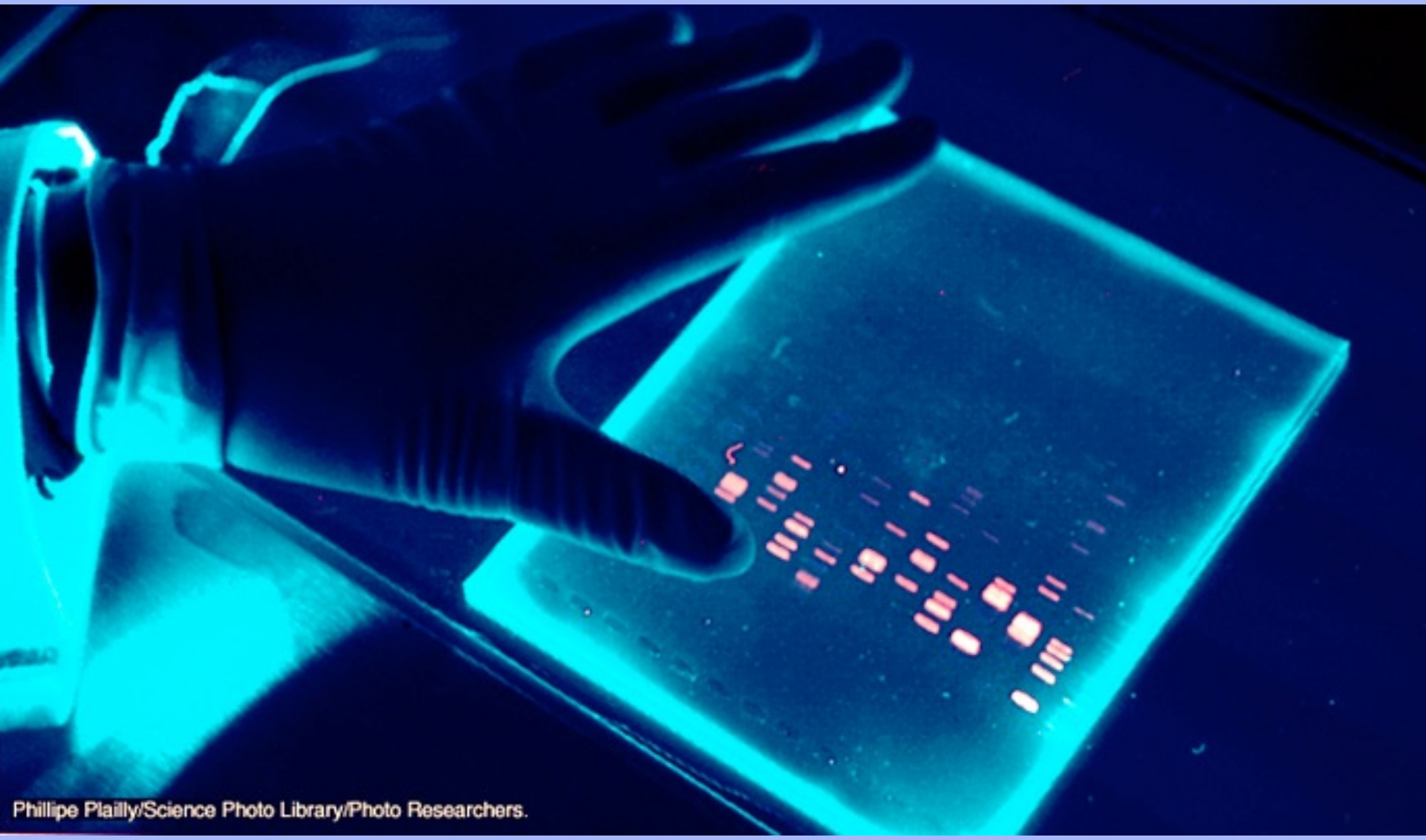

CSI:


TRACY SAYS HER DAUGHTER
LOOKS EXACTLY LIKE HENRY

DNA Electrophoresis



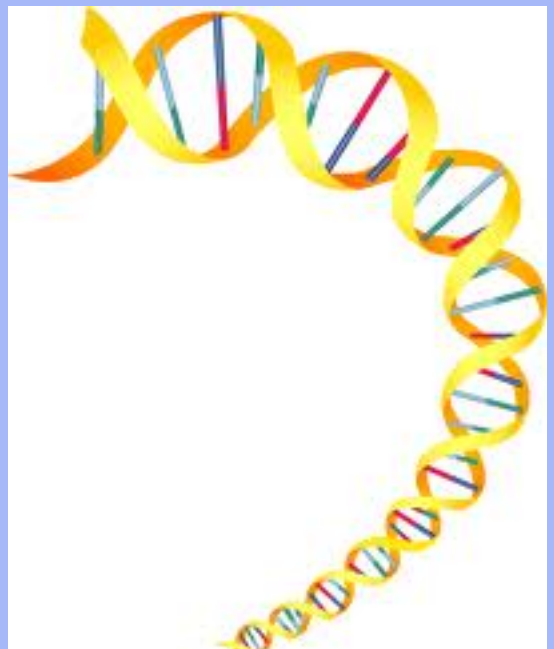
What is Gel Electrophoresis?

- A technique that allows us to compare DNA.

- Common uses:
  - Identify a suspect in a crime.
  - Paternity testing.

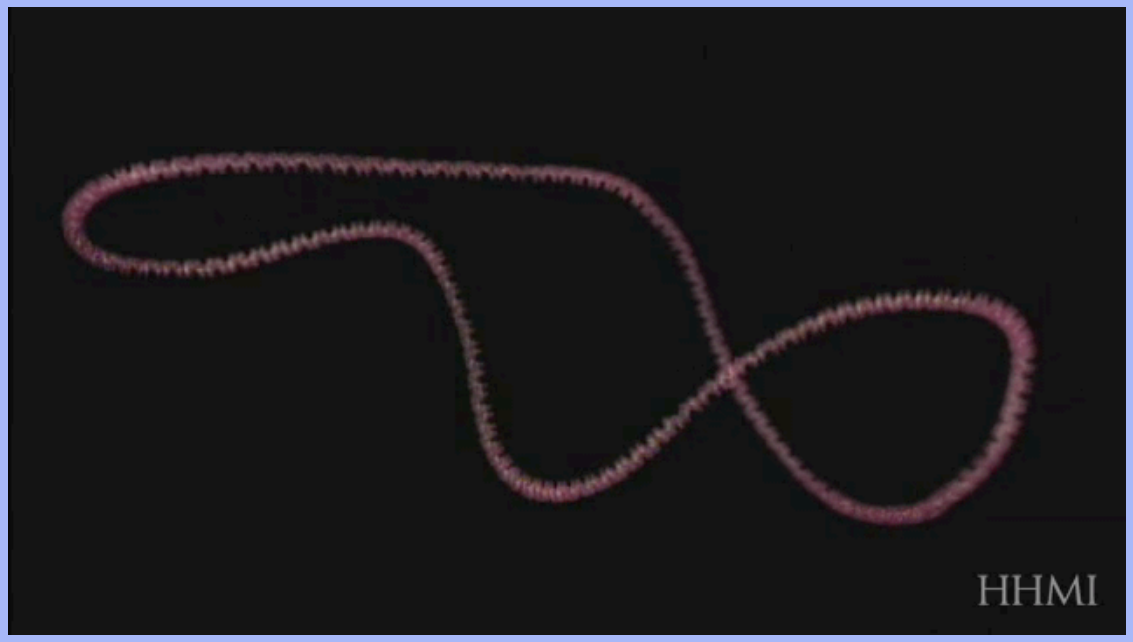
General Overview

- DNA is obtained & amplified to make enough sample to test (using PCR- see tomorrow).



