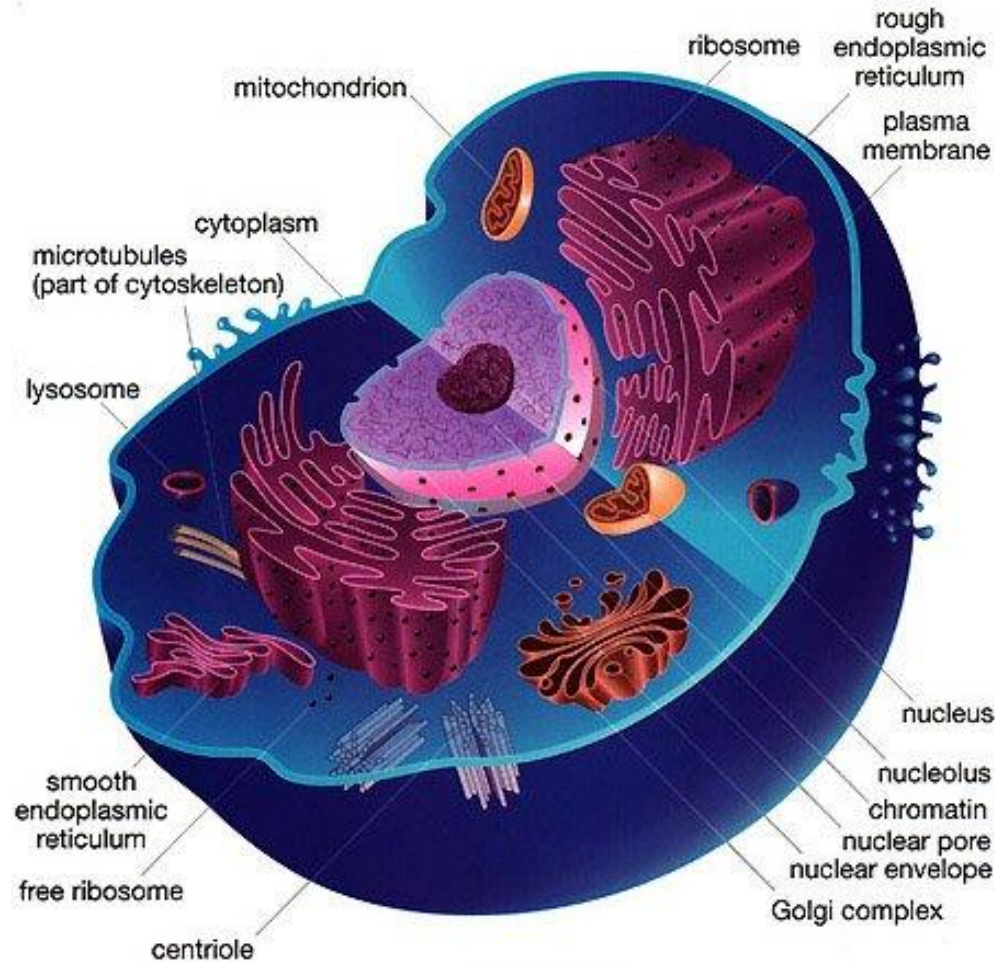


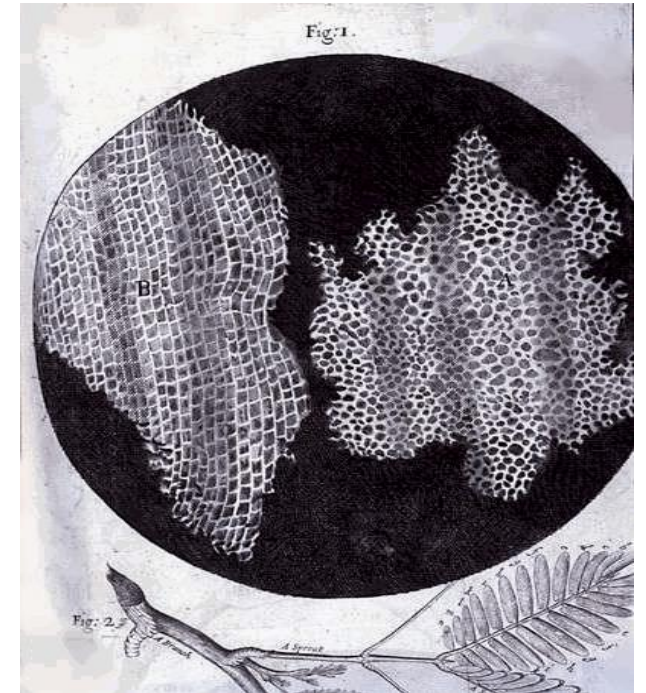
Video- Biovisions Inner Life of the
Cell (computer animation of
organelles set to music)

The Cell Theory





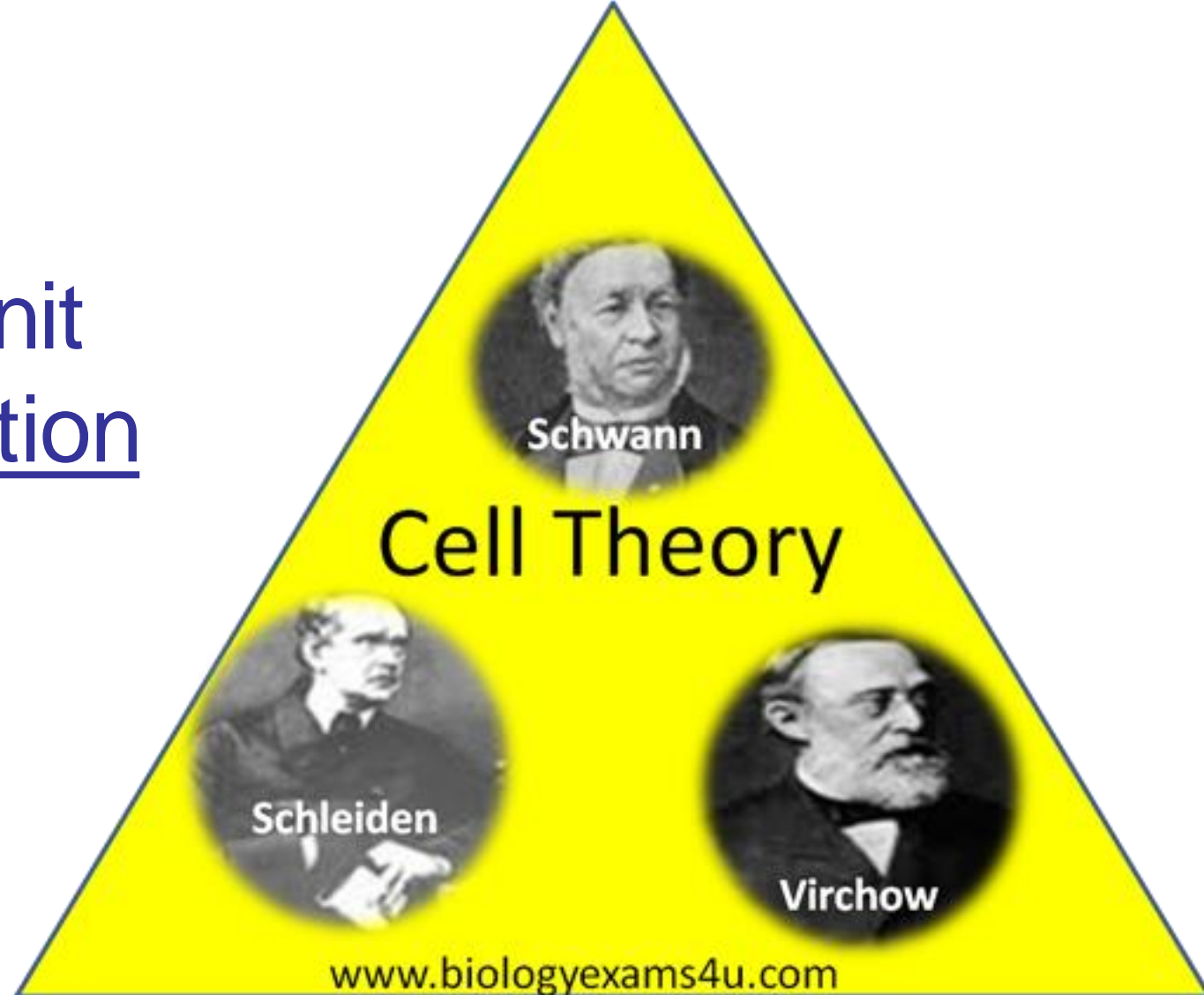
Robert Hooke
(1635-1703)



- The discovery of cells and their structure is linked to the development of the magnifying lenses, particularly the **microscope** in the late 1600's. In 1665 Robert Hooke coined the term "**cells**" after observing a slice of **cork** under a simple microscope.
- Many scientists of the time recognized the importance of cells as **building blocks** of living tissue. But not until **1838** did the general statement of "**cell theory**" receive general acceptance

The Cell Theory States:

1. All living things are made up of cells.
2. Cells are the basic unit of structure and function in all living things.
3. Cells arise from pre-existing cells.



Exceptions to the Cell Theory:

1. Where did the first cell come from?

2. Viruses

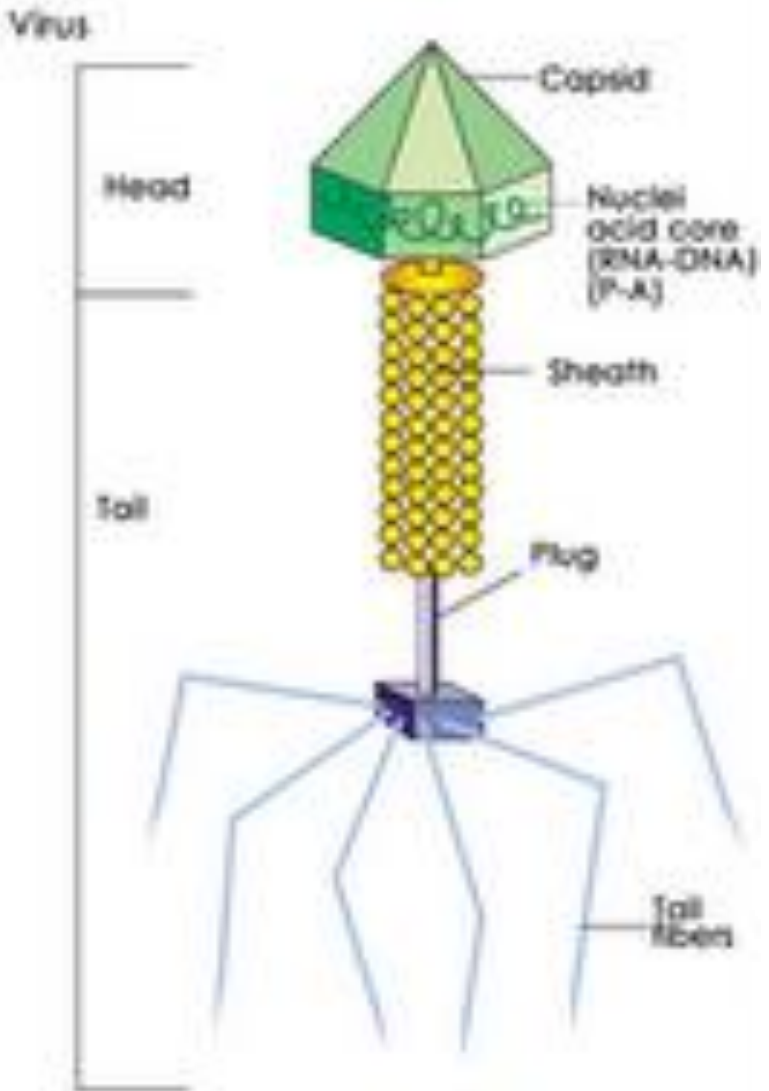
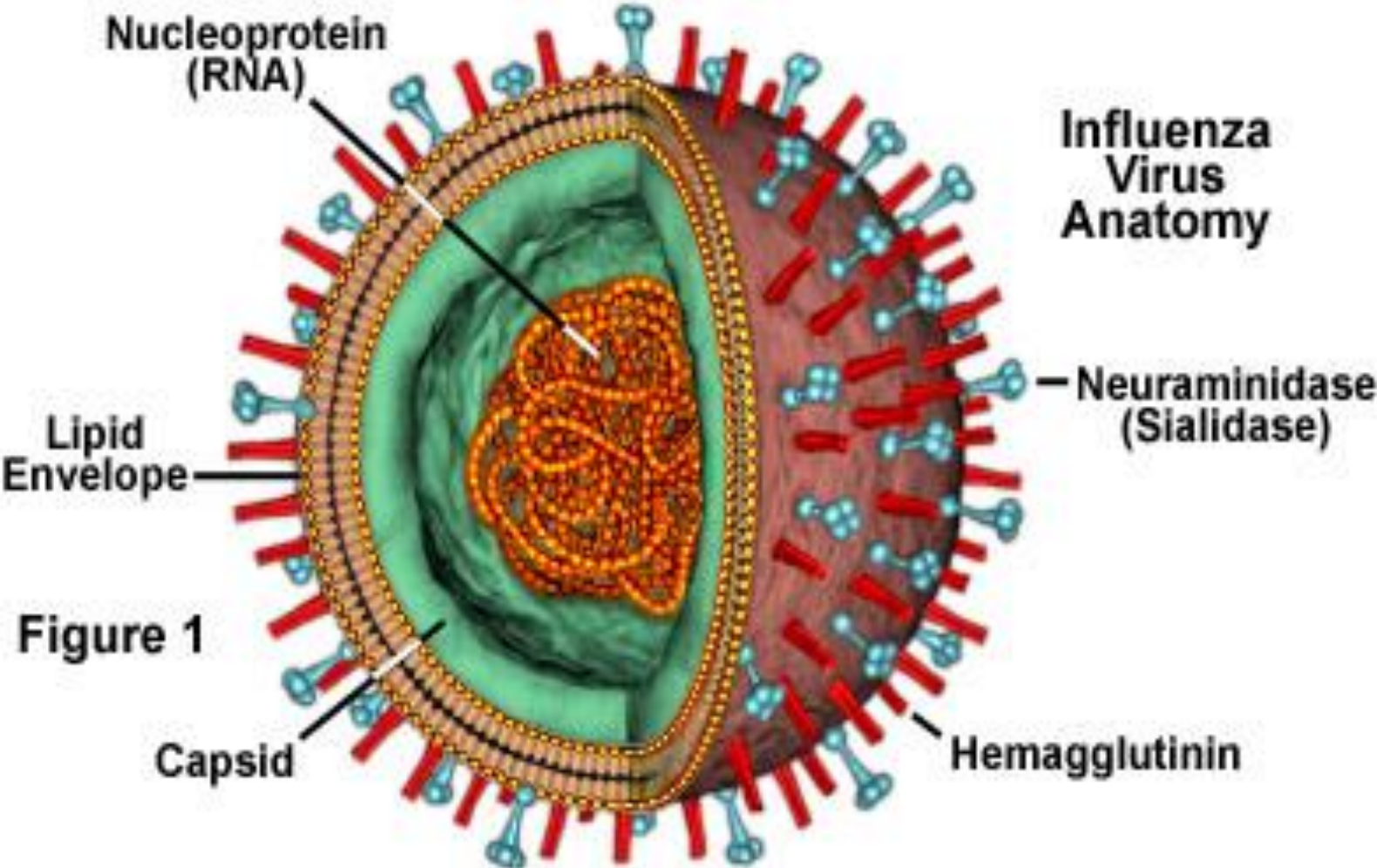
- have a non-cellular structure and can only REPRODUCE within a host cell

