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Bioconvection as a Consequence of Bio-Stratification in Bacterial Populations DANIEL SHOUP, BENJAMIN STRICKLAND, KENTARO HOEGER, TRISTAN URSELL, Univ of Oregon — The collective motion of bacterial populations in solution can generate convective currents that significantly alter fluid motion and material transport. Known as bioconvection, this process is highly influenced by stimuli such as nutrients and toxins that can attract or repel bacteria via chemotaxis. Despite its prevalence in natural environments, ranging from the ocean floor to fluid in the human gut, this dynamic process and the physical and biological factors that influence it remain largely unexplored. To close this gap, we measure and analyze spontaneous bioconvection arising from the collective movement of dense populations of bacteria, such as *Escherichia coli* and *Bacillus subtilis*. By combining microscopy and image analysis, we find that modulations of the fluid volume geometry, erasure of the air-liquid interface, chemical perturbations like nutrients or antibiotics all alter the development of these dense bacterial masses and in turn the bio-convective currents and corresponding transport phenomena they generate. Our work suggests biophysical principles of material and organismal transport that apply to a broad range of systems where organisms can sense gradients and move within their environments.

Daniel Shoup
Univ of Oregon

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