Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Influence of Helical Cell Shape on Motility of *Helicobacter Pylori*[1]

JOSEPH HARDCASTLE, Boston University, LAURA MARTINEZ, University of Washington, NINA SALAMA, Fred Hutchinson Cancer Research Center, RAMA BANSIL, Boston University, BOSTON UNIVERSITY COLLABORATION, UNIVERSITY OF WASHINGTON COLLABORATION — Bacteria's body shape plays an important role in motility by effecting chemotaxis, swimming mechanisms, and swimming speed. A prime example of this is the bacteria *Helicobacter Pylori;* whose helical shape has long been believed to provide an advantage in penetrating the viscous mucus layer protecting the stomach lining, its niche environment. To explore this we have performed bacteria tracking experiments of both wild-type bacteria along with mutants, which have a straight rod shape. A wide distribution of speeds was found. This distribution reflects both a result of temporal variation in speed and different shape morphologies in the bacterial population. Our results show that body shape plays less role in a simple fluid. However, in a more viscous solution the helical shape results in increased swimming speeds. In addition, we use experimentally obtained cell shape measurements to model the hydrodynamic influence of cell shape on swimming speed using resistive force theory. The results agree with the experiment, especially when we fold in the temporal distribution. Interestingly, our results suggest distinct wild-type subpopulations with varying number of half helices can lead to different swimming speeds.

[1]NSF PHY

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Date submitted: 15 Nov 2013 Electronic form version 1.4