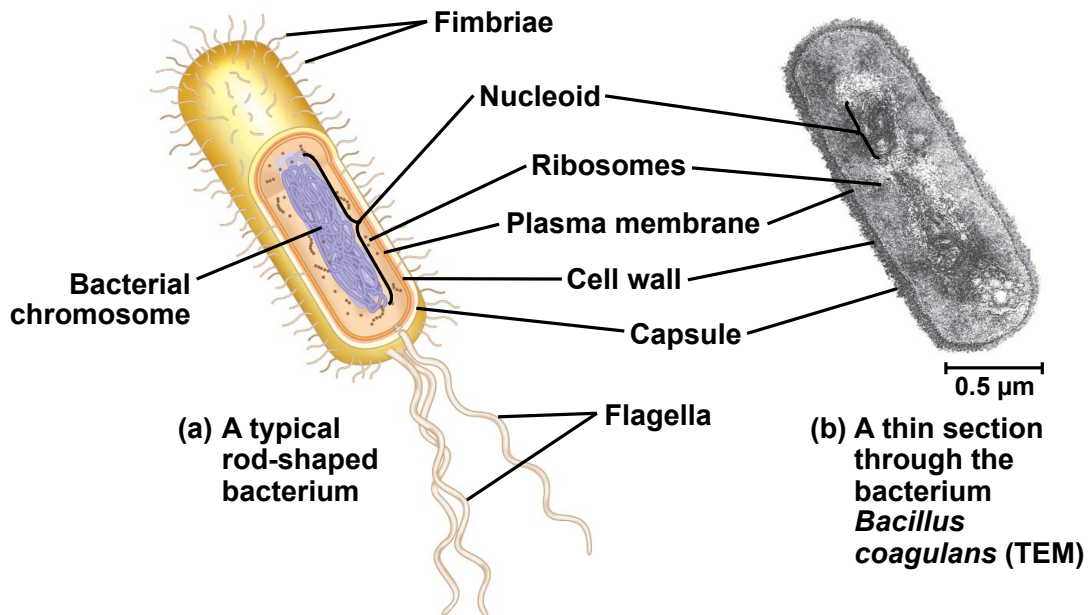


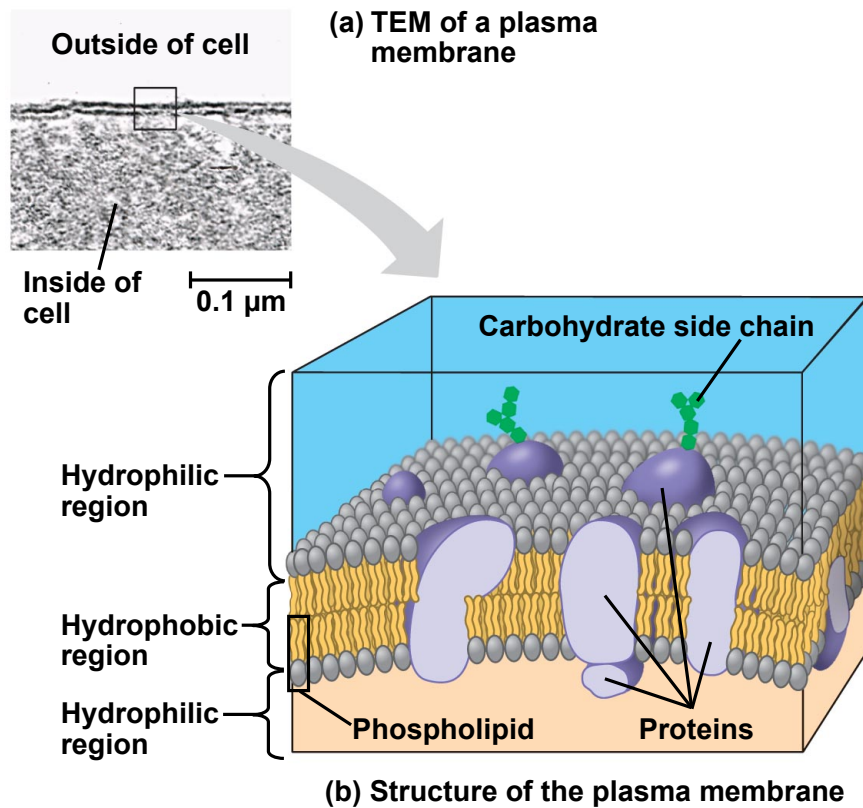
Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

1



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

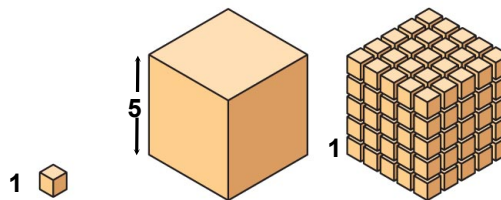
2



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

3

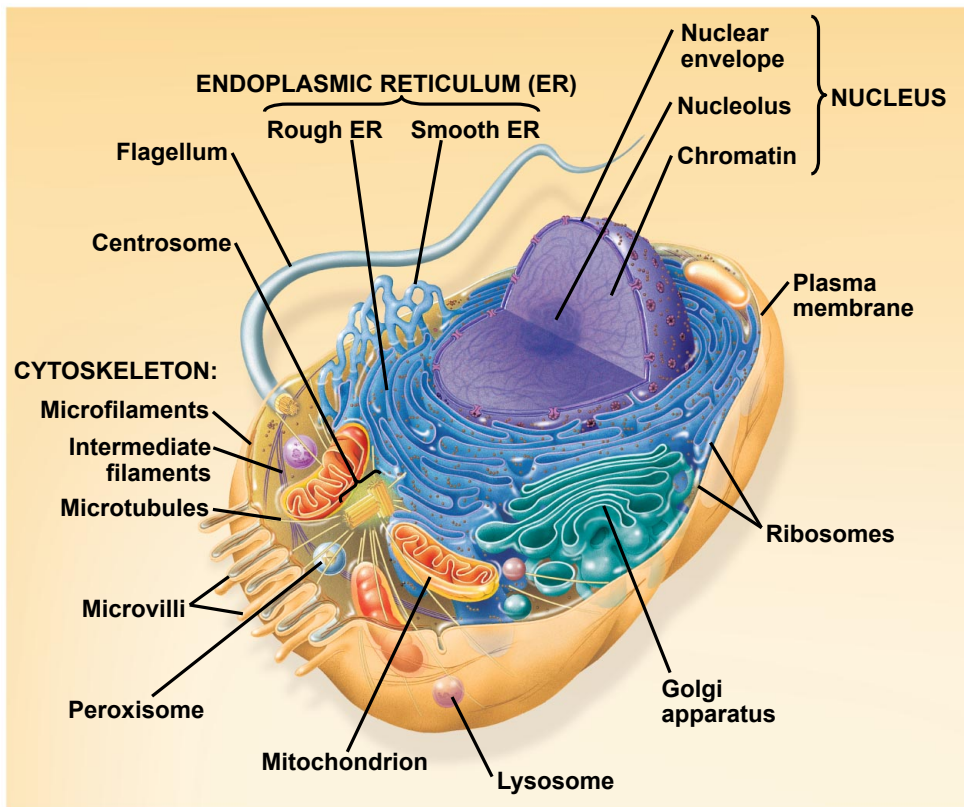
Surface area increases while total volume remains constant



