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Caulobacter crescentus exploits its helical cell body to swim efficiently BIN LIU, MARCOS MENDOZA, JOANNA VALENZUELA, School of Natural Sciences, University of California, Merced — How an organism gets its shape remains an open question of fundamental science. In this study, we measure the 3D shape of a bacterium, *Caulobacter crescentus*, using a computational graphic technique for free-swimming microorganisms to analyze thousands of image frames of the same individual bacterium. Rather than having a crescent shape, the cell body of the organism is found to be twisted with a helical pitch angle around 45 degrees. Moreover, the detailed size and geometry of the cell body, matches the optimized cell body obtained by the slender body theory for swimming at fixed power. This result sheds new light on the shape evolution of microorganisms, and suggests that *C. crescentus* has adapted to its natural habitat of fresh-water lakes and streams, lacking nutrients.

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