Unit 2: Cellular Organization and Processes

Section 2-1: Cellular Structure
Book Reading: Chapter 6 pages 96-121

Cytology- The Study of Cells

- Microscopy
  - Light Microscope (LM)
    - *How does it work?*
    - *What are its limitations?*
    - *What are its benefits?*
  - Electron Microscopes
    - Scanning Electron Microscope (SEM)- *what parts of a cell are visible with its use?*
    - Transition Electron Microscope (TEM)- *what parts of a cell are visible with its use?*
    - Allows researchers to see more detailed view of cellular components
    - Often produces artifacts- pieces that aren't really a part of the cell
  - Cell Fractionation
    - Sample is homogenized then centrifuged at high speeds
    - Cellular components are separated based on *what property?*
    - *What does this technique enable researchers to do?*

Comparing Prokaryotic and Eukaryotic Cells

- Common Features
  - *List*
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  -

- Unique Prokaryotic Features
  - *List*
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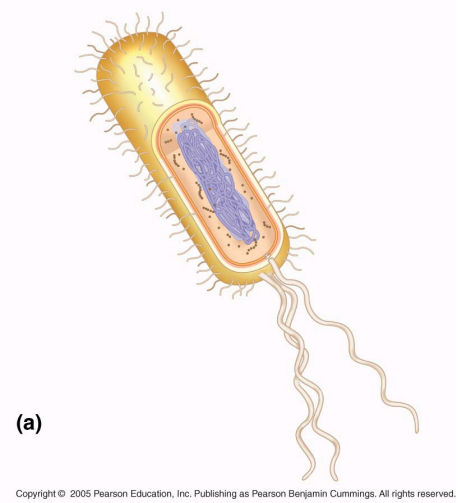

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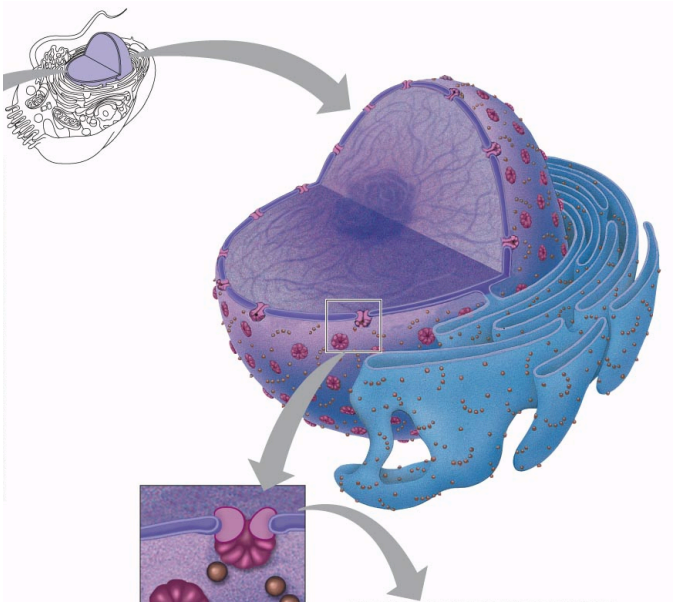
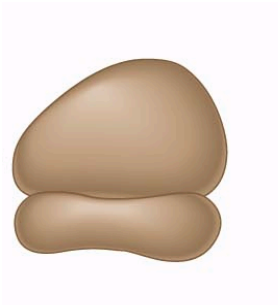
- Cell Size Limitations and Adaptations
  - Must be big enough to *do what?*
  - Must be small enough to *do what?*
  - Large animals do not have larger cells, the have more cells- often specialized for specific functions
  - Cells specialized for exchange of materials have modifications to increase surface area to volume ratios

