

### Genetically modified animals and crops

- Many proteins that can be used for the treatment of diseases in humans are produced through genetic engineering.

Protein required for treatment	Disease/Symptom
Interferons	Viral diseases
Insulin	Diabetes
Endorphin	Pain
Somatotropin	Growth disorders

### Proteins and their uses :

- Interferons --- Used against viral infections and viral diseases
- Insulin ---- used for the treatment of Diabetes
- Endorphin --- used as pain reliever
- Somatotropin ---- used in the treatment of growth disorders
- Genetic modification in organisms can be implemented more effectively through the insertion of gene that code for desirable characters into the genetic constitution of an organism.
- One of the future promises of genetic engineering is **Pharm animals**.
- Genes responsible for the production of insulin and growth hormones required for humans are inserted into animals like cow, pig etc, transforming them into Pharm animals.
- Medicines can be extracted from the blood or milk of genetically modified animals

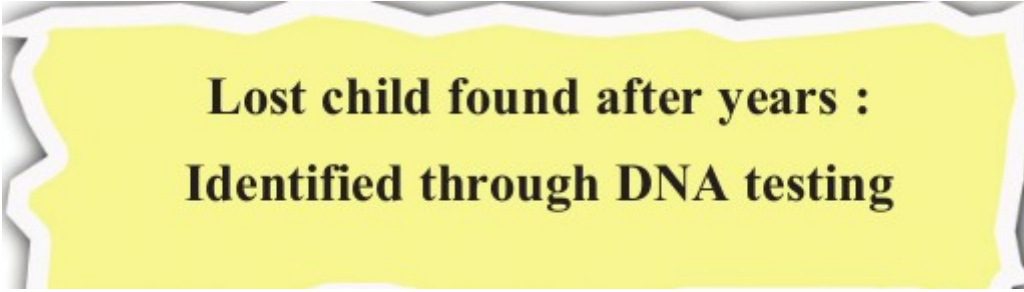
- The limitations in producing insulin using bacteria is difficulties in culturing of bacteria.
- **Genetic modification is implemented not only in animals but in plants**
- When genetic modification is carried out in organisms, it should be ensured that there are no harmful consequences to humans or nature.
- Insect resistant plants like Bt brinjal, soyabean, cotton, maize etc are few examples.

- **Bt is Bacillus thuringiensis**

- A particular gene that is present in the soil bacterium Bacillus thuringiensis is separated and inserted in these plants .
- Bt crops can resist the attack of insect as protein present in these are harmful to the larvae of insects so we can prevent crop loss .
- Bacillus thuringiensis (**Bt**), soil-dwelling bacterium that naturally produces a toxin that is fatal to certain insects.
- The toxin produced by Bacillus thuringiensis (**Bt**) has been used as an insecticide spray and is commonly used in organic farming.

### **Advantages**

- BT successfully repels the larval insects that harm the plant thereby eliminating the necessity for pesticides.
- There are no potentially physical health hazards .
- Insect-protected **Bt** crops provide the **farmer** with season-long protection against several damaging insect pests, and reduce or eliminate the need for insecticide sprays.



**Lost child found after years :  
Identified through DNA testing**

- How are persons identified through DNA testing?

### **DNA Finger printing**

- **DNA fingerprinting** is a laboratory technique used to establish a link between biological evidence and a suspect in a criminal investigation.
- A **DNA** sample taken from a crime scene is compared with a **DNA** sample from a suspect.

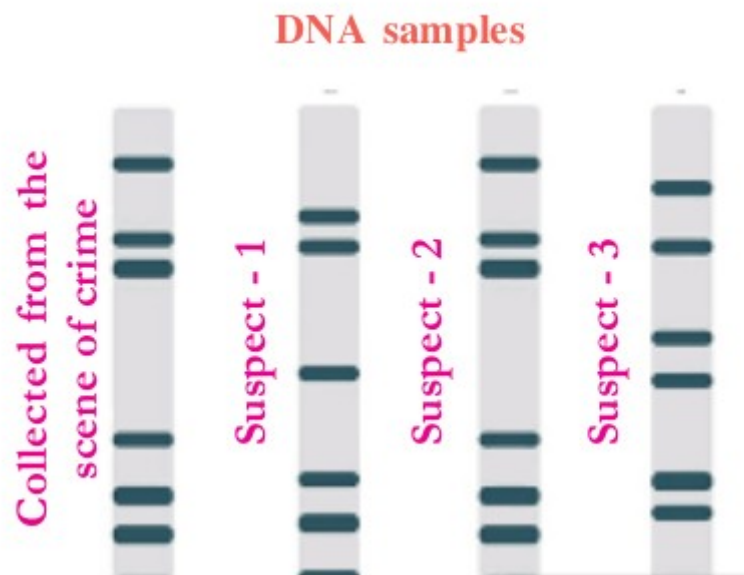
### **DNA PROFILING**

- The technology of testing the arrangement of nucleotides is **DNA profiling**.
- It helps to identify the sequence of arrangement of nucleotides.
- Just like the difference in the fingerprint of each person, the arrangement of nucleotides in each person also differs which was proved by certain experiments conducted by a scientist named **Alec Jeffreys in 1984**
- The arrangement of nucleotides among close relatives has many similarities.

### **Scope of DNA finger printing**

- Helpful to find out hereditary characteristics
- To identify real parents in cases of parental dispute

- To identify persons found after long periods of missing due to natural calamities or wars.
  - To identify the real culprits among the suspected from the place of murder, robbery etc.
  - DNA of the skin, hair, nail, blood and other body fluids obtained , is compared with the DNA of suspected persons.
  - Thus, the real culprit can be identified among the suspected persons through this method.
- How DNA finger printing helps in criminal investigation



- A **DNA** sample taken from a **crime** scene is compared with a **DNA** sample from a suspect.
- If the two **DNA** profiles are a match, then the evidence came from that suspect.
- **DNA** is often discovered at **crime** scenes during police **investigations**, after which persons of interest may be asked to voluntarily provide their **DNA** sample. .
- Once forensic scientists obtain a sample, they extract the **DNA** from cells in bodily fluids or tissues and copy it which is compared with the DNA sample taken from the crime scene

- In case of parental disputes a sample is taken from the child is compared with the samples of parents.

### **Threat to Indigenous varieties**

It is criticized that genetically modified varieties cause harm to indigenous varieties and may cause health issues to humans.

### **Bioweapons - A new challenge**

Application of genetically modified pathogens and pathogens multiplied through biotechnology upon enemies is called biowar. This becomes a threat to the existence of human beings.

### **Genetic modification - violation of rights**

Certain organizations argue that genetic modification is an intrusion upon the freedom of living beings and it is a violation of rights.

## **Disadvantages of Genetic Engineering**

### **1) Threat to indigenous varieties :**

- Genetically modified varieties cause harm to indigenous varieties and may cause health issues to humans.

### **2) Bioweapons :Harmful biological agent used as weapon of war**

- Application of genetically modified pathogens and pathogens multiplied through biotechnology upon enemies is called biowar.
- This becomes a threat to the existence of human beings.

### **3) Genetic modification -violation of rights**

- Genetic modification is an intrusion upon the freedom of living beings and it is a violation of rights.

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