Occurrence of parasitic and predatory fungi and fungus-like organisms in different water reservoirs of Podlasie Province of Poland

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Abstract. Studies concerning the occurrence of some parasitic and predatory fungi and fungus-like organisms, collected in different water reservoirs: springs, lakes, and ponds of Podlasie Province, were made in the years 2001-2004. Bait method was used to isolate the fungi and fungus-like organisms. The following species of parasitic and predatory fungi and fungus-like organisms were found: *Ancylistes netrii, Arthrobotrys brochopaga, A. dactyloides, A. oligospora, Euryancale sacciospora, Sommerstorffia spinosa, Zoopage phanera, Zoophagus insidians,* and *Z. tentaclum.*

Key words: aquatic fungi, aquatic fungus-like organisms, lakes and ponds, Poland, rivers, springs

Introduction

Fungi and fungus-like organisms were found on dead substrata, though there are several species which are parasites on algae and aquatic organisms both invertebrates and vertebrates. Parasitism of aquatic animals and saprotrophic existence on dead bodies and sloughed remains have always been recognized. Parasites on nematodes and rotifers, arthropods and vertebrates deserve special attention since they bridge the freshwater and marine environments, but with different and possibly phylogenetically distantly related species (Dick 2001). A separate group of aquatic fungi is the group of predatory species which grow freely in the aquatic environment and catch as a prey some invertebrate animals in their surroundings. About 200 species of predatory molds are recentlly known in the world (Czygier & Boguś 2001). These fungi and fungus-like organisms are saprobionts in conditions of a good nutrient level. Being short of nitrogen, they become parasites and predators (Barron 2003). The main aim of the present study was to establish the diversity of parasitic and predatory fungi and fungus-like organisms found in different water reservoirs in Podlasie Province of northeastern Poland.

Materials and Methods

The material was collected from the following water reservoirs: springs (Bagnówka, Cypisek, Dojlidy Górne, Dolistówka, Jaroszówka, Pólko, Rybnik, and Sobolewo), ponds (Akcent, Białowieża, Dojlidy, and Palace), lakes (Hańcza, Komosa, and Wigry), and rivers (Biała, Bug, Czarna, Czarna Hańcza, Narew, Sokołda, and Supraśl) of Podlasie Province from Poland.

Bait method with the use of onion skin (*Allum cepa*), hemp-seeds (*Cannabis sativa*), crucian carp spawn (*Carassius carassius*), and snake skin (*Natrix natrix*) as a bait, was applied to isolate fungi. The bait was placed in one-liter containers and poured with water from the respective site. The containers were covered with glass plates, at least partly to protect the water from penetration by bacteria. The samples were stored for approximately one month in a laboratory at the same temperature as that measured in the respective water reservoir, spring, river, pond or lake. The light and temperature were regulated to resemble natural thermal and light conditions. Microscopically determined mycelia were removed from the baits and transferred to sterilized Petri plates containing distilled water. The microscopic examination of the mycelia

was repeated after a few days. Several microscopic preparations were made each time. Identification of the aquatic fungi and fungus-like organisms involved measurement and determination of the vegetative organs – shape and size of the hyphae, asexual reproductive organs – shape of sporangium and spores, and generative organs – the structure of the oogonium, oosporangium and antheridium (zoosporic fungi), and conidiophores and conidia (anamorphic hyphomycetes). Fungi and fungus-like organisms were identified according to the works of Dudka (1974), Batko (1975), Ingold (1975), Fassatiova (1983), and Dick (1990).

Results

During the long-term studies of organisms in water reservoirs, the presence of several species of parasitic and predatory fungi and fungus-like organisms were found (Tab. 1, Figs 1a, b). In waters' surface of Podlasie Province were occurred such parasitic and predatory fungi as: *Ancylistes netrii, Arthrobotrys brochopaga, A. dactyloides, A. oligospora, Euryancale sacciospora, Sommerstorffia spinosa, Zoopage phanera, Zoophagus insidians,* and *Z. tentaclum*. The most common species in springs, rivers, ponds, and lakes was *Zoophagus insidians*, while the presence of *Euryancale sacciospora* was marked only in Biała River.

Discussion

The present study allowed finding of some parasitic and predatory fungi and fungus-like organisms on the onion skin, hemp-seeds, crucian carp spawn, and snake skin which were used as baits. Among the nine species of parasites and predatory fungi and fungus-like organisms encountered in the water reservoirs of north-eastern Poland. The representatives of the anamorphic fungi were comparatively frequently found at various latitudes (Drechsler 1935; Peach 1950; Carmichael *et al*. 1980). *Ancylistes netrii* is a parasite that occurs in soil and seldom in water (Batko 1975). *Euryancale sacciospora* is an endoparasitic fungus described by Batko (1975) which occurs in amoebae and nematodes. *Sommerstorffia spinosa* is a predatory fungus-like organism which catches rotifers and lives in soil but above all lives epiphytically on tread-like

Table 1. Parasitic and predatory fungi and fungus-like organisms in different water reservoirs

