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Type IV pili mediated "walking" motility of bacteria MAXSIM GIBIANSKY, UCLA, JACINTA CONRAD, Univ of Houston, VERNITA GORDON, UIUC, DOMINICK MOTTO, Univ of Notre Dame, FAN JIN, UCLA, JOSHUA SHROUT, Univ of Notre Dame, GERARD WONG, UCLA — We develop image recognition and particle tracking algorithms to identify and track large numbers of surface-associated bacteria, up to ∼800 cells for up to 6 hours. To characterize the pili-dependent motility mechanisms, we image wild type (WT) and flagella-deficient (pilA) knockout strains of P. aeruginosa. In the pilA strain, we observe two motility mechanisms: a novel "walking" mechanism, characterized by bacteria orienting themselves normal to the surface, and a "crawling" mechanism, characterized by the bacteria lying flat on the surface. We find that "crawling" bacteria move along their long axis and maintain their orientation over time, whereas "walking" bacteria change direction rapidly, allowing them to sample microenvironments more efficiently. We also observe both "walking" and "crawling" in the WT strain, suggesting that flagella do not interfere with these mechanisms of Type-IV pili based motility.

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