

Warming effects on microbial food webs—from genes to ecosystems



BASS CONNECTIONS

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Bass Connections in Energy & Environment

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Overarching Goal

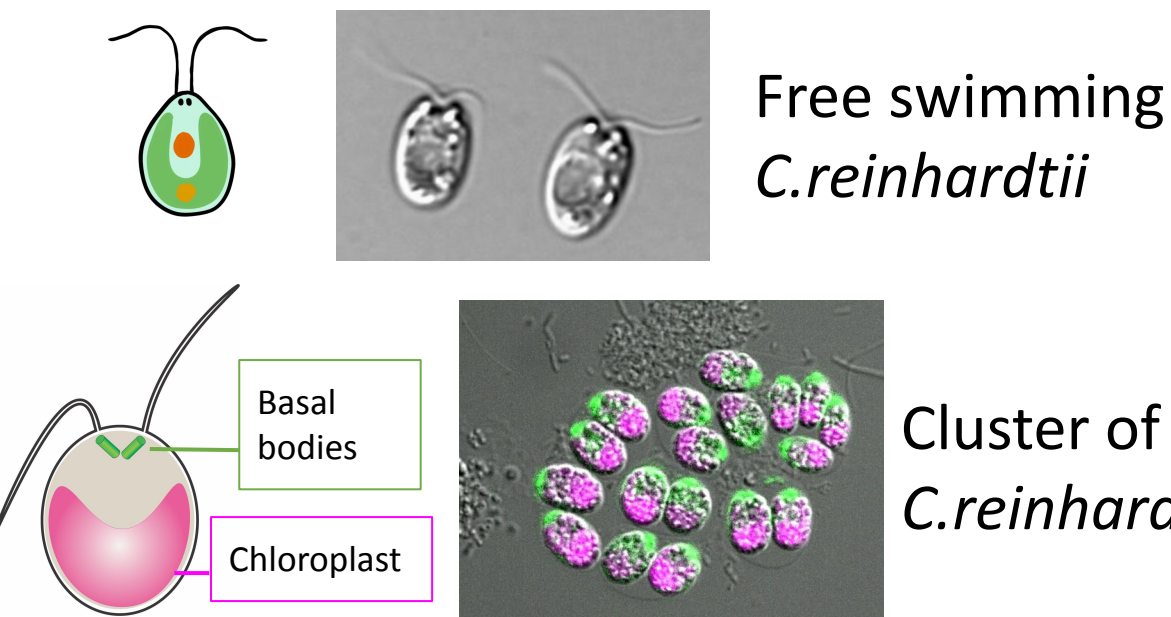
We bridge **cell biology**, **evolutionary ecology**, and **math** to study the effects of warming effects on microbial food webs.

