

Lesson 5: Forensic science

Genetic fingerprinting

DNA is obtained from the white blood cells and mixed with an enzyme called restriction endonuclease. This 'cuts' the DNA into millions of fragments, but not the repeated regions, which retain their original length.

The DNA fragments are then loaded into a slot at the end of an agarose gel.

An electric current is passed across the gel, with the positive electrode at the end farthest from the fragments.

Since DNA molecules have a negative charge, they will migrate through the gel towards the positive electrode. Larger fragments move through more slowly than the smaller ones. The result is a series of bands down the gel, though these are invisible at this stage.

Since the gel is difficult to keep, the DNA bands are then transferred to a nylon membrane, which is incubated overnight with radioactive probes.

The radioactive probes bind with the DNA that has repeating regions.

A sheet of X-Ray photographic film is laid over the membrane in total darkness. The radiation will affect the film which is later developed, like a photograph.

The developed film reveals the series of DNA bands, which are unique to an individual.

Uses:

- ★ Identifying particular plants or animals with particular alleles of a gene for selective breeding.
- ★ Identifying a particular strain of microbe so that correct treatment can be given.
- ★ Establishing paternity.
- ★ Confirming animal pedigrees.
- ★ Establishing genetic diversity for gene banking.