Total surface area [Sum of the surface areas (height $\times$ width) of all boxes sides $\times$ number of boxes]	6	150	750
Total volume [height $\times$ width $\times$ length $\times$ number of boxes]	1	125	125
Surface-to-volume (S-to-V) ratio [surface area $\div$ volume]	6	1.2	6

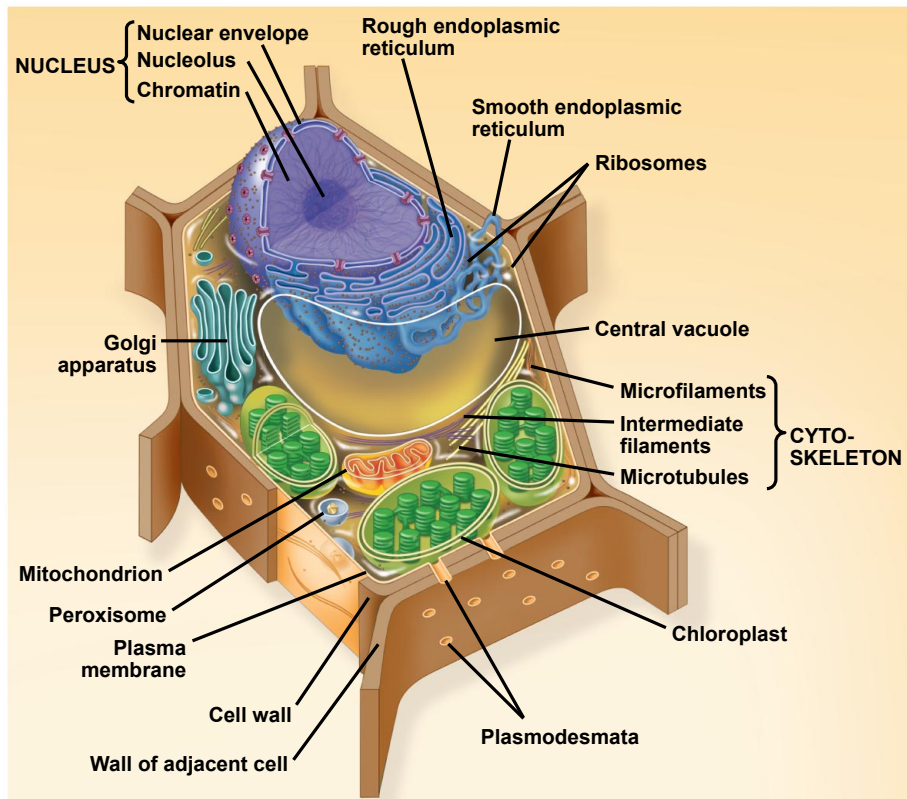
Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

4



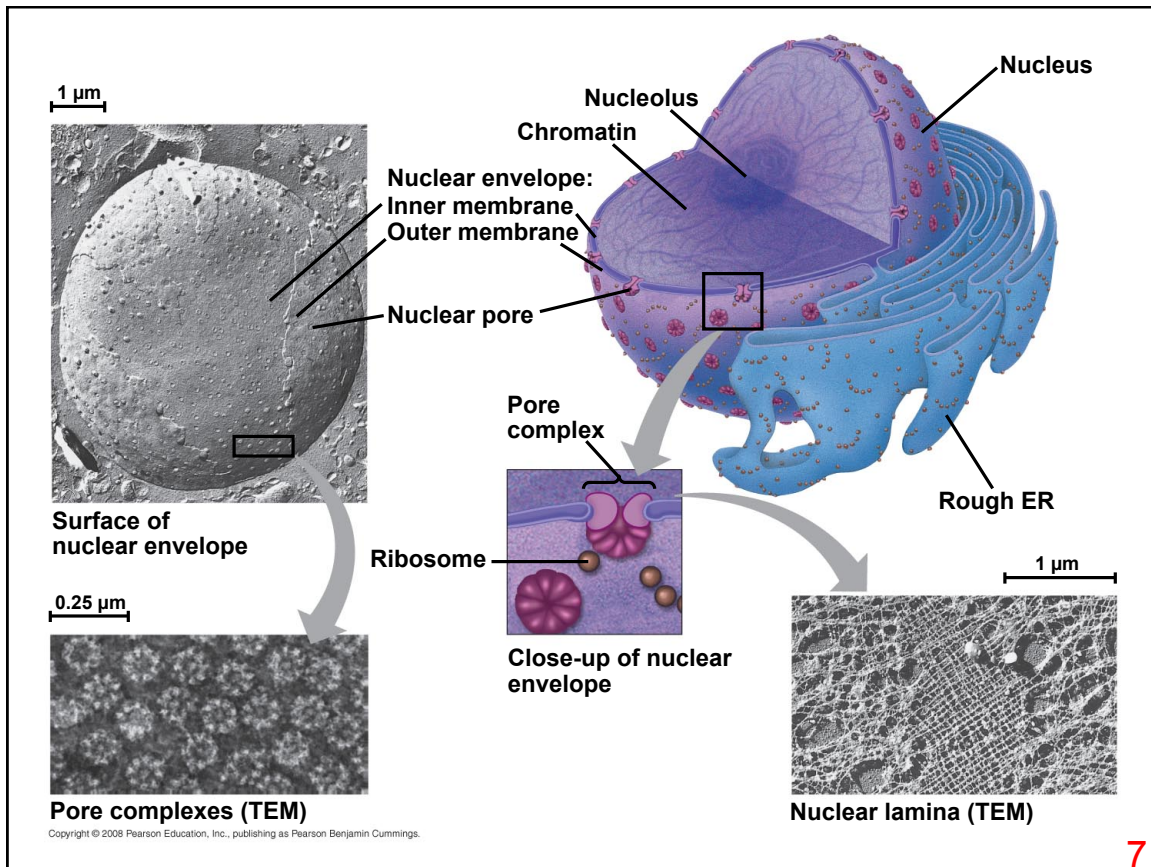
Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

