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The lysis-lysogeny decision in variable environments

Bacteriophage, viruses that infect bacteria, are the most abundant life form on the planet, and are critical to both ecosystem function and human health. After infecting a host cell, temperate bacteriophage have two life-history strategies: they can immediately kill the cell and release progeny viral particles (lysis); alternatively, they can integrate their genetic material in the host genome (lysogeny), persisting as an integral part of the host for many generations. Thus, in lysogeny, the predator can choose to become genetically part of the prey. Similar to a bet-hedging strategy, recent experimental evidence suggests that lysogeny may be favoured in variable environments. We examine the evolutionary stability of the lysis-lysogeny decision by analysing invasion reproductive numbers in this intriguing predator-prey system, evolving in the context of a periodic environment.