
Recombinant
DNA Technology
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What is DNA?

DNA is a group of molecules that is responsible for carrying and transmitting the hereditary materials or the genetic instructions from parents to offsprings

Recombinant DNA

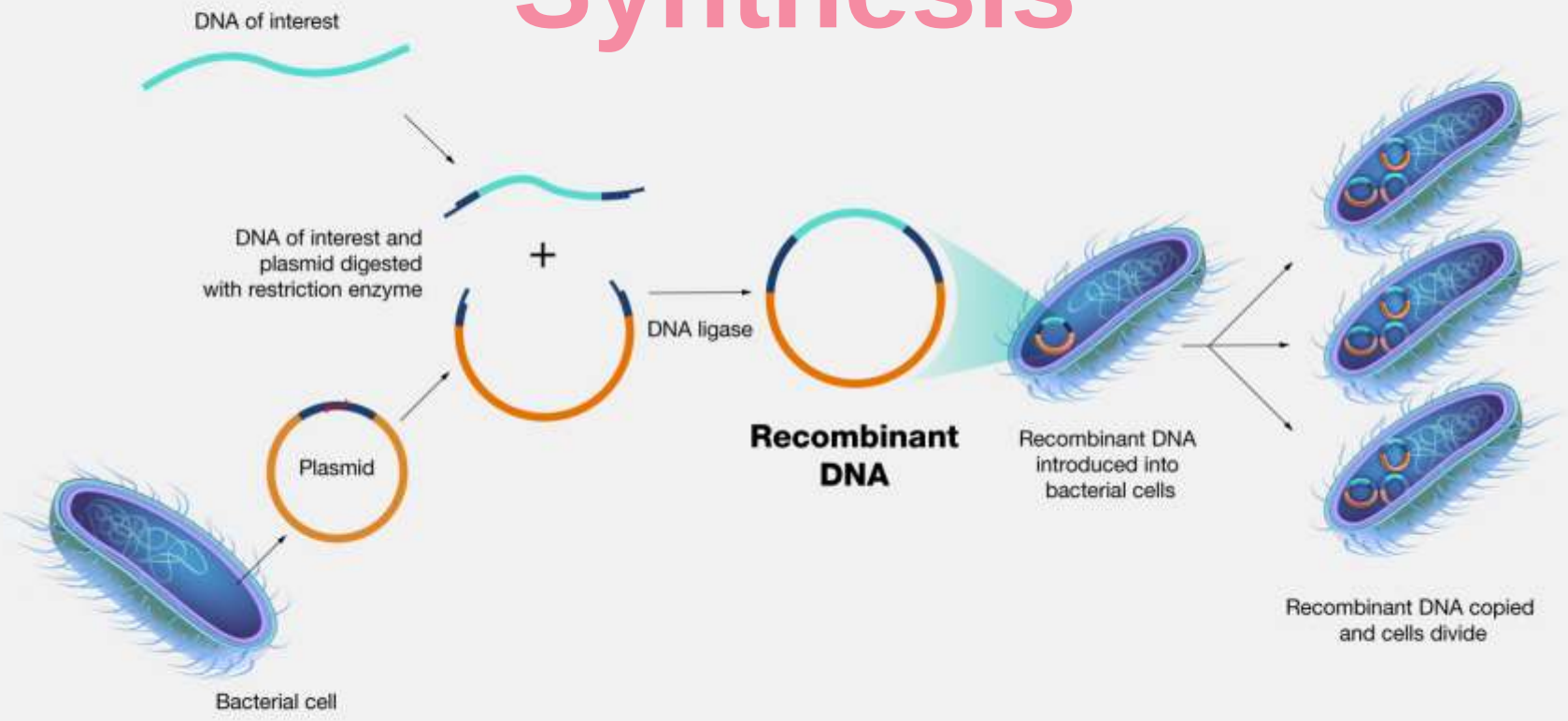
Recombinant DNAs are molecules of DNA that are formed through genetic recombination methods. DNA molecules from two or more different sources are cleaved using restriction enzymes and then joined together using ligases. Recombinant DNA is possible since the fundamental chemical structure of DNA molecules is the same in most organisms.

The DNA fragments may come from any species. Thus, recombinant DNA is sometimes referred to as chimeric DNA due to the DNA resulting from the recombination of DNA fragments from two different species, likened to a chimera.

