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Flows generated by bacteria settled upon a solid surface¹ LUIS CISNEROS, JOHN KESSLER, University of Arizona, RICARDO ORTIZ, RICARDO CORTEZ, Tulane University, MARTIN BEES, University of Glasgow — Free-swimming *Bacillus subtilis* are propelled by rotating helical flagella distributed over the the cell body surface. Rearward-oriented coherent bundles of these organelles propel the organisms forward. This directional polarity is a dynamically self-organized aspect of swimming. A swimming cell generates only local disturbance of the fluid. But, when such a cell settles on a surface, the cell body becoming immobile, the flagella adopt bi-polar ordering, inferred from the production of a circulating ($\sim 10 \mu\text{m} \sim 10$ cell diameters) flow. Such flows can be significant for cell-cell communication and the transport of small molecules involved in metabolism or larger ones involved in the local synthesis of biofilms. Experimental results and associated mathematical models provide cross-validation for this remarkable discovery.

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