Soil and waterborne amoeba act as long-term environmental reservoirs of pathogenic bacteria

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Abstract. The emergence of human and wildlife diseases are difficult to forecast due to complex interactions between pathogens, reservoirs, and their environment. Such complexity can obscure mechanisms enabling long-term survival of pathogens in the environment. *Yersinia pestis* bacteria, the causative agent of plague, is characterized by sporadic outbreaks negatively affecting local human and wildlife populations, followed by long dormant phases of persistence in unknown reservoirs. This ongoing research indicates that free-living-amoeba (FLA) act as "Trojan horses" for *Y. pestis* and that FLA facilitate re-emergence of this pathogen into the environment under natural conditions. This research has validated that taxonomically similar bacteria resist digestion by amoeba and survive inside protective cysts formed by 'infected' amoeba. Ongoing research seeks to understand how long *Y. pestis* bacteria remains viable in amoebal cysts and mechanisms of re-introduction to vulnerable environments. The integration of artificial infection experiments with field observations and theoretical modeling suggest that amoeba abundance and subsequent plague transmission is highly correlated with local precipitation events. Identifying disease reservoirs is crucial for understanding ecological interaction networks and enabling effective wildlife conservation and management of human and wildlife diseases.