Ch. 6: A Tour of the Cell

1. Compare the 2 Types of Cells	PROKARYOTES	BOTH	EUKARYOTES
	• Domain: • Relative Size & Complexity: • No _____ • DNA in _____ • No _____ • Examples:		• Domain: • Relative Size & Complexity: • Has _____ • Has _____ • Examples:

What are ORGANELLES? Why are they **IMPORTANT**?	1. <u>Specialized structures</u> a. _____ 2. <u>Containers</u> a. _____ cell into _____ b. create different _____ i. separate pH, or concentration of materials 3. <u>Membranes as sites for chemical reactions</u> a. unique _____ of lipids & proteins b. embedded _____ & reaction centers i. chloroplasts & mitochondria
2. Why are cells so small?	1. to maintain a _____ to _____ ratio 2. Large S.A. allows _____ rates of chemical exchange between cell and environment
3. What is an example of LARGE SURFACE AREA in **animals**?	<u>Small Intestine</u>: _____ to increase _____ of nutrients • _____: finger-like projections on SI wall • _____: projections on each cell
4. What is an example of LARGE SURFACE AREA in **plants**?	_____: extensions of root epidermal cells; increase surface area for absorbing _____ and minerals
5. What JOBS do cells have?	1. 2. 3.

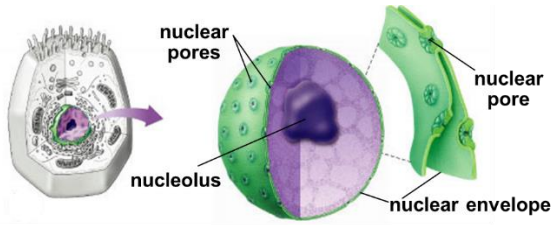
CELL ORGNAELLES, THEIR FUNCTIONS, & IMPORTANCE

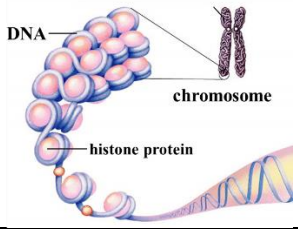
NUCLEUS

STRUCTURE:

- Surrounded by double membrane (_____)
- Continuous with the _____

- _____: control what enters/leaves nucleus
- _____: complex of DNA + proteins; makes up chromosomes
- _____: region where ribosomal subunits are made





FUNCTION:

RIBOSOMES

STRUCTURE:

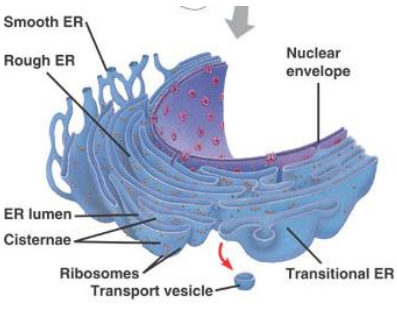
- Composed of _____ + _____
- Large subunit + small subunit

FUNCTION: _____

- Types:
  - _____ribosomes: float in cytosol, produce proteins _____cell
  - _____ribosomes: attached to ER, make proteins _____from cell or for _____

ENDOPLASMIC RETICULUM

Network of _____ and _____



ROUGH ER

STRUCTURE: _____ on surface, connects to _____ _____

FUNCTIONS:

1. package _____ for _____
2. send transport vesicles to _____ (for export)
3. make replacement _____