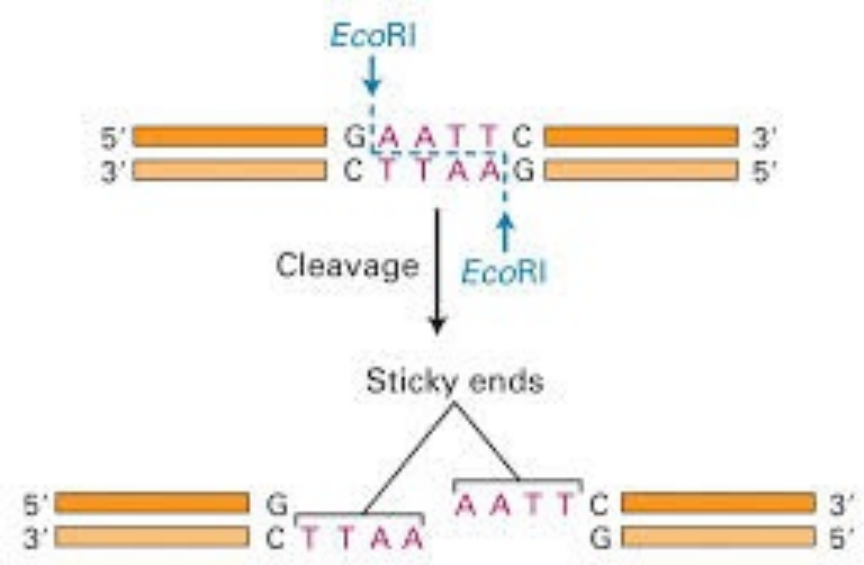
General Overview

- DNA is obtained & amplified to make enough sample to test (using PCR).
- DNA samples are cut by restriction enzymes (chemical scissors that cut DNA at specific sequences)
- these Enzymes are chemical scissors and have a specific site they cut DNA



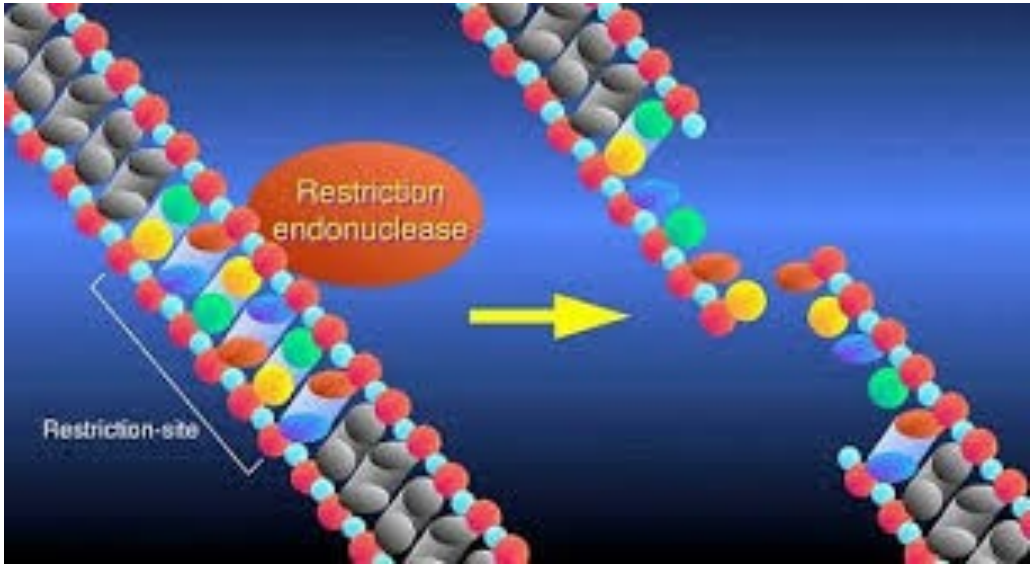
Restriction Enzymes

- restriction enzymes cut DNA at a specific **recognition site**
- recognition sites are always **palindromic**: (same sequence when read from the 5' to 3' direction on either strand)



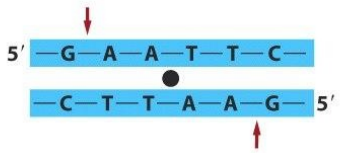
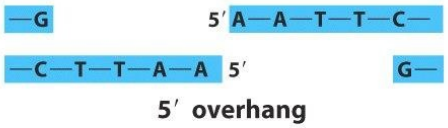
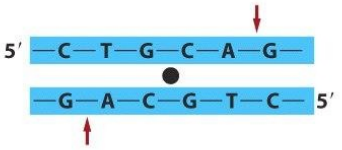
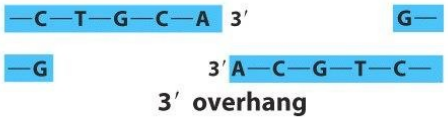
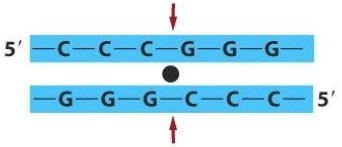
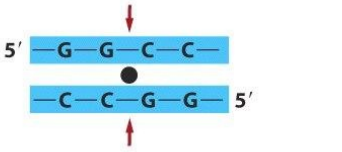
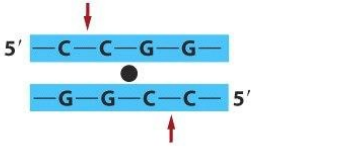
Restriction Enzymes

- Restriction enzymes are harvested by researchers & used in genetic engineering
- they are produced by bacteria to function as an "immune system" against invading viruses by cutting up the viral DNA or RNA

