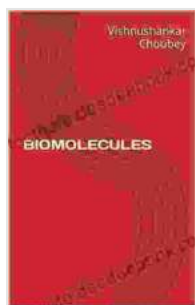


# Biomolecules: A Comprehensive Guide for JEE Mains, Advanced, and NEET

Biomolecules are the building blocks of life and play crucial roles in various biological processes. Understanding biomolecules is essential for students preparing for competitive exams like JEE Mains, Advanced, and NEET.

This guide provides an in-depth overview of the structure, properties, and functions of carbohydrates, proteins, lipids, and nucleic acids.



## BIOMOLECULES: JEE Mains/Advance/ NEET by Marie James

★★★★☆ 4.7 out of 5

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Text-to-Speech	: Enabled
Enhanced typesetting	: Enabled
Print length	: 44 pages
Lending	: Enabled
Screen Reader	: Supported



## Carbohydrates

Carbohydrates are organic compounds composed of carbon, hydrogen, and oxygen. They are classified based on their structure into three main groups:

- **Monosaccharides:** Simple sugars like glucose, fructose, and galactose.

- **Disaccharides:** Two monosaccharides linked together, such as sucrose (glucose + fructose) and lactose (glucose + galactose).
- **Polysaccharides:** Long chains of monosaccharides, including starch, glycogen, and cellulose.

Carbohydrates serve primarily as a source of energy for living organisms. They undergo glycolysis, a series of enzymatic reactions, to release energy. Additionally, carbohydrates play structural roles in cell walls (cellulose) and provide recognition signals for cell-cell interactions (glycoproteins).

