Akronym: QualiTrait

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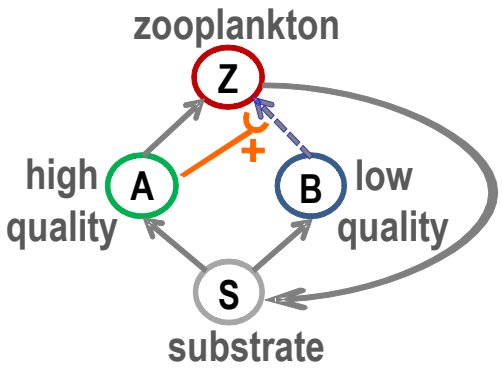
Trait heterogeneity effects on trophic interactions: the role of essential nutrients

Model system:



Food quality depends on the availability of essential resources in the prey and has great impacts on physiological, behavioral and life history traits of predators. The objective of the project is to integrate such food quality effects into recent approaches on trait variation. We will assess the role of food quality and associated feedback mechanisms in shaping trait heterogeneity and the complex and dynamic interactions between predator and prey. In particular, we want to estimate population dynamics and species coexistence by studying interspecific trait variation in bi-trophic model systems and intraguild predation in tri-trophic model systems.

Using a combined experimental and theoretical approach, we are studying simple, manually assembled and therefore highly tractable food webs in chemostat systems consisting of a rotifer predator and two prey species substantially differing in food quality (in terms of essential lipids). We assume that a limitation by biochemical nutrients will mainly affect the prey utilization efficiency of the predator (and thus its numerical response and growth rate), but not saving the prey from predation as this is the case for low palatability. As the utilization of the low quality prey depends on the availability of the high quality prey and the physiological response of the predator, trophic interactions and population densities can be highly dynamic, resulting in important feedback loops between trophic levels.

Subsequently, food webs of higher complexity will be explored, considering, for instance, potential differences in defense capacities among prey species and the presence of additional intermediary grazers (intra-guild predation). The population/community dynamics will be investigated by iteratively using mathematical models and experiments. Understanding the potential of essential nutrients in shaping population dynamics is crucial for predicting how populations and food webs will respond to changing environmental conditions.