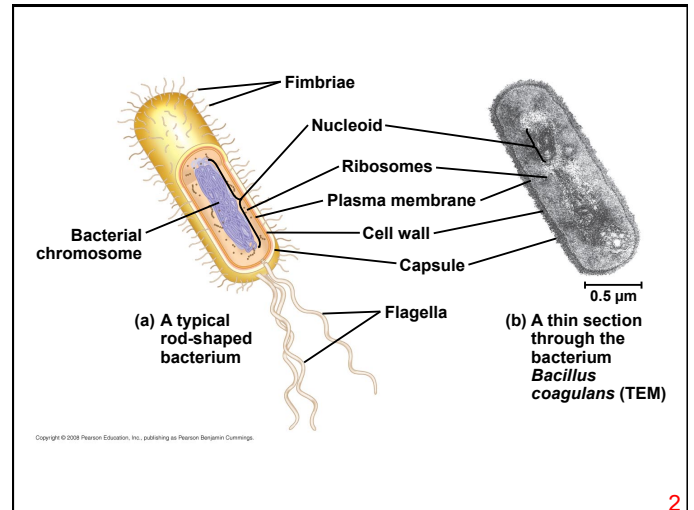
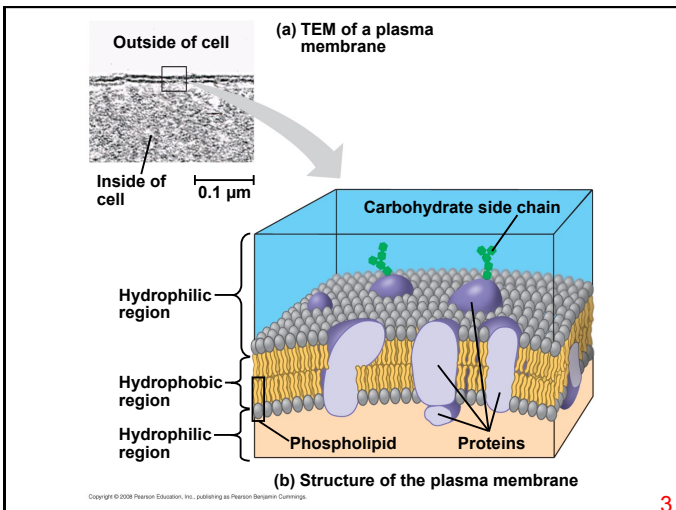


