Soil and waterborne amoeba can act as environmental reservoirs of pathogenic bacteria under certain precipitation regimes

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Abstract: The emergence of human and wildlife diseases is 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 research indicates that soil and water-born amoeba, specifically *Dictyostelium discoideum*, act as "Trojan horses" for *Y. pestis*. Amoeba exhibit multiple life stages, each uniquely suitable for culturing and preserving Y. pestis, given the appropriate moisture and climate regimes. 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 and drought events. This research indicates amoeba could facilitate re-emergence of this pathogen into the environment under natural conditions. Identifying disease reservoirs is crucial for understanding ecological interaction networks and enabling effective wildlife conservation and management of human and wildlife diseases.