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Bacteria swimming in shear MARCOS, ROMAN STOCKER, Massachusetts Institute of Technology — The watery habitat of bacteria is typically in motion, exposing cells to fluid shear and thus to a viscous torque. By tracking individual bacteria exposed to a range of shear rates in microfluidic channels, we find that shear alters bacterial swimming patterns and in particular reduces movement across streamlines. This results from the bacteria undergoing Jeffery orbits, which bias cell orientation in the direction of the flow and hamper cross-streamline swimming. We speculate that this could significantly hinder chemotaxis and the quest for nutrients. A model based on resistive force theory is in good agreement with the observations. This process is a purely passive hydrodynamic effect. Further experiments suggest that bacteria do not actively respond to shear: nature has apparently not deemed it worthwhile to develop a shear sensor at the micrometer scale.

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