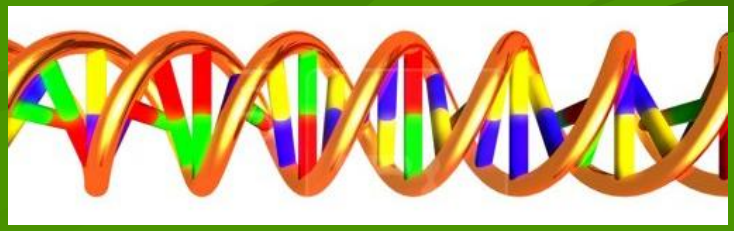
DNA

What is DNA?

- The genetic material in the chromosome is the DNA.
- DNA stands for DeoxyriboNucleic Acid.
- DNA is found in almost all living cells.
- DNA is a long molecule that is made up of many small subunits called nucleotides.
- DNA is found in the nucleus of the cell

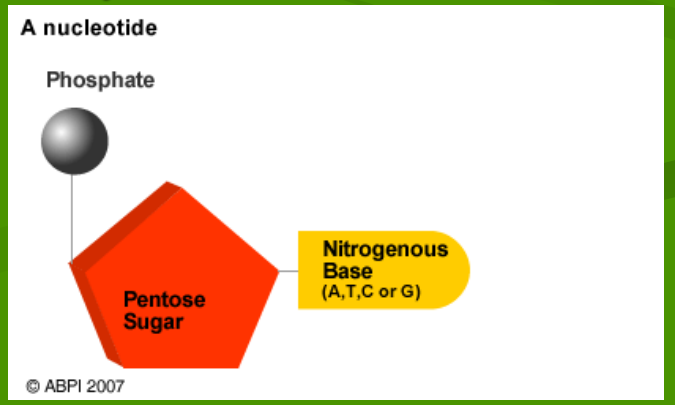
What is DNA?

- Every person has 46 chromosomes → approx 25,000 genes → 3 million base pairs.
- A gene is the unit of heredity that instructs the body to make proteins that determine our characteristics. The base pairs are part of the DNA molecule.
- In 1868, DNA was discovered and in the 1950's, Watson & Crick announced that DNA had a double helix structure.



What makes up DNA?

- The double helix, which resembles a twisted ladder or a spiral staircase, can be stretched out to look like a ladder. The ladder consists of many nucleotides.
- The nucleotides are made up of three basic parts:
  - Five carbon sugar called deoxyribose
  - Phosphate group
  - Nitrogenous base



