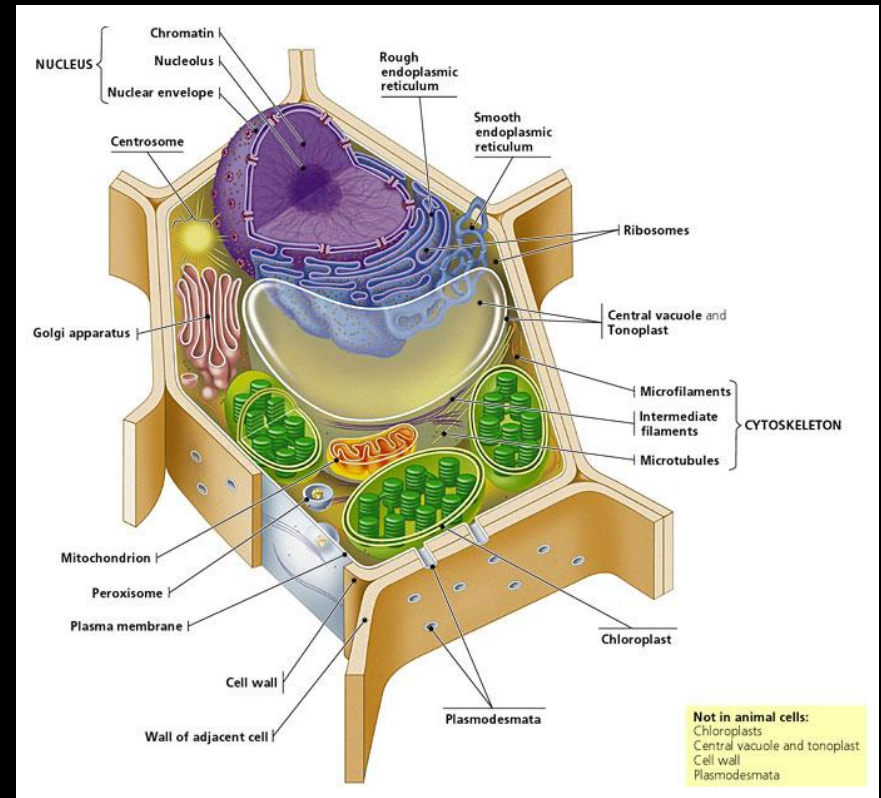
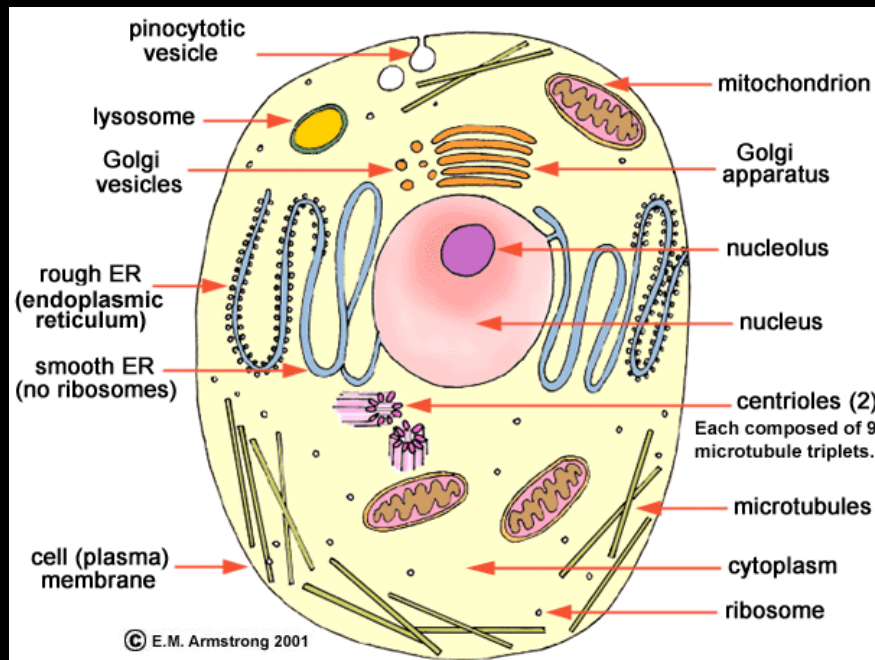


# Cell Structure and Function

## Membrane Bound Organelles



## Structures that can be seen using an optical microscope

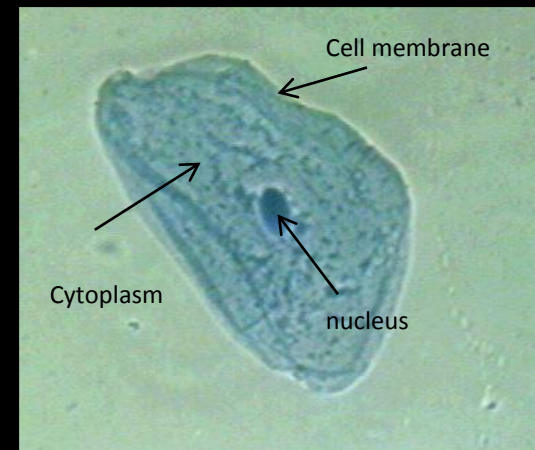
- Cell membrane
- Cell wall
- Nucleus
- Chloroplasts
- Cytoplasm
- Vacuole

## Structures that can be seen using an electron microscope

- Cell membrane
- Cell wall
- Nucleus
- Chloroplasts
- Cytoplasm
- Vacuole
- Golgi apparatus
- Smooth endoplasmic reticulum
- Rough endoplasmic reticulum
- Ribosomes
- Mitochondrion
- Lysosome
- Centrioles

# Organelles

- are membrane bound structures in cells.
- are surrounded by a fluid known as the cytosol. Cytoplasm refers to the cytosol and the organelles of a cell.

