

12-1 DNA

Objectives

- **Summarize** the relationship between genes and DNA.
- **Describe** the overall structure of the DNA molecule.



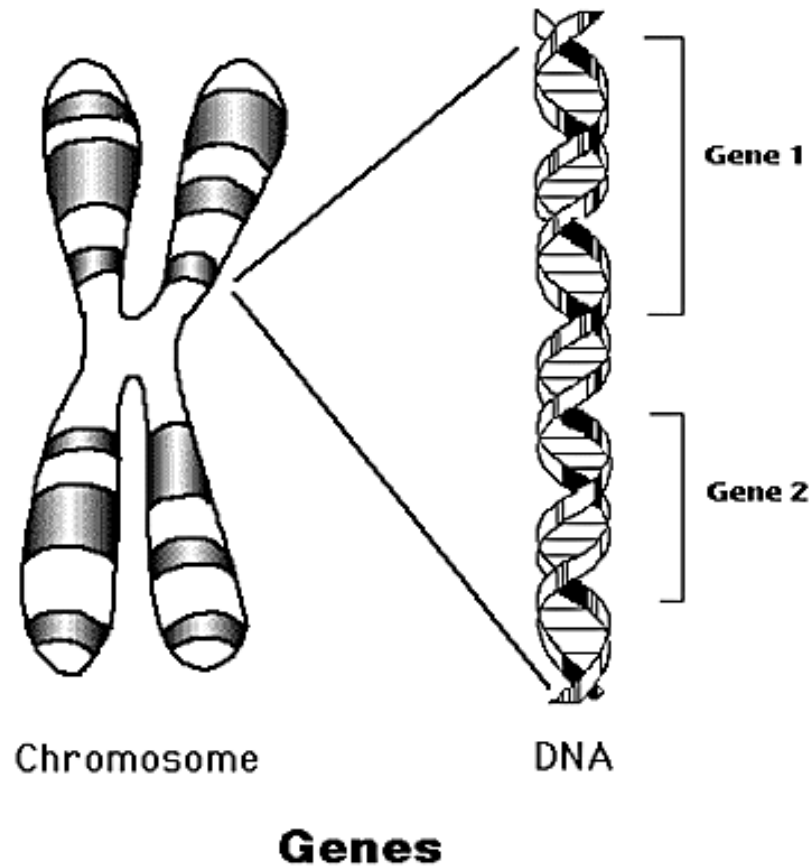
Do Now:

- What are the four main Macromolecules?
- Which of the four macromolecules is DNA made up of?
- What does DNA stand for?



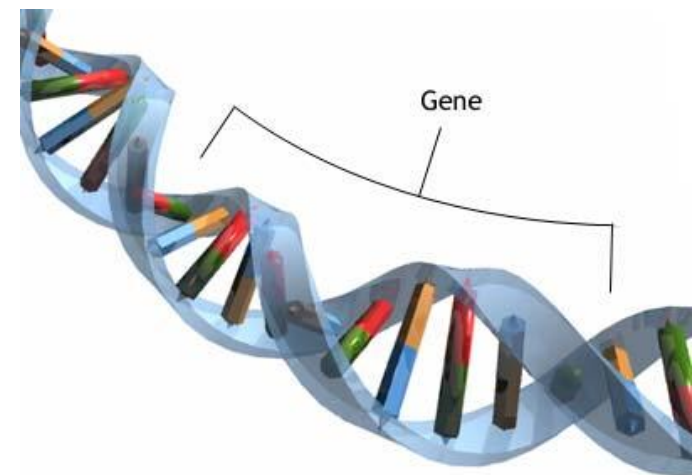
Define A Gene

- Provide a definition of a gene using your own words.