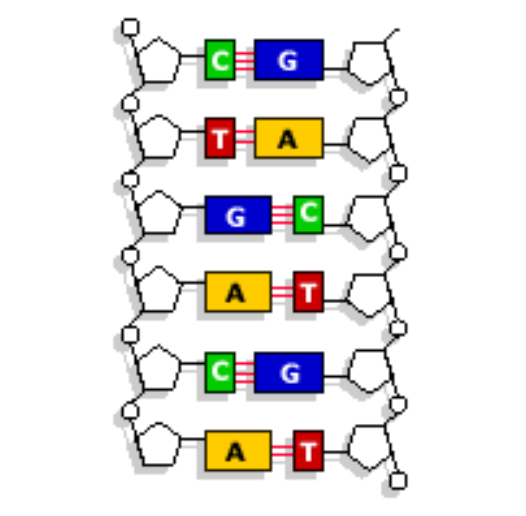
The Nucleotide

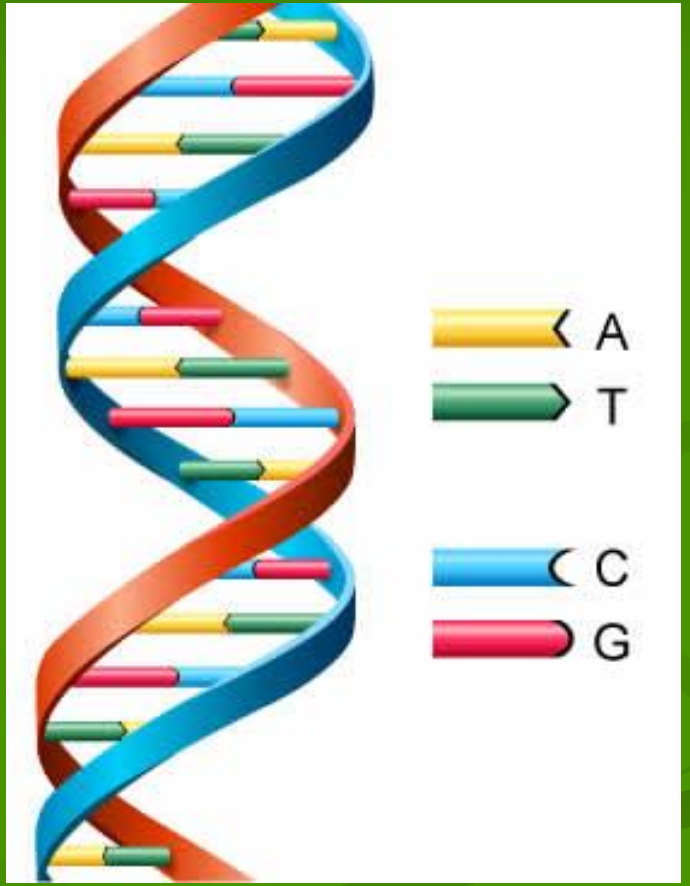
- Each leg of the ladder consists of an alternating sugar and phosphate unit. The rungs of the ladder are made of pairs of nitrogenous bases that are bonded together.
- There are four different nitrogeneous bases in a DNA molecule:
  - Adenine (A)
  - Guanine (G)
  - Cytosine (C)
  - Thymine (T)

The Nucleotide

- The order of the bases in the DNA molecule provide instructions used to build amino acids and link them together into proteins.
- Base pairing rule:
  - One nitrogeneous base will only join with a certain other nitrogenous base.
  - Example:
    - Adenine can only join with thymine (A-T
    - Thymine can only join with adenine (T-A)
    - Cytosine can only join with guanine (C-G)
    - Guanine can only join with Cytosine (G-C)