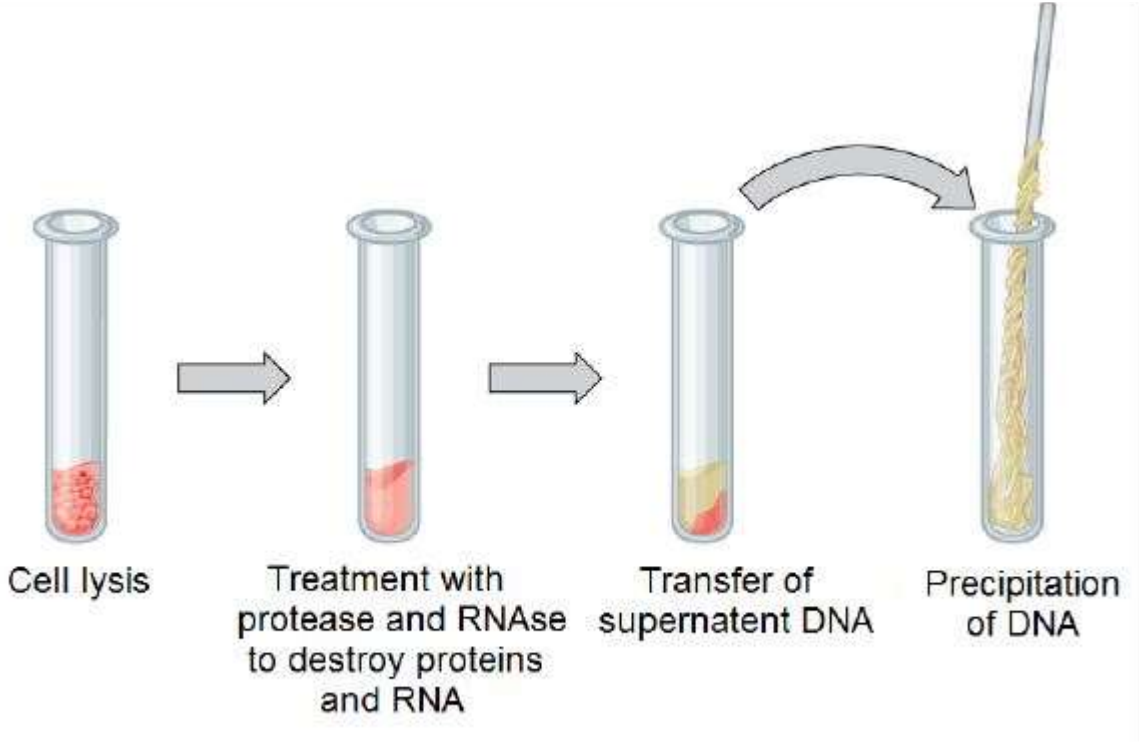
What is Recombinant DNA Techonology

Recombinant DNA technology involves using enzymes and various laboratory techniques to manipulate and isolate DNA segments of interest. This method can be used to combine (or splice) DNA from different species or to create genes with new functions. The resulting copies are often referred to as recombinant DNA.

