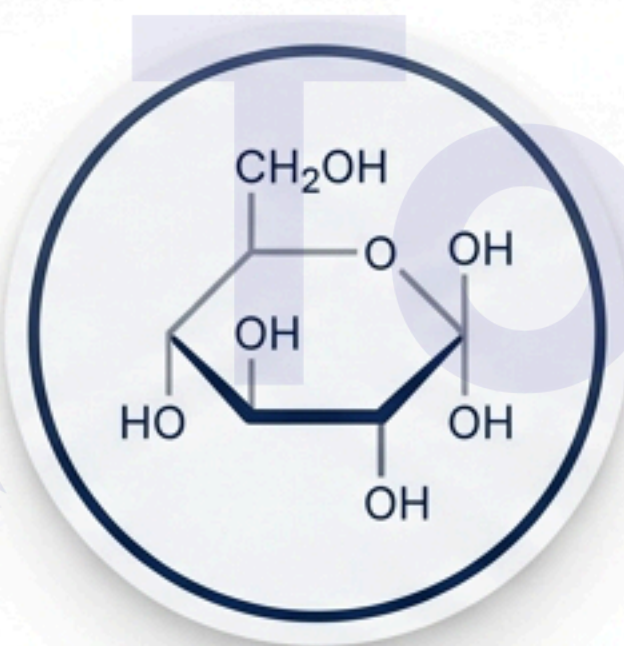
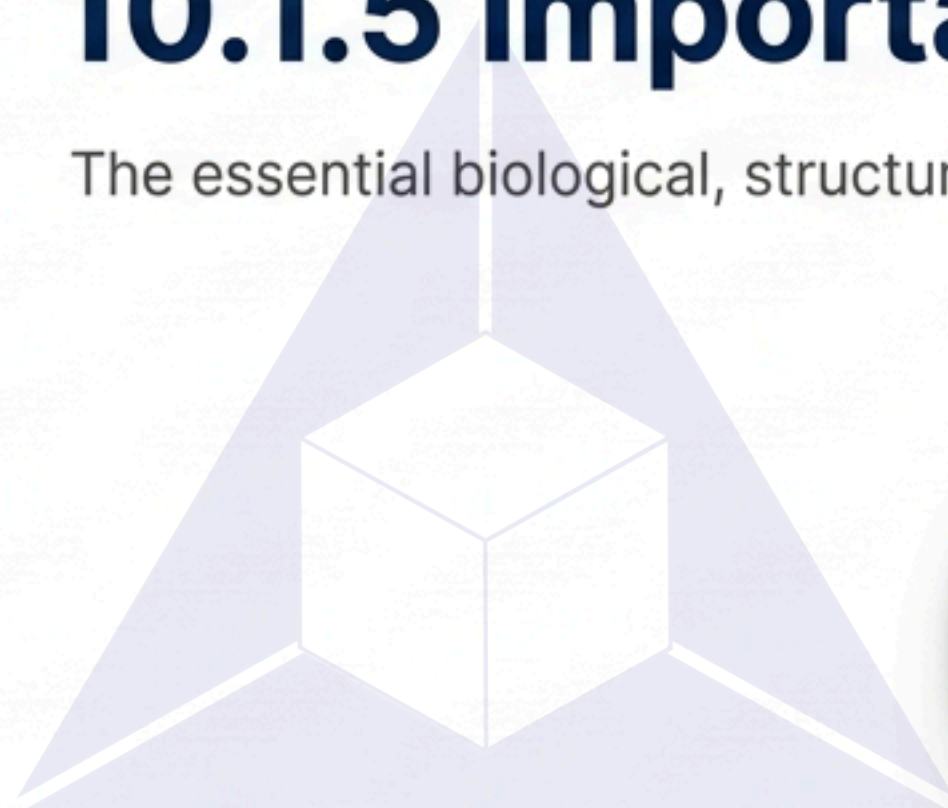


CHAPTER 10 | BIOMOLECULES

10.1.5 Importance of Carbohydrates

The essential biological, structural, and industrial roles of saccharides in living systems.