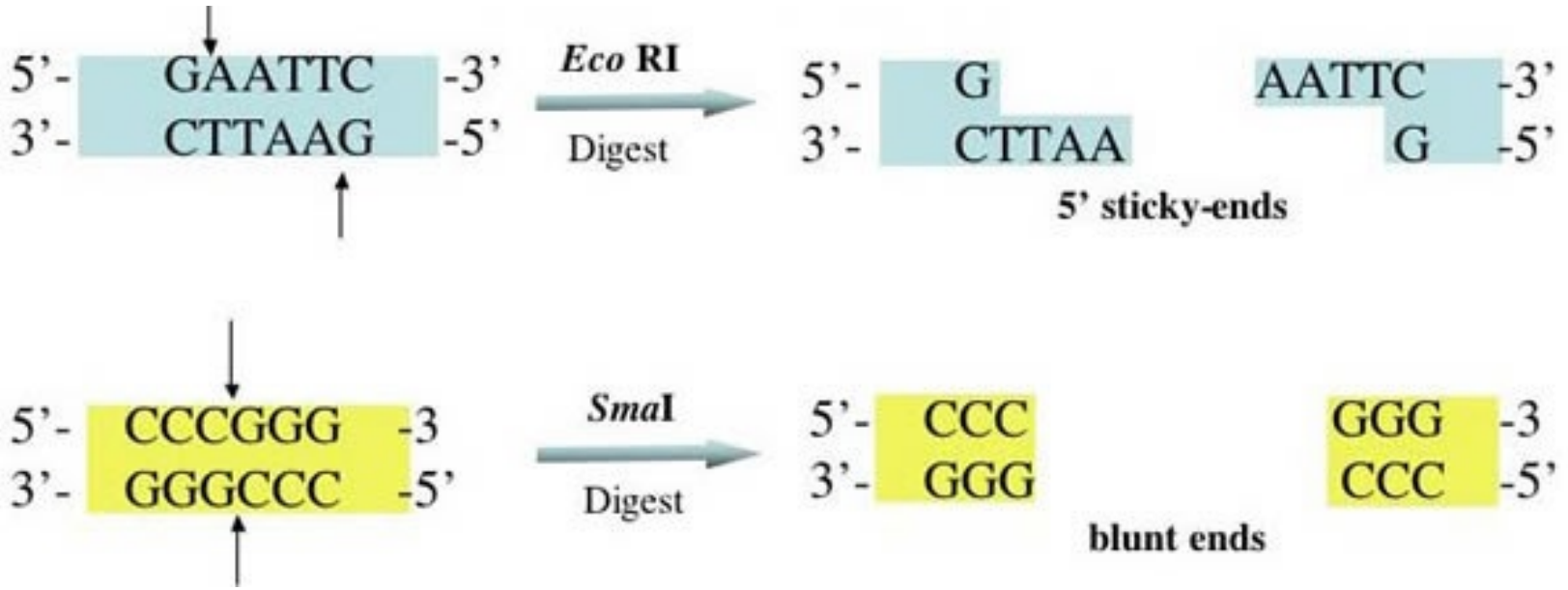


Restriction Enzymes *(pg 367)*

Some restriction enzymes

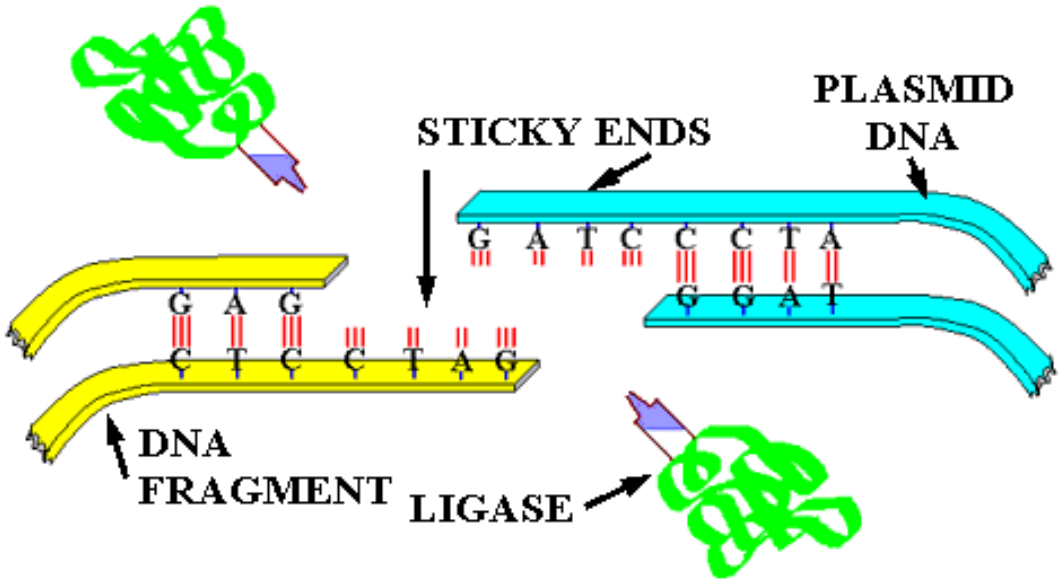
Enzyme	Source organism	Restriction recognition site in double-stranded DNA	Structure of the cleaved products
(a)			
*Eco*RI	*Escherichia coli*		
*Pst*I	*Providencia stuartii*		
*Sma*I	*Serratia marcescens*		
(b)			
*Hae*III	*Haemophilus aegyptius*		
*Hpa*II	*Haemophilus parainfluenzae*		

