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**Combined effects of thermal variability and nutritional constraints on aquatic ecosystem function**

The trophic transfer efficiency (TTE) between phytoplankton and zooplankton is determinant for aquatic ecosystem structure and function1. When this efficiency is low, primary production accumulates and forms algal or cyanobacterial inflorescences with various harmful effects for the ecosystem and its users(toxicity, anoxia). Conversely, high efficiency ensures control of phytoplankton populations, increases water transparency and promotes fish production. TTE depends mainly on the extent to which the nutritional requirements of zooplankton are covered by the stoichiometric and biochemical composition of phytoplankton. Predicting the evolution of TTE in a context of global warming is therefore a major issue. Yet, such prediction is highly complex because temperature simultaneously drives the nutritional requirements of zooplankton2 and nutritional quality of phytoplankton (via its impact on the dynamics and taxonomic composition of phytoplankton communities). Furthermore, one of the main components of climate change is not only an increase in average temperature but an increase in thermal variability. This results in greater thermal amplitudes and a high frequency of extreme temperature episodes4. This increase in thermal variance alone can have more significant effects than an increase in average temperature5. The thesis subject will therefore tackle the problem of predicting the efficiency of TTE between phytoplankton and zooplankton in a context of increased thermal variability through a combination of experimental and theoretical approaches. The objective will be to isolate the effect of the different components of thermal variability (mean, variance, autocorrelation) on the metabolic rate and life history traits of zooplankton and to quantify the effect of their factorial combinations with the nutritional quality of phytoplankton. On the experimental and analytical level, the student will benefit from innovative methodologies such as microcalorimetry for the measurement of metabolic rate and modeling approaches based on the Theory of Dynamic Budgets (DEB)6 currently developed in the hosting research group 7.8