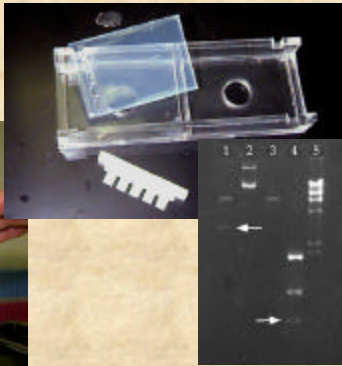


## DNA Analysis



## DNA Fingerprinting:



- Dr. Alec Jefferys coins the term in 1984 and a DNA fingerprint is used for the first time to exonerate a suspect in 1985.
- DNA fingerprinting is a technique where banding patterns are identified to include or exclude individuals in a sample. A.K.A. DNA Profile.

## Sources for DNA Testing:

- Blood
- Semen
- Saliva
- Urine
- Body tissue
- Bone (marrow)
- Hair root
- Tooth (pulp)



## DNA Analysis Methods:

- **RFLP**- Restriction Fragment Length Polymorphisms
- **PCR**- Polymerase Chain Reaction
- Requires large amounts of DNA (20-50 ng)
- Requires much less DNA (2 ng)
- Takes 4-8 weeks
- Takes 2-3 days

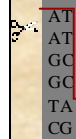


## RFLP Procedure:

- Obtain a DNA sample.
- DNA extraction.
- DNA is Digested with a restriction enzyme (enzymes that cut DNA into specific sequences.)

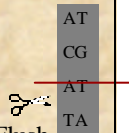


## Enzyme Cuts:



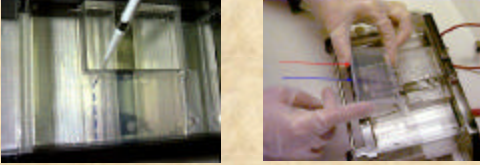
There are two types of enzyme cuts: Flush cut and Sticky cut.

- Flush cut: Enzymes cut the DNA strand straight across the molecule.
- Sticky cut: Enzymes cut the DNA strand so that there is a tail on each end of the cut segments.



### RFLP Procedure Continued:

- Agarose Gel electrophoresis (Process of separating DNA, by size, through a gelatin matrix by an electric current.)



### Gel Electrophoresis:

- The cut DNA samples are loaded into wells in the gel.
- The DNA segments are then sorted by size as they are pulled through the gel by electric current.
- The smaller segments travel the fastest and the larger segments travel the slowest, therefore the smaller segments reach the end of the gel much earlier than a larger one would.
- When the small segments reach the end, the electricity is turned off and the location of the various sized segments form the bands of the DNA profile.

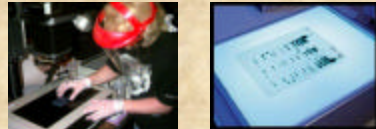
### RFLP Procedure Continued:

- The DNA is denatured while still in the agarose and stained with radioactive probes are introduced to bind to targeted DNA segments.
- The gel is then washed and only the probed DNA areas are visible.



### RFLP Procedure Continued:

- The DNA profile is photographed onto X-ray film.
- The photograph is called an autoradiograph or autorad.
- A DNA profile is then read from the autorad.



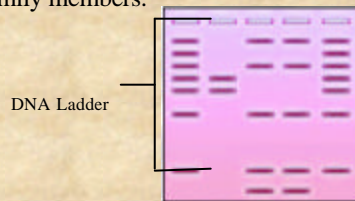
### Reading a DNA Fingerprint:

- The autorad must be viewed on a fluorescent viewing lamp (or other bright light source.)



### Reading a DNA Fingerprint:

- The banding patterns of the DNA sample are compared with a “DNA Ladder” and samples from a crime scene, other potential family members.



- A population frequency for a DNA fingerprint is: 1 : 5,000,000.
- A “match” in a DNA profile “includes” the individual as someone who could be involved.
- Not finding a “match” in a DNA profile “excludes” an individual as someone who could be involved.

