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Hydrodynamic effects of mastigoneme distribution in Cryptomonad flagella LUDIVINE SANCHEZ ARIAS, HENRY C. FU, University of Utah — Cryptomonads are aquatic unicellular eukaryotes that inhabit both marine and freshwater environments worldwide and whose photosynthetic forms may be responsible for a large part of primary carbon production. Cryptomonads have flattened, elliptical cells and swim using two flagella that are known to bear rigid mastigonemes, fibrous ultrastructures of a nanometer-scale thickness. Previous studies have shown that the external structure of cryptomonad mastigonemes and their arrangement is relatively uniform. It has been claimed that by affecting the drag of flagella, they can affect swimming behavior — even reversing swimming direction — but recent work has not discerned hydrodynamic effects due to mastigonemes in *Chlamydomonas*. In this study, we experimentally investigate flagellar kinematics and mastigoneme geometry of *Chilomonas paramecium* through high-speed imaging of freely swimming cells, and SEM and TEM imaging. We then numerically investigate the potential hydrodynamic effects of *Chilomonas paramecium* mastigonemes using the method of Regularized Stokeslets. We find that hydrodynamic effects are strongly affected by the distribution of mastigonemes; only two-dimensional arrangements of mastigonemes within the beating plane can reverse swimming direction.

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