



## STUDY OF THE GENUS: *HELICOMYCES* LINK AERO-AQUATIC HYPHOMYCETES FUNGI IN BHIMA BASIN OF AHMEDNAGAR DISTRICT (MAHARASHTRA)

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### ABSTRACT:

The present paper deals with freshwater higher fungi (The Aero-Aquatic Hyphomycetes) from Ahmednagar district (Maharashtra). These species of fungi belonging to three sp. of Hyphomycetes in one genera) of freshwater higher fungi. These fungi were encountered on decaying submerged wood and leaves. Conidia of some fungi encountered in foam samples. The data provide information on the distribution of these fungi in India, apart from description and illustrations. The taxonomy, morphology and ecology of these fungi are discussed.

**Key words:** - Aero-Aquatic Hyphomycetes, Bhima basin, foam samples

### INTRODUCTION:

Ahmednagar district (Maharashtra state) is located between 18°2' and 19°9' North latitude and 75°9' and 75° 5' East longitude and is situated partly in the upper Godavari basin and partly in the Bhima basin. It is bounded on north-east by Nashik and Aurangabad districts, on the east by Beed and Osmanabad districts, and on the south by Solapur district. The major part on the west is surrounded by Pune district. On the north-west it is surrounded by Thane district. It is occupying more or less the central position in the state with an area of 17,035 sq km. The district at present is divided into 14 revenue talukas. The main rivers are Godavari, Pravara, Mula, Bhima, Sina and Dhora (Pradhan and Singh, 1999).

The aero-aquatic Hyphomycetes were first termed by van Beverwijk (1951 a, b; 1953; 1954). Later Fisher (1977) defined them as indwelling organisms characterized by the production of purely vegetative mycelium in substrates under

water and formation of conidia with special flotation devices, formed only when the substrates on which the fungus is growing are exposed to a moist environment. These fungi are usually found in stagnant ponds, ditches, or slow flowing water and are capable of vegetative growth on submerged leaves and woody substrates under semi-anaerobic conditions.

These multicellular dispersal units are morphologically diverse, but all have one feature in common; they entrap air between in their cells, therefore float on air-water interface (Webster and Descals, 1981; Michaelides and Kendrick, 1982; Goh and Hyde, 1996). These Hyphomycetes with special flotation or air-trapping device were dispersed from one static water habitat to another by the topography, contour and environmental conditions of ponds or ditches and substrate-water interface (Fisher 1977; Subramanian, 1983; Webster and Descals, 1981). The conidia or forms of propagules are

mostly coloured. They are often tightly helicoids in more than one plane. Examples of these fungi are *Helicomycetes*, *Helicoon*, and *Helicodendron* etc.

In the present paper Freshwater higher fungi from Ahmednagar district (Maharashtra) are reported. These include threespecies of fungi belonging to one genera The Aero-Aquatic Hyphomycetes of freshwater higher fungi. The data provide information on the distribution of these fungi in the Ahmednagar district (Maharashtra) and India, apart from illustrations.

#### **MATERIALS AND METHODS:**

Sample of foam, submerged decaying wood and submerged decaying leaves were collected from various localities along major streams and water reservoirs from Ahmednagar district (Maharashtra state). The survey was undertaken for two years during 2013-2015. The sample analysis was done by the following methods:

1) Wood analysis:-Submerged woody debris was collected and placed in polythene bags from various streams, rivers and lakes. Samples were transported to the laboratory. Collections contaminated by sediments or fouling organisms were washed with tap water. Specimens were observed for sporulating structures (Ascomata and conidia). After initial observations, samples were placed in plastic boxes and after one week periodically examined for the presence of fungal fruiting bodies.

2) Leaf litter analysis: -Submerged leaves were collected from sampling sites and brought to the laboratory in polythene bags. They were washed in tap water and finally in distilled water. They were cut into small bits and incubated, separated in Petri dishes containing distilled water at laboratory temp. (25-30°C). The water was replaced in Petri dishes once in three days to minimize the growth of bacteria and other aquatic organisms (algae, animals etc.). The leaf bits were screened under microscope at 72 hour intervals

for 60 days to detect the water borne fungi appearing on margin and petiole of the leaves.