3. Mitochondria & Chloroplasts

- have their own DNA
- can reproduce within a cell

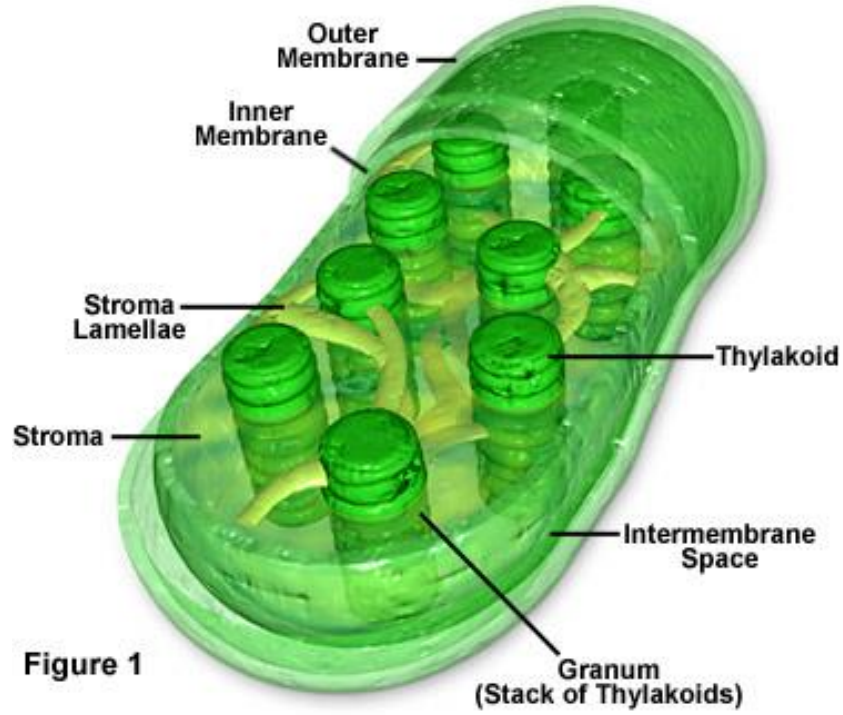


Viruses

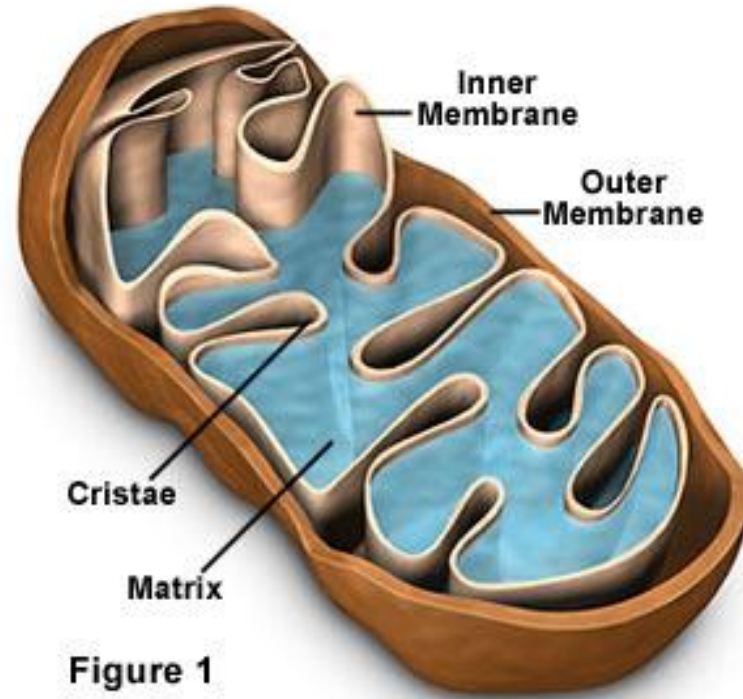


[Are Viruses Alive? - YouTube](#)

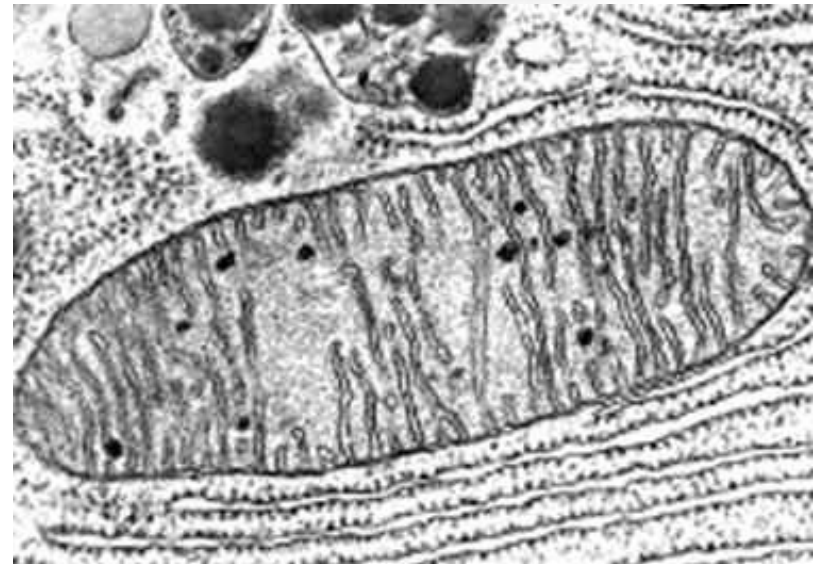
Chloroplast



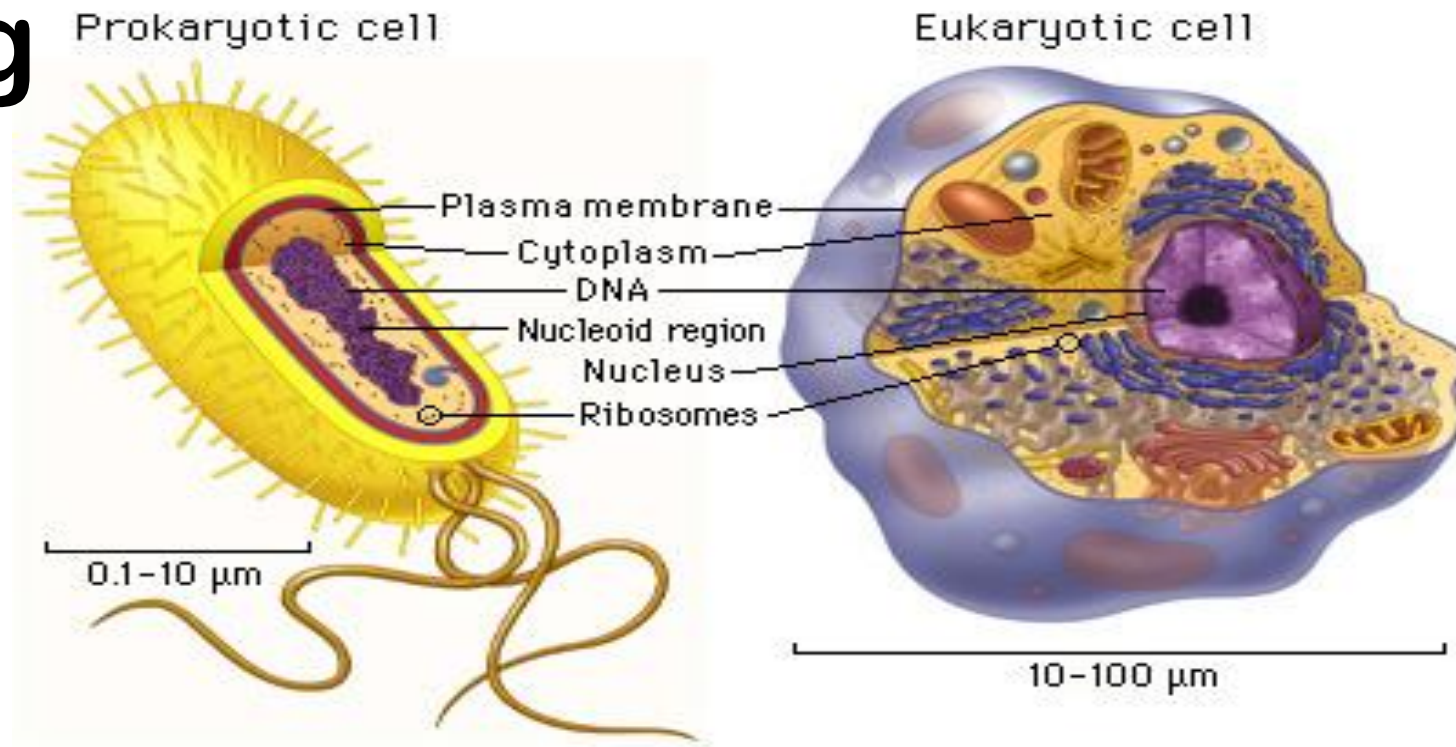
Mitochondria



[Video - Endosymbiotic Theory](#)



Categorizing Cells

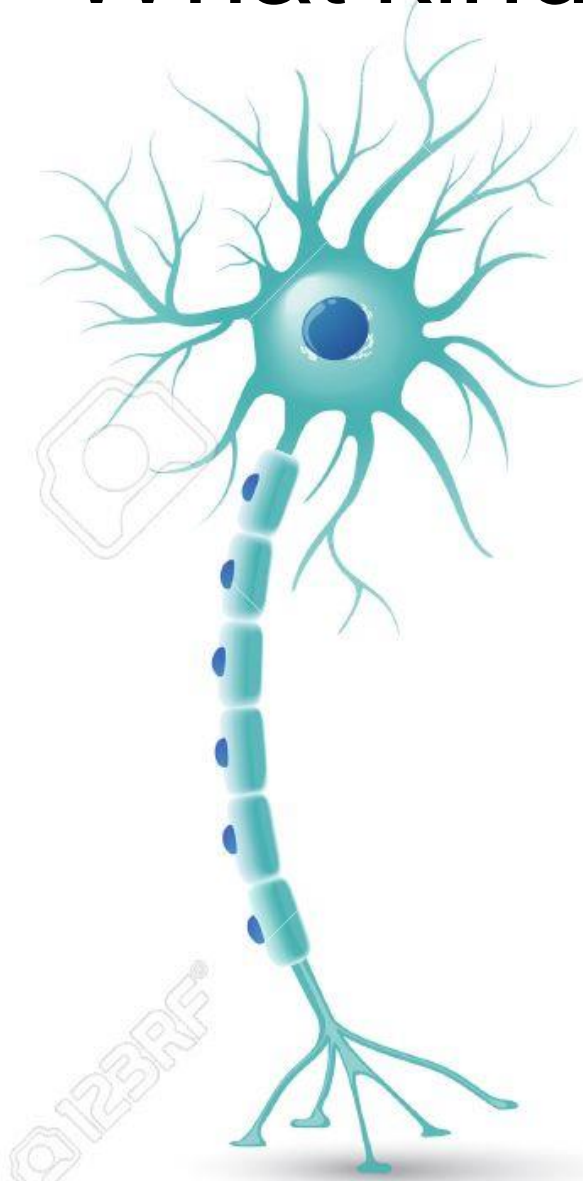


[Video - Specialized Cells: Significance & Examples \(Amoeba Sisters\)](#)

Prokaryotes: simple cells with no nuclear membrane and few organelles (ex. bacteria, archaea)

Eukaryotes: complex cells with nuclei & many cell organelles (Animals, plants, fungi, protists)

What kinds of cell types do you know?

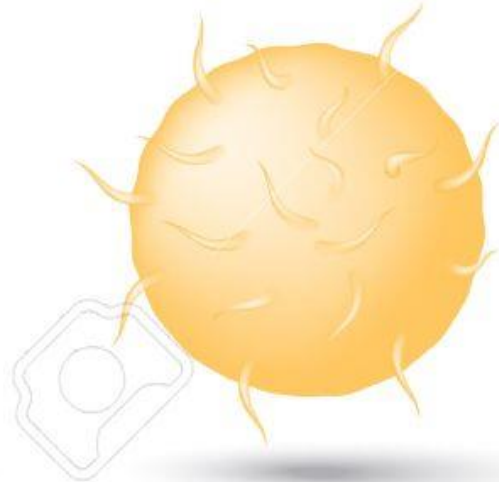


Motor neuron

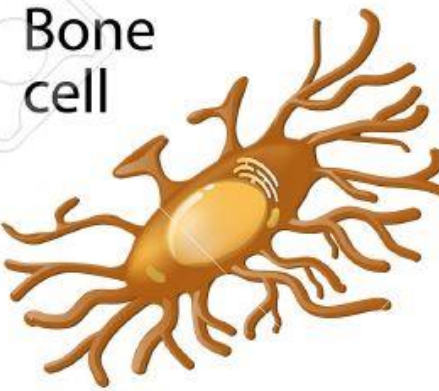
Red blood cell



White blood cell



Cells in the inner lining of the intestine



Bone cell

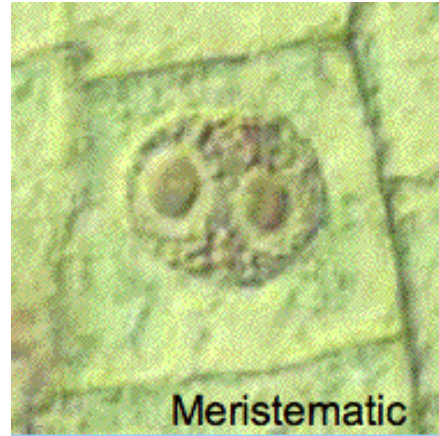
Ovum



Sperm cell

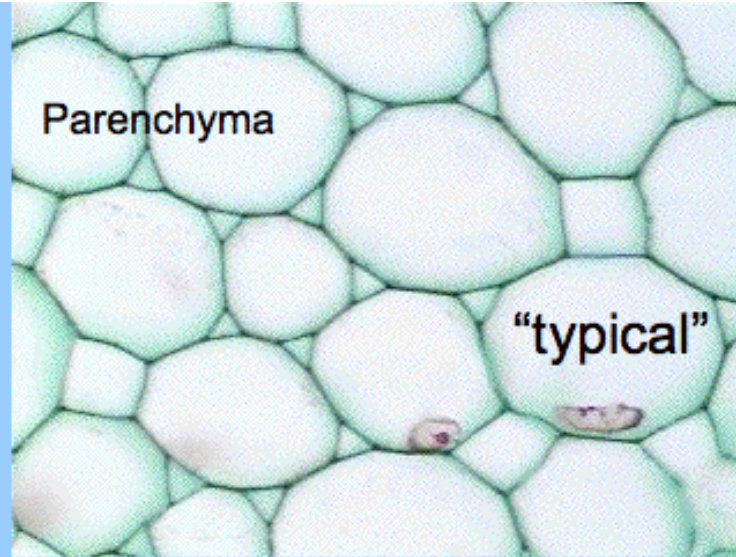


What kinds of cell types do you know?

