

Abstract Submitted
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Possible increase in microorganism motility due to motion-dependent nutrient uptake¹ CARLOS A. CONDAT, MARIO E. DI SALVO, FaMAF, National University of Cordoba and CONICET, Argentina, GUSTAVO J. SIBONA, National Technological University and CONICET, Argentina — Since they have to beat Brownian forces or reach evanescent nutrient patches, some microorganisms inhabiting marine habitats must swim at very high speeds. As a consequence, they must allocate a considerable part of their energetic budget to motion. It is therefore tempting to assume that they enhance their nutrient uptake by increasing their swimming speed. Enhanced nutrient absorption would itself help the microorganism sustain higher translational speeds. We have formulated a model that uses the concept of internal energy depot to investigate this assumption, postulating that the nutrient absorption rate is an increasing function of the microorganism speed. Using realistic values of the parameters, we show that the resulting increment in speed can be substantial, even in the case of small marine bacteria. We find the stationary solutions to the equations of motion and analyze their stability and the influence of thermal noise using various forms for the energy-transfer function.

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Carlos A. Condat
FaMAF, National University of Cordoba

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