

Spreading of non-motile bacteria on hard surface

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Self-organization into multicellular communities is a natural trend of most of the bacteria. Mutual interactions and competition among the bacterial cells in such multicellular organization play essential role in governing the spatiotemporal dynamics. We here present the spatiotemporal dynamics of growing bacterial colony using both agent-based and continuum model of non-motile cells growing utilizing diffusing nutrient on a semi-solid surface by their growth and division forces and by pushing each-other through sliding motility. We show how the resource competition over a fixed amount of food, the diffusion coefficient of the nutrient and the demographic fluctuations govern the morphology of bacterial colonies. Our results show that for very low initial food concentrations, colony develops fingering pattern at the front, while for intermediate values of initial food sources, the colony undergoes transitions to branched structures at the periphery and for very high values of food colony develops smoother fronts.

References:

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