



FORENSIC ISSUES IN DNA PROFILING

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EXCEPTIONS TO DNA EVIDENCE

- And with the exception of identical twins, everyone's DNA is different.



STR PROFILES OF IDENTICAL TWINS

DNA Marker	Father	Mother	Identical Son 1	Identical Son 2
D7S820	9, 10	10, 11	10, 10	10, 10
D3S1358	16, 17.2	15, 15.2	15, 16	15, 16
D16S539	11, 11	9, 11	9, 11	9, 11
D8S1179	13, 15	15, 16	13, 16	13, 16
CSF1PO	10, 12	10, 10	10, 12	10, 12
SE33	25, 31.2	27, 33	25, 33	25, 33
TPOX	8, 12	9, 13	9, 12	9, 12
Amelogenin	X, Y	X, X	X, Y	X, Y

WHOLE DNA SEQUENCES OF IDENTICAL TWINS

Identical Son 1

....AATTGGGGGCATGCAATTCCGCATATACGGCAATGCATTTTTCTCCTGATA....

Identical Son 2

....AATTGGGGGCATGCAATTCCGCATATACGGCAATGGATTTTTCTCCTGATA....

WHOLE DNA SEQUENCES OF IDENTICAL TWINS

Identical Son 1

....AATTCCCCCATGCAATTCTGCATATACGGCAATGCATAATTCTCCTGATA....

Identical Son 2

....AATTCCCCCATGCAATTCTGCATATACGGCAATGGATAATTCTCCTGATA....

EXCEPTIONS TO DNA EVIDENCE

- With the exception of red blood cells, every cell in your body has DNA.



EXCEPTIONS TO DNA EVIDENCE

- DNA samples need to be collected properly. Immovable objects must be scrutinized completely, and evidence collection is crucial.



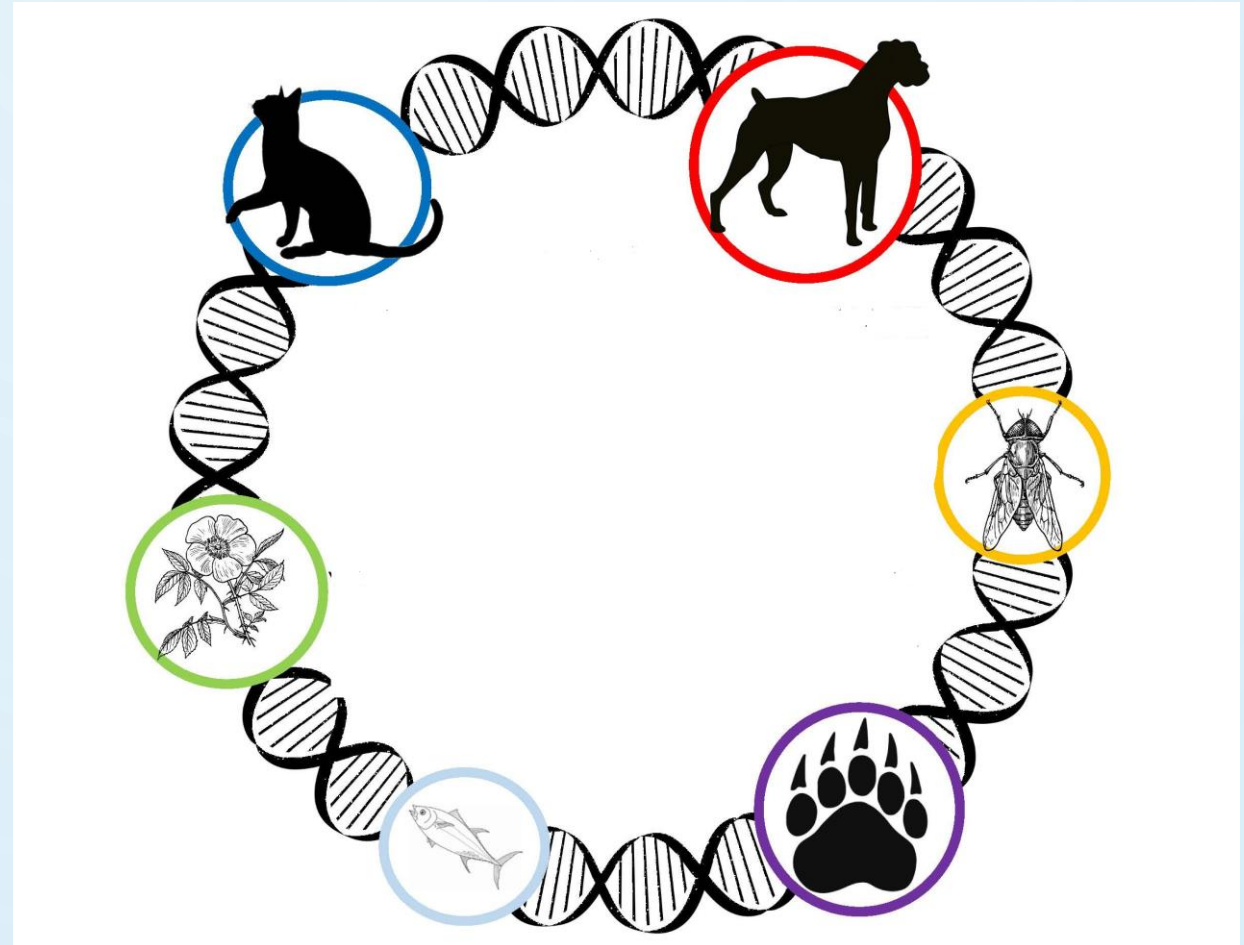
Evidence can be collected in the form of:

