

Abstract Submitted
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Simulation and Theory of Antibiotic Resistant Bacteria Populations¹ JD RUSSO, JJ DONG, Bucknell University — Bacteria developing antibiotic resistance is a ubiquitous threat to medical treatment. Main mechanisms for the emergence of resistance include conjugation and transformation. We focus on the effect of transformation. Plasmids are small, independently replicating genetic materials, often including DNA segments that encode antibiotic resistance. A cell can absorb a plasmid and its associated trait through transformation. However, this comes with a small fitness cost, which manifests as a slower doubling time. We used a combined approach of Kinetic Monte Carlo simulation and mathematical modeling methods to explore the interplay among growth, death, transformation, and plasmid availability. We focused on the effects of differential growth and transformation, finding that whether the susceptible or resistant population dominates is heavily dependent on transformation rate.

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