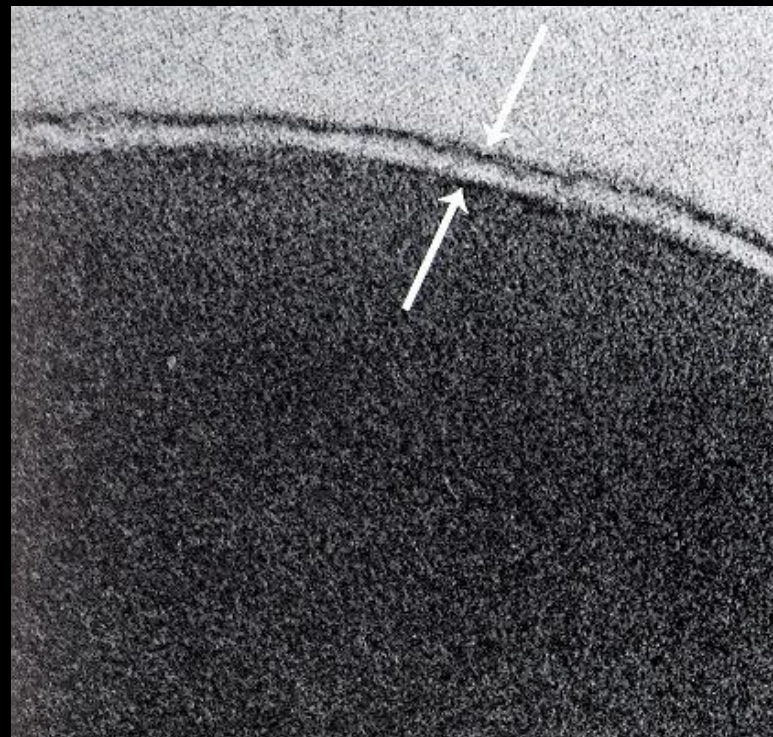


# Cell Membrane

A layer on the outside of all cells that controls what enters and leaves the cell. It is made up of phospholipids and protein.

Under a light microscope, it appears as a single line.

Under an electron microscope, it appears as two lines.

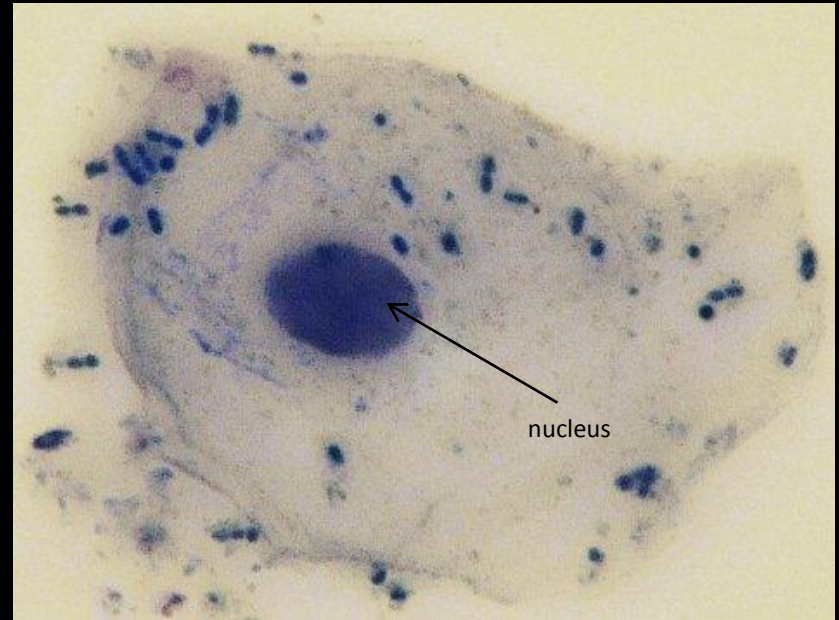
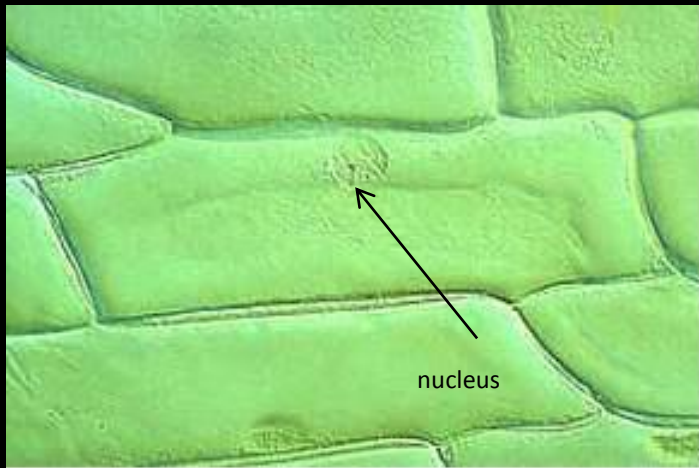


← Outside of Cell

← Inside of Cell

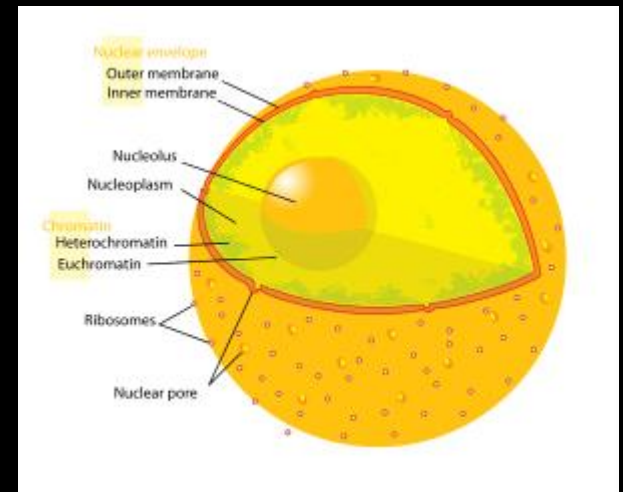
# Nucleus

Controls activity of Cell such as cellular replication.  
It does this by the genes found in the nucleus.  
These genes typically produce proteins.



# Nucleolus

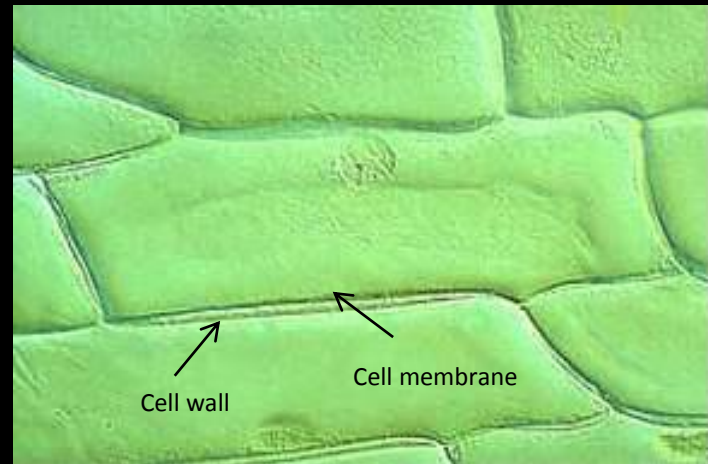
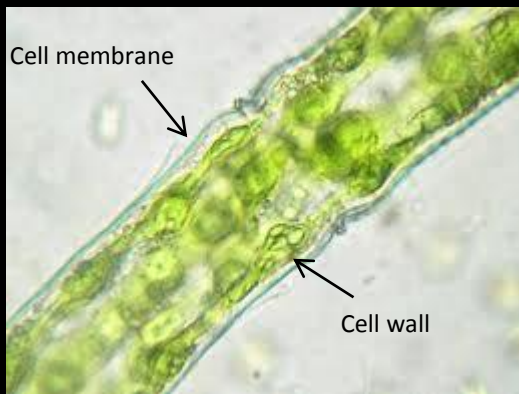
- Nucleolus is a non membrane bound structure found in the nucleus of the cell.
- It is composed of proteins and nucleic acids.
- One of its functions is to assemble ribosomes used to create proteins.