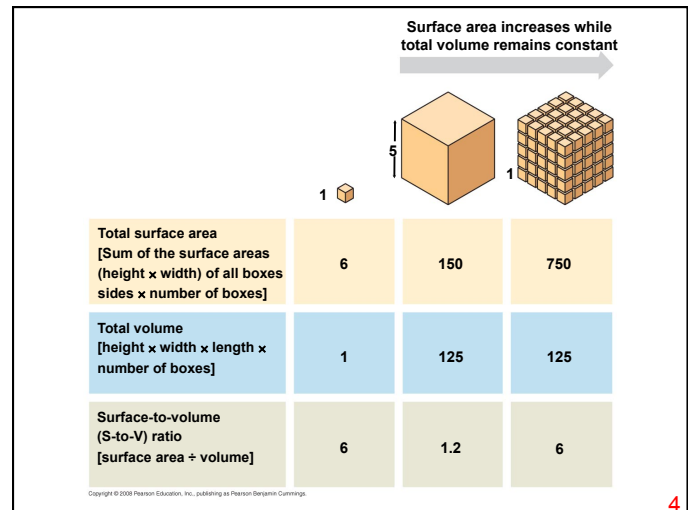
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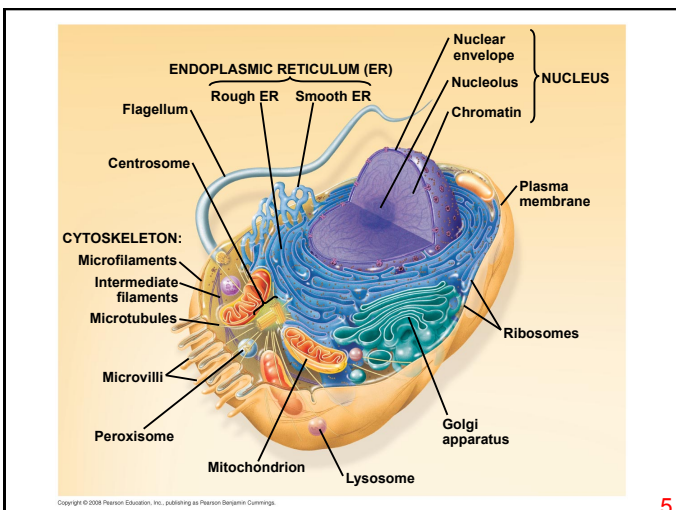
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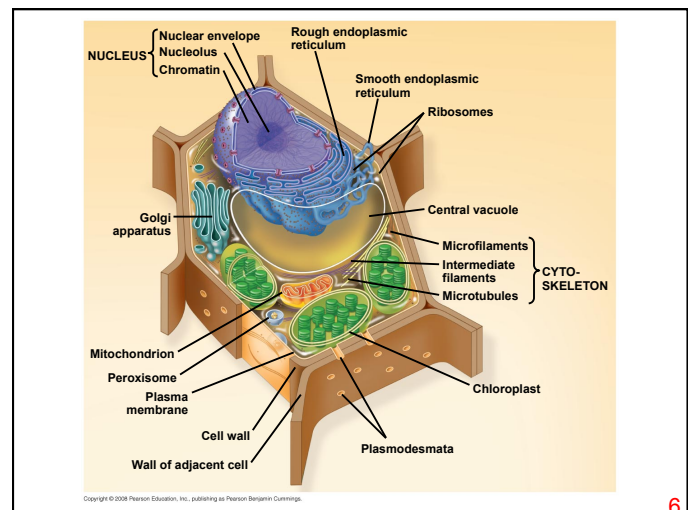
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