

Abstract Submitted
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Biophysical Fitness Landscapes and Evolutionary Dynamics of Proteins MICHAEL MANHART, ALEXANDRE MOROZOV, Rutgers University — The molecular biophysics of proteins fundamentally shapes their fitness landscapes and evolutionary dynamics. For example, the evolution of new function in a protein is constrained by the need to maintain folding stability. We investigate the role of molecular biophysics in protein evolution by developing a class of fitness landscapes based on protein folding and binding energetics. We characterize the properties of these landscapes, such as their epistasis, accessibility, and number of local maxima. We also use a recently-developed path-based approach to random walks on networks to analyze the dynamics of populations evolving on these landscapes, focusing especially on the distribution and diversity of adaptive trajectories. These models make qualitative predictions relevant to both natural evolution as well as directed evolution experiments.

Michael Manhart
Rutgers University

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