3) Foam analysis:-Foam samples were collected in wide mouthed plastic bottles and kept for 24 hours to enable the foam to dissolve. It was preserved by adding FAA to yield 5% foam solution. Then samples were scanned under high power of a microscope using 10x or 15x eyepieces for the presence of conidia of Hyphomycetes.

The slides were made permanent by using double cover glass method (Volkmann-Kohlmeyer and Kohlmeyer, 1996). The measurement of various parts of fungi were taken and used in the identification and classification of different species. Reports of fungi from India and Maharashtra state were confirmed with the help of Bilgrami et al. (1979, 1981, 1991), Sridhar et al. (1992), Sarbhoy et al. (1975, 1986, 1996), Jamaluddin et al. (2004), Borse et al. (2014), Patil and Borse (2015) and other relevant literature.

#### **RESULT & DISCUSSION:**

##### **Genus: *Helicomycetes* Link**

The genus was introduced by Link in 1809, with *H. roseus* Link as its type species. The species of the genus are characterized by having, *Colonies*: effuse to arachnoid or tuberculate, white to pinkish, or becoming brownish in age. *Mycelium*: immersed or superficial, composed of branched, septate, hyaline to dilute fuscous hyphae. *Conidiophores*: lacking or formed as short, lateral branches of the repent mycelium. *Conidiogenous cells*: mono- or polyblastic, producing conidia from the apex, or synchronously and /or successively from short denticles. *Conidia*: hyaline, dry, hygroscopic, frequently uncoiling in water. *Conidial filament*: coiled 1-8 times, usually in one plane to form a disk-like body, but sometimes in three planes and resembling a loosely coiled spring; basal cell attached eccentrically; conidial secession schizolytic. The genus is represented by 12 species (Zhao et al., 2007).

### 1) *Helicomyces colligatus* R.T. Moore

**Colonies:** Effuse coraceous, coarsely flocculose or nearly crust-like, pale rose when fresh; when old composed almost entirely of conidia. **Mycelium** and **conidiophores:** not apparent, when young the whole stratum composed of semi agglutinated mycelium, conidia and conidiophores; conidia arising directly from the mycelium or else borne on robust conidiophores up to 45 µm tall. **Conidia:** loosely coiled 1-2 times, hygroscopic, multiseptate at maturity, each cell containing one large vacuole or two smaller ones; filament tapering at both ends, the basal end 3.5 µm broad, filament enlarging to 8 µm broad in the middle and becoming slightly less at the distal end, easily broken into segments; diameter of coils 50-60 µm.

### 2) *Helicomyces roseus*

**Colonies:** effuse. **Mycelium:** immersed and superficial, fuscous composed of branched, septate, hyphae. Stalked sclerotia often present. **Conidiophores:** short, pale brown, mostly as lateral branches of the repent mycelium. **Conidiogenous cells:** mono- or polyblastic, developing as denticles on the repent hyphae, or as the terminal cell of the conidiophores. **Conidia:** hyaline, white to pinkish in mass, frequently with hyaline secondary conidia, 25-60 µm in diam. **Conidial filament:** 4-5 µm in diam, multiseptate, tapering to an enlarged, obliquely flattened basal cell, coiled 2 ¼ -3 times.

### 3) *Helicomyces torquatus* Lane & Shearer

**Colonies:** floccose, light brown to dark blackish-brown on aging. **Mycelium:** immersed, composed of branched, septate, hyphae, subhyaline to light brown. **Conidiophores:** micronematous formed laterally on repent hyphae, 2-3-septate, 19-56 x 4-5 µm. **Conidiogenous cells:** monoblastic, hyaline, 12-24 x 4-5 µm. Conidia produced holoblastically, terminally, and singly at tips of conidiogenous cells, seceding schizolytically from conidiogenous cells. **Conidia:** hyaline, multiseptate, dry, coiled 2 to 3 times, 58-132 µm

diam, end cells broadly spathulate, end of basal cell bearing flattened attachment scar. Conidia in water are hydrophilic and floating or unwinding to assume a torque-like or sigmoid form, 372-528 x 5-7 µm.

