سخنرانی علمی

The effect of randomness on the fate of mutants: Minority rules

علی مهدی پور

Princess Margaret Cancer Center, Toronto, Canada

Abstract:
In this research, we study the effect of spatial randomness on the chances of mutant fixation in a population of individuals of a constant size.
Such problems arise in models of cancer initiation and progression, bacterial dynamics, and drug resistance. It turns out that spatial heterogeneity rede fines the notion of neutrality, allowing, e.g., a minority of cells (whose fitness values are drawn from the same distribution as that of the wild type) to behave as if they had a selective advantage. The effect can be very significant (increasing the probability of mutant invasion by orders of magnitude), it increases with the standard deviation of the underlying probability distribution and decreases with the skewness. It is the largest when the fitness values of the mutants and wild types are anti-correlated. We discuss the results for a spatial ring geometry of cells (such as that of a colonic crypt), a mass-action (complete graph) arrangement, and also for a line model with reflecting boundaries.

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