

UNIT 10 • BIOMOLECULES

# Importance of Carbohydrates

Beyond energy: The three vital roles of carbohydrates in biological and industrial systems.

# The Molecular Triad

Carbohydrates serve three distinct, fundamental purposes in nature.



## Energy Reserve

Card 1

**Starch** (plants) and  
**Glycogen** (animals/fungi).



## Building Blocks

Card 2

**Cellulose** makes up  
plant/bacteria cell walls.

Drives human industry: wood,  
cotton, textiles, paper,  
lacquers, and breweries.



## Genetic Backbone

Card 3

Specific aldopentoses form  
the structural foundation of  
our genetic code.

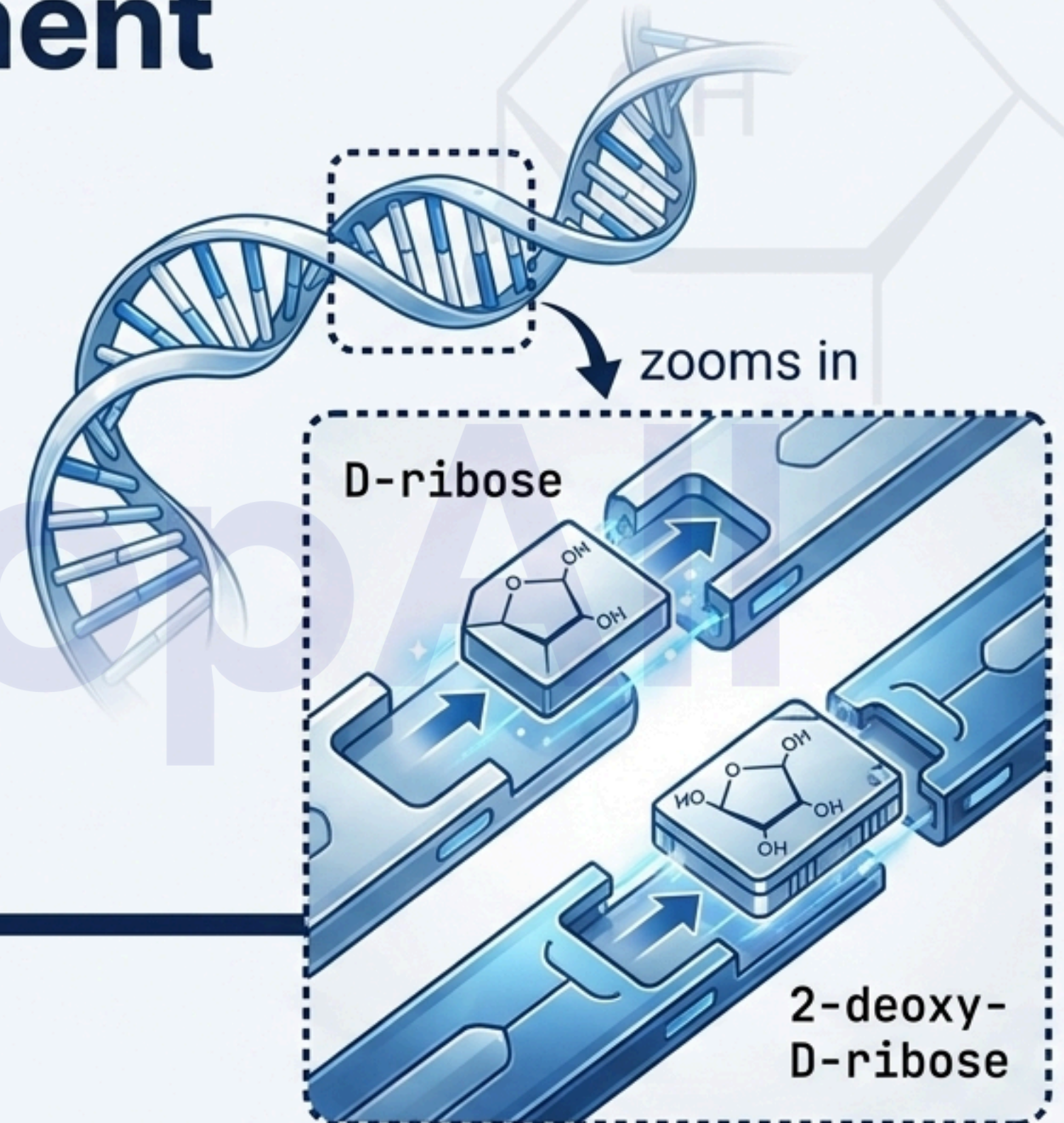
**D-ribose**  
**2-deoxy-D-ribose**

# The Genetic Component

## The Aldopentose Foundation

Carbohydrates aren't just macronutrients. Two specific **five-carbon sugars** are the literal links holding the genetic code together.

