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Visualizing viral transport and host infection KWANGMIN SON, MIT, JEFFREY GUASTO, Tufts university, ANDRES CUBILLOS-RUIZ, MIT, MATTHEW SULLIVAN, University of Arizona, ROMAN STOCKER, MIT, MIT TEAM — A virus is a non-motile infectious agent that can only replicate inside a living host. They consist of a <100 nm diameter capsid which houses their DNA, and a <20 nm diameter tail used to inject DNA to the host, which are classified into three different morphologies by the tail type: short tail ($\sim$ 10 nm, podovirus), rigid contractile tail ($\sim$ 100 nm, myovirus), or flexible noncontractile tail ($\sim$ 300 nm, siphovirus). Combining microfluidics with epifluorescent microscopy, we studied the simultaneous diffusive transport governing the initial encounter and ultimately the infection of a non-motile cyanobacteria host ($\sim$ 1 μm; prochlorococcus) and their viral (phage) counterparts in real time. This methodology allows us to quantify the virus-host encounter/adsorption dynamics and subsequently the effectiveness of various tail morphologies for viral infection. Viral transport and the role of viral morphology in host-virus interactions are critical to our understanding of both ecosystem dynamics and human health, as well as to the evolution of virus morphology.

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