5

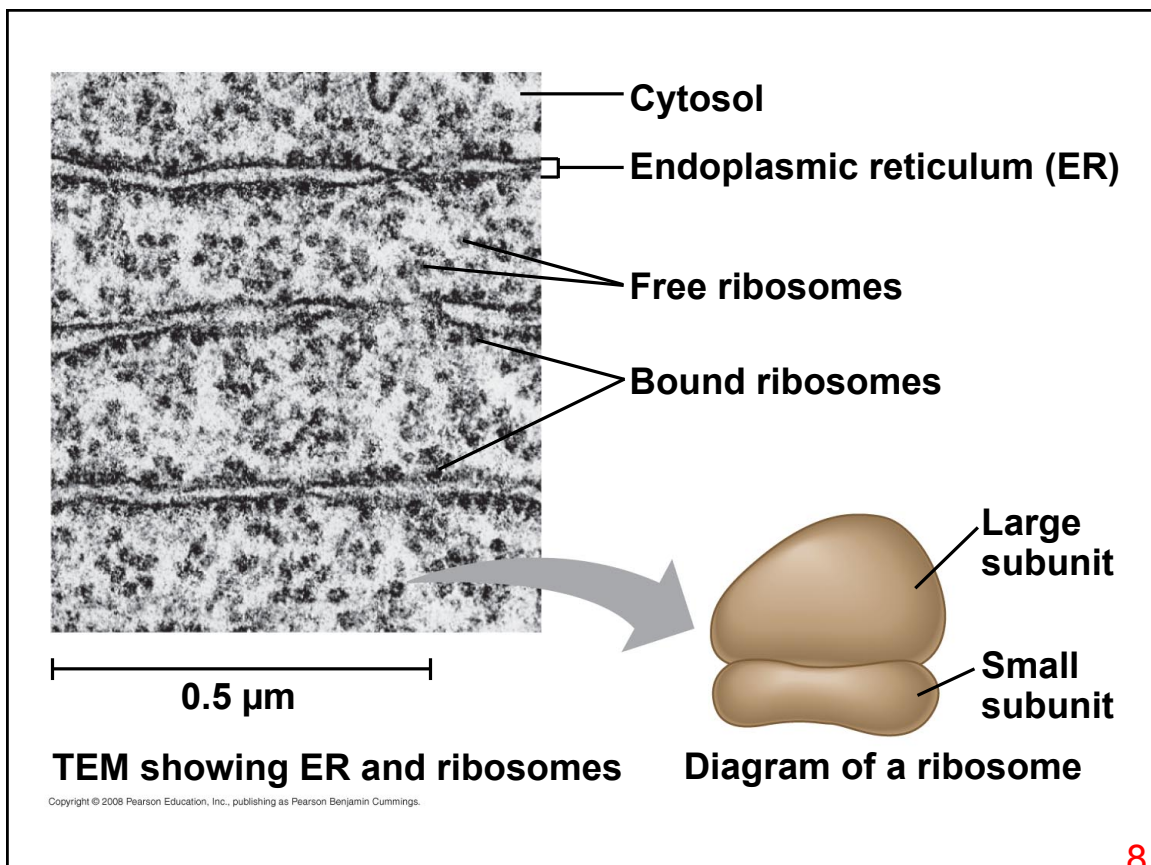


Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

6

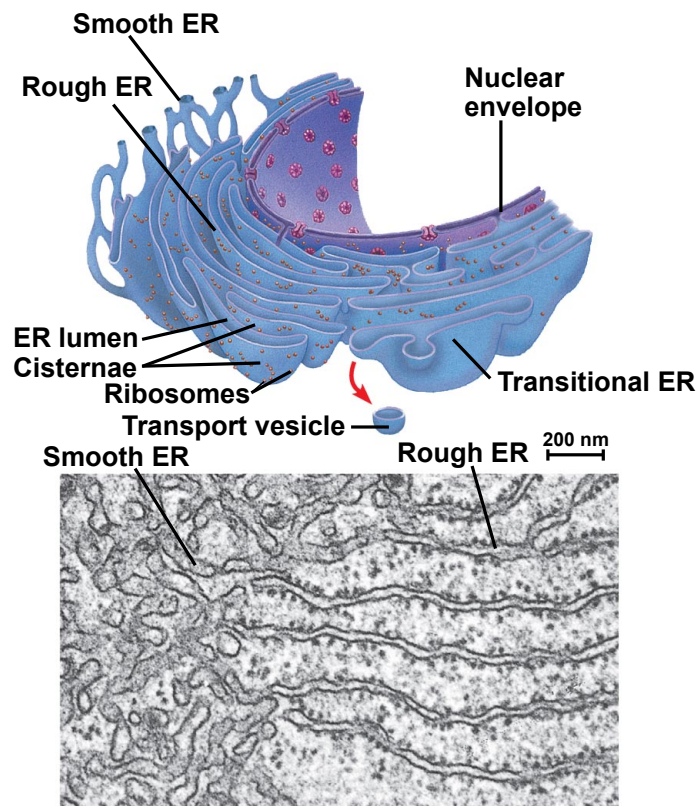


7

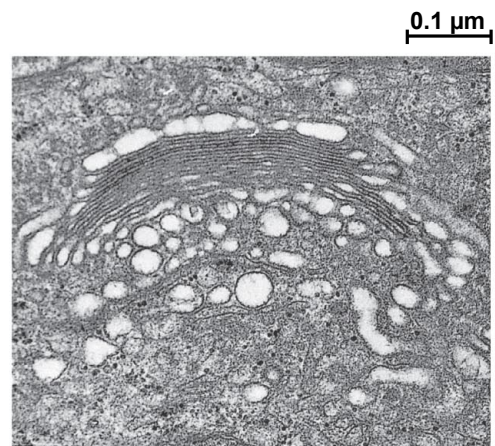
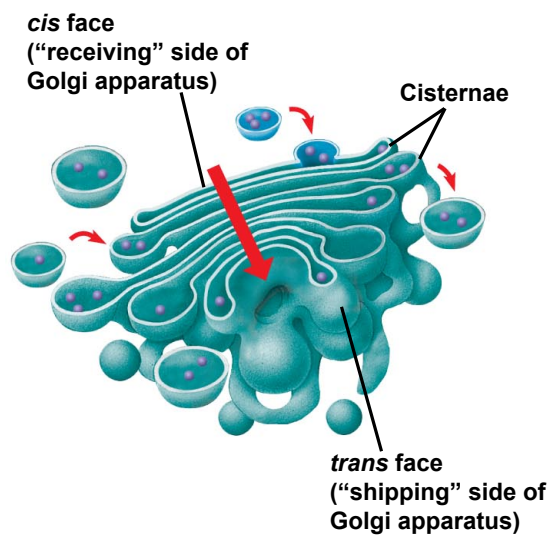


