

# The evolutionary potential of the determinants of species coexistence

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## Motivation

- Our understanding of biodiversity remains limited by a lack of studies that test interactions between ecological and evolutionary forces that dictate the creation and maintenance of biodiversity.
- Competition among species can cause them to evolve. Yet, we do not understand why this evolution sometimes promotes or sometimes hinders the coexistence of these species.

## Context

- Most current research is retrospective, observational, and lacks rigorous evaluations of the impacts evolution on species coexistence.
- Using 2 species of duckweed, rapidly reproducing aquatic plants, we will conduct manipulative studies at large scales.

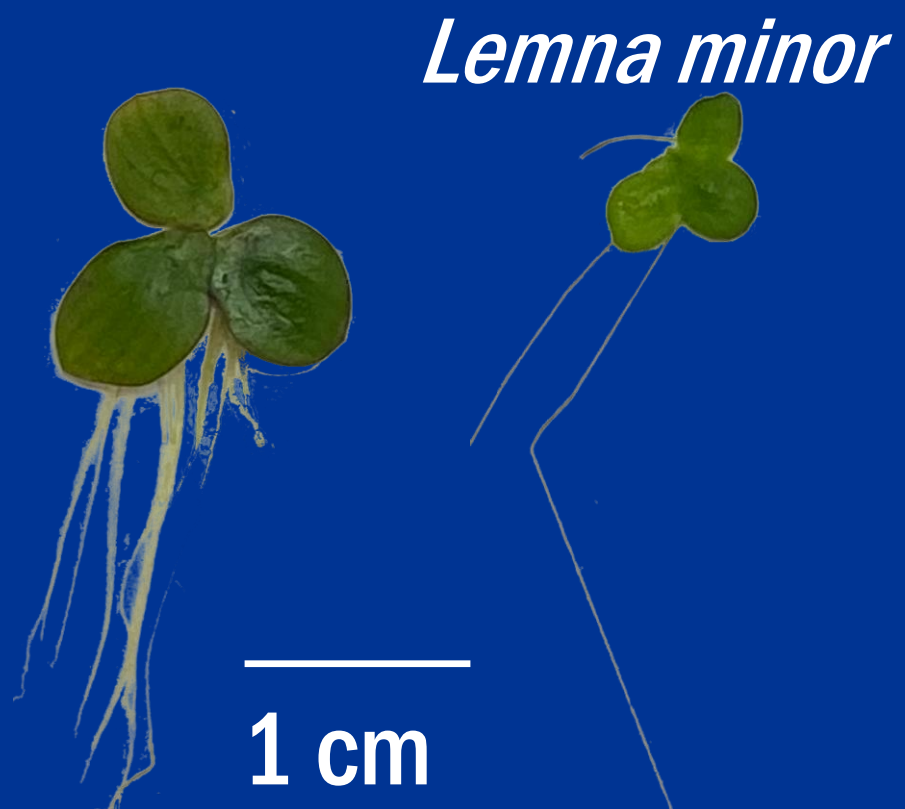
## Project Description

- Quantify how natural populations differ in the determinants of species coexistence, and their evolutionary potential.
- Experimental evolution in the field to test how evolution alters the determinants of species coexistence
- Create synthetic populations to tease apart the mechanism driving evolution