Blunt Ends vs. Sticky Ends



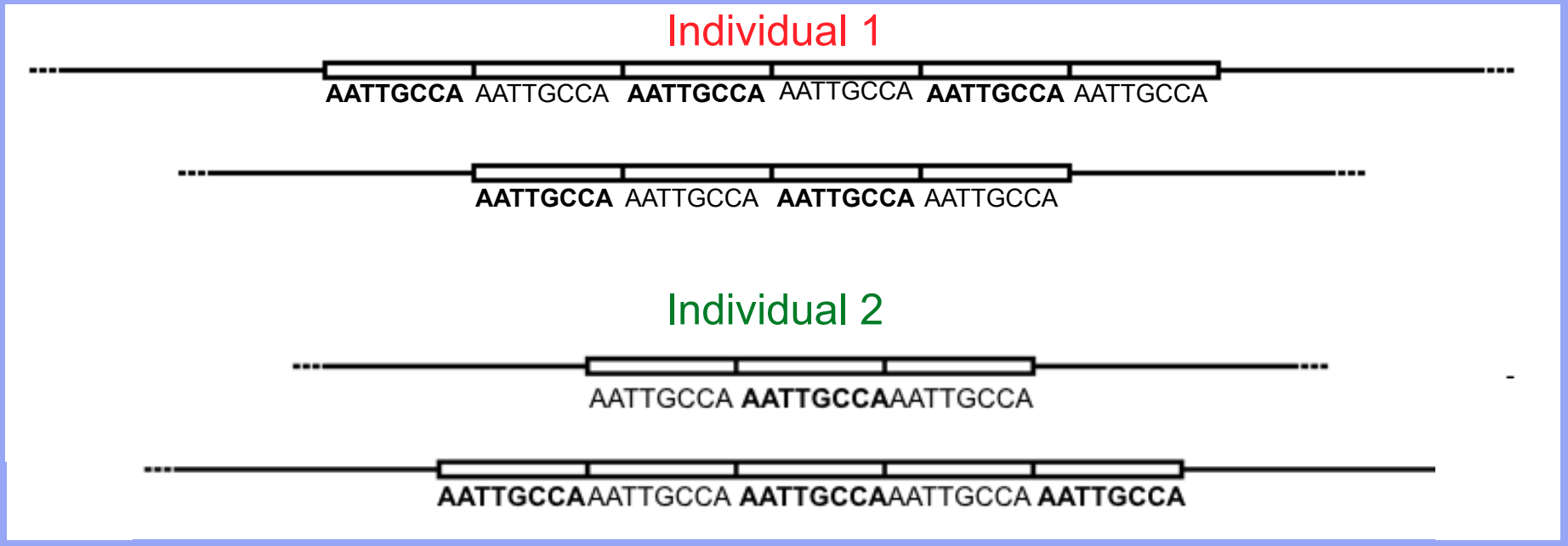
DNA Ligase

- **DNA ligase** can be used to attach restriction fragments if desired



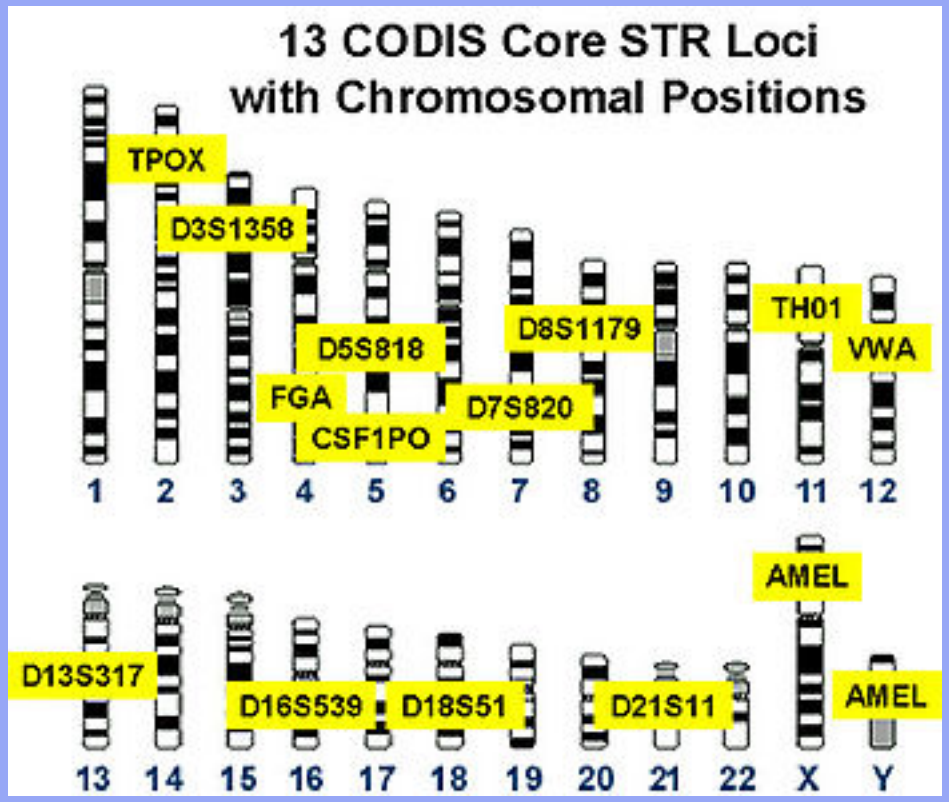
http://www.dnalc.org/resources/animations/restriction.html

The use of Variable Number Tandem Repeat in DNA Profiling



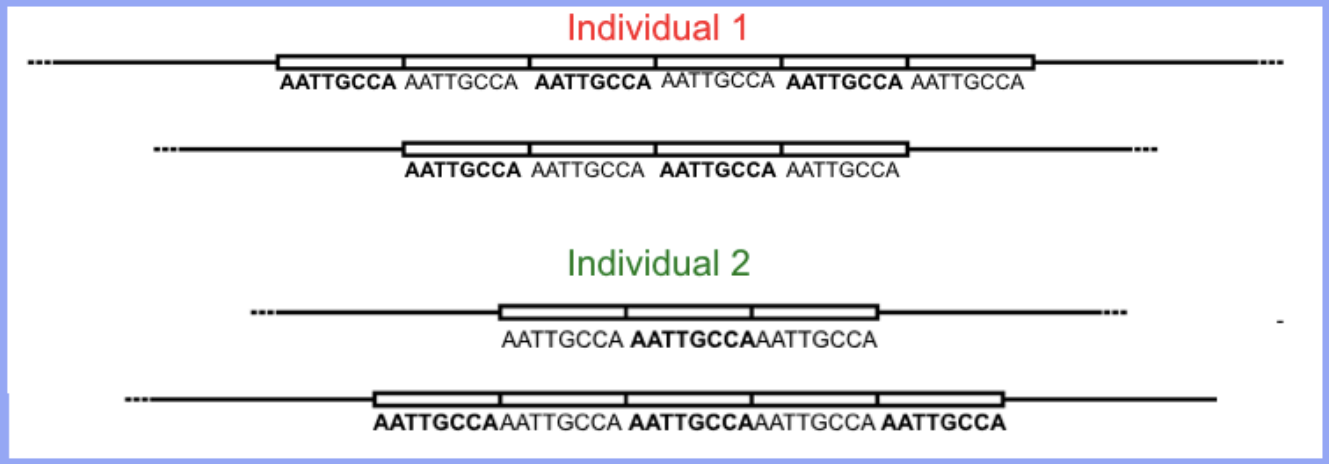
- Variable Number Tandem Repeats or VNTR are short repeated sequences found in DNA and like heritable like genes (or alleles of genes)
- one from each parent (NON coding genes are used)
- These are used as the sequences to compare DNA profiles in **Parentage** or **Criminal fingerprinting**

The use of Variable Number Tandem Repeat in DNA Profiling



- Data banks of these VNTR for missing persons, and criminal data banks of convicted offenders exists throughout North America
- CODIS is the US data bank (20 Loci)