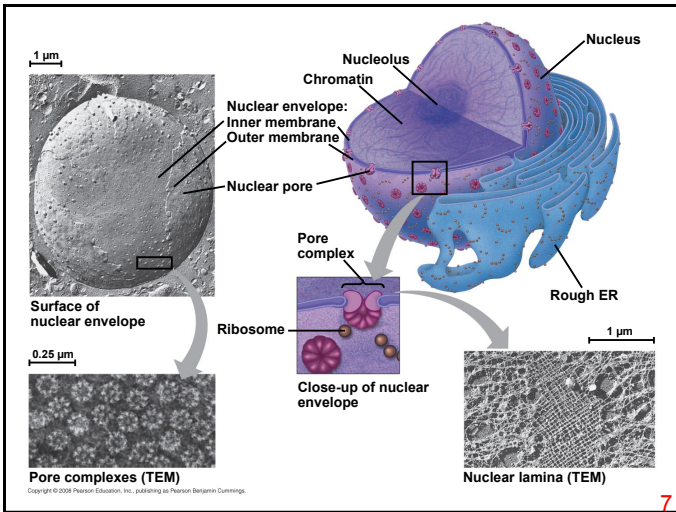
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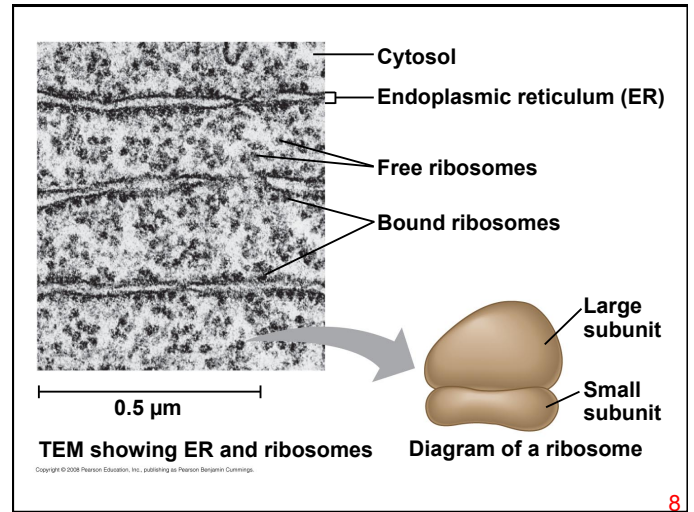
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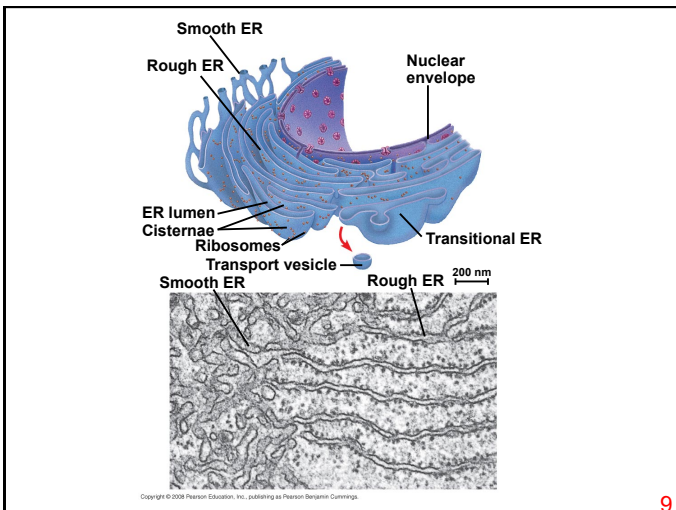
