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Biofilm-forming bacteria can self-attract by chemotaxis, but only part of the population gets the message QIUXIAN CAI, Univ of Texas, Austin, QI OUYANG, Peking University, VERNITA GORDON, Univ of Texas, Austin — Chemotaxis has been shown to be important for the formation of *P. aeruginosa* biofilms, but the specific role of chemotaxis in the biofilm-formation process has been unknown. Using a recently-developed microfluidic device for assaying chemotaxis, we show that *P. aeruginosa* will chemotax towards its own cellular products. This could act to magnify small heterogeneities in density and promote the accumulation of a high density of bacteria, as in a biofilm. The paradigmatic model organism for chemotaxis is *E. coli*. *E. coli* has multiple flagella and uses these to swim with a run-and-tumble random walk, biasing its runs towards chemoattractant. However, *P. aeruginosa* has only a single polar flagellum and therefore in a bulk fluid can only go forward and backward (with small changes in angle possible). This would seem to pose a significant barrier to efficient chemotaxis. We find that the efficiency of *P. aeruginosa* chemotaxis depends strongly on the initial swimming direction as well as the steepness of the sensed gradient of chemoattractant. Cells swimming up a sufficiently-steep gradient continue going up and do not reverse direction; the remainder show no chemotactally-directed motion. Thus, populations of P. aeruginosa show bimodal response to chemoattractant. Higher levels of chemoattractant increase overall chemotaxis not by increasing swimming speed but by increasing the proportion of bacteria that are in the chemotaxing sub-population.

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