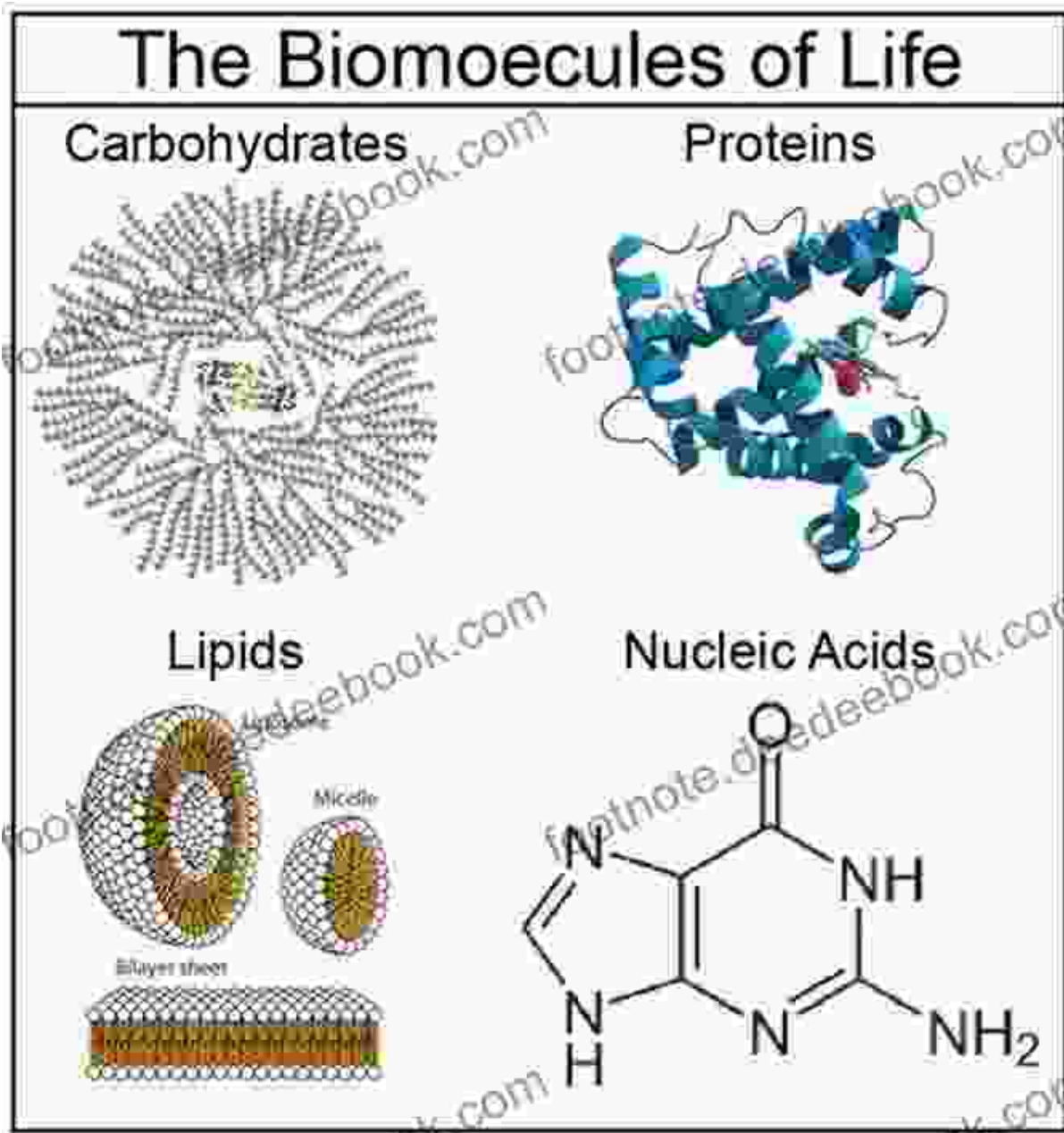


## Proteins

Proteins are composed of amino acids linked by peptide bonds. They exhibit a wide range of structures and functions, including:

- **Primary structure:** Sequence of amino acids.
- **Secondary structure:** Formation of alpha-helices or beta-sheets.
- **Tertiary structure:** Three-dimensional arrangement of secondary structures.
- **Quaternary structure:** Interaction between multiple polypeptide chains.

Proteins perform diverse functions, including enzyme catalysis, hormone regulation, muscle contraction, and cell signaling. They also play a crucial role in immunity and structural support.



Structure of proteins, showing primary, secondary, tertiary, and quaternary structures.

## Lipids

Lipids are a diverse group of organic compounds that are insoluble in water but soluble in organic solvents. They include fats, oils, waxes, phospholipids, and steroids.

- **Fatty acids:** Long chains of carbon atoms with hydrogen atoms and a carboxyl group (-COOH) at one end.
- **Triglycerides:** Three fatty acids attached to a glycerol molecule.
- **Phospholipids:** Lipids with a phosphate group attached, forming the backbone of cell membranes.
- **Steroids:** Ring-shaped structures with four fused rings, including cholesterol and hormones like estrogen.

Lipids primarily serve as energy storage, insulation, and membrane components. They also act as signaling molecules and precursors for hormone synthesis.