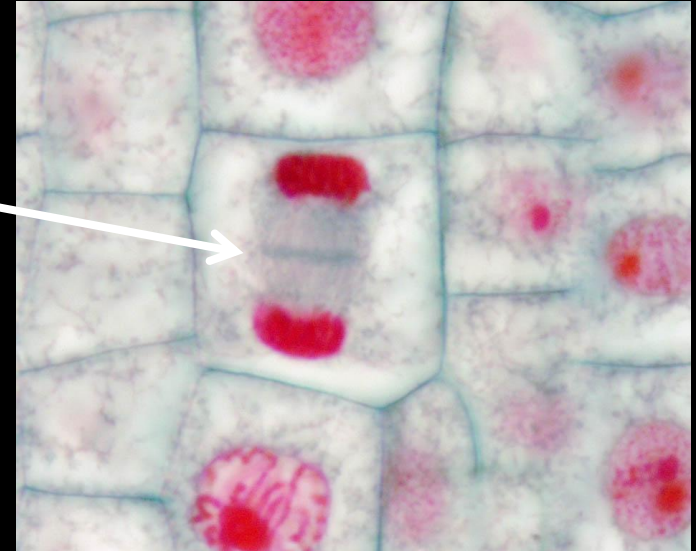
# Cell Wall

Plant cells also have a cell wall surrounding the cell membrane of each cell to provide structural support.

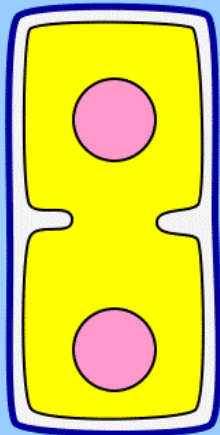


# Cell plate

During cytokinesis in some plants and algae a *new cell wall* begins to form in the middle, dividing the two sides



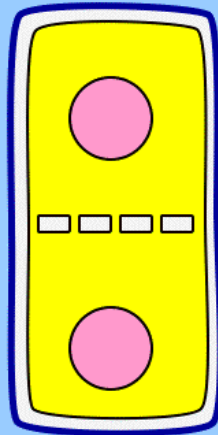
## Different modes of cytokinesis among Plantae



**Algal cell**

phycoplast

Modified furrowing with dividing wall building from edge toward center of cell, leaving one pore.



**Plant cell**

phragmoplast

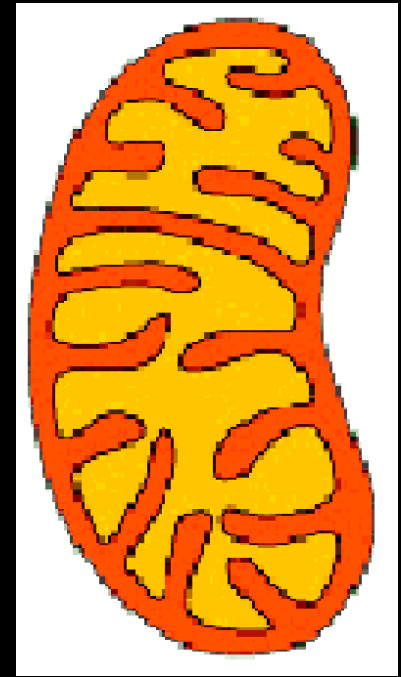
Longitudinal microtubules direct vesicles containing wall materials and enzymes to equatorial plane.

The vesicles coalesce to form a wall plate perforated by plasmodesmata.

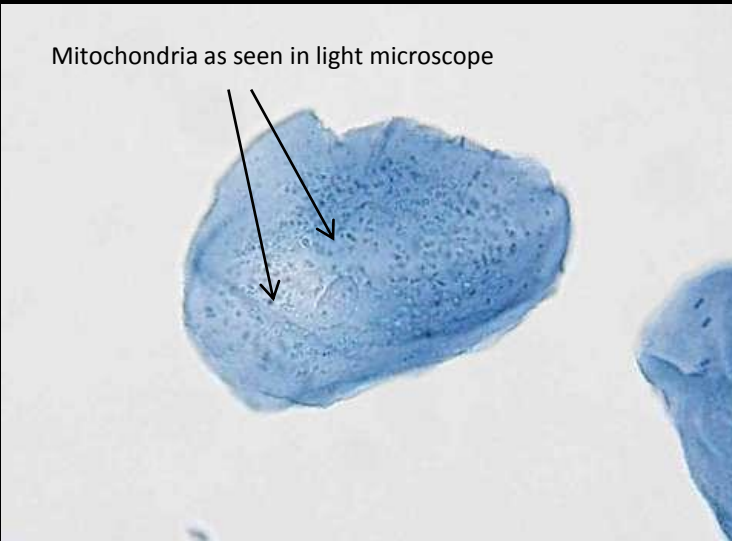


# Mitochondrion (pl. mitochondria)

The function of the mitochondrion is to provide the cell with energy in the form of ATP. You may be able to see it under a light microscope but not clearly.



Mitochondria as seen in light microscope



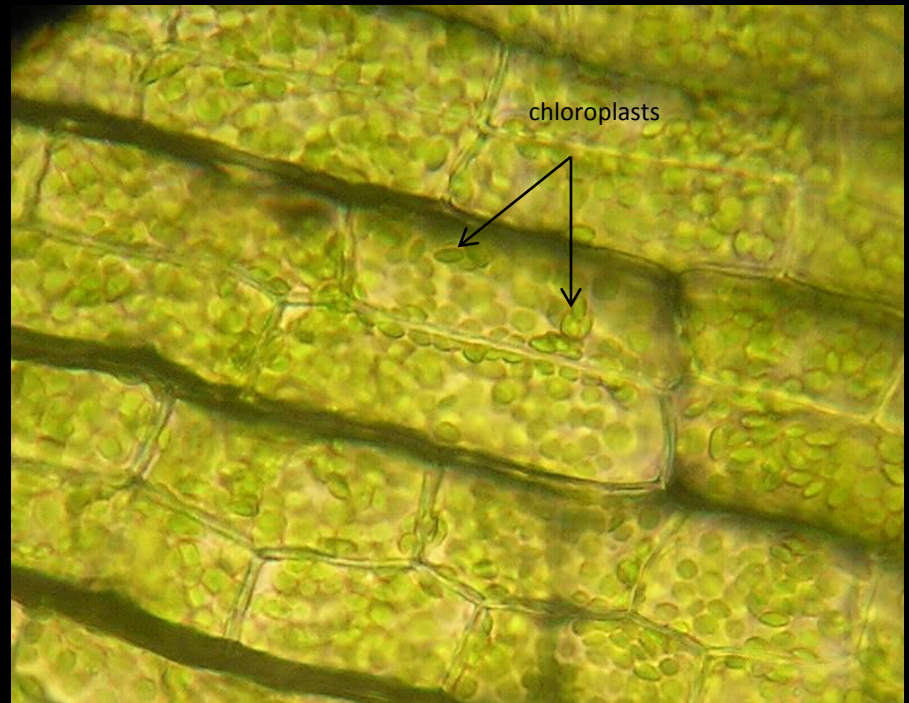
Mitochondria as seen in electron microscope