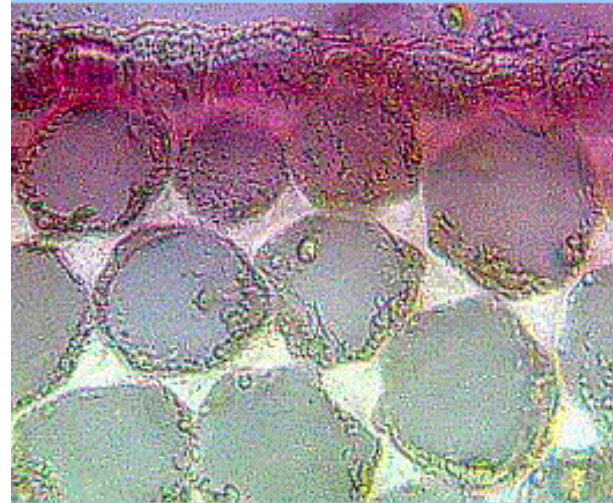


Meristematic

Some Plant Cell Types

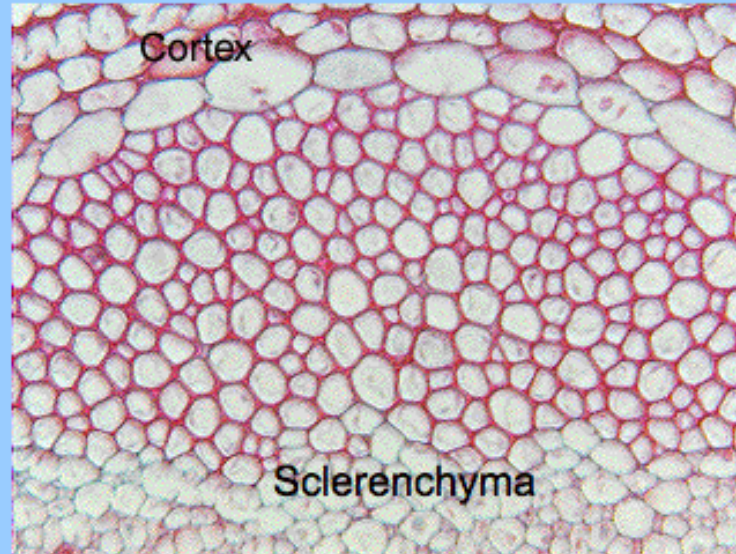


<http://www.mhhe.com/biosci/pae/botany/histology/images/parench.jpg>



Collenchyma

<http://www.biologie.uni-hamburg.de/b-online/fo06/01.jpg>



<http://www.sbs.utexas.edu/mauseth/web/lab/webchap11stem/web11.5-15.jpg>



Guard cells

**Vacuole /
vesicle**

**Cell Wall
(plant only)**

**Nuclear
Pores**

Lysosome

Cytoplasm

Nucleus

Nucleolus

Mitochondria

Ribosomes

**Chloroplast
(plant only)**

**Golgi
Complex**

**Cell
Membrane**

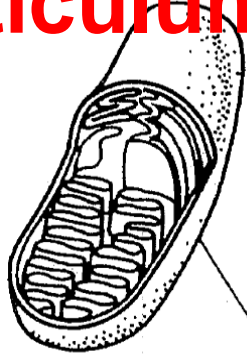
**Endoplasmic
Reticulum**

**Microtubules &
Microfilaments**

**Nuclear
Membrane**

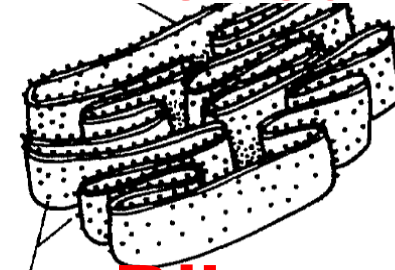
**Centrioles
(animal only)**

3. **Smooth Endoplasmic Reticulum**



4. **Vacuole / vesicle**

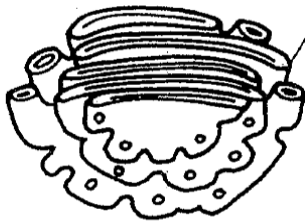
5. **Rough Endoplasmic Reticulum**



2. **Mitochondria**

1. **Cell Membrane**

14. **Golgi Complex**



13. **Centrioles**

12. **Nuclear Membrane**

6. **Ribosomes (attached / free)**

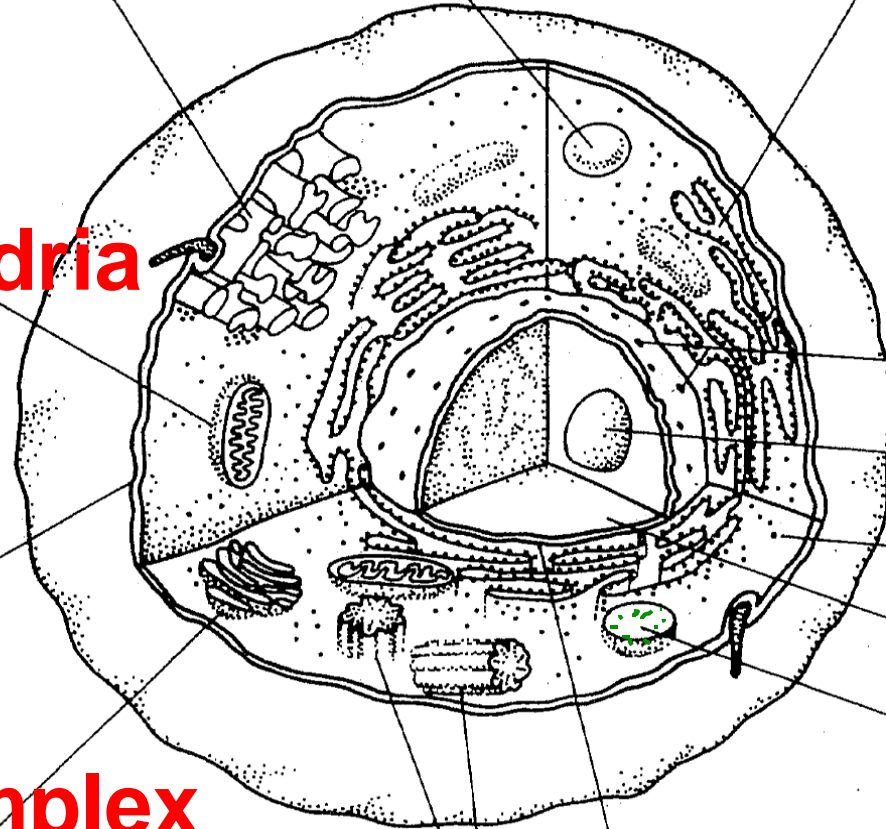
7. **Nuclear Pore**

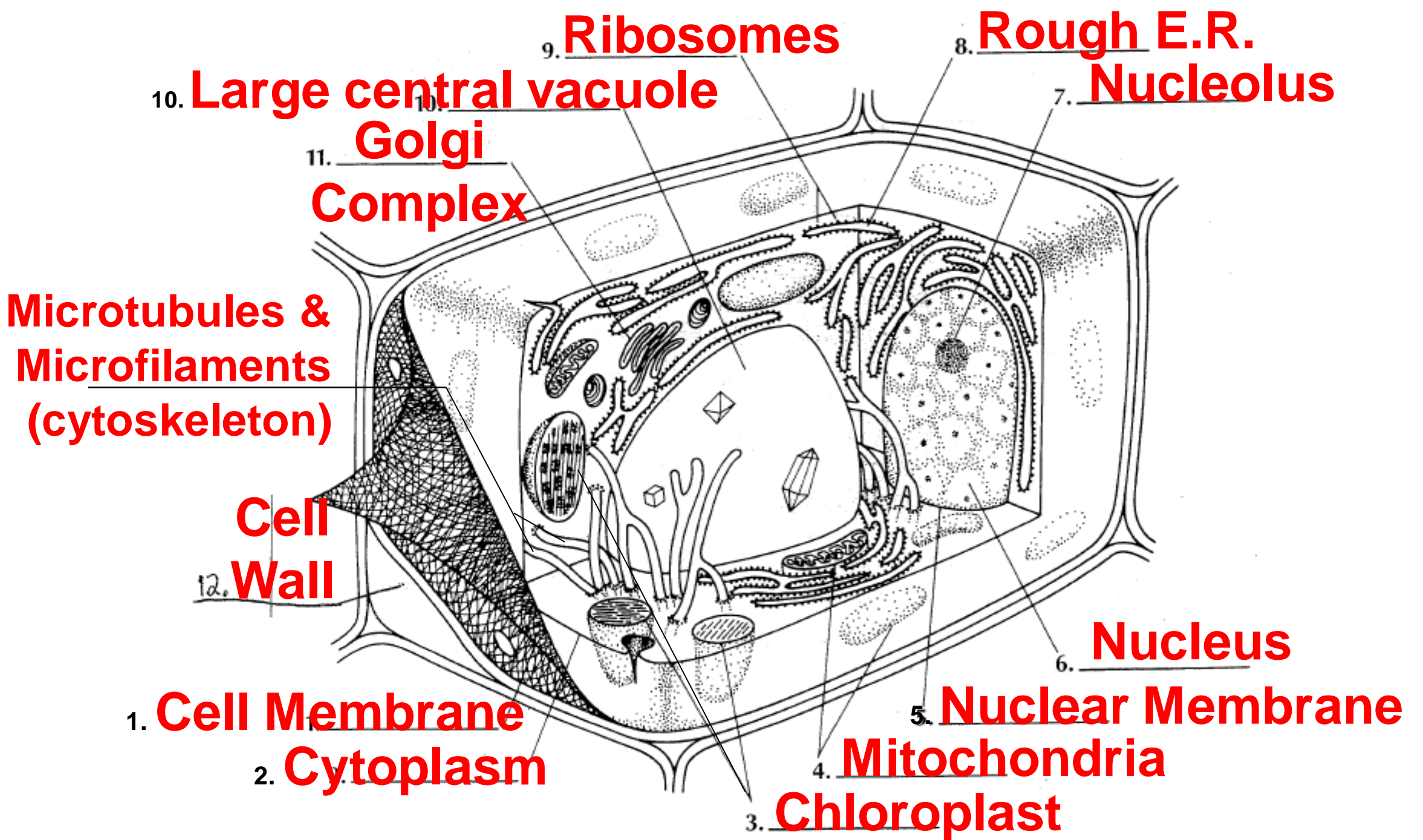
8. **Nucleolus**

9. **Cytoplasm**

10. **Nucleus**

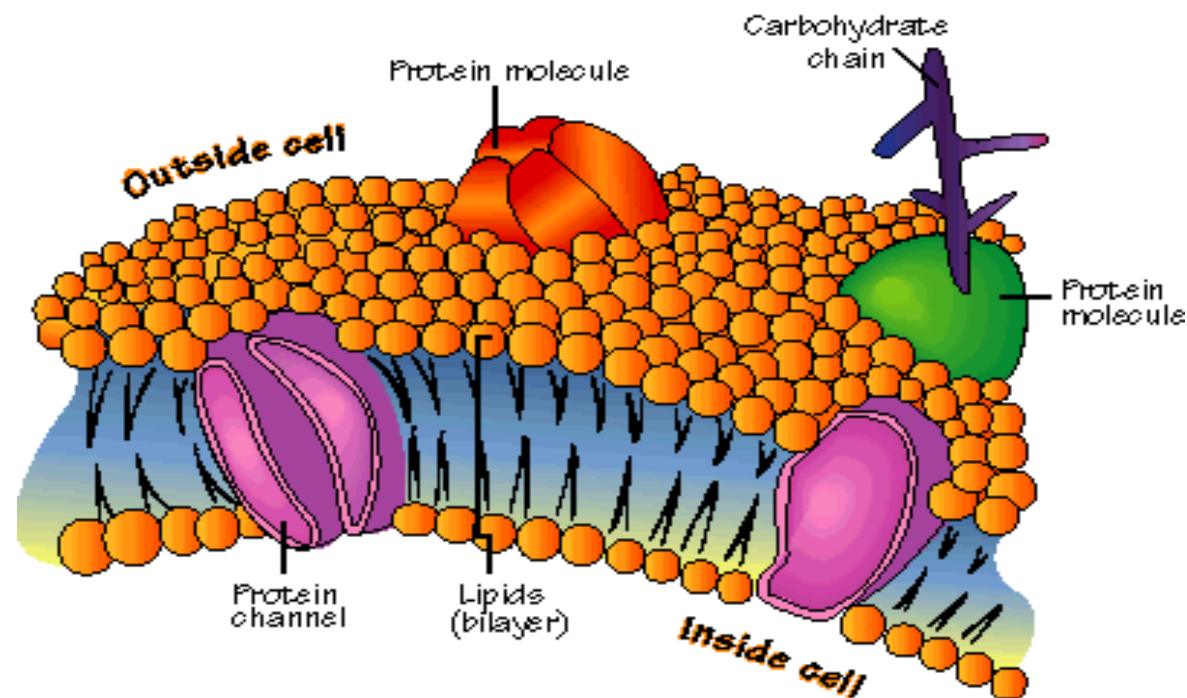
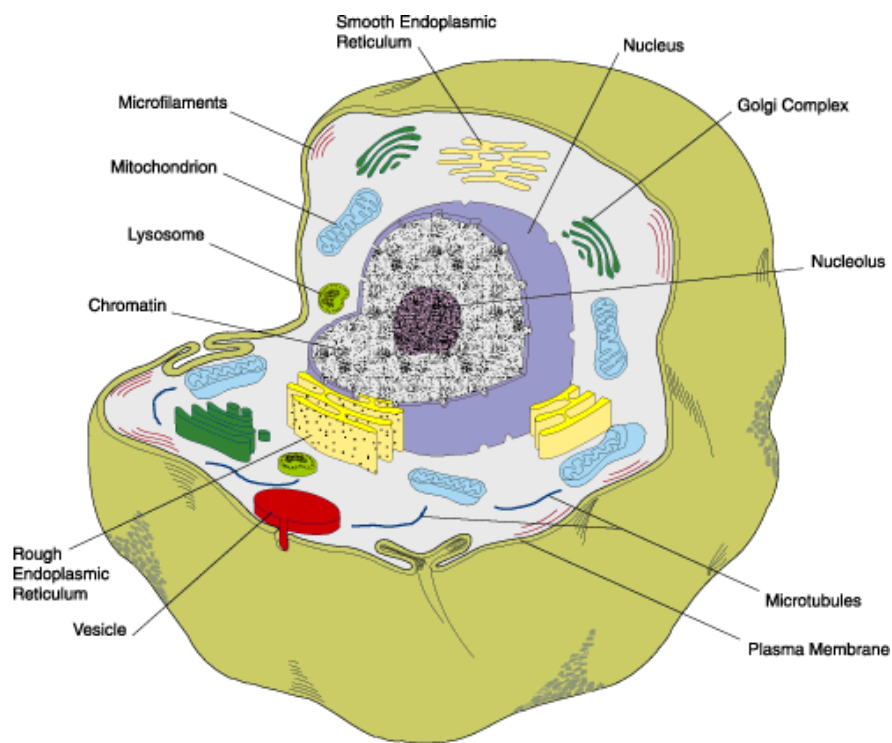
11. **Lysosome**





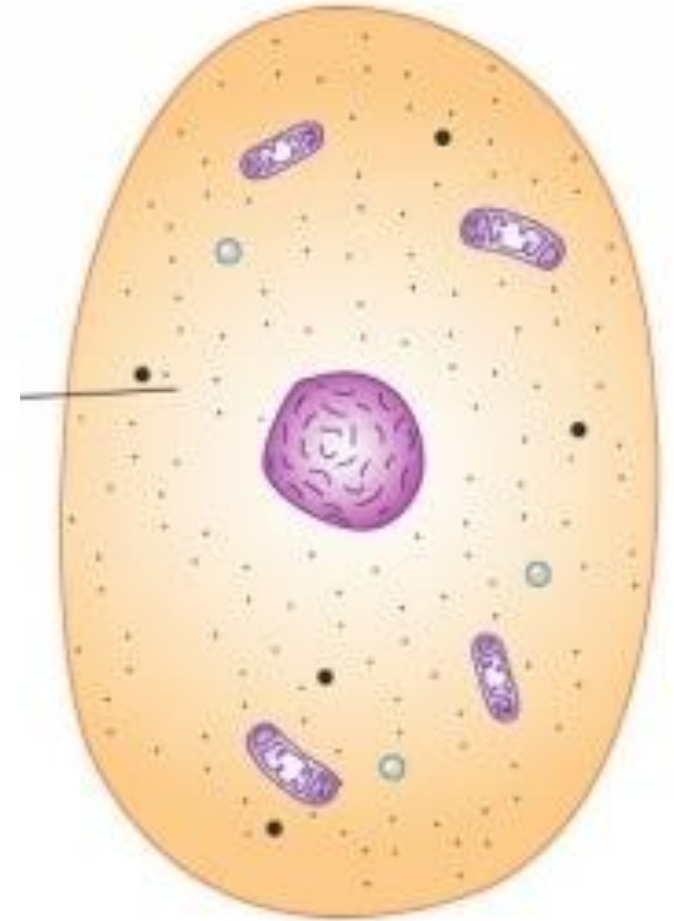
Cell (Plasma) Membrane

- Regulates movement of materials into & out of the cell
- “selectively permeable”
- Contains Receptors for cellular communication



Cytoplasm

- Watery jelly-like medium
- Circulates materials around the cell (cyclosis)
- Site for many chemical reactions



Nucleus

- Contains the genetic information (chromosomes, genes, DNA)
- Controls and directs the cell's activities
- Has a porous membrane

