Speciation dynamics and ecosystem feedbacks

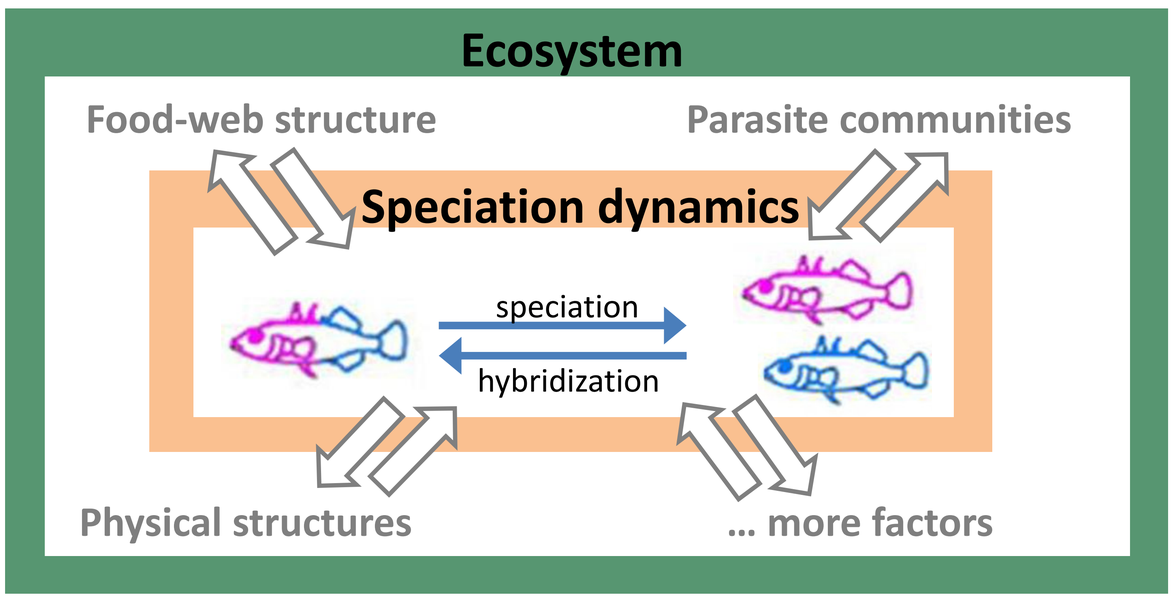
F.S. Brunner[1], J.M. Anaya-Rojas[2], B. Matthews[2], C. Eizaguirre[1]

[1] GEOMAR Helmholtz center for Ocean research, Kiel, Germany
[2] Eawag Swiss Federal Institute of Aquatic Science and Technology, Kastanienbaum, Switzerland

Integrating ecology and evolution

It is now clear that evolutionary dynamics can strongly interact with ecological dynamics in their influence on ecosystem functions and biodiversity levels. Integrative studies in semi / natural systems are indispensable to make predictions on ecosystem stability under (anthropogenic) environmental change.
Here, we will test the role of environmental change (eutrophication) within the context of further selection pressures (parasites) in species evolution (Q 1 &2). The transgenerational setup will allow us to test for feedback effects of these speciation / hybridization dynamics at the same time (Q 3 &4). Three-spined sticklebacks are a suitable model system for these questions as they are known to show fast speciation and reverse speciation patterns as well as affecting their environment differentially, depending on ecotype diversity and specializations.

