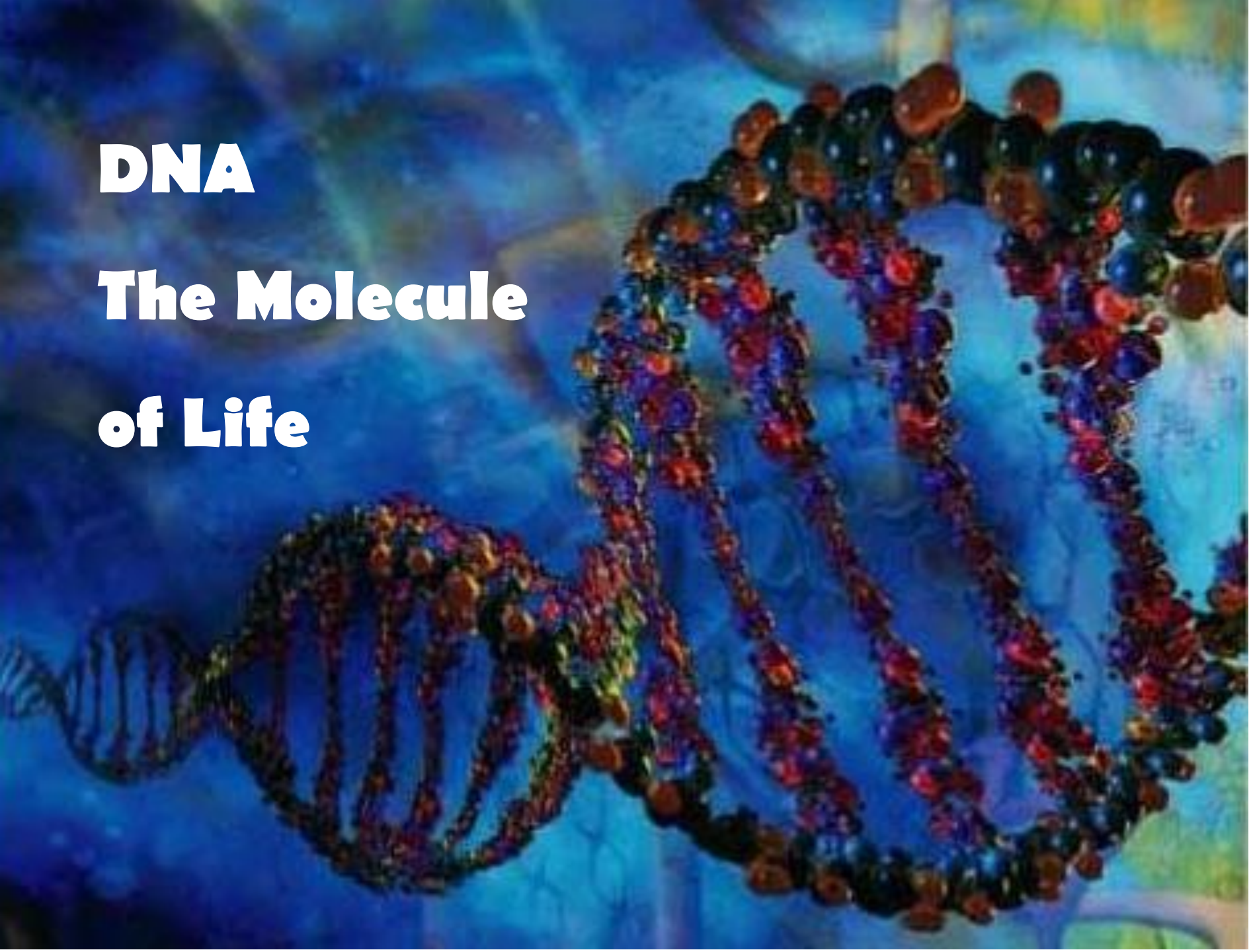

DNA
The Molecule
of Life

What does a molecule of genetic inheritance need to do?

