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Analysis of Peristaltic Waves their Role in Migrating Physarum Plasmodia OWEN LEWIS, Univ of Utah, ROBERT GUY, University of California Davis — The true slime mold *Physarum polycephalum* exhibits a vast array of sophisticated manipulations of its intracellular cytoplasm. Growing microplasmodia of *physarum* have been observed to adopt an elongated tadpole shape, then contract in a rhythmic, traveling wave pattern that resembles peristaltic pumping. This contraction drives a fast flow of non-gelated cytoplasm along the cell longitudinal axis. It has been hypothesized that this flow of cytoplasm is a driving factor in generating motility of the plasmodium. In this work, we use two different mathematical models to investigate how peristaltic pumping within *physarum* may be used to drive cellular motility. We compare the relative phase of flow and deformation waves predicted by both models to similar phase data collected from *in vivo* experiments using *physarum* plasmodia. Both models suggest that a mechanical asymmetry in the cell is required to reproduce the experimental observations. Such a mechanical asymmetry is also shown to increase the potential for cellular migration, as measured by both stress generation and migration velocity.

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