed and partly superficial, comprising branched, anastomosing, pale brown, smooth, 2-4 µm wide hyphae. Conidiophores: medium to dark reddish brown, solitary or rarely in groups of 2-3, sometimes arising from superficial hyphae, 20-45 x 5-8 µm. Conidia: flexuous, cylindric-obclavate, elongate, pseudoseptate, broadly rounded at the apex, obconically truncate at the base, medium to dark reddish brown, smooth, 150-500 x 14-17(20) µm.

**Habitat**: On submerged woody debris, 24th November, 2013, Cipna River, Semadoh, Leg. V.R. Patil

**Distribution**: Kerala: On dead wood (Rao and Mani Verghese, 1979); Maharashtra: On dead wood (Rao and Mani Verghese, 1980); on submerged wood (present studies); Andhra Pradesh: On dead wood (Rao Venugopal and Manoharachary, 1985); Madhya Pradesh: On dead stem (Sharma et al., 1989).

**Remarks**: The present fungus is rare in occurrence. The descriptions and measurements of conidia and conidiophores are completely agreed with that of *Ellisembia adscendens* (Berk.) Subramanian as provided by Goh and Hyde (1999). Therefore, it is assigned to that species.

**Figure 1**: *Ellisembia adscendens* (Berk.) Subramanian


**Colonies**: on natural substrate velvety, olivaceous brown. Mycelium: mostly superficial, comprising pale to medium brown, 2-3(3.5) µm wide, smooth or verruculose, septate, extensively ramifying hyphae. Conidiophores: brown on superficial smooth hyphae, with a knot of hyphae, 7-9 µm wide at the base, solitary or aggregated in groups of 2 to 3, straight flexuous, cylindrical, pale to medium brown, 15-35 x 3.5-4.5 µm, uniform in width and colour, unbranched, smooth, 0-2-septate, not cicatrized, sometimes with one precurrent proliferation. Conidia: obclavate, slightly rostrate, straight or slightly asymmetric, pale grayish brown, 30-45 x 7-9 µm, mostly with 6- pseudosepta, rarely 7-pseudoseptate, not constricted at the septa, apical cell usually hyaline, rounded at the tip, usually provided with a hyaline, subglobose (ca. 10-15 µm diam.) mucilaginous sheath, obconically truncate at the base and usually with a slightly darkened hilum.

**Habitat**: On submerged woody debris, 24th November, 2013, Cipna River, Semadoh, Leg. V.R. Patil

**Distribution**: Maharashtra: Saprobic on submerged wood (present studies).

**Remarks**: The present fungus is occasional in occurrence. The descriptions and measurements of conidia and conidiophores are completely agreed with that of *Ellisembia repentioriunda* Goh and Hyde (1999). Therefore, it is assigned to that species. It is being reported for the first time from India.

**Figure 2**: *Ellisembia repentioriunda* Goh & K.D. Hyde

**ACKNOWLEDGMENTS**

Authors are thankful to Management and Principal of S.V.S. Naik Arts, Comm. & Sci. college, Raver-425508, Maharashtra; Management of Navodaya Shalkshanic Sanshtas, Dule, Dule, Maharashtra and Management and Principal of S. S. V. P. Sansth's L. K. Dr. P. R. Ghogrey Science Collehe, Dule, Maharshtra for providing laboratory and library facilities. We are thankful to Dr. Angel Aguirre-Sanchez and authorities Smithsonian Tropical Research Institute, Washington, DC for providing pdf files of rare research articles on freshwater fungi.
REFERENCES


Printers and Publishers, New Delhi, pp. 798.


4. Borse BD, Jagdale PE & Patil SY, 2014. Freshwater Higher Fungi from Pune district (M.S, India): The

district, Maharashtra (India). Bioinfolet, 8: 359-362.


Fungal Diversity, 3: 57-85.

Freshwater Mycology (Eds. Tsui, C.K.M. & Hyde, K.D.), Fungal Diversity Press, Hong Kong,
pp. 325-343.

9. Ingold CT, 1975. An illustrated guide to Aquatic and Water-borne Hyphomycetes (Fungi Imperfect. with notes on their Biology.

308.


13. Ramesh Ch, 2002. Seasonal occurrence of water borne fungi in different streams of Uttar
Kannada region, Karnataka state, India. Kavaka, 30: 31-52.


204-244.

Acad. Sci, India, 56 (B): 395-396.


264.

streams of the Western Ghats by damp incubation and bubble chamber incubation.

Kali, southern India. EVRJ, 5: 1-14.


24. Talde UK, 1981. Aquatic Deuteromycetous fungi from Purna

647-649.

Bot, 15: 649-666.


28. Udayan K & Manian S, 1991b. Fungi colonizing wood in the Cooling tower water system at the Madras fertilizer company,


CITE THIS ARTICLE AS:
Patil VR, Patil SY and Borse BD, Aquatic Fungi From North Maharashtra-Ix. The Mitosporic Genus Ellisella

Source of support: Nil
Conflict of interest: None Declared