Abstract Submitted
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Hydrodynamics of Microbial Filter-Feeding[1] ANDERS ANDERSEN, Department of Physics and Centre for Ocean Life, Technical University of Denmark, LASSE TOR NIELSEN, National Institute of Aquatic Resources and Centre for Ocean Life, Technical University of Denmark, JULIA DOLGER, 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 — Microbial filter-feeders form an important group of plankton with significance to the aquatic food webs. While the concept of filter-feeding is straightforward, our quantitative understanding of microbial filter-feeding leaves a lot to be desired. As a model organism, we focus on the filter-feeding choanoflagellate Diaphanoeca grandis. We quantify the feeding flow using particle tracking, and demonstrate that hydrodynamic theory underestimates the observed clearance rate by an order of magnitude. We find similar discrepancies for other choanoflagellate species, highlighting an apparent paradox. To resolve the paradox we argue that D. grandis and other choanoflagellates must have so far unbeknownst morphological features. Specifically, we suggest a flagellar vane that connects the flagellum to the filter, as known in choanocytes of sponges, creating a radically different, and order of magnitude more capable, pumping mechanism.

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