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Hydrodynamics of prey capture in ciliated microorganisms[1]
MADS RODE, Department of Physics and Centre for Ocean Life, Technical University of Denmark, THOMAS KIORBOE, National Institute of Aquatic Resources and Centre for Ocean Life, Technical University of Denmark, ANDERS ANDERSEN, Department of Physics and Centre for Ocean Life, Technical University of Denmark — Unicellular microorganisms play a key role in the biological processes in the ocean. Here we focus on the marine ciliate *Euplotes vannus*, which uses complex arrangements of cilia with periodic beat patterns to generate a feeding flow, retain prey particles, and transport the retained particles to the mouth region of the cell. We describe the hydrodynamics of prey capture to answer how the flow-rate of the feeding current and the prey size spectrum depend on motion and design of the organelles. We use particle image velocimetry to determine the feeding flow quantitatively, and particle tracking to identify retained and lost prey particles and to follow their transport to the mouth region. We have observed *E. vannus* to both swim freely and crawl or sit on solid surfaces. When freely swimming, the ciliate generates a puller-like flow field seemingly without feeding, and when sitting it generates a strong feeding flow that resembles the flow due to a point force at the front of the cell.

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