BIOTECHNOLOGY: PRINCIPLES AND PROCESSES

PRINCIPLES OF BIOTECHNOLOGY

It is a technique using live organisms or their cellular components or enzymes to produce useful products and processes for man.

According to **European Federation of Biotechnology (EFB),** "Biotechnology is the integration of natural science and organisms, cells, parts there of and molecular analogues for products and services."

The term biotechnology coined by **Karl Ereky (1917).**

Development of biotechnology can be studied under two phases.

(i) Old or Traditional Biotechnology:

It is also known as conventional technology that has been used for many centuries. Curd, bread, wine, ghee, and other alcoholic beverages, idli, dosa, cheese, paneer have been produced using traditional biotechnology.

(ii) Modern Biotechnology:

It is new branch developed during 1970. It involves development of highly new and useful traits in crop varieties and animal breeds by the use of genetic engineering

e.g. In vitro fertilization leading to a **'Test tube baby'** synthesining a gene and using it, developing a DNA vaccine or correcting a defective gene are all parts of modern biotechnology.

Principles of Biotechnology:

(i) Genetic engineering:

In this Technique, chemistry of genetic material (DNA & RNA) is altered and introduced these into host organisms and thus alter the phenotype of the host organism is called **genetic engineering (Recombinant DNA technology)**.

(ii) 'Bioprocess Technology :

Maintenance of sterile (microbial contamination-free) ambience in chemical engineering processes to enable growth of only the desired microbe/eukaryotic cell in large quantities for the manufacture of biotechnological products like antibiotics, vaccines, enzymes, etc.

The concept of genetic engineering was the outcome of two very significant discoveries made in bacterial research. These were-

(i) presence of extrachromosomal DNA fragments called plasmids in the bacterial cell, which replicate along with, chromosomal DNA of the bacterium.

(ii) presence of enzymes restriction endonucleases which cut DNA at specific sites.

These enzymes are. therefore. called 'molecular scissors'.

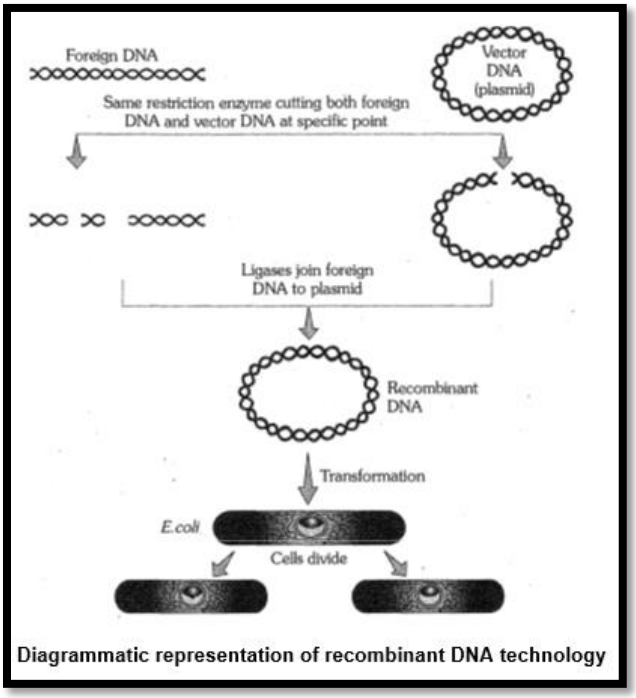
The main basis of Recombinant DNA Technology is DNA cloning :- It is making multiple identical copies of any template DNA

There are three basic steps of DNA donning -

(i) identification of DNA with desirable genes:

(ii) introduction of the identified DNA into the host:

(iii) maintenance of introduced DNA in the host and transfer of the DNA to its progeny.



Diagrammatic representation of recombinant DNA technology