DNA FINGERPRINTING

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What is DNA Fingerprinting?

- DNA Fingerprinting is a forensic technique used to identify individuals by characteristics of their DNA.
- The process of DNA fingerprinting was invented by Alec Jeffrey at the University of Leicester in 1985.
- Also called DNA Profiling or Molecular Fingerprinting.

PRINCIPLE

Variable Number of Tendem Repeats {VNTR}

- Small part of DNA vary from individual to individual

- Chances 30,000 million to 1 (except for identical twins).

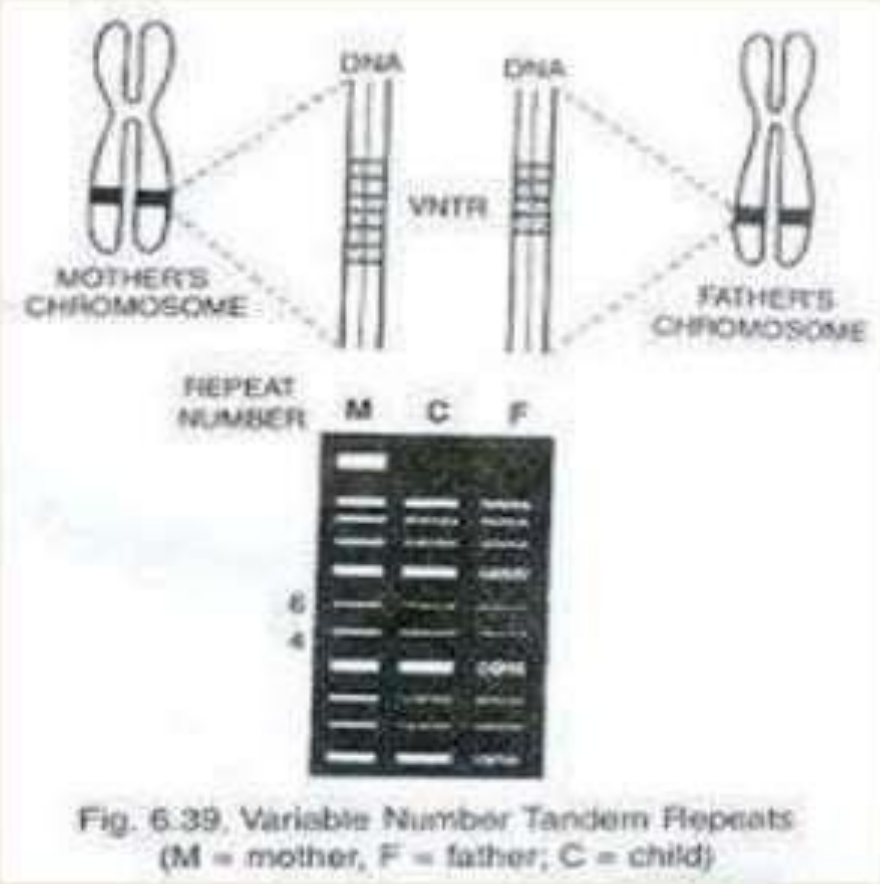


Fig. 6.39. Variable Number Tandem Repeats (M = mother, F = father; C = child)

Methodology

Steps involved :-

1. DNA Extraction
2. DNA Cutting
3. Gel Electrophoresis
4. Southern Hybridization
5. Autoradiography

1. DNA EXTRACTION

- Cells are broken down to release DNA.
- Sample Collect from:-
  - ✓Blood
  - ✓Hair
  - ✓Saliva
  - ✓Semen
  - ✓Body tissue cells