DNA Models

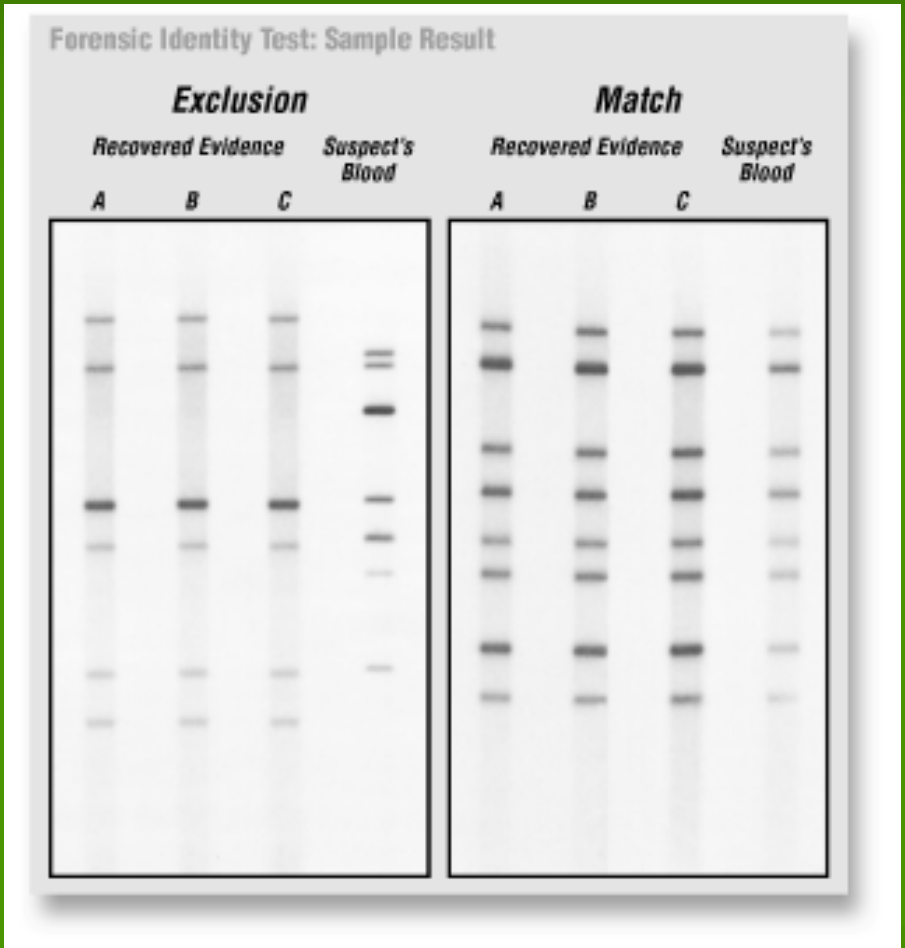


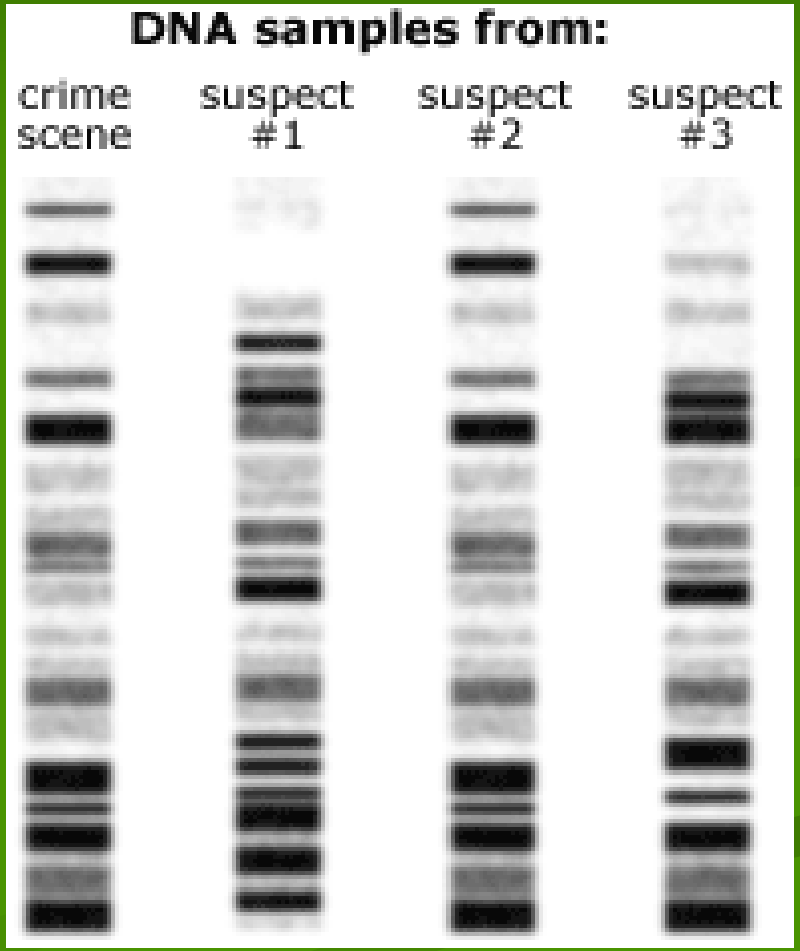


How is DNA used in Forensics?

- DNA Fingerprinting
  - The DNA of all people is basically the same except there are certain areas of the DNA base pair sequence which are repetitive. These sections can be separated by electrophoresis to create an individual specific DNA banding pattern, which is called DNA fingerprinting. The DNA bands are extremely individualized.

DNA Fingerprints





DNA Fingerprinting

- Today DNA fingerprint is routinely used to test samples of blood, hair root, saliva, and other bodily fluids.
- DNA fingerprinting can also be used to determine familial relationships as half a person's genome comes from each parent.

A
B
C
D
A/D
Mother
Child
Alleged Father
E
F
G
Mother
Child
Alleged Father
H
I
J
K
Mother
Child
Alleged Father
L
M
N
O
Mother
Child
Alleged Father

DNA on Trial

- When medical personnel who do the testing appear at a trial, they tell the jury the statistical probability that two matching samples (one from the crime scene and one from the suspect) came from the same person.
- This process was used on Monica Lewinsky's dress to indicate that there was semen from Bill Clinton. Seven base pair sequences were used and the probability of someone else having the same pattern was 1 in 8 trillion!