Freshwater Ascomycetes — The unseen fungi in fresh water habitats
by Huzefa Raja and Carol Shearer

Beneath the quiet waters of a small lake, bog, swamp or within the waters of a running brook or river, unseen but active, a distinctive group of fungi lives and reproduces. The filamentous bodies of these fungi invade submerged plant substrates (dead stems and leaves of herbaceous and woody plants). These fungi are called the freshwater ascomycetes. Freshwater ascomycetes are **microscopic fungi** that decompose leaves and wood that fall or are washed into aquatic habitats. These fungi play an important role in aquatic ecosystems by breaking down complex plant materials into more digestible components that can then be used by aquatic invertebrates as a food source. Predators such as amphibians and fish then eat the aquatic invertebrates.

The ascomycetes grow vegetatively as long, septate filaments (hyphae) about 3-5 microns wide, but eventually undergo sexual reproduction to produce a fruiting body in the shape of a disc, cup or flask with a narrowed neck. Most of the freshwater ascomycetes are very small (fruiting bodies are usually less than 0.5 mm in diameter) and cannot be seen in detail without the aid of a microscope. Within the fruiting body they reproduce sexually to form ascospores in a sac (ascus). The ascospores are liberated from the ascus in a variety of ways and are then dispersed via water currents to new substrates. The ascospores may be variously shaped: round, oval or long and filamentous. Many of the ascospores are equipped with gelatinous appendages or sheaths that are thought to help them attach to substrates in flowing or moving water (See photos).

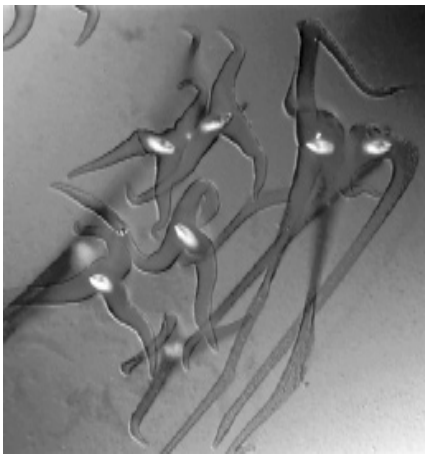
Some species also reproduce asexually by forming conidia or mitospores that are branched or long and filamentous, features that help them attached to substrates in moving water. These fungi are referred to as Ingoldian fungi or aquatic hyphomycetes (in reference to Prof. C.T. Ingold, who was the first to recognize this distinct ecological group of fungi in freshwater habitats).

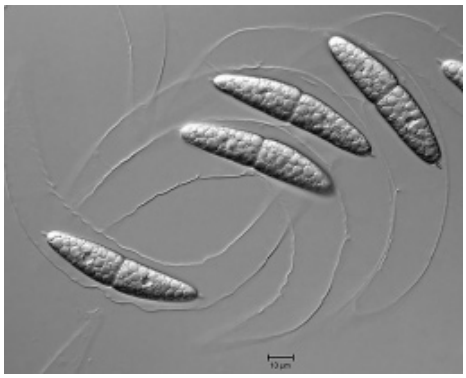
Biodiversity

Currently, ~ 570 species of freshwater ascomycetes and ~ 290 species of Ingoldian fungi have been reported in the literature, mostly from North America, Europe, and South East Asia. For freshwater ascomycetes this number includes species collected and described exclusively from freshwater habitats like streams, and lakes, as well as species reported from wet or moist habitats.

Readers are encouraged to check our website on the Freshwater Ascomycetes for more information on species morphological characteristics (found in "Species Monograph"), and their geographical, habitat and substrate distributions (found in "World Records"). In addition, the website provides information on the systematics of freshwater ascomycetes and literature citations to over 300 papers on this group of fungi. We hope the next time you visit an aquatic habitat and see wood and herbaceous material floating or submerged in the water – you will know that there is a distinctive group of fungi that live on it called the Freshwater Ascomycetes!

