

Chapter 3 Notes Cell Structures and Functions

- Together the work of Schleiden, Schwann and Virchow, laid the foundation of the CELL THEORY
- **The 3 parts of the cell theory are:**

- _____
- _____
- _____

- **Cell Differentiation (Specialization)**

- Cells in organisms are specialized to perform _____ tasks

Level	Function	Example
	Different organs work together to carry out a function	Nervous system
	Different tissues work together to carry out a function	Brain
	Similar cells work together to carry out a function	Nervous tissue
	Cell that can perform a specialized job	neuron

- **Why study cells?**

- organisms are made up of cells
- cells do all the work of life!

- **What is meant by the work of life?**

- "breathe"
 - ✓ gas exchange: O₂ in vs. CO₂ out
- eat
 - ✓ take in & digest food
- make energy
 - ✓ ATP (gasoline for the cell)
- build molecules
 - ✓ proteins, carbohydrates, fats, nucleic acids
- remove wastes
- control internal conditions, maintain homeostasis
- respond to external environment
- build more cells
 - ✓ growth, repair, reproduction & development

- **ALL cells (both prokaryotic and eukaryotic) have 4 characteristics**

- _____
- _____
- _____
- _____

****since all organisms are made up of cells effectively all organisms have 4 characteristics in common

What are the levels of organization, from simplest to most complex?

What is one benefit of being multicellular to an organism?

In your own words, explain cell differentiation

What are the 3 MAIN jobs that cells have?

What 4 characteristics do a bacteria, mushroom, tree, fish, lizard, spider, mosquito, humans, lions, tigers and bears have in common?

What do the following prefixes mean?

-pro

-eu

-karyo

• **2 types of Cells**

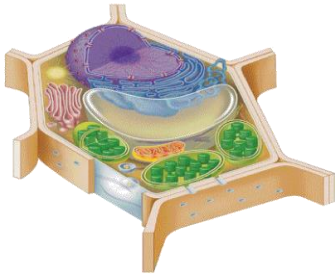
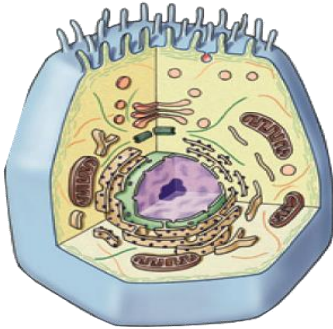
- Prokaryotic (bacteria ONLY)
- Eukaryotic (protist, fungi, plants animals)

Characteristic	Prokaryotes	Eukaryotes
Nucleus		
Ribosomes		
Membrane bound organelles		
Large (relative to cells)		
Small (relative to cells)		
Simple		
Complex		
Bacteria		
Plant, animal, fungus or protist		

Give an example of a prokaryotic cell

Give an specific example of a eukaryotic cell

• **Plant vs Animal Cell**

<ul style="list-style-type: none"> • Eukaryotic • Autotrophic • Chloroplast • Cell wall • 1 large vacuole • Rigid structure <ul style="list-style-type: none"> ○ Square or rectangle "ish" in shape 	<ul style="list-style-type: none"> • Eukaryotic • Heterotrophic • No chloroplast • No cell wall • Many small vacuoles • Round "ish" in shape 
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Microscope review:

In the boxes place the following based on your knowledge of magnification and field of view.

10X, 20X, 30X, 40X

What happens to the field of view as magnification increases?

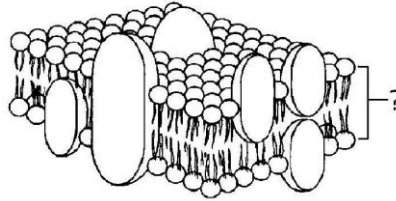


CELL ORGANELLES: Doing Life's Work

- **Cells need POWER**
 - to fuel daily life & growth, the cell must...
 - ✓ take in food & digest it
 - ✓ take in oxygen (O₂)
 - ✓ make ATP
 - ✓ remove waste
 - organelles that do this work...
 - ✓ cell membrane
 - ✓ lysosomes
 - ✓ vacuoles & vesicles
 - ✓ mitochondria