SMOOTH ER

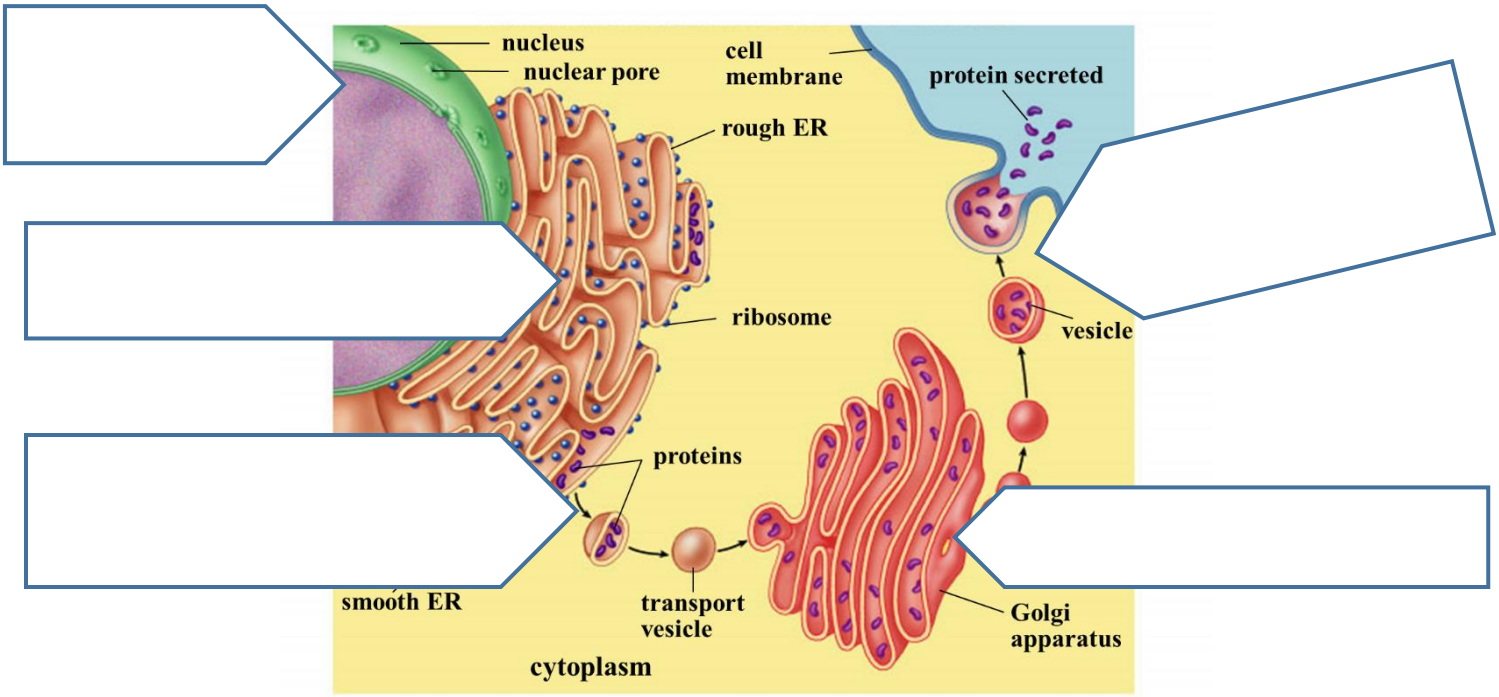
STRUCTURE:
no ribosomes on surface

FUNCTIONS:

1. synthesize _____
2. metabolize _____ (glycogen → glucose)
3. _____ drugs & poisons (liver), _____ Ca^{2+}

GOLGI APPARATUS (GOLGI BODY)	***STRUCTURE***: ○ Series of flattened _____ _____ (cisternae) ○ ***Cis* face**: _____ vesicles ○ ***Trans* face**: _____ vesicles ***FUNCTION:*** _____/finish, _____, _____, and _____ proteins (in vesicles)
4. Describe the "order" of how proteins are made.	The protein assembly line is part of the **ENDOMEMBRANE SYSTEM**. Which organelles are included?

Draw a line to show the process/order of how proteins are made all the way to excretion. Be able to explain what is ***happening*** at each cellular site.



LYSOSOMES lyse– = break apart –some = body	***STRUCTURE***: ○ membrane sac of _____ ○ Contains hydrolytic enzymes (like an _____ environment; good ex. of _____)
	FUNCTION: ○ _____ food ○ digest _____(and worn out) cell organelles/parts ○ _____ cell's materials ○ programmed cell death **(**_____**)** – examples:

TEST YOUR UNDERSTANDING: A cell is treated with a chemical that prevents new lysosomes from forming. The cell continues to produce hydrolytic enzymes normally stored inside lysosomes. Where will these enzymes most likely accumulate in the cell? Why?

