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Protozoa in soils: a taxonomic and functional underestimated group of organisms

Stefan Geisen, Jan Weinert, Michael Bonkowski

*Zoological Institute, Dept. Terrestrial Ecology, University of Cologne, Germany*

#### Abstract

Soil organisms are of fundamental importance for the decomposition of organic matter and mineralization and recycling of nutrients to plants. Protozoa, due to their high abundance, biomass, and turnover rates are a fundamental component of soil food webs. They mainly link the nutrient and energy transfer from soil organic matter via bacteria to higher trophic levels in the soil food web. However, little is known on the diversity and functional importance of specific protozoan taxa.

The taxonomy and identification of protozoa in soil has been hampered, because protozoa can not be extracted from soil and due to their small size and high diversity. Molecular methods are not easily applicable, because morphological similar protozoan taxa can be highly paraphyletic. Due to their high biodiversity, high numbers and ubiquitous distribution in soils, protozoa may be good bioindicators of soil nutrient status, disturbance and function.

The EU-funded project "EcoFINDERS" seeks to identify microbial and faunal bioindicators of soils with different land use intensity across a broad range of European soils; and to link soil biodiversity and resulting ecosystem services.

We aim to elucidate the diversity and community structures of protozoa, by combining taxonomy and modern high throughput sequencing methods.

First results on the cultivation of amoebae from Sardinian and Dutch grassland soils indicate an enormous undescribed protozoan diversity. Based on culture isolates, we constructed phylogenetic trees based on two genes (18S rDNA and cytochrome oxidase 1) to decipher deep-relationships among protozoa and to identify genetic barcodes targeting individual taxa for pyrosequencing. First experiments revealed further a broad spectrum of functional roles for protozoa.