8



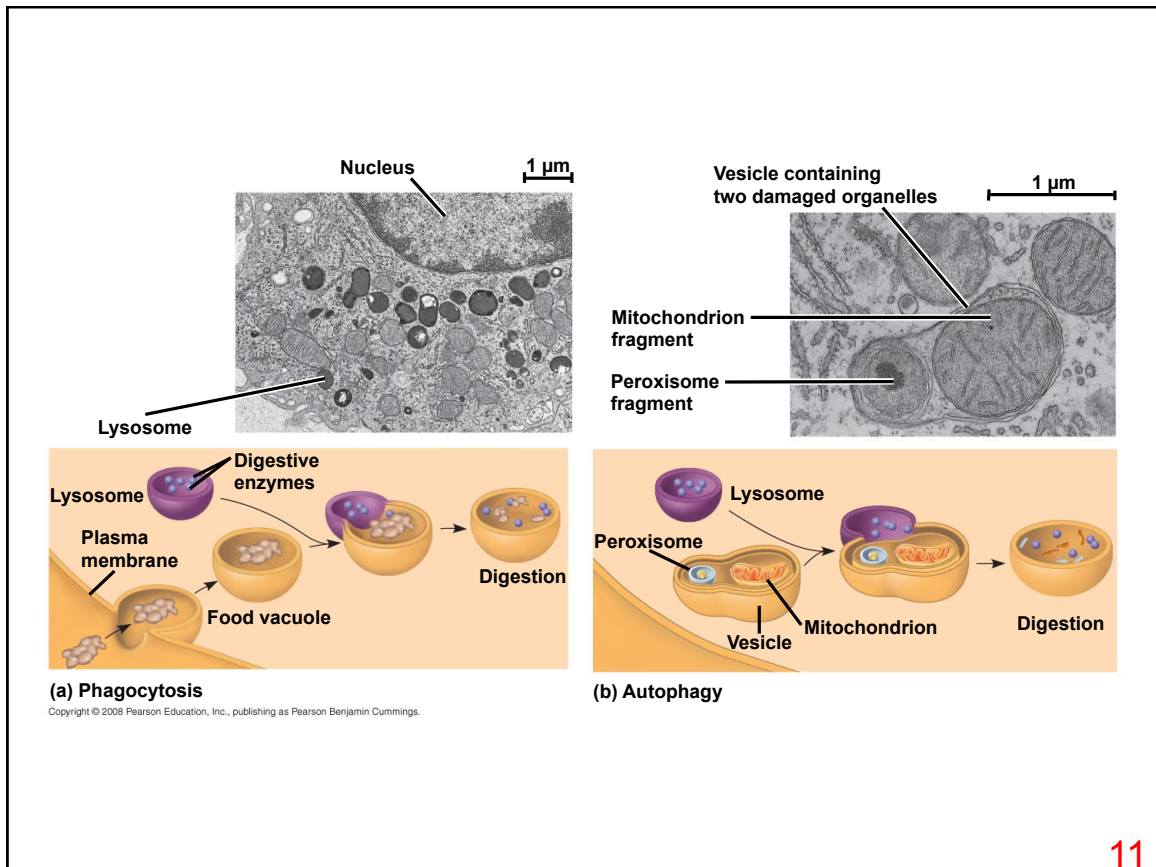


Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

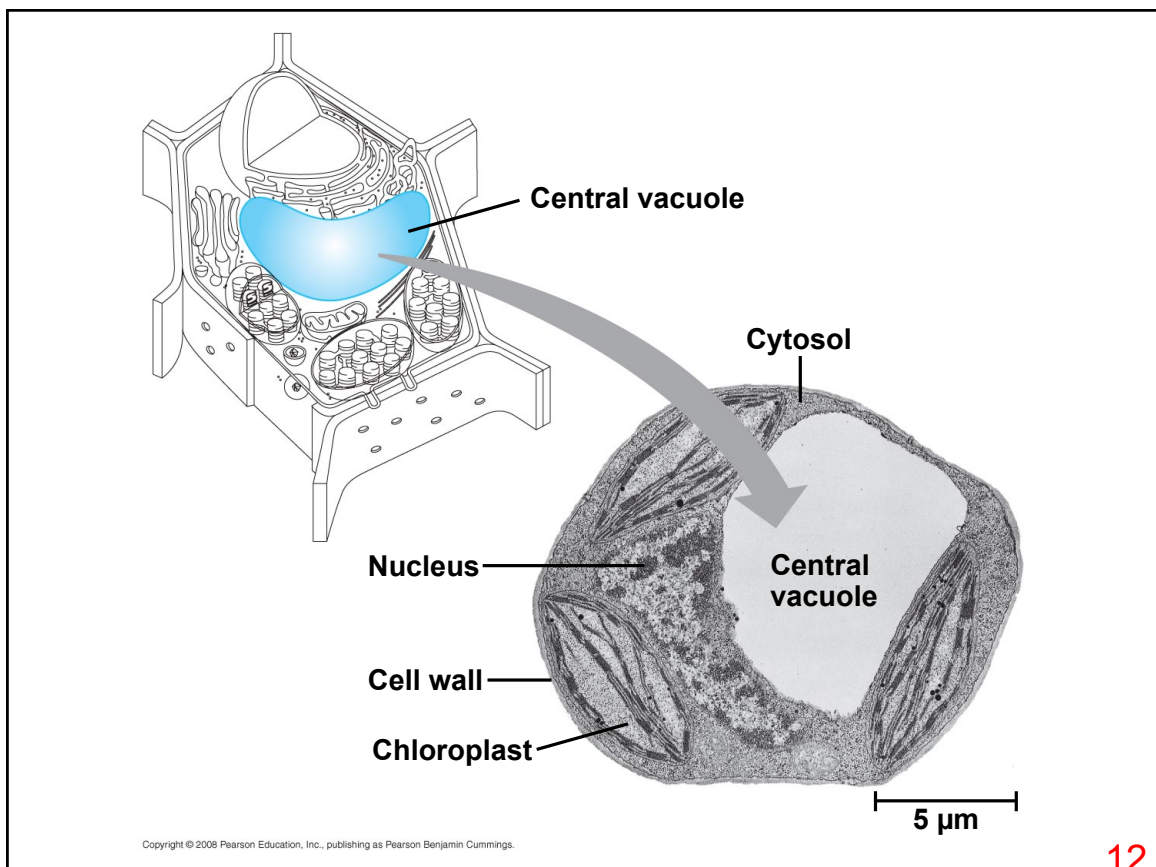


TEM of Golgi apparatus

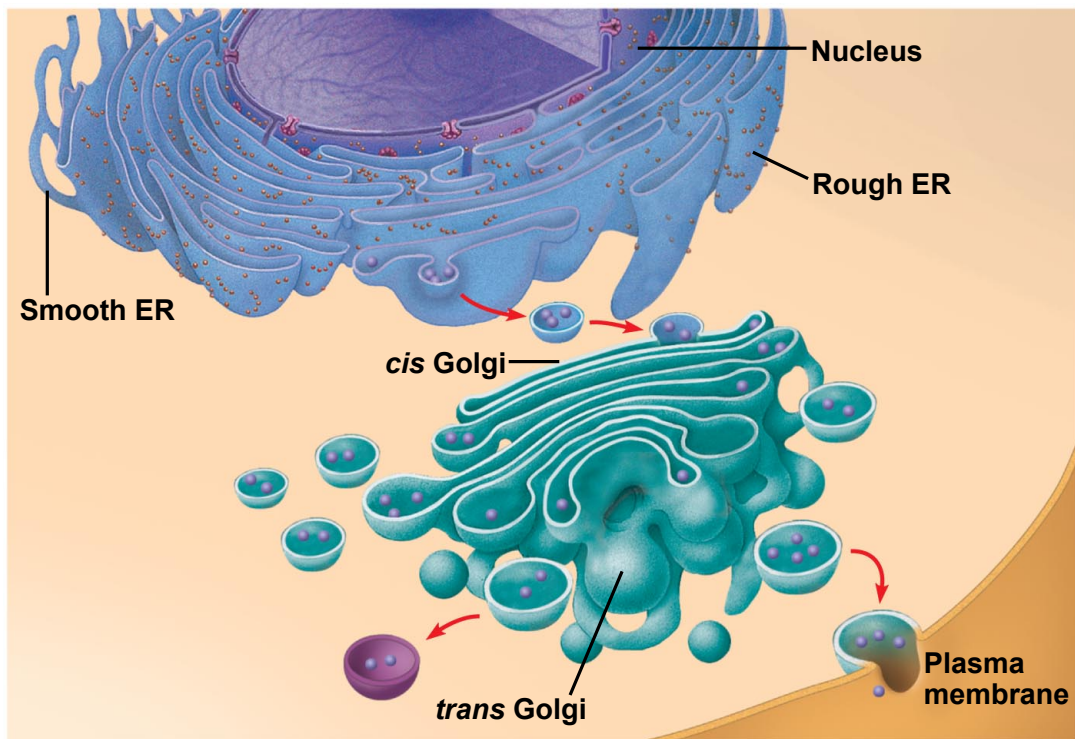
Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.



