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Hydrodynamic functionality of the lorica in choanoflagellates

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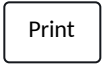
Body:

Choanoflagellates are unicellular microswimmers that are ubiquitous in aquatic habitats. They have a single flagellum that creates a flow toward the collar, the filtration apparatus composed of closely spaced filter strands. Loricated choanoflagellates have evolved a basket-like “skeleton” around the cell, the lorica, the function of which remains unknown. Here, we use Computational Fluid Dynamics (CFD) to explore the possible hydrodynamic function of the lorica by studying the choanoflagellate *Diaphaoneca grandis*, with and without its lorica. We study the flow rate, the flow recirculation, and the resulting clearance rate for the capture of motile and non-motile prey by the freely swimming choanoflagellate. We find no support for several previous hypotheses regarding the effects of the lorica. Rather, our simulations suggest that the main function of the lorica is to enhance the capture efficiency, but this happens at the cost of lower encounter rate with motile prey.

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