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FUNCTIONAL MORPHOLOGY AND FLUID DYNAMICS OF FORAGING IN ‘TYPICAL EXCAVATES’

Excavates are phagotrophic flagellates characterized by a ventral groove and two flagella. The anterior flagellum is naked, and its beating creates a feeding current directed towards the groove, while the posterior flagellum is equipped with a vane and beats within the groove. We combined flow visualization and observations of prey capture in three clades of excavates with computational fluid dynamic modelling to understand the functional significance of this arrangement. We estimated clearance rate magnitudes from flow visualization and CFD modelling. We found that a vaned flagellum beating in a confined groove produces a very efficient feeding current at low energy costs, irrespective of the beat plane and the orientation of the vane and of all other morphological variations.

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