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Survival Strategies in Bacterial Range Expansions

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Bacterial communities represent complex and dynamic ecological systems. Different environmental conditions as well as bacterial interactions determine the establishment and sustainability of bacterial diversity. In this talk we discuss the competition of three *Escherichia coli* strains during range expansions on agar plates. In this bacterial model system, a colicin E2 producing strain C competes with a colicin resistant strain R and with a colicin sensitive strain S for new territory. Genetic engineering allows us to tune the growth rates of the strains and to study distinct ecological scenarios. These scenarios may lead to either single-strain dominance, pairwise coexistence, or to the coexistence of all three strains. In order to elucidate the survival mechanisms of the individual strains, we also developed a stochastic agent-based model to capture the ecological scenarios *in silico*. In a combined theoretical and experimental approach we are able to show that the level of biodiversity depends crucially on the composition of the inoculum, on the relative growth rates of the three strains, and on the effective reach of colicin toxicity.