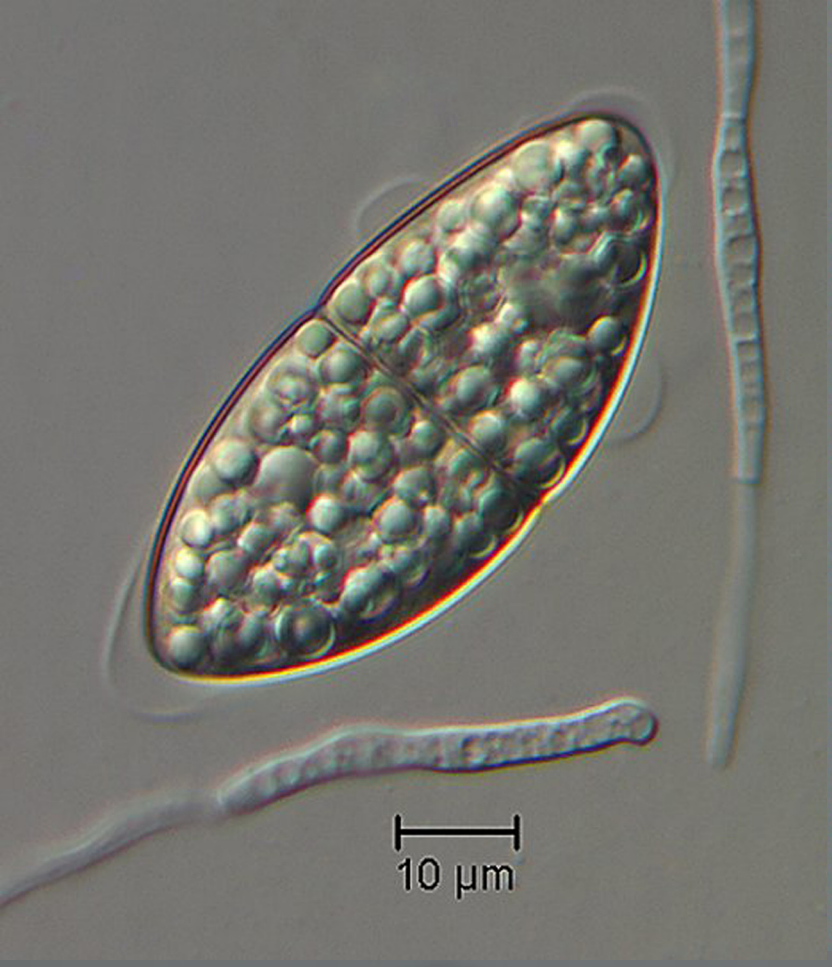
Freshwater Ascomycete website: http://fungi.life.uiuc.edu/

