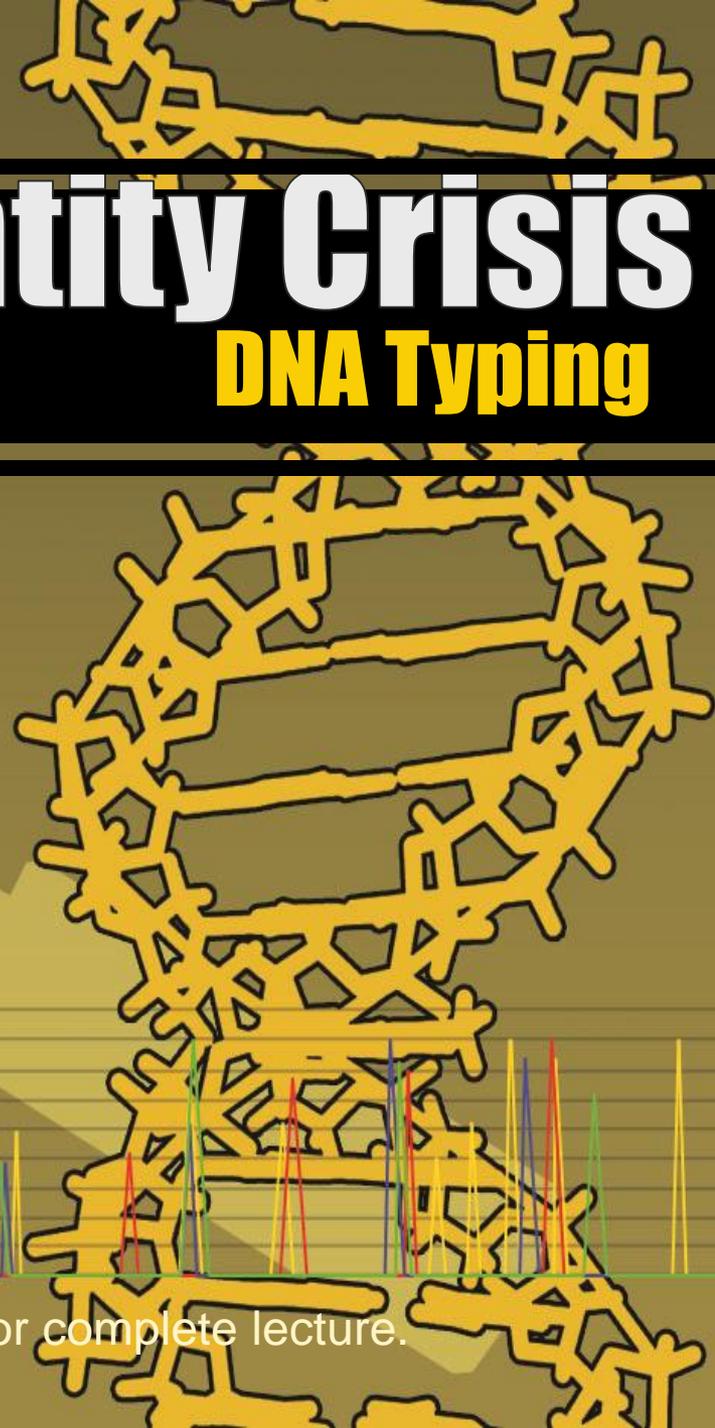




The Mystery of
Lyle and Louise

An Identity Crisis

DNA Typing



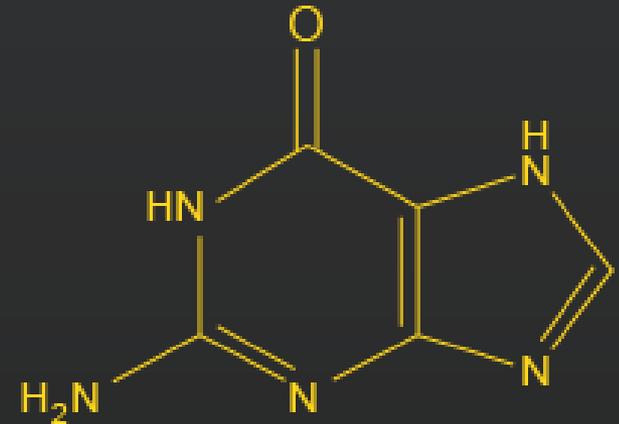
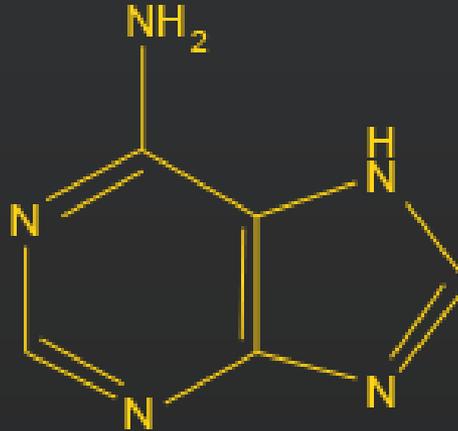
Preview slides – visit www.CrosscuttingConcepts.com for complete lecture.