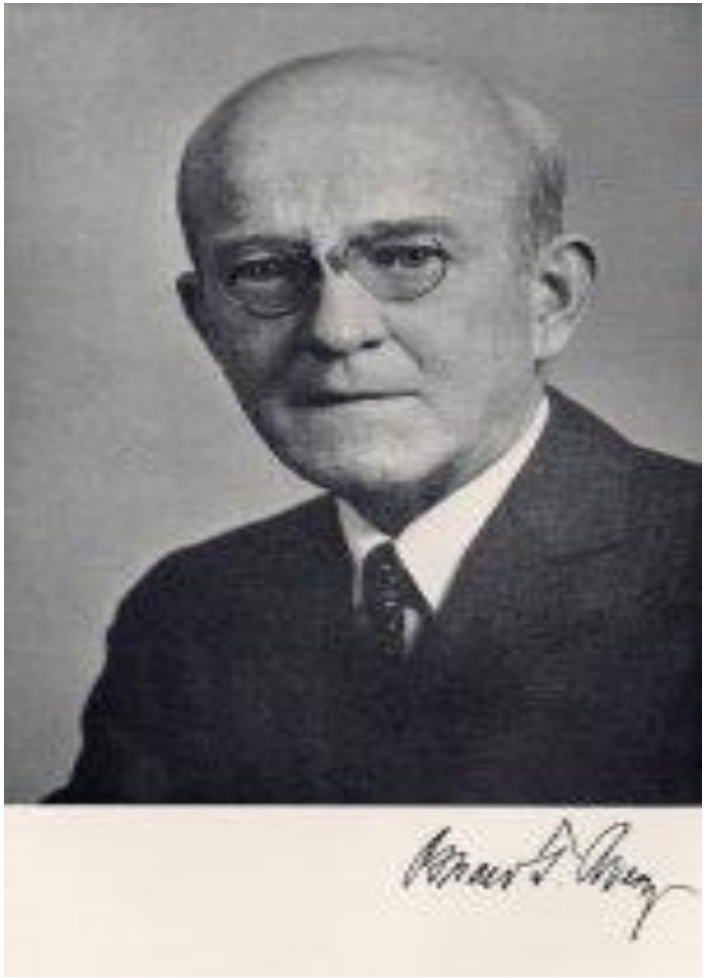
- Make copies of itself
- Send directions to cell parts
- Pass instructions to new cells


The
Race for
the
Double
Helix

The Pathway to Discovery

1944

- Oswald Avery
- Experiments with bacteria showed DNA is the genetic material ! ! !



Chargaff's Rule

1951

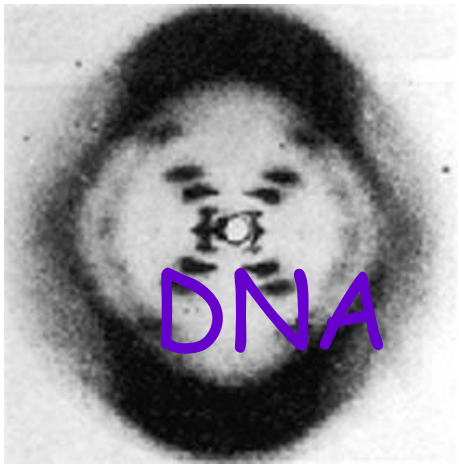
- **Edwin Chargaff**
- **In DNA**

Adenine=Thymine

Cytosine=Guanine

A Famous X-ray

This X-ray of the center of a DNA molecule, shows the spiral shape of



Rosalind Franklin

1951

The Plot Thickens

1953

- Maurice Wilkins

who works with Franklin

- "Shares" results with Franklin's rivals . . .

EUREKA!!!