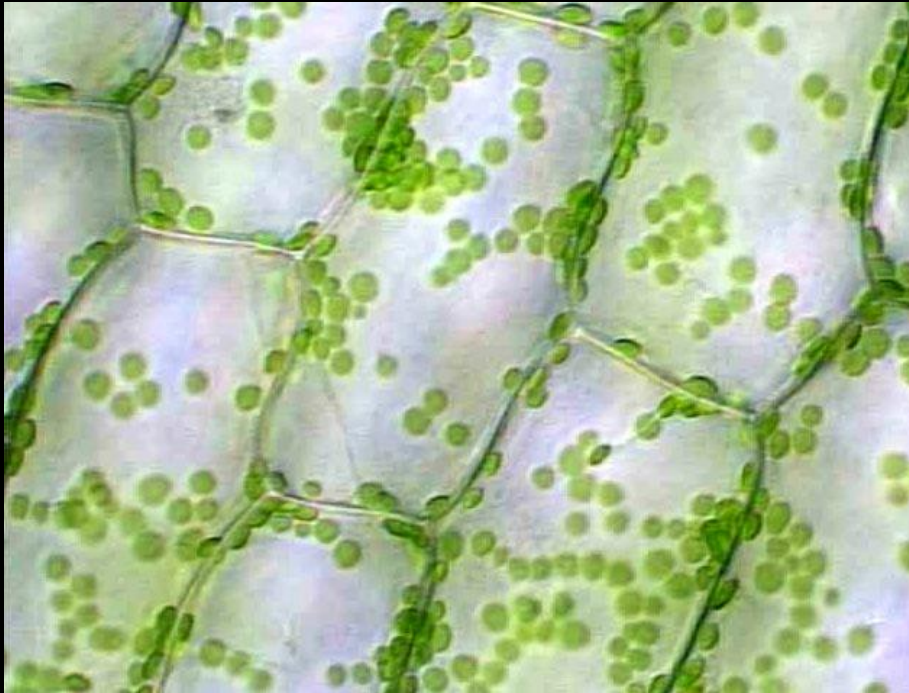
# Chloroplast

Only found in plant cells and some unicellular organisms. Chloroplasts contain the pigment, chlorophyll, that is necessary for photosynthesis.

Photosynthesis is the process whereby green plants manufacture their own food using light as an energy source