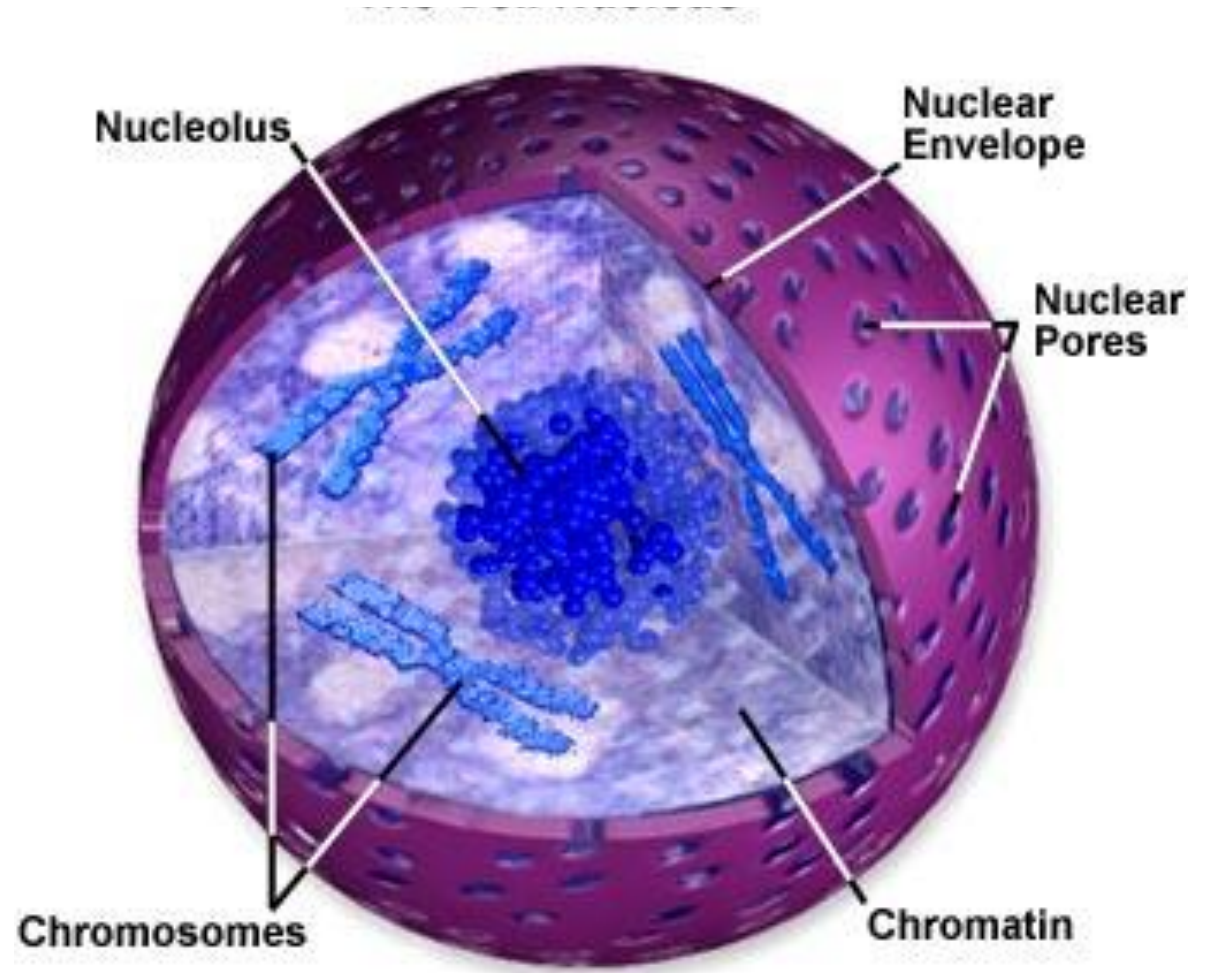


Figure 1

Nucleolus

- Builds Ribosomes
which make
proteins
- Contains
messenger RNA

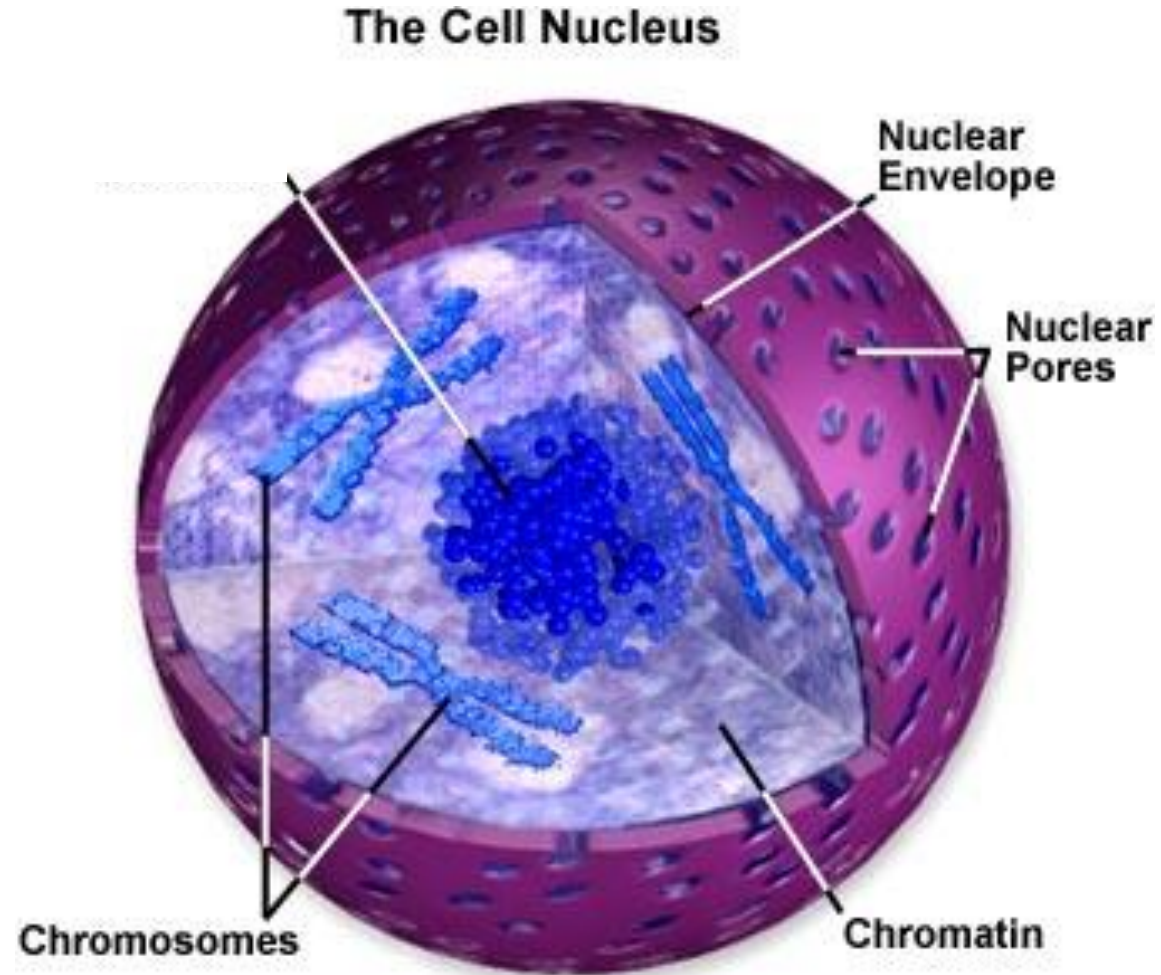
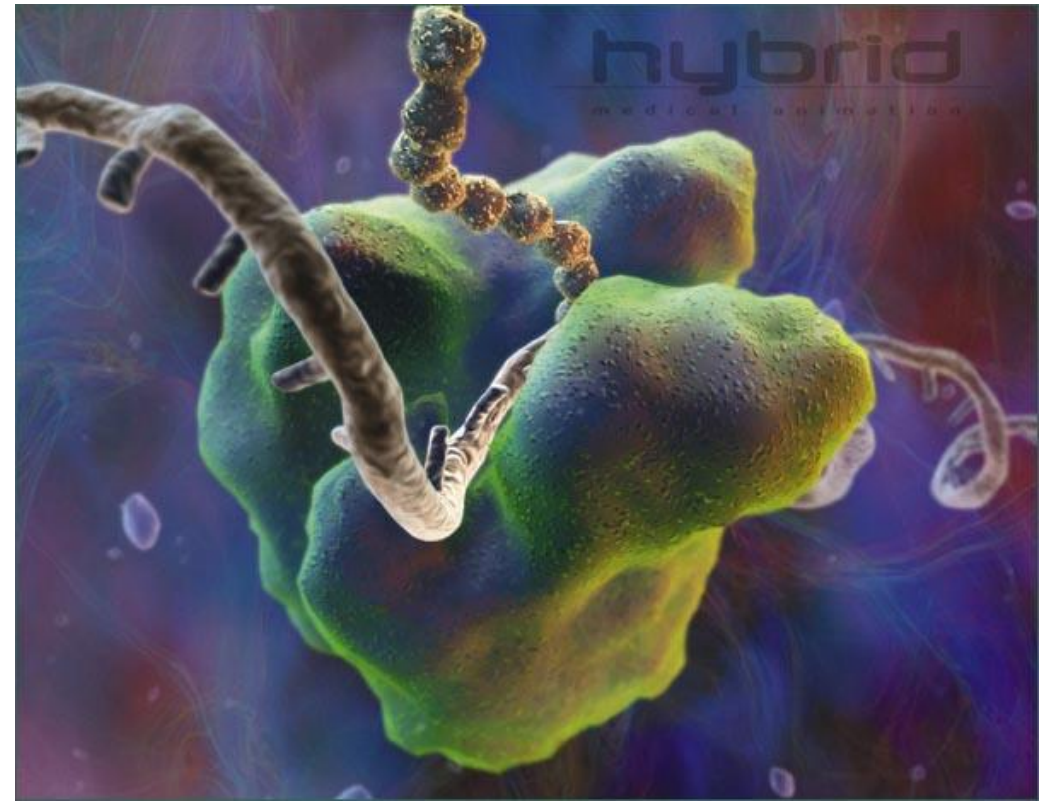
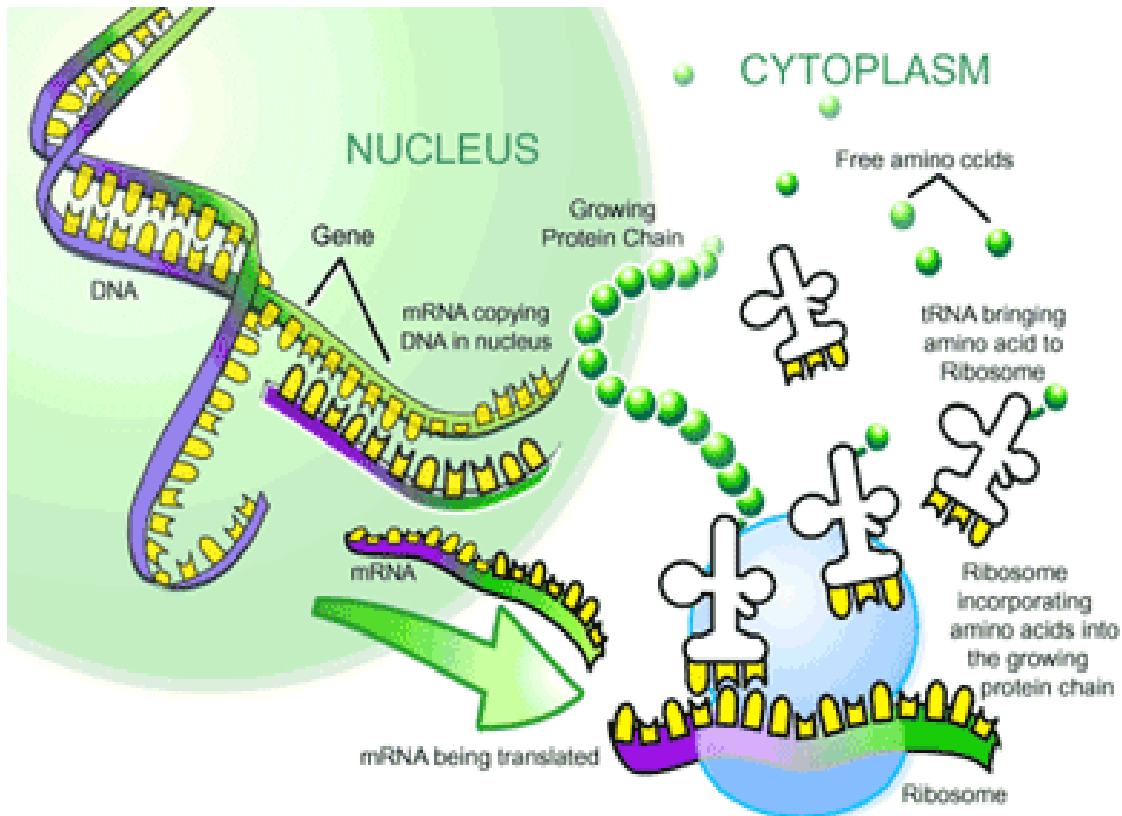