<u>Eukaryotic Cells</u>

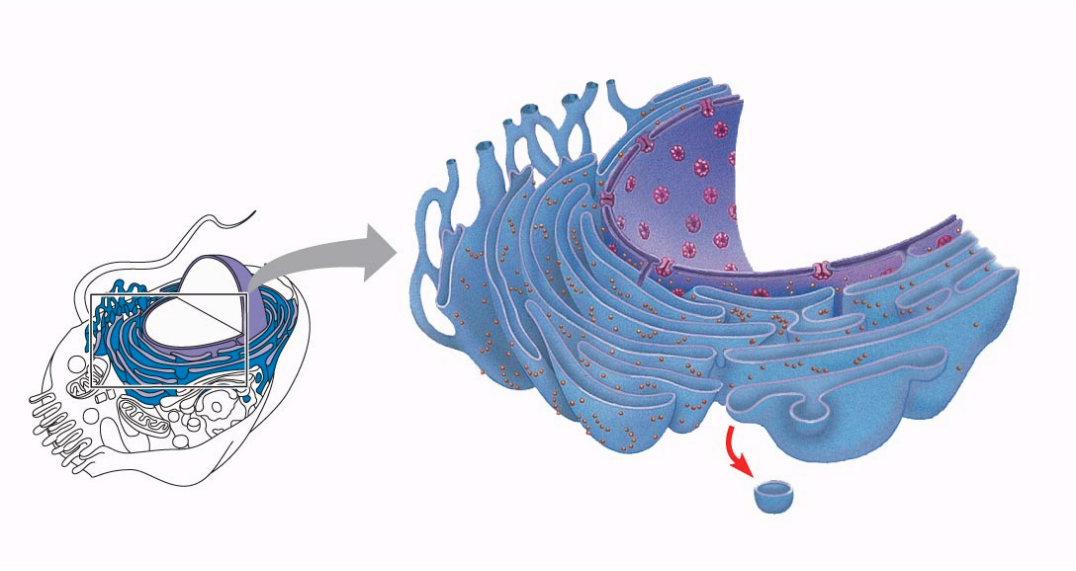
- Nucleus
  - Nuclear Membrane- *describe*
  - Nuclear Pores- *describe*
  - Nuclear lamina- *describe*
  - Nuclear matrix- *describe*
  - Chromosomes- *describe*
  - Cromatin- *describe, how is it different from chromosomes*
  - Nucleolus- *describe- what is its specific function?*
  - MAJOR FUNCTION: *????????*



- Ribosomes
  - NO MEMBRANE!!!!!
  - Made of *what?*
  - Free ribosomes- *what are they? Where are they? What do they do?*
  - Bound ribosomes- *what are they? Where are they? What do they do?*
  - MAJOR FUNCTION: *?????????*

