Hydrodynamic functionality of the lorica in choanoflagellates

Walther, Jens Honore; Asadzadeh, Seyed Saeed; Nielsen, Lasse Tor; Andersen, Anders; Dölger, Julia; Kiørboe, Thomas; Larsen, Poul Scheel

Publication date:
2018

Document Version
Peer reviewed version

Citation (APA):
Walther, J. H., Asadzadeh, S. S., Nielsen, L. T., Andersen, A., Dölger, J., Kiørboe, T., & Larsen, P. S. (2018). *Hydrodynamic functionality of the lorica in choanoflagellates*. Abstract from 71st Annual Meeting of the APS Division of Fluid Dynamics , Atlanta, Georgia, United States.

DFD18-000639

Hydrodynamic functionality of the lorica in choanoflagellates

Jens Honore Walther[1], Sayed Saeed Asadzadeh[1], Lasse Tor Nielsen[1], Anders Andersen[1], Julia Dolger[1], Thomas Kiørboe[1], Poul Scheel Larsen[1]
[1]Technical University of Denmark

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. Loricate 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.

Funding Acknowledgment:

We gratefully acknowledge funding from the Villum Foundation for SSA and JHW through research grant (9278), for AA, JD and TK through the Centre for Ocean Life, and from The Danish Council For Independent Research for LTN through research grant (7014-00033B).

Special Instructions:

Print Close