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Investigation of the swimming mechanics of *Schistosoma cercariae* and its role in disease transmission DEEPAK KRISHNAMURTHY, ARJUN BHARGAVA, GEORGIOS KATSIKIS, MANU PRAKASH, Stanford University — Schistosomiasis is a Neglected Tropical Disease responsible for the deaths of an estimated 200,000 people annually. Human infection occurs when the infectious forms of the worm known as cercariae swim through freshwater, detect humans and penetrate the skin. Cercarial swimming is a bottleneck in disease transmission since cercariae have finite energy reserves, hence motivating studies of their swimming mechanics. Here we build on earlier studies which revealed the existence of two swimming modes: the tail-first and head-first modes. Of these the former was shown to display a novel symmetry breaking mechanism enabling locomotion at low Reynolds numbers. Here we propose simple models for the two swimming modes based on a three-link swimmer geometry. Using local slender-body-theory, we calculate the swimming gait for these model swimmers and compare with experiments, both on live cercariae and on scaled-up robotic swimmers. We use data from these experiments and the models to calculate the energy expended while swimming in the two modes. This along with long-time tracking of swimming cercariae in a lab setting allows estimation of the decrease in activity of the swimmer as a function of time which is an important factor in cercarial infectivity. Finally, we consider, through experiments and theoretical models, the effects of gravity since cercariae are negatively buoyant and sink in the water column while not swimming. This sinking affects cercarial spatial distribution which is important from a disease perspective.

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