# DNA fingerprinting

## Mini- versus Micro- satellites

**A satellite is a small, repeated sequence of bases in an intron ( a non-protein coding portion of DNA). They are also known as short tandem repeats, or variable number tandem repeats (VNTR). They are useful because, unlike the majority of our DNA, they are reasonably unique, and can thus distinguish between individuals.**

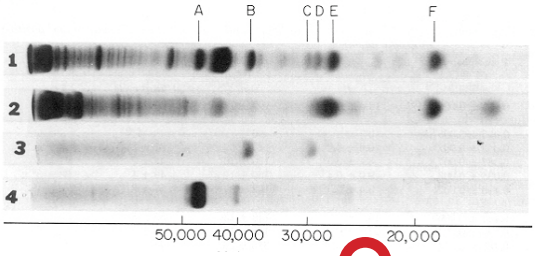
**A mini-satellite contains 20-50 base pairs and can be repeated from 50 to several hundred times.**

**A micro-satellite usually contains 2-4 base pairs, and is repeated 5-15 times.**

## The process of DNA fingerprinting

**1** **The desired satellite is identified and cut from the DNA sample using restriction enzymes to splice the sequence at defined points.**

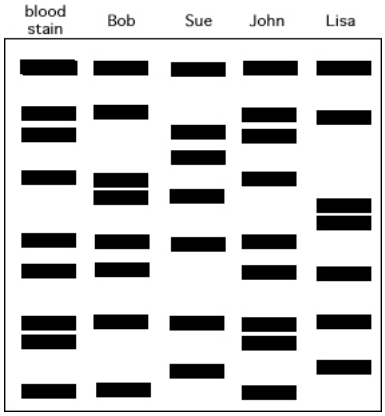
**2** **The DNA fragments of varying length are then separated by gel electrophoresis.**




**3** **These are then transferred onto a nylon membrane with the use of an alkali buffer to separate the strands. The fragments stick to the membrane.**

**4** **This in then placed in a bag with lots of antisense probes which stick to certain satellites, forming a banded pattern like a barcode, a single band occurring where both maternal and paternal chromosomes have the same number of repeats, and a double band where the number of repeats is different.**

**5** **This pattern is revealed by using either x-ray (for radioactive probes) or a laser and detector (for fluorescent probes). The DNA fingerprint can looks like a bar code or be represented as a graph-style profile.**




## PCR

PCR (polymerase chain reaction) is used to amplify very small or damaged pieces of DNA for analysis by DNA fingerprinting. Without PCR, many DNA samples such as those obtained by tiny amounts of saliva or skin would be too small for DNA fingerprinting to be conclusively carried out. This amplification is achieved by using **DNA primers** to attach to the bases either side of the desired satellite, which can then be amplified using **DNA polymerase** and **free nucleotides**. The Forensic Science Service in Britain typically amplifies and analyses 10 micro satellites of 4 bases each, with an additional primer pair to determine gender. A temperature cycle is used to facilitate the three key stages of the process; the separation of the double stranded DNA, the attachment of primers and the replication itself. The optimum temperature for these three stages is different, necessitating this tri-stage process.