GENOMIC EVOLUTION DRIVEN BY ENVIRONMENTAL STRESS.

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Knowledge of genetic mechanisms that enable populations to adapt to novel environments is required to predict and even manipulate their evolutionary fate. To discover these mechanisms we developed an experimental system using budding yeast where starvation served as a proxy to a variety of environmental conditions that lower population mean fitness. We found that cell populations starved for one month show a dramatic increase in the frequency of genomic rearrangements but only a modest increase in the incidence of point mutations. We also determined that some survivors were more fit to starvation than their common ancestor, and that a subset of these fitter variants was reproductively isolated from their common ancestor. Because both resilience to starvation and reproductive isolation were strongly associated with genomic rearrangements, severe environmental stress may actually increase the rate of incipient speciation. Here, we will explore the mechanisms by which starvation-associated genomic rearrangements confer increased fitness, analyze population structure in order to discover which cells are most susceptible to genomic rearrangement, and report on the pleiotropic effects of starvation-induced rearrangements.