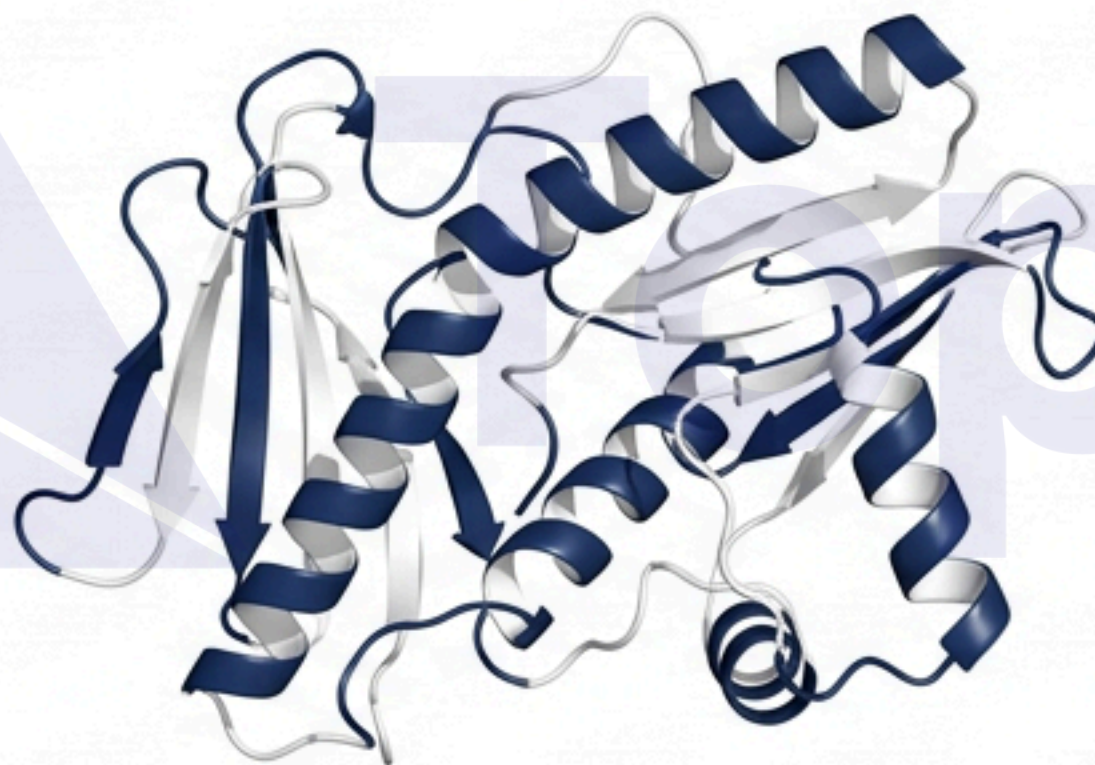


CHAPTER 10 / BIOMOLECULES

10.2 Proteins

The primary structural and functional polymers of living systems.



Exam-Smart Summary

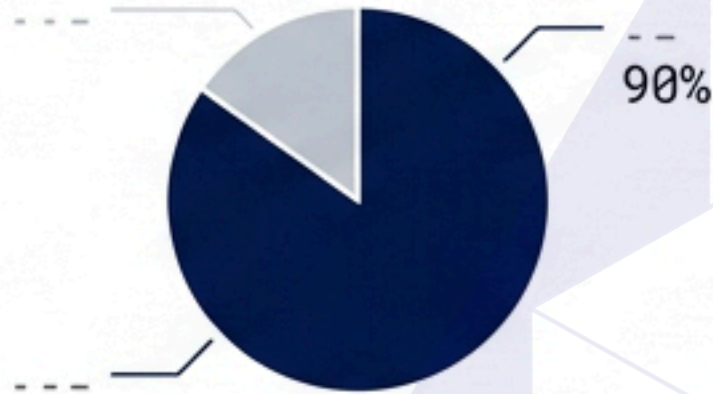
5-Minute Review

BIOLOGICAL SIGNIFICANCE

The Molecular Logic of Life

"Proteios"
(Greek) =
Primary /
Of Prime
Importance

Proteins



Abundance

The most abundant biomolecules in the living system. They occur in every part of the human body.

Cellular



Foundation

Form the fundamental chemical basis for both the physical structure and dynamic functions of life.