The big picture



The big questions

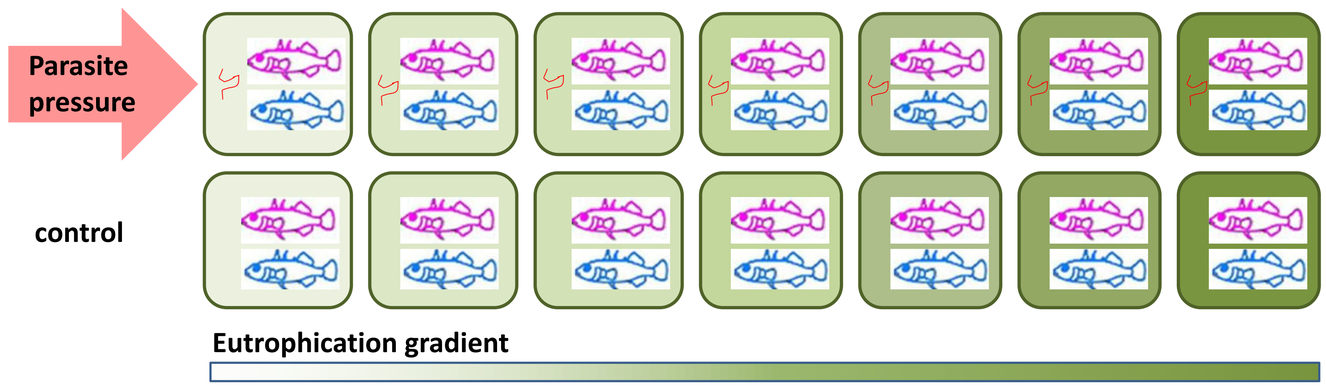
Q1 How do diversifying, diverging and homogenizing forces interact in their influence on speciation dynamics in semi/natural settings?

Q2 How does eutrophication disrupt or support parasite mediated speciation?

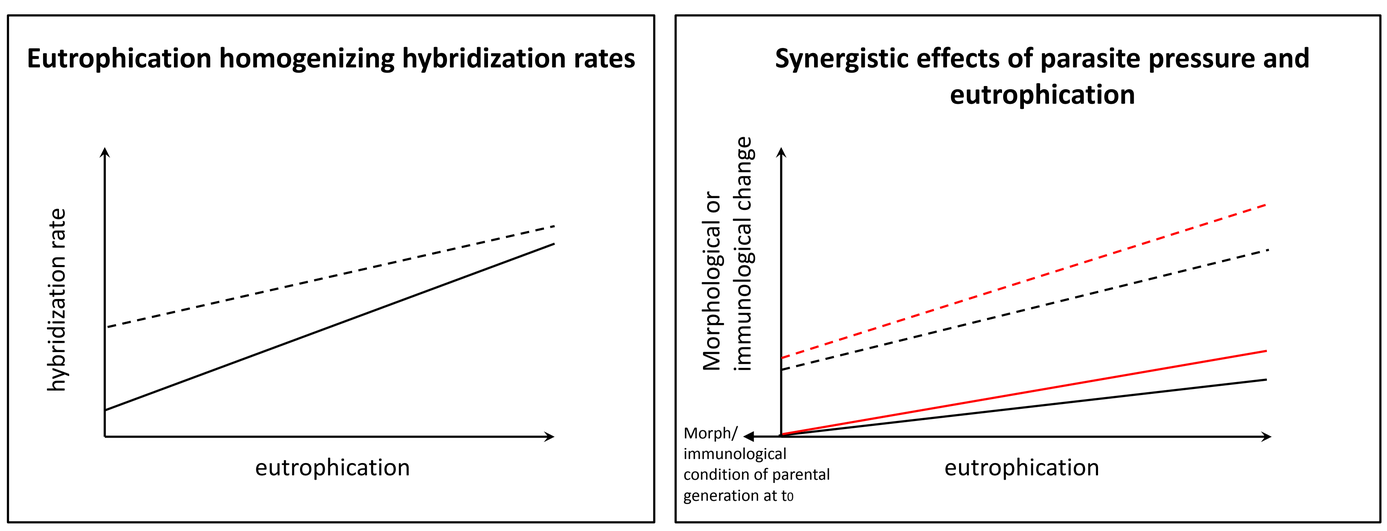
Q3 How do multilevel interactions affect evolutionary and ecological properties of the system through subsequent feedback cycles?

Q4 Which factors dominate long-term dynamics and evolutionary outcomes?

A way forward : integrating different selection pressures and ecosystem feedbacks



Direct effects: Predictions



Feedback effects: what to expect?

-Structural and physical changes in mesocosms

- Effects of these changes on the offspring generation (raised in mesocosms altered by the parental generation)

Contact: Franziska Brunner, fbrunner@geomar.de