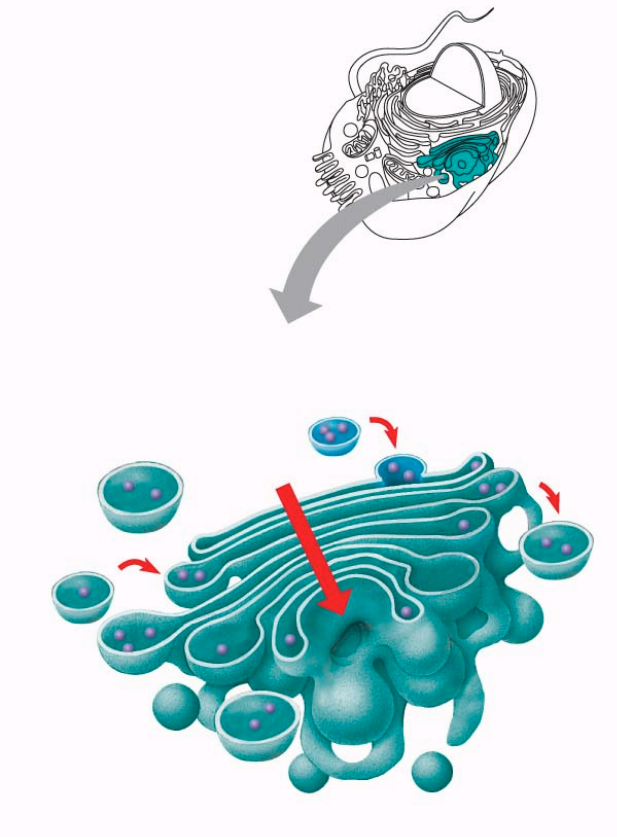


- Endoplasmic Reticulum
  - Cisternae- *describe*
  - Lumen- *describe*
  - ER membrane is continuous with the nuclear envelope
- Smooth Endoplasmic Reticulum
  - Synthesis of *???????*
    - In vertebrates, the synthesis of *????*
  - Detoxification of *???????*
    - Found especially in *what kind of animal cells?*
    - *How specifically do they go about detoxifying?*
  - Storage of *???????*
- Rough Endoplasmic Reticulum
  - Production of *what kinds of proteins?*
    - Most are glycoproteins- *what does that mean?*
    - As they are made by the ribosomes attached to the rough ER they exit into the ER lumen where they are folded
    - *What happens after they are packaged?*
  - Production of *what other cellular components?*
    - Grows membrane pieces that eventually break off and can fuse with other membranes



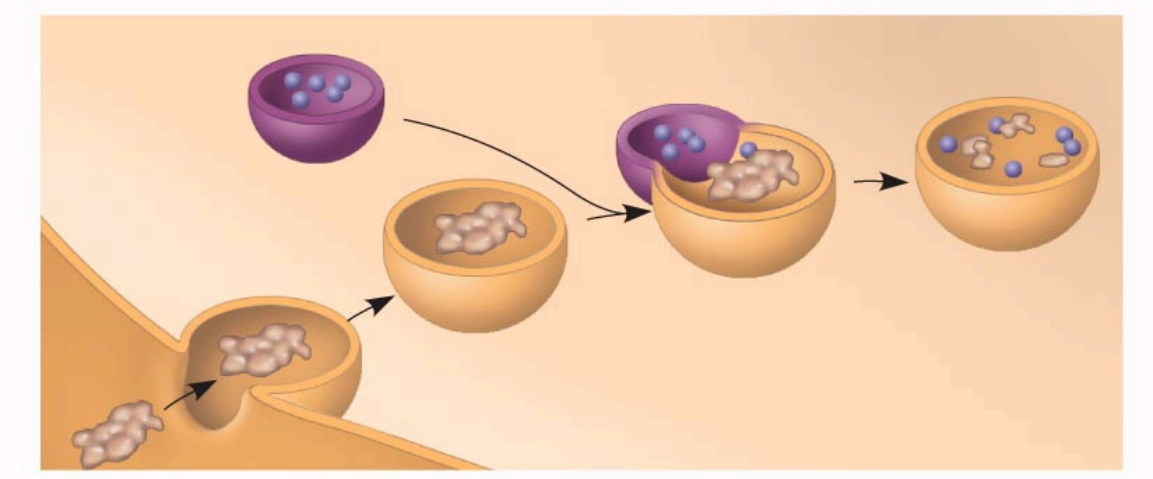
❖ Golgi Apparatus

- Consists of cisternae- flattened membranous sacs
- *Cis* face of the Golgi
  - *what's its function?*
  - *Where does it face?*
- *Trans* face of the Golgi
  - *What's its function?*
  - Where vesicles bud off the Golgi in vesicles and are transported to other sites
- As products from the ER move from the *cis* region to the *trans* region they are modified
- MAJOR FUNCTIONS: ????????