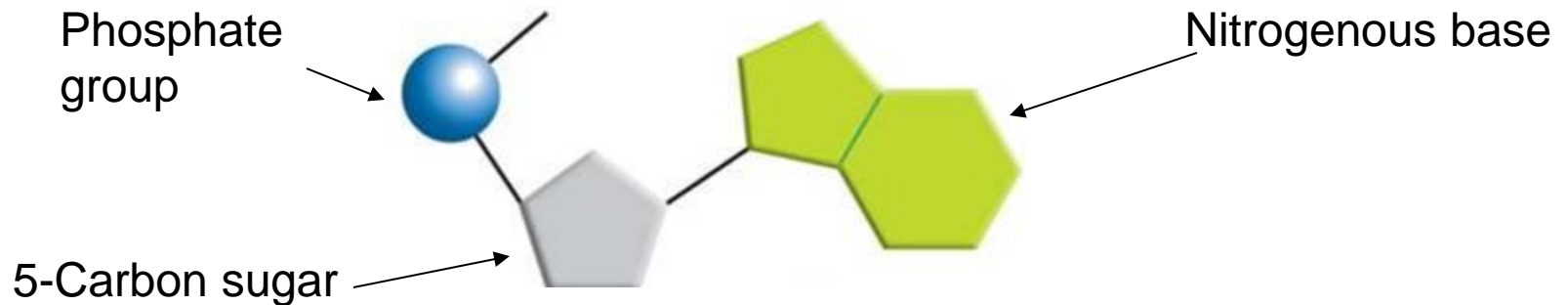
3 known roles of genes:

1. Genes pass information from one generation to the next.
2. Genes use information to determine the characteristics of organisms.
3. Are copied into every cell.



The Structure of DNA

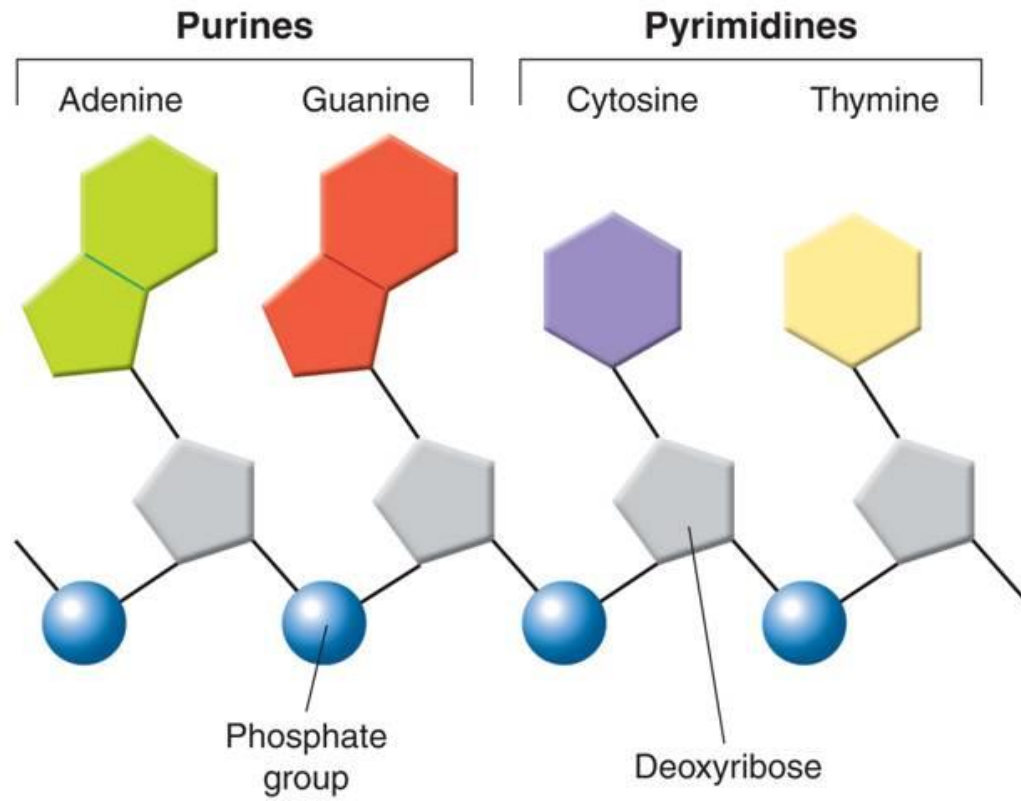
- DNA is made up of nucleotides.
- A nucleotide is made up of 3 parts:
 1. 5-carbon sugar called deoxyribose
 2. Phosphate group
 3. Nitrogenous base