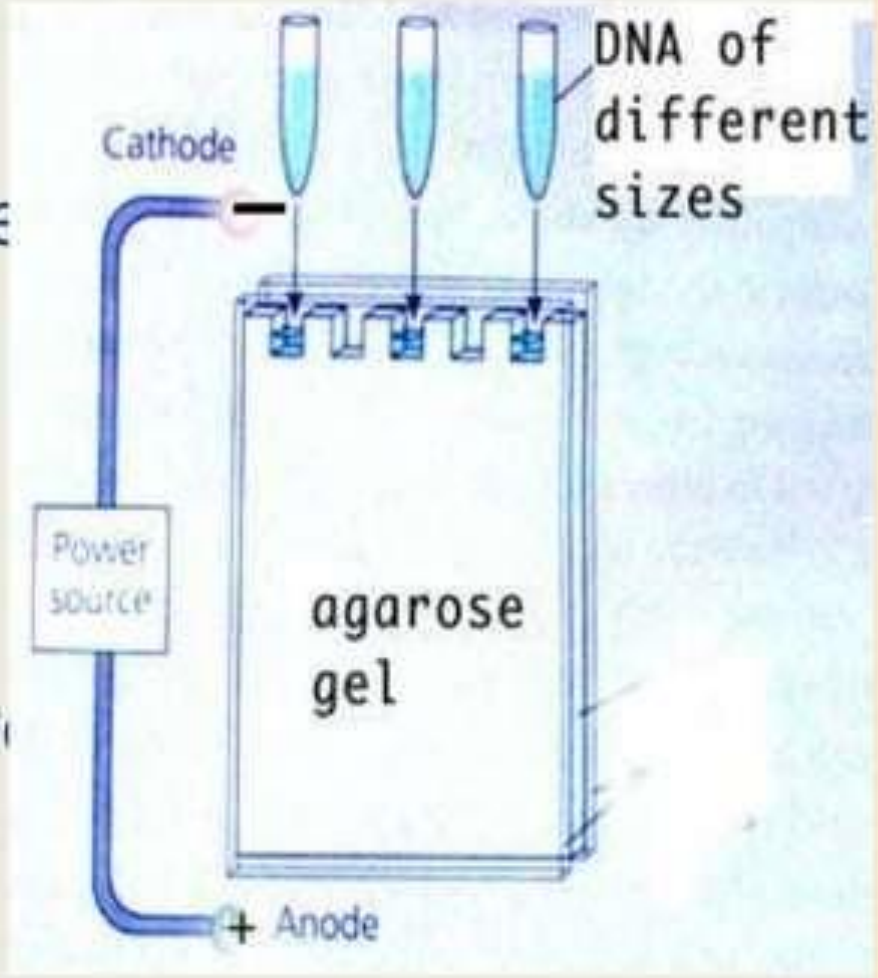
2. DNA CUTTING

- The DNA is cut into fragments using **restriction enzymes**.

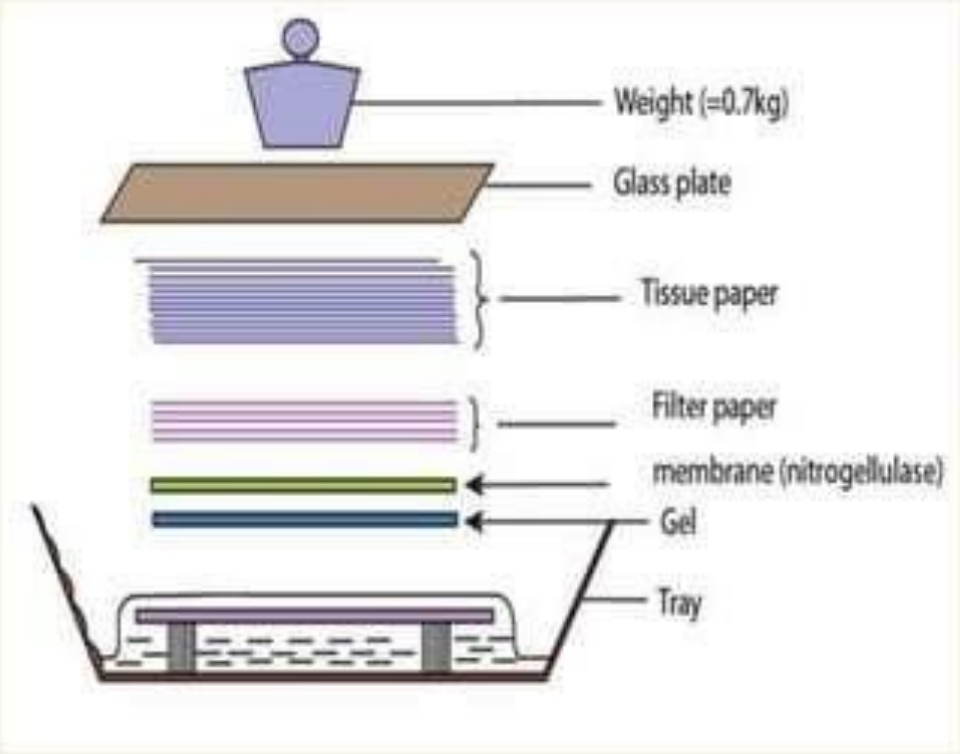
- Each restriction enzyme cuts DNA at a specific base sequence.

