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Microscopic filter feeders at an angle to nearby boundaries: Feeding restrictions and strategies RACHEL PEPPER, University of Colorado, MARCUS ROPER, Universiy of California Berkeley, SANGJIN RYU, Brown University, PAUL MATSUDIARA, National University of Singapore, HOWARD STONE, Princeton University — Microscopic sessile filter feeders are an important part of aquatic ecosystems and form a vital link in the transfer of carbon in marine food webs. These filter feeders live attached to boundaries, consume bacteria and small detritus, and are in turn eaten by larger organisms. Such filter feeders survive by creating a feeding current that draws fluid towards them, and from which they filter their food of interest. Eddies form near these organisms as a result of fluid forcing near a boundary. The extent of these eddies, and their effect on the nutrient uptake of the organism, depend on the angle of fluid forcing relative to the boundary. For a model with perfect nutrient capture efficiency, and in the absence of diffusion, we show that feeding at an angle greatly increases the feeding efficiency of filter feeders. We also show experimental data that living filter feeders in culture feed at an angle to the substrate. We discuss the effects of nutrient diffusion and inefficient nutrient capture on our model, as well as a possible mechanism for filter feeders to change their orientation.

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