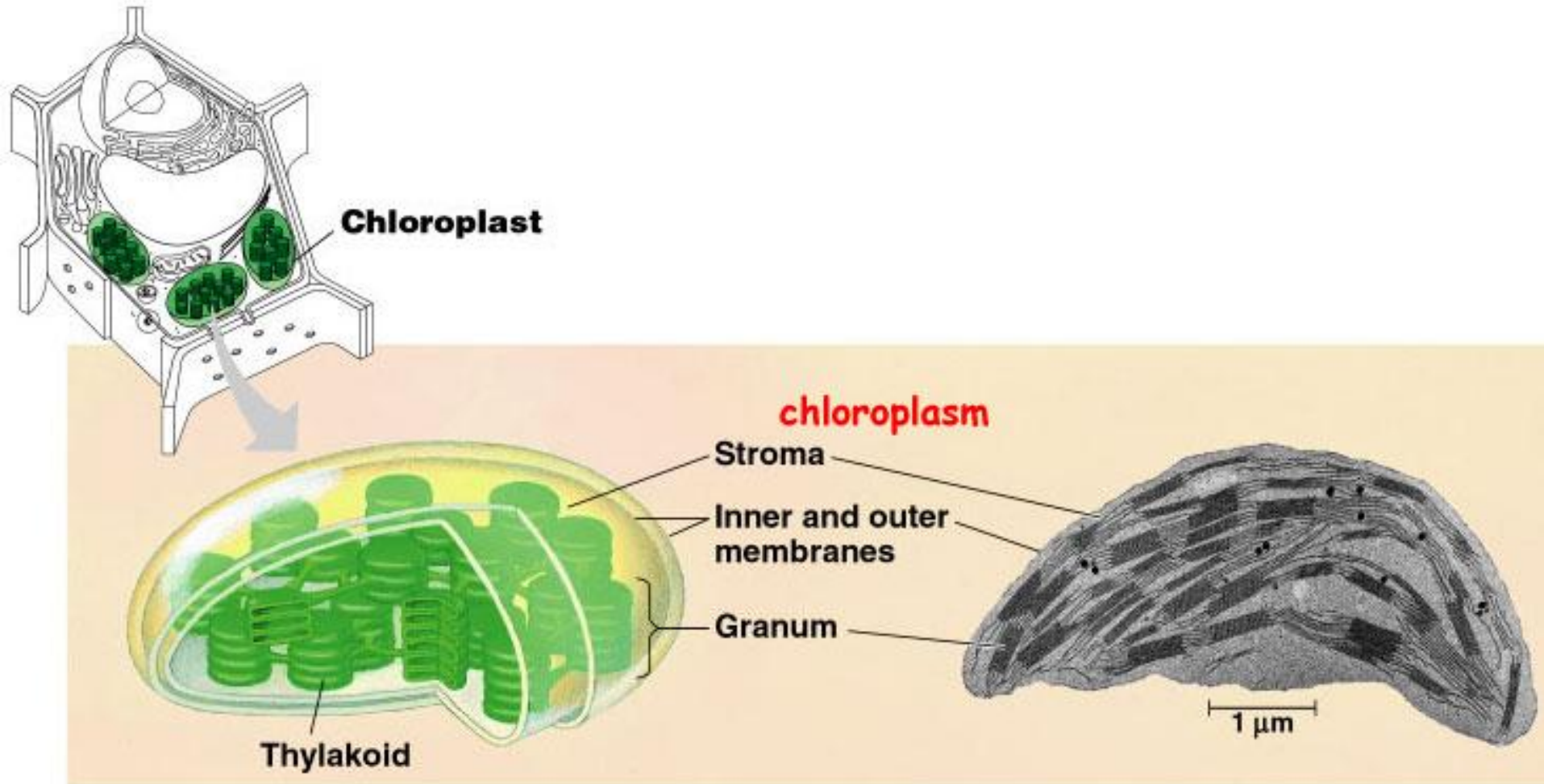


# Chloroplasts under a light microscope



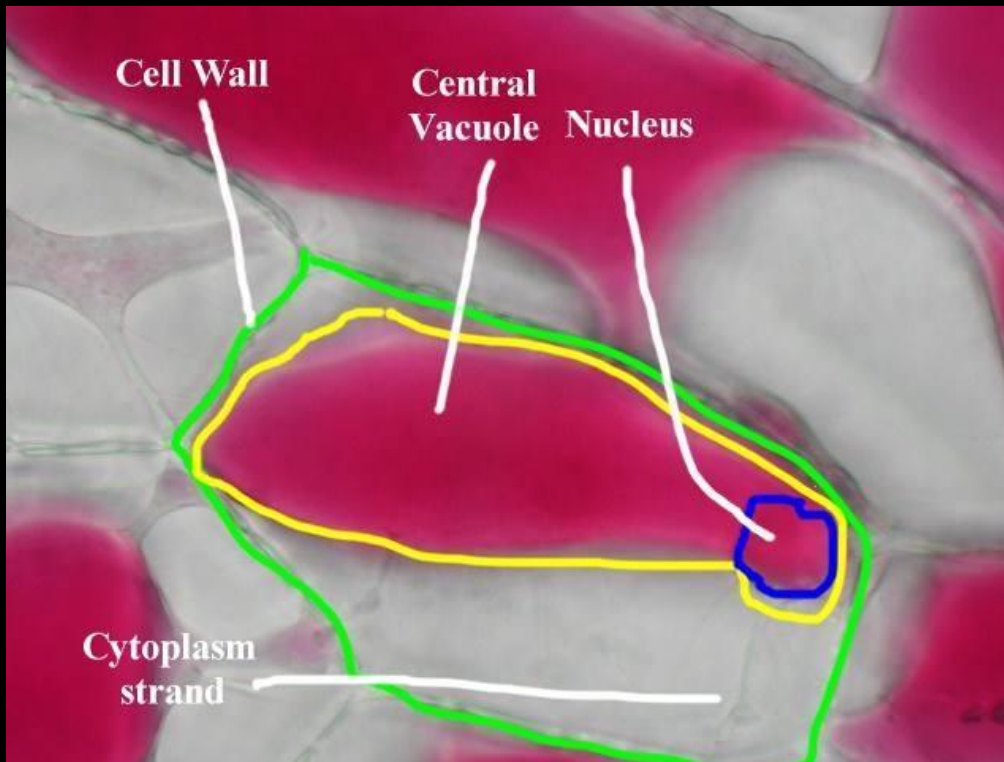


# One chloroplast as seen under an electron microscope



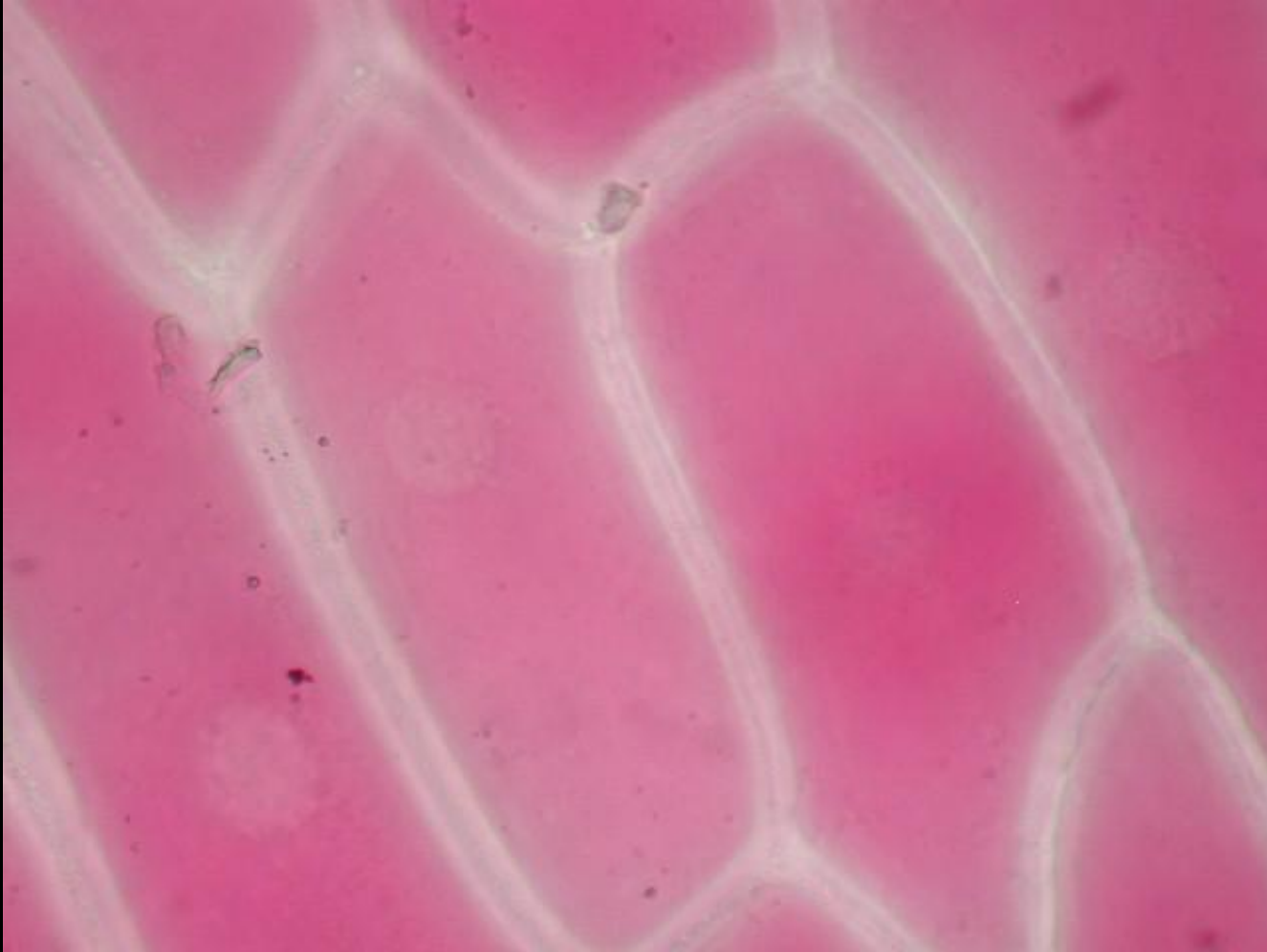
# Vacuoles

These are large fluid filled regions in cells. They may store water, pigments or food. In plant cells, they are typically very large and help regulate fluid levels in the cell.