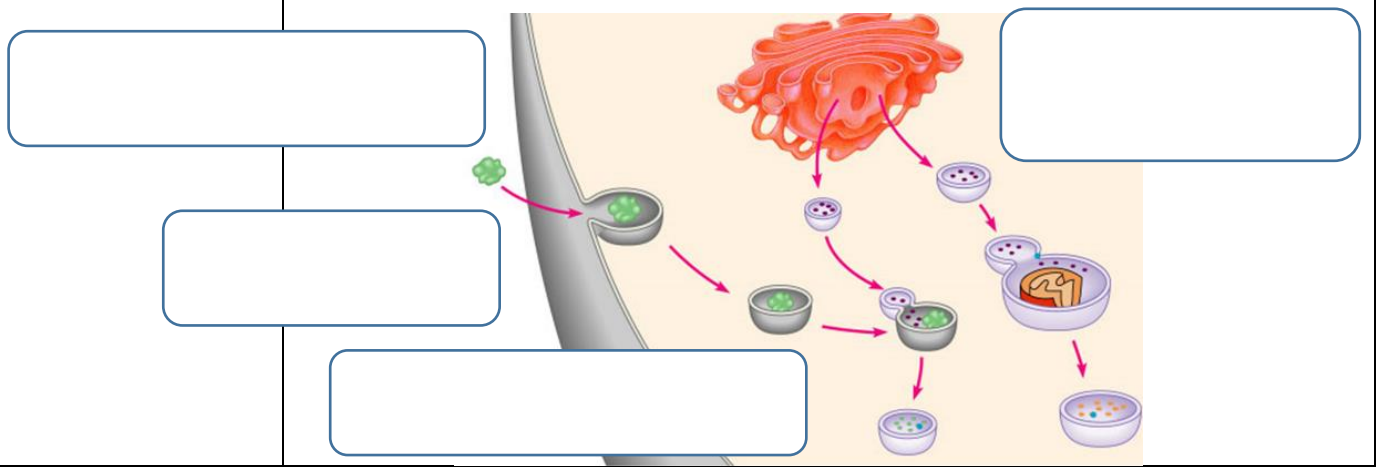
VACUOLES & VESICLES

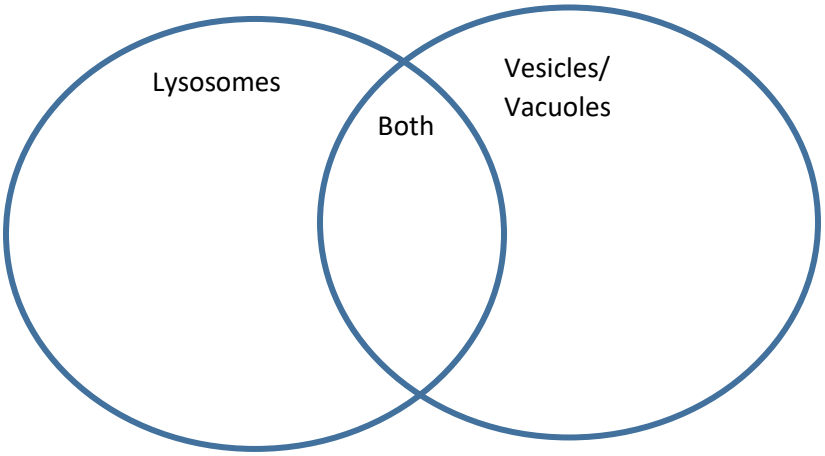
STRUCTURE:

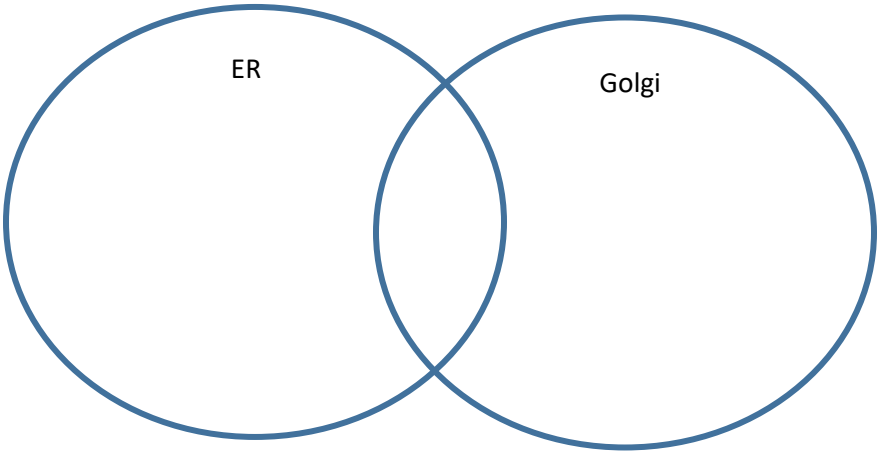
FUNCTION:

Types:

Difference in plant vs animal cells?

