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Bacterial surface adaptation

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Biofilms are structured multi-cellular communities that are fundamental to the biology and ecology of bacteria. Parasitic bacterial biofilms can cause lethal infections and biofouling, but commensal bacterial biofilms, such as those found in the gut, can break down otherwise indigestible plant polysaccharides and allow us to enjoy vegetables. The first step in biofilm formation, adaptation to life on a surface, requires a working knowledge of low Reynolds number fluid physics, and the coordination of biochemical signaling, polysaccharide production, and molecular motility motors. These crucial early stages of biofilm formation are at present poorly understood. By adapting methods from soft matter physics, we dissect bacterial social behavior at the single cell level for several prototypical bacterial species, including *Pseudomonas aeruginosa and Vibrio cholerae*.