*Cell from a red onion showing a vacuole containing a red pigment.*

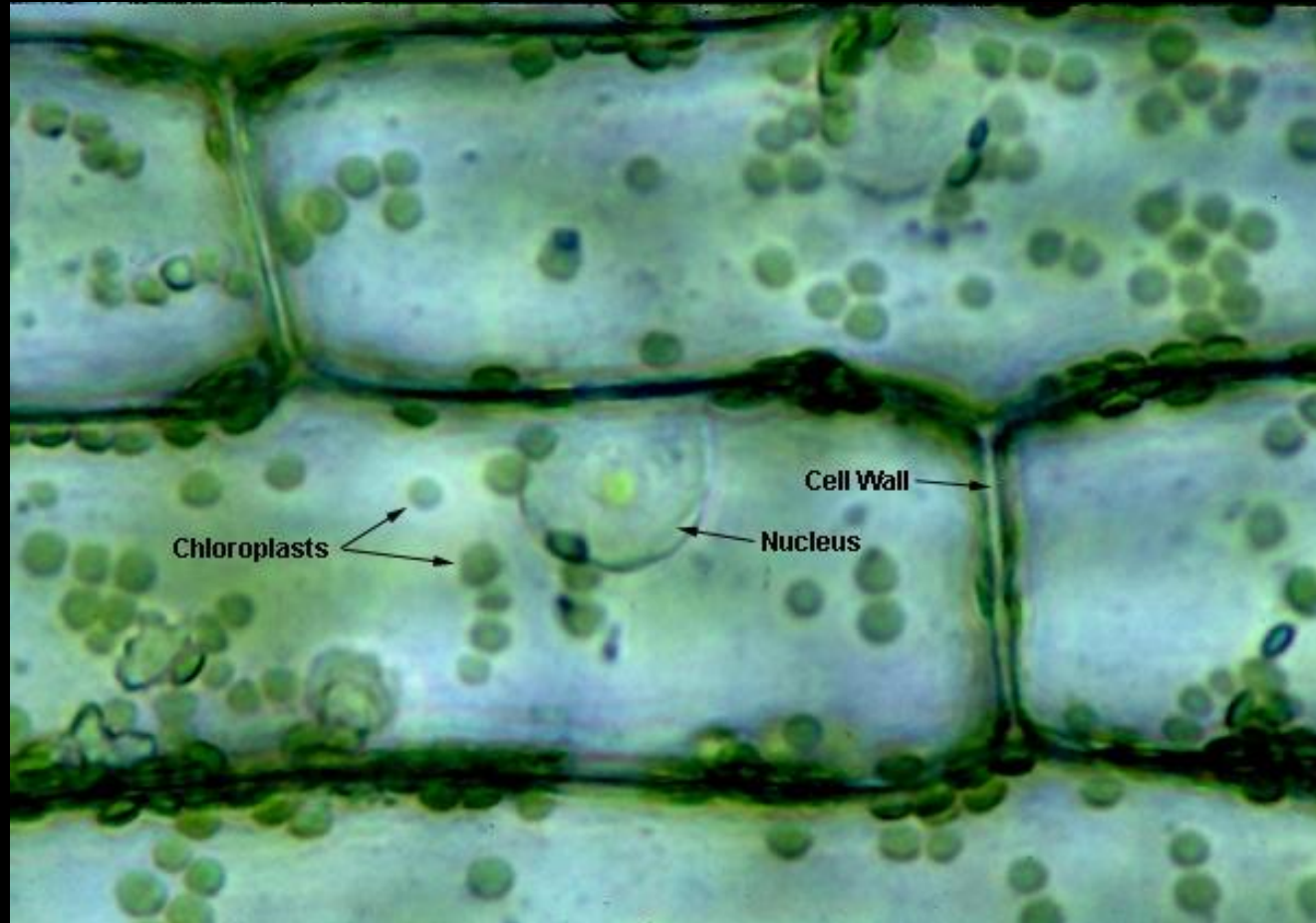
# How do we interpret this?



Is the nucleus in the vacuole?? **No**



# Other Vacuoles



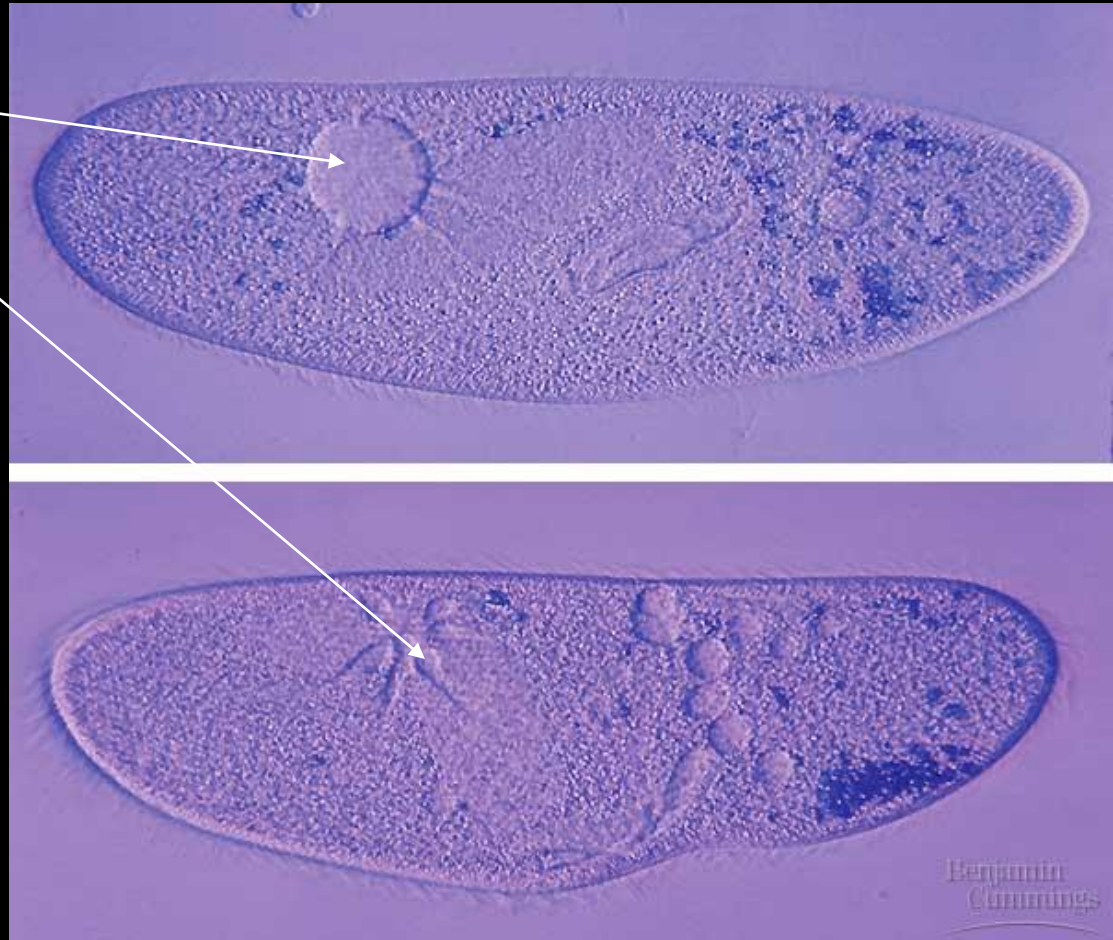
Where is the vacuole here??