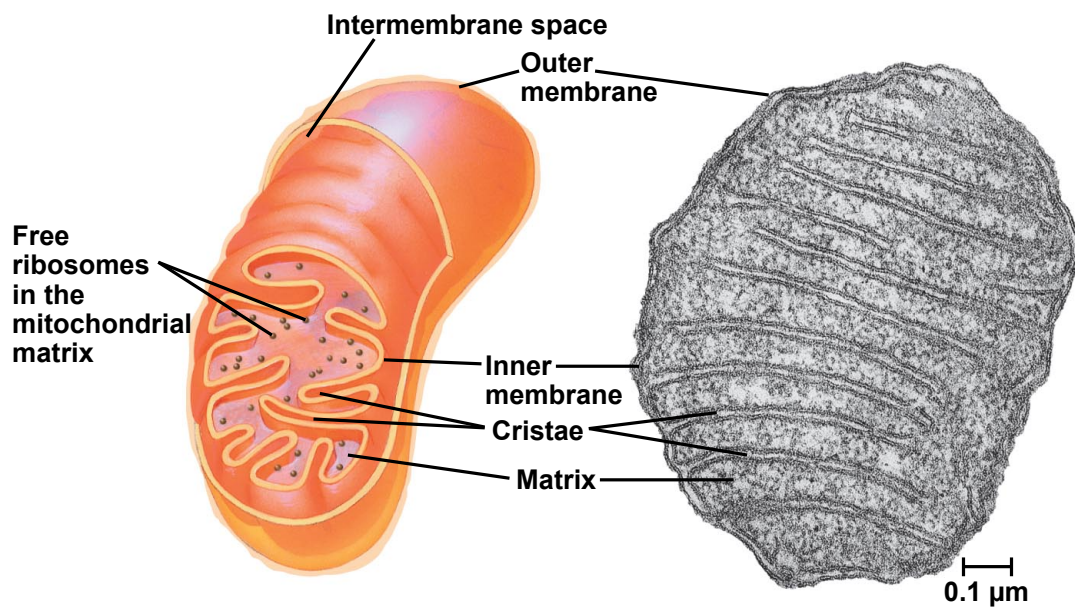
11



12



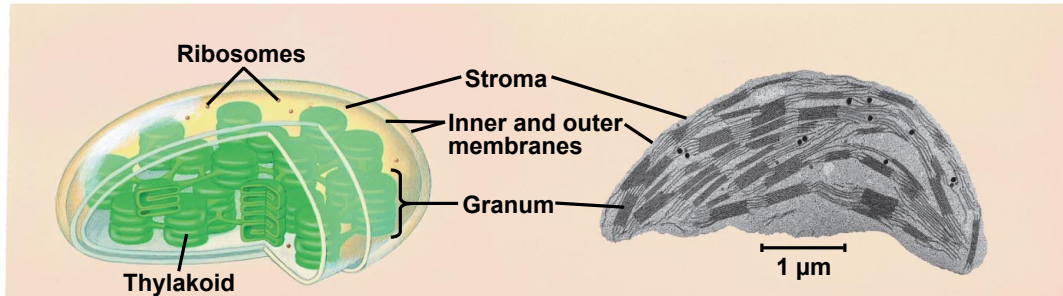
13



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

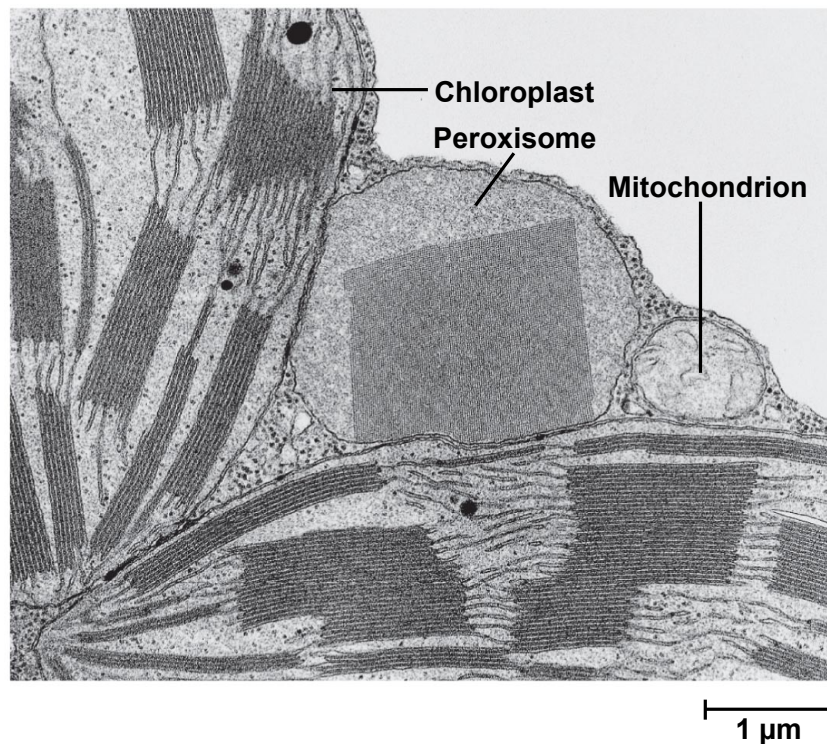
14





Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

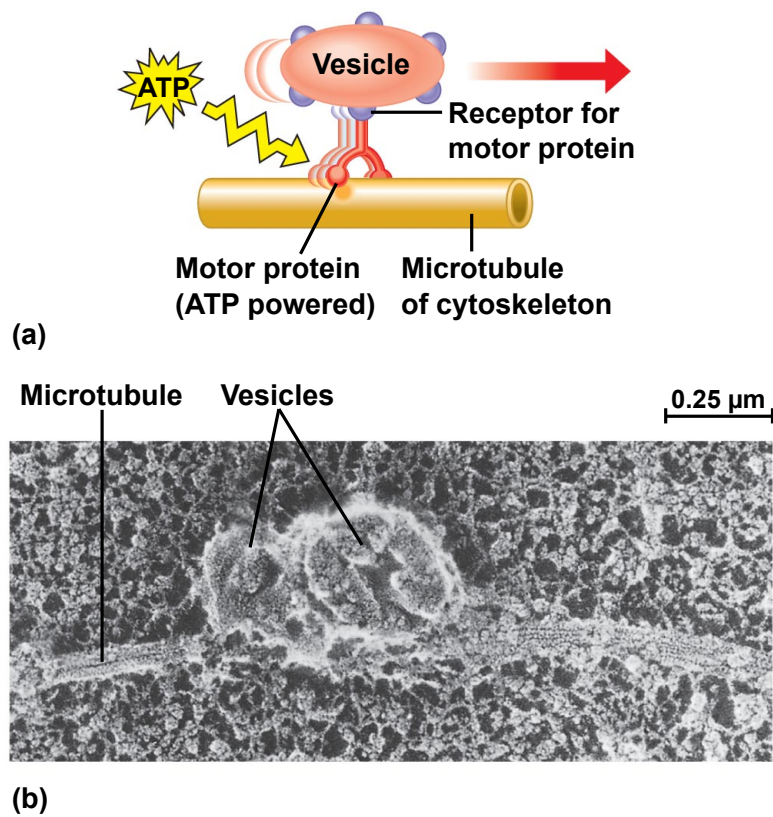
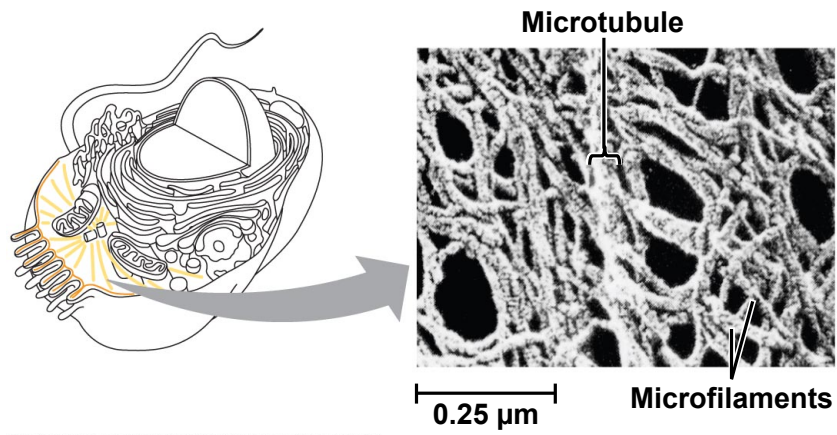
15



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

16

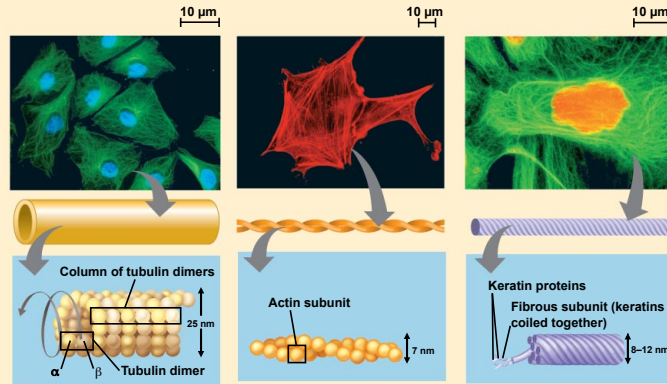




**Table 6.1 The Structure and Function of the Cytoskeleton**

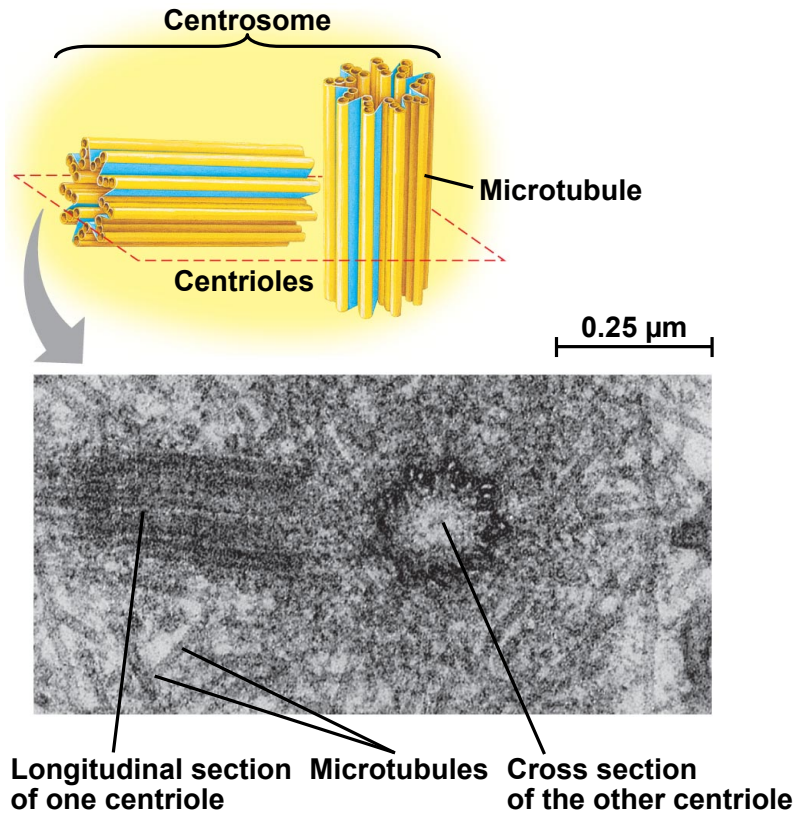
Property	Microtubules (Tubulin Polymers)	Microfilaments (Actin Filaments)	Intermediate Filaments
Structure	Hollow tubes; wall consists of 13 columns of tubulin molecules	Two intertwined strands of actin, each a polymer of actin subunits	Fibrous proteins supercoiled into thicker cables
Diameter	25 nm 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 "girders") 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.



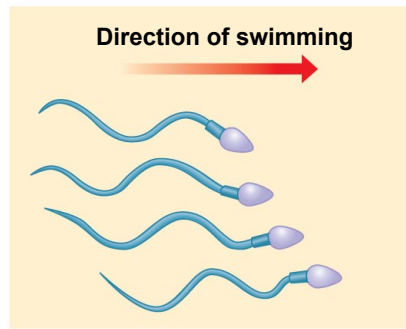
Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