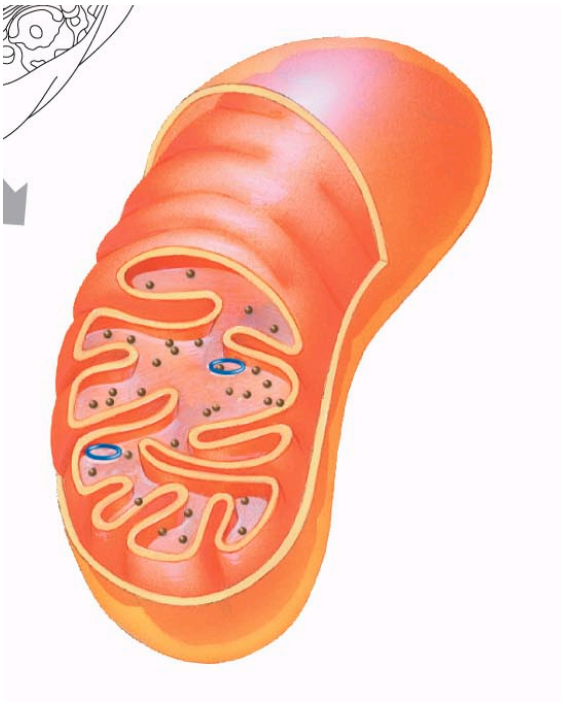
❖ Lysosomes

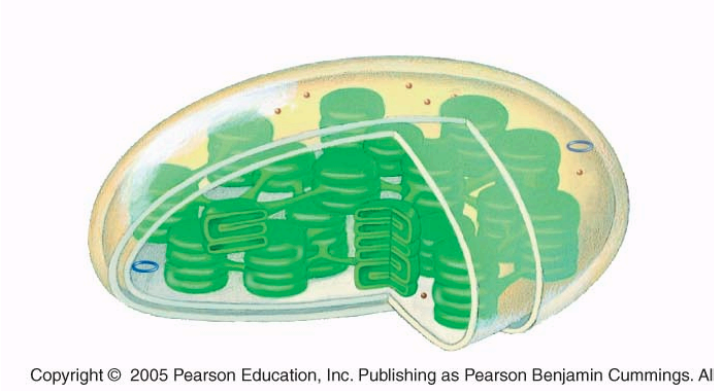
- Membranous sacs *full of what? And what is the function of those enzymes?*
- Hydrolytic enzymes work best in acidic environments inside the lysosomes
- Examples of intracellular digestion
  - *List*
  -
  -
- MAJOR FUNCTION: *???????*



- Vacuoles
  - Membrane bound sacs specialized *what function?*
    - Food vacuoles- store food
    - Contractile vacuoles- *what doe they do?*
    - Central Vacuole- *in what cells is it found? What is its function?*

- Mitochondria
  - Number of mitochondria in a cell is correlated with the cell's level of *what?*
  - Enclosed by two membranes
    - Outer membrane is smooth
    - Inner membrane has folds called *what?*
  - Intermembrane space- *where is it located?*
  - Mitochondrial matrix- *where is it located? And what does it contain?*
  - MAJOR FUNCTION: *???????*





- Chloroplasts
  - One kind of plastid- *what is a plastid?*
  - Bound by a double membrane
  - Inside the internal membrane are interconnected stacks called *what?*
  - Grannum (granna)- *what are they?*
  - Stroma- *what is it? What three important componenets does it contain?*
  - MAJOR FUNCTION: *???????*

- Endosymbiont Theory- *We will discuss this in class during lecture.*

- Peroxisomes
  - Specialized metabolic compartment bound by a single membrane
  - Contains enzymes that transfer hydrogen from various substances to oxygen producing hydrogen peroxide
  - Also contain enzymes to break down the hydrogen peroxide into water and oxygen (since it is toxic to our cells) *what is this enzyme called?*
  - MAJOR FUNCTION: *?????*

- Plant Cell Walls
  - Extracellular structure that *what's its function?*
  - Made of *what?*
- Cilia and Flagella
  - Cilia
    - Short and numerous
    - *What kind of motion do they exhibit?*
  - Flagella
    - Longer and usually one, sometimes two
    - *What kind of motion do they exhibit?*