1. Food web complexity?
2. Standing genetic variation?
3. Temperature?
4. What genes?

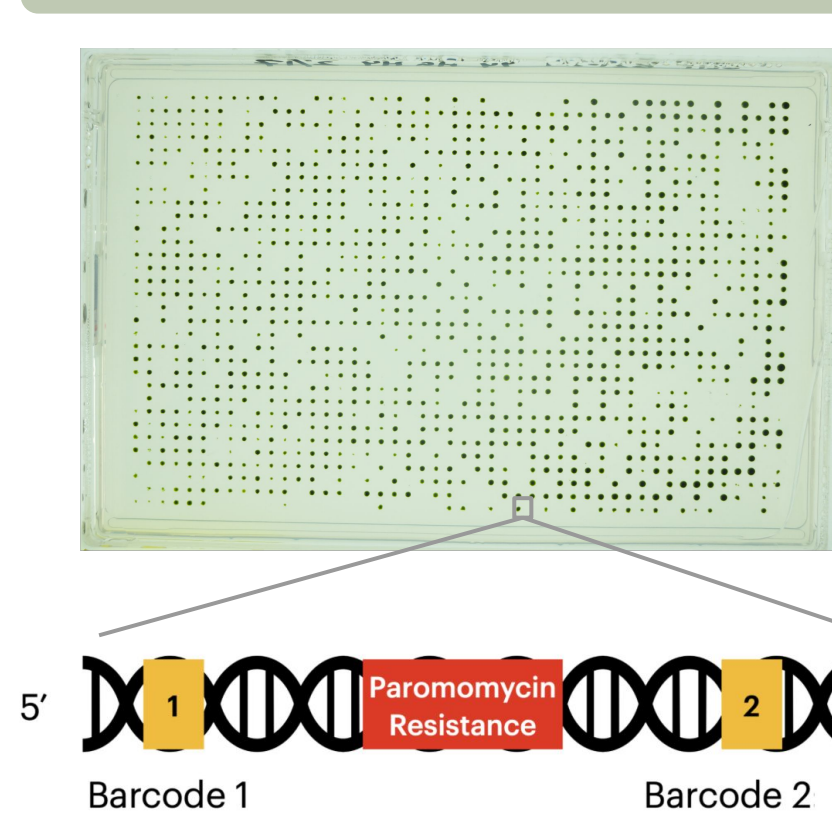
Model System

Algal Prey: *Chlamydomonas reinhardtii*

C. reinhardtii is a unicellular green alga that exhibits two forms in its division cycle:

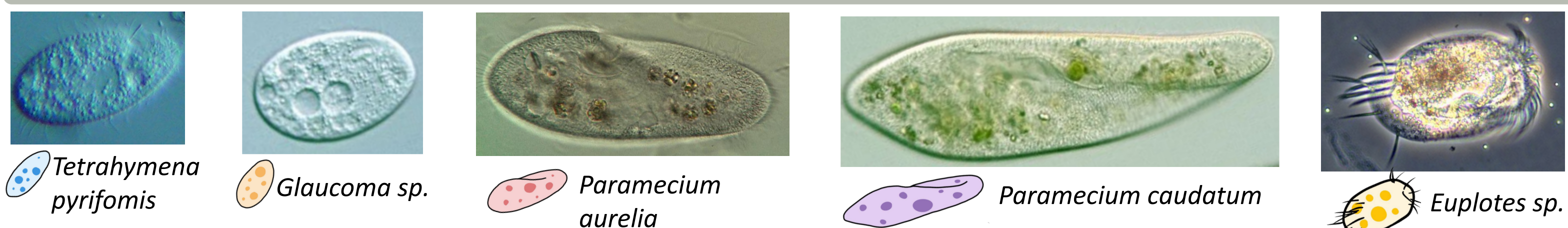


CLiP Mutant Library



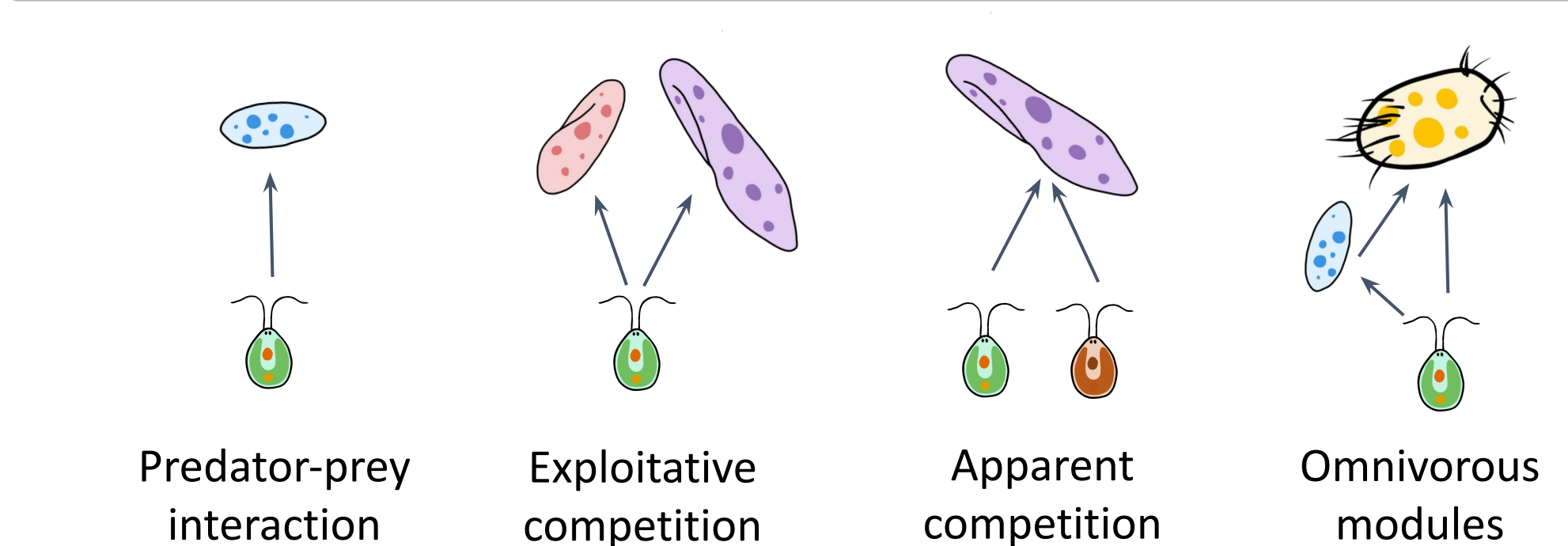
- ❖ 13,000 knock-out mutant strains
- ❖ Unique DNA barcodes for each strain
- ❖ Allows phenotype to genotype mapping