1953

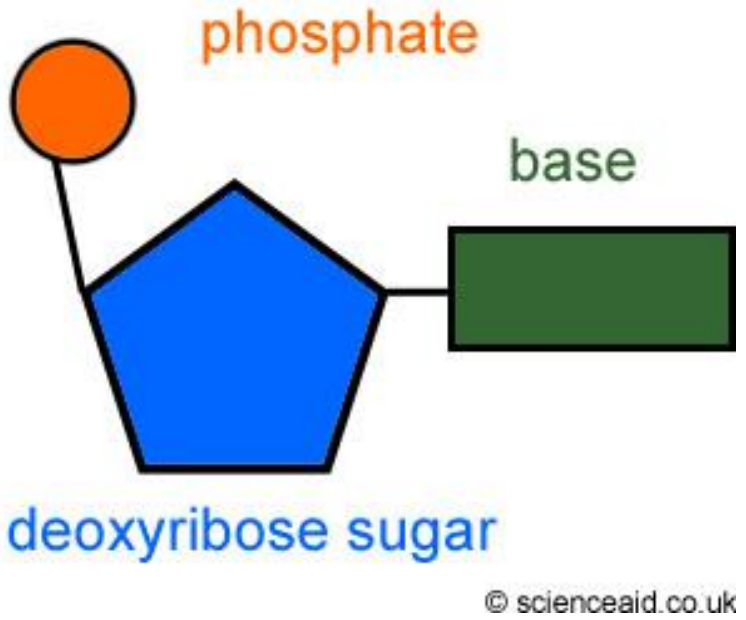
King's College

James Watson **England** Francis Crick

Watson and Crick worked together making models of DNA molecules. They used Chargaff's Rule, Rosalind Franklin's x-ray (unknown to her), toys and their own work to determine the shape of DNA

DNA = Deoxyribonucleic Acid

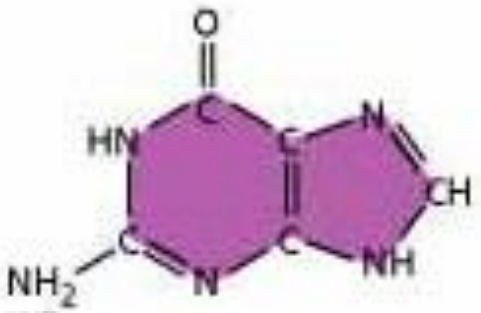
- **Function**: stores genetic information to make proteins
- **Structure**: double sided chain of nucleotides that form a double helix
- **Parts of a DNA nucleotide**:
  - Sugar: deoxyribose
  - Phosphate group
  - Nitrogen base
    - Adenine (A)
    - Guanine (G)
    - Cytosine (C)
    - Thymine (T)