Introduction – The ABC's of DNA

DNA (deoxyribonucleic acid) is a **negatively-charged** double-stranded chain of **nucleotides**.

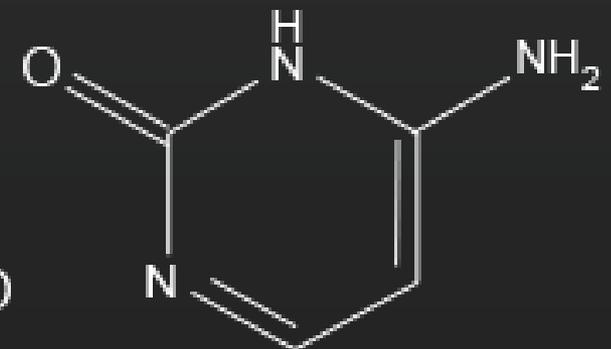
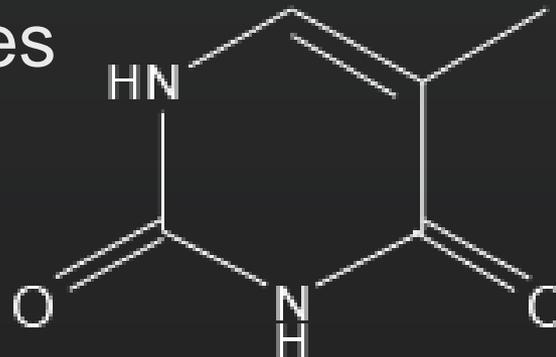
- Purine Bases

- Adenine (A)
- Guanine (G)



- Pyrimidine Bases

- Thymine (T)
- Cytosine (C)



Introduction – The ABC's of DNA

This chain also includes a 'backbone' made from molecules of sugar (deoxyribose) and phosphate.

In 1950, biochemist Erwin Chargaff discovered that the number of Adenine and Thymine were equal and that the same was true for Guanine and Cytosine.

What conclusions can you draw from Chargaff's discovery?

DNA Double Helix



DNA has directionality – each chain has a ‘top’ and a ‘bottom’ end.

- ‘Top’ end is called **Five Prime (5’)**
- ‘Bottom’ end is called **Three Prime (3’)**

Two nucleotide chains together wind into a **double helix**.

Hydrogen bonds between paired bases hold the two DNA strands together..

DNA strands are **antiparallel** and complementary to each other.

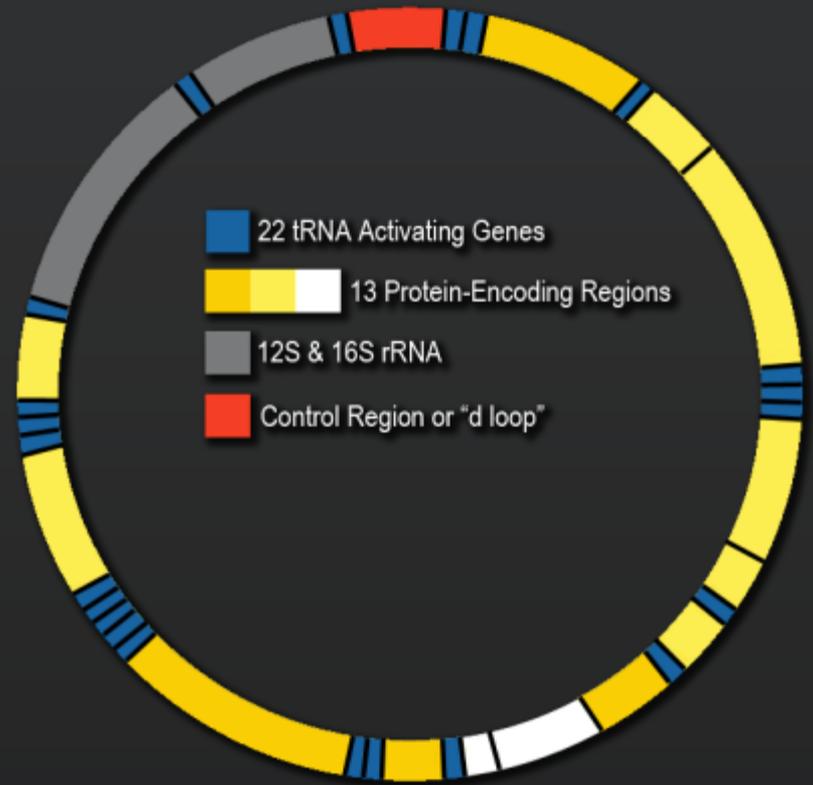
5’ ACGTC 3’
3’ TGCA G 5’

Mitochondrial DNA

Mitochondrial DNA (mtDNA) is different from the DNA found in the nucleus of the cell.

