International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

DNA Fingerprinting

Gurasis Kaur

Student, Mris Cw

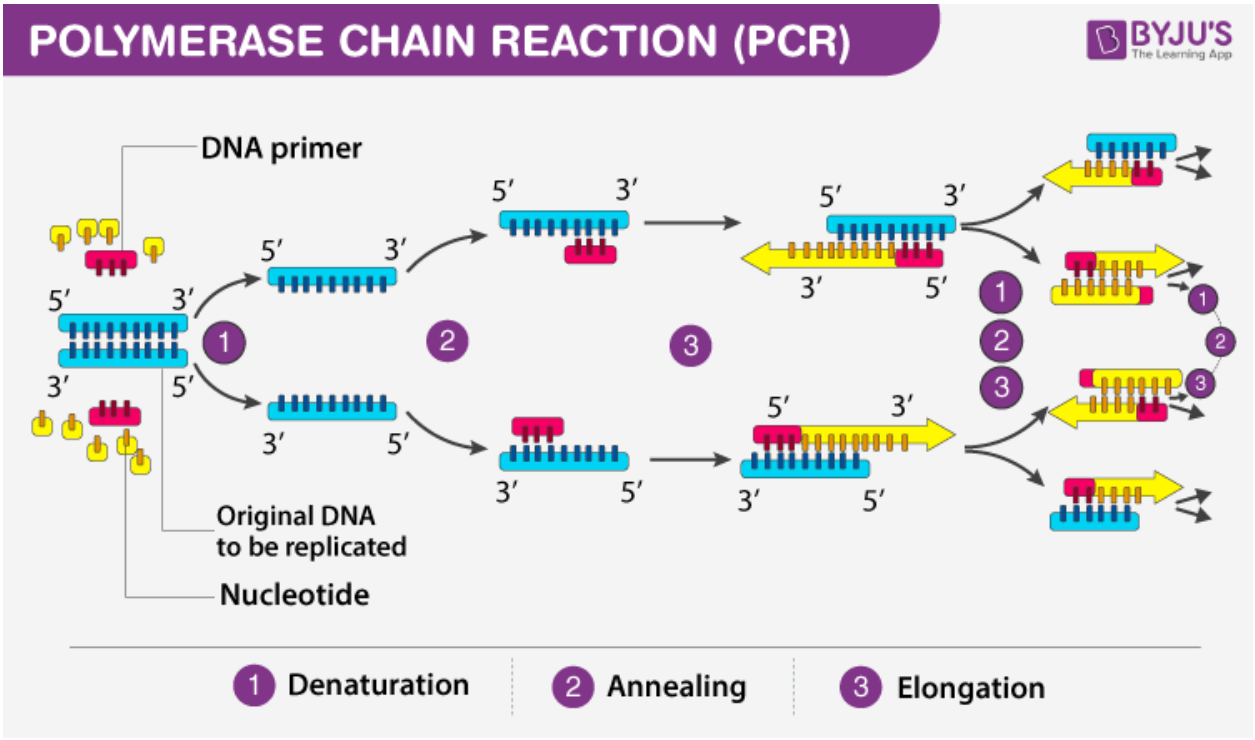
Abstract:
DNA fingerprinting is a technique that shows the genetic makeup of living things. It is a method of finding the difference between the satellite DNA regions in the genome.

WHAT IS SATELLITE DNA ?

Satellite DNA regions are stretches of repetitive DNA which do not code for any specific protein. These non-coding sequences form a major chunk of the DNA profile of humans. They depict a high level of polymorphism and are the basis of DNA fingerprinting. These genes show a high level of polymorphism in all kind of tissues as a result of which they prove to be very useful in forensic studies.

POLYMERASE CHAIN REACTION

PCR or Polymerase Chain Reaction is a technique used in molecular biology to create several copies of a certain DNA segment. This technique was developed in 1983 by Kary Mullis, an American biochemist. PCR has made it possible to generate millions of copies of a small segment of DNA. This tool is commonly used in the molecular biology and biotechnology labs.