# Contractile Vacuole from *Paramecium* a

single celled organism found in freshwater.

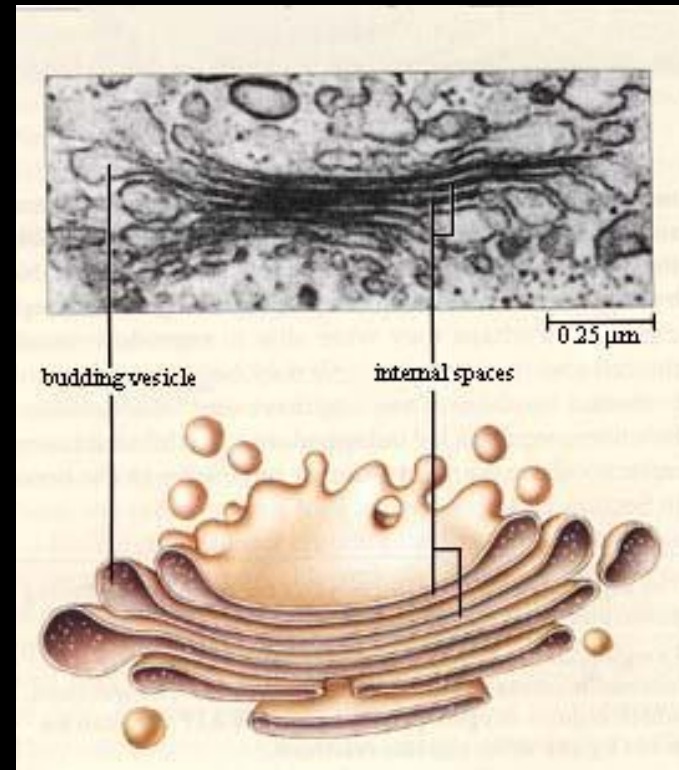
Contractile Vacuole

The vacuole  
pumps water out  
of the cell that  
enters by  
osmosis.



# Golgi Apparatus (Body or Complex)

- This organelle that modifies and stores proteins prior to secretion from the cell.
- Not readily seen using a light microscope.
- Made up of stacks of flattened membranous cells not connected to each other.



# Endoplasmic Reticulum (ER)

- A network of continuous membranes with different domains.
- It has various functions:
  - it provides transport for substances in and out of the cell e.g. proteins
  - Synthesis and storage of substances required in the cell



Endo: inside

Plasmic: cytoplasm

Reticulum: network

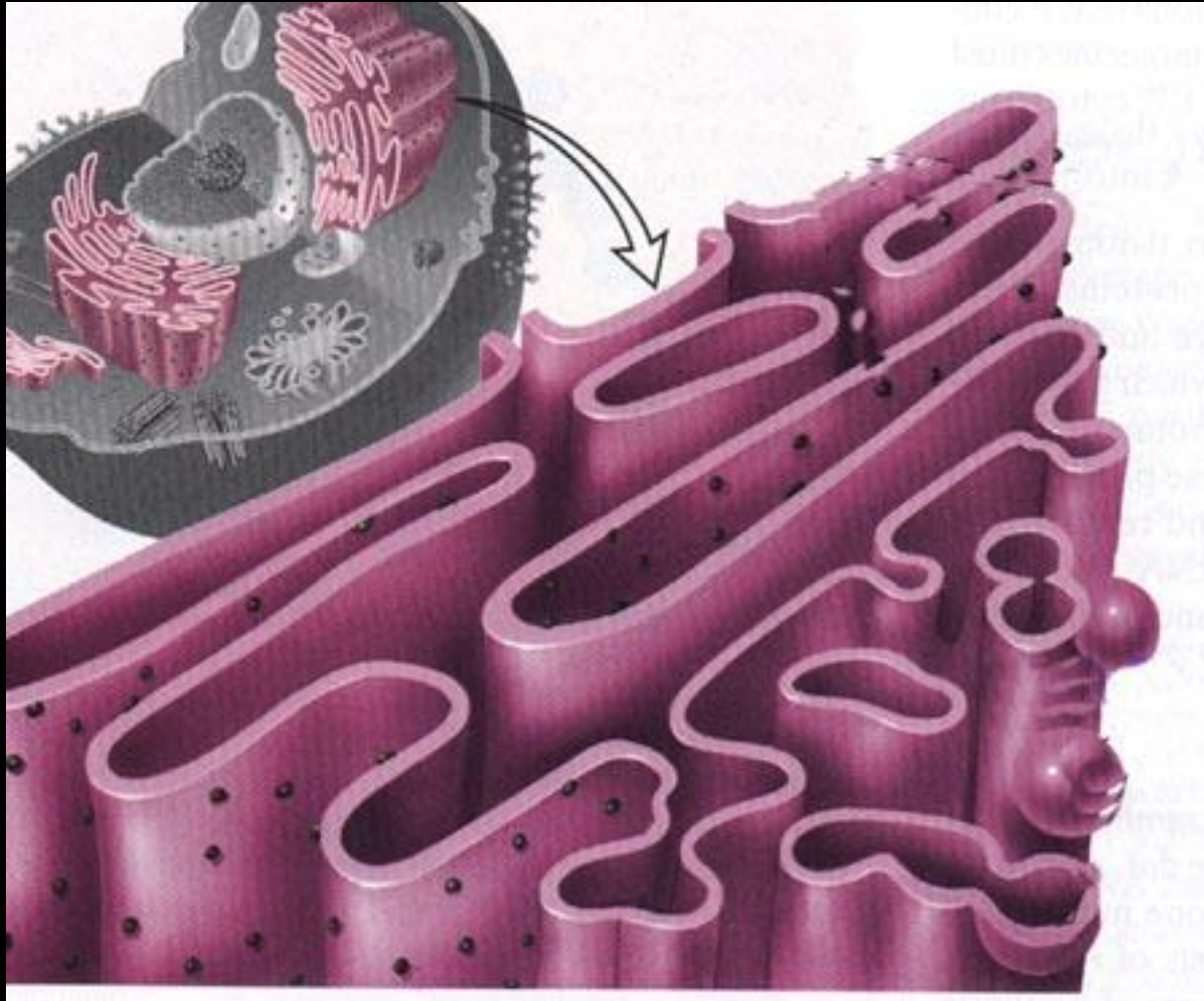
Endoplasmic reticulum

What is this?

