

DNA PROFILING



K. BHAGYA SREE DEVI

What is DNA?

Hereditary material

Where is it present?

Nearly every cell

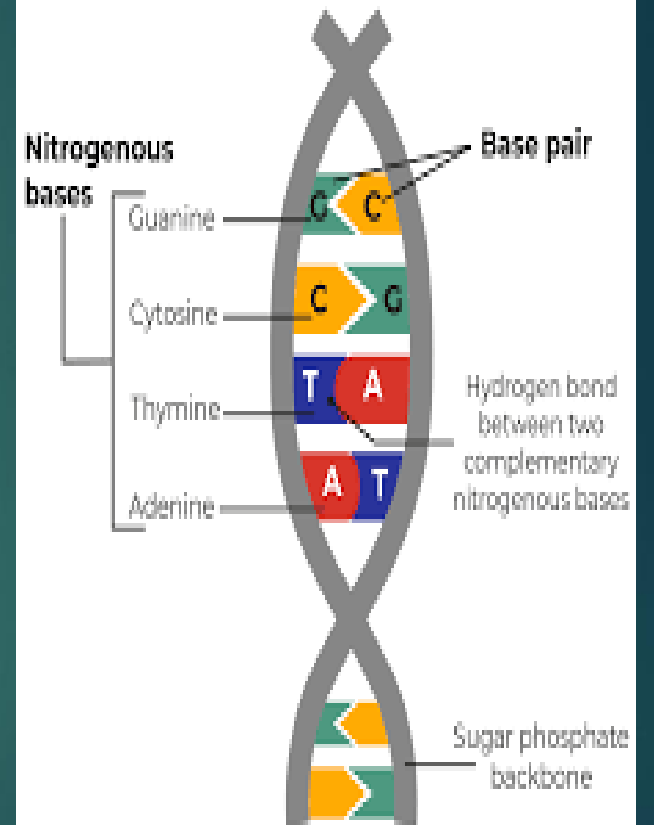
Why is it important?

Comparison/elimination

Forensic Application?

Criminal investigation
Paternity testing
Maternity testing
Driver swapping
Person identification

DNA structure



DNA FINGERPRINTING

- ▶ Laboratory technique to identify the genetic makeup of a person or living things.

PRINCIPLE:

Satellite DNAs show polymorphism and this polymorphism is the basis of DNA fingerprinting.

