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Perspective

The Contrast between Plasmid Vector DNA and Viral Vector Gene

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INTRODUCTION

Plasmids are self-replicating entities found in almost all bacterial species and play an important role in bacterial adaptation and evolution. Furthermore, plasmids are studied for their own sake and as useful tools in molecular biology research. Plasmids are typically circular, though linear forms have been described, and their sizes range from 1 kb to 200 kb. Mega plasmids, which can be up to 1,000 kb in size, have also been discovered. The number of copies per chromosome varies among plasmids, and bacterial cells can carry multiple types. Plasmids, like chromosomes, code for RNA molecules and proteins, replicate as the cell grows, and are normally distributed in equal numbers to the two daughter cells upon cell division.

Plasmids, on the other hand, do not code for functions that are required for bacterial growth in the absence of a stressful situation, such as the absence of an antibiotic. The first plasmids described were named based on the presence of known phenotypes. As a result, the first plasmid discovered in the early 1950's was named F factor, which stands for fertility, because it is involved in the exchange of genetic information in *Escherichia coli* and related Enterobacteriaceae. R factor plasmids were discovered in Japan in the late 1950's when *E.coli* and *Shigella* strains resistant to a variety of antibiotics were isolated from patients' feces. The ColE1 plasmid contains a gene whose product, colicin El, can kill bacteria that do not have this plasmid. Tumefacient *Agrobacterium* the Ti plasmid contains genes that, when transferred to plant cells, can cause tumors. This system of nomenclature has caused some confusion because several plasmids carry genes coding for phenotypes other than those for which they were originally named. The nomenclature of bacterial plasmids has now been standardized to avoid further confusion. Plasmid names begin with the letter Sp-for plasmid, followed by capital letters that either describe the plasmid or the location where it was constructed or give the initials of the person or people who isolated or constructed it. Following these letters are numbers that help identify the concept.

DESCRIPTION

If plasmid genes, such as those for antibiotic resistance and toxin synthesis, were incorporated into the chromosome, all cells would benefit. To explain the presence of plasmids, there is one disadvantage and one advantage. The disadvantage would be that the bacteria would have to bear the burden of replicating and maintaining a larger chromosome. Experiments have shown that bacterial cells with smaller genomes outgrow those with larger ones and that bacterial cells without plasmids outgrow those with plasmids, assuming that the plasmid function(s) is not required. The benefit of plasmids is that genetic information that is not required for growth under all conditions can be easily distributed among cells in a population and even to cells of other species depending on the plasmids' host range.

While some have very particular host ranges and others can be transferred to and replicated in all gram-negative species. Plasmids can alter the phenotype of a bacterial host in a variety of ways. There are four basic groups of plasmid genes. Determinant factors involved in plasmid replication and daughter cell segregation: These determinants regulate plasmid properties like copy number per chromosome, incompatibility, and host range. Conjugational transfer determinants control plasmid transmissibility and associated plasmid and strain characteristics such as donor selectivity. Interactions with other replicons and extra-chromosomal elements are regulated by determinants. This includes plasmid sequences involved in chromosome involvement as well as genetic mutations where products inhibit the fertility of other conjugative in the same host, inhibit the growth of specific bacteriophages, or stop the host from acting as a recipient in conjugal crosses determinants that impact the interaction of the plasmid-bearing cell with its environment: These include genes for bacteriocin production and immunity, adhesion and pathogenicity factors, anti-bacterial resistance (antibiotics, ions, and radiation), and environmental substrate metabolism (sugars, organic adds, aromatic and aliphatic hydrocarbons, detergents and pesticides).

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General characteristics of plasmid

The ability of bacterial plasmids to maintain stable coexistence with their hosts is one of their most important properties. Aside from copy number control, plasmids must be equally segregated into the two daughter cells, especially when only a few copies are present. Because bacterial cells can accept and inherit multiple plasmids, what happens if two plasmids belong to the same incompatibility group? All plasmids can be transferred to cells from the same or different species. Conjugative plasmids encode the genetic information needed to catalyze their own transfer from a donor to a recipient cell. To transfer to the recipient cell, mobilizable plasmids must be present in the same cell as a conjugative plasmid.

Transgene multiplication and its regulation

When a bacterial cell grows, it replicates its chromosome(s), as well as any plasmids present within the cell. While autonomous replication is a fundamental feature of plasmids, they must synchronize their replication with host division. Each plasmid must replicate once every generation on average to ensure stable coexistence with its host. Each plasmid typically has one replication origin, or ori V site, where replication begins.

CONCLUSION

Furthermore, the plasmid must encode at least one protein that allows replication to begin at the ori V site. The host cell provides all other required proteins such as DNA polymerase, ligase, primase, and helicase. Each plasmid replicates using one of two general mechanisms.

- Synchronization of theta circles
- Replicating a rolling circle.