4 Types of Nucleotides

Adenine

Guanine

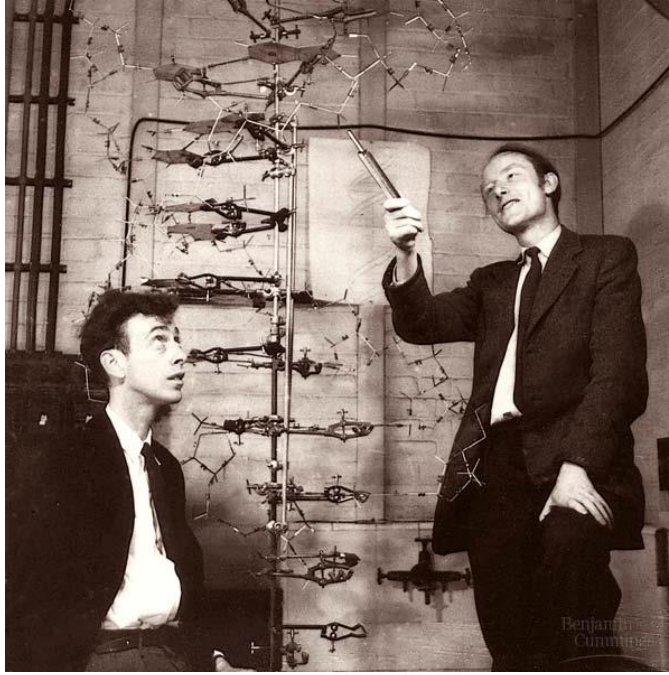


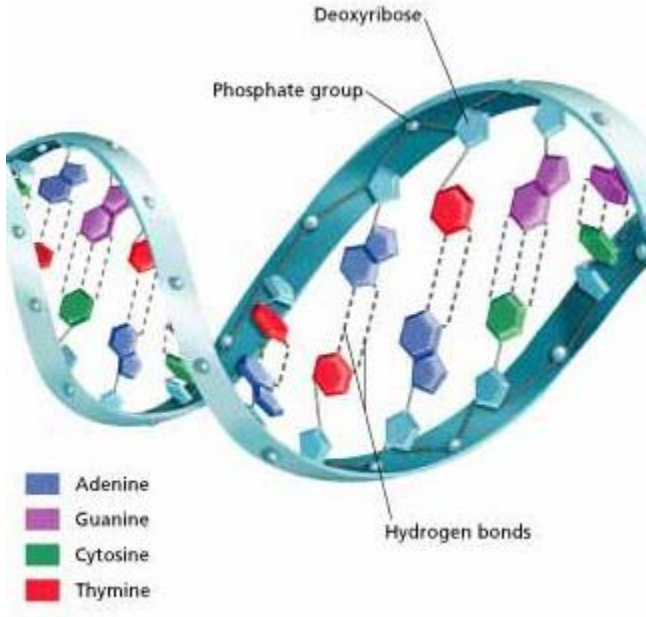
Thymine

Cytosine

The Double Helix

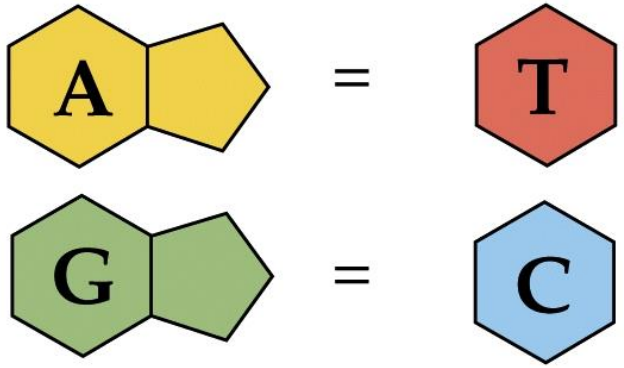
- In 1953, James Watson and Francis Crick suggested a model for DNA as a **double helix** (two nucleotide chains wrap around each other in a double spiral).
- Backbone is alternating sugars and phosphates.
- Bases attach the two strands in the center.