Ciliate Predators



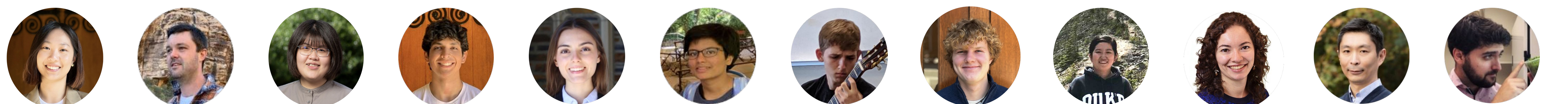
Ciliate predators can induce clumping in *C. reinhardtii* as defensive trait.

Microbial Food Web



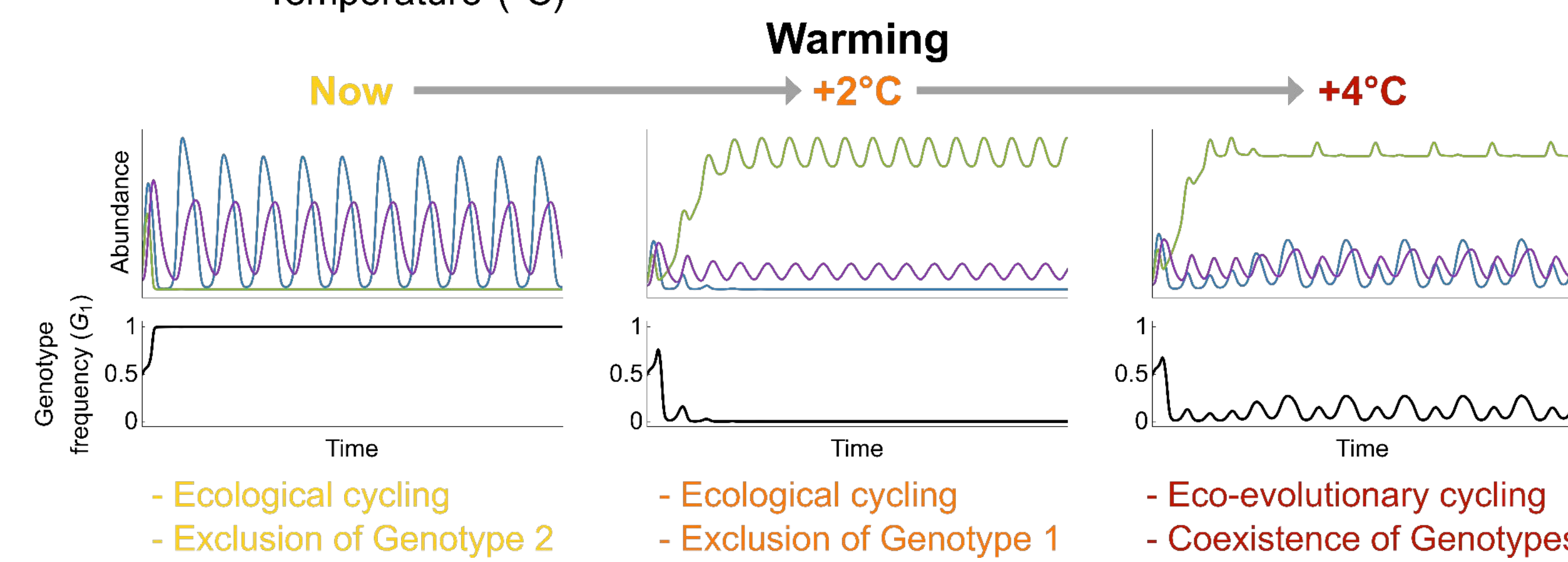
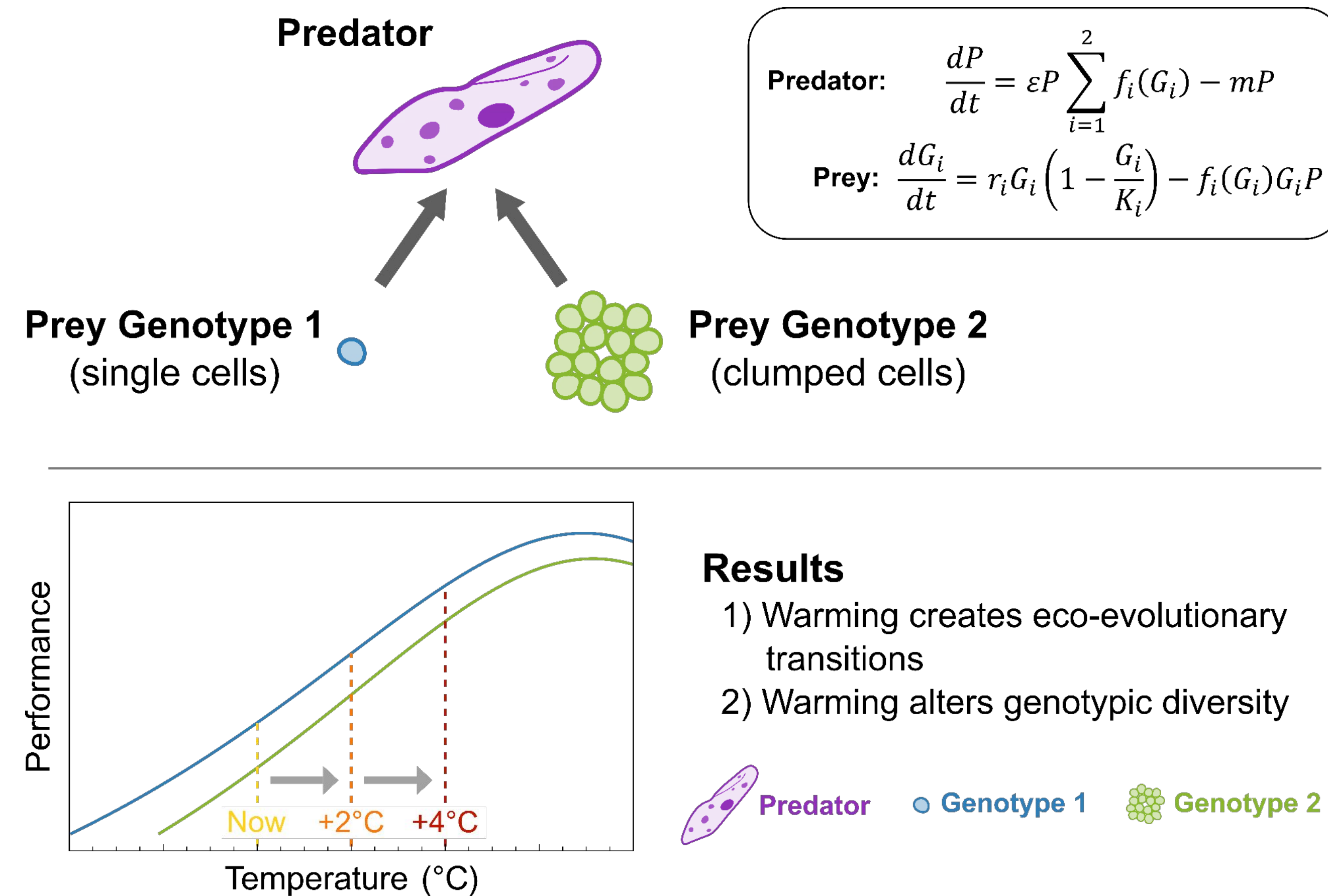
- ❖ Protists are crucial to global carbon cycle, accounting for 2x the carbon of all animals globally.
- ❖ We study basic food web modules to understand how climate change affects microbial evolution and ecology

