

DNA Polymorphism & Fingerprinting

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DNA Polymorphism & Fingerprinting Latest News

Last DNA match day occurred after the family held a symbolic funeral for the victims of Air India Flight AI 171, which crashed on June 12, 2025, resulting in the tragic death of 241 people.

What is DNA?

- **DNA (Deoxyribonucleic Acid)** is the **hereditary material** found in almost all **human cells** – blood, skin, bone, teeth, etc.
- Humans have **46 chromosomes**:
 - **23 inherited from the father** (via sperm)
 - **23 inherited from the mother** (via egg)
- **Genes** within chromosomes determine **physical traits** and **biological identity**.

DNA Polymorphisms

- **DNA polymorphisms** are **variations in DNA sequences** unique to individuals.

- Useful for:
 - **Parentage identification**
 - **Genetic lineage tracing**
 - **Identity verification** in forensic science
- Enable **accurate matching** between body samples and known relatives.

Short Tandem Repeats (STRs)

- **STRs** are **short, repeating sequences of DNA bases** (e.g., GATCGATC).
- Each individual has a **unique STR pattern**, making them ideal for:
 - **Criminal investigations**
 - **Forensic victim identification**
 - **Ancestry and paternity testing**
- STRs are **inherited**, providing strong evidence for **genetic relationships**.

PCR (Polymerase Chain Reaction) in DNA Amplification

- **PCR** is a technique to **amplify small amounts of DNA** for analysis.
- **Steps involved:**
 - **DNA Extraction** from bones, blood, or tissue
 - **Denaturation** (95°C): DNA strands are separated
 - **Annealing** (60°C): Primers bind to specific DNA sequences
 - **Extension** (72°C): DNA polymerase builds new strands
 - **Cycling**: Steps are repeated to create **millions of DNA copies**

DNA Fingerprinting

- A **DNA fingerprinting** is a **unique genetic profile** built using **STR variations**.
- **Capillary Electrophoresis** separates STR fragments based on size using electric current.
- Final output is a **distinct DNA profile, unique to each person** (except identical twins).
- **Sources for DNA**: blood, saliva, bone, teeth, skin cells, sweat, semen.

Source: **IE**

Source: <https://vajiramandravi.com/current-affairs/dna-polymorphism-fingerprinting/>

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