1.Preparation

PPE, sterile tools, and containers

2. Collection

Blood, Buccal Swabs, Hair, Saliva, Bone, Fingernail Scraping

3. Handling

Avoid contamination, proper storage

4. Chain of Custody

Documentation and sealing

5. Storage and Transport

Temperature control, secure packaging



DNA EVIDENCES IN FORENSICS

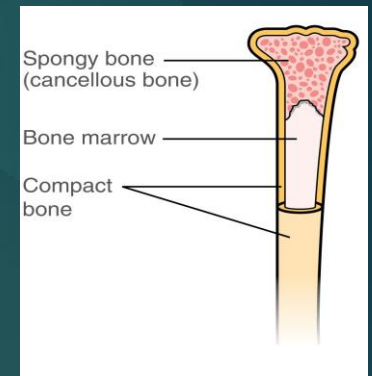
Blood



Hair



Bone



Saliva/ sweat/ mucus/
skin cells/urine



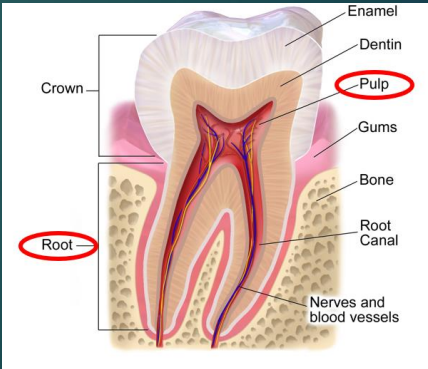
Semen/
