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Poster #9: A prophage-encoded anti-phage defence system that prevents phage DNA packaging by targeting the terminase complex

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A unique feature of temperate phages is the ability to protect their host bacteria from a second phage infection. Such protection is granted at the lysogenic state, where the phages persist as prophages integrated within the bacterial chromosome, expressing genes that defend the host and themselves from predation. Here, we report a prophage-encoded anti-phage defence system that inhibits DNA packaging of invading phages in Listeria monocytogenes. This system includes a defence protein, TerI, and two self-immunity proteins, anti-TerI1 and anti-TerI2. TerI targets the terminase complex of invading phages to prevent DNA translocation into procapsids without halting the lytic cycle, thereby leading to the release of unpacked non-infectious procapsids upon bacterial lysis. In contrast, the self-immunity proteins, anti-TerI1 and anti-TerI2, counteract TerI during prophage induction to allow virion production. We found this unique prophage-encoded anti-phage defence system, TERi, to be prevalent in Listeria phages, providing population-level host protection without compromising the prophage lytic lifecycle.

Reference #1

Reference #2

Reference #3

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