The use of Variable Number Tandem Repeat in DNA Profiling



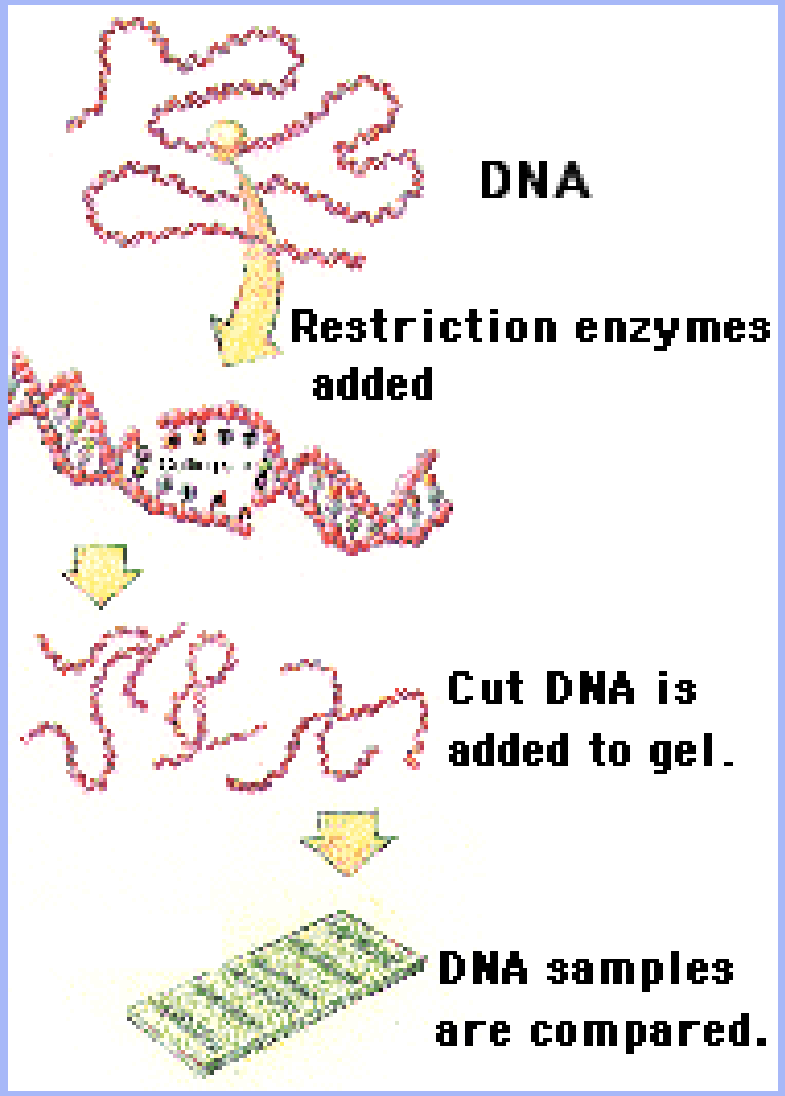
SEE DEMO ON CUTTING DNA

General Overview

- cut samples are then run through a gel in an electrical field that separates the DNA

  i.e. RUN the gel

- interpret results



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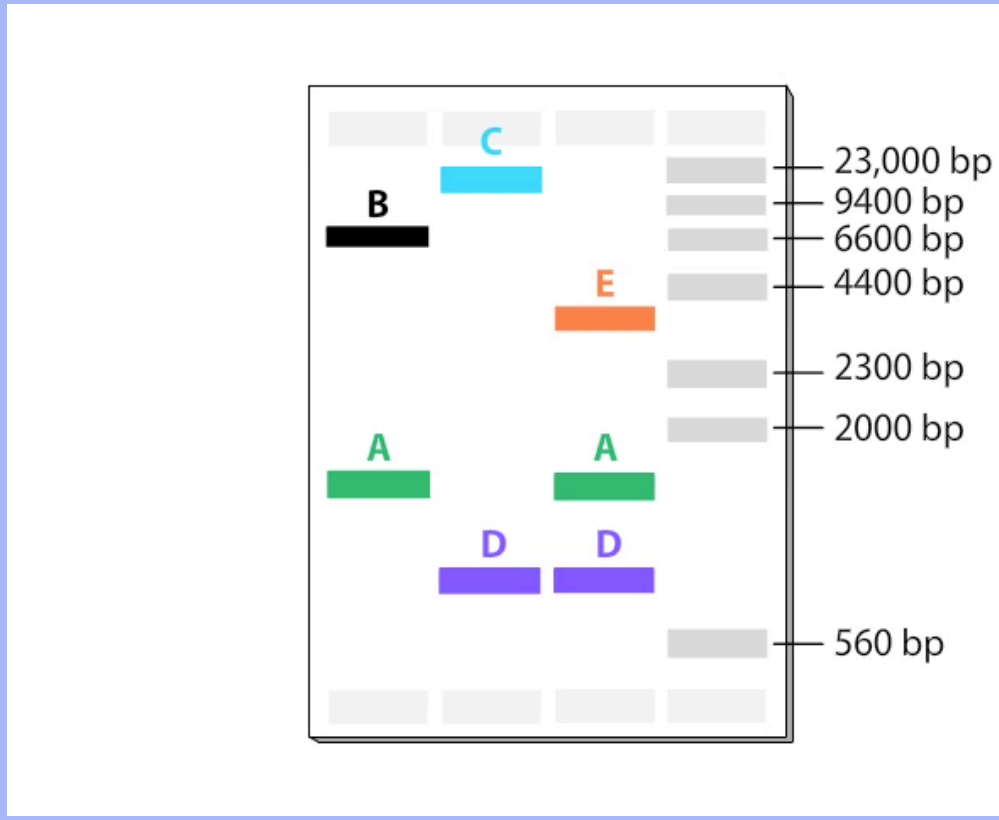
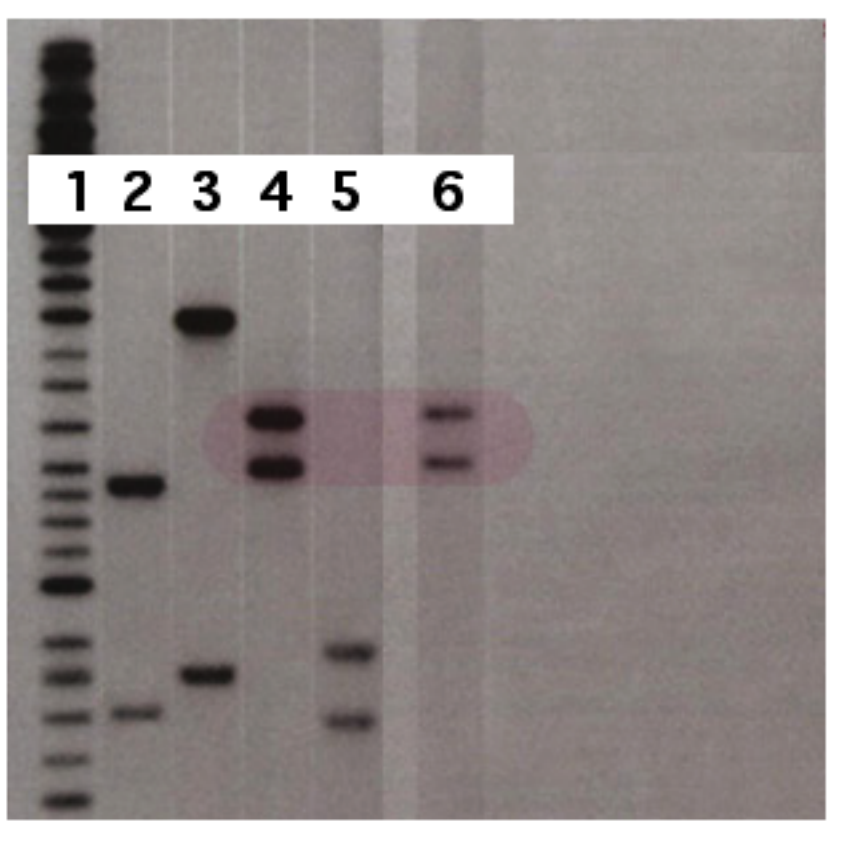


