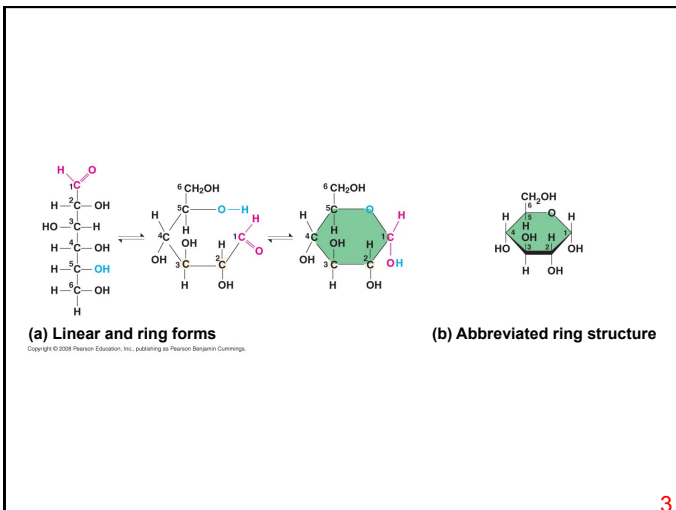


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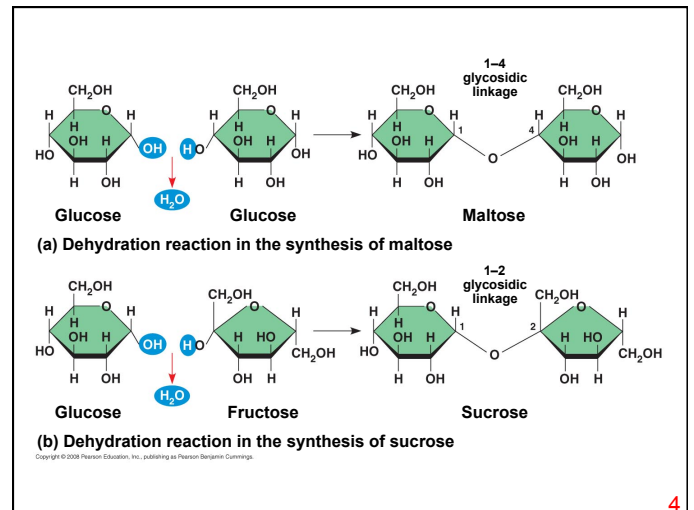
	Trioses (C ₃ H ₆ O ₃)	Pentoses (C ₅ H ₁₀ O ₅)	Hexoses (C ₆ H ₁₂ O ₆)	
Aldoses	Glyceraldehyde	Ribose	Glucose	Galactose
Ketoses	Dihydroxyacetone	Ribulose	Fructose	

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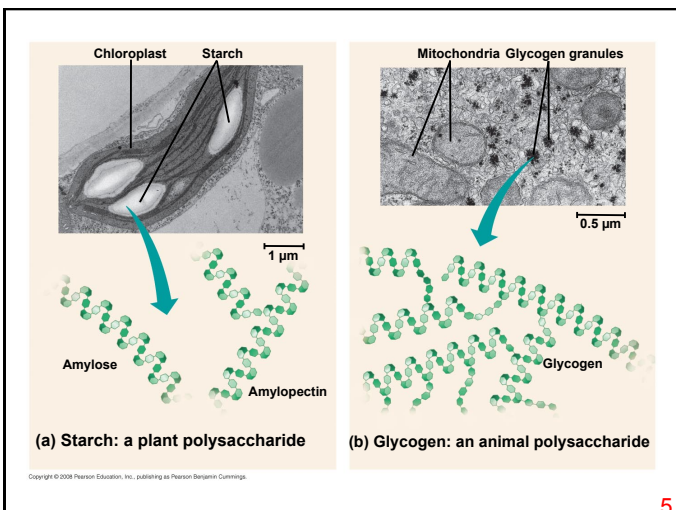
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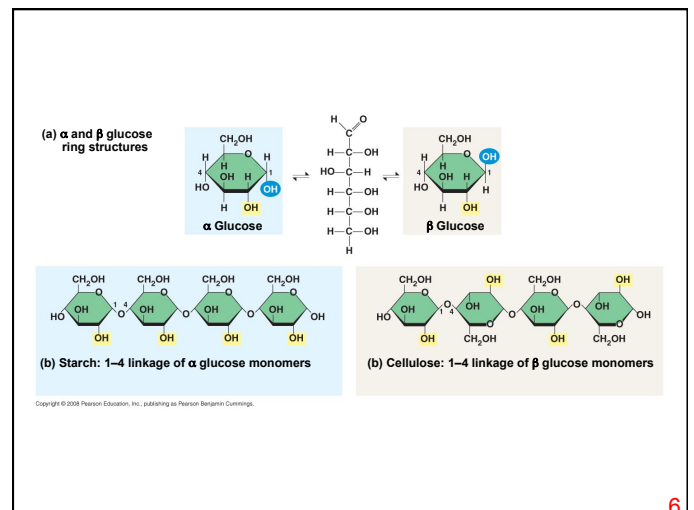
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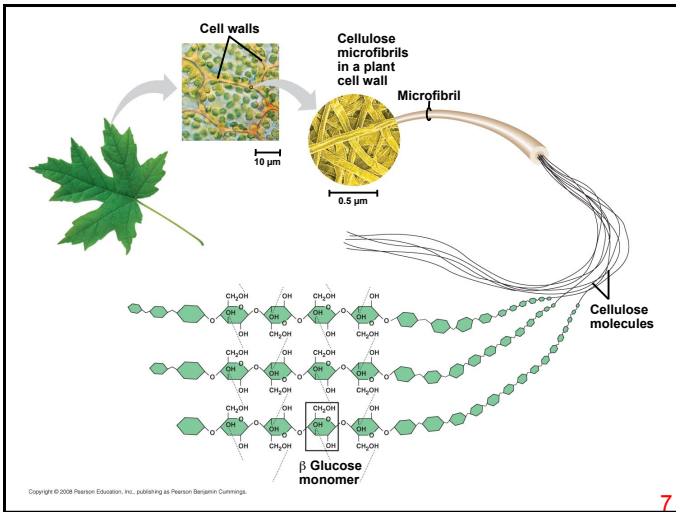