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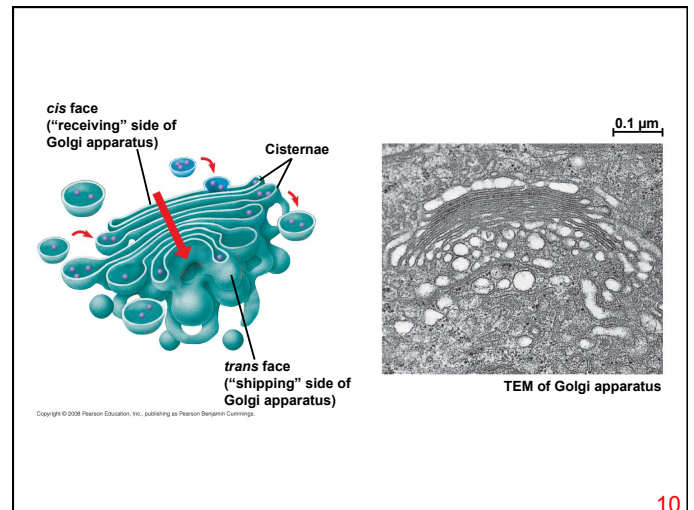
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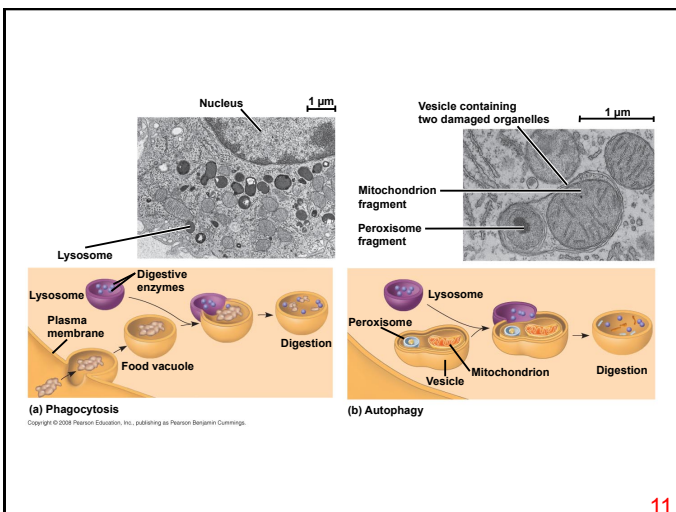
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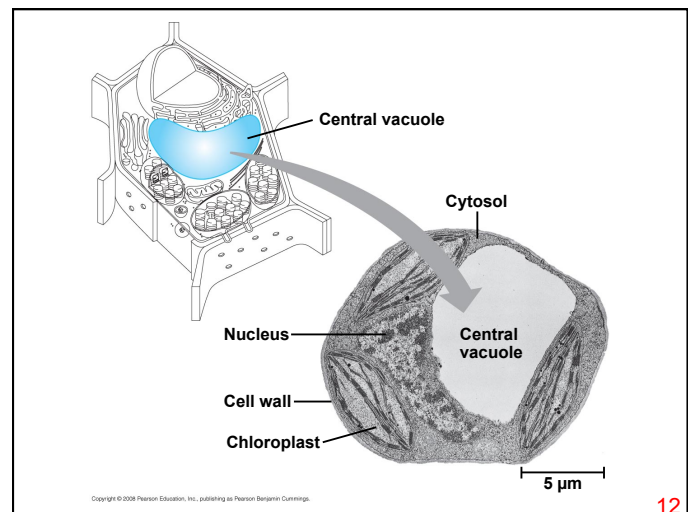