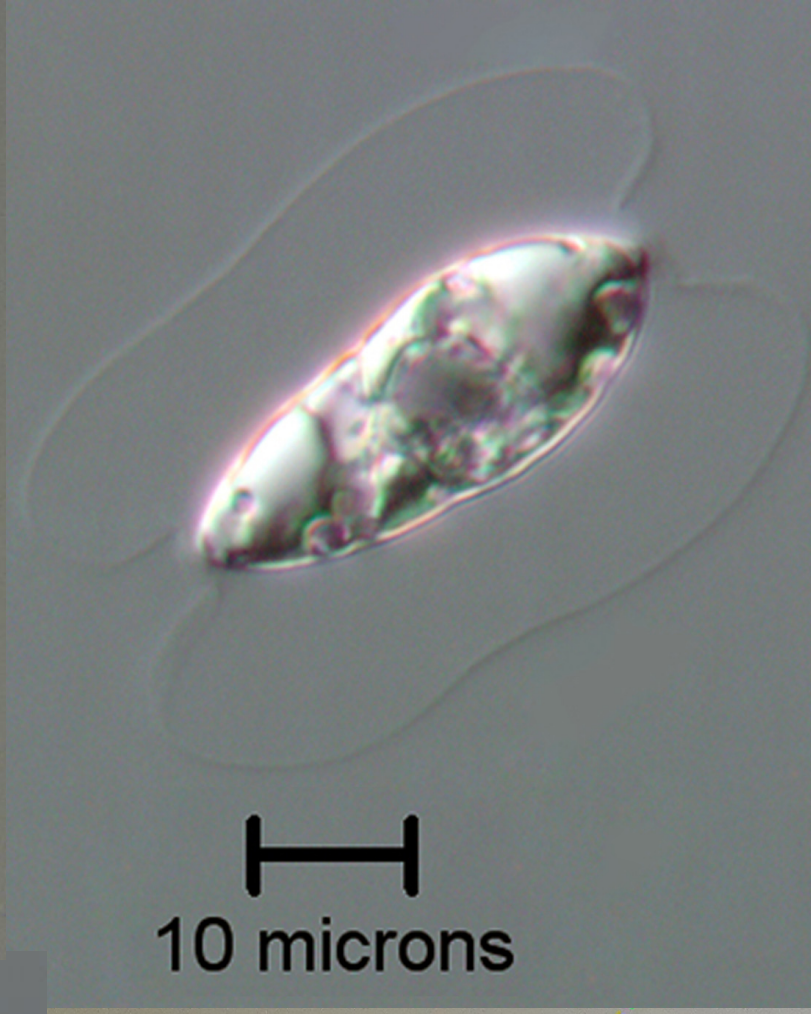




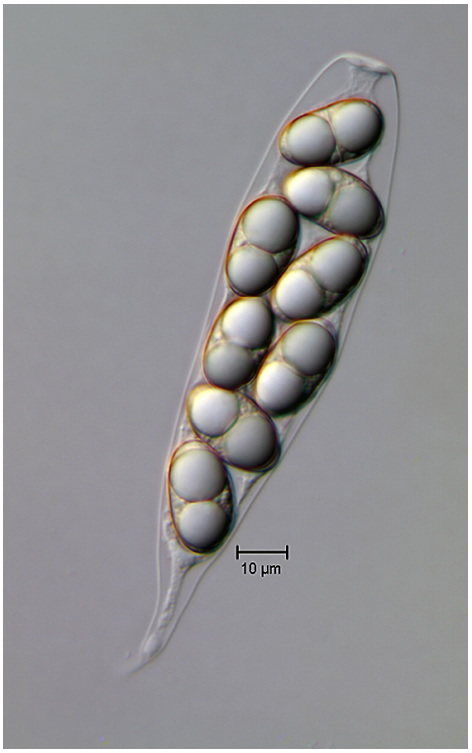
Top two photos: *Ascovaginospora* by Dr. Payam Fallah. Most aquatic fungi have a gelatinous sheath surrounding them. This helps the spore stick to stuff that it would like to eat as it tumbles through the water. But this one has arms and spikes that serve the same purpose, wedging it into place.

Bottom photo is *Aliquandostipite crystallinus*, photo by Huzefa Raja. The trailing gelatinous sheathes are clearly visible.





Clockwise from upper left:*Jahnula potamophila*, photo by Carol Shearer. In this one, the gelatinous sheath surrounding the spore can be seen.
Second is *Alascospora evergladensis*, this one has pontoons. In the next photo, we see spores of *Annulatascus velatisporus* being ejected from their ascus; and finally *Lucidascocarpa pulchella* which has a much bigger sheath than usual, Last 3 photos by Huzefa Raja.



Top left: *Aniptodera megaloascocarpa* ascus, photo by Huzefa Raja.

Top right:Ascus (spore development chamber) of *Megalohypha aqua-dulces,* photo by Astrid Ferrer.

Photo to left is an ascus of *Aniptodera inflatiascigera*, photo by Huzefa Raja. The spores develop here and will be ejected through the opening at the top right.