

Abstract Submitted
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How do the effects of mutations add up? ANDREA VELENICH, MIT, MINGJIE DAI, Harvard University, JEFF GORE, MIT — Genetic mutations affect the fitness of any organism and provide the variability necessary for natural selection to occur. Given the fitness of a wild type organism and the fitness of mutants A and B which differ from the wild type by a single mutation, predicting the fitness of the double mutant AB is a fundamental problem with broad implications in many fields, from evolutionary theory to medicine. Analysis of millions of double gene knockouts in yeast reveals that, on average, the fitness of AB is the product of the fitness of A and the fitness of B. However, most pairs of mutations deviate from this mean behavior in a way that challenges existing theoretical models. We propose a natural generalization of the geometric Fisher's model which accommodates the experimentally observed features and allows us to characterize the fitness landscape of yeast.

Andrea Velenich
MIT

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