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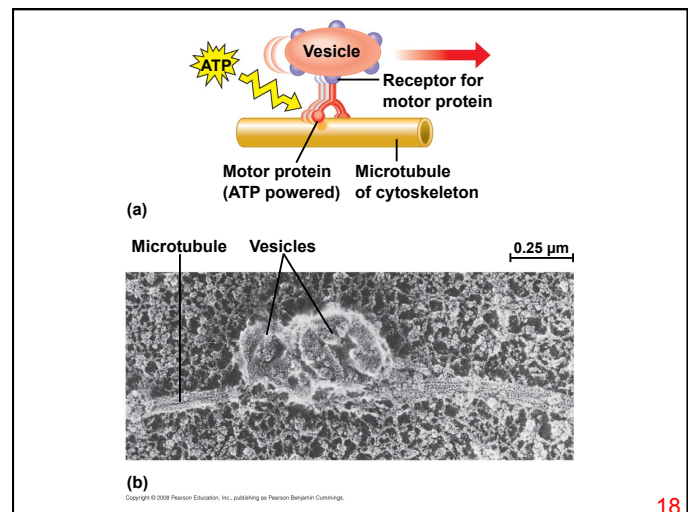
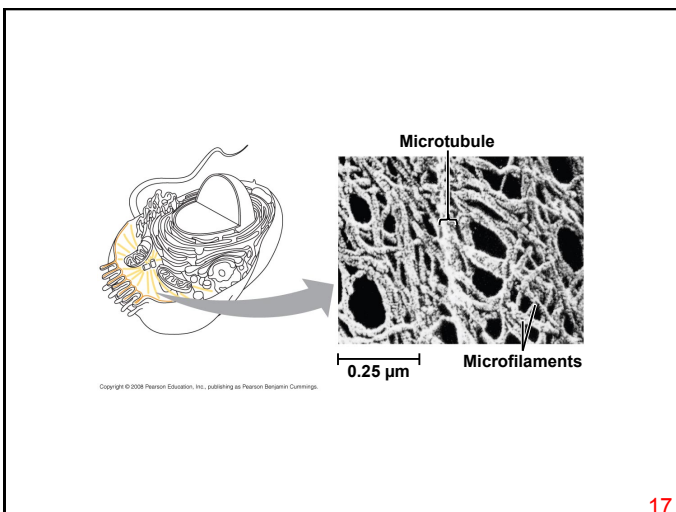
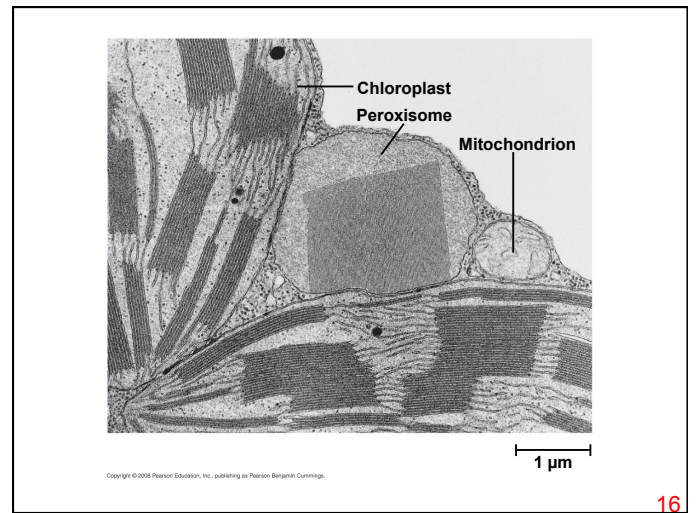
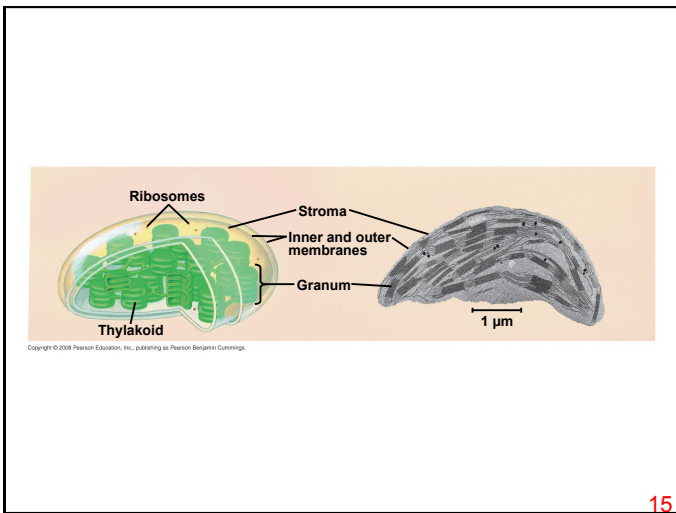
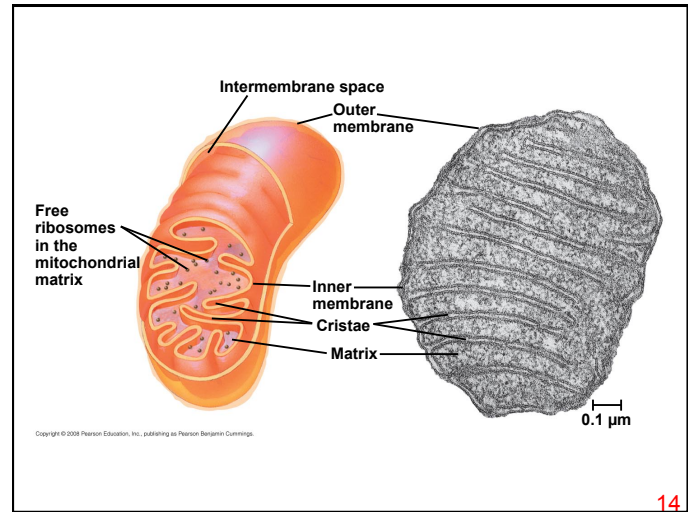
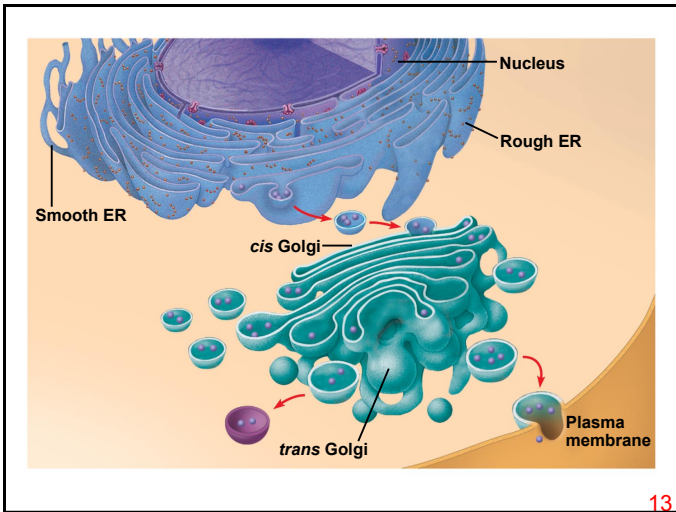