Vaginal
Discharge



Nails



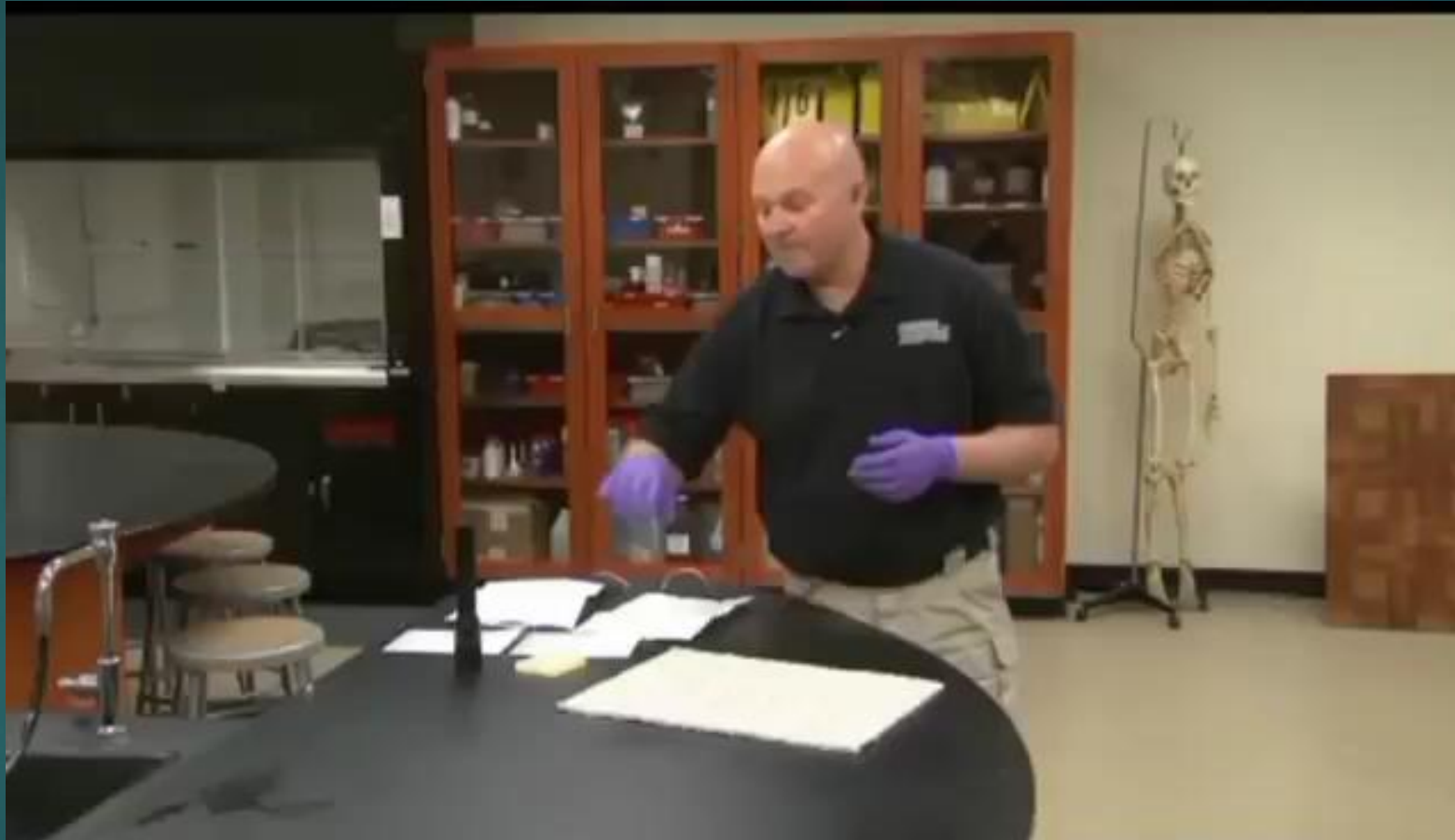
Tooth



Collection of nail scrappings



Collecting hair samples from fabrics



Buccal Swab collection



SPECIMENS

Blood
Buccal Swab
Saliva
Hair
Semen
Bone
Nail

PURIFICATION

Surface Cleaning
Decontamination
Fragmentation
Drying
Acid Treatment

EXTRACTION

Cell Lysis
Protein Removal
Phenol Chloroform
Extraction
Ethanol Precipitation
Washing
Drying
Eluting

AMPLIFICATION

Polymerase Chain
Reaction (PCR)