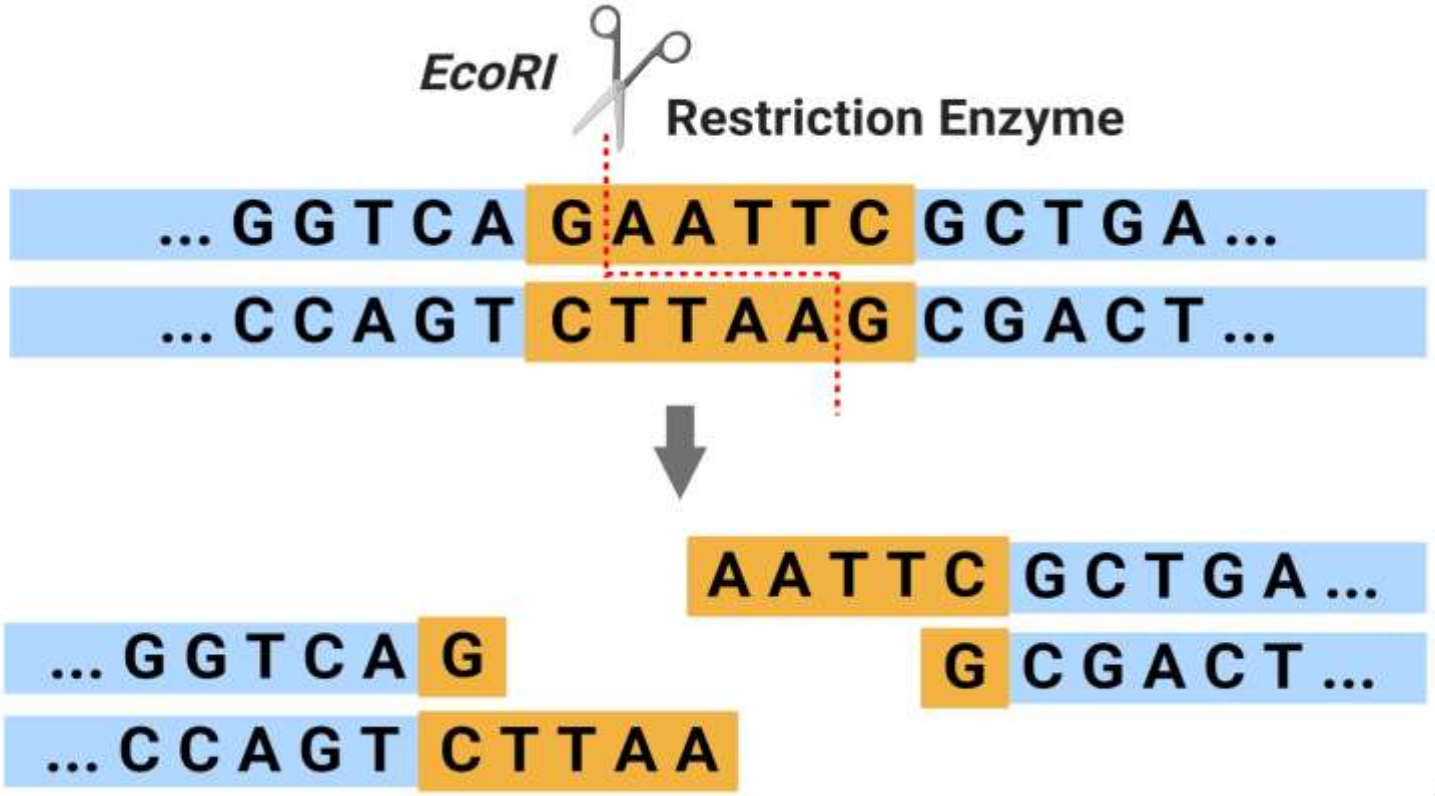
Overview of rDNA Synthesis



1. Isolation of Genetic Material

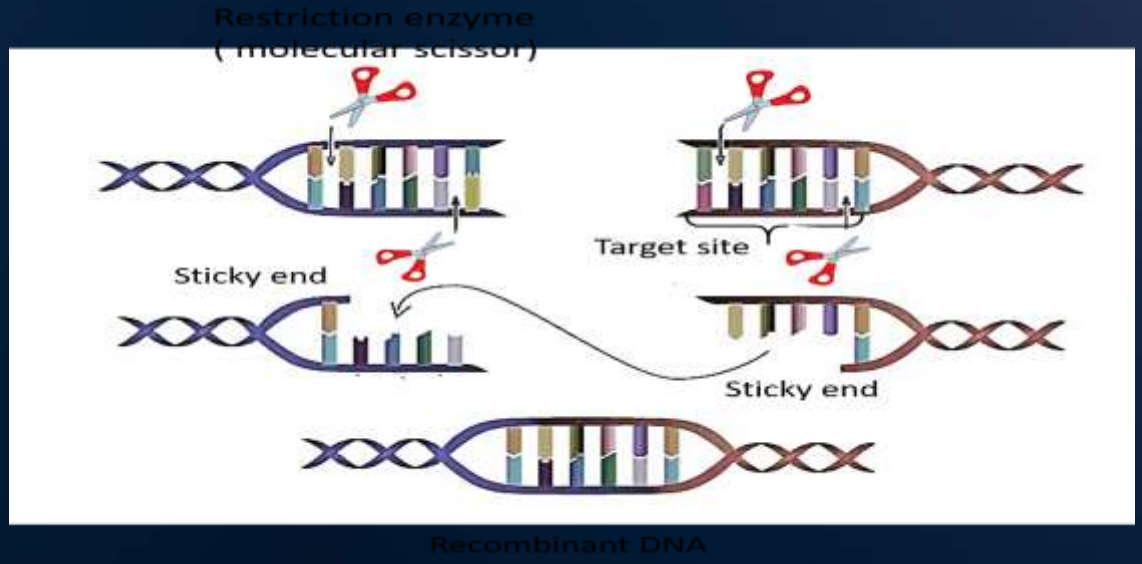


2. Restriction Enzyme Digestion



Restriction enzymes

Restriction enzymes are the enzymes produced by certain bacteria that have the property of cleaving DNA molecule at or near specific base sequences

