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Biophysical analysis of swimming force by *Chlamydomonas* flagella JOHN N. YUKICH, Department of Physics, Davidson College, KAREN K. BERND, Department of Biology, Davidson College, RACHEL PATTON MCCORD, Department of Biophysics, Harvard University — Numerous studies have used indirect techniques to investigate the function of flagella of the unicellular green algae *Chlamydomonas reinhardtii*. We report the first direct measurement of the flagellar swimming force of *Chlamydomonas*. Using an optical trap we detect a 75% decrease in swimming force between wild type cells and mutant cells lacking an internal flagellar component. This difference is consistent with previous estimates. To examine flagellar organization and function, we deflagellated cells and examined force generation during flagellar regrowth. As expected, fully regrown flagella are functionally equivalent to flagella of untreated wild type cells. However, analysis of swimming force vs. flagella length reveals intriguing patterns where increases in force do not always correspond with increases in length. These investigations of flagellar force contribute to the understanding of *Chlamydomonas* motility and demonstrate the advantages of the optical trapping technique in studies of cell motility.

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