mitochondrion



# ER: another view



# Ribosomes

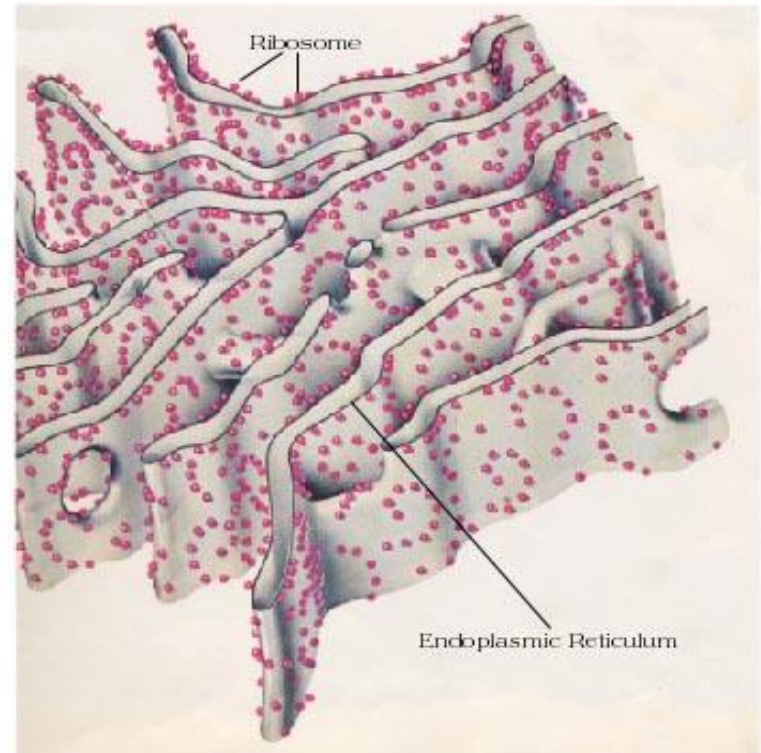
- These are large and complex molecules that are the site where proteins are made.
- They are often attached to the Endoplasmic Reticulum or they may be free.
- ER that has ribosomes attached is called rough ER.
- ER that does not have ribosomes attached is called smooth ER.



# Rough Endoplasmic Reticulum

Rough ER is studded with ribosomes.

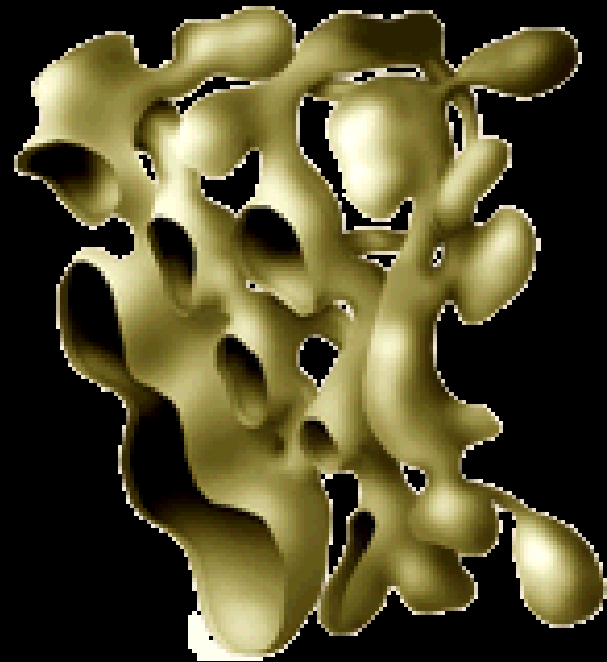
A main function of rough ER is to hold on to the ribosomes used for making proteins that will be packaged and trucked elsewhere.



# Smooth Endoplasmic Reticulum

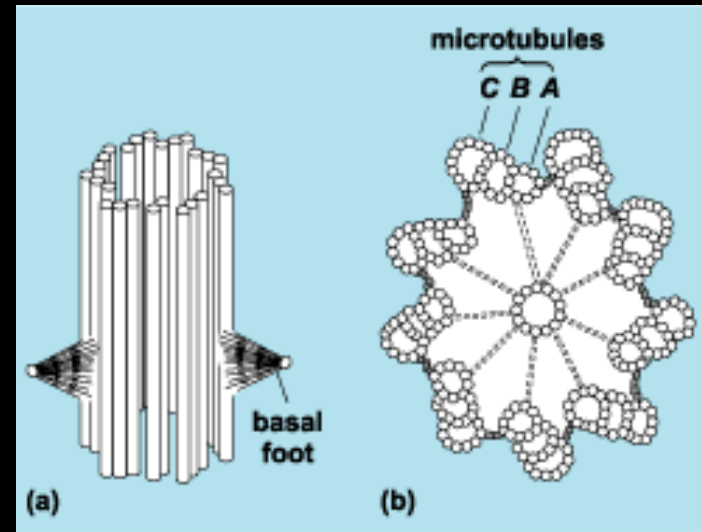
Smooth ER does not have ribosomes. Attached to it

Smooth ER has several functions the main one is detoxification of several compounds and synthesis of carbohydrates and lipids.



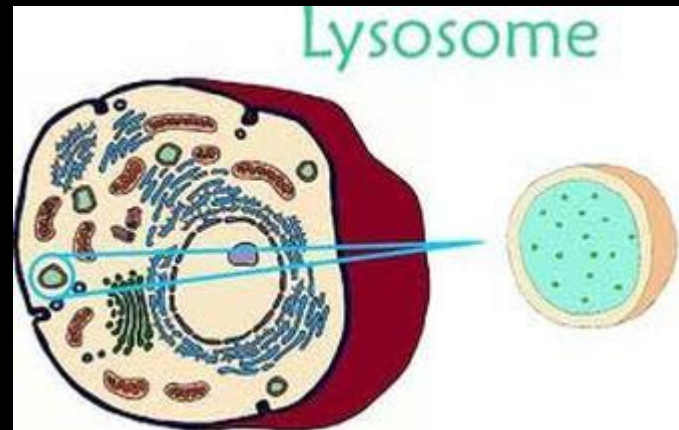
# Centriole

- Cylindrical structures composed of microtubules.
- 
- Found in animal cells.
- Helps organise the assembly of microtubules used for cell division.
- Centrioles called basal bodies form cilia and flagella.



# Lysosome

- Cellular organelles that contain acids that help break down cellular waste materials
- Found only in animal cells



# Can we label this cell diagram!

