

# FUNGI

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## Project title: Fungi from Geothermal Soils and Thermotolerant Plants

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Objective: To provide information to increase our understanding of fungal survival in unique environments, the roles of fungi in ecosystem dynamics, and the temporal and spatial scales of the micro-habitats that fungi occupy. Specifically, this work will provide information about 1) how fungi survive under environmental conditions too harsh for mycelial growth; 2) whether fungal community structure changes in response to environmental conditions; 3) if fungi can alter between saprophytic and symbiotic lifestyles in response to environmental conditions; 4) the scale of soil studies necessary to accurately assess the roles of these fungi in ecosystem dynamics; 5) how biological and/or genetic diversity of fungal communities changes in response to environmental conditions; 6) the adaptive mechanisms of tolerance required for the growth of fungi soils containing high levels of metals and other inorganic chemicals. In addition, the feasibility of developing molecular biological tools will be determined for rapidly assessing a) fungal community structure based on molecular biomass measurements; b) the metabolically active, and inactive, species of fungal communities; and c) the occurrence of fungi in thermotolerant plants.

Findings: Several fungal species have been isolated from geothermal soils and found to be either mesophilic or thermophilic. The populations of both fluctuate throughout the year as a result of soil temperature and moisture. Fungi are in highest densities in soil under plants and can be found in soils with temperatures up to 100 C. The annual temperatures of the geothermal soils fluctuated as much as 30 - 40 C while non-thermal soils fluctuated 5 - 10 C. There are two classes of fungi present in the soils: saprophytic and symbiotic. The symbiotic fungi colonize the dominant plant species in the geothermal soils (*Dichanthelium lanuginosum*). Preliminary data suggest that the fungal symbiont may be responsible for the ability of the plant to tolerate high temperatures, dry summers, and heavy metals. This project is still in progress.