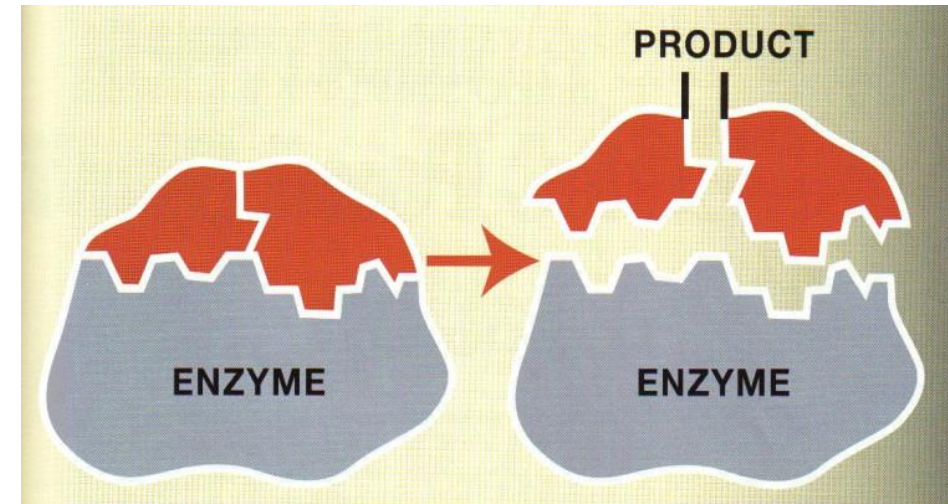
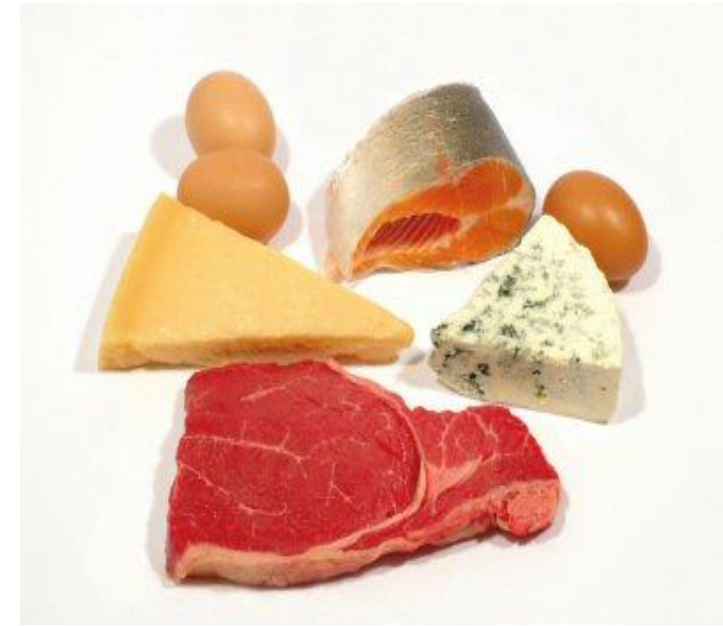
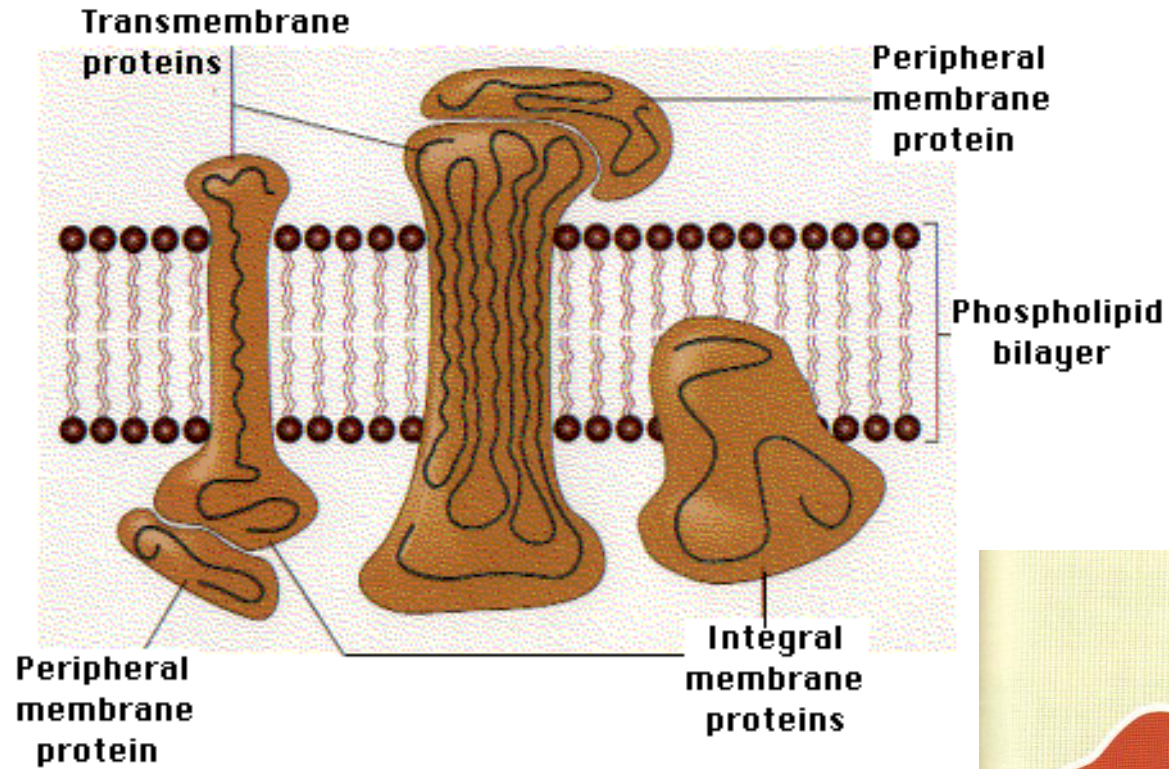
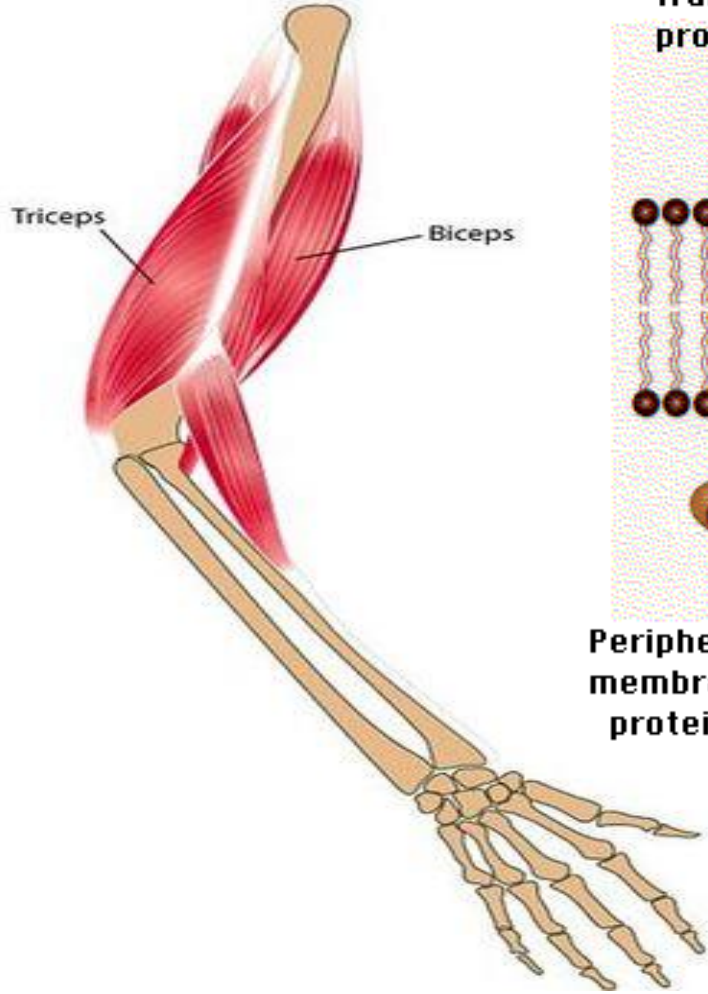
Figure 1

Ribosomes

- Site of protein synthesis (the main job of the cell)
 - building proteins out of amino acids)
- NOTE: These proteins are **NOT** food for the cell!



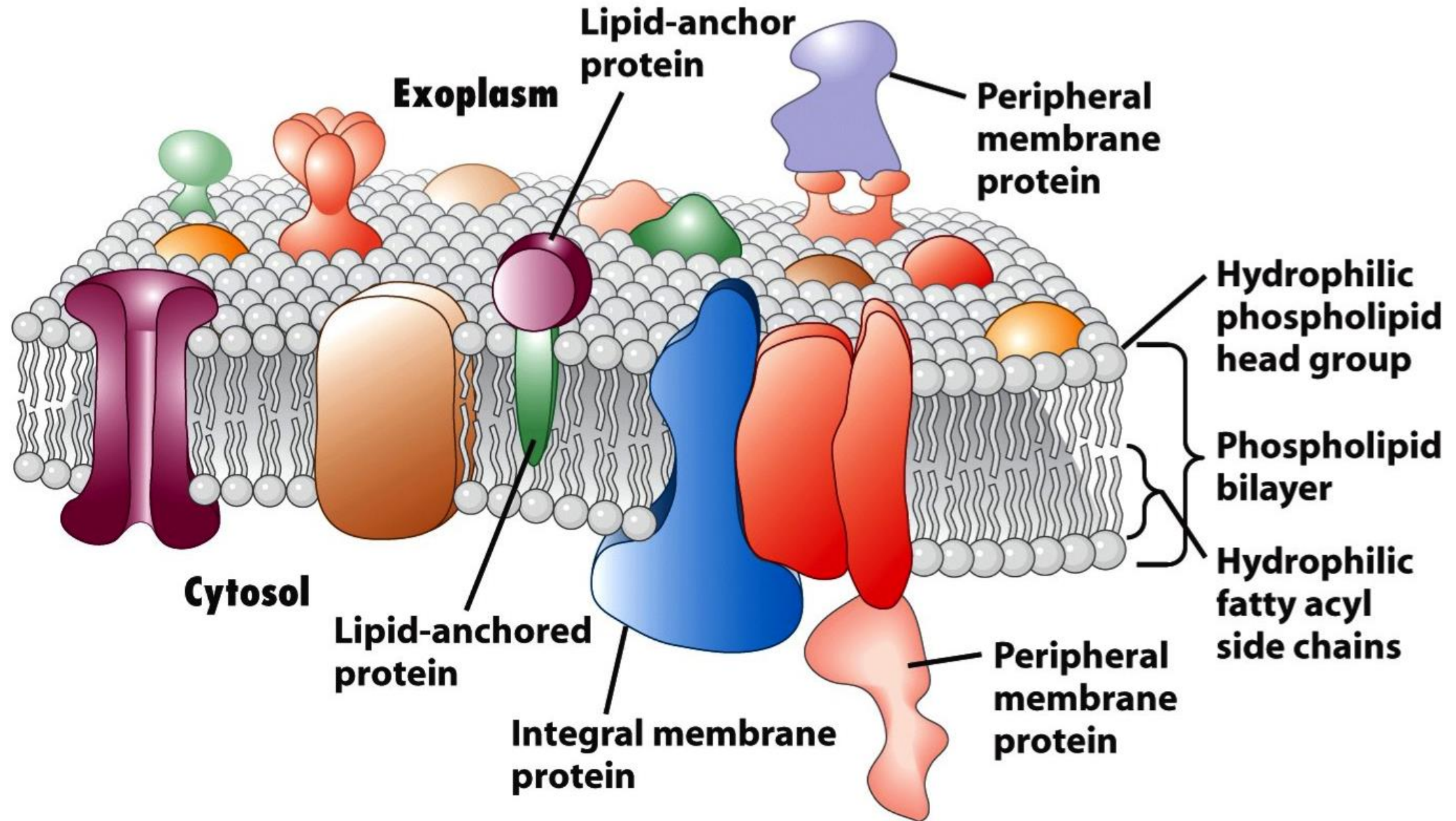
Examples of Important Proteins



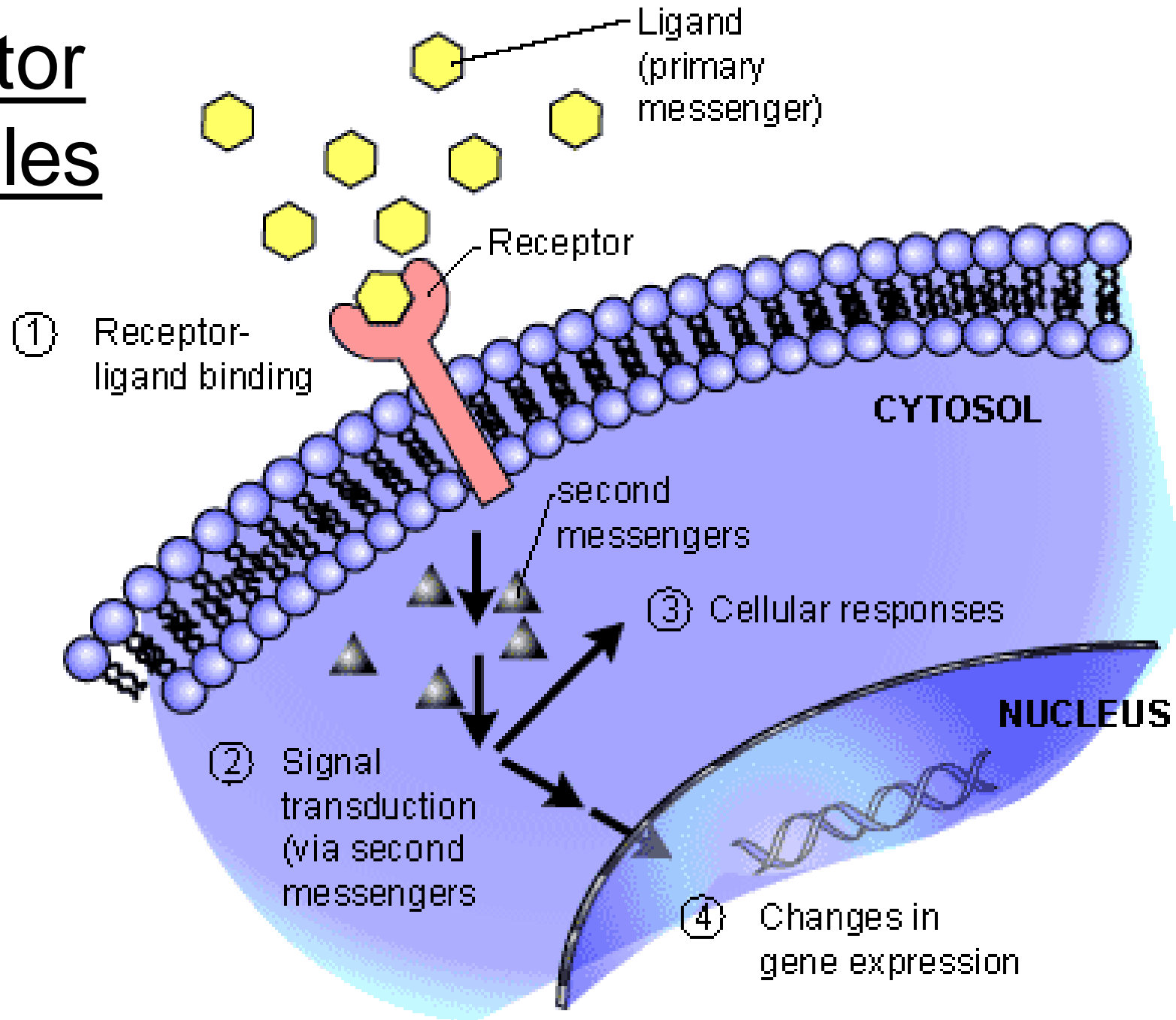
Examples of Important Proteins

- Membrane transport proteins
- Receptor molecules
- Enzymes
- Hormones
- Neurotransmitters
- Hemoglobin
- Antibodies
- Antigens

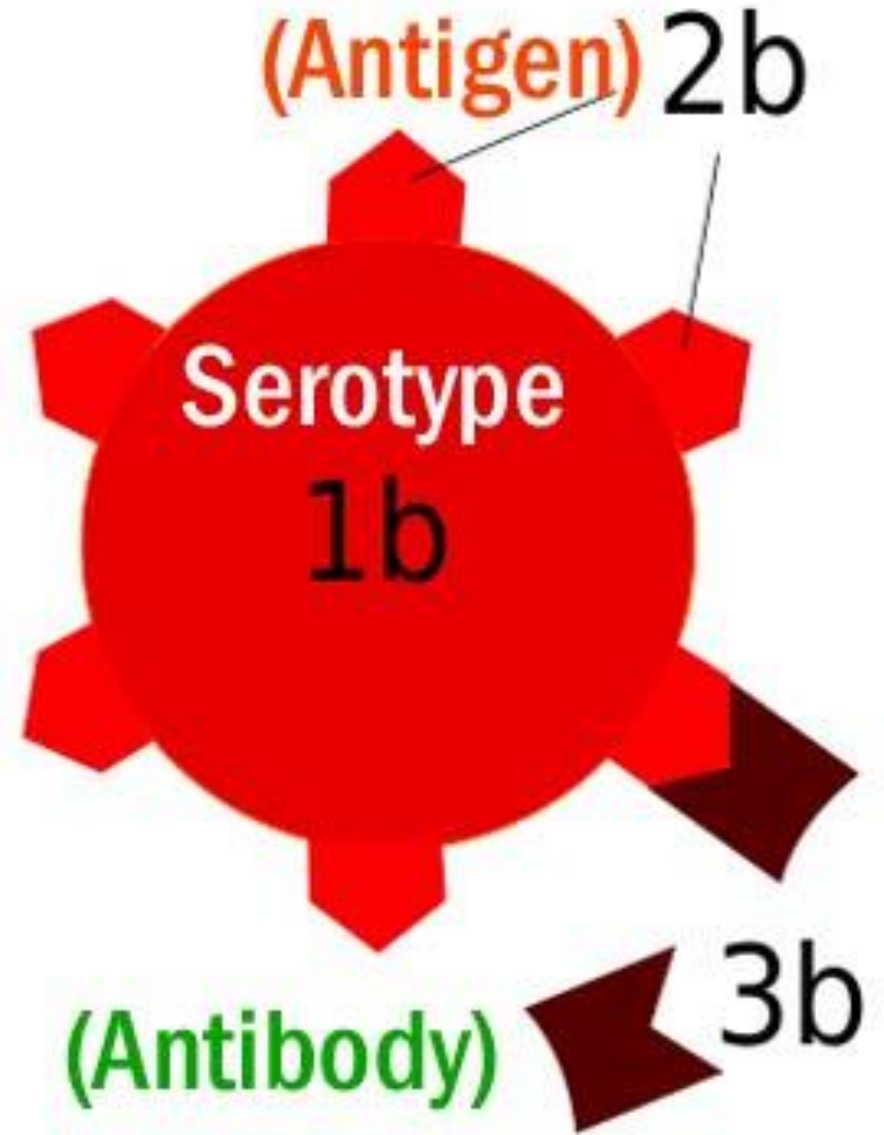
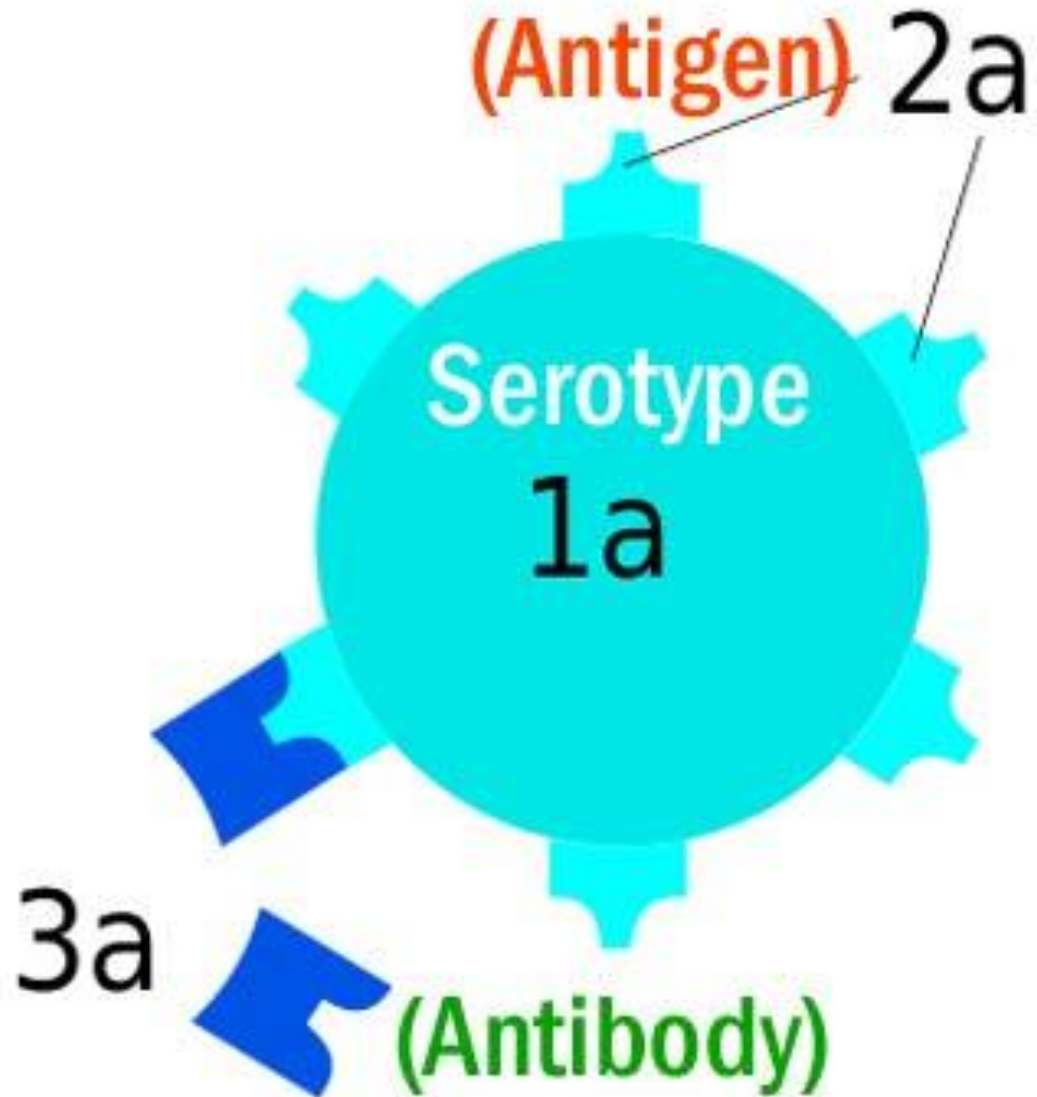
Membrane Transport Proteins

