
Ubiquitous phage-inducible chromosomal islands in the bacterial universe

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Résumé

Ourselves and others have discovered and extensively characterised a family of pathogenicity islands in Gram-positive cocci, the phage-inducible chromosomal islands (PICIs), which contribute substantively to horizontal gene transfer, host adaptation and virulence. We now report that similar elements also occur widely in Gram-negative bacteria. As with the PICIs from the Gram-positive cocci, their uniqueness is defined by a constellation of features: unique and specific attachment sites, exclusive PICI genes, a phage-dependent mechanism of induction, conserved replication origin organization, convergent mechanisms of phage interference, and specific packaging of PICI DNA into phage-like infectious particles, resulting in very high transfer frequencies. We suggest that the PICIs represent two or more distinct lineages, have spread widely throughout the bacterial world, and have diverged much more slowly than their host organisms or their prophage cousins. Overall, these findings represent the discovery of a universal class of mobile genetic elements, which have had a broad impact on lateral gene transfer in the bacterial world.

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