

Different strategies underlie the ecology of microbial invasions

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Infectious disease can play a key role in mediating the outcome of competition between rival groups, as seen in the effects of disease-bearing conquistadors in the New World--or, on a much smaller ecological scale, the ability of bacteria to spread their viruses to competing bacteria.

In a new study, researchers have compared two different general ways in which bacteria compete with one another, and they have found that each strategy seems to be particularly effective under different ecological circumstances--for example, depending on whether the bacteria are rare invaders or abundant residents. The findings, reported by a group of researchers including Sam P. Brown of the University of Texas at Austin, Cambridge University, and University of Montpellier II, and François Taddei of University of Paris, appear in the October 24th issue of *Current Biology*.

Bacteria are not always so fortunate as to grow alone in their environment, and they often face competition from other lineages. One widespread solution is to kill these competitors.

In the new work, the researchers explored the relative value to both invading and defensive bacteria of two distinct microbial mechanisms of killing competitors: through the release of chemicals (for example, antibiotics or bacteriocins) and through the release of parasites (for example, bacterial viruses, known as phages). Focusing on the second mechanism in an experimental setting, the researchers showed that even

though some of the invading bacteria can be killed by their own phage parasites, upon their death they release a burst of infectious parasites that can kill competitor bacteria.

Unlike chemical killing, released parasites trigger an epidemic among susceptible competitors, which become factories producing more parasites. Amplification therefore makes phage carriers able to successfully compete with phage-susceptible bacteria even faster when the carriers are rare, whereas chemical killers can only win in a well-mixed environment when chemical carriers are sufficiently abundant. The findings show that the release of chemical toxins is superior as a resident strategy to repel invasions, whereas the release of parasites is superior as a strategy of invasion.

Citation: Brown et al.: "Ecology of Microbial Invasions: Amplification Allows Virus Carriers to Invade More Rapidly When Rare." Publishing in *Current Biology* 16, 2048–2052, October 24, 2006 DOI 10.1016/j.cub.2006.08.089

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