

Plasmids

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Introduction to Plasmids

The American molecular biologist [Joshua Lederberg](#) introduced the term 'plasmid' in 1952.



A plasmid is a double stranded circular DNA. It is not dependent of the host chromosome. It is found in bacterial cells and some other type of cells. Automatically, plasmids replicate inside the bacterial chromosome. These plasmids can have a gene of 10 kb size too. The plasmids are considered as a transferable genetic elements.

Types of plasmids

Bacteria have variety of plasmids. The naturally occurring plasmids have been classified by the characteristics coded by the plasmid genes. Plasmids can provide bacteria with an ability to fix elemental [nitrogen](#). Plasmids used in [genetic engineering](#) are called [vectors](#). Large amounts of protein can be made by plasmids.

Let's now discuss the types of plasmid.

Classification based on the ability to transfer to other bacteria

Conjugative plasmids:

- Contain tra genes
- [Conjugation](#) that is the transfer of plasmids to another bacterium is performed by them.

Non-conjugative plasmids

- Cannot initiate conjugation
- Can only be transferred with the assistance of conjugative plasmids

Classification based on function:

1. F plasmids:

- These are known as Fertility plasmids.
- tra genes only carried by them.
- Capable of [conjugation](#).
- They don't have any characteristic beyond this conjugation performance.

2. R plasmids:

- Also known as Resistance plasmids
- Known as R factors also,
- used in recombinant DNA technology.
- can build a resistance against [antibiotics](#)
- help bacteria produce [pili](#)

3. Col Plasmids:

- These plasmids code for colicins (proteins)
- [Proteins](#) that can kill other bacteria, e.g., ColE1 of E.coli

4. Degradative plasmids:

- Allow the host bacterium to metabolize unusual substances
- e.g. [toluene](#) or [salicylic acid](#).

5. Virulence Plasmids:

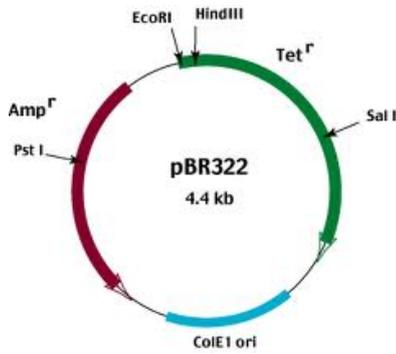
- Turn the bacterium into [apathogen](#). e.g. Ti plasmids of Agrobacterium tumefaciens

Classification based on Yeast cloning vectors

1. Yeast integrative plasmid (Yip) - Used to study the toxicity of a gene.
2. Yeast Replicative Plasmid (YRp) - Less stable plasmids.

Two plasmid vectors that have been extensively used in genetics are pBR322 and pUC18. These vectors are derived from natural plasmids, but both have been genetically modified for convenient use as recombinant DNA vectors.

pBR322



With the standard rules for vector nomenclature, the name 'pBR322' is given to this

plasmid.

- "p" indicates ?plasmid
- "BR" ? Bolivar and Rodriguez, the two researchers who developed pBR322.
- '322' ? distinguishes this plasmid from other plasmids developed in the same laboratory in which the vector was originally constructed
- tetR and ampR are the 2 resistant genes present in this plasmid. They have unique restriction target sites for cloning. The selected gene can be inserted in any one of these resistance gene.

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Reference Links:

- <http://en.wikipedia.org/wiki/Plasmid>
- <http://www.biotecharticles.com/Others-Article/Plasmids-Types-Functions-and-Applications-187.html>
- [http://en.wikipedia.org/wiki/Vector_\(molecular_biology\)](http://en.wikipedia.org/wiki/Vector_(molecular_biology))
- <http://en.wikipedia.org/wiki/PBR322>

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