

Branching process model of the early phase of a bacterial insertion sequence invasion

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Keywords: Multitype branching process, insertion sequence

AMS: 60J80

Abstract

Bacterial insertion sequences (ISs) are short DNA segments that can proliferate on their own inside a bacterial genome and can spread in a host cell population through horizontal gene transfer. With the help of a continuous-time, multitype Markov branching process model we examine the population dynamics of the early phase of an IS invasion into an uninfected cell population at carrying capacity. In particular, we are interested in the probability of a successful IS invasion depending on the rate of horizontal gene transfer, in the distribution of IS counts per cell over the host cell population and in the time needed to reach a certain threshold number of infected cells.

Acknowledgements: The author thanks Prof. Andreas Wagner and Prof. Andrew Barbour for their support in biological and mathematical matters, respectively. This work is supported by the Swiss National Science Foundation.