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Marine bacteria exploit Euler buckling to turn KWANGMIN SON, JEFFREY S. GUASTO, ARNAUD LAZARUS, JAMES MILLER, PEDRO M. REIS, ROMAN STOCKER, MIT — Important species of marine bacteria were recently discovered to swim in a three-step pattern: they swim forward by rotating a single helical flagellum, then backwards by reversing the flagellar rotation, and finally "flick" the flagellum in an off-axis motion, producing a large ($\sim 90^\circ$) reorientation in the swimming direction. What remains unknown in this elegant, minimalistic swimming pattern are the biomechanics of the flick. Here we present new observations based on high-speed video microscopy to capture the detailed dynamics of the reorientation process in *Vibrio alginolyticus*. Combining the data with a model of buckling of thin structures, we show that the onset of forward swimming triggers a mechanical instability of the flagellar hook, because the propulsive force exceeds the threshold for Euler buckling. This surprising adaptation, where cells take advantage of the flexibility of the flagellar hook to generate a turn, may represent the evolutionarily cheapest bacterial motility pattern and a highly beneficial solution to foraging in resource-poor marine environments.

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