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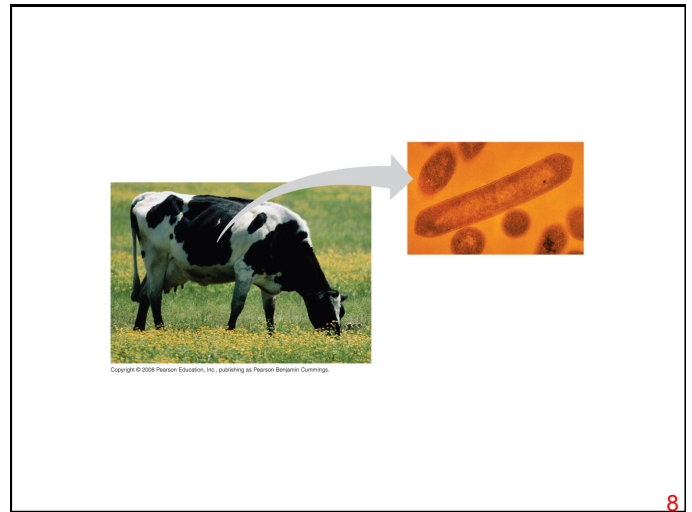
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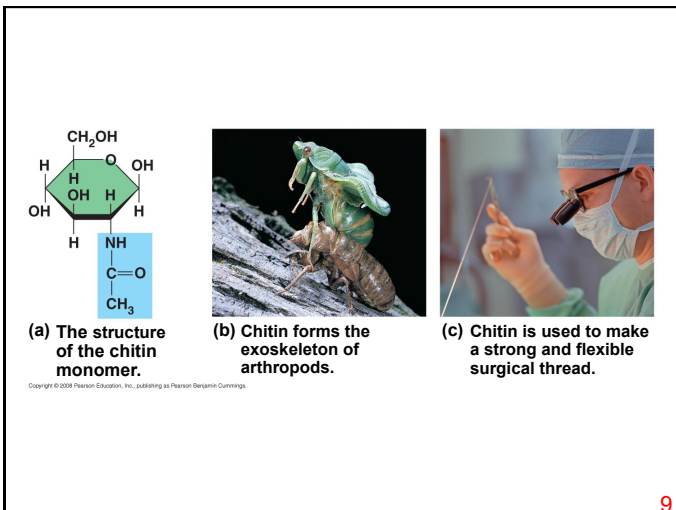
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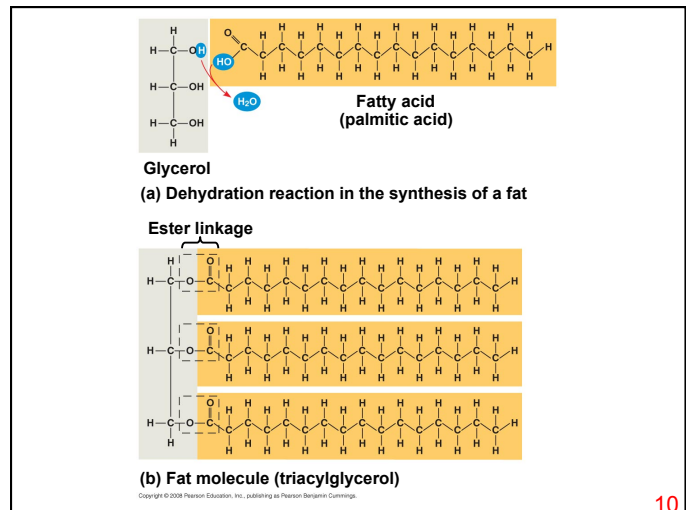
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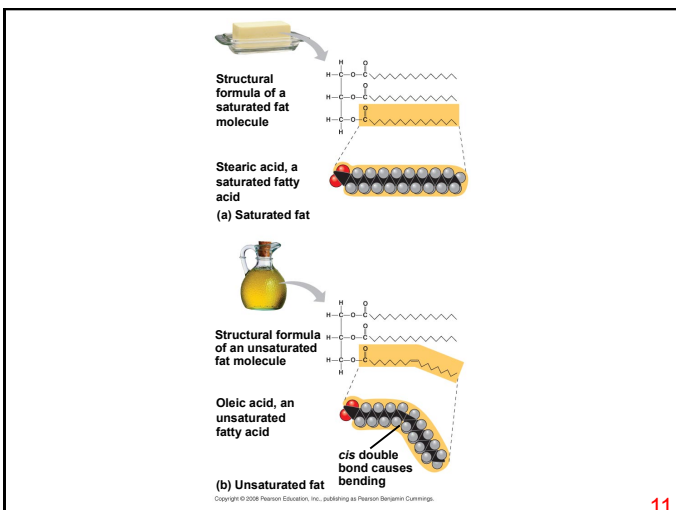
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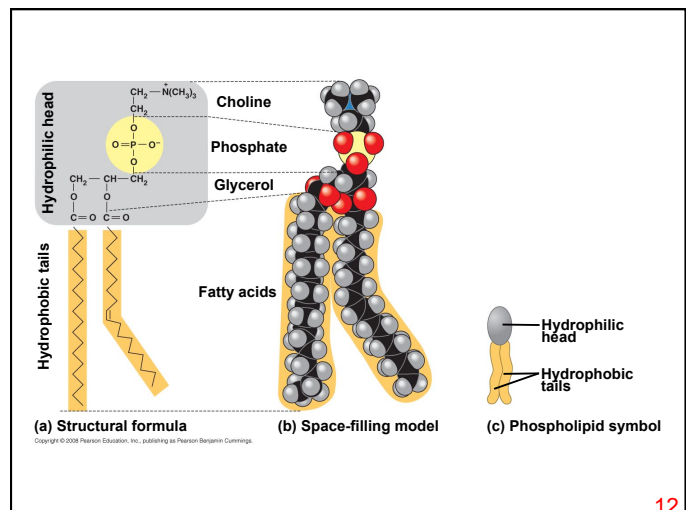
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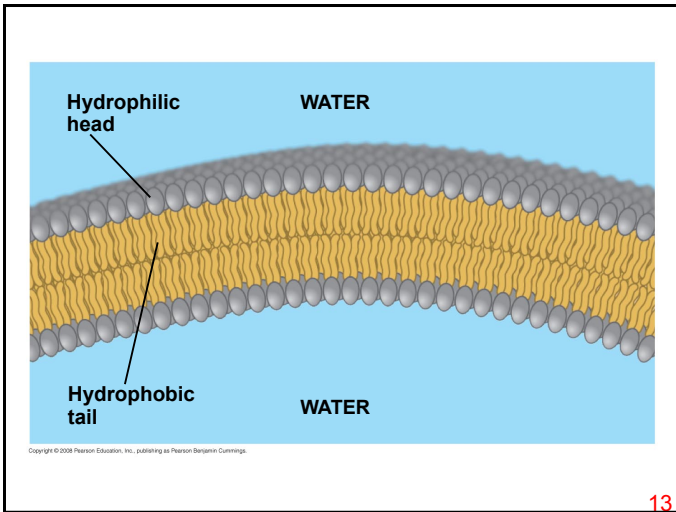