A Nucleotide

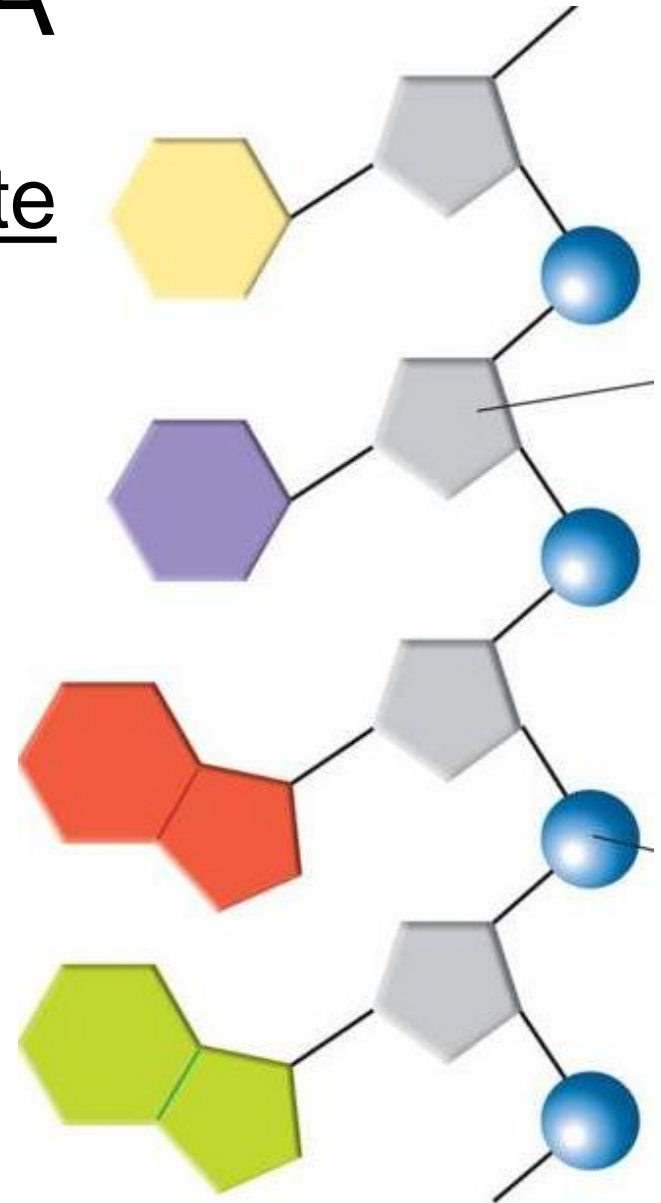
The Structure of DNA

- There are four kinds of bases in DNA:
 - Adenine and Guanine are called **Purines**.
 - Cytosine and Thymine are called **Pyrimidines**.