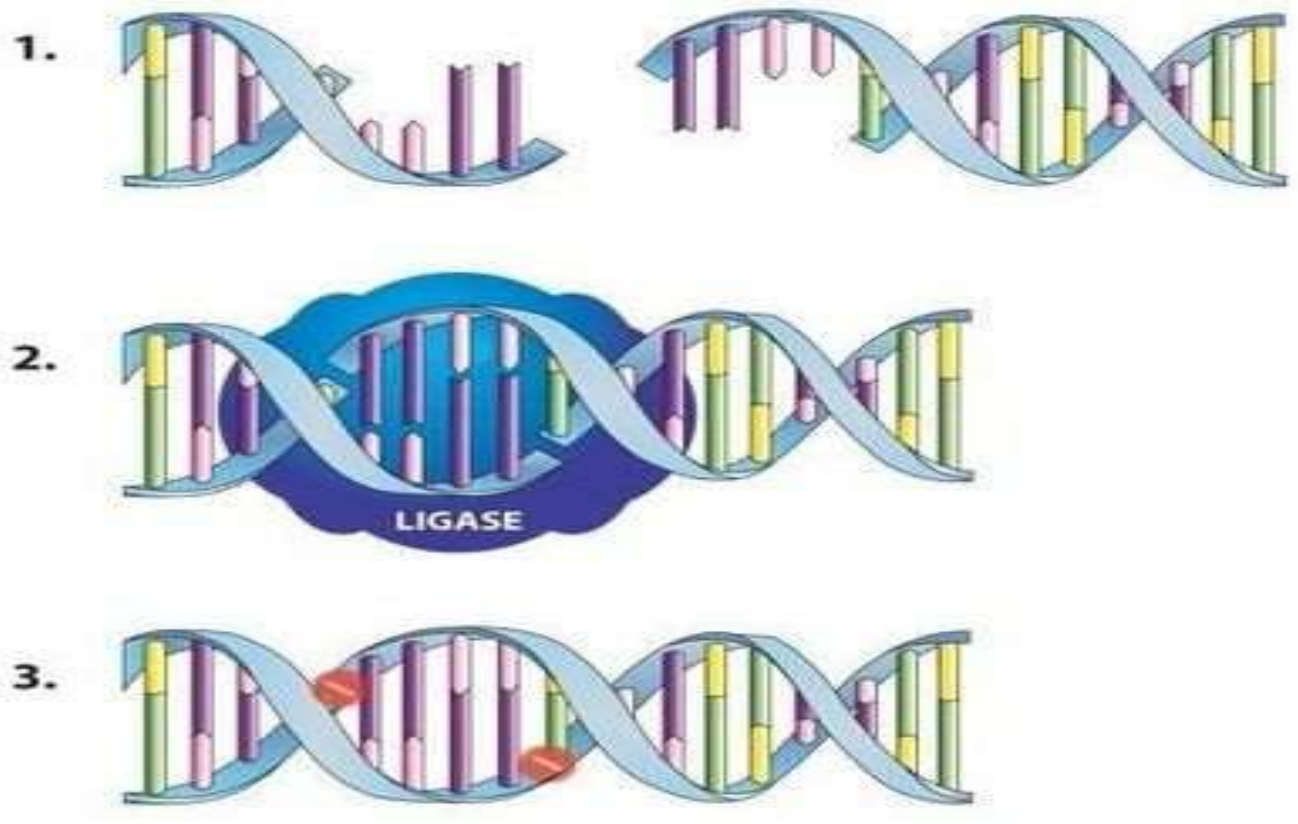


Nomenclature of restriction enzymes

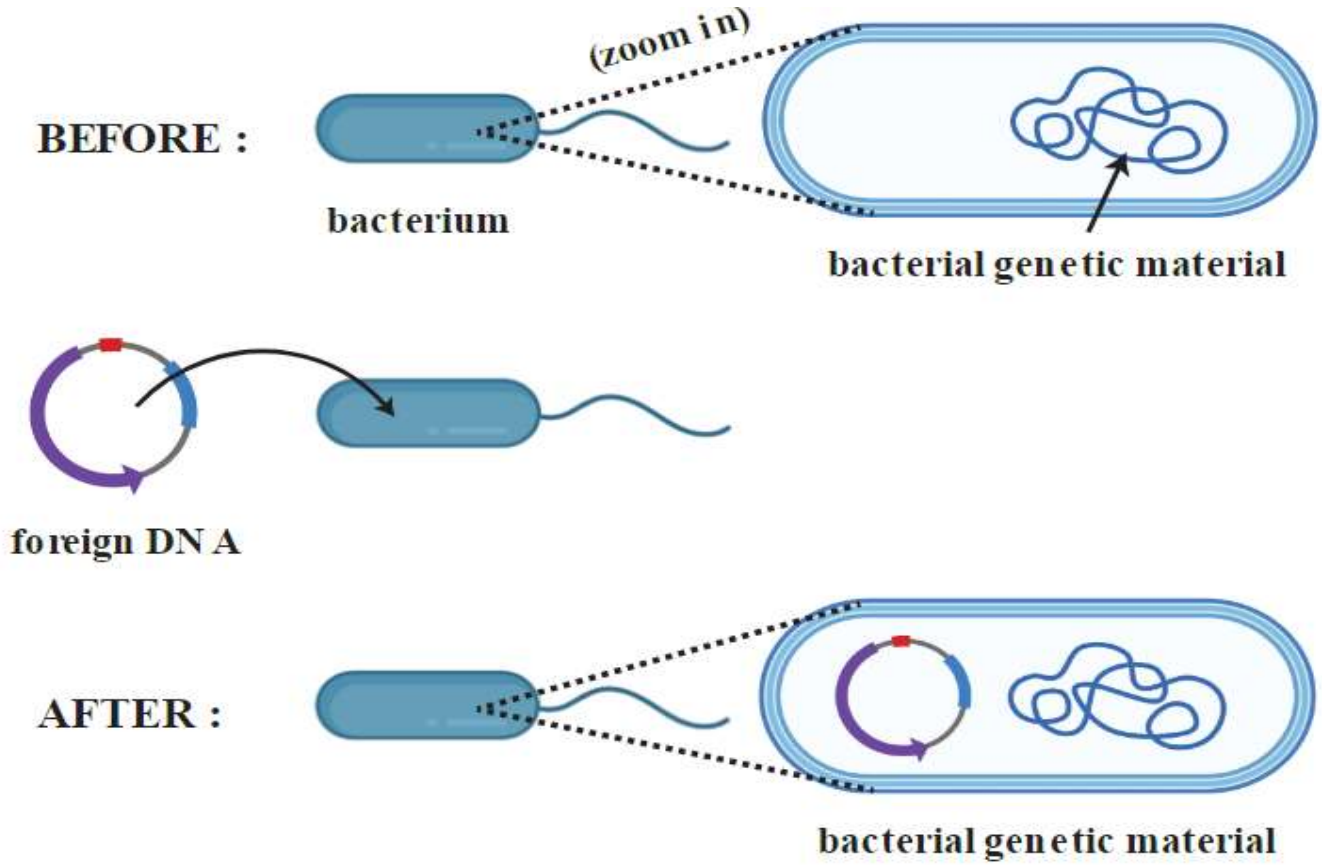
Derivation of the EcoRI name		
Abbreviation	**Meaning**	**Description**
E	*Escherichia*	genus
co	*coli*	species
R	RY13	strain
I	First identified	order of identification in the bacterium

- Each enzyme is named after the bacterium from which it was isolated, using a naming system based on bacterial genus, species and strain

Ligation of DNA Molecules



Insertion of Recombinant DNA in Host



Isolation of Recombinant Cells

•The transformation process generates a mixed population of transformed and non-trans- formed host cells.

•The selection process involves filtering the transformed host cells only.

•For isolation of recombinant cell from non-recombinant cell, marker gene of plasmid vector is employed.

•For examples, PBR322 plasmid vector contains different marker gene (Ampicillin resistant gene and Tetracycline resistant gene. When pst1 RE is used it knock out Ampicillin resistant gene from the plasmid, so that the recombinant cell become sensitive to Ampicillin.

Applications

- DNA technology is also used to detect the presence of HIV in a person.
- Gene Therapy – It is used as an attempt to correct the gene defects which give rise to heredity diseases.
- Recombinant DNA technology is widely used in Agriculture to produce genetically-modified organisms such as Flavr Savr tomatoes, golden rice rich in proteins, and Bt-cotton to protect the plant against ball worms and a lot more.
- In the field of medicines, Recombinant DNA technology is used for the production of Insulin.

Thank you !