- Scrappings
- Saline swabs
- Cellotape lifts



EXCEPTIONS TO DNA EVIDENCE

- DNA extraction for animal/wildlife samples is not done in the same laboratory.



ANIMAL/WILDLIFE DNA TESTING

- If animal/wildlife DNA testing is done in the same laboratory, the rate of cross-contamination increases.
- DNA may be extracted from a wide range of biological material such as blood, meat, urine, faeces, skin, hair, scales, bone, feathers, claws, teeth, shells, scales, venom and embryonic tissue, as well as processed products such furs, leather goods, and medicines
- Preservation of wildlife samples need separate and highly specialized temperature conditions.

EXCEPTIONS TO DNA EVIDENCE

- The target DNA template may not amplify due to the presence of PCR inhibitors in the extracted DNA.
- Labs can only clean/remove recorded/known PCR inhibitors

PCR inhibitors

Sodium dodecyl sulphate
KCl
Tannic acid
Urea
Bile
Salt
Phenol
Ethanol
Methanol
Polysaccharides
Melanin
Cell wall proteins
Immunoglobulins
Chaperon
Collagen
Haemoglobin
Protease
Nuclease

EXCEPTIONS TO DNA EVIDENCE

- Errors due to low DNA template - degraded exposure to the environment or harsh chemicals like acids and alkalis.