- Denaturation
- Annealing
- Extension

ANALYSIS

Capillary
electrophoresis
Detection
Peak analysis
Match Profile
Profile Report

PHENOL CHLOROFORM ISOAMYL ALCOHOL DNA EXTRACTION

PRINCIPLE: Phenol-chloroform extractions are used to separate nucleic acids from proteins and lipids

Reagents:

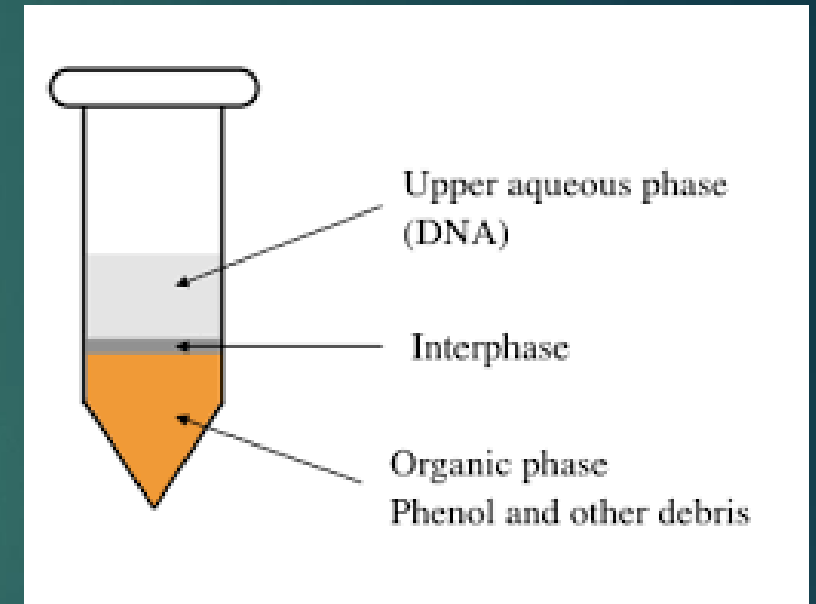
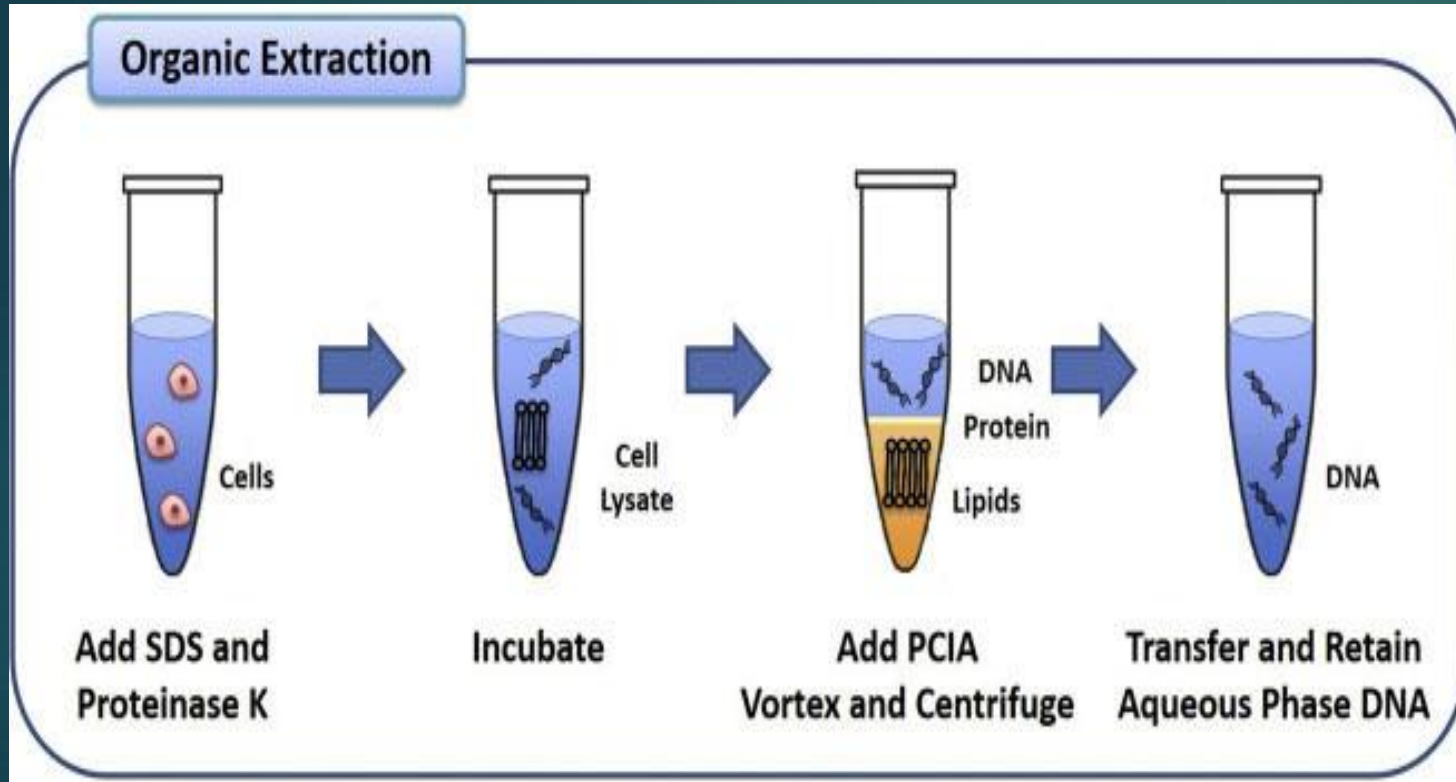
- **Phenol:** Helps denature proteins.
- **Chloroform:** Helps in phase separation.
- **Isoamyl Alcohol:** Reduce foaming and improve phase separation.



