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The type VI secretion system impacts bacterial invasion and population dynamics in a model intestinal microbiota[1] SAVANNAH L. LOGAN, DREW S. SHIELDS , Department of Physics, University of Oregon, BRIAN K. HAMMER, Georgia Institute of Technology, JOAO B. XAVIER, Memorial Sloan-Kettering Cancer Center, RAGHUVEER PARTHASARATHY, Department of Physics, University of Oregon — Animal gastrointestinal tracts are home to a diverse community of microbes. The mechanisms by which microbial species interact and compete in this dense, physically dynamic space are poorly understood, limiting our understanding of how natural communities are assembled and how different communities could be engineered. Here, we focus on a physical mechanism for competition: the type VI secretion system (T6SS). The T6SS is a syringe-like organelle used by certain bacteria to translocate effector proteins across the cell membranes of target bacterial cells, killing them. Here, we use T6SS+ and T6SS- strains of V. cholerae, the pathogen that causes cholera in humans, and light sheet fluorescence microscopy for in vivo imaging to show that the T6SS provides an advantage to strains colonizing the larval zebrafish gut. Furthermore, we show that T6SS+ bacteria can invade and alter an existing population of a different species in the zebrafish gut, reducing its abundance and changing the form of its population dynamics. This work both demonstrates a mechanism for altering the gut microbiota with an invasive species and explores the processes controlling the stability and dynamics of the gut ecosystem.

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