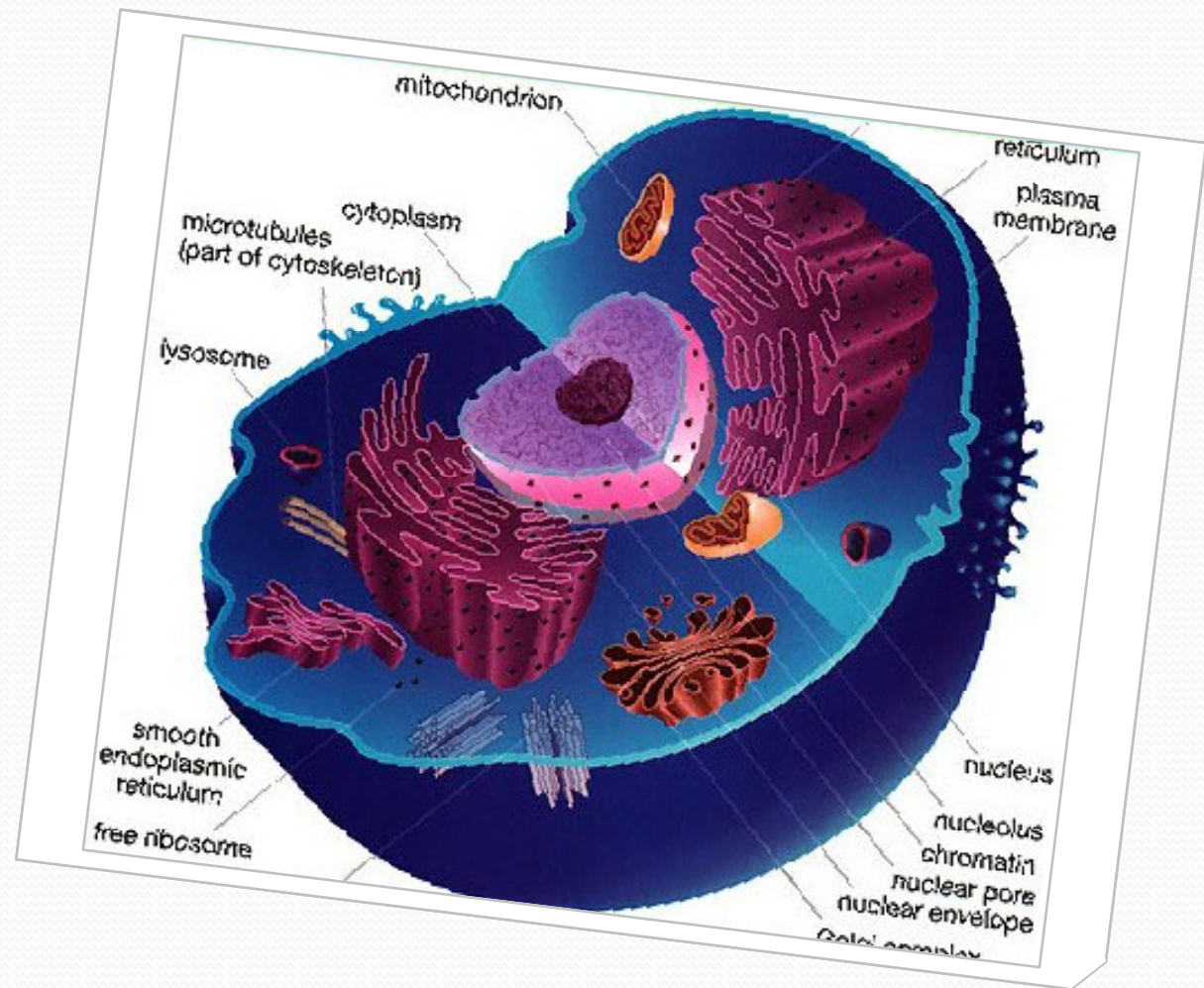


# CELL STRUCTURE

CELL BIOLOGY

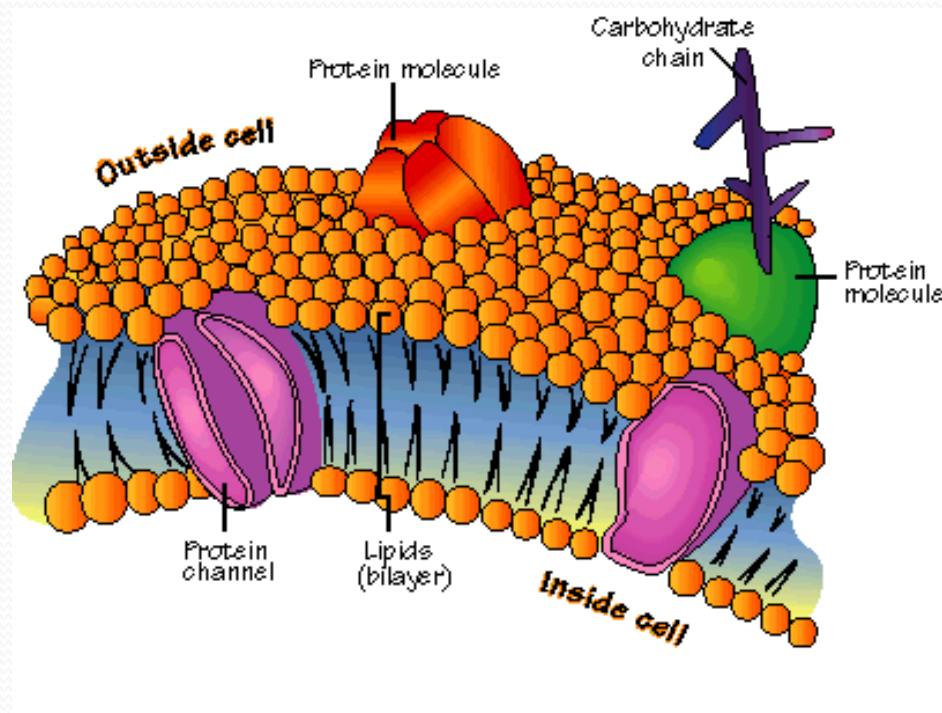
# Cell Structure

By the end of this section you need to be able to **identify** and **describe** cell structures and their functions.



# CELL MEMBRANE (structure)

- The 'gate-keeper' of the cell
- Composed of a phospholipid (fat) bilayer embedded with protein molecules