# Experimentally test why evolution in response to competition sometimes promotes or hinders species coexistence.



*Spirodela polyrhiza*



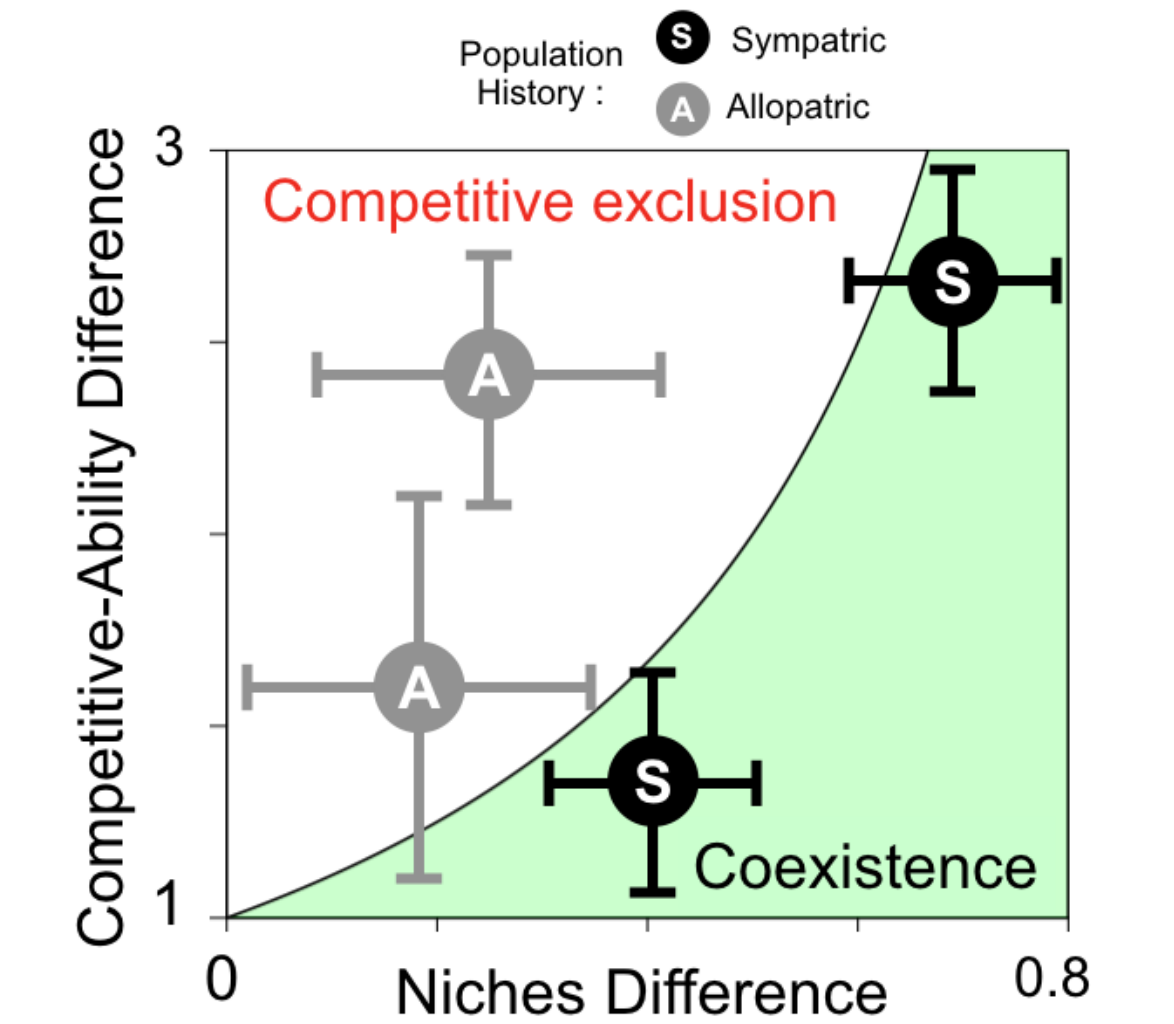
*Lemna minor*



Pitt's Pymatuning Lab of Ecology

## Project Deliverables

Determinants of Species Coexistence



Populations with various competitive histories may differ in the key traits that favor or harm species coexistence as well as their evolutionary potential (error bars).

- Quantification of genotypic diversity among single and mixed species communities.
- Estimates of genetic variation in the determinants of species coexistence.
- Experimentally controlled and replicated tests of the impact of evolution on species coexistence.
- Relative importance of various ecological and evolutionary drivers in dictating why evolution harms or promotes coexistence.

## Potential Impact

- Provides new understanding, and rare experimental tests, of the fundamental interactions between community and evolutionary ecology that together dictate the maintenance and creation of biological diversity.

## References and/or Acknowledgements

- Turcotte Lab
- Simon Hart
- Jonathan Levine
- Relevant manuscript: Hart, S. P., Turcotte, M. M., & Levine, J. M. (2019). Effects of rapid evolution on species coexistence. PNAS, 33, 201816298.