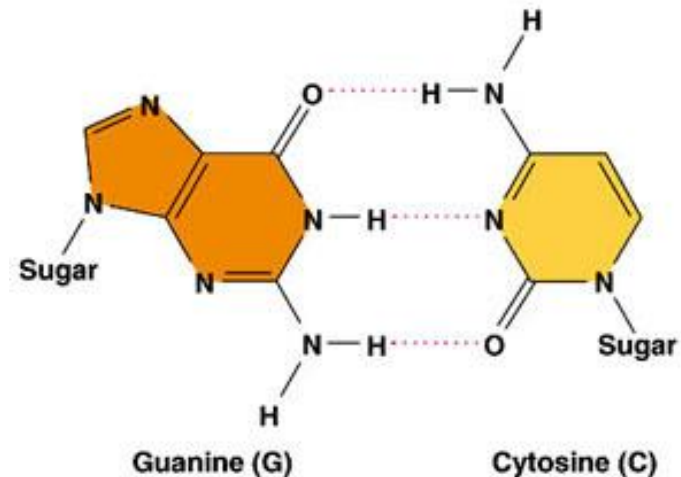
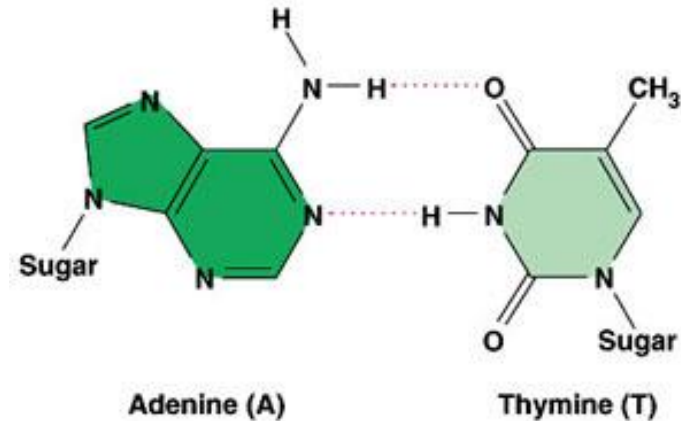
The Structure of DNA

- DNA has a sugar-phosphate backbone.
- Nitrogenous bases are paired up with each other in the middle.
- The bases can be joined together in any order.



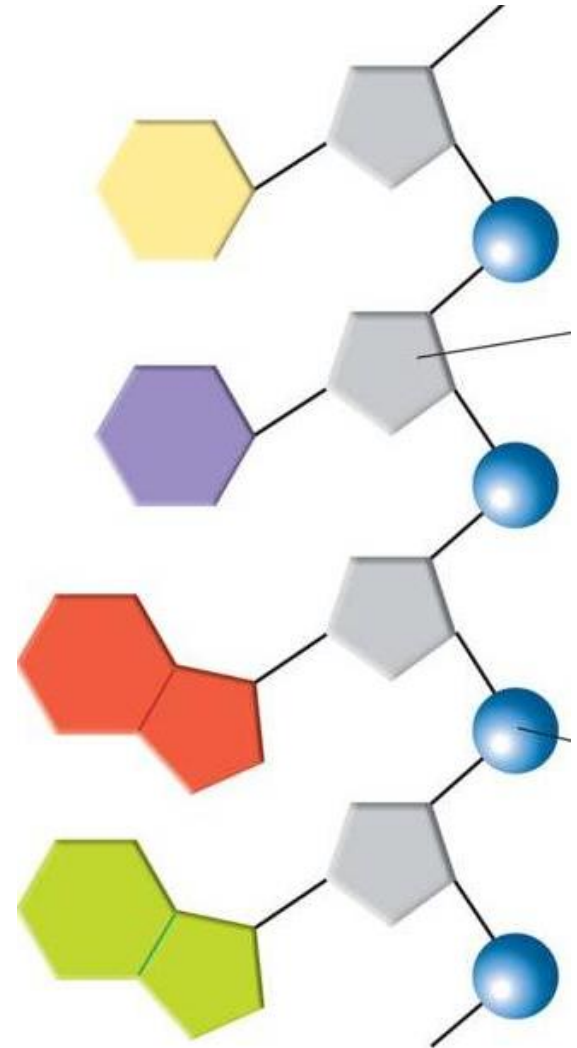
Chargaff's Rule

- The percentages of guanine (G) and cytosine (C) bases are almost equal in DNA samples.
- The percentages of adenine (A) and thymine (T) bases are almost equal in DNA samples.



