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TITLE Novel interactions and species' responses to climate change

ACRONYM NICH

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Predicting the responses of species, communities and ecosystems to global climate change is a great challenge facing ecologists today. Progress will hinge on our ability to predict how responses are shaped by evolution and species interactions, and especially by entirely novel interactions among species whose ranges don't yet overlap. To tackle this goal, we combine cutting-edge experiments and process-based modeling to address three questions about the impact of novel competitors on the responses of alpine plant communities to climate change:

(1) How will novel interactions impact species responses to climate change? We test the ecological consequences of novel competitors for population persistence, and the potential for longer-term evolutionary responses, using a whole community transplant experiment that simulates future competitive scenarios faced by focal alpine plants.

(2) Do species traits predict the outcome of novel interactions? A mechanistic understanding of competitive effects is essential to predict impacts of novel interactions. We test how climate affects the outcome of competition among pairs of species planted along an elevational climate gradient, and whether these effects can be predicted using species' functional traits.

(3) What are the implications of novel competitive interactions for species' ranges dynamics under climate change? We will use process-based species distribution models, parameterized with demographic data from our field experiments, to explore the consequences of changing competitive interactions for range dynamics under climate change.

This project will advance our understanding of species' responses to climate change, whilst also shedding light on fundamental questions in ecology, particularly into the mechanisms shaping species' distributions. By linking experimental community ecology and macroecology, it will push the limits of our ability to predict the dynamics of complex ecological systems.