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### RESEARCH ARTICLE

#### MYCOSPHAERELLA LIMNETICA SP. NOV. (ASCOMYCETES) ON SUBMERGED WOOD FROM MAHARASHTRA, INDIA.

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#### Abstract

Mycosphaerella limnetica a new species in Pezizomycotina, Dothideomycetes, Capnodiales, Mycosphaerellaceae, encountered on decorticated submerged woody debris from a freshwater river (Aner, Maharashtra) in India, is described and illustrated. The characteristic features of the new species are: Ascomata: subglobose, semi-immersed, black, papillate, ostiolate with conical beak. Peridium: thick-walled, composed of cells of textura angularis. Pseudoparaphyses: absent. Asci: fissitunicate, 8-spored, 2-3 seriate, clavate, 90-120 x 14-20 µm, lacking stalk, rounded at the apex. Ascospores: one-septate, septum supra-median, upper cell broader and shorter than basal cell, clavate to cylindrical, multiguttulate, hyaline, becoming golden colored at maturity, with cylindrical gelatinous sheath which constricted at the septum, becoming elongated and diffuse in water.

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#### Introduction:-

Freshwater ascomycetes are defined as ascomycetous fungi which have been recorded in freshwater lentic and lotic habitats and complete part, or the whole of their lifecycle within freshwater environment, playing an important role in recycling organic matter (Shearer, 1993; Wong et al., 1998), and include lignicolous ascomycetes and their asexual state that grow on wood, leaves or asexual spores found in foam samples (Cai et al., 2006; Vijaykrishna et al., 2006). Shearer (1993) listed 288 species of ascomycetes that had been recorded from freshwater habitats; this number has grown to 622 species (Shearer et al., 2014; Cai et al., 2014).

The genus *Mycosphaerella* was introduced by Johanson (1884). Type species of the genus is *Mycosphaerella punctiformis* (Pers. & Fr.) Starback. The species of the genus are characterized by having, Ascomata: solitary or gregarious, globose, subglobose, conical or depressed, in some species surrounded by a hyphoid stroma or even enclosed in a compact stroma, immersed or erumpent, ostiolate, epapillate or with a short papilla, thin-walled to medium thick-walled. Peridium: composed of 1 to 4 layers of dark, polygonal cells. Pseudoparaphyses: usually absent; young ascomata filled with a pseudoparenchyma of thin-walled, polygonal or rounded, deliquescing cells. Asci: 8-spored, elongate-cylindrical, ventricose, ovoid or rarely short clavate, bitunicate, arising in a fascicle or parallel to each other from a small-celled ascogenous tissue at the base of the ascomata venter. Ascospores: bi-seriate or irregularly arranged, ellipsoidal to elongate, usually 3 times as long as wide, 1-septate near the middle, hyaline, in some species becoming brownish in age or surrounded by a gelatinous sheath. In this paper, we describe

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and illustrate a new species of *Mycosphaerella* that was found on decorticated submerged wood collected from a freshwater river Aner (Maharashtra) in India.

### Materials and Methods:-

The methods for collection and morphological characterization are outlined in Borse et al. (2016). Asci and hamathesia were mounted in India ink (Camel Band) for illustrations. The holotype specimen is deposited in the Herbarium Cryptogamiae Indiae Orientalis (H.C.I.O.), Division of Mycology and Plant Pathology, I.A.R.I. Pusa Campus, New Delhi, India (HCIO- 52062).

### Taxonomy

*Mycosphaerella limnetica* K.N. Borse, N. S Pawar and B.D. Borse sp. nov.

MycoBank No: Mycobank: MB 830068, Figs 1, 2

**Holotype:** INDIA, Aner dam (on Aner river, Shirpur), Dhule, Maharashtra, on submerged wood, 26 Jan 1998, leg. K. N. Borse (HCIO- 52062).

### Description

Ascomata: globose to subglobose, superficial or immersed, 230-470  $\mu\text{m}$  diam., brown, ostiolate with conical beak. Peridium: thick-walled, composed of cells of *textura angularis* to *globosum*. Pseudoparaphyses: absent. Asci: fissitunicate, 8-spored, 2-3 seriate, clavate, 90-120 x 14-20  $\mu\text{m}$ , lacking stalk, rounded at the apex. Ascospores: one-septate, septum suprmedian, upper cell broader and shorter than basal cell, clavate to cylindrical, multigattulate, hyaline becoming golden, upper cell 13.0-20.5 x 10-14  $\mu\text{m}$ , lower cell 6-13 x 3-5  $\mu\text{m}$ , with cylindrical gelatinous sheath which constricted at the septum, becoming elongated and diffuse in water,

**Etymology:** From the Greek, 'limn' meaning standing water referring to freshwater habitat.

**Anamorph:** Not known

### Discussion

The general characteristics of the present collection fit within the concept of the genus *Mycosphaerella* which was introduced by Johanson (1884). *M. limnetica* differs markedly from the other freshwater and marine species of the genus: i) The present taxon is not substrate specific as many other species of the genus are parasitic and occur on specific substrate, ii) Ascomata are more than 230  $\mu\text{m}$  as in other aquatic species lesser than 175  $\mu\text{m}$  in diameter, iii) Asci are longer than 90  $\mu\text{m}$  as in other aquatic species shorter than 65  $\mu\text{m}$ , iv) Ascospores are more than 10  $\mu\text{m}$  as in other aquatic species lesser than 8.5  $\mu\text{m}$  in diameter. Comparison of marine and freshwater species of the genus with the present fungus is provided in the Table 1.