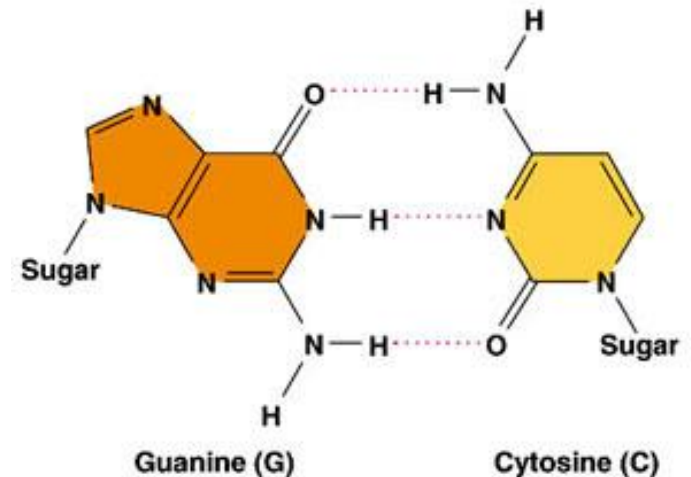
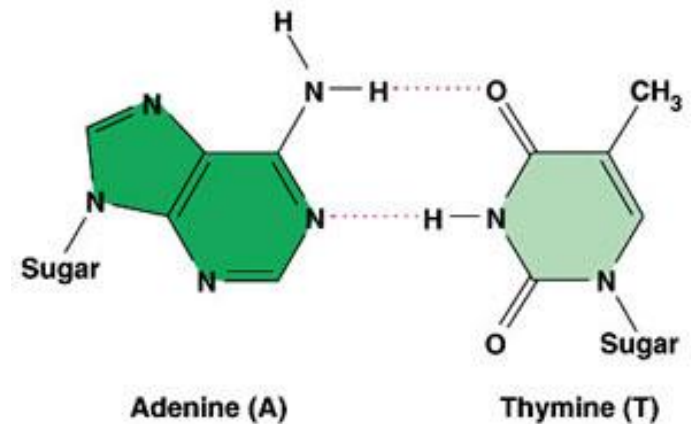
What forms the backbone of the DNA Chain?

- Phosphates and
- Deoxyribose sugars.



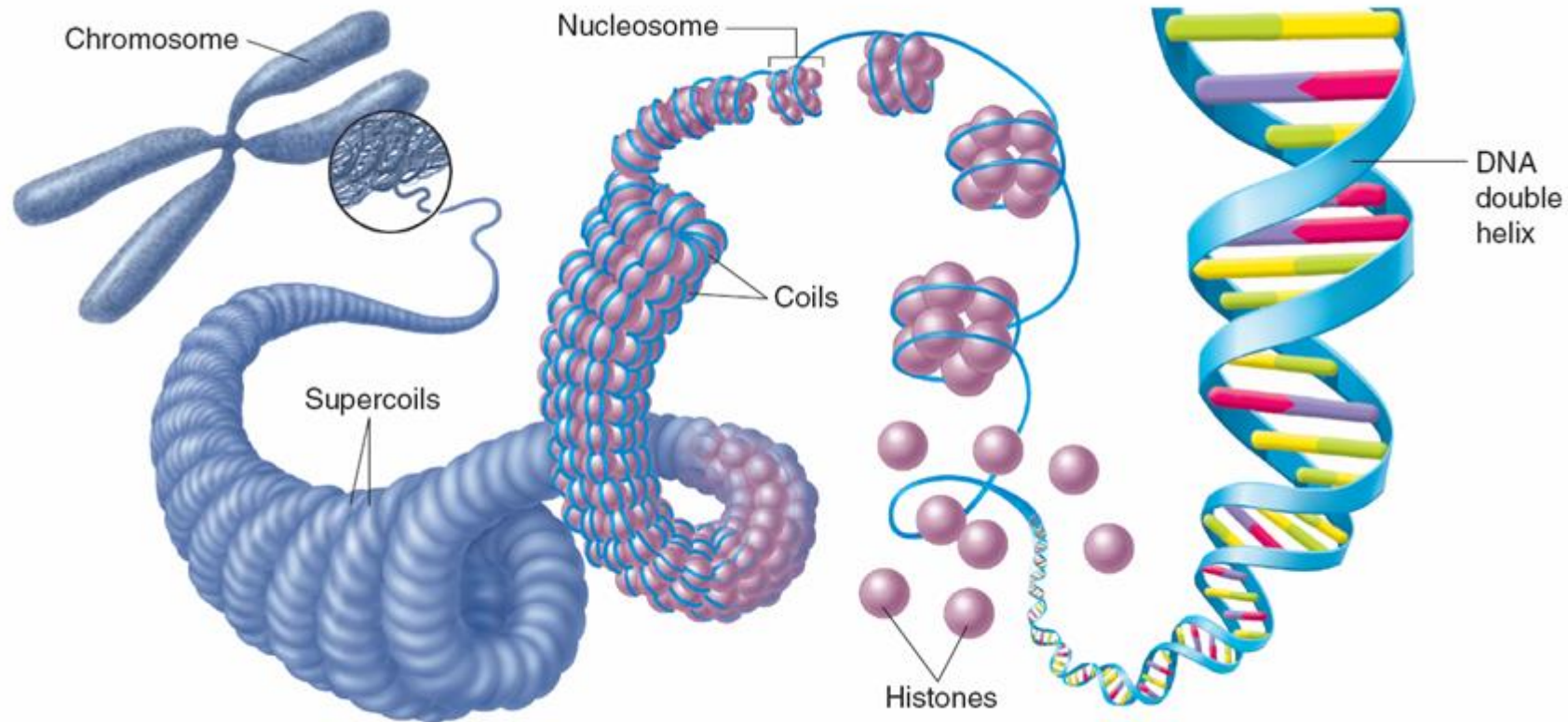
What is Chagraff's Rule?

