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Chemotaxis and Autotaxis in Biofilm-Forming Systems SHINJI STRAIN, SAMUEL BIENVENU, TRAVIS THATCHER, BENJAMIN COOLEY, VERNITA GORDON, University of Texas at Austin — Biofilms are multicellular, surface-bound communities of interacting unicellular organisms. In the initial stages of biofilm formation, discrete cells populate the surface and eventually form microcolonies (dense surface-bound clusters of cells). How much these microcolonies arise from clonal growth and how much they arise from attraction and active motility of non-clonal cells is not well-understood. One potentially important form of attraction is autotaxis, movement of cells toward like cells. Another is chemotaxis, movement of cells toward an attractive chemical, which could act to concentrate cells with no direct intercellular interaction. While both autotaxis and chemotaxis have been studied for three-dimensional, swimming, dense bacterial systems, they remain largely unstudied in sparse, surface-bound populations that initiate biofilms. Using microscopy and automated tracking and analysis algorithms, we will study how bacteria respond to each other and to chemoattractants, in a spatially-dependent manner. We will determine how variations in neighbor density and arrangement stimulate changes in the motility of E. coli and P. aeruginosa cells on a surface.

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