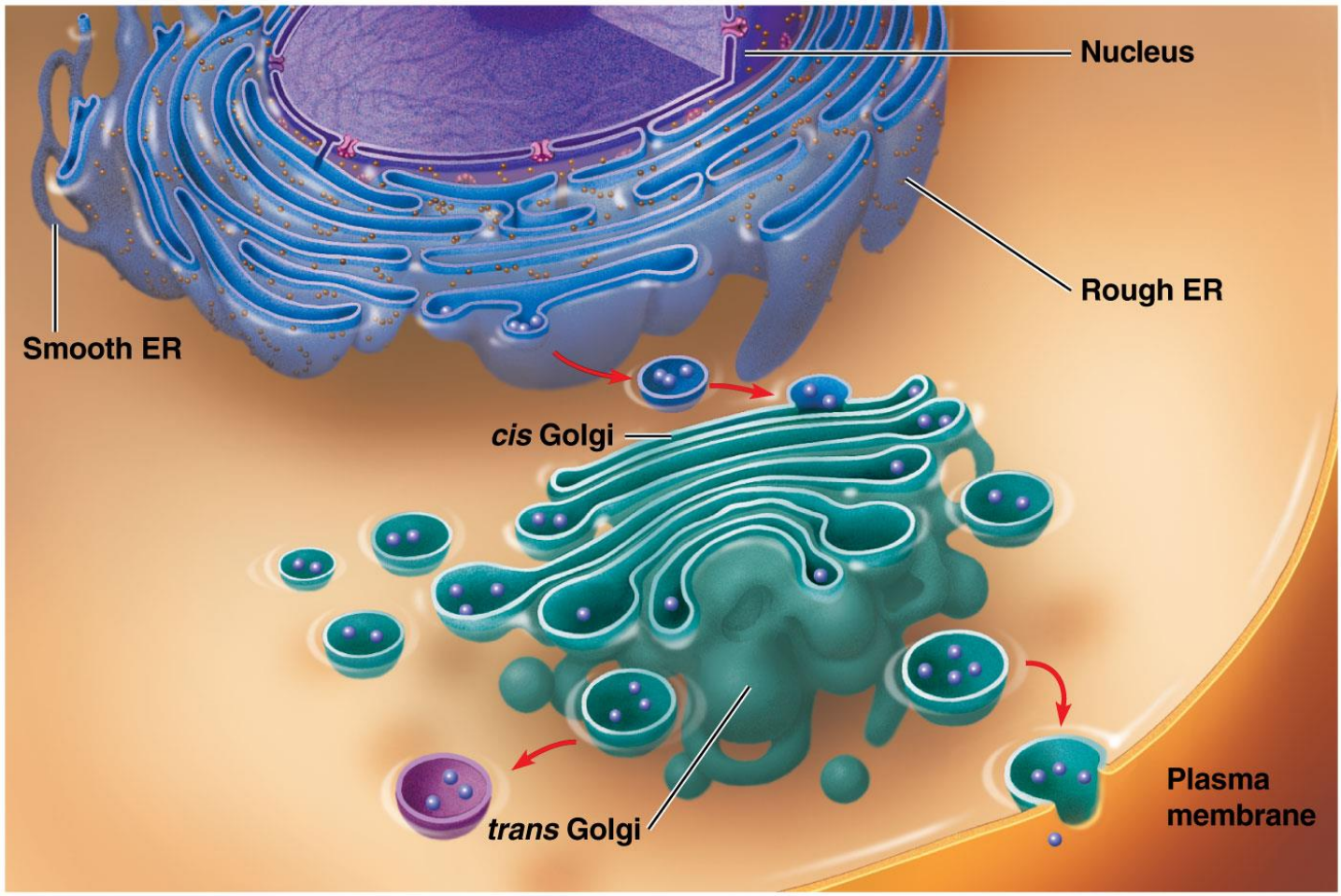






Summary: Endomembrane Transport of Proteins

- Know the sequence of organelles involved.
- Know what happens at each step along the way.



1.

2.

3.

4.

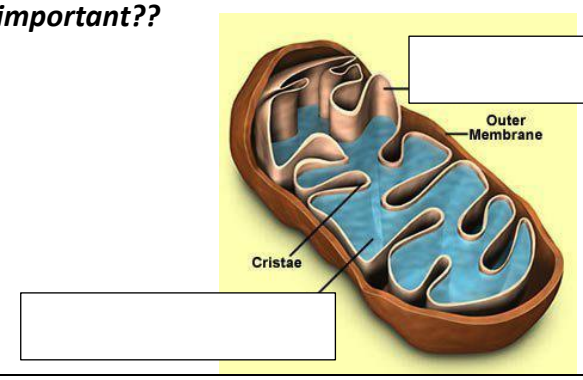
5.

MITOCHONDRIA

STRUCTURE:

- 2 membranes
  - smooth _____ membrane
  - highly _____ inner membrane = _____
- internal fluid-filled space= _____
  contains: _____, _____ & enzymes

Why is a double membrane important??



FUNCTION:

- _____: generate _____ from breakdown of _____, fats & other fuels in the presence of _____
- break down larger molecules into smaller to generate energy = _____
- generate energy in presence of O_2 = _____ respiration

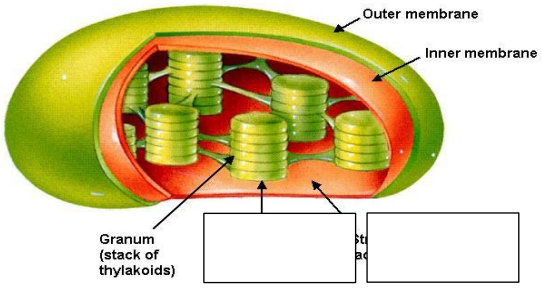
CHLOROPLAST

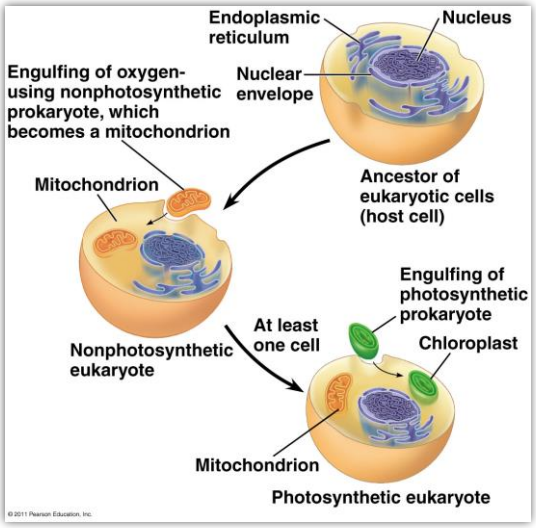
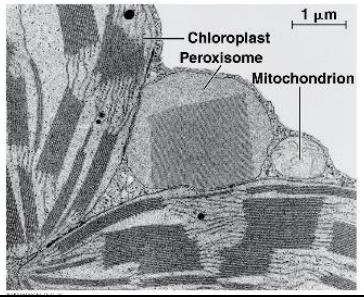
- Found only in _____ cells
- class of plant structures = _____
  - amyloplasts - store _____ in roots & tubers
  - chromoplasts - store _____ for fruits & flowers
  - chloroplasts store _____ & function in photosynthesis in leaves

STRUCTURE:

- 2 membranes
- _____ = internal fluid-filled space containing:
  - DNA, ribosomes & enzymes
  - _____ = membranous sacs where _____ is made
    - _____ = stacks of thylakoids

Why internal sac membranes?