Team Members

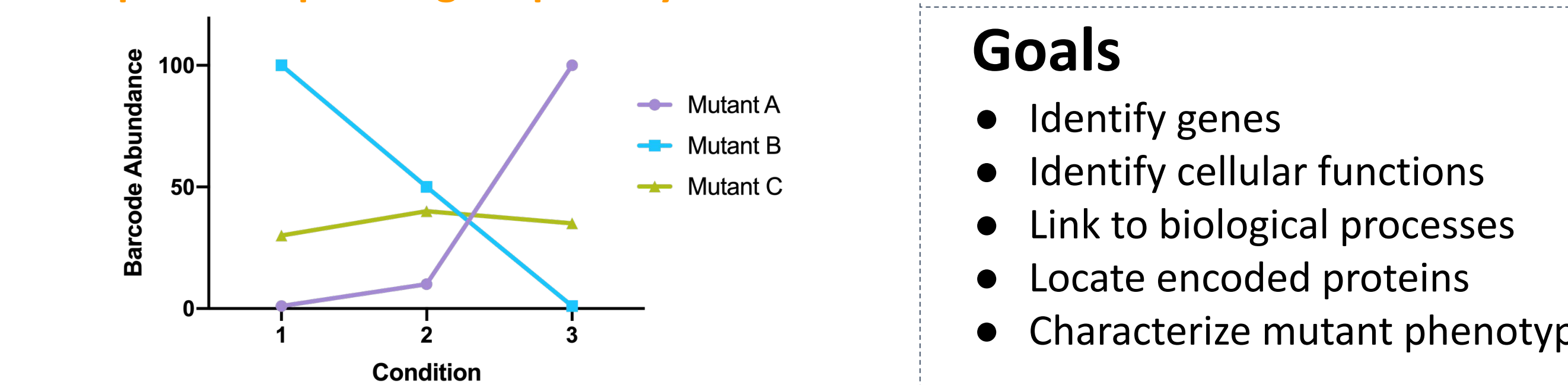
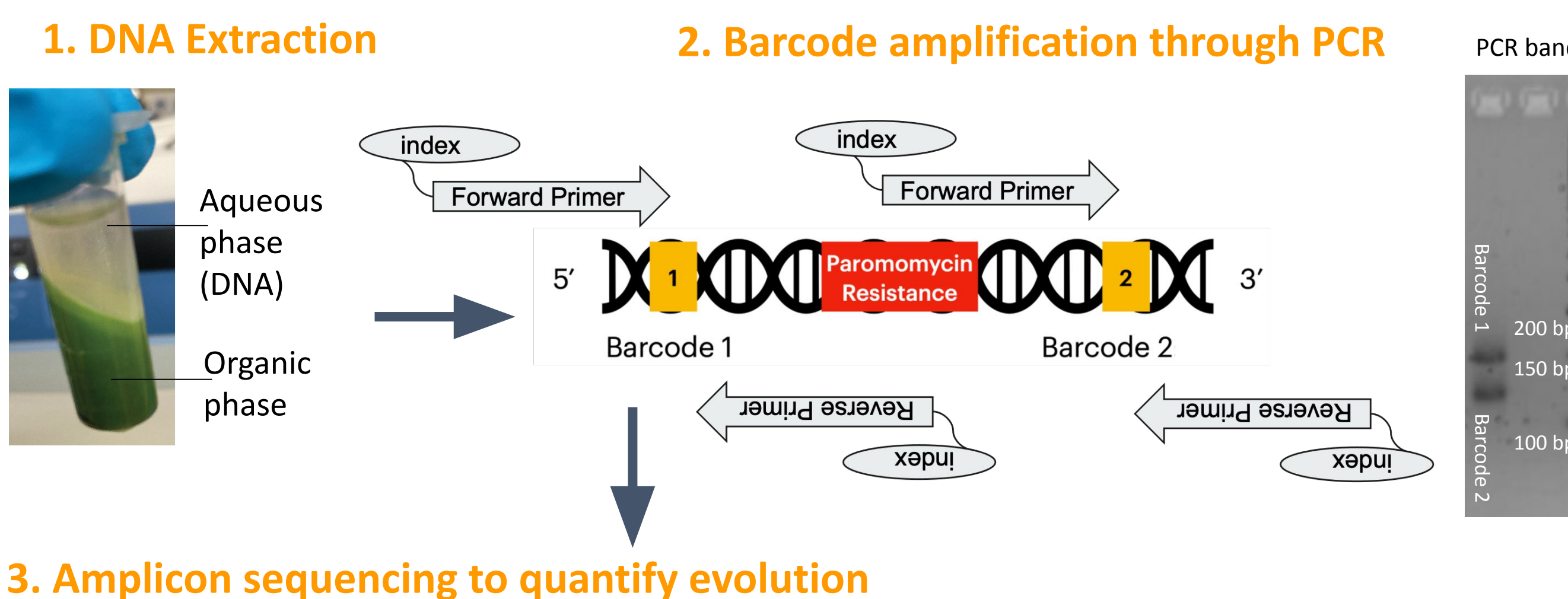