Comparing DNA

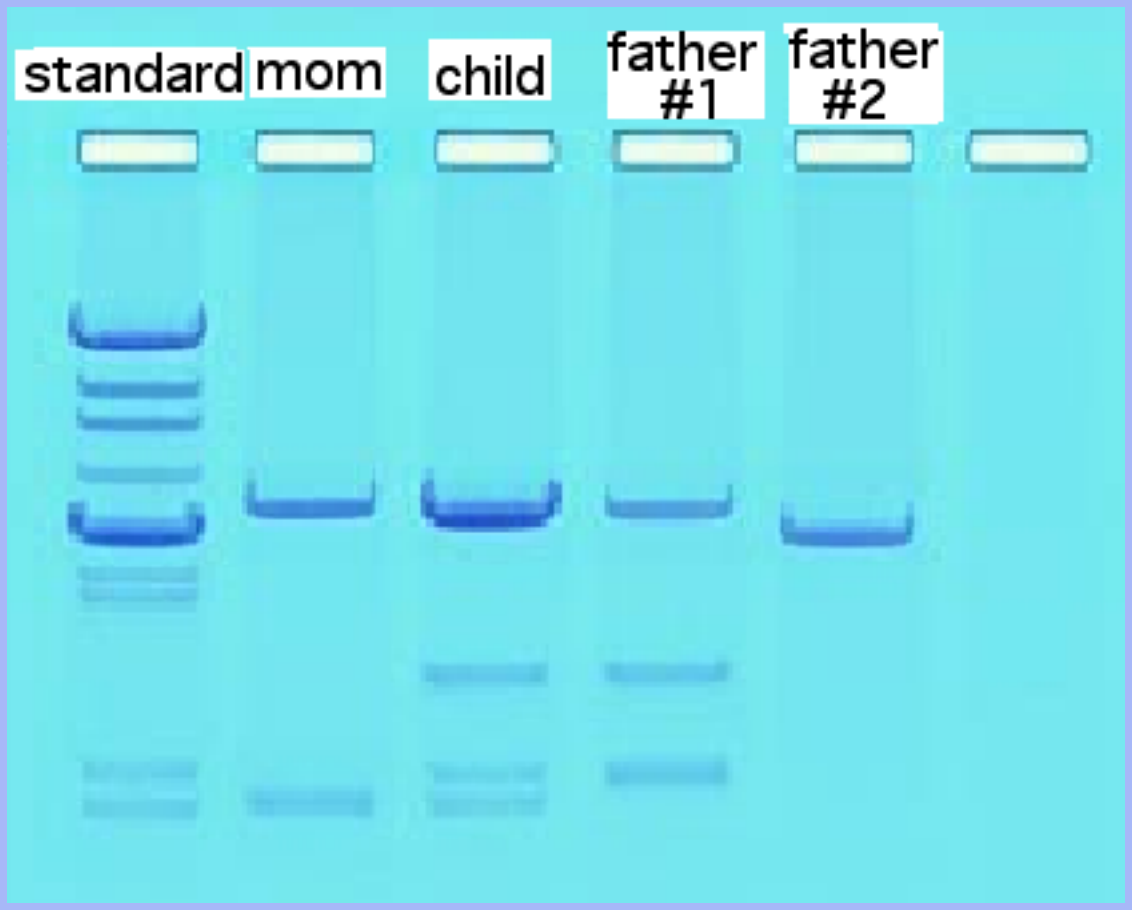
- Suspect test:



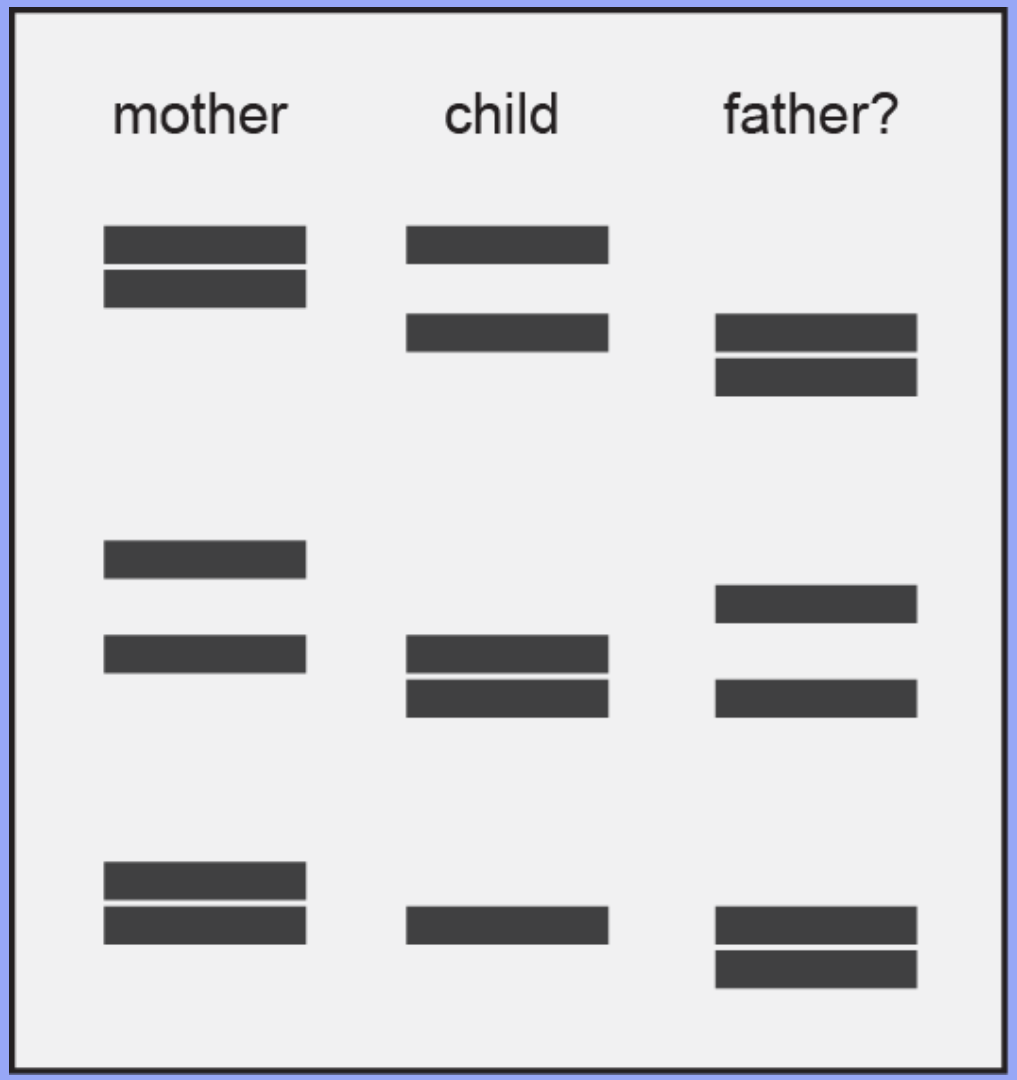
1. Standard
2. Technician's DNA
3. Victim's DNA
4. Suspect 1's DNA
5. Suspect 2's DNA
6. DNA recovered from the crime.