Equipments:

- Centrifuge:** For separating the phases.
 - Pipettes and Pipette Tips:** For transferring liquids.
 - Sterile Tubes:** For mixing and separating samples.
 - Vortex Mixer:** For thorough mixing of solutions.
 - Incubator or Water Bath:** For temperature-controlled incubations.
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DNA EXTRACTION



QUBIT FLUOROMETER :

Used to measure the concentration of nucleic acids (DNA, RNA) and proteins by utilizing fluorescence-based assays.

Functions:

Fluorescence-Based Detection

High Sensitivity

Specificity

Ease of Use

DNA Template

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Denaturation (High Temp - DNA strands separate)

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Annealing (Lower Temp - Primers bind to DNA)

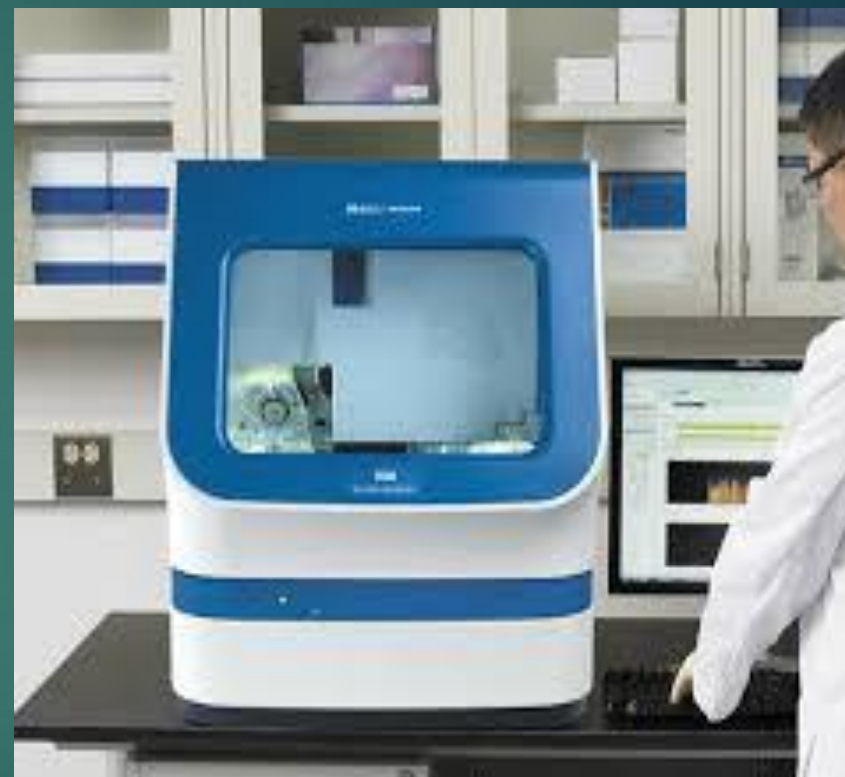
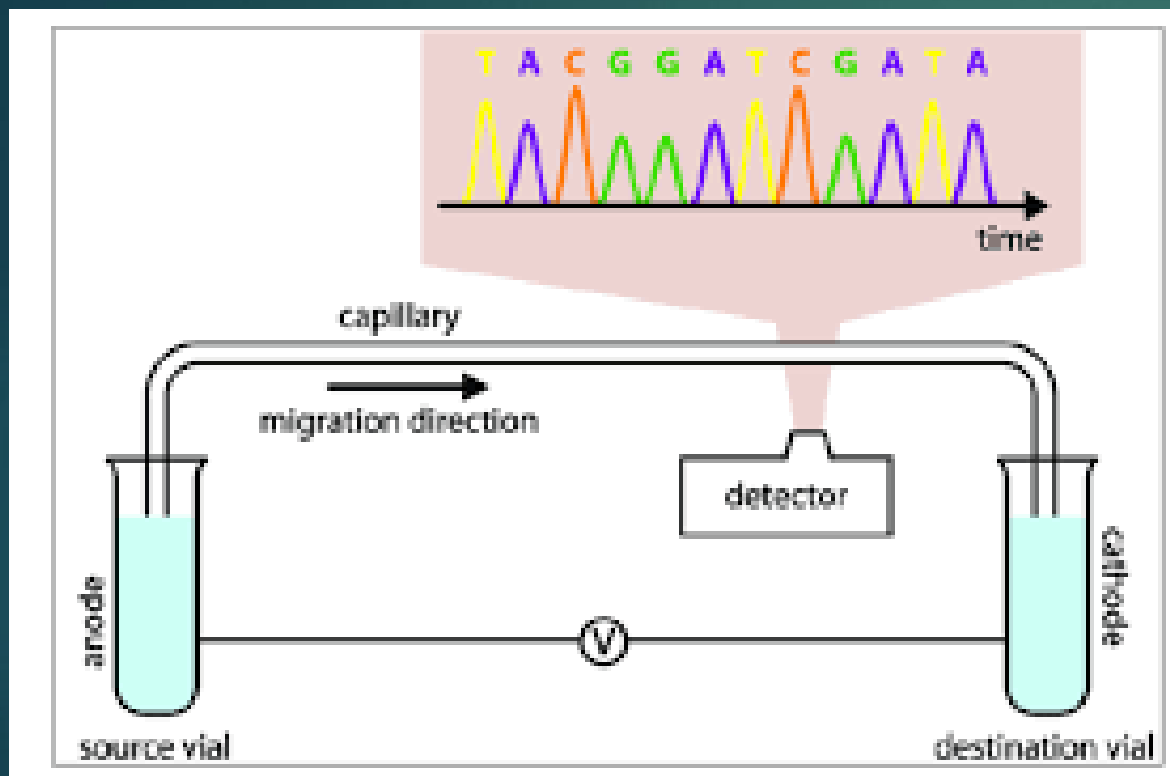
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Extension (Optimal Temp - DNA polymerase synthesizes new strands)