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Mathematical Modeling

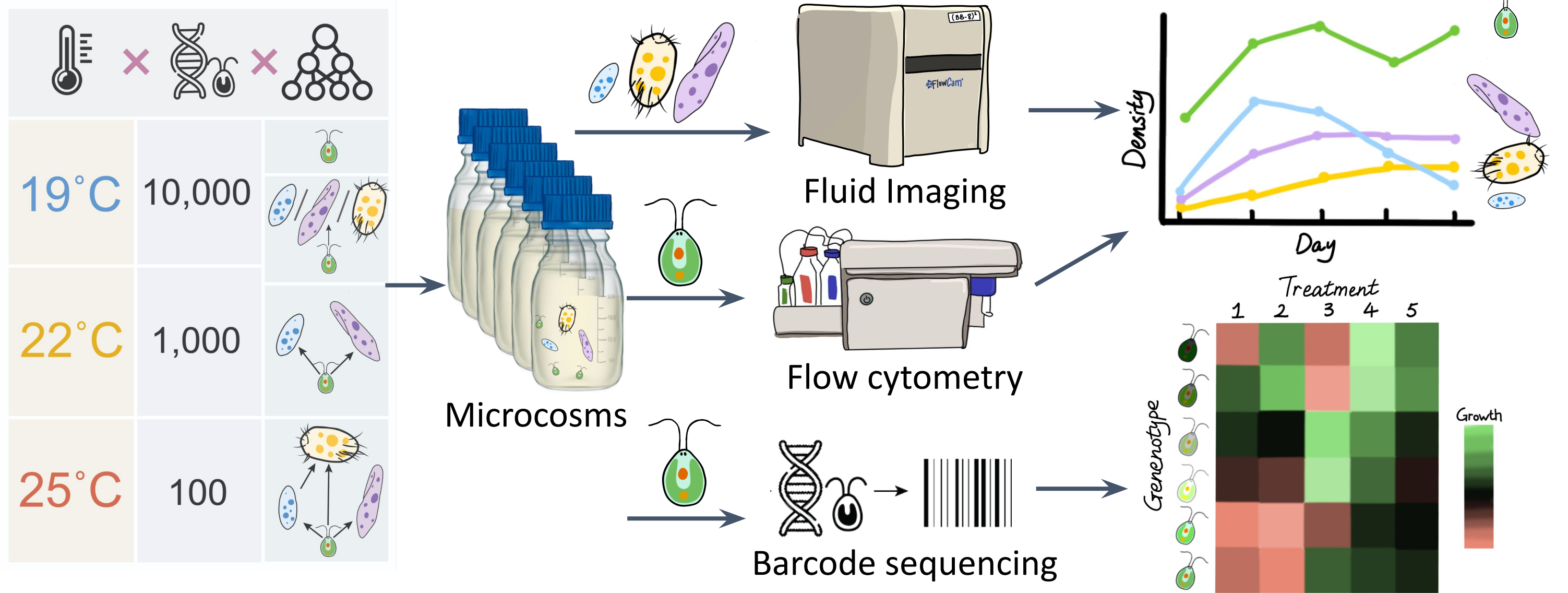


Quantifying Evolution