- RNA backbone uses **D-ribose**
- DNA backbone uses **2-deoxy-D-ribose**





**You've Learned the Theory.  
Let's Test Them Now.**

$$E=mc^2$$



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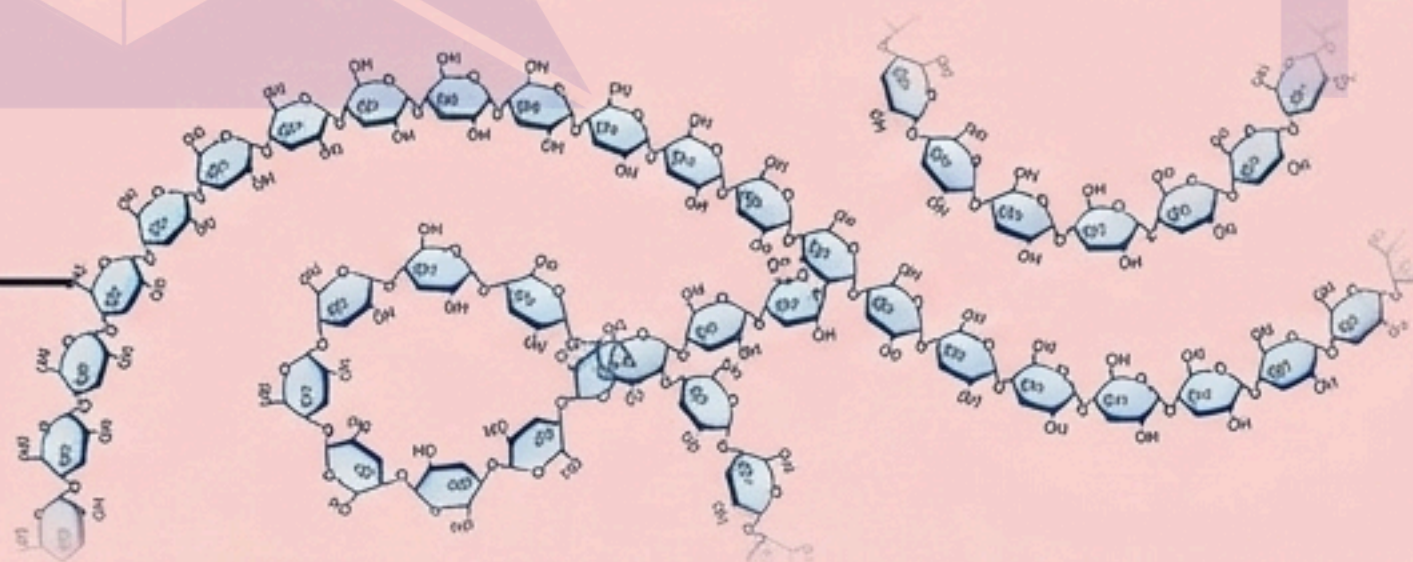
# Watch For This Concept Trap

**Do not conflate the scale of carbohydrate roles.**

Examiners frequently try to mix up " **macro-roles** " with " **micro-roles** ".

- **Storage & Structure** rely on massive polysaccharides (like starch and cellulose) made of hundreds of glucose units.
- **Nucleic Acid Components** rely on individual monosaccharides (like D-ribose) acting as **discrete links** in a completely different polymer chain.

Giant Chain



Single Link

# Summary

- ✓ Carbohydrates function as **storage** (starch, glycogen) and **structural/industrial** materials (cellulose for wood, paper, textiles).
- ✓ At the micro-level, the aldopentoses D-ribose and 2-deoxy-D-ribose are essential structural components of the **nucleic acid** backbones (RNA and DNA).

# Looking Ahead

NEXT CONCEPT CONNECTION

## We've seen the sugar. Now let's build the code.

The D-ribose and 2-deoxy-D-ribose sugars you just learned will combine with phosphoric acid and nitrogenous bases in **Section 10.5: Nucleic Acids**.

[CONTINUE TO NUCLEIC ACIDS →]



# You've Learned the Theory.

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