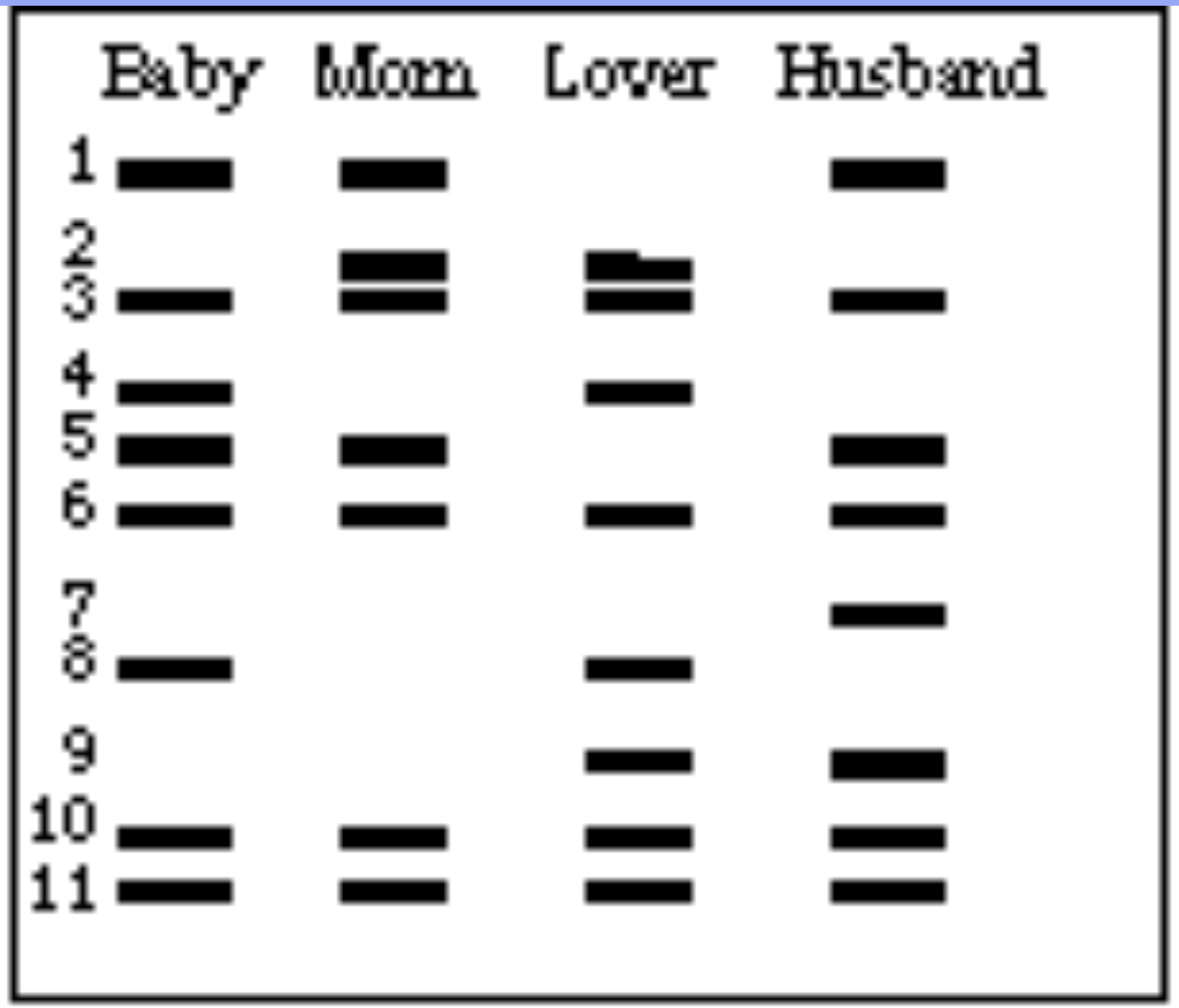
Comparing DNA

- Paternity test:



