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Evolutionary aspects of collective motility in pathogenic bacteria.

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Pseudomonas aeruginosa is a pathogenic bacteria that can use its single polar flagellum to swim through liquids. It can move collectively over semisolid surfaces, a behavior called swarming. It can also settle and form surface-attached communities called biofilms that protect them from antibiotics. The transition from single motility (swimming) to collective motility (swarming) is biologically relevant as it enables exploring environments that a single bacterium cannot explore on its own. It is also clinically relevant since swarming and biofilm formation are thought to be antagonistic. We investigate the mechanisms of bacterial collective motility using a multidisciplinary approach that combines mathematical modeling, quantitative experiments, and microbial genetics. We aim to identify how these mechanisms may evolve under the selective pressure of population expansion, and consequently reinforce or hinder collective motility. In particular, we clarify the role of growth rate and motility in invasive populations.