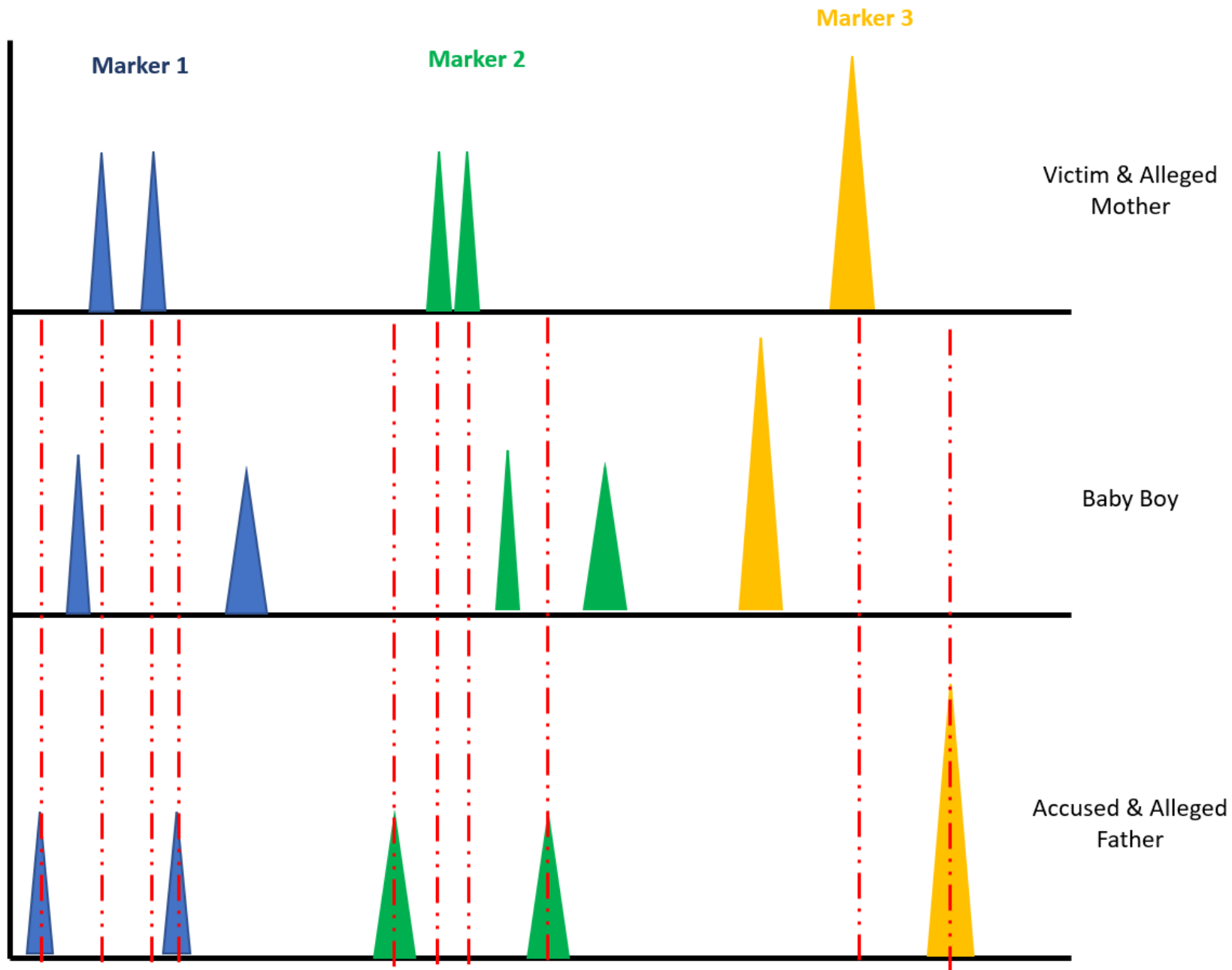
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Repeat Cycles (Exponential amplification of DNA)

CAPILLARY ELECTROPHORESIS



Marker Names	Child (Born Via Surrogacy)	Single Father (American Citizen)
Marker 1	16,17	17,20
Marker 2	5,9.3	5,7
Marker 3	7,13	9,13
Marker 4	12,14.3	14.3,17
Marker 5	15.3,25	15.3,32.2
Marker 6	10,13.2	10,16
Marker 7	11,11	8,11



Marker Names	Victim 1 (18–20-year-old)	Victim 2 (30–35-year-old)	Alleged Brother & Uncle
Marker 1	10, 10	10, 12	10, 12
Marker 2	8, 13	8, 8	8, 11
Marker 3	26, 30	15.3, 26	21, 26
Marker 4	15, 16	16, 16	16, 17
Marker 5	8, 9	9, 9.3	9, 9.3
Marker 6	29, 30.2	28, 30.2	28, 30.2
Sex Marker	X, X	X, X	X, Y



THANK YOU