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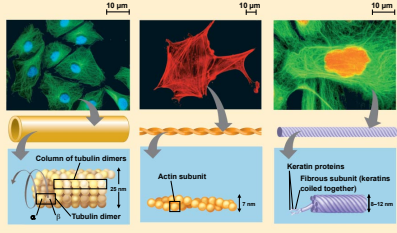




**Table 6.1 The Structure and Function of the Cytoskeleton**

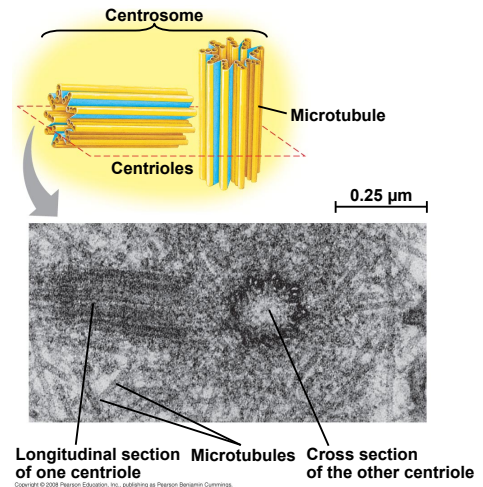
Property	Microtubules (Tubulin Polymers)	Microfilaments (Actin Filaments)	Intermediate Filaments
Structure	Hollow tubes; wall consists of 13 columns of tubulin molecules	Two intertwined strands of actin, each a polymer of actin subunits	Fibrous proteins supercoiled into thicker cables
Diameter	25 nm with 15-nm lumen	7 nm	8–12 nm
Protein subunits	Tubulin, a dimer consisting of $\alpha$ -tubulin and $\beta$ -tubulin	Actin	One of several different proteins of the keratin family, depending on cell type
Main functions	Maintenance of cell shape (compression-resisting "scaffolds") Cell motility (as in cilia or flagella) Chromosome movements in cell division Organelle movements	Maintenance of cell shape (tension-bearing elements) Changes in cell shape Muscle contraction Cytoplasmic streaming Cell motility (as in pseudopodia) Cell division (cleavage furrow formation)	Maintenance of cell shape (tension-bearing elements) Anchorage of nucleus and certain other organelles Formation of nuclear lamina

Micrographs of fibroblasts, a favorite cell type for cell biology studies. Each has been experimentally treated to fluorescently tag the structure of interest.