Maintenance



Maintenance

Strictly required for the continuous physical growth and maintenance of the body over time.

To study living systems is to study proteins.



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Sourcing the Building Blocks

Animal Sources

[Milk]

[Cheese]

[Fish]

[Meat]



Plant Sources

[Pulses]

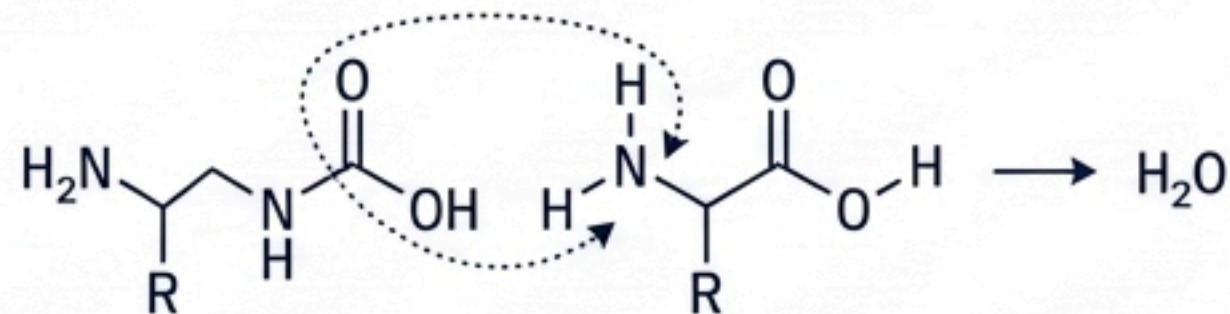
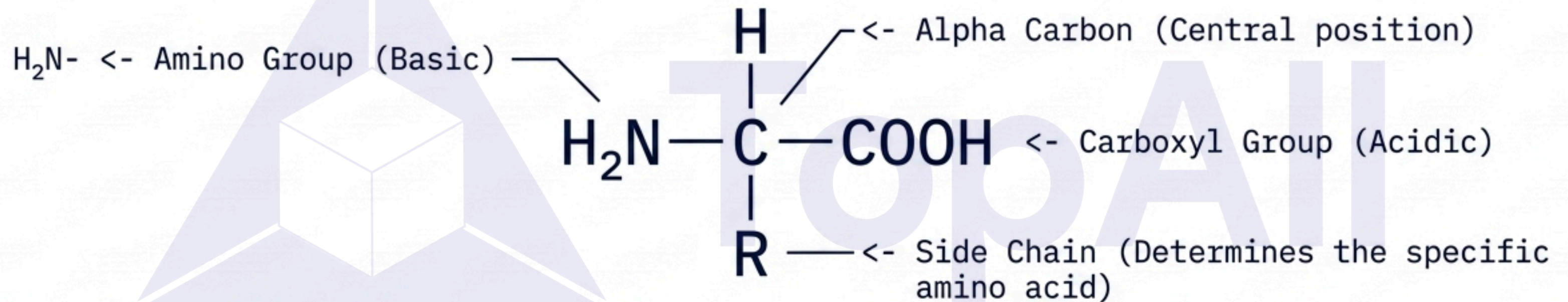
[Peanuts]

[Grams]

Note: The human body breaks down these dietary sources during digestion into simple amino acids, which are then used to rebuild complex human proteins.

Polymers of α -Amino Acids

All proteins are long-chain polymers constructed from α -amino acid monomers. Only α -amino acids are obtained upon the hydrolysis of proteins.



The Peptide Bond

Monomers connect via **amide linkages (peptide bonds)**. Formed between the $-COOH$ of one molecule and the $-NH_2$ of another, eliminating a water molecule (H_2O).

The Dual Nature of Proteins

Proteins operate as the ultimate multitaskers in biological systems, divided into two broad domains of action:

Structural Biomolecules



- ✓ Act as the primary architectural scaffolding of the body.
- ✓ Form the physical mass of structural tissues (muscles, hair, cellular walls).
- ✓ Drive physical growth and continuous bodily maintenance.

Functional Biomolecules



- ✓ Act as the dynamic, operational machines of the biosystem.
- ✓ Drive metabolic reactions (operating as enzymes).
- ✓ Regulate complex biological activities (operating as hormones).

Proteins = α -amino acid polymers essential for both the **structure** and **function** of life.



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