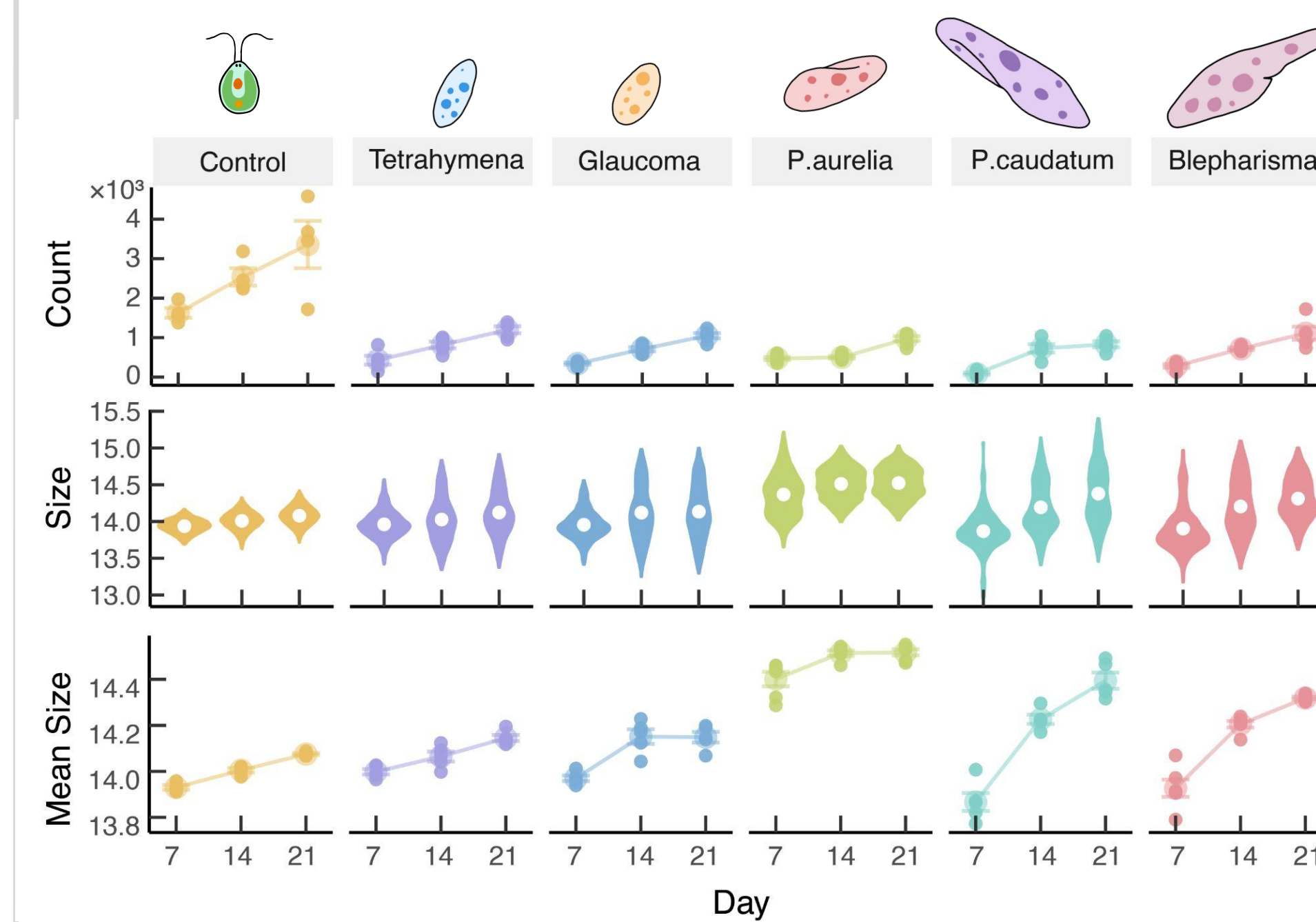
Eco-Evo Experiment

Question | How does temperature mediate the effects of genetic diversity and food web complexity on prey evolution?