3.Gel Electrophoresis

- Fragments separated by length
- DNA (negatively charge
- Moves towards +ve terminal
- Shorter fragments mov faster

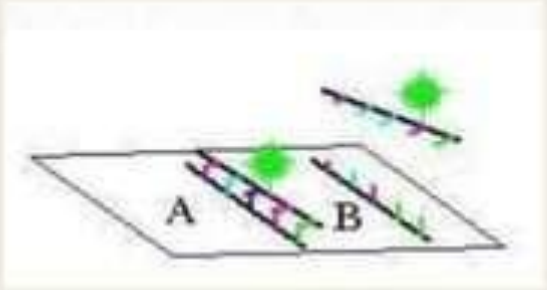


4. Southern Hybridization

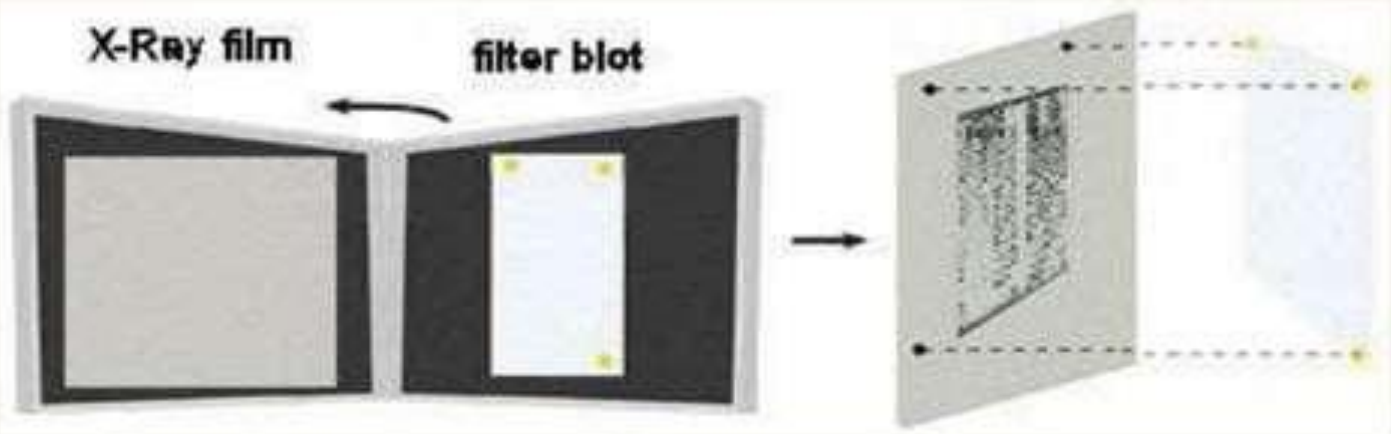


- DNA fragments transferred from gel to filter paper or nylon membrane
- DNA is split into single strands using an alkaline solution