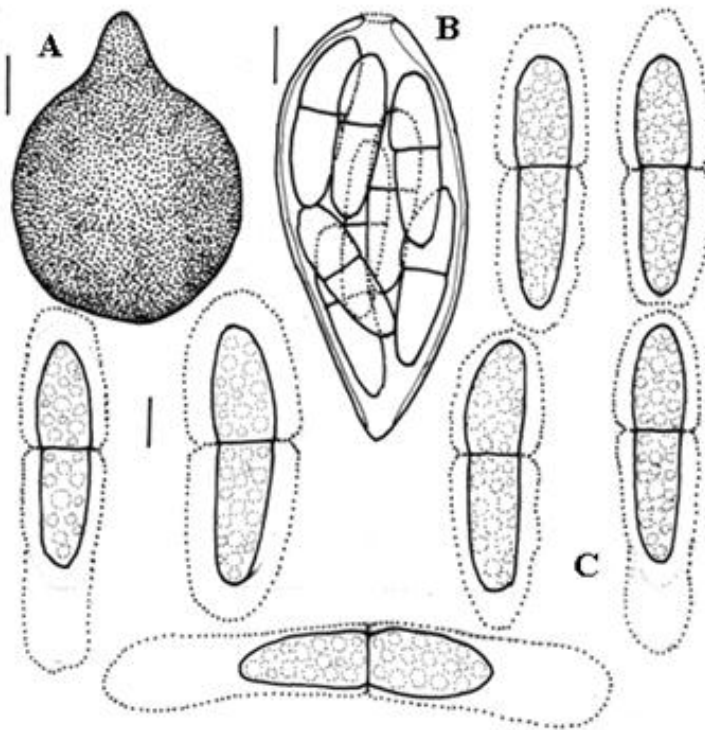
**Table 1:-** Comparison of morphological characters of *Mycosphaerella limnetica* and freshwater and marine species

Species	Ascomata	Asci	Ascospores	Habitat
<i>M. limnetica</i>	230-470 $\mu\text{m}$ diam.	90-120 x 14-20 $\mu\text{m}$	13-20.5 x 10-14 $\mu\text{m}$ , with sheath	Freshwater, saprobic on submerged decorticated wood
<i>M. aquatica</i> (Cooke) J.H. Mill. (Cooke, 1883, Miller, 1941)	---	---	20 x 04 $\mu\text{m}$ , without sheath	Freshwater, parasitic on leaves of <i>Quercus aquatica</i>
<i>M. ascophylli</i> Cotton (1907)	65-130 x 80-90 $\mu\text{m}$	50-60 x 18-20 $\mu\text{m}$	18-21 x 4-5 $\mu\text{m}$ , without sheath	Marine, symbiotic on algae <i>Ascophyllum nodosum</i> and <i>Pelvetia canaliculatum</i>
<i>M. marina</i> Deakin (Swinscow, 1965)	100-150 $\mu\text{m}$ diam.	30-40 x 10-15 $\mu\text{m}$	10-15 x 4-6 $\mu\text{m}$ , without sheath	Marine, parasitic on lichen thalli of <i>Verrucaria mucosa</i> and <i>V. microspora</i>
<i>M. pneumatophorae</i> Kohlm.	90-170 x	37-60 x 15-	14-18 x 7-8.5 $\mu\text{m}$ ,	Marine, saprobic on

(Kohlm. & Kohlm., 1979)	110-175 $\mu\text{m}$	21 $\mu\text{m}$	without sheath	pneumatophores of Avicennia species
M. salicorniae (Rabenh.) Lindau (Kohlm. & Kohlm., 1979)	22-80 x 24-80 $\mu\text{m}$	20-40 x 10-18 $\mu\text{m}$	10-18 x 3.6 $\mu\text{m}$ , with sheath	Marine, saprobic on Salicornia and Suaeda species
M. staticicola (Pat.) Dias. (Kohlm. & Kohlm., 1979)	60-80 x 60-120 $\mu\text{m}$	30-50 x 14-18 $\mu\text{m}$	12-15 x 4-6 $\mu\text{m}$ , without sheath	Marine, saprobic on Armeria and Limonium species
M. suaedae-australis Hansf. (Kohlm. & Kohlm., 1979)	Above 150 $\mu\text{m}$ diam.	60 x 13 $\mu\text{m}$	18-20 x 3-3.5 $\mu\text{m}$ , without sheath	Marine, saprobic on Suaedae-australis

