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Coupling between evolutionary and population dynamics in experimental microbial populations ALVARO SANCHEZ, JEFF GORE, Department of Physics, Massachusetts Institute of Technology — It has been often been assumed that population dynamics and evolutionary dynamics occur at such different timescales that they are effectively de-coupled. This view has been challenged recently, due to observations of evolutionary changes occurring in short timescales. This has led to a growing interest in understanding eco-evolutionary dynamics of populations. In this context, recent theoretical models have predicted that coupling between population dynamics and evolutionary dynamics can have important effects for the evolution and stability of cooperation, and lead to extremely rich and varied dynamics. Here, we report our investigation of the eco-evolutionary dynamics of a cooperative social behavior, sucrose metabolism, in experimental yeast populations. We have devised an experimental strategy to visualize trajectories in the phase space formed by the population size (N) and the fraction of cooperator cells in the population (f). Our measurements confirm a strong coupling between evolutionary and population dynamics, and allowed us to characterize the bifurcation plots. We used this approach to investigate how sudden environmental changes affect the stability and recovery of populations, and therefore the stability of cooperation.

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