- Radioactive probe in solution binds to DNA

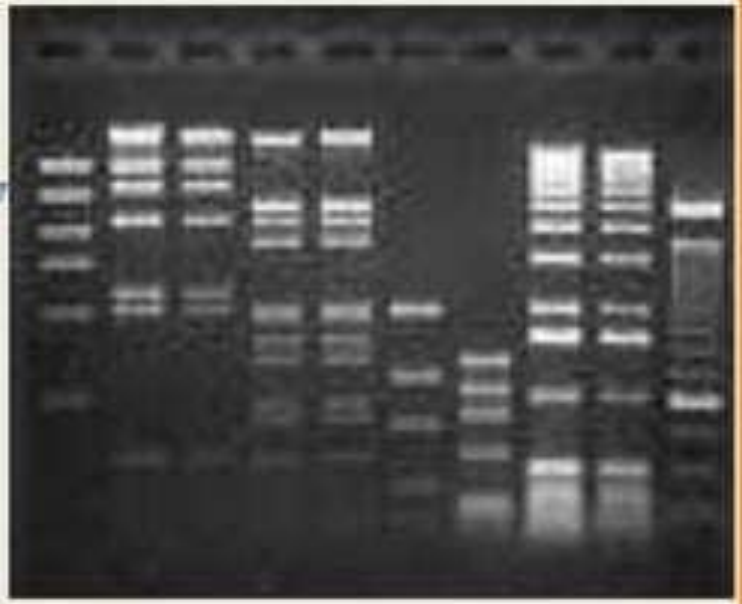


5. Autoradiography



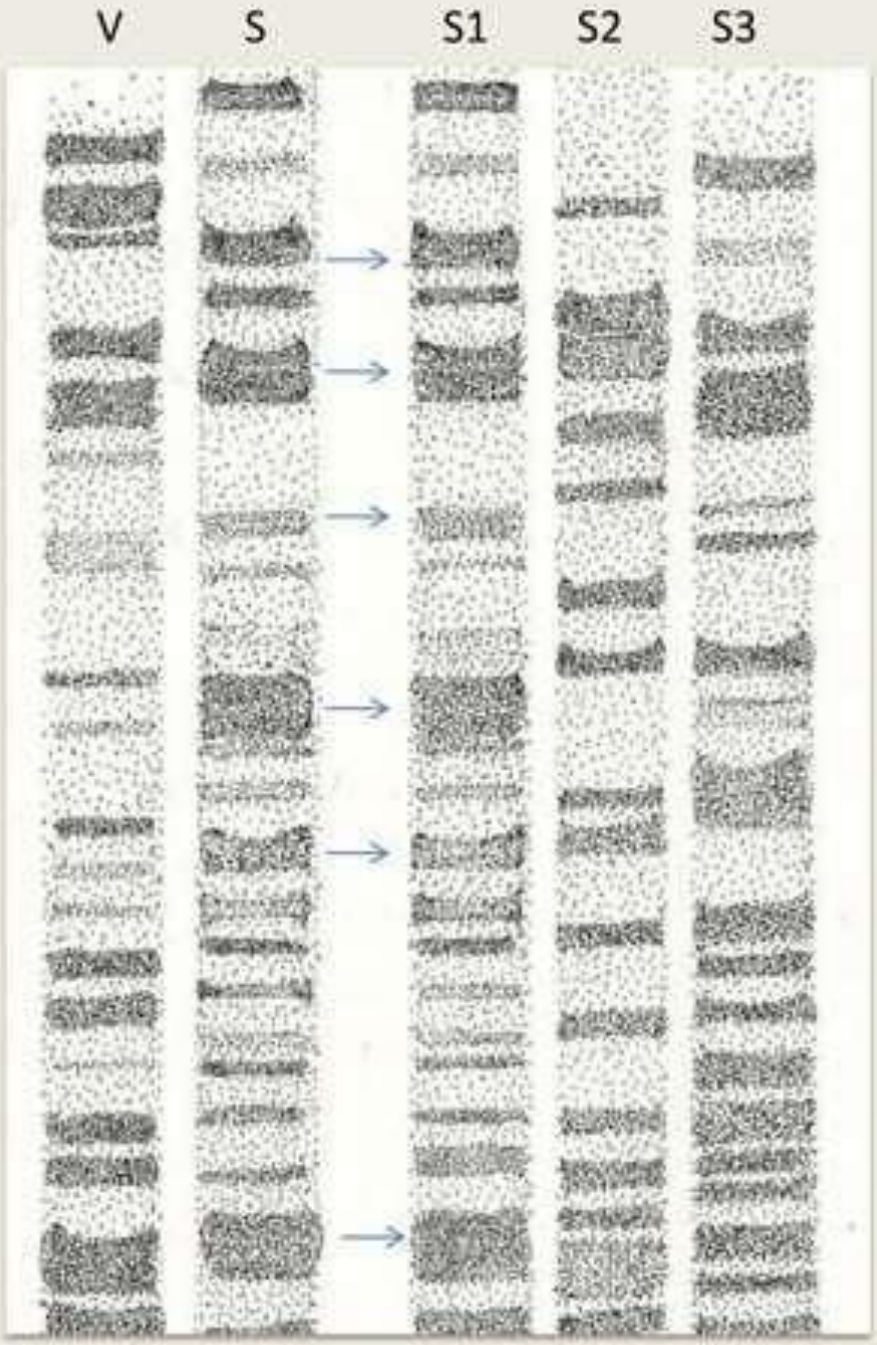
- X-ray film placed over filter paper.
- Radioactivity probes makes dark spots on film.

DNA Fingerprinting patterns



Example

- Violent murder case
- The forensics team retrieved a blood sample from the crime scene.
- They prepared DNA profiles of the blood sample, the victim and a suspect as follows:



DNA Profile

V victim

S sample from crime scene

S1 suspect 1

S2 suspect 2

S3 suspect 3

Paternity test

1 mother

2 son

3 possible father A

4 possible father B

There is a match between one of the child's restriction Fragments and one of the mother's.

Applications

- Individuality
- Paternity/Maternity Disputes
- Hereditary Diseases
- Forensics
- Sociology

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Thank you