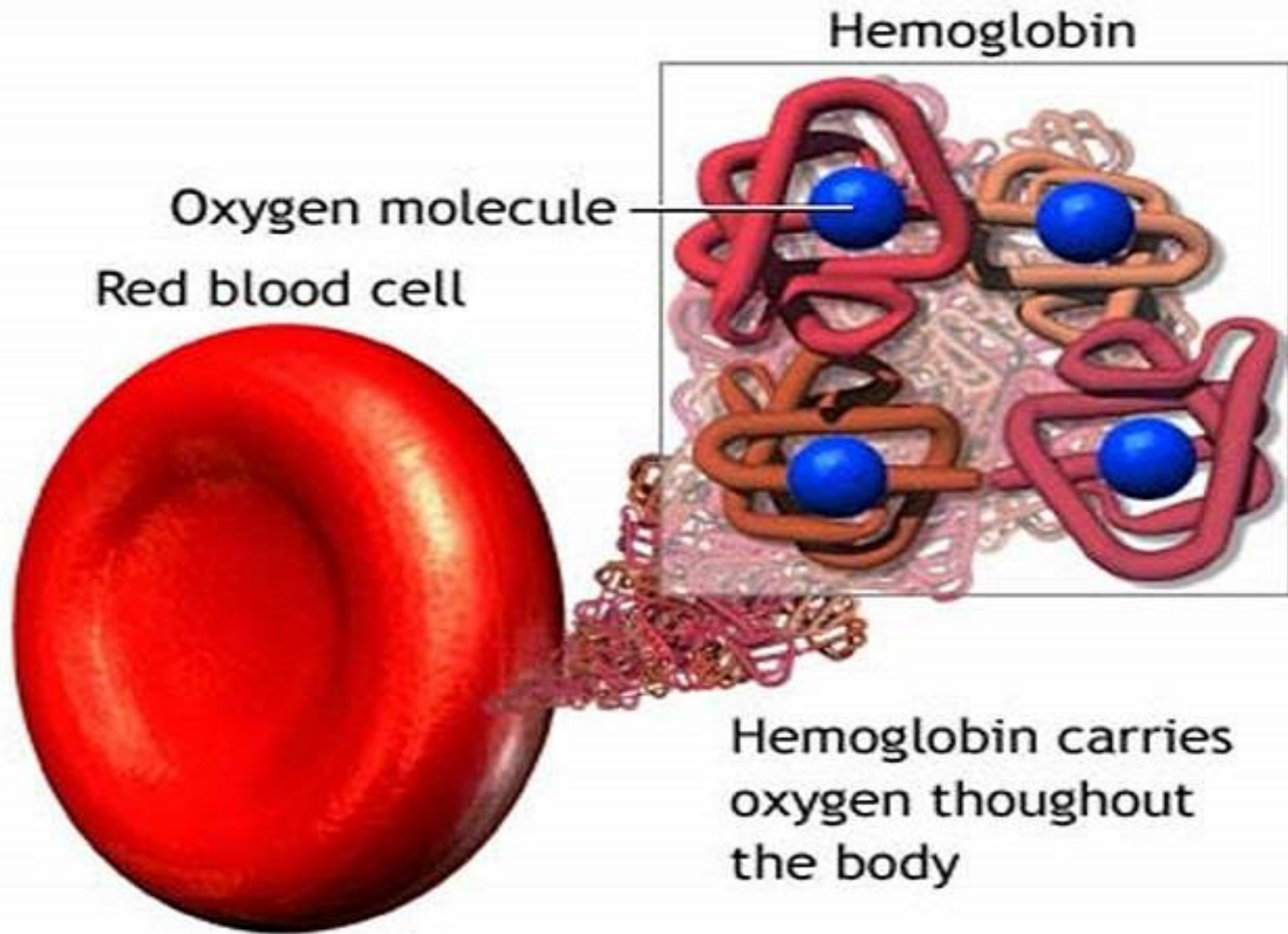


Receptor Molecules



Antigens and Antibodies

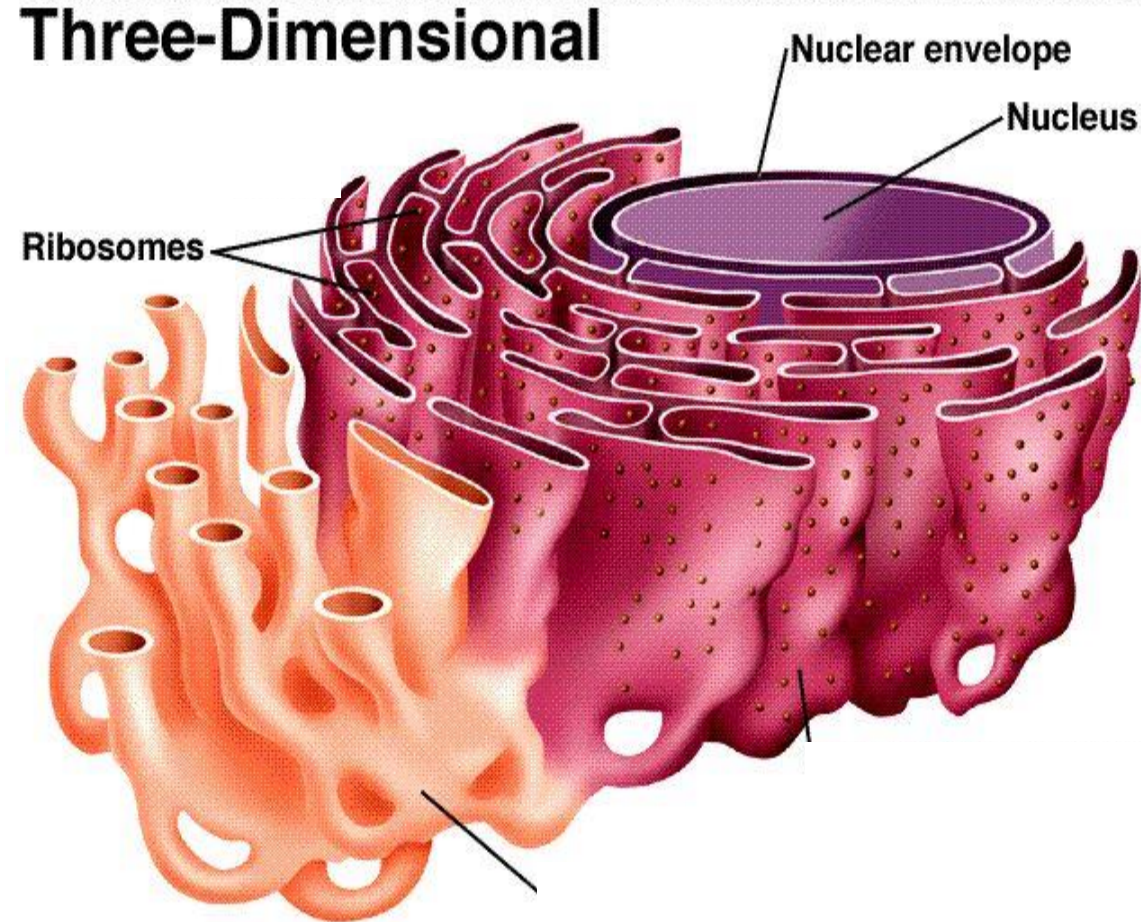




Endoplasmic Reticulum

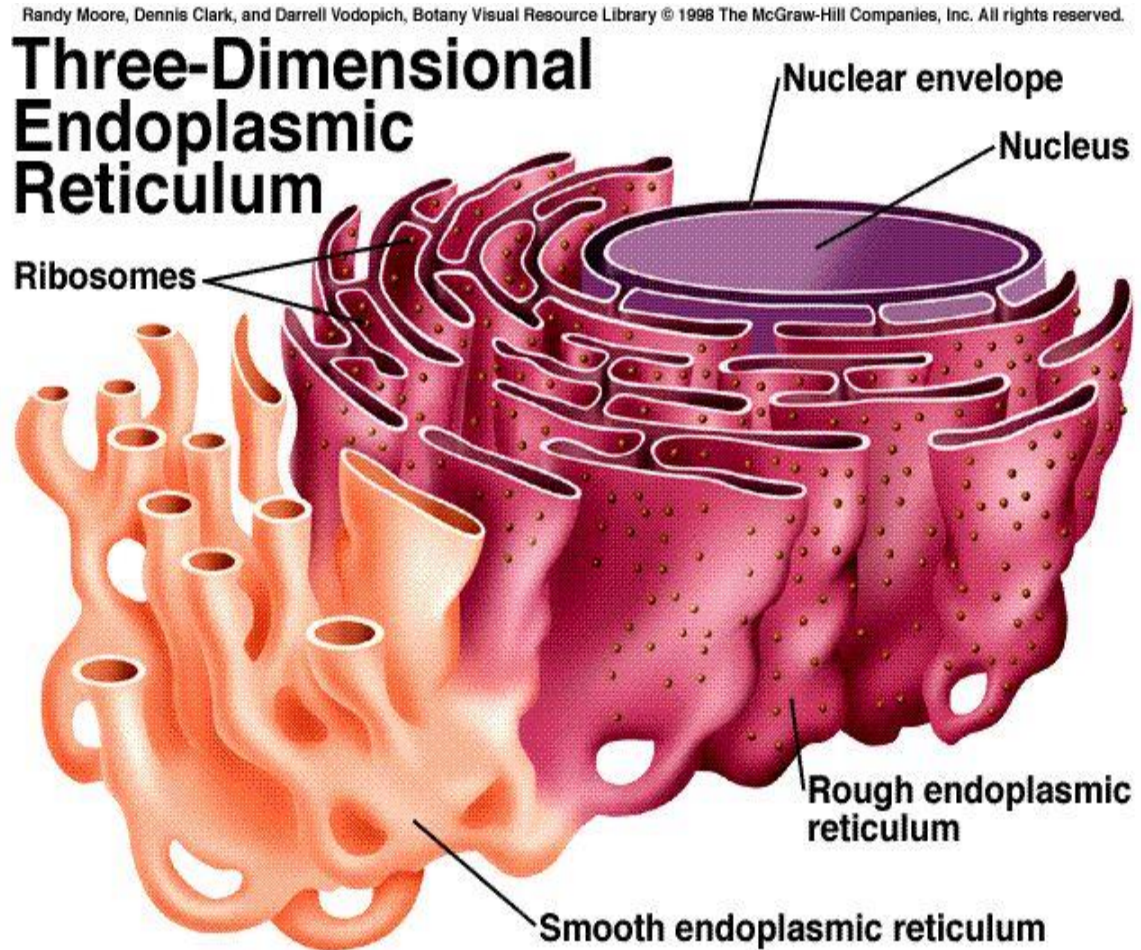
- Transport, storage, and synthesis of substances (mainly proteins) within the cell

Randy Moore, Dennis Clark, and Darrell Vodopich, Botany Visual Resource Library © 1998 The McGraw-Hill Companies, Inc. All rights reserved.



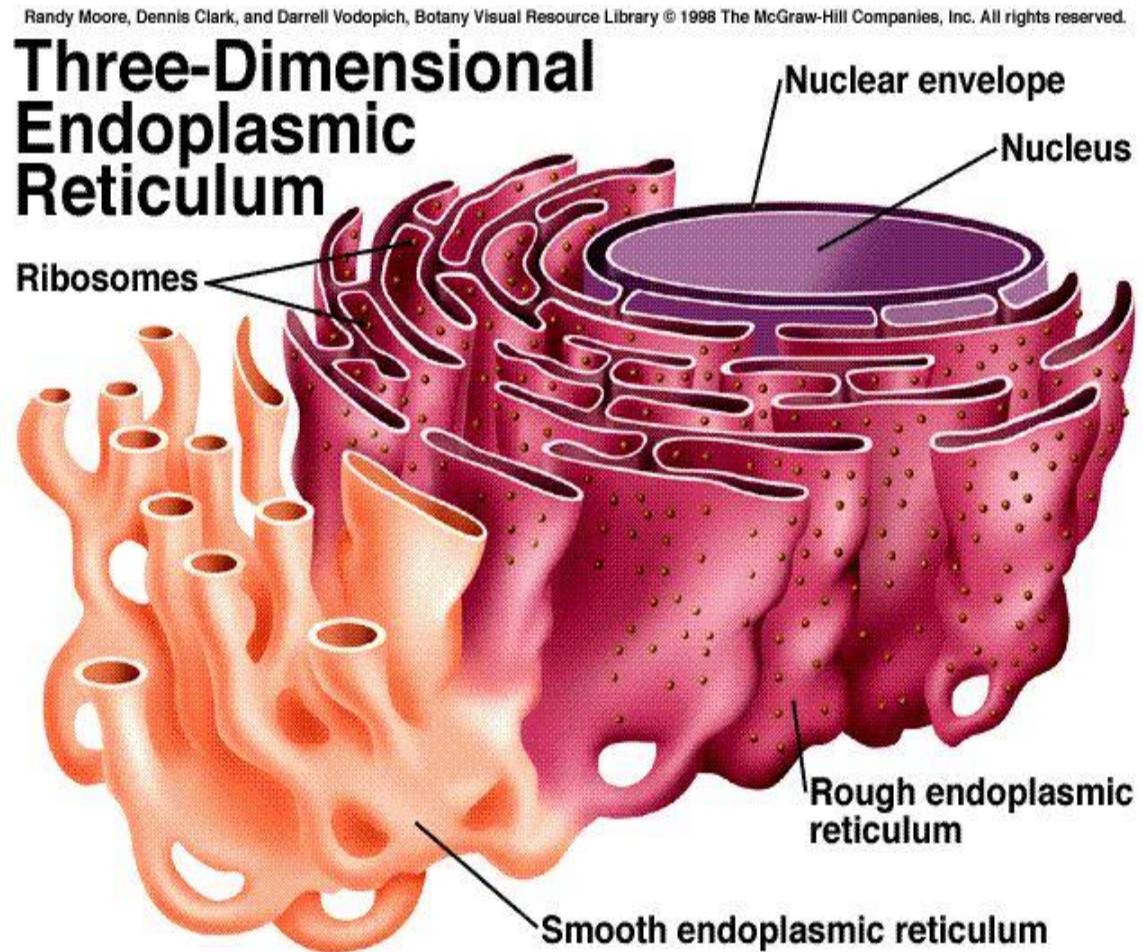
Rough Endoplasmic Reticulum

- Covered in ribosomes (rough)
- Takes the proteins and send them to the golgi complex