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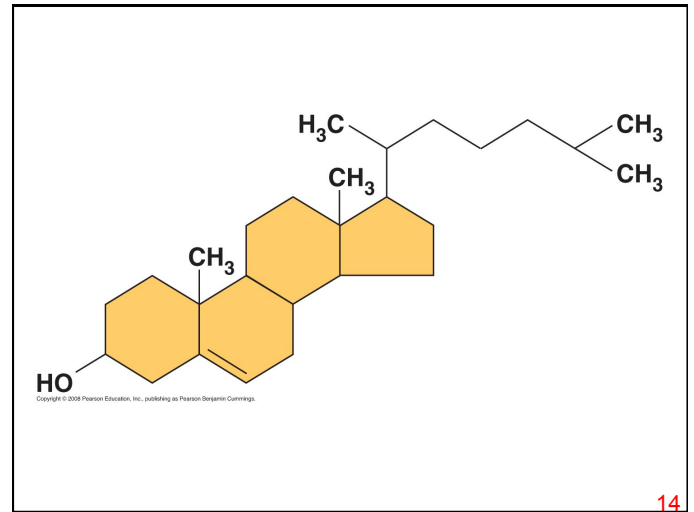
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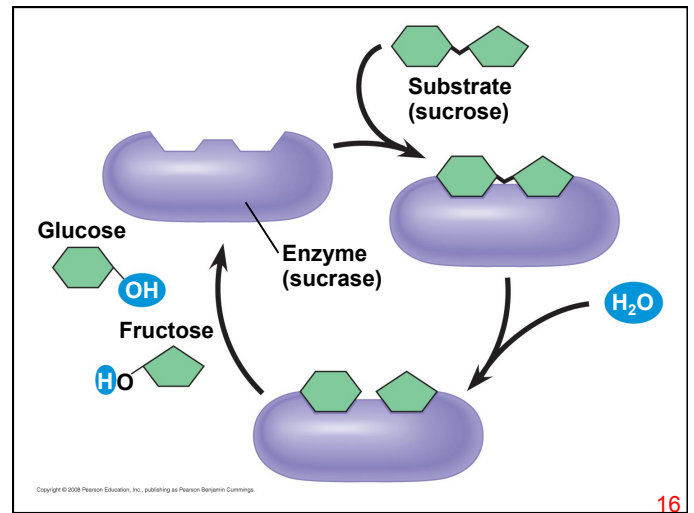
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Table 5: An Overview of Protein Functions

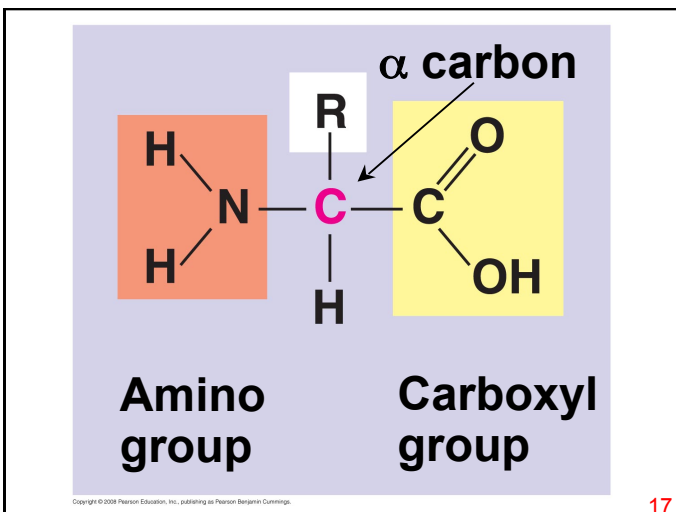
Type of Protein	Function	Examples
Enzymatic proteins	Selective acceleration of chemical reactions	Digestive enzymes
Structural proteins	Support	Silk fibers; collagen and elastin in animal connective tissues; keratin in hair, horns, feathers, and other skin appendages
Storage proteins	Storage of amino acids	Ovalbumin in egg white; casein, the protein of milk; storage proteins in plant seeds
Transport proteins	Transport of other substances	Hemoglobin, transport proteins
Hormonal proteins	Coordination of an organism's activities	Insulin, a hormone secreted by the pancreas
Receptor proteins	Response of cell to chemical stimuli	Receptors in nerve cell membranes
Contractile and motor proteins	Movement	Actin and myosin in muscles, proteins in cilia and flagella
Defensive proteins	Protection against disease	Antibodies combat bacteria and viruses.