Taxa	Reservoir
Peronosporomycetes	
Sommerstorffia spinosa Arnaudov	Lake: Komosa River: Czarna, Sokołda
Zygomycetes	
Ancylistes netrii Couch ex B.E. Tucker	Rivers: Czarna, Supraśl
Euryancale sacciospora Drechsler	River: Biała
Zoopage phanera Drechsler	Pond: Palace Lakes: Hańcza, Komosa, Wigry Rivers: Czarna, Supraśl
Zoophagus insidians Sommerst.	Springs: Bagnówka, Cypisek, Dojlidy Górne, Dolistówka, Jaroszówka, Pólko, Rybnik, Sobolewo Ponds: Akcent, Białowieża, Dojlidy, Palace Lakes: Hańcza, Komosa, Wigry Rivers: Biała, Bug, Czarna, Czarna Hańcza, Sokołda, Supraśl
Zoophagus tentaclum Karling	Springs: Bagnówka, Cypisek, Dolistówka, Pólko, Rybnik, Sobolewo River: Biała Ponds: Akcent, Palace
Anamorphic fungi	
Arthrobotrys brochopaga (Drechsler) S. Schenck, W.B Kendr. & Pramer	Lake: Hańcza Rivers: Biała, Bug, Czarna Hańcza, Supraśl
Arthrobotrys dactyloides Drechsler (Syn. *Drechslerella dactyloides* (Drechsler) M. Scholler, Hagedorn & A. Rubner)	Lake: Komosa Rivers: Biała, Bug, Narew, Sokołda
Arthrobotrys oligospora Fresen.	Spring: Bagnówka, Cypisek, Dolistówka, Pólko Ponds: Białowieża, Dojlidy, Palace Lakes: Komosa, Wigry Rivers: Biała, Czarna, Czarna Hańcza, Supraśl

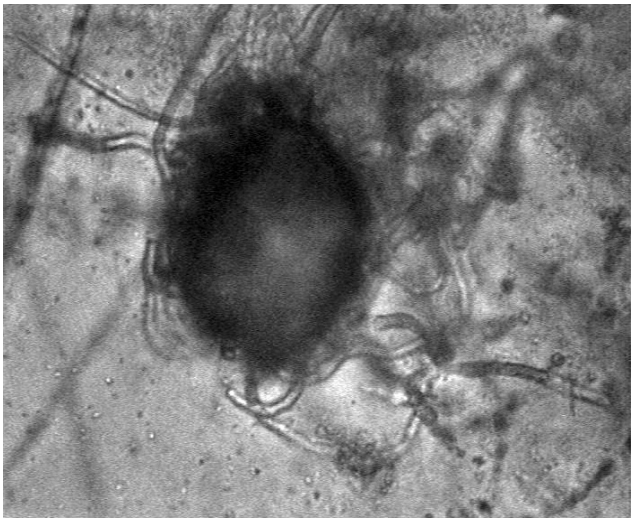

Fig. 1. A zygospora of *Ancylistes netrii*

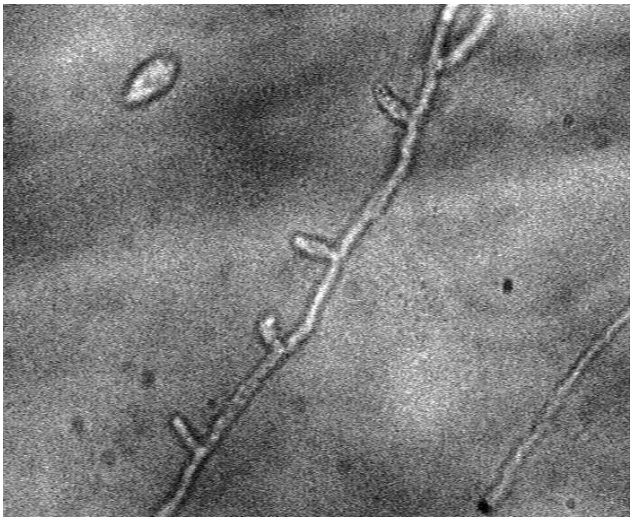

Fig. 2. A hypha with tentacles of *Zoophagus insidians*

algae in water. The ecology of that species was elaborated by Czeczuga & Próba (1980), Saikawa (1986), and Czeczuga *et al*. (2000). *Zoopage phanera* is described as a predatory fungus which caught amoebae (Batko 1975). This fungus was marked in water by Czeczuga (1991, 1993), Czeczuga *et al*. (1995), Czeczuga & Muszyńska (1999), and Kiziewicz & Czeczuga (2003). The taxonomic characteristics of *Zoophagus insidians* which caught rotifers were presented by Dick (1990), Powell *et al*. (1990), Czeczuga & Kiziewicz (1999), Czeczuga *et al*. (2002) in different water. *Zoophagus tentaclum* in north-eastern Poland was observed only in rivers by Czeczuga (1993). *Arthrobotrys brochopaga, A. dactyloides,* and *A. oligospora* produce conidiophores with shrinkable rings, which attack and kill nematodes. The biology of these anamorphic fungi was studied by Barron (1979, 1981, 2003), Waller & Faedo (1993), Glockling & Dick (1994), Morgan *et al.* (1997), and Fernandez *et al.* (1999).

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