HISTORY OF DNA FINGERPRINTING

DNA fingerprinting was first used in forensic science in 1986 when police in the UK requested Dr. Alec J. Jeffreys, of University of Leicester, to verify a suspect's confession that he was responsible for two rape-murders. Tests proved that the suspect had not committed the crimes.

DNA FINGERPRINTING STEPS

Alec Jeffreys developed this technique in which he used satellite DNAs also called VNTRs (Variable Number of Tandem Repeats) as a probe because it showed the high level of polymorphism.
Following are the steps involved in DNA fingerprinting:

Isolating the DNA.
↓
Digesting the DNA with the help of restriction endonuclease enzymes.
↓
Separating the digested fragments as per the fragment size by the process of electrophoresis.
↓
Blotting the separated fragments onto synthetic membranes like nylon.
↓
Hybridising the fragments using labelled VNTR probes.
↓
Analysing the hybrid fragments using autoradiography.

Polymerase Chain Reaction

Applications of DNA Fingerprinting

- Utilizing the DNA fingerprinting strategy, the natural personality of an individual can be uncovered. For approving one's character, there is no other preferable alternative over DNA fingerprinting.
- Gravely harmed dead bodies can be distinguished.
- It is utilized to detect maternal cell contamination.
- One of the significant downsides of pre-birth determination is maternal cell tainting. The amniotic liquid or CVS test contains the maternal DNA or maternal tissue, once in a while. Contamination expands the opportunity of false-positive outcomes, particularly on account of carrier recognition. Utilizing VNTRs and STRs markers with PCR-gel electrophoresis, maternal cell tainting can be recognized during pregnancy hereditary testing.
- One of the most significant uses of the current strategy is in the crime scene examination and criminal check. The example is gathered from the crime site which could be salivation, blood, hair follicle, or semen. DNA is removed and investigated against the suspect, utilizing the two markers we clarified previously. By coordinating DNA band designs criminal's connected to wrongdoing can be built up. olymerase Chain Reactio

CASES RELATED TO DNA FINGERPRINTING

1. St. Paul, Minnesota, November 1994: A man wearing a nylon stocking over his face and armed with a knife jumped out from behind bushes and forced a woman who was walking by to perform oral sex. Semen recovered from the victim's skirt and saliva was analyzed using DNA technology. The resulting

profile was searched against Minnesota's CODIS database. The search identified Terry Lee Anderson, who confessed and he is now in prison.

2. In 1991, DNA fingerprinting evidence was presented in the Kerala High Court in a paternity dispute case. And for the first time in the annals of the history of Indian Judiciary it was accepted as an infallible evidence in the court of law.

Future of DNA fingerprinting in India

India has used DNA fingerprinting for establishing guilt in suspects and convicts of court cases. However, the technology can be equally useful in establishing innocence of suspects and convicts. India is yet to have made use of this technology for saving people from wrongful convictions. The Indian legal system also has very limited sections that mention DNA. Wherever it does, it only talks of the procedures and situations under which DNA samples are collected from the accused and the victim.

EXPERIMENT ON DNA FINGERPRINTING

MATERIALS REQUIRED

- Pencil
- Roll of Scotch tape
- Fingerprint activity template
- Bottle of hand lotion
- Cocoa powder, baby powder or powdered paint
- Paper plate
- 9 oz plastic cup
- Paintbrush

PROCEDURE

1. Using the pencil, scribble a small section on the Fingerprint Worksheet. Next, rub your right thumb over the pencil scribble mark. You want the tip of your thumb to be covered with pencil graphite. Finally, take a piece of Scotch tape and stick it onto your finger. The tape should cover the graphite. Now, you will "lift" the print. Carefully pull the tape off your thumb, and stick the tape to the appropriate box to leave your print.
2. If you dust an area with a contrasting colored powder, you can lift fingerprints! This is called "dusting for prints."
3. Put a small drop of lotion on your fingertips. Rub them together. Next, press one finger on the side of the 9 oz. plastic cup.Sprinkle your powder on the side of the cup. This powder will coat the fingerprint.Gently brush the powdered area with your paintbrush. When you have brushed off the loose powder, you should see your fingerprint!

OBSERVATIONS