Preliminary Results

Experiment I

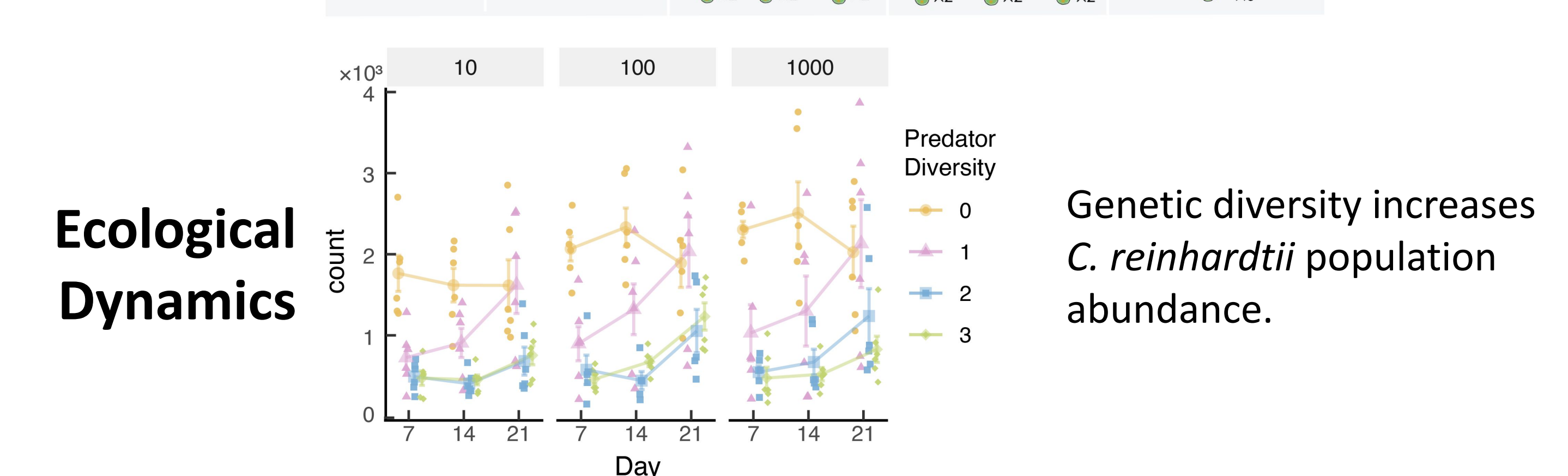
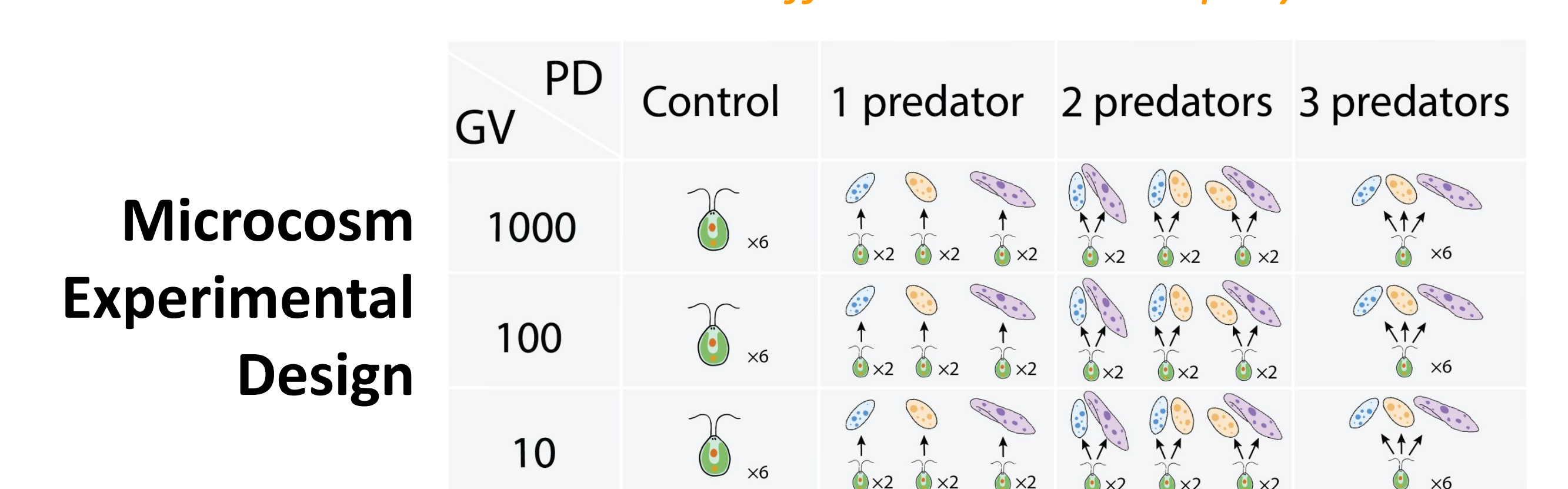


Predators have different effects on prey densities and phenotypes

- Predators eat *C.reinhardtii* at different rates
- Predators induce different plastic defensive responses

Experiment II

Predator diversity (PD) and standing genetic variation (GV) interact to affect selection on prey



Next steps | 1) Quantify genetic variation 2) Map genotypes to phenotypes