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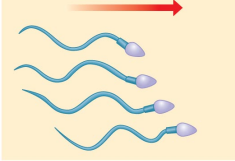


Longitudinal section of one centriole  
Microtubules  
Cross section of the other centriole

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Direction of swimming

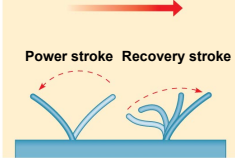


(a) Motion of flagella

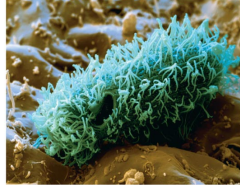


5 μm

Direction of organism's movement



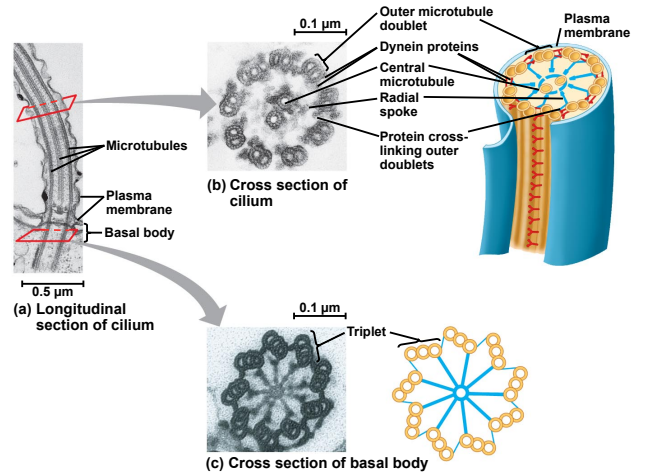
(b) Motion of cilia



15 μm

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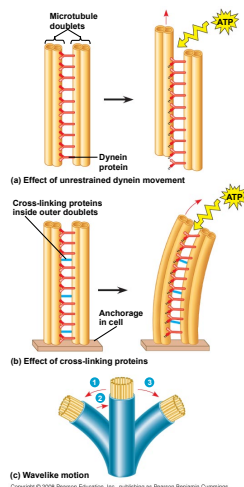
(a) Longitudinal section of cilium