- He found an equal amount of Adenines and Thymines, and an equal amount of Cytosines and Guanines.



How can DNA be more tightly packed?

- It would have to be twisted.



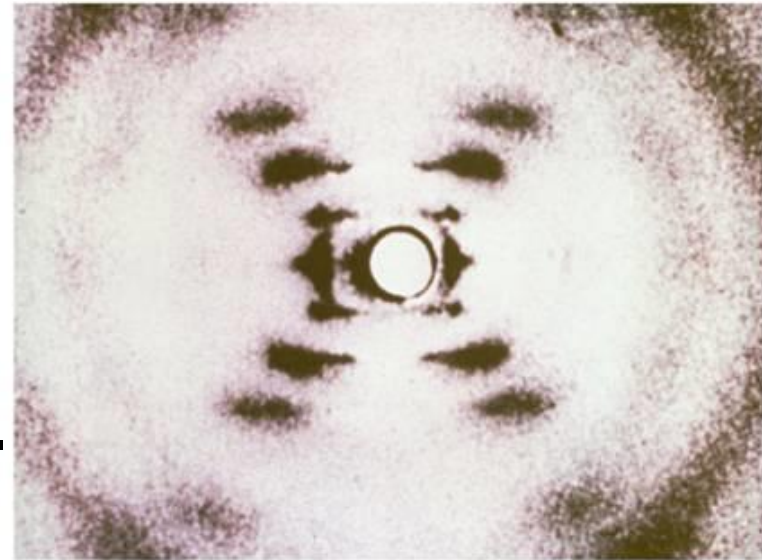
DNA Discoveries

X-Ray Evidence

■ **Rosalind Franklin** aimed an X-ray beam at concentrated DNA samples and recorded the scattering pattern of the X-rays on film.

