Abstract

The present thesis focuses on testate amoebae (TA) and their relationship to their natural environment, as well as on relevant microscopic imaging methods. The bulk of the data has been published in original scientific papers and is compiled into three separate chapters (Pt I, Pt II and Pt III), each annotated by a brief introduction.

(Pt I) The methods section is devoted to specialized microscopic techniques employed to broaden the scope of the ecological analyses. In particular, precise discrimination between live and dead individuals, biomass determination inside individual tests and a multi-modal visualization of the cytoplasm and organelles enhance the data. Laser scanning confocal microscopy and two-photon microscopy are the main imaging modalities employed to study TA morphology in detail. The data have implications for taxonomy and ecophysiology, including the use of TA as bioindicators of pollution.

(Pt II) An actuoecological analysis focuses on the seasonal variability of TA species composition in a freshwater ecosystem, namely the Komořany ponds in Prague, during the course of the year. The species composition variation is correlated to simultaneously recorded limnological parameters such as temperature, pH, contamination by (heavy) metals (As, Cd, Mn, Ni, Fe, Pb), polycyclic aromatic hydrocarbons (PAH) and other chemical species (NH_4^+, NO_3^-, P). For example, the data obtained in shallow ponds revealed that the ecological preferences of *Arcella* and *Difflugia* genera are more-or-less opposite.

(Pt III) More complex ecological interactions were studied by investigating the interaction in the mycorhizosphere of European rhododendrons between TA and ericoid mycorrhizal fungi (ErMF) and dark septate endophytes (DSE) fungi. The possible role of TA as a source of nutrients for the host plant is discussed. Another study focuses on the interactions between TA and saprotrophic fungi mycelium colonizing Scots pine (*Pinus sylvestris* L.). The analysis of TA species composition data revealed that the saprotrophic/parasitic fungi do indeed interact with TA. Soil fungi interact with TA indirectly by affecting the bacterial population in the hyphosphere. This interaction involves mycophagy, fungal parasites and TA test decomposition.