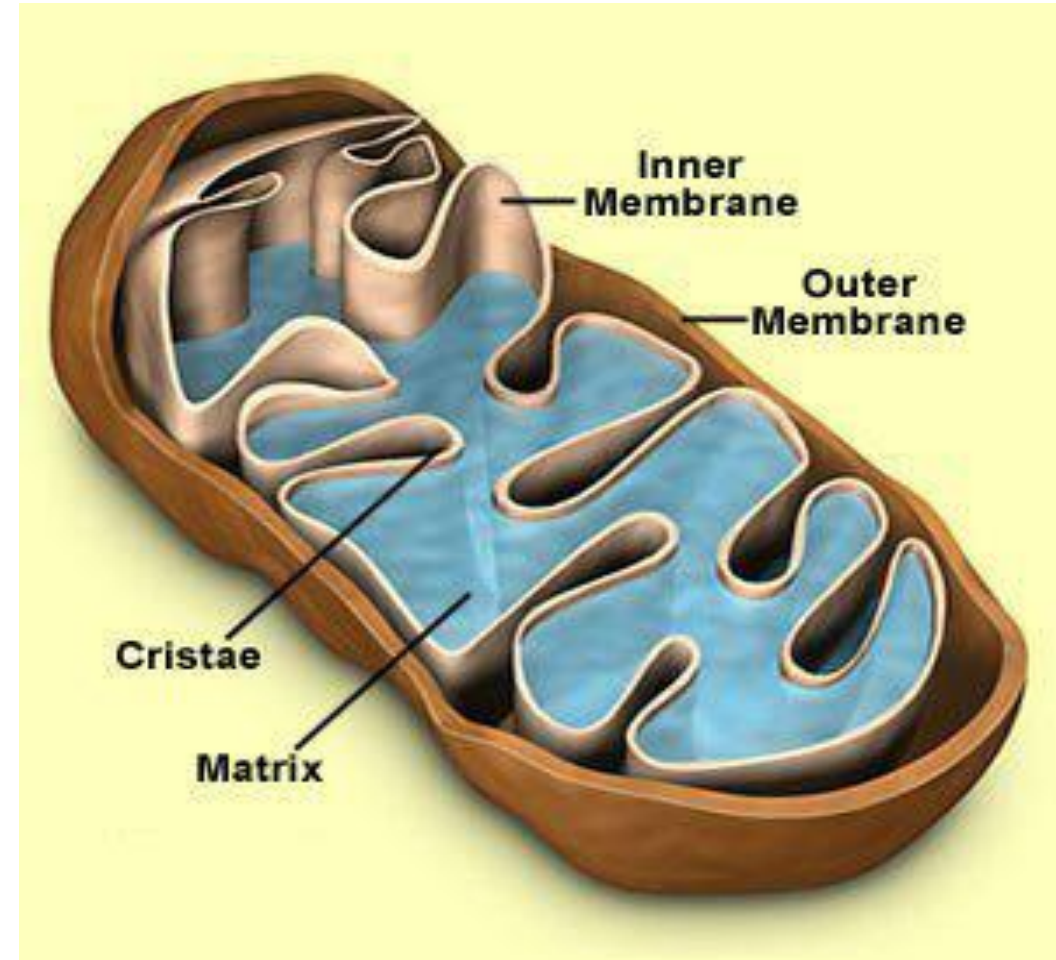
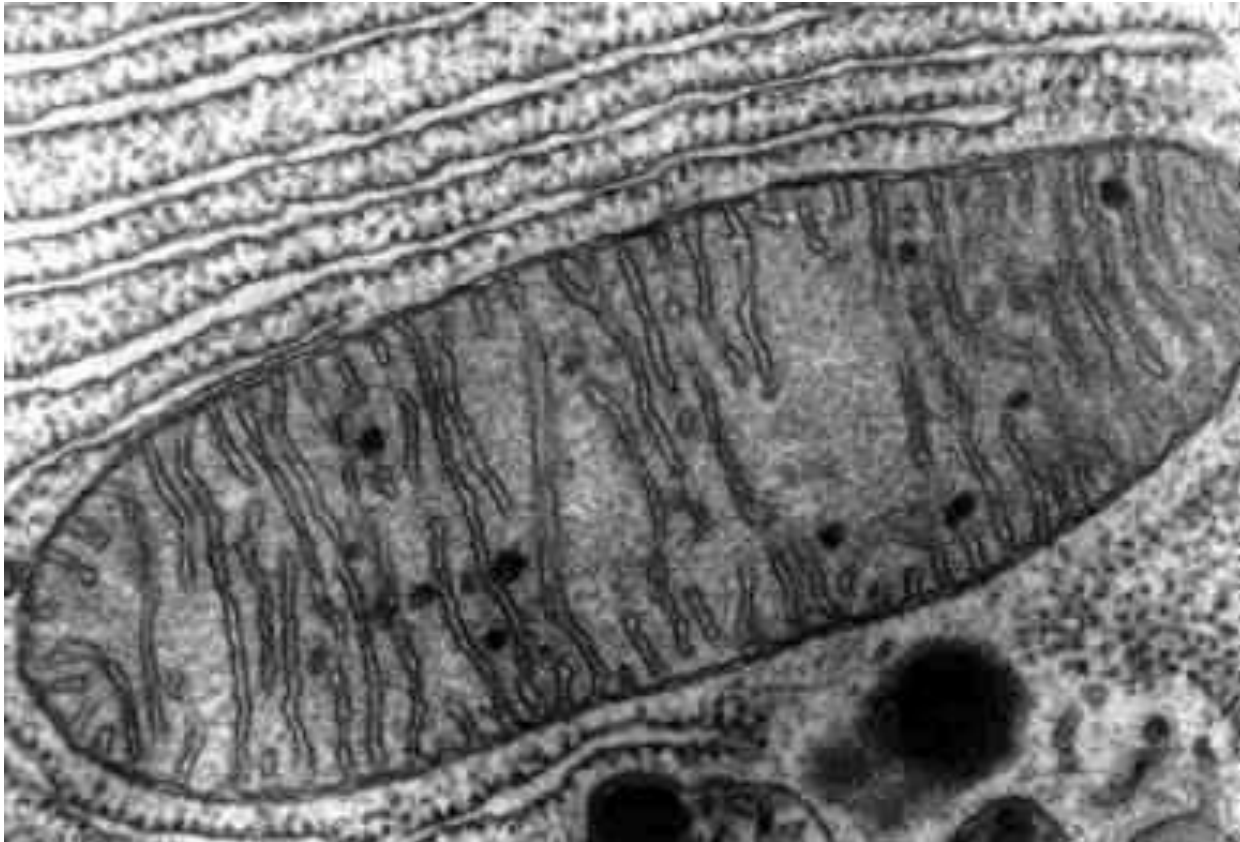
Smooth Endoplasmic Reticulum

- **Not covered in ribosomes**
- **Storage and creation of steroids**



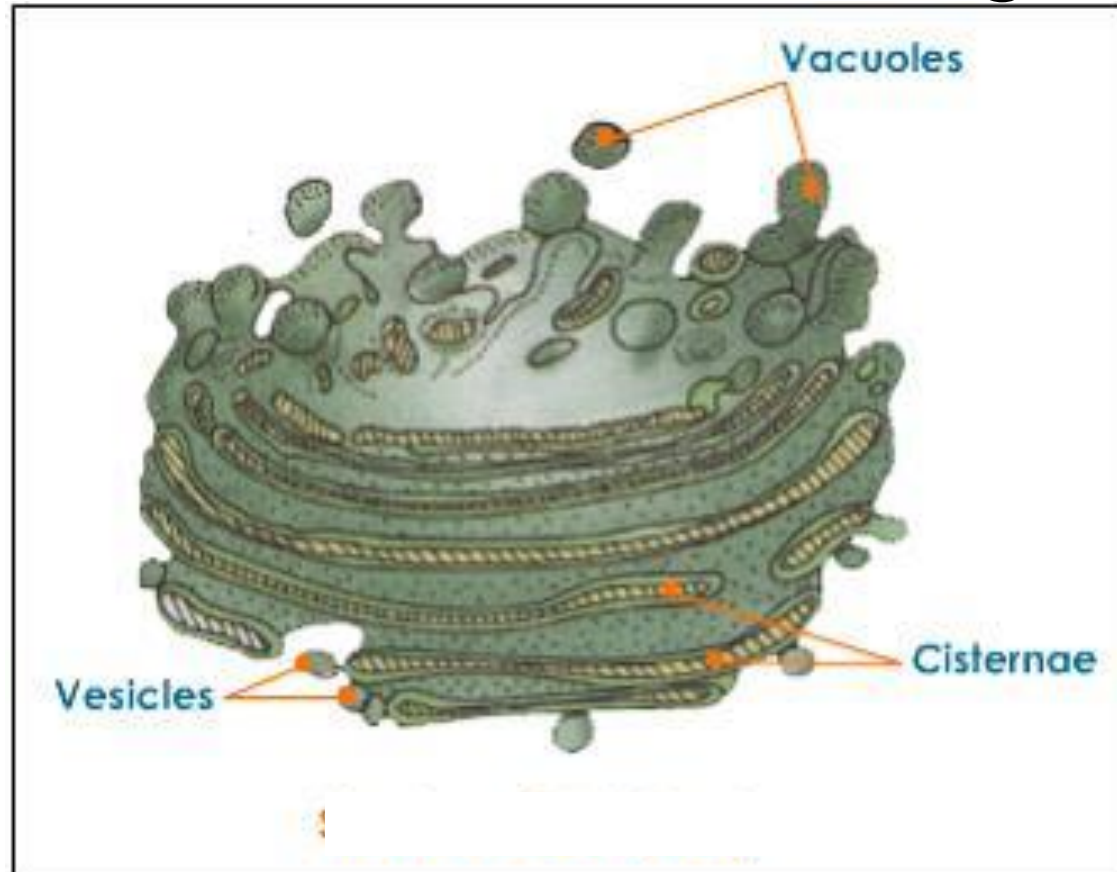
Mitochondria

- Site of cellular respiration
- Produces ENERGY (ATP!)



Golgi Complex (Apparatus)

- Packages proteins made by ribosomes
- Sends proteins to final destination either in the cell membrane or outside of the cell through secretory vesicles



Lysosome

- Contain enzymes
- Fuse w/food vacuoles to help with digestion
- Break down worn out organelles
 - “Lyse” rhymes with “slice”

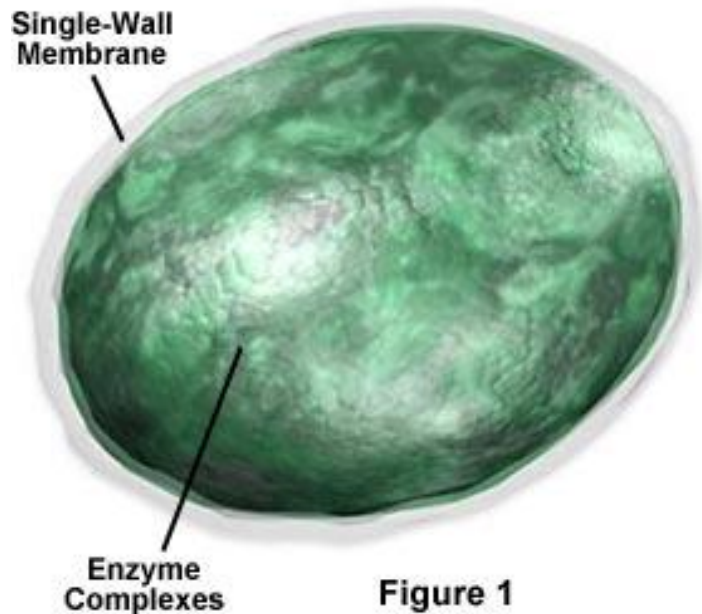
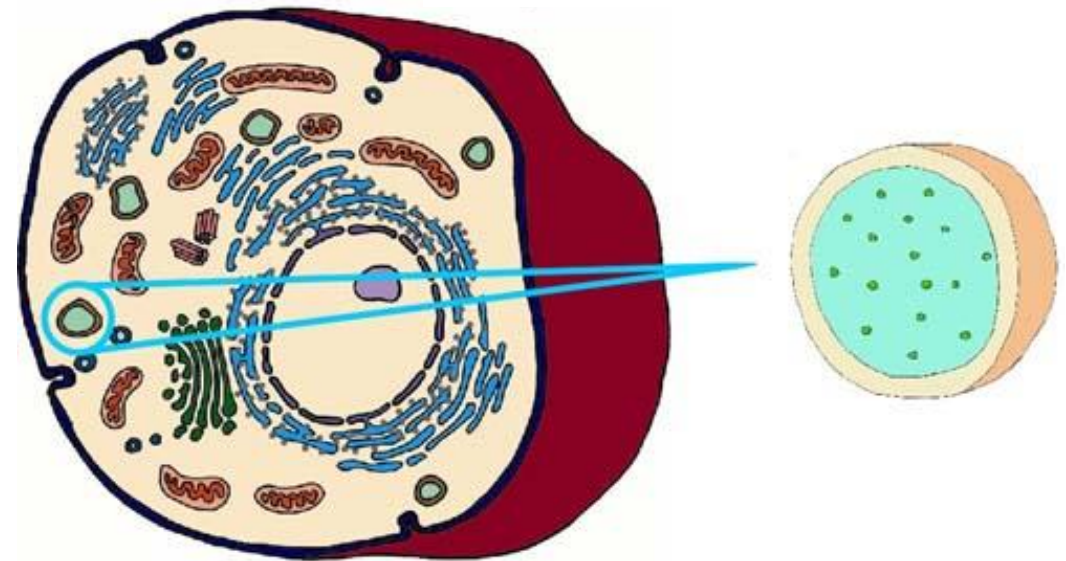
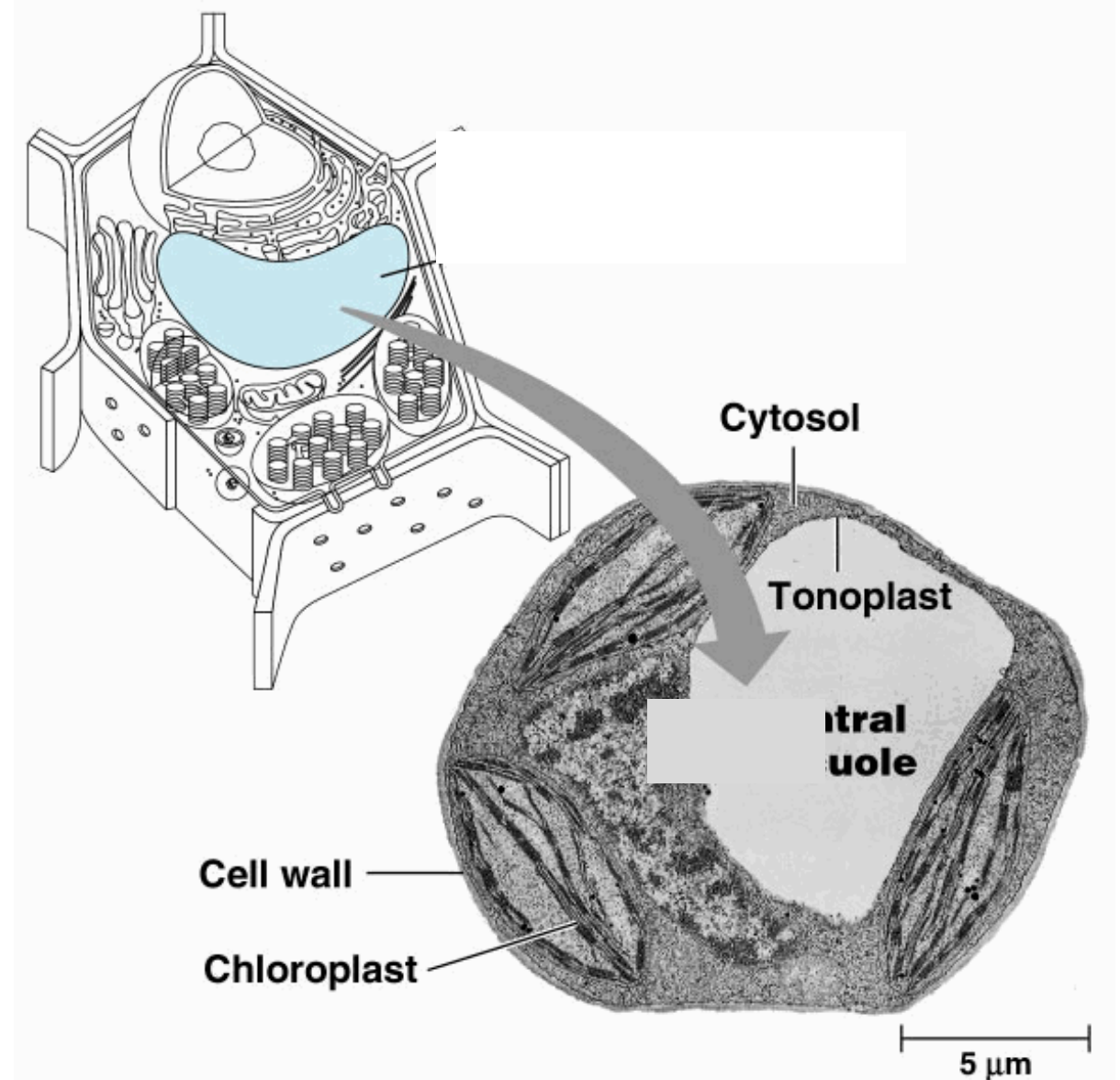