■ Her conclusions:

1. Strands in DNA are twisted around each other.
2. The angle of the X shows there are two strands.



DNA Discoveries

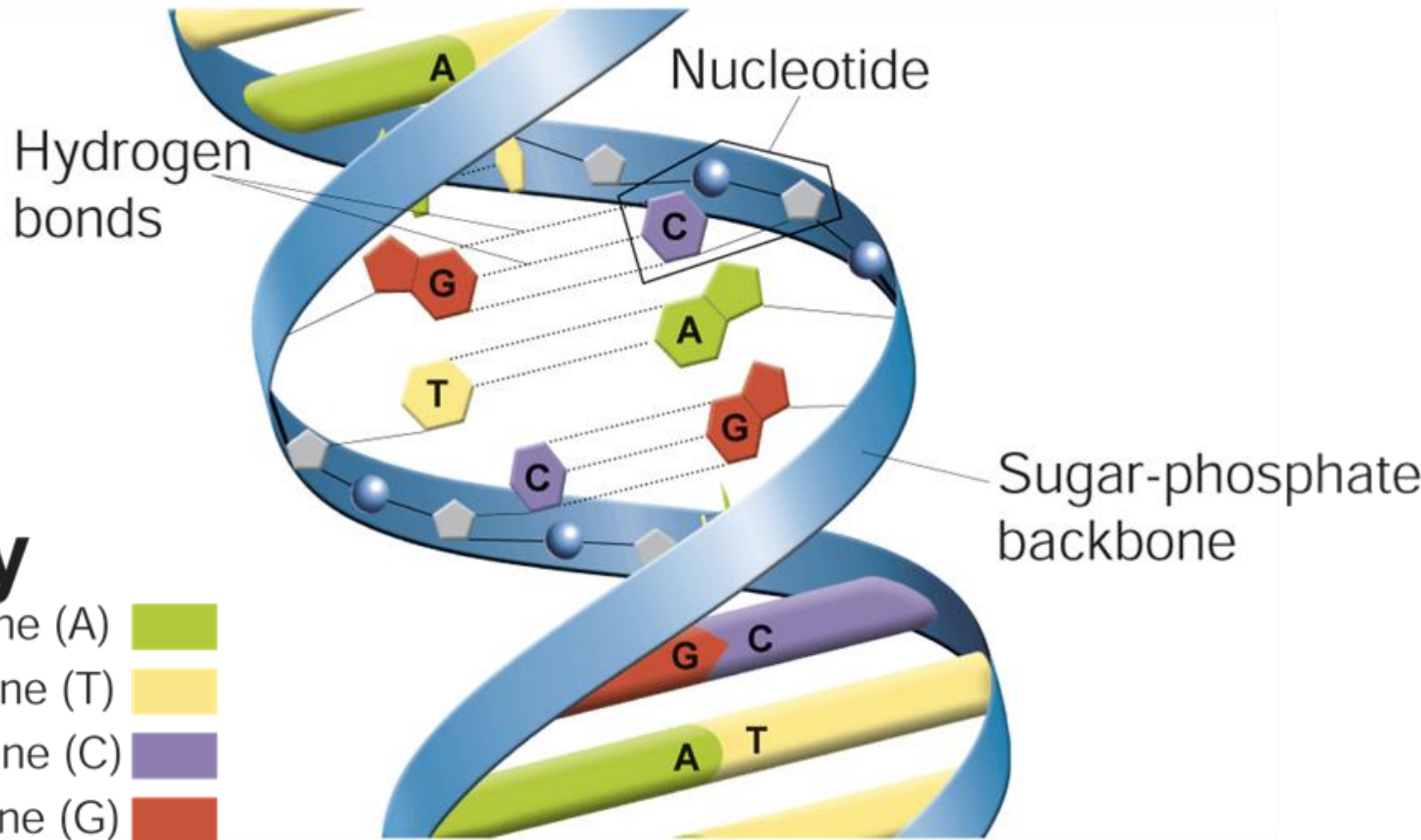
The Double Helix

■ Using clues from Franklin's pattern, **James Watson and Francis Crick** built a model that explained how DNA carried information and could be copied.

■ Watson and Crick's model of DNA was a double helix, in which two strands were wound around each other.



DNA Double Helix



Hydrogen Bonds

- Hydrogen bonds can form only between certain base pairs—adenine and thymine, and guanine and cytosine.
- This principle is called base pairing.

