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Effects of Noise on Ecological Invasion Processes: Bacteriophage-mediated Competition in Bacteria JAEWOOK JOO, Sandia National Laboratories, HARVILL ERIC, REKA ALBERT, Pennsylvania State University — Pathogen-mediated competition, through which an invasive species carrying and transmitting a pathogen can be a superior competitor to a more vulnerable resident species, is one of the principle driving forces influencing biodiversity in nature. Using an experimental system of bacteriophage-mediated competition in bacterial populations and a deterministic model, we have shown in [Joo et al 2005] that the competitive advantage conferred by the phage depends only on the relative phage pathology and is independent of the initial phage concentration and other phage and host parameters such as the infection-causing contact rate, the spontaneous and infection-induced lysis rates, and the phage burst size. Here we investigate the effects of stochastic fluctuations on bacterial invasion facilitated by bacteriophage, and examine the validity of the deterministic approach. We use both numerical and analytical methods of stochastic processes to identify the source of noise and assess its magnitude. We show that the conclusions obtained from the deterministic model are robust against stochastic fluctuations, yet deviations become prominently large when the phage are more pathological to the invading bacterial strain.

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