7. Genetics of the future

Traditional biotechnology

1. Yeast (a kind of fungus) used to prepare bread
2. The ability of fungi and bacteria to convert sugar into alcohol utilised to make wine,appam and cake.

Modern biotechnology

Genetic engineering is the technology of controlling of traits of organism by bringing desirable changes in their genetic constitution.

Tools:-

A. **Restriction endonuclease** (genetic scissor) – Enzyme used to cut genes

B. **Ligase** (genetic glue) - Enzyme used to join genes

C. **Vector** – This is used to transfer gene from one cell to another. Eg:- **Plasmid** of bacteria.

Gene mapping is used to identify the location of gene that responsible for a purticular trait in DNA. The human genome (total genes in human DNA) are identified by **Human Genome Project.**

Donations

I. Medical sector

1. Insulin is produced by bacteria

   We cut the insulin gene from human DNA → This gene joined to bacterial DNA (plasmid) → Plasmid with ligated insulin gene is inserted into bacteria → Bacteria multiply in the culture medium and produce inactive insulin → We produce active insulin from this.

2. Gene therapy

   In this method of treatment genes that are responsible for disease are removed and normal functional gene inserted in their place.

3. Pharm animals and plants

   Medicines are produced from genetically modified plants and animals

Protein	Disease/symptom
Interferons	Viral diseases
Insulin	Diabetes
Endorphin	Pain
Somatotropin	Growth disorder

II. Forensic test

1. **DNA fingerprinting** is used to identify real parents in cases of parental dispute and real culprits. **Alec Jeffrey** is the inventor of DNA fingerprinting.

Basic rule

The arrangement of nucleotides in each person is different, but in close relatives has many similarities.

III. Agriculture sector

1. Insect resistant plants are developed by genetic engineering. (Eg:- Bt.cotton, Bt.brinjal, Bt.maize, Bt.soyabean)

Threats

♣ Threat to indigenous varieties

♣ Use of bio weapons (e.g:- genetically modified pathogens and pathogens multiplied by biotechnology)

♣ When an organism genetically modified, they show unnatural characters. This is against their rights.