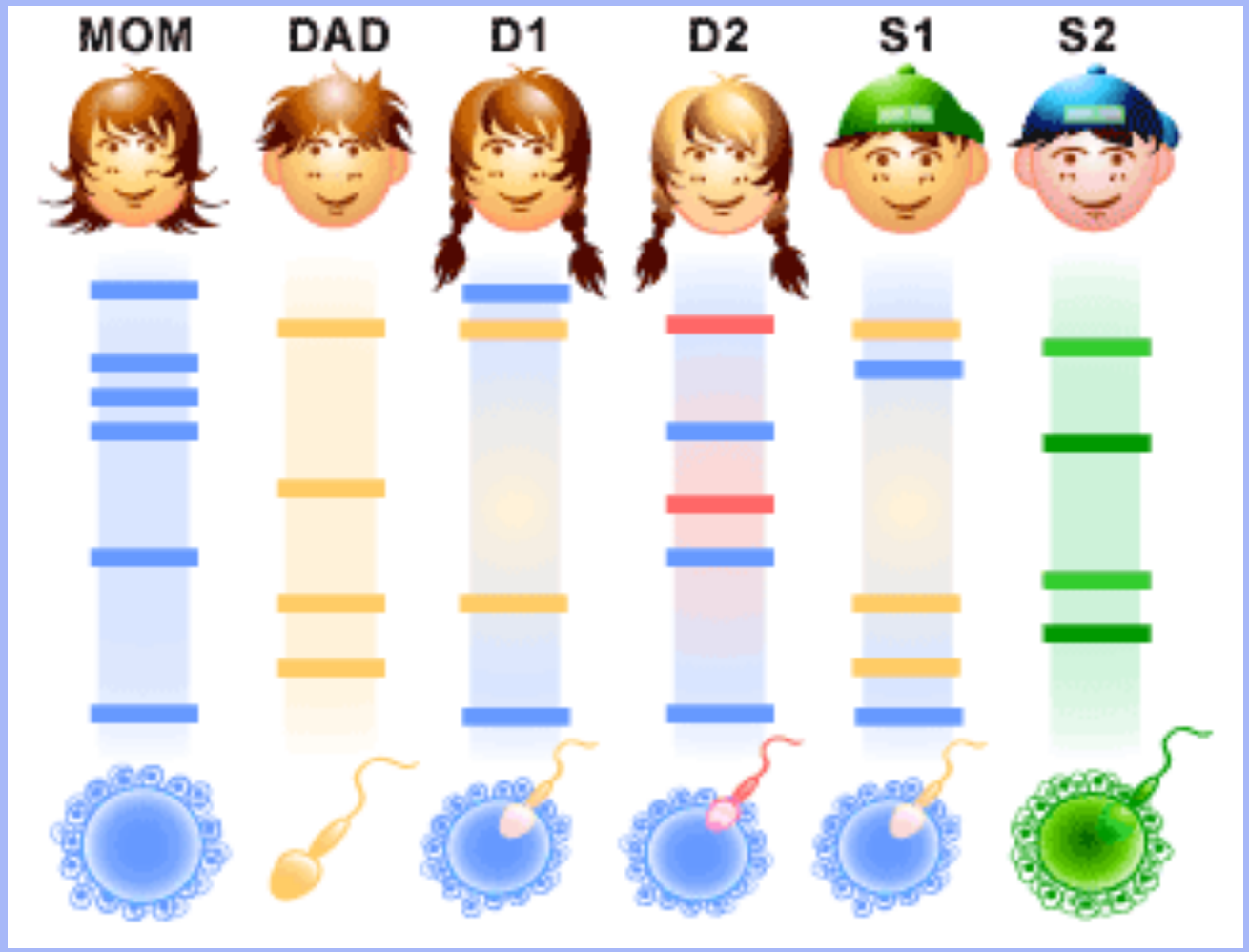
Comparing DNA




Baby
Mom
Lover
Husband
1
2
3
4
5
6
7
8
9
10
11

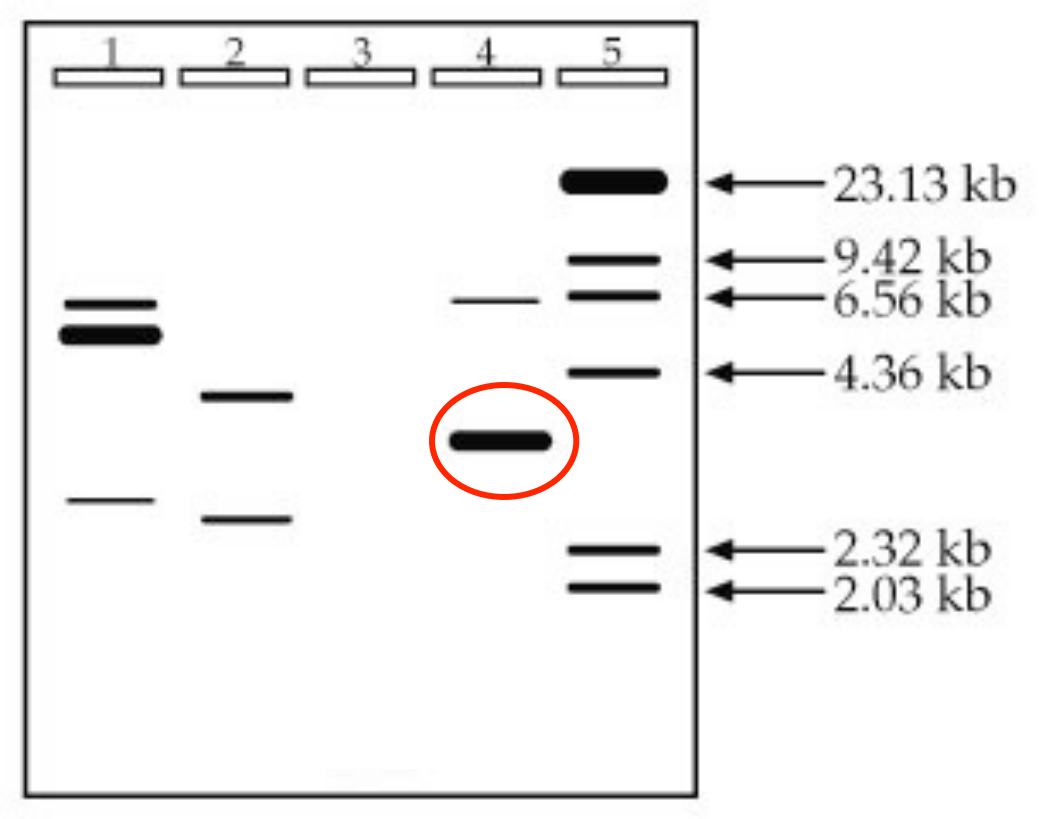
Comparing DNA

- Paternity test:



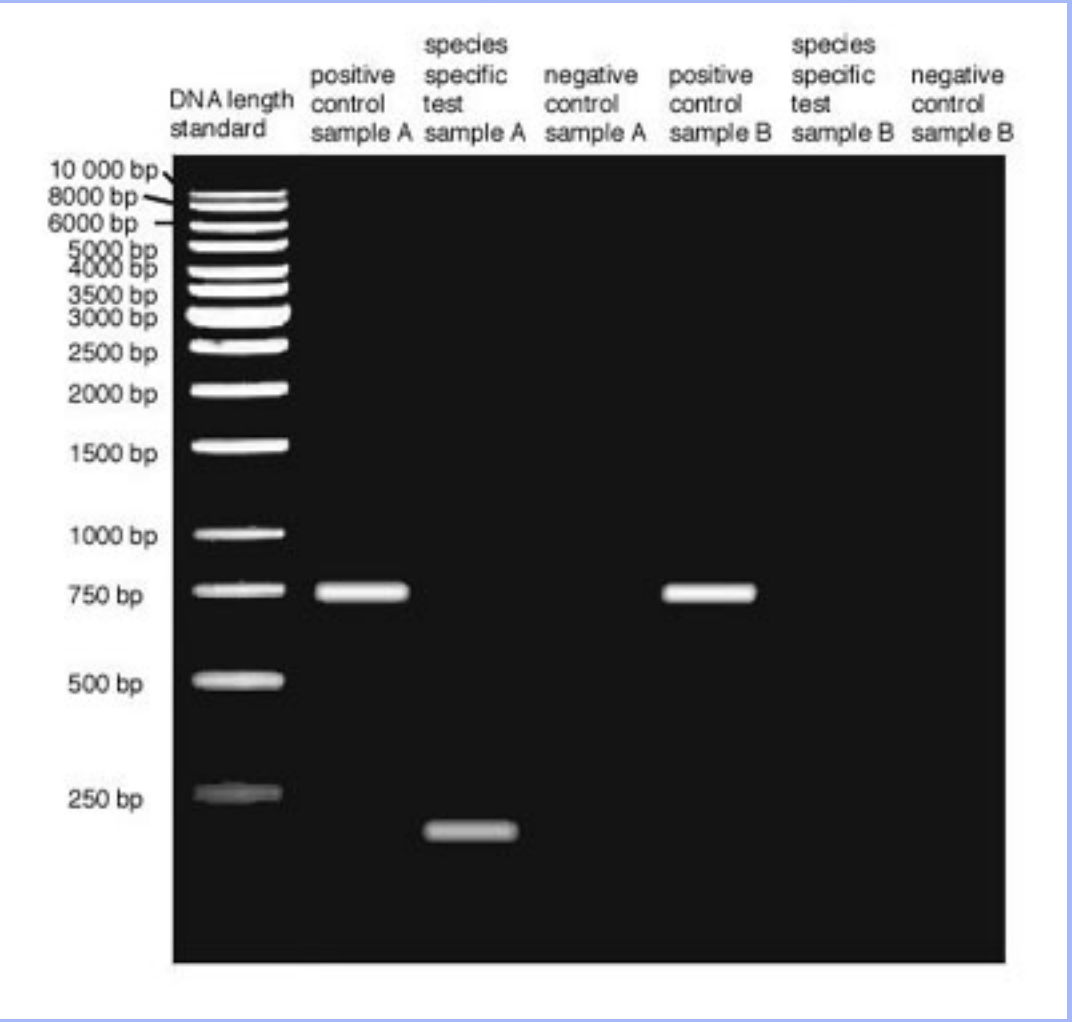
What is the standard for ?

- DNA fragments are measured in kilobases (kb)



Using the Standard

- Known fragments of various sizes are run together with tests
- Allows you to calculate sizes of unknown fragments.
- Small sizes run faster



Questions to try… Monday we will try out electrophoresis

- Read about DNA profiling on page 351
- Do activity on page 352 along with the DATA based question on 353