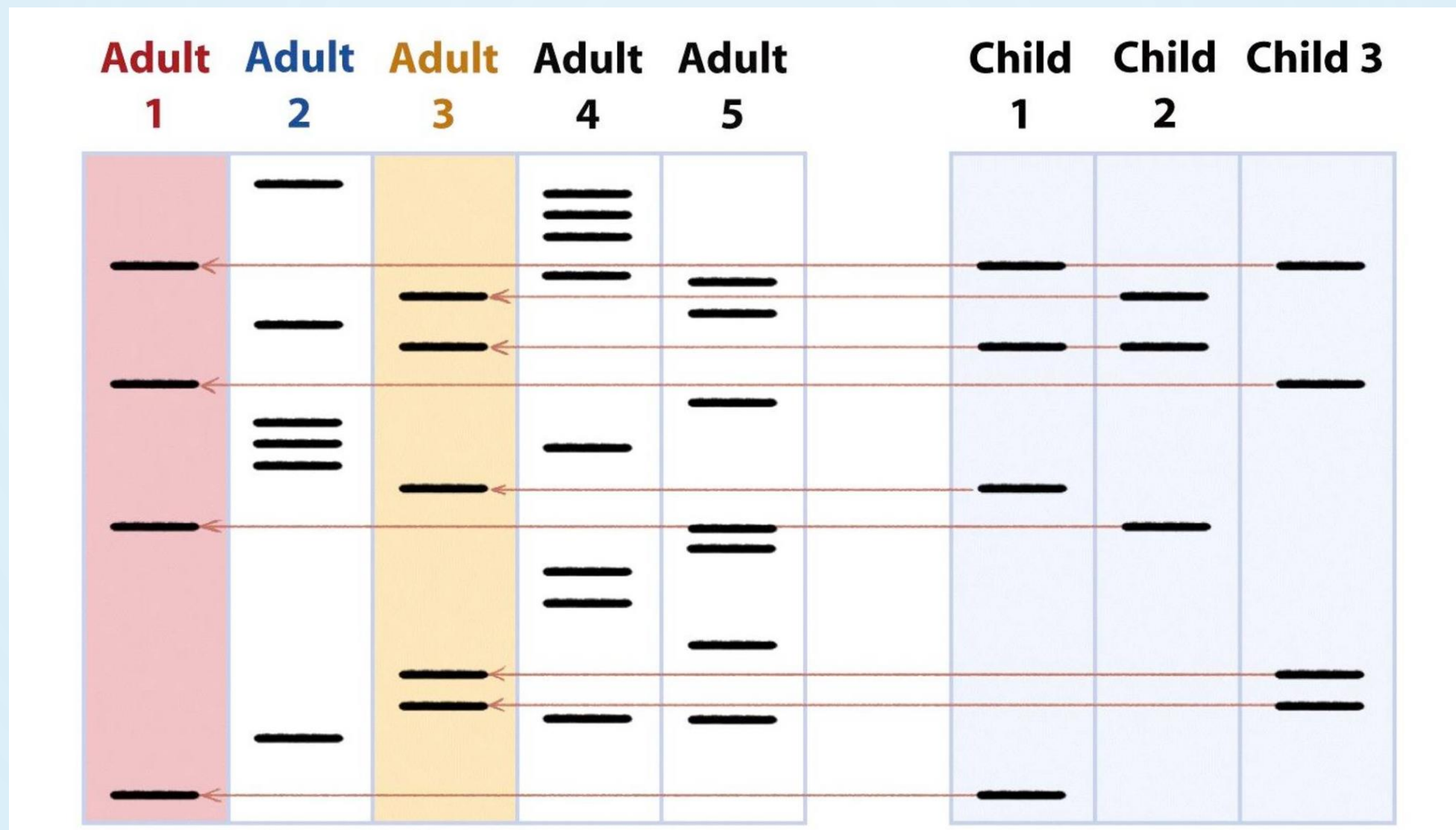


ISSUES WITH DNA PROFILING IN INDIA

- No centralized DNA database for tracking criminals or unrelated crimes
- Poor collection & preservation of evidence
- Inadequate and limited DNA fingerprinting facilities and resources
- Limited and inadequate experience in DNA profiling
- Lack of quality management



Manual comparison is time consuming and prone to errors.



Each bone fragment has to be individually typed and then segregated. Extremely time consuming process.