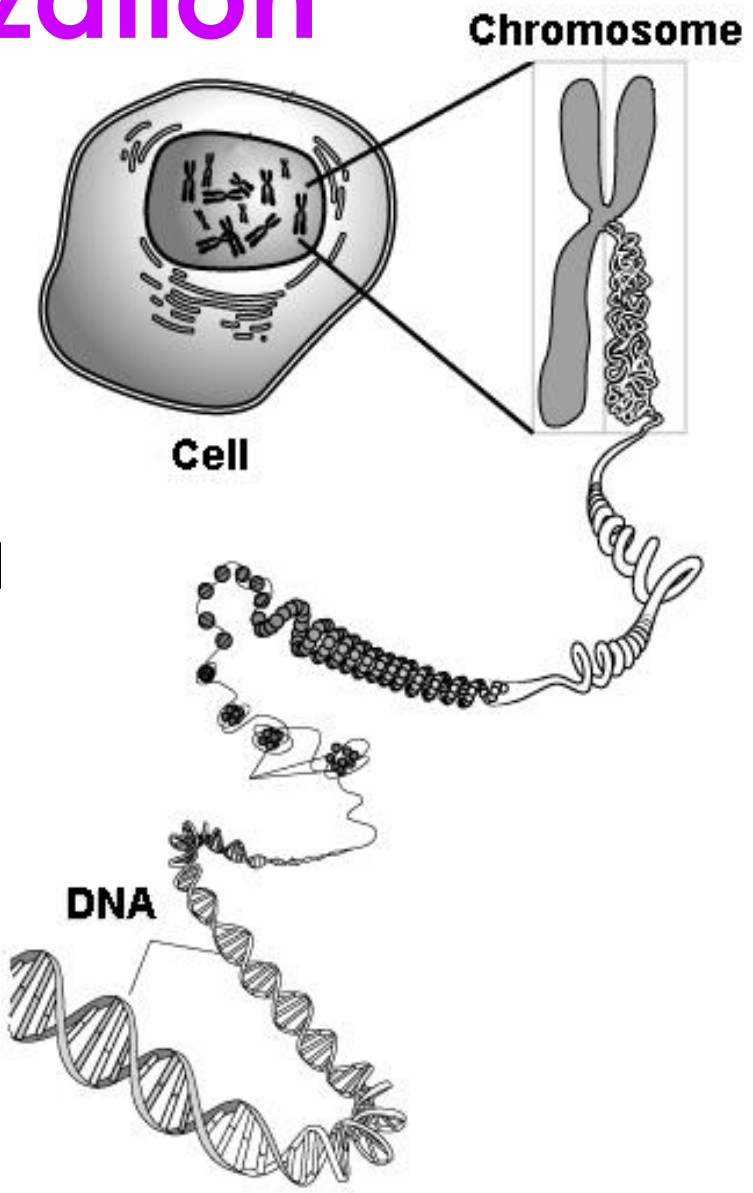
Complementary Base Pairing

- The bases are connected to each other in the double helix by hydrogen bonds. (Chargaff's Rule)
  - A pairs with T
  - G pairs with C



