Abstract Submitted
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**Efficient swimmers use bending kinematics to generate low pressure regions for suction-based swimming thrust**[1] SEAN COLIN, Roger Williams Univ, BRAD GEMMELL, University of Southern Florida, JOHN COSTELLO, Providence College, JENNIFER MORGAN, Marine Biological Laboratory, JOHN DABIRI, Stamford University — A longstanding tenet in the conceptualization of animal swimming is that locomotion occurs by pushing against the surrounding water. Implicit in this perspective is the assumption that swimming involves lateral body accelerations that generate locally elevated pressures in the fluid, in order to achieve the expected downstream push of the surrounding water against the ambient pressure. Here we show that to the contrary, efficient swimming animals primarily pull themselves through the water by creating localized regions of low pressure via waves of body surface rotation that generate vortices. These effects are observed using laser diagnostics applied to normal and spinally-transected lampreys. The results suggest rethinking evolutionary adaptations observed in swimming animals as well as the mechanistic basis for bio-inspired underwater vehicles.

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