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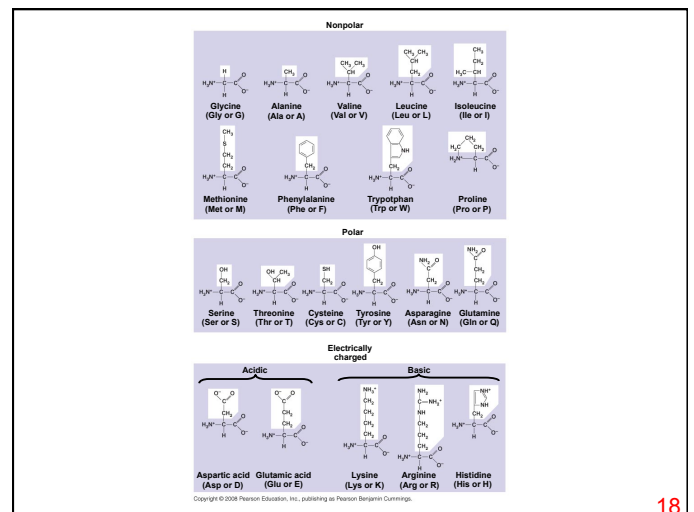
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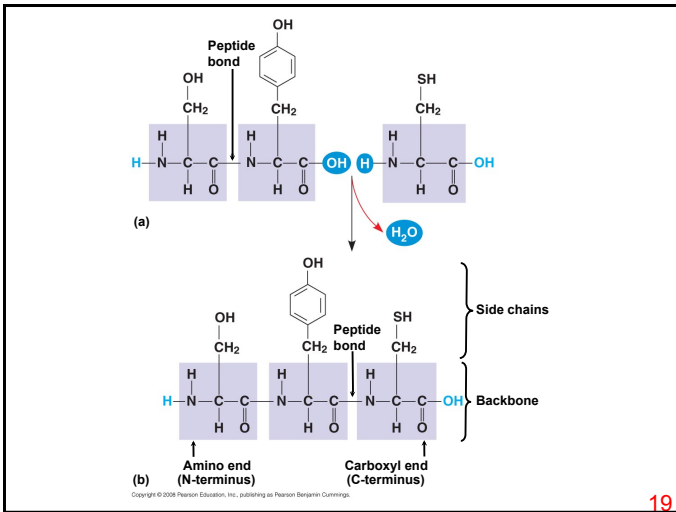
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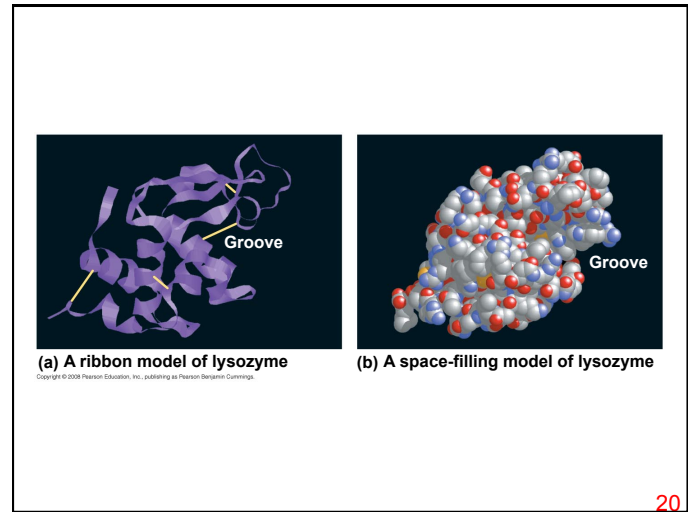
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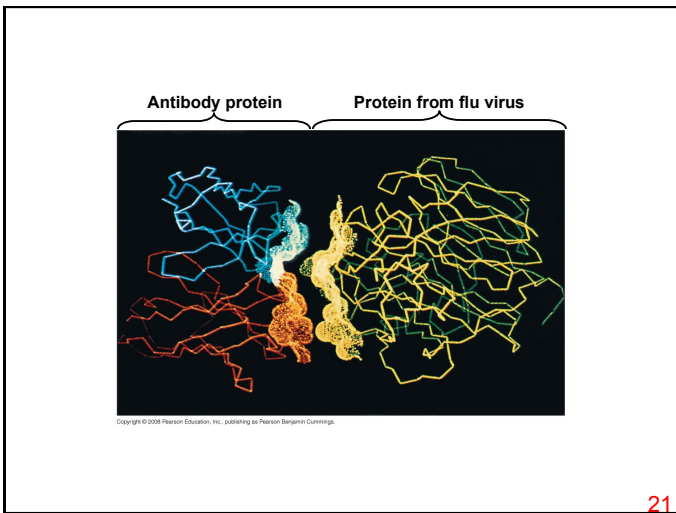
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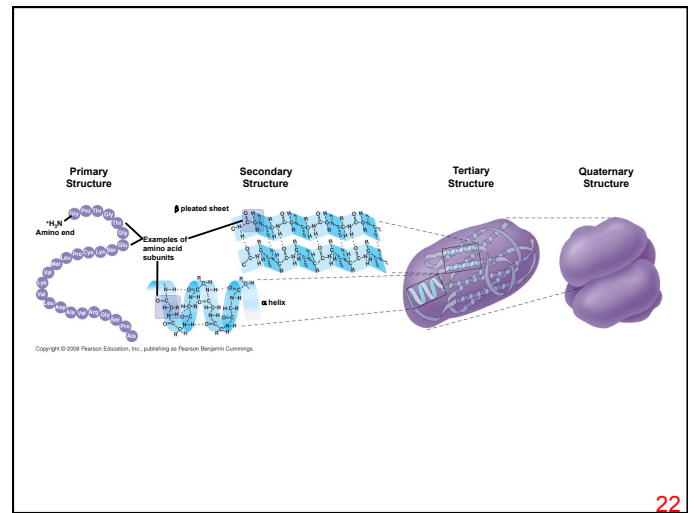
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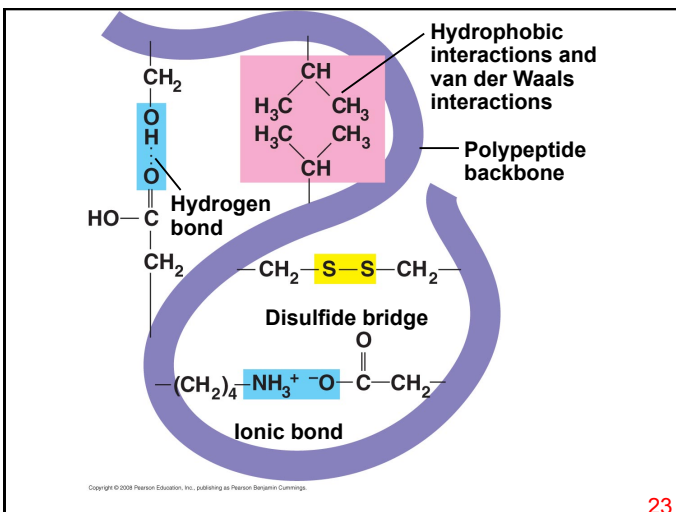
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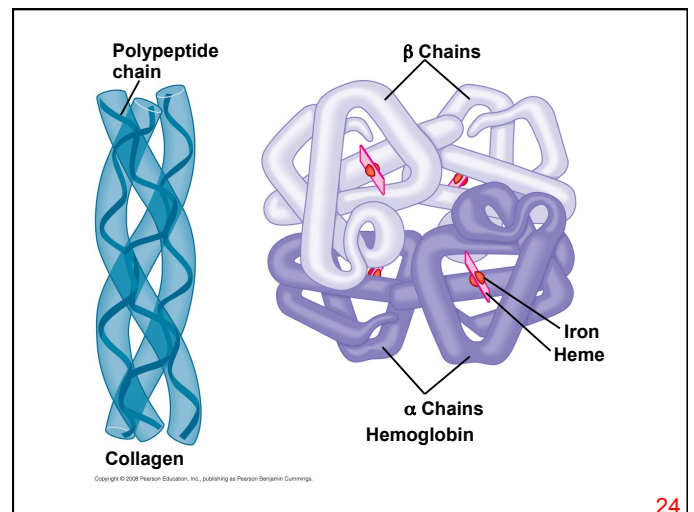
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<p>Primary structure</p> <p>Normal hemoglobin: 1 2 3 4 5 6 7</p> <p>Sickle-cell hemoglobin: 1 2 3 4 5 6 7</p>	<p>Secondary and tertiary structures</p> <p>Normal hemoglobin: β subunit</p> <p>Sickle-cell hemoglobin: Exposed hydrophobic region, β subunit</p>
<p>Quaternary structure</p> <p>Normal hemoglobin (top view): α, β</p> <p>Sickle-cell hemoglobin: α, β</p>	<p>Function</p> <p>Normal: Molecules do not associate with one another, each carries oxygen.</p> <p>Sickle-cell: Molecules interact with one another and crystallize into a fiber; capacity to carry oxygen is greatly reduced.</p>
