The rate of complex adaptation with and without stress-induced mutagenesis

Yoav Ram and Lilach Hadany

Stress-induced mutagenesis - the increase of mutation rates in response to stress or maladaptation - has been demonstrated in numerous species of bacteria, as well as yeast and human cancer cells. However, the consequences of inducible mutation rates in adaptive evolution are not yet clear. We modeled a population crossing an "adaptive valley" and analyzed the adaptation rate with and without stress-induced mutagenesis. Our results support the hypothesis that stress-induced mutagenesis can be an adaptive trait and provide quantitative predictions about the difference between different mutational strategies in adaptive evolution.