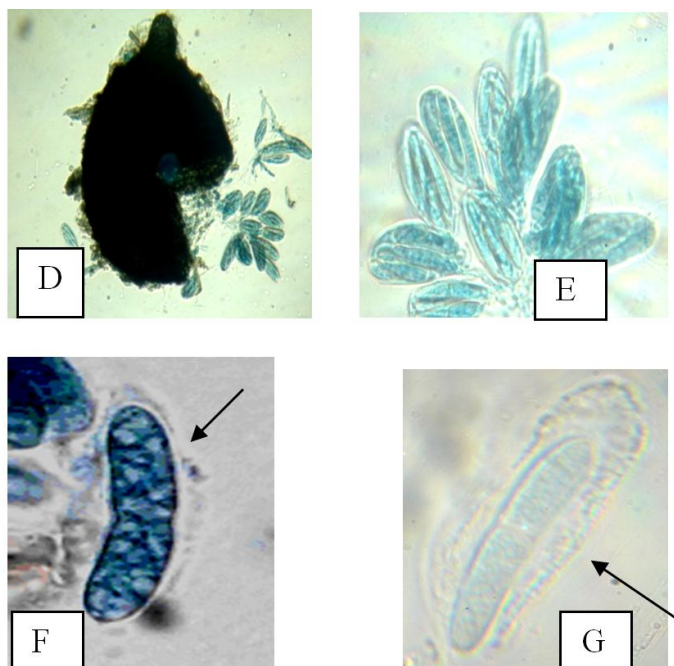
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**Fig. 1:-** Mycosphaerella limnetica

A.Ascogonia from submerged wood, B.Ascus, C.Ascospores with sheath (arrow). Scale bars: A=20  $\mu\text{m}$ ; B-C=10  $\mu\text{m}$ )



**Fig. 2:-** *Mycosphaerella limnetica*

D. Ascogonium, E. Asci, F. Ascospore with sheath (arrow), G. Ascospore with sheath (arrow).

### References:-

1. Borse, B.D., Tuwar, A.R., Patil, V.R., Pawar, N.B., Patil, S.Y. & Borse, K.N. (2016). Aquatic Ascomycetes from India: The genus *Savoryella*. *Sci. Park Res. J.*, **3**: 1-5.
2. Cai, L., Hyde, K.D. & Tsui, C.K.M. (2006) "Genera of freshwater fungi", Fungal Diversity Press, Hong Kong, China. pp. 1-261.
3. Cai, L., Hu, D.M., Liu, F., Hyde, K.D., & Jones, E.B.G. (2014) The molecular phylogeny of freshwater Sordariomycetes and discomycetes. In: "Freshwater Mycology and Fungal-Like Organisms", Walter de Gruyter, GmbH, Berlin, Germany, pp. 47-71.
4. Cooke, M.C. (1883) On *Sphaerella* and its allies. *The Journal of Botany*. **21**: 106-110.
5. Cotton, A.D. (1907) Notes on marine Pyrenomycetes. *Trans. Br. Mycol. Soc.*, **3**: 92-99.
6. Johanson, C.J. (1884) *Svampar Fran Island. Oefvers. K. Vetensk.-Akad., Foerh.*, **41**: 157-174.
7. Kohlmeyer, J. & Kohlmeyer, E. (1979) *Marine Mycology: The Higher Fungi.*, Academic press, New York, pp. 689.
8. Miller, J.H. (1941) Georgia Pyrenomycetes. II. *Mycologia*, **33**: 74-81.
9. Shearer, C.A. (1993) Freshwater Ascomycetes. *Nova Hedwigia*, **56**: 1-33.
10. Shearer, C.A., Pang, K.L., Suetrong, S. & Raja, H.A. (2014) Phylogeny of the Dothideomycetes and other classes of freshwater fissitunicate Ascomycota. In: "Freshwater Mycology and Fungal-Like Organisms", Walter de Gruyter, GmbH, Berlin, Germany, pp. 25-45.
11. Swinscow, T.D.V. (1965) The marine species of *Arthopyrenia* in the British Isles: Pyrenocarpous lichens-8. *The Lichenologists*, **3**: 55-64.
12. Vijaykrishna, D., Jeewon, R. & Hyde, K.D. (2006) Molecular taxonomy, origin and evolution of freshwater Ascomycetes. *Fungal Diversity*, **23**: 351-390.
13. Wong, M.K.M., Goh, T.K., Hodgkiss, I.J., Hyde, K.D., Ranghoo, V.M., Tsui, C.K.M., Ho, W.H., Wong, S.W. and Yuen, T.C. (1998) The role of fungi in freshwater ecosystems. *Biodivers. Conserv.*, **7**: 1187-1206.