

DNA and RNA

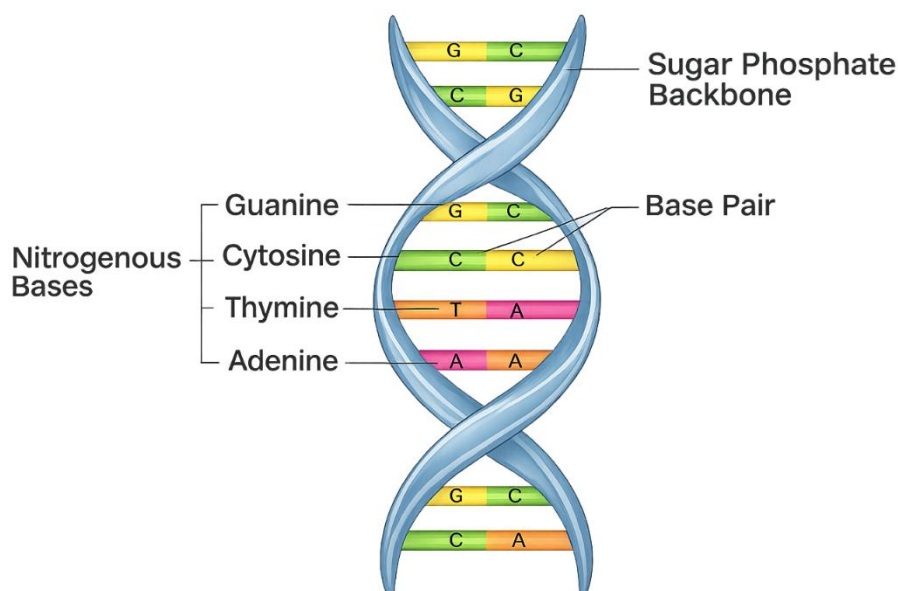
DNA and the Flow of Molecular Information

What is DNA?

- DNA stands for **Deoxyribonucleic Acid**.
- It is a long molecule found inside the **nucleus** of the cell.
- DNA contains the instructions that allow an organism to:
 - develop,
 - survive,
 - reproduce.

Structure of DNA

- DNA is made of smaller units called **nucleotides**.
- **Each nucleotide has:**
 - a sugar (deoxyribose),
 - a phosphate group,
 - a nitrogenous base:
 - A (adenine),
 - T (thymine),
 - C (cytosine),
 - G (guanine).



- The **sequence of bases** forms the genetic code.
- This code acts like an instruction manual for the cell.

The Genetic Code

- The order of the four bases (A, T, C and G) stores information.
- This information tells the cell how to make proteins.
- Proteins carry out most functions in the cell.

Central Dogma of Molecular Biology

DNA → RNA → Protein

Three main steps:

1. **Replication** – DNA makes a copy of itself.
2. **Transcription** – DNA is used to make RNA.
3. **Translation** – RNA is used to make a protein.

How the Information Flows in the Cell

- DNA remains inside the **nucleus**.
- A specific section of DNA called a **gene** is transcribed into **messenger RNA (mRNA)**.
- The mRNA leaves the nucleus and travels to a structure called a **ribosome**.
- The ribosome reads the mRNA and **links amino acids in the correct order**.
- This process produces a **protein**.

Why is the DNA → RNA → Protein Flow Important?

- Proteins perform most of the important jobs in a cell.
- **They act as:**
 - enzymes,
 - structural components,
 - messengers, and
 - transporters.
- Therefore, the flow of information from DNA to RNA to protein is **essential for the structure, function, and survival of all living cells**.

DNA Functioning

1. Replication – Copying the DNA

- Before a cell divides, it must make a copy of its DNA so that both new cells get the same instructions.
- **Where it happens:** In the nucleus (in eukaryotes).



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