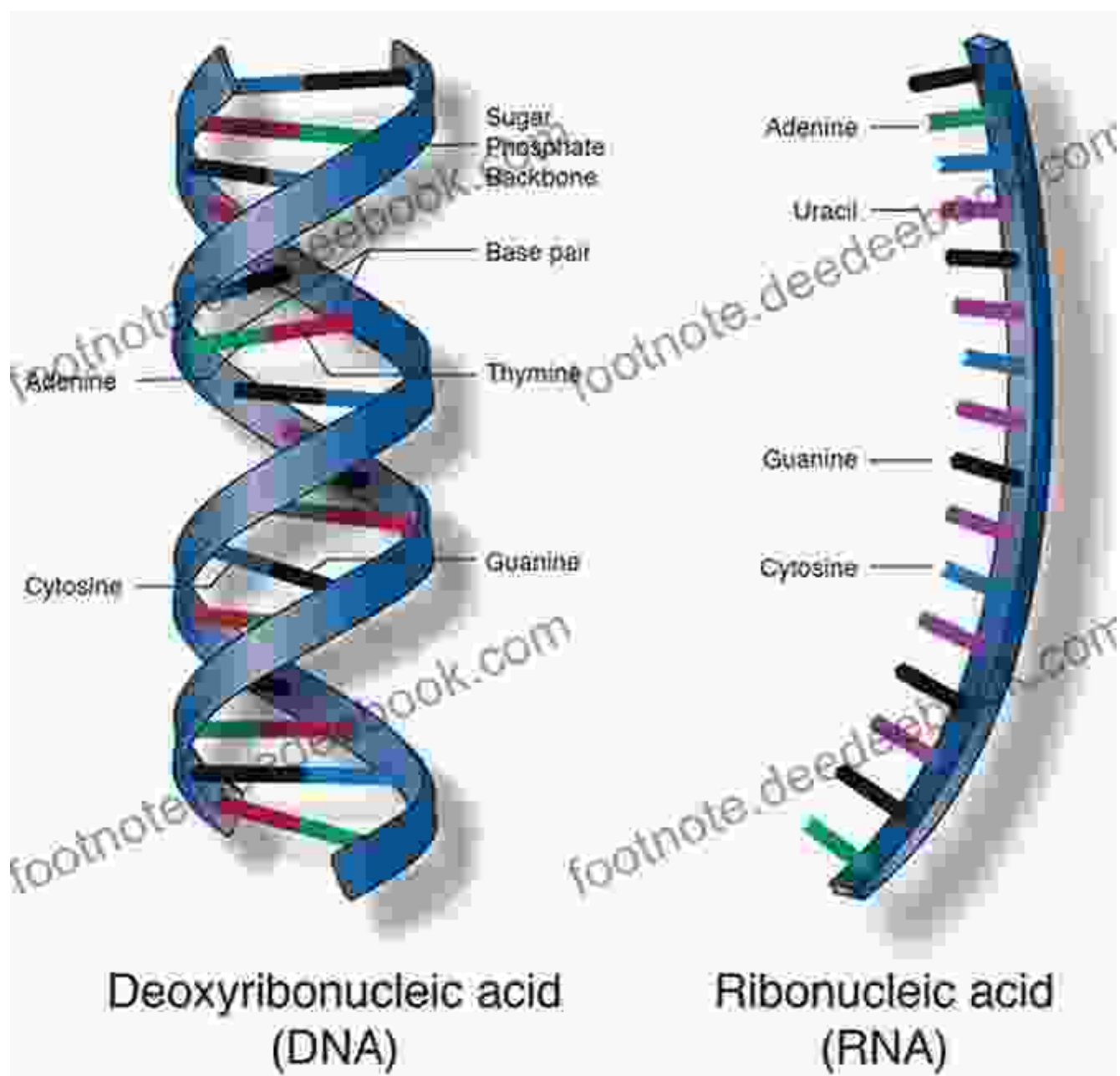


## Nucleic Acids

Nucleic acids are complex molecules that store and transmit genetic information. They consist of two types:

- **DNA (deoxyribonucleic acid):** Double-stranded molecule with a sugar-phosphate backbone and nitrogenous bases (adenine, cytosine, guanine, and thymine).
- **RNA (ribonucleic acid):** Single-stranded molecule with a sugar-phosphate backbone and nitrogenous bases (adenine, cytosine, guanine, and uracil).

DNA carries the genetic code and is found in the nucleus of cells. RNA is involved in protein synthesis and gene regulation.

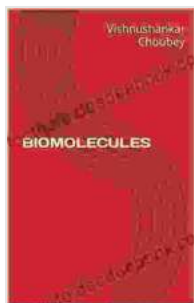


Structure of nucleic acids, showing a DNA double helix and an RNA single strand.

Biomolecules are essential components of living organisms and play vital roles in various cellular processes. This comprehensive guide provides a foundational understanding of the structure, properties, and functions of carbohydrates, proteins, lipids, and nucleic acids, which is crucial for success in competitive exams like JEE Mains, Advanced, and NEET. By



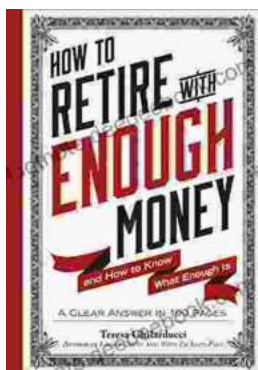
mastering these concepts, students can gain a deeper insight into the molecular basis of life and excel in their academic pursuits.



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