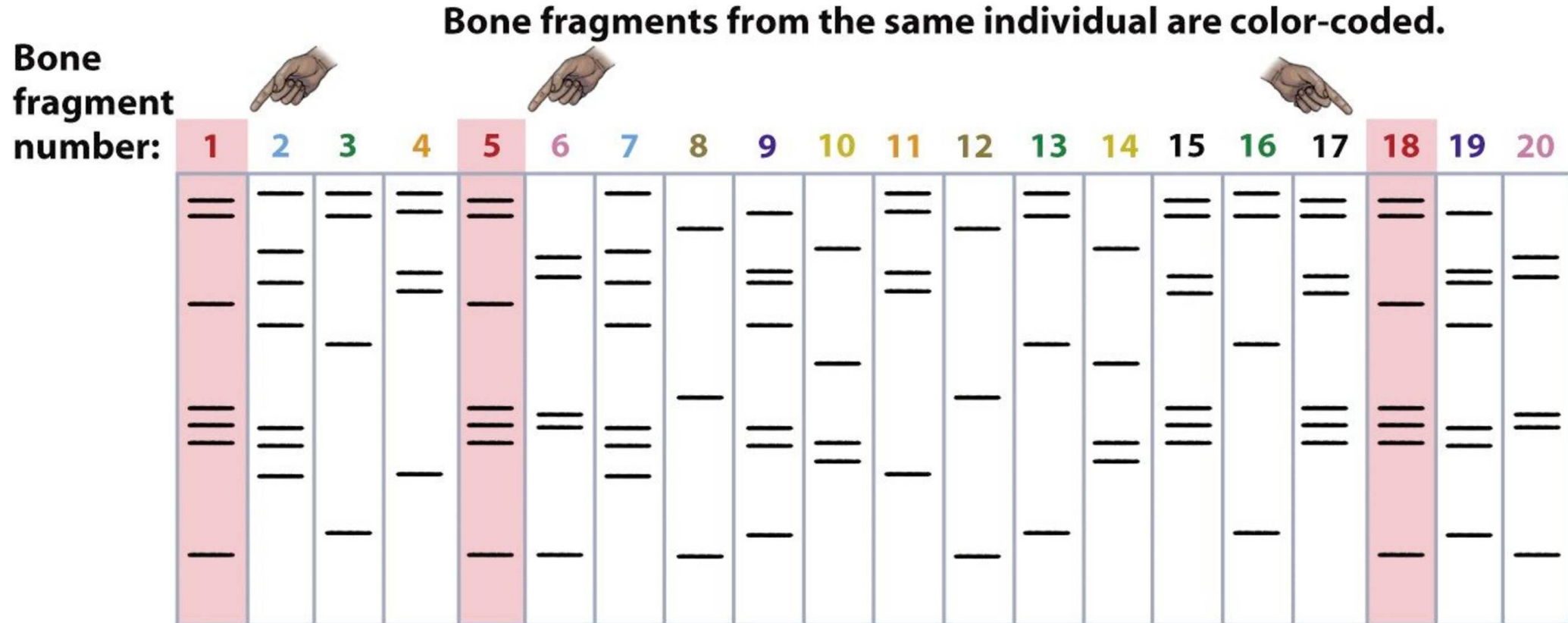
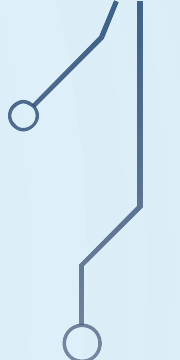
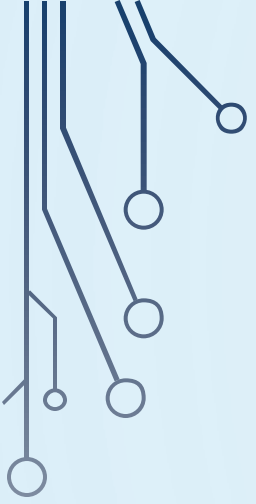


Figure 7-10 Biology: Science for Life, 2/e
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ISSUES WITH DNA PROFILING IN INDIA

- Lack of technology – slow implementation of improved in technology
 - Issues related to tampering of evidence or breaking of chain of custody.
 - Non-human DNA analysis is limited or negligible
 - People are unwilling to volunteer their blood/buccal samples for analysis
 - Misconceptions related DNA fingerprinting.
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THANK YOU