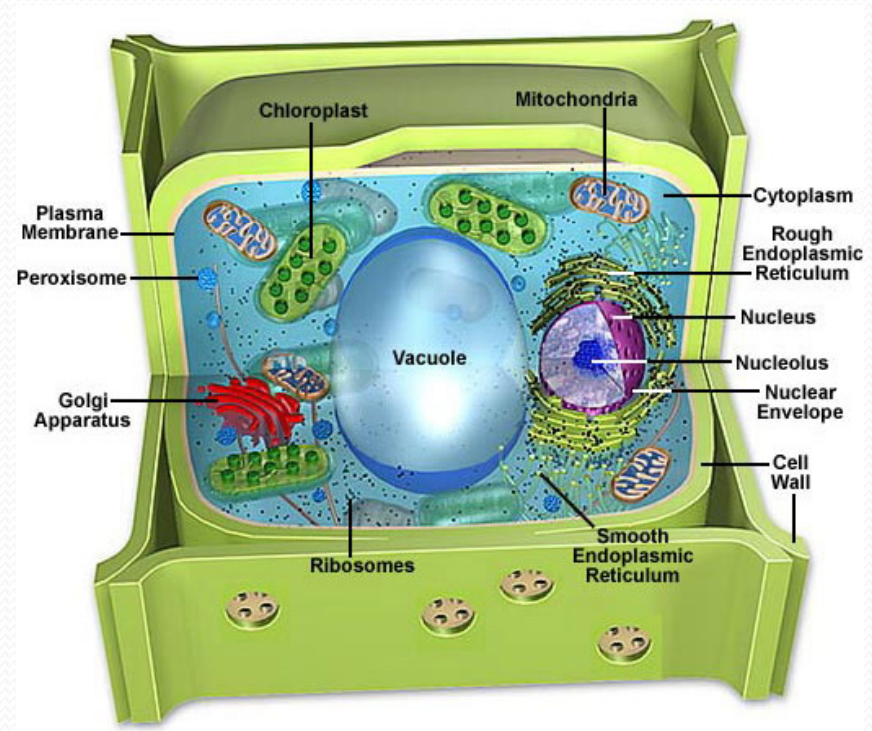


# CELL MEMBRANE (function)

- Separates the contents of the cell from its surroundings
- Regulates entrance (endocytosis) and exit (exocytosis) of large molecules
- Allows for movement of small molecules and water (diffusion and osmosis)
- Divides the cell into compartments
- Cell recognition (glycoproteins & glycolipids on outside of membrane)

