

Ecology of lower fungi in litter decomposition in aquatic habitat*

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Certain chytrids, such as *Polyphagus*, *Woronina*, *Octomyxa* etc. were found growing on the surface of decaying leaves in fresh water ponds colonizing *Euglena* and Saprolegnial hosts, such as *Saprolegnia* and *Achlya* and appeared to play important role in food-web and litter decomposition in aquatic habitats.

Key-words - Fungi, chytrids, Saprolegniales, aquatic ecology, food-web.

INTRODUCTION

A great deal of work has been done on isolation and taxonomy of chytrids (Paterson, 1967; Sparrow, 1968; Willoughby, 1961 a,b, but little is known about their role in community development and litter decomposition in aquatic habitats. The ubiquity and their large number testify their potential importance. An attempt has been made to study the role of lower fungi, especially Chytridiomycetes, in litter decomposition and their contribution in the energy budget and food-web. The results have been embodied and discussed.

MATERIAL AND METHOD

Members of Chytridiomycetes were obtained by incubating freshly fallen and decaying leaves from the banks and bottom of stagnant water bodies, viz., Kukrail lake, Paper mill pond, garden pond (Botany Department) and Suraj Kund pond in the city of Lucknow, harbouring anchored and free floating hydrophytes. Leaves of *Holoptelea integrifolia* and *Pithocellobium dulce* growing on the banks of water bodies formed the major component of freshly fallen leaf litter. These leaves were incubated in a moist chamber on a tissue paper in sterile petridishes at 25°C and were observed daily for the appearance of fungi (Fisher, 1978). *Polyphagus* species was obtained in pure culture by placing it on the colony of *Euglena* sp. which was parasitized by it. Water-moulds, viz., *Achlya*, *Dictyuchus* and *Saprolegnia* were obtained in pure cultures on sterilized leaf discs of freshly fallen leaves of *Pithocellobium dulce*.

RESULTS AND DISCUSSION

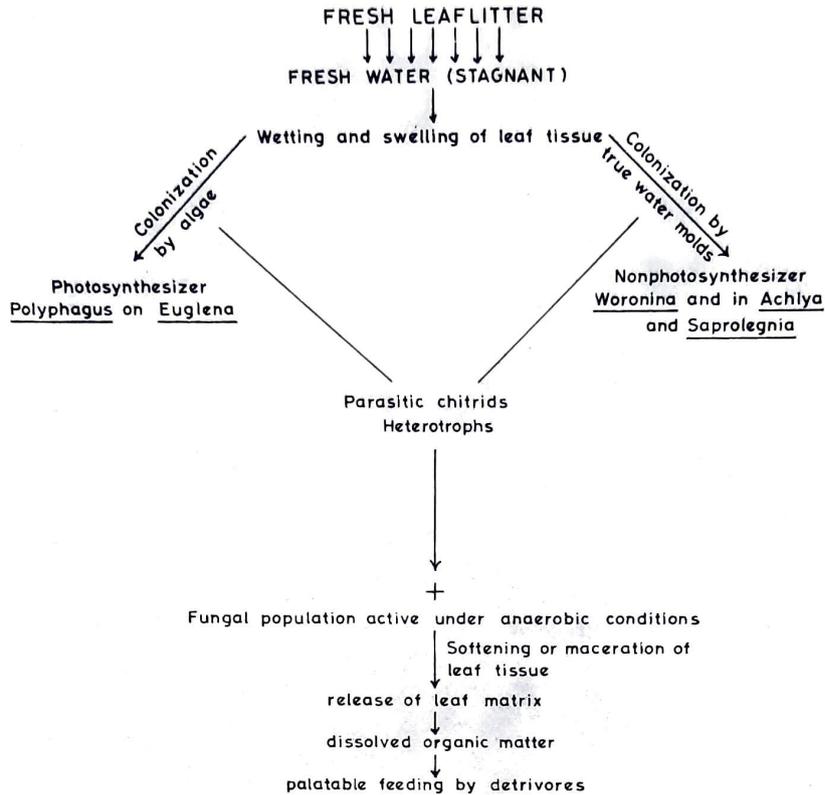
Three chytrids - *Polyphagus*, *Woronina* and *Octomyxa* were observed parasitizing *Euglena* sp., *Saprolegnia* sp. and *Achlya* sp., respectively. Two species of *Polyphagus* were observed growing inside a species of *Euglena* exhibiting germination of prosporangia (Pl.1, fig. 1) or stages in the development of zoosporangia (Pl 1, fig. 2). A species of *Woronina* was obtained growing as cystosorus (Pl 1, fig. 3) inside a saprolegnial host; may be *Saprolegnia* or *Achlya* (The genus could not be confirmed as reproductive structures were not present). The *Woronina* in its morphology of cystosorus resemble *W. polycystis* Cornu., which is an endoparasite of many Saprolegniales (Sparrow, 1943). A third chytrid obtained, was found to be very near to the genus *Octomyxa* (Pl. 1, fig. 4.) The identity of the genus could not be confirmed.

The Oomycetes consists of five genera, viz., *Aphanomyces*, *Achlya*, *Dictyuchus* (Pl. 1, fig. 5), *Pythium* and *Saprolegnia* sp. (Pl. 1, fig. 6). Of these, *Achlya*, *Dictyuchus* and *Saprolegnia* species were observed degrading the leaf discs of freshly fallen litter as leaf tissue near the veins was found disintegrating, but *Pythium* sp. could not colonize the leaf discs.