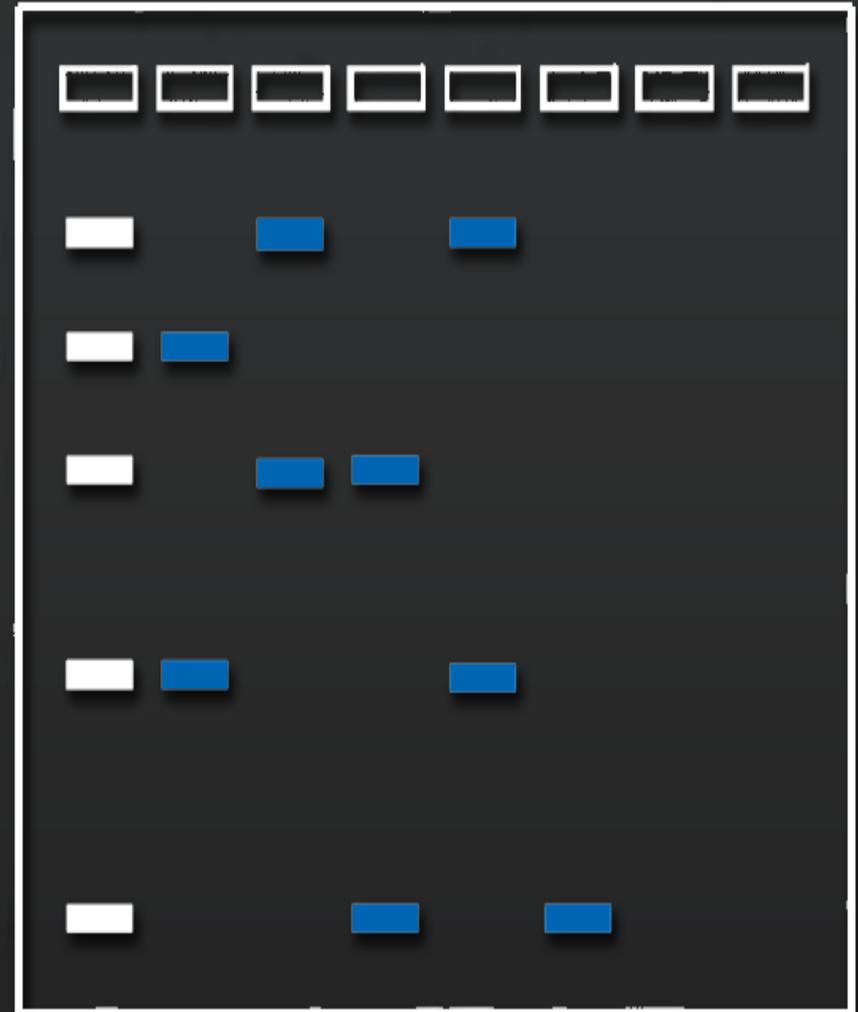
- Ring shaped
- Less Protection from mutation
- Codes for only 37 genes
- Has about 16,000 bp
- mtDNA is **haploid** not **diploid**

Because the tiny amount of mitochondria in human sperm is destroyed during fetal development, mtDNA is always inherited from the mother's egg – a male's mtDNA comes from his mother, but will not pass on to his offspring.



A **lane** is the straight line traveled by the DNA molecules between the well and the positive end of the gel.

A **size ladder** is a solution of DNA molecules of **known lengths** which is usually run on the first and/or last lanes of the gel to let us measure the sizes of the DNA pieces being tested.



PCR – Preliminary Step

In order to perform PCR, a number of 'ingredients' and tools are necessary.
The most important ones are:

- **DNA sample**
- **Polymerase** – Polymerase binds to open DNA and synthesizes a complementary strand from primer bound to the original strand; Taq polymerase is a special polymerase which does not degrade at high temperatures
- **Primers** – Short sequences of DNA that bind to specific complementary (matching) regions of the DNA sample – called the **target sequence** – that we want to amplify
- **Nucleotides** – Raw material for the polymerase to synthesize new DNA strands
- **Thermocycler** – Machine used to precisely raise and lower the temperature of the DNA samples for specific lengths of time

PCR – After Cycle 30

1,073,741,766
target molecules

60
longer
length
molecules

For More...

To access the complete lecture presentation,
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An Identity Crisis™ DNA Typing



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Math



Biology