About 1.7 million species of fungi are estimated to occur in the world (Hawksworth, 1991). Above 1,00,000 species of fungi are known from all over the world (Kirk et al., 2008). Thus, only 5 % of the total number of fungi species are so far been recorded and the remaining are still to explore and their ecological role yet to be determined.

In the present work extensive collections of higher freshwater fungi were made from Ahmednagar district. Most of the fungi were found on naturally submerged woody debris and conidia of mitosporic fungi in foam sample and few on submerged leaf litter. The present work highlights on several unrecorded freshwater fungi from India.

Studies of these fungi help us to elucidate the fungi involved in decomposition of dead organic material in freshwater and will provide better understanding of the aquatic ecosystems. Diversity on higher freshwater fungi has been more or less neglected from Maharashtra and very few reports of these fungi have been recorded (Borse et al., 2014; Patil and Borse, 2015). As such, this is more or less a pioneering work in this region so far as the higher freshwater fungi are concerned.

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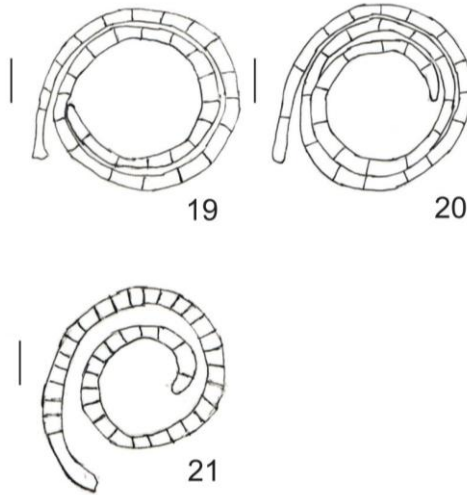
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Sr.no	Name of Fungi
1	<i>Helicomycetes colligatus</i> R.T. Moore
2	<i>Helicomycetes roseus</i> Link
3	<i>Helicomycetes torquatus</i> L.C. Lane & Shearer

Table shows three species of Aero Aquatic Hyphomycetes (Table;-1)

**Figures of Helicomycetes**



**PLATE NO - VI**

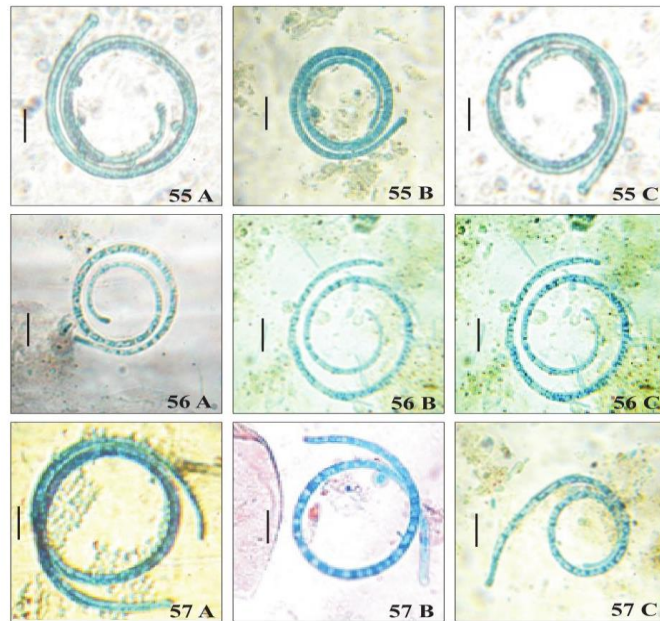


Photo plates of Helicomycetes