19



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

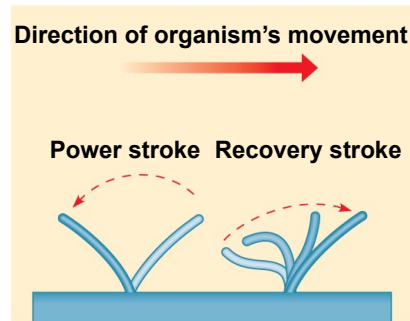
20



(a) Motion of flagella



5 μm



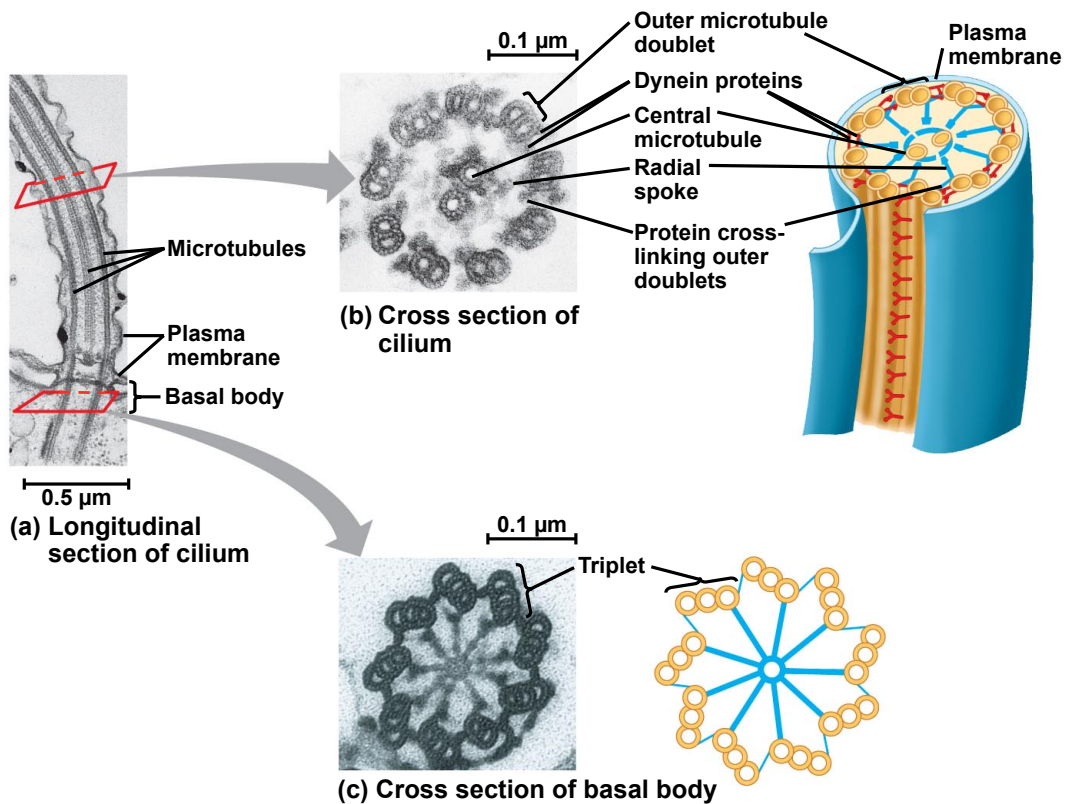
(b) Motion of cilia



15 μm

Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

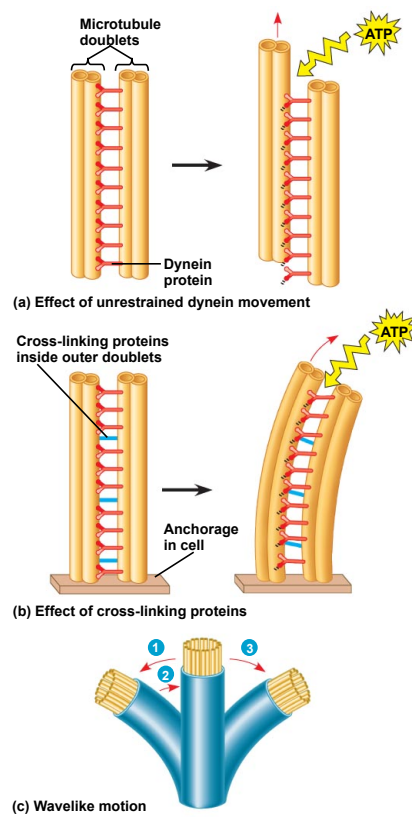
21



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

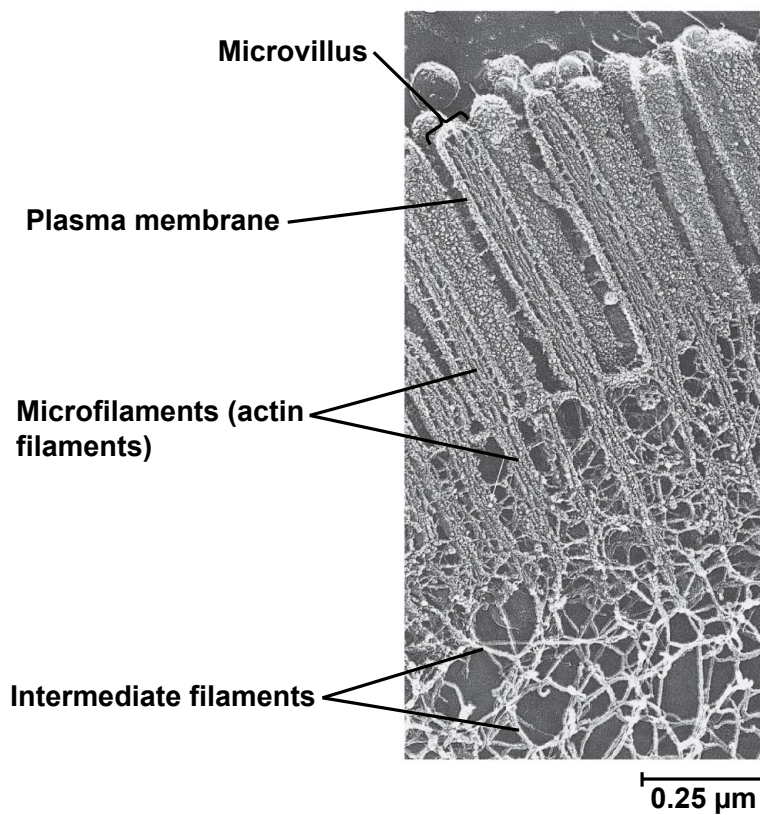
22





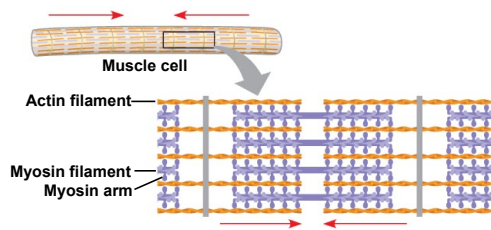
Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