	FUNCTION _____: • generate ATP & synthesize _____ • transform _____ energy into _____ energy • produce sugars from _____ & _____
5. ENDOSYMBIONT THEORY 	What does the theory state? Why are chloroplasts and mitochondria evidence of this? What were the advantages to being an endosymbiont? 
PEROXISOMES	***FUNCTIONS***: A. break down _____ (and send to mitochondria for fuel) B. detox _____ a. Involves production of _____ (H_2O_2) 

CYTOSKELETON

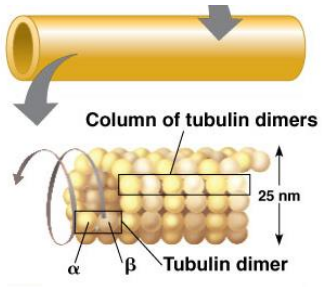
STRUCTURE: network of _____ fibers

FUNCTION:

1. _____ 2. _____ 3. regulate biochemical activities

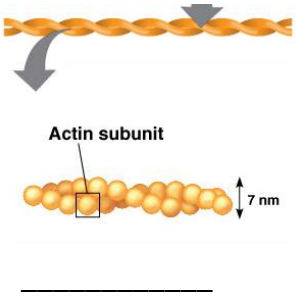
Microtubules

- Protein = _____
- _____ fibers
- Shape/_____ cell
- Track for _____ movement
- Forms _____ for mitosis/meiosis
- Component of _____



Microfilaments

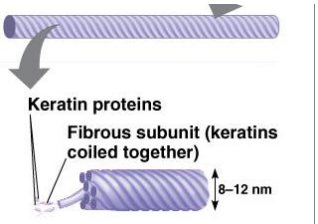
- Protein = _____
- _____ fibers
- Support cell on smaller scale
- _____
- Eg. ameboid movement, cytoplasmic streaming, _____ cell



_____

Intermediate Filaments

- Intermediate size
- _____ fixtures
- Maintain shape of cell
- Fix position of organelles



CENTROSOMES vs. CENTRIOLES

Centrosomes

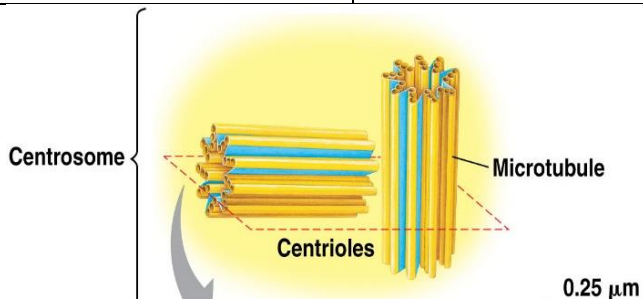
- region from which _____ grow
- Also called *microtubule organizing center*

Centrioles

STRUCTURE: one _____ in each cell

FUNCTION: help coordinate _____ _____

only in _____ cells



<table>
<tr><td>CILIA & FLAGELLA</td><td colspan="3">• _____: long and few; propel through water
• _____: short and numerous; locomotion or move fluids
• Have “9+2 pattern” of microtubules</td></tr>
<tr><td>EXTRACELLULAR MATRIX (ECM)</td><td colspan="3">STRUCTURE:
• _____ plasma membrane
• Composed of _____ (ex. collagen)

FUNCTION: _____ tissues and transmits external _____ to cell</td></tr>
<tr><td rowspan="2">INTERCELLULAR JUNCTIONS in ANIMAL CELLS</td><td>Tight junctions</td><td>Desmosomes</td><td>Gap Junctions</td></tr>
<tr><td>2 cells are _____ to form _____ seal</td><td>“_____” that fasten cells into strong sheets</td><td>_____ through which ions, sugar, small molecules can pass</td></tr>
<tr><td rowspan="2">INTERCELLULAR JUNCTIONS in PLANT CELLS</td><td colspan="2">Cell Wall</td><td>Plasmodesmata</td></tr>
<tr><td colspan="2">• protect plant, maintain shape
• Composed of _____</td><td>_____ between cells to allow passage of molecules</td></tr>
</table>