(b) Cross section of cilium

(c) Cross section of basal body

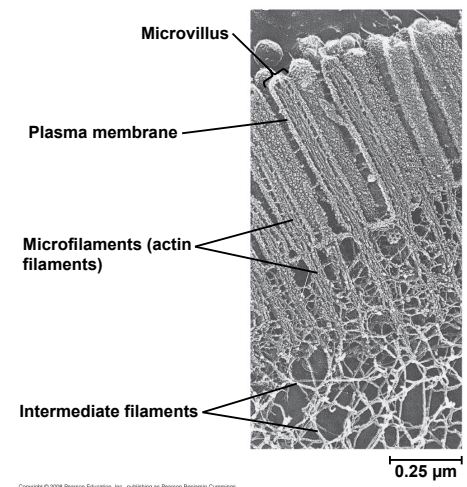
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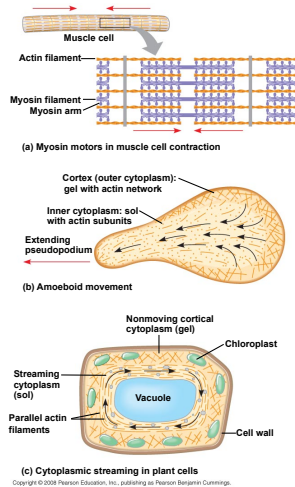
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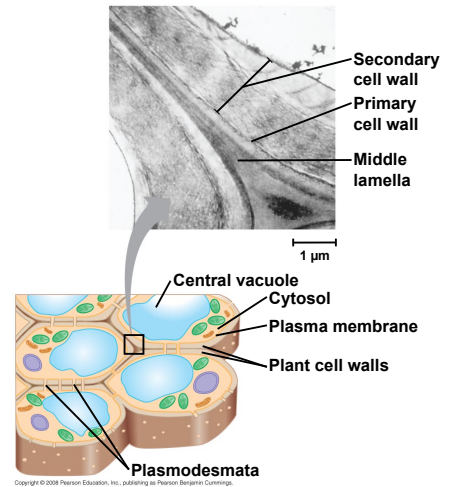
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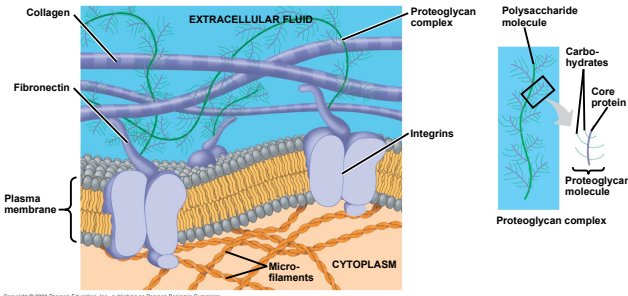
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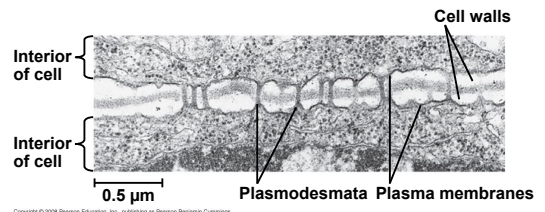
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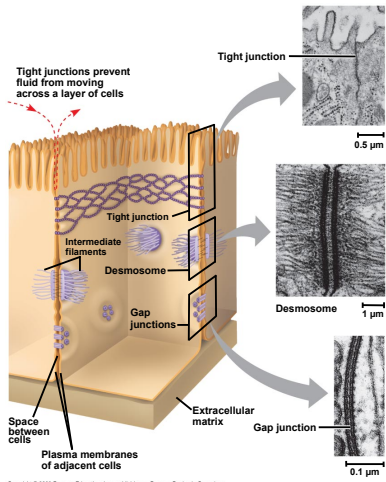
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Cell Component	Structure	Function
<b>Concept 6.3</b> The eukaryotic cell's genetic instructions are housed in the nucleus and carried out by the ribosomes	<b>Nucleus</b> Surrounded by nuclear envelope (double membrane) perforated by nuclear pores. The nuclear envelope is continuous with the endoplasmic reticulum (ER).	Houses chromosomes, made of chromatin (DNA, the genetic material, and proteins). Contains nucleolus, where ribosomal subunits are made. Regulates entry and exit of materials.
	<b>Ribosome</b> Two subunits made of ribosomal RNA and proteins. Can be free in cytosol or bound to ER.	Protein synthesis
<b>Concept 6.4</b> The endomembrane system regulates protein traffic and performs metabolic functions in the cell	<b>Endoplasmic reticulum</b> Extensive network of membrane-bound tubules and sacs. Membrane separates lumen from cytosol. Continuous with the nuclear envelope.	Smooth ER: synthesis of lipids, metabolism of carbohydrates, Ca <sup>2+</sup> storage, detoxification of drugs and poisons. Rough ER: Acts in synthesis of secretory and other proteins from bound ribosomes. Also carbohydrates to glycoproteins, proteolysis near membrane.
	<b>Golgi apparatus</b> Stacks of flattened membrane-bound sacs, low polarity (cis and trans faces).	Modification of proteins, carbohydrates on proteins, and glycoproteins. Synthesis of many polysaccharides, storage of Golgi released to vesicles.
	<b>Lysosome</b> Membranous sac of hydrolytic enzymes (in animal cells).	Breakdown of ingested substances, cell macromolecules, and damaged organelles for recycling.
	<b>Vacuole</b> Large membrane-bound vesicle in plants.	Storage, storage, waste disposal, water balance, cell growth, and production.
<b>Concept 6.5</b> Mitochondria and chloroplasts change energy from one form to another	<b>Mitochondrion</b> Rounded by double membrane; inner membrane has cristae (folds).	Cellular respiration
	<b>Chloroplast</b> Typically two membranes around fluid stroma, which contains membranous thylakoids stacked into grana (in plants).	Photosynthesis
	<b>Peroxisome</b> Specialized metabolic compartment bounded by a single membrane.	Contains enzymes that transfer hydrogen to water, producing hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> ) as a by-product, which is converted to acetyl-CoA; enzymes in the peroxisome.

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