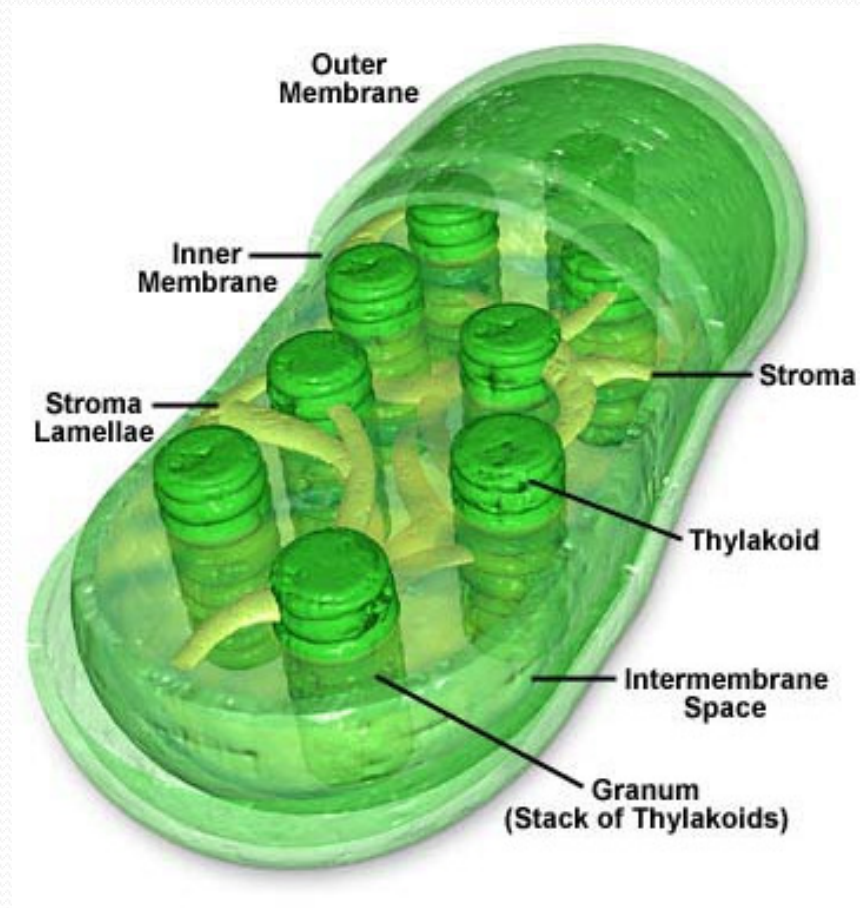
# CELL WALL

- Found in the cells of plants, fungi, and bacteria.
- Located outside the cell membrane.
- Provides structural support to the cell



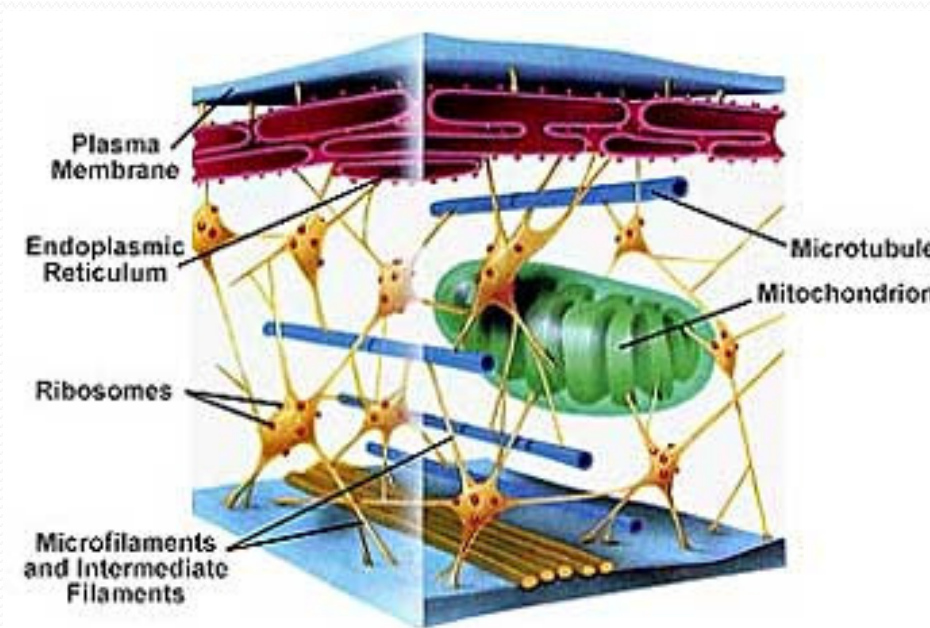
# CHLOROPLAST

- Found in plant cells
- Site of photosynthesis



