BIOTECHNOLOGY: PRINCIPLES AND PROCESSES

The European Federation of Biotechnolo.gy (EFI3) definition of hiotedinology is as follow- the integration of natural science and organisms, cells, parts thereof, and molecular analogous for products and service'.

- Genetic Engineering - it is the technique of altering the chemistry of .genetic material (DNA and RNA) to introduce these into host organisms and thus changes the .phenotype of the host a TA n ism_
- In chromosome There is a specific DNA 5eqUence ga lled the origin of replication, which is responsible for initiating replication. In genetic engi neeking the foreign DNA iris li nked with the origin of replication, so th-e foreign DNA can replicate and multiply itself in the hell organism, which is also known as cloning or making multiple Identical copies of any template DNA.
- Stanley Cohen and Harbert Boyer in 1972 isolated the arrtibiotic resistance gene b..1 cutting out o piece of DNA from a plasmid which was making multiple identical copies of any template DNA, The cutting of DNA *at* specific locations became possible with the discovery of the so•cal led molecular scissors'_ restriction ernymes_

Steps of Genetically Modifying ark organism-

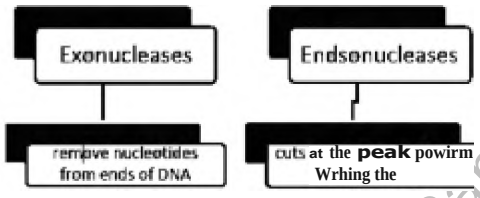
!. Identification of DNA with desirable genes.
IL Introduction of the identified DNA into the host.
I [[. Maintenance of introduced DNA in the host and transfer of the DNA to its progeny.

Tools of Recombinant DNA Technology Includes

- Restriction Enzymes
- Polyrneraseenzyrries
- Ligases
- Vectors host organisms

- Restriction enzymes are responsible for restricting the growth of bacteriaphage in Ecoli was called as restriction evidoriudease. The first restriction endorkuclease- Hind II always cut DNA molecule at a particular point by recognizing a specific sequence of six Base pairs, called recognition sequence. Restriction enzymes belong to. group of enzymes called nucleases_

Nu LI EeNr:....



Each restriction endonuclease recognises a specific palindromic nucleotide sequence in the DNA. Palindromes are group of letters that form the same words when read both forward and backward for example "MALYALANr_

- Restriction enzymes cut the strand of DNA a little away from the centre of the palindrome site between the same two biases on the opposite strands having sticky strand_ The stickiness of the strands facilities the action Otte enzyme DNA ligase.

Separation and isolation of DNA fra.gmertts

The fragment of DNA obtained by cutting DNA using restriction enzyme is separated by technique called gel electrophore5ls. Negatively charged DNA fragments can be separated by forcing them to made towards the anode under an electric field through medium_ DNA fragments separate according to their size through sieving effect provided by *agarose eel.*

The separated DNA fragment can be visualized after staining the DNA with ethatlium bromide followed by exposure to UV light. Separated bands of DNA are separated from agarose gel and extracted frOrn.gei, called elution. The DNA fragment purified this way is used *fir v@torrthirkatiori.*

Cloning Vector

Plasmids and Bacterlophages is commonly used vector For cloning. They have ability to replicate within bacterial cells independent *of* the control of chromosomal DNA.

Following features are required to facilitate cloning into a vector-

{a} Origin of repEcation (ors}

(b) Selects hlc marker

{El Cloning sites

{d) Vector for cloning genes in plants and animals

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Bisriff I

4970bocteriunt twrrefoctiong (pathogen of clIca plant) Is able to deliver a piece of DNA known as DNA" to itrariAlOrrn normal plant cells into a tumor and direct these. tumor celli to prixluce the chemicals required by the pathogen.

Competent host

Now a clay. DNA is directly introduced into host cell bar rnicroinjection in which DNA is directly injected into the nucleus of an animal cell. Bipligtic or gene g.un is also used to inject DNA in to target host-

Protmed of Recombinant DNA TeefirialOgif

Flecombinant DNA technology involves Seve ral steps in specific sed uence-

1. Isolation of DNA
2. F ragm entatlon of DNA by restriction endonucleases
3_ Isolation of a desired DNA fragment
4. Ligation of the DNA fragment into vector
5_ Transforming the recombinant DNA into the host
6. Cuirburi ng the host cells In a medium at large scale
7_ Extraction of the desired product_

Downstream Processing involves. processes that make the product obtain ready for marketing. This process includes separation and purification called as downstream processing. Suitable preservatives are aided to it and send for clinical trial in case OF drug beforE r. i.E..asing to rriarkAt for ri.o bile use..