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Mixing by individual swimmers DMITRI PUSHKIN, Theoretical Physics, University of Oxford, HENRY SHUM, University of Pittsburgh, JULIA YEOMANS, Theoretical Physics, University of Oxford — Despite their evolutionary and technological importance, different biomixing mechanisms, their effectiveness and universality remain poorly understood. In this talk we focus on the Lagrangian transport of the surrounding fluid by swimmers. Low Re passive tracers advected by swimmers move in loops that are, in general, almost closed. We analyze the reasons for this behavior and, as non-closedness of the loops is a natural requirement for an efficient mixing, propose a classification of possible mechanisms for biogenic mixing. Next, we discuss the universal (common to all swimmers) and the swimmer-dependent features of the resulting tracer displacements and analyze the Darwin drift, the total fluid volume displaced by a swimmer passing from and to infinity. We show that the Darwin drift is finite for force-free swimmers and can be decomposed into a universal and a swimmer-dependent part. We illustrate our consideration with examples for model swimmers and biological data.

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