The presence of Chytridiomycetes and Oomycetes on leaf litter is an indication that these fungi may be playing some direct or indirect role in the litter decomposition in aquatic habitats. A hypothetical scheme is presented in text-figure 1. The absorption of water by freshly fallen leaves results in the swelling of their tissues, making the nutrients to leach

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Text-figure 1. Role of parasitic chytrids in litter decomposition and food web in the aquatic system.

out in the surrounding environments. The photosynthesizer, i.e. algae and non-photosynthesizers water-moulds (Chytrids and Oomycetes) colonize the degrading leaves. The residential phylloplane fungi, under anaerobic conditions also contribute to the degradation of leaf litter attracting the detritivores.

Oomycetes has been reported as early colonizers of leaf litter and cellulosic materials in fresh water environments (Apinis *et al.*, 1972; Taligoola *et al.*, 1972; Park & Mckee, 1978). Senescent leaves release substantial quantities of easily decomposable carbohydrates soon after submergence, which attract other microflora and fauna. Cooke and Rayner

PLATE 1

- 1 & 2. *Polyphagus* sp. 1. Germinating prosporangia in *Euglena* sp., X 600.
2. Stages in development of zoosporangia, X 600.
3. *Woronina*, cysts in *Saprolegnia* host, X 600.
4. *Octomyxa*, cysts in *Saprolegnia* host, X 600.
5. *Dictyuchus* sp., zoosporangia, x 140.
6. *Saprolegnia* sp., Oogonia and oospores, X 140.

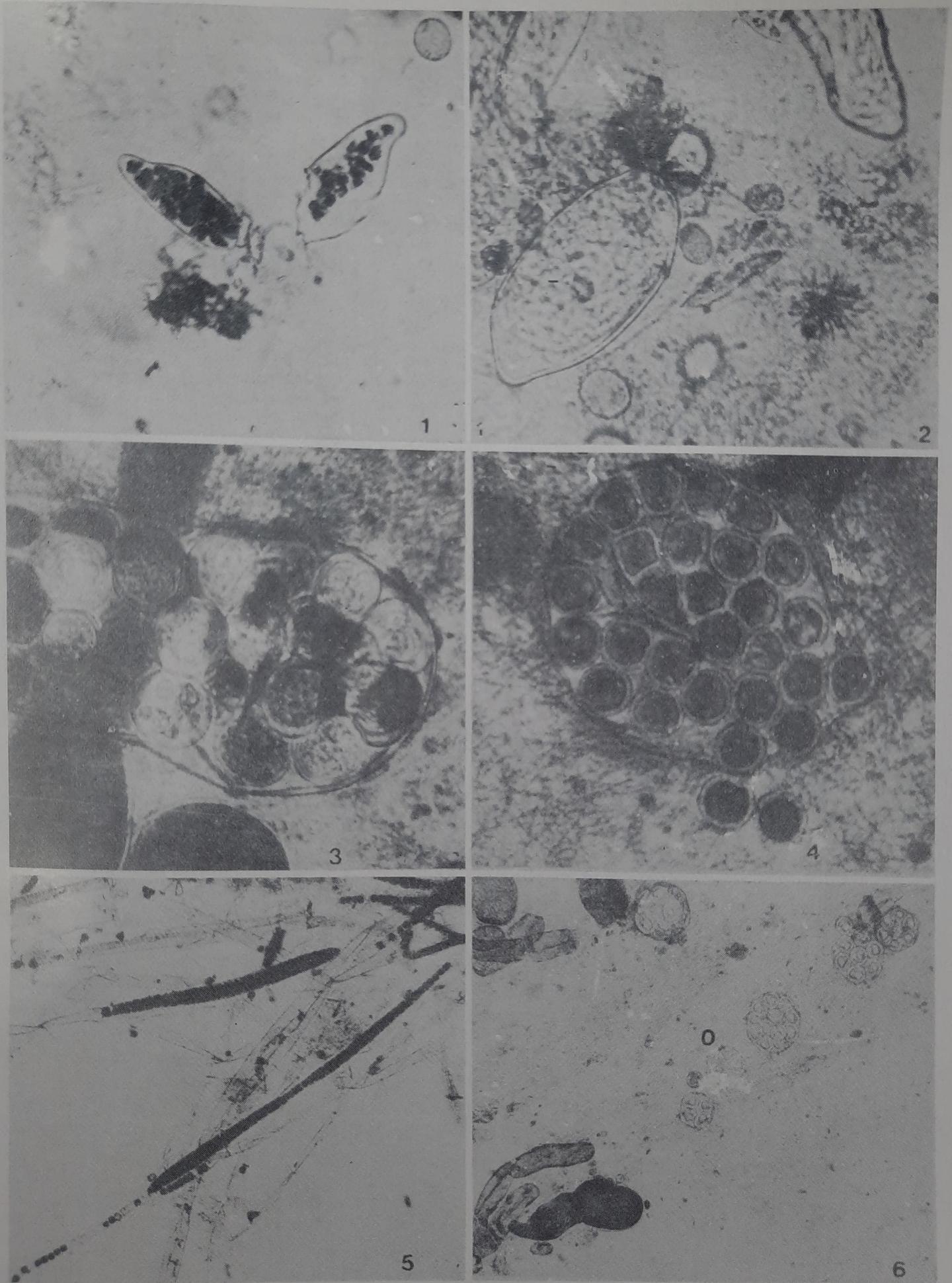


PLATE 1

(1984) have also mentioned that chytrids, because of their restricted local activity, get outnumbered by filamentous fungi resulting in the early decline of chytrid population. Most Chytridiomycetes are of little direct economic importance, but fungi like *Polyphagus* sp. which parasitizes *Euglena* sp. by destroying it deletes a link in the food chain of aquatic animals. The colonization observed that *Achlya* sp. could degrade leaf discs of *Aglaia elaeagnoides* and opined that fungal colonization rendered leaves more palatable and nutritious for aquatic animals. These studies clearly indicate that Chytrids and water moulds play important role in the productivity of fresh water systems and contribute much to the energy budget and food-web.

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