Characterizing oxygen consumption and its relation to other functional traits: a case of Tetrahymena ciliates

Nils Svendsen*[1] and Nicolas Schtickzelle[1]

[1]Université Catholique de Louvain (UCL) – Place de lÚniversité 1 - 1348 Louvain-La-Neuve, Belgium

Abstract

The mechanisms underlying the relationship between biodiversity and ecosystem functioning are still poorly understood. Although species richness is commonly used as a biodiversity measure, recent studies showed that functional diversity, i.e. the diversity of functional traits, is a better proxy for biodiversity when studying the ecosystem functioning. Functional traits are defined as the components of an organism's phenotype that determine its niche, its response to environmental factors, and its influence on ecosystem functions. Nevertheless, the use of functional traits to quantify biodiversity is associated with several challenges. For example, which traits should be considered as functional, and why? Do we need to measure the whole set of phenotypical traits? Here we investigate these questions using an actively dispersing protist, *Tetrahymena thermophila,* as a study species. We focus on the oxygen consumption, which is considered a highly structuring trait among natural protist communities, thus matching the definition of a functional trait. We selected 42 genotypes (clonal strains) of *T. thermophila*, which represent variation in phenotypical traits and thermal niches of this species. Firstly, we quantified the variation in oxygen consumption between those genotypes. Secondly, we estimated the correlation between oxygen consumption and other phenotypical traits (e.g. morphology and motility traits). We evidenced large differences between genotypes in the oxygen consumption rates, with some strains consuming four times more oxygen than others. Our results also highlight strong correlations between oxygen consumption rates and other traits that could be considered as functional in *T. thermophila*, e.g. a positive one with cell movement speed, or a negative one with cell size. This suggests that functional diversity of this species could be efficiently assessed by measuring a limited number of traits.

*Speaker