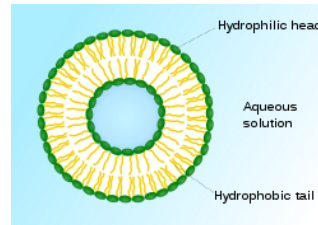
Function

- separates cell from outside
- controls what enters or leaves cell = O₂, CO₂, food, H₂O, nutrients, waste
- recognizes signals from other cells = allows communication between cells
- Structure - double layer of fat = phospholipid bilayer
- receptor molecules - proteins



Function

- moving material around cell
- storage
- Structure - membrane sac



Function

- digest food - used to make energy
- clean up & recycle - digest broken organelles
- Structure - membrane sac of digestive enzymes



Function

- make ATP energy from cellular respiration
- sugar + O₂ → ATP
- fuels the work of life
- Structure - double membrane

Plants make energy in 2 ways

Mitochondria - make energy from sugar + O₂

- cellular respiration : sugar + O₂ → ATP

Chloroplasts

- make energy + sugar from sunlight
- photosynthesis : sunlight + CO₂ → ATP & sugar
- ATP = active energy
- sugar = stored energy
- build leaves & roots & fruit out of the sugars



What type of biomolecule makes up part of the phospholipid bilayer?

Why is this important?

Which part of a phospholipid is...

- ✓ Hydrophilic-
- ✓ Hydrophobic-

Compare the function of a vacuole with that of a lysosome in 2 words.

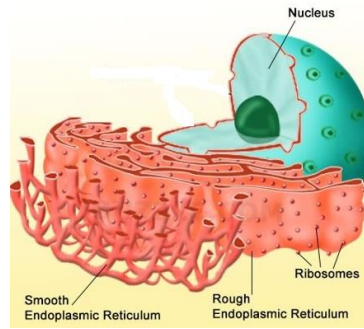
What two organelles can plants utilize to make energy?

What organelle is primarily responsible for protein synthesis?

- **Cells need workers: Proteins**

Making proteins

- to run daily life & growth, the cell must...
- read genes (DNA)
- build proteins
 - ✓ structural proteins (muscle fibers, hair, skin, claws)
 - ✓ enzymes (speed up chemical reactions)
 - ✓ signals (hormones) & receptors
- organelles that do this work...
 - ✓ nucleus
 - ✓ ribosomes
 - ✓ endoplasmic reticulum (ER)
 - ✓ Golgi apparatus



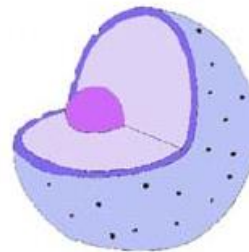
Why is it important for DNA to remain in the nucleus?

- **Function**

- control center of cell
- protects DNA - instructions for building proteins

Structure

- nuclear membrane
- nucleolus
- ribosome factory
- chromosomes/DNA



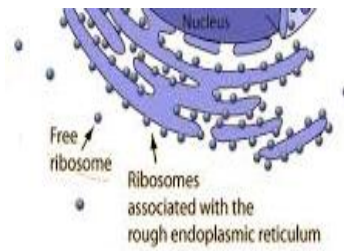
Explain the role of endoplasmic reticulum and golgi apparatus in protein synthesis.

- **Function**

- protein factories
- read instructions to build proteins from DNA

Structure

- some free in cytoplasm
- some attached to ER

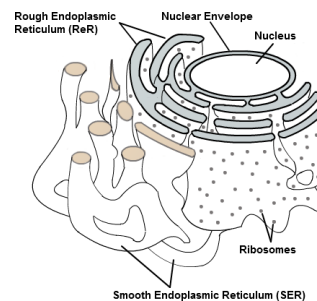


- **Function**

- Gets proteins ready for transport (finishes them) and helps complete the proteins after a ribosome builds them
- makes membranes

Structure

- rough ER - ribosomes attached; works on proteins
- smooth ER - makes membranes



What structures are found in a plant cell but NOT in an animal cell?

- **Function**

- finishes, sorts, labels & ships proteins
- like UPS headquarters
- shipping & receiving department
- ships proteins in vesicles - "UPS trucks"

Structure

- membrane sacs