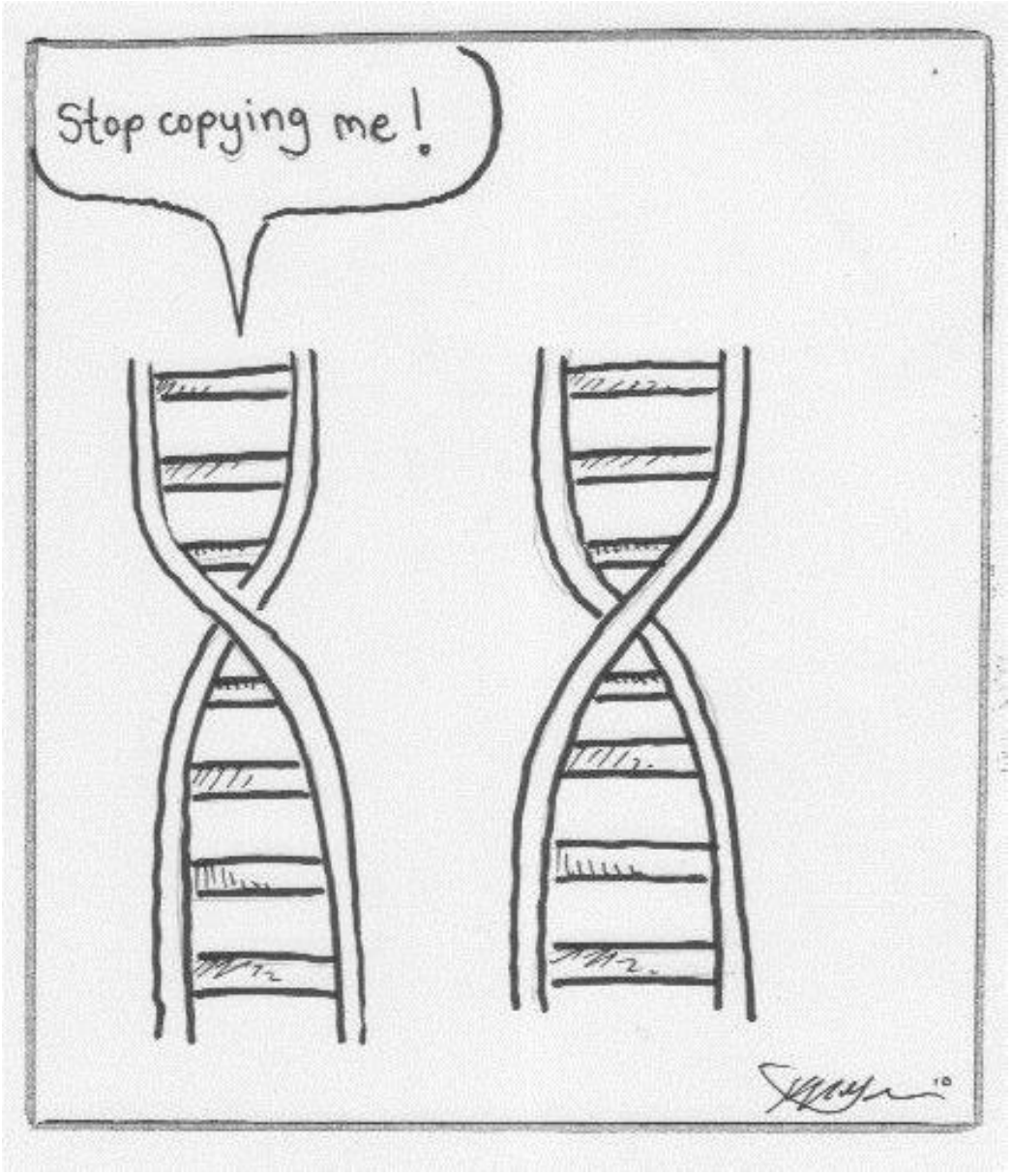
DNA Organization

- DNA is very long. The nucleus of each human cell contains more than 1 meter of DNA.
- **So how does it all fit?**
- DNA is tightly wrapped and coiled into chromatin which is wrapped and coiled into chromosomes.
- **REMEMBER: DNA makes up genes and genes make up chromosomes.**
- **DNA → Genes → Chromosomes**



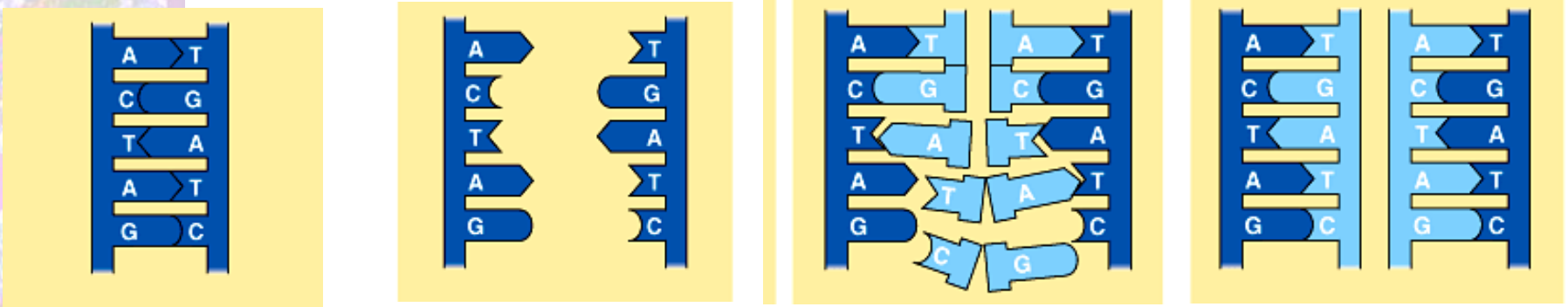
DNA Replication

- **DNA Replication** – process of copying DNA
- The strands of DNA unwind (using enzymes) and make copies using the complementary base pairing rules.
- **Makes EXACT copies of DNA**.


Stop copying me!

DNA Replication

1. DNA begins with 2 complementary original strands.
2. DNA strands separate or unzip.
3. New nucleotides are added to the original strand following base pairing rules.
4. Result is 2 exact copies of DNA, each having one original strand and one new strand.



DNA Replication