23

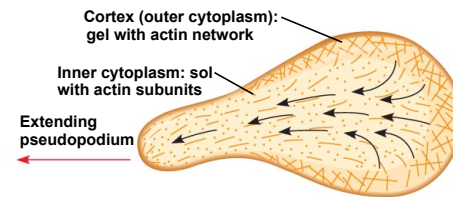


Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

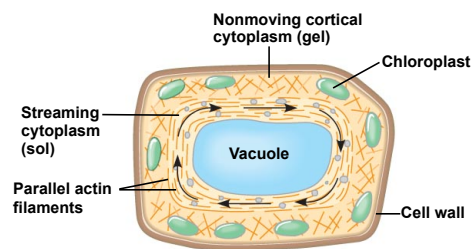
24



(a) Myosin motors in muscle cell contraction

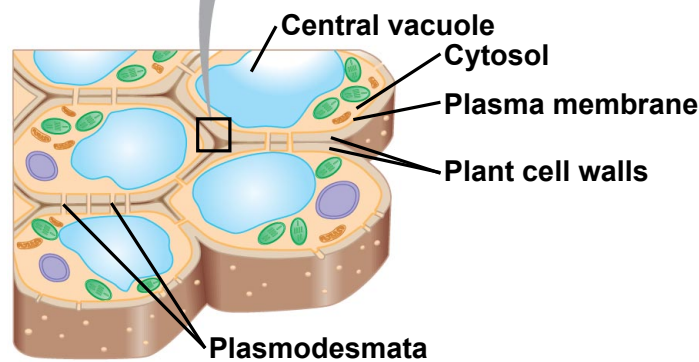
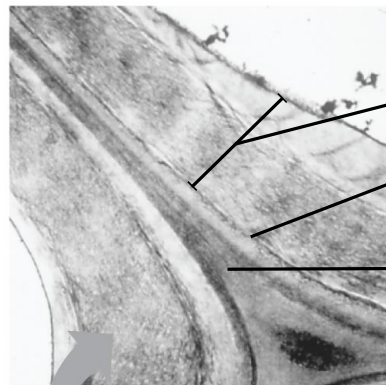


(b) Amoeboid movement

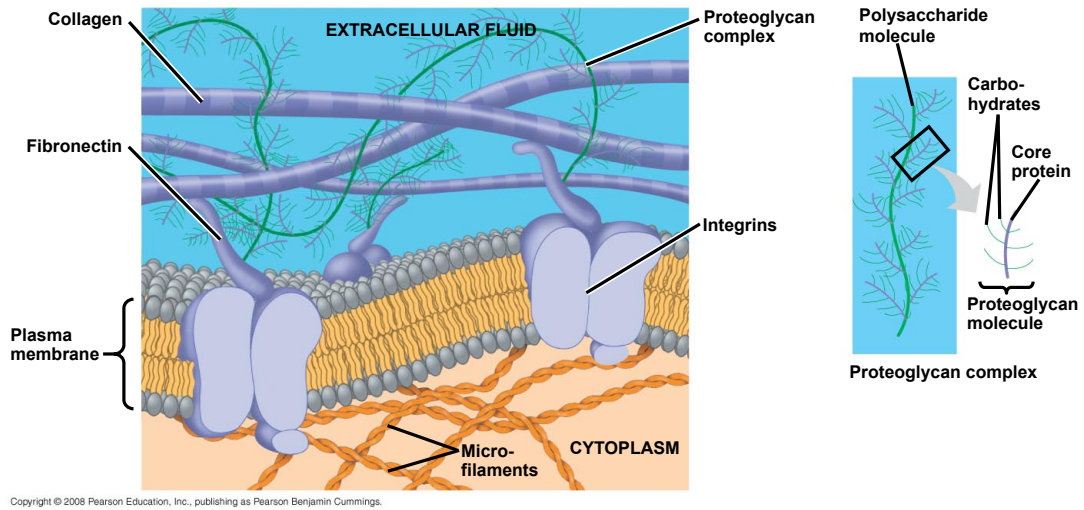


(c) Cytoplasmic streaming in plant cells

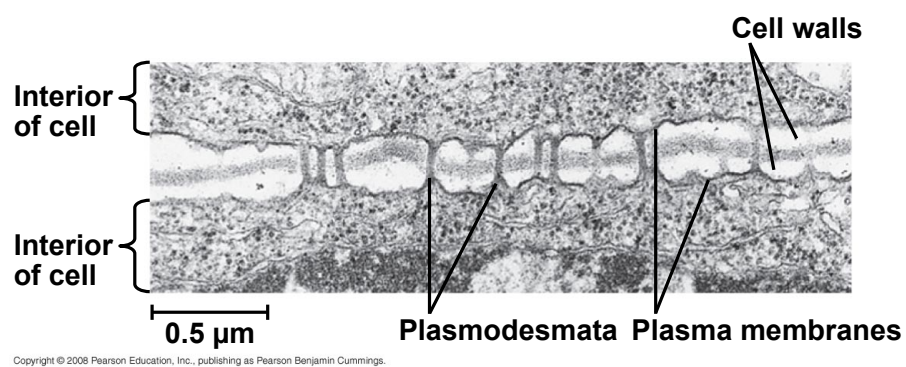
Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

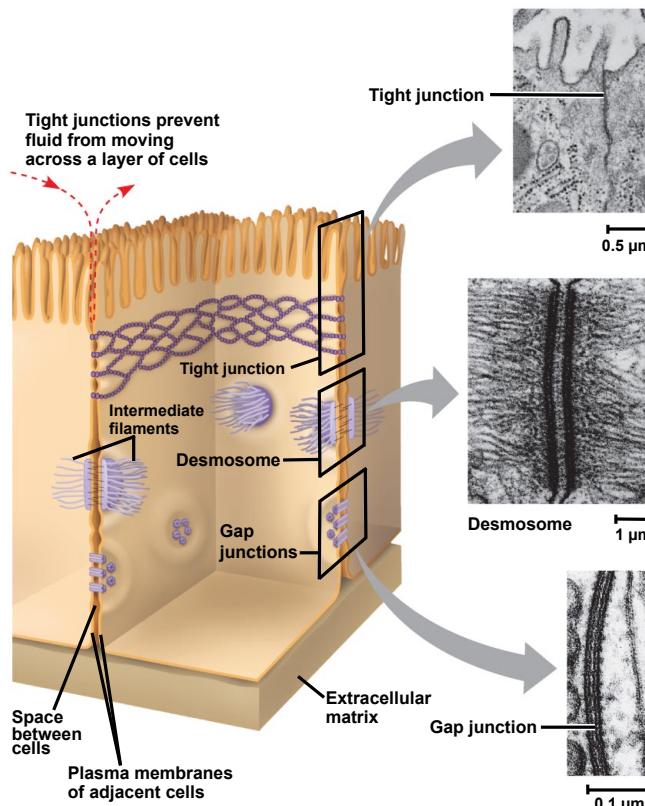


27

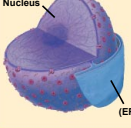

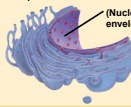





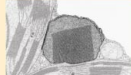


28





Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

	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 nucleoli, where ribosomal subunits are made. Pores regulate 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: Aids in synthesis of secretory and other proteins from bound ribosomes; adds carbohydrates to glycoproteins; produces new membrane
	<b>Golgi apparatus</b> 	Stacks of flattened membranous sacs; has polarity (cis and trans faces)	Modification of proteins, carbohydrates on proteins, and phospholipids; synthesis of many polysaccharides; sorting of Golgi products, which are then released in 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-bounded vesicle in plants	Digestion, storage, waste disposal, water balance, cell growth, and protection
	<b>Mitochondrion</b> 	Bounded by double membrane; inner membrane has infoldings (cristae)	Cellular respiration
<b>Concept 6.5</b> Mitochondria and chloroplasts change energy from one form to another	<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 water by other enzymes in the peroxisome

Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.