Abstract Submitted
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Of cilium and flagellum kinematics[1] PROMODE R. BANDYOPADHYAY, JOSHUA C. HANSEN, Naval Undersea Warfare Center — The kinematics of propulsion of small animals such as paramecium and spermatozoa is considered. Larger scale models of the cilium and flagellum have been built and a four-motor apparatus has been constructed to reproduce their known periodic motions. The cilium model has transverse deformational ability in one plane only, while the flagellum model has such ability in two planes. When the flagellum model is given a push-pull in one diametral plane, instead of transverse deflection in one plane, it forms a coil. Berg & Anderson's postulation (*Nature* **245** 1973) that a flagellum rotates, is recalled. The kinematics of cilia of paramecium, of the whipping motion of the spermatozoa flagella, and of the flapping motion (rolling and pitching) of the pectoral fins of much larger animals such penguins, have been reproduced in the same basic paramecium apparatus. The results suggest that each of the tiny individual paramecium propulsors have the intrinsic dormant kinematic and structural building blocks to optimize into higher Reynolds number propulsors. A synthetic hypothesis on how small might have become large is animated.

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