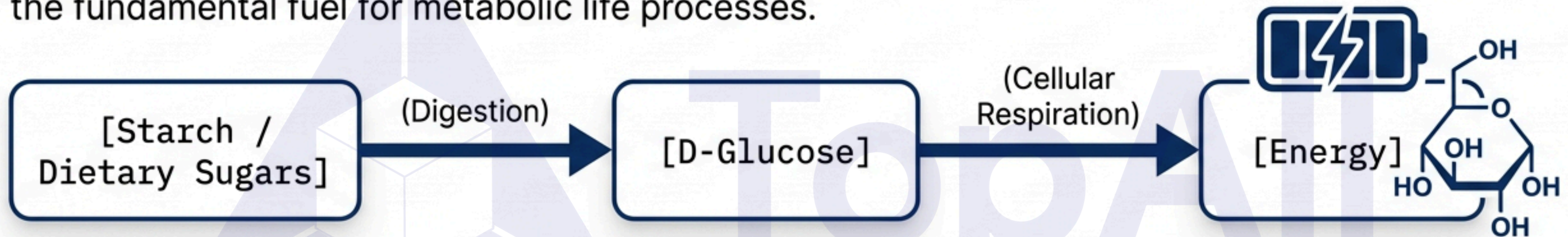
[EXAM REVISION]

[YIELD: HIGH]

[SECTION 10.1.5]

Primary Fuel: The Instant Energy Source

Carbohydrates form the major portion of the mammalian diet, acting as the fundamental fuel for metabolic life processes.



[CHIP: Modern Biology]

Glucose Focus: D-glucose is the most critical and direct source of cellular energy for mammals, driving the molecular logic of life processes.

[CHIP: Historical Context]

Ayurvedic Medicine: Honey has been utilized for centuries by 'Vaids' in the ayurvedic system of medicine as a rapid, instant energy source due to its high simple-sugar content.



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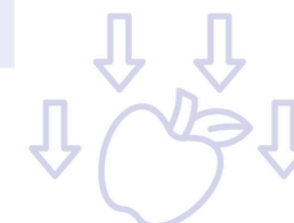
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Energy Reserves: Storage Polysaccharides

When energy is not required instantly, living systems polymerize simple sugars into dense macromolecules for later use.

Plant Kingdom

Molecule: Starch (comprising Amylose + Amylopectin)

Primary Sources: Cereals, roots, tubers, and vegetables.

Function: Acts as the main nutritional reservoir for plants; forms the foundation of the human dietary chain.

Animal Kingdom

Molecule: Glycogen (often termed Animal Starch)

Storage Sites: Liver, muscles, and brain. (Also found in yeast and fungi).

Mechanism: When the body needs glucose, specific enzymes rapidly break the highly branched glycogen back down into usable glucose.

Beyond Fuel: Structure & Industry

Carbohydrates provide rigid architectural support in nature and act as vital raw materials for global manufacturing.

Cellular Architecture

Cellulose forms the primary structural component of plant and bacterial cell walls.

Genetic Framework

Aldopentoses (D-ribose and 2-deoxy-D-ribose) form the vital structural backbone of nucleic acids (RNA and DNA).

Everyday Materials

Harvested globally as wood for furniture and construction, and as cotton fibre to clothe ourselves.

Industrial Precursors

Provides essential raw materials for major manufacturing sectors: textiles, paper, lacquers, and breweries.

The 4 Pillars of Carbohydrate Utility

1. ENERGY

The primary dietary fuel source (Glucose/Honey).

2. STORAGE

Long-term energy reserves (Starch in plants, Glycogen in animals).

3. STRUCTURE

Physical architecture (Cellulose in walls, Ribose/Deoxyribose in RNA/DNA).

4. INDUSTRY

Economic raw materials (Wood, cotton, paper, lacquers, breweries).

PREPARING FOR THE NEXT MODULE

Having mastered the **energy and structural roles of Carbohydrates**, we now shift to the primary **functional machines** of the biosystem: **Proteins**.

> Amino Acids

> Peptide Linkages

> Denaturation



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