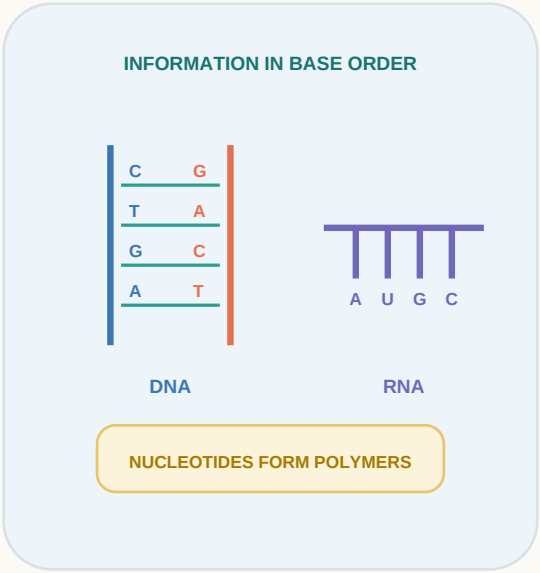
AP BIOLOGY | UNIT 6

TOPIC 6.1

DNA and RNA Structure

Nucleic acids store and use hereditary information through nucleotide sequences, complementary base pairing, and chromosome organization.



THE CORE CAUSAL CHAIN

NUCLEOTIDES → sugar + phosphate + base

BASE SEQUENCE → stores information

BASE PAIRING → copies and transfers

CHROMOSOMES → organize long DNA

BY THE END, YOU SHOULD BE ABLE TO...

1. Identify the parts of a nucleotide.
2. Compare DNA and RNA structure.
3. Explain base pairing and chromosome packaging.

CENTRAL IDEA

The sequence of nitrogenous bases stores genetic information. Complementary pairing makes that information readable and reproducible.

1 Nucleotides build DNA and RNA

Each nucleotide contains a sugar, phosphate, and base. Polymer structure and base identity distinguish DNA from RNA.

THE MONOMER

ONE NUCLEOTIDE



DNA COMPARED WITH RNA

DNA

- deoxyribose sugar
- bases A, T, G, C
- usually double-stranded

RNA

- ribose sugar
- bases A, U, G, C
- usually single-stranded

COMPLEMENTARY BASE PAIRING

DNA **A - T**

Adenine pairs with thymine; guanine pairs with cytosine.

RNA **A - U**

Adenine pairs with uracil; guanine still pairs with cytosine.

BASE FAMILIES

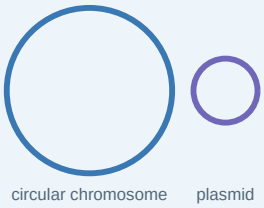
Purines have two rings: adenine and guanine. Pyrimidines have one ring: cytosine, thymine, and uracil. A purine pairs with a pyrimidine.

2 Chromosomes organize long DNA molecules

Cells package hereditary material differently: prokaryotes commonly use circular DNA, while eukaryotes package linear DNA with proteins.

TWO ORGANIZATIONAL PATTERNS

PROKARYOTES



Usually one main circular chromosome; small extra circular DNA molecules may occur as plasmids.

EUKARYOTES



Usually multiple linear chromosomes; DNA associates with histones and other proteins.

EUKARYOTIC DNA PACKAGING



DNA

double helix



NUCLEOSOME

DNA around histones



CHROMATIN

folded fiber



CHROMOSOME

condensed form

HISTONES HELP COMPACT AND ORGANIZE EUKARYOTIC DNA

PACKAGING CHANGES ACCESSIBILITY WITHOUT CHANGING THE BASE SEQUENCE

FINAL MAP

Nucleotides form nucleic acid strands. Base sequence carries information, complementary pairing preserves it, and chromosome packaging organizes it within cells.