<p>Red blood cell shape</p> <p>Normal: Normal red blood cells are full of individual hemoglobin molecules, each carrying oxygen.</p> <p>Sickle-cell: Fibers of abnormal hemoglobin deform red blood cells into sickle shape.</p>	

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Steps of Chaperonin Action:







- 1 An unfolded polypeptide enters the cylinder from one end.
- 2 The cap attaches, causing the cylinder to change shape in such a way that it creates a hydrophilic environment for the folding of the polypeptide.
- 3 The cap comes off, and the properly folded protein is released.

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Large Biological Molecules	Components	Examples	Functions
Concept 5.2 Carbohydrates serve as fuel and building material	 Monosaccharide monomer	Monosaccharides: glucose, fructose	Fuel: carbon sources that can be converted to other molecules or combined into polymers
		Disaccharides: lactose, sucrose Polysaccharides: <ul style="list-style-type: none"> Cellulose (plants) Starch (plants) Glycogen (animals) Chitin (animals and fungi) 	<ul style="list-style-type: none"> Strengthens plant cell walls Stores glucose for energy Stores glucose for energy Strengthens exoskeletons and fungal cell walls
Concept 5.3 Lipids are a diverse group of hydrophobic molecules and are not macromolecules	 Triglyceride (fat or oil): glycerol + 3 fatty acids	Triglyceride (fat or oil): glycerol + 3 fatty acids	Important energy source
	 Phospholipids: phosphate group + 2 fatty acids	Phospholipids: phosphate group + 2 fatty acids	Lipid bilayers of membranes
	 Steroid backbone	Steroids: four fused rings with attached chemical groups	<ul style="list-style-type: none"> Component of cell membranes (cholesterol) Signals that travel through the body (hormones)
Concept 5.4 Proteins have many structures, resulting in a wide range of functions	 Amino acid monomer (20 types)	<ul style="list-style-type: none"> Enzymes Structural proteins Storage proteins Transport proteins Hormones Receptor proteins Motor proteins Defensive proteins 	<ul style="list-style-type: none"> Catalyze chemical reactions Provide structural support Store amino acids Transport substances Coordinate organismal responses Receive signals from outside cell Function in cell movement Protect against disease
Concept 5.5 Nucleic acids store and transmit hereditary information	 Nucleotide monomer	DNA: <ul style="list-style-type: none"> Sugar = deoxyribose Nitrogenous bases = C, G, A, T Usually double-stranded 	Stores all hereditary information
		RNA: <ul style="list-style-type: none"> Sugar = ribose Nitrogenous bases = C, G, A, U Usually single-stranded 	Carries protein-coding instructions from DNA to protein-synthesizing machinery

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