Figure 1



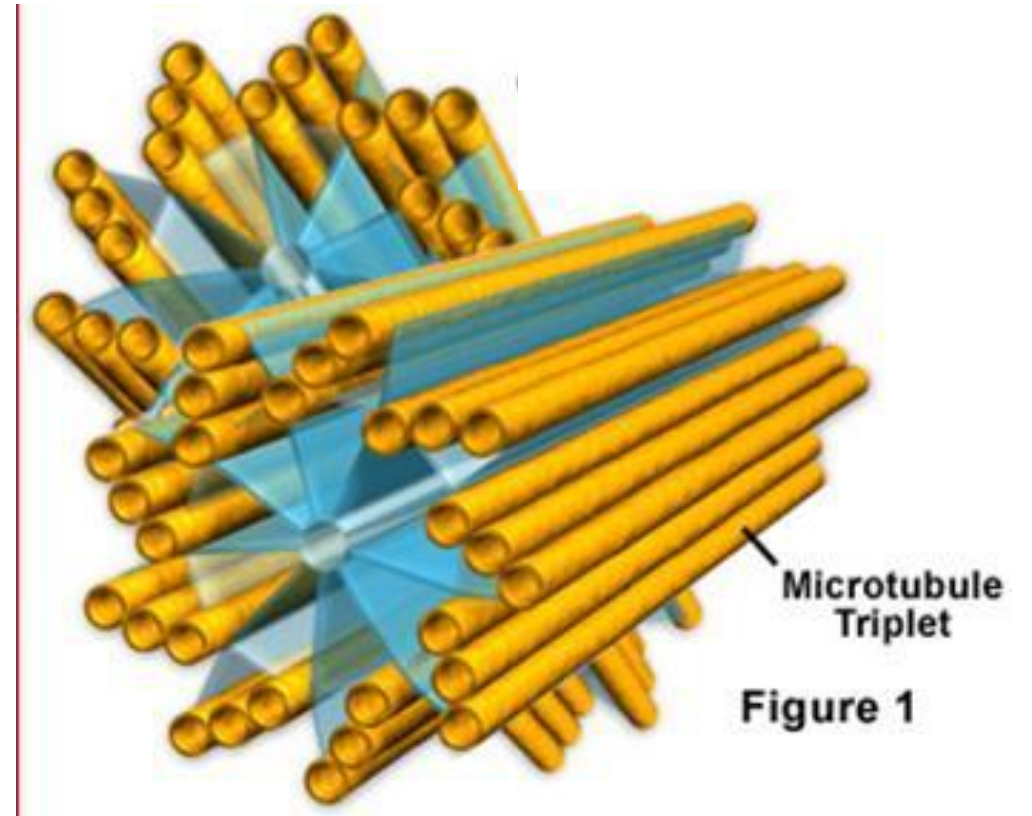
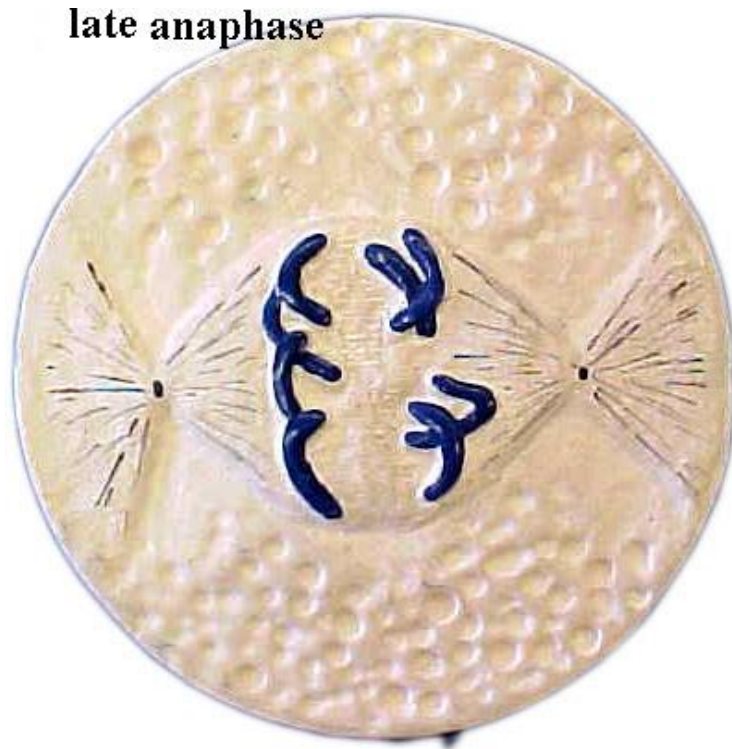
Vacuole / vesicle

- Storage of water, food, enzymes, waste
- Large central vacuole in plant cells
- Contractile vacuole helps maintain water balance in unicellular protists



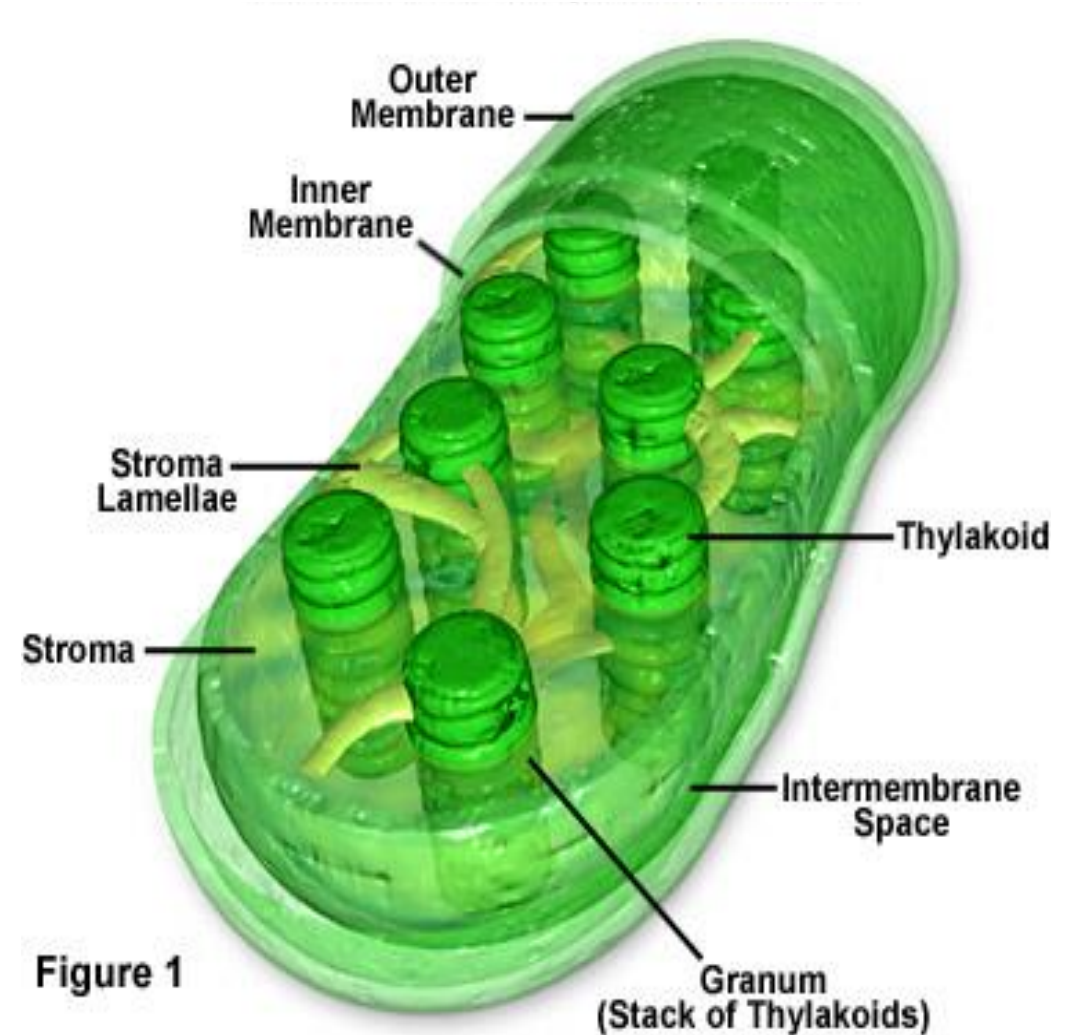
Centrioles

- Used in Cell division
(mitosis)
- Only in animal cells



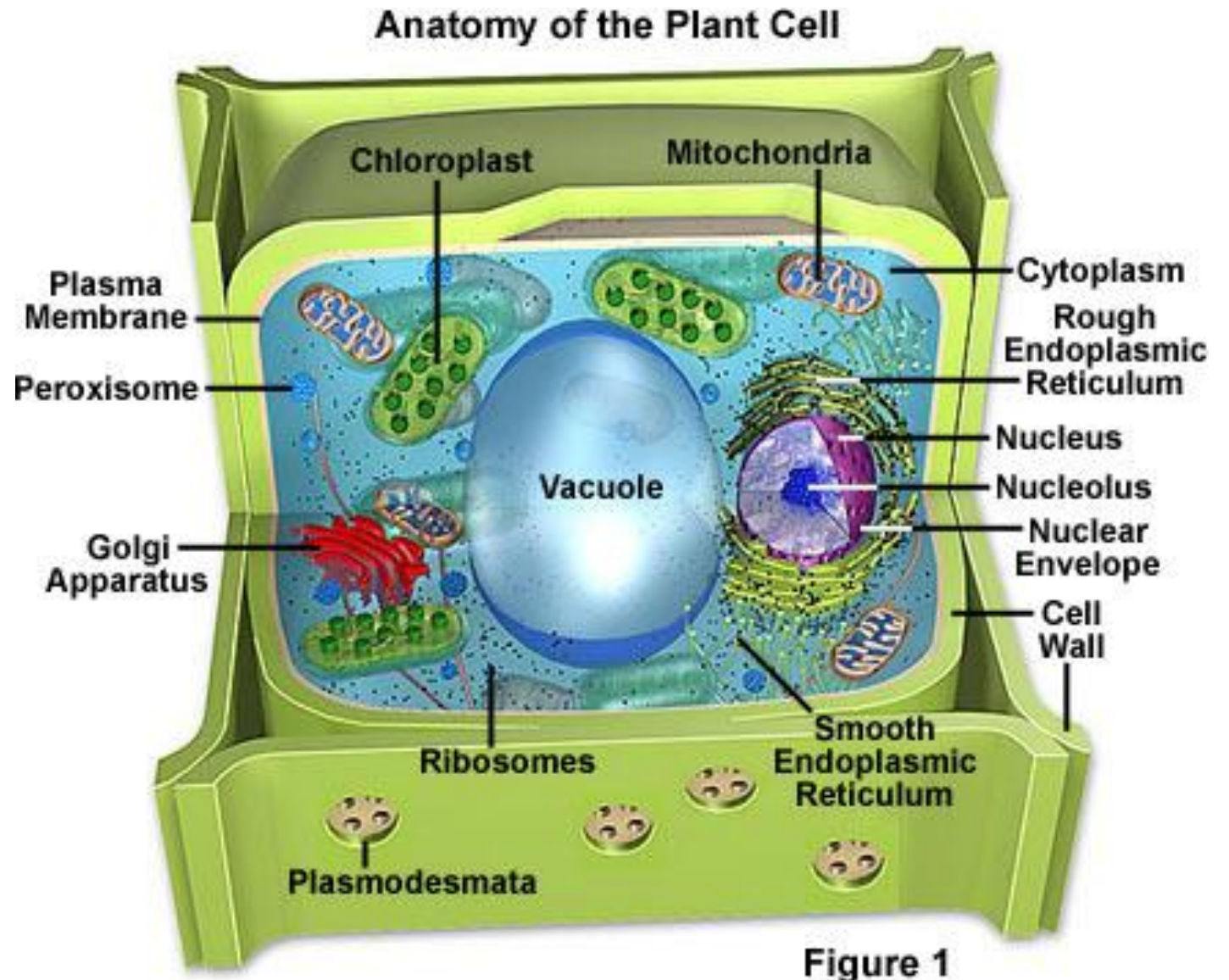
Chloroplast

- Contain chlorophyll (green pigment that absorbs light)
- Site for photosynthesis in autotrophs (ex. Plants & algae)



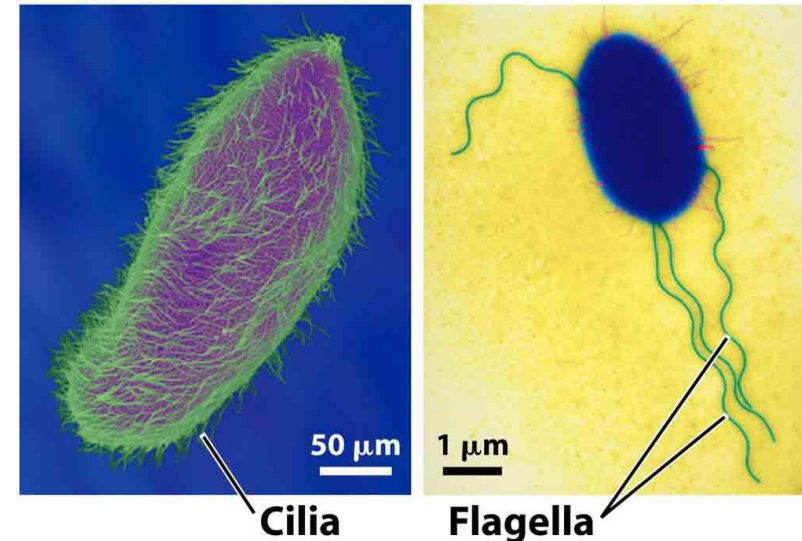
Cell Wall

- Provides structural support in plant and bacterial cells
- made of cellulose (a plant starch)



Microtubules & Microfilaments

- Form the cytoskeleton
- Provide structure
- Allow movement of chromosomes and organelles inside cell
- make up cilia & flagella used for locomotion (movement)



Only PLANT cells have...

- Cell Wall
- Chloroplasts
- Large Central Vacuole

Only ANIMAL cells have

- centrioles

How do life processes and organelles interact to help maintain homeostasis in a cell?

