The effect of phenotypic plasticity on ecological and evolutionary dynamics in bi- and tri-trophic systems

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We will analyze the effects of phenotypic plasticity on community and population dynamics in a tri-trophic system with algae as food, herbivorous ciliates as primary consumer and their ciliate predators. In our system phenotypic plasticity acts on two trophic levels. The ciliates (*Euplotes octocarinatus*) can form phenotypically plastic defences against their predators. We will use different *Euplotes* strains that differ in their degree of plasticity and which will be used in monoclonal and multiclonal experiments. Additionally, we will use predators (*Lembadion bullinum*) that can form inducible offences, which partly allow to overcome the prey defences, or predators, which do not respond to the prey defences (*Stenostomum sphagnetorum*). With our system we will address several hypotheses:

1. *Trait variation (here phenotypic plasticity) on the consumer and/or on the top-predator level promotes the stability and persistence of trophic levels within a tri-trophic system if changes in the trait values are fast enough.*
2. *Trait variation on one (consumer or top predator) trophic level stabilizes trophic dynamics more than trait variation on two (consumer and top predator) trophic levels within a tri-trophic system.*
3. *Phenotypic plasticity on both trophic levels helps to maintain trait variation (and width of trait range) and by this promotes coexistence of different prey clones.*

Key papers:

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Tollrian, R & C. D. Harvell (Eds.). 1999. The Ecology and Evolution of Inducible Defenses. Princeton University Press, Princeton, NJ.

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