TEST YOUR UNDERSTANDING:

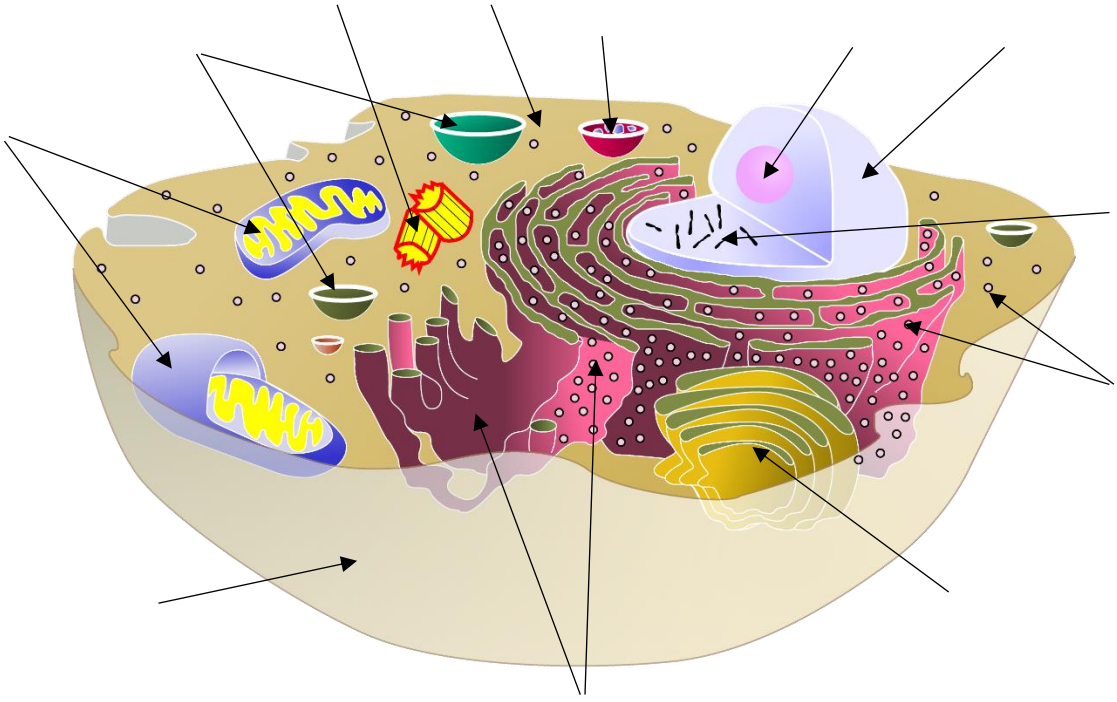
One of the key innovations in the evolution of eukaryotes from a prokaryotic ancestor is the endomembrane system. What eukaryotic organelles or features might have evolved as a part of, or as an elaboration of, the endomembrane system?
A) plasma membrane
B) chloroplasts
C) mitochondria
D) nuclear envelope
E) none of these

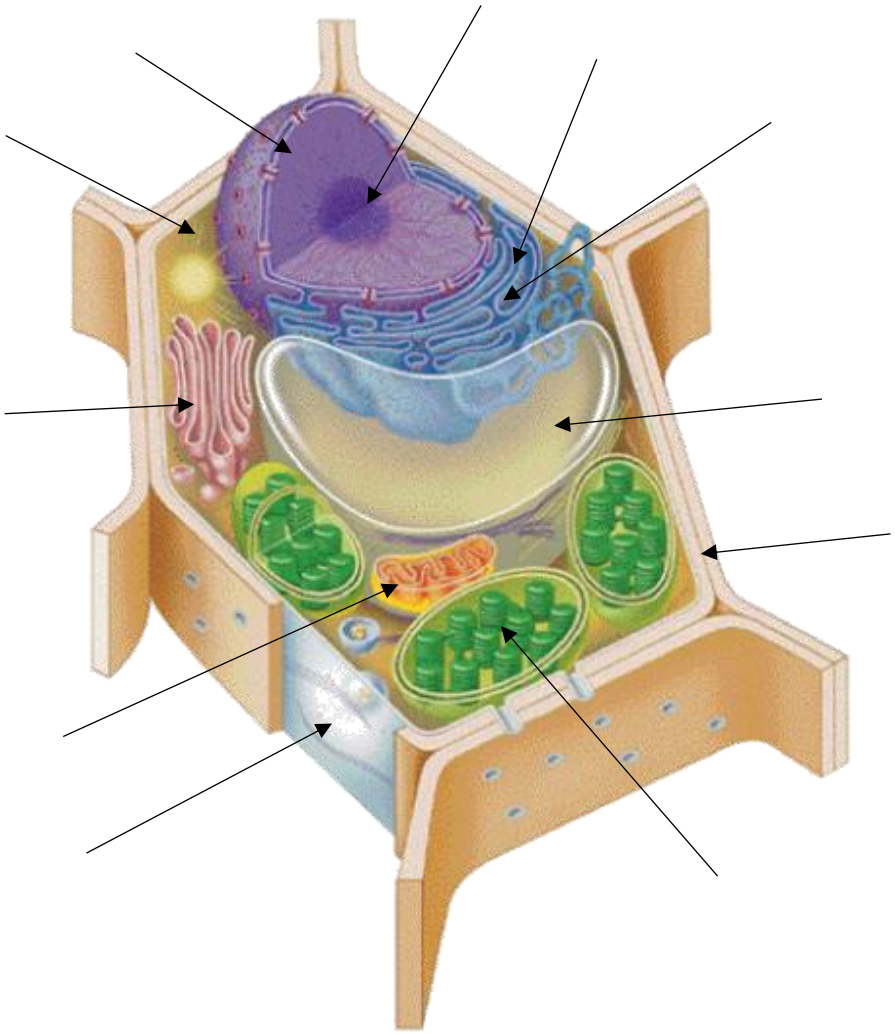
Why isn't the mitochondrion classified as part of the endomembrane system?
A) It is a static structure.
B) Its structure is not derived from the ER or Golgi.
C) It has too many vesicles.
D) It is not involved in protein synthesis.
E) It is not attached to the outer nuclear envelope.

Centrioles, cilia, flagella, and basal bodies have remarkably similar structural elements and arrangements. Which of the following hypotheses is most plausible in light of such structural similarities?
A) Cilia and flagella arise from the centrioles.
B) Loss of basal bodies should lead to loss of all cilia, flagella, and centrioles.
C) Motor proteins such as dynein must have evolved before any of these four kinds of structure.
D) Cilia and flagella coevolved in the same ancestral eukaryotic organism.
E) Natural selection for cell motility repeatedly selected for microtubular arrays in circular patterns in the evolution of each of these structures.

Summary: Plant Cells ONLY vs Animal Cells ONLY – look back at your notes and fill in the chart.

Plant Cells ONLY	Animal Cells ONLY





ORGANELLE – FUNCTION MATCHING

1. _____Nucleus	A. controls movement of materials in & out
2. _____ Ribosome	B. make ATP in cellular respiration
3. _____ Rough ER	C. jelly-like material holding organelles in place
4. _____ Golgi Apparatus	D. Synthesize lipids, detox
5. _____ Lysosomes	E. finishes, packages & ships proteins
6. _____ Vacuole	F. storage
7. _____Mitochondria	G. control cell, protects DNA
8. _____ Chloroplast	H. processes proteins and sends in vesicles to Golgi, makes membranes
9. _____Peroxisome	I. Support & protection
10. _____Cytoskeleton	J. make proteins
11. _____Centrioles	K. transport inside cells
12. _____ Nucleolus	L. Role in cell division in animal cells
13. _____ Cell wall	M. make ribosomes
14. _____ Cell Membrane	N. break down fatty acids, detox alcohol, produces H_2O_2
15. _____ Cytoplasm	O. food digestion, garbage disposal, recycling. & apoptosis
16. _____ Vesicle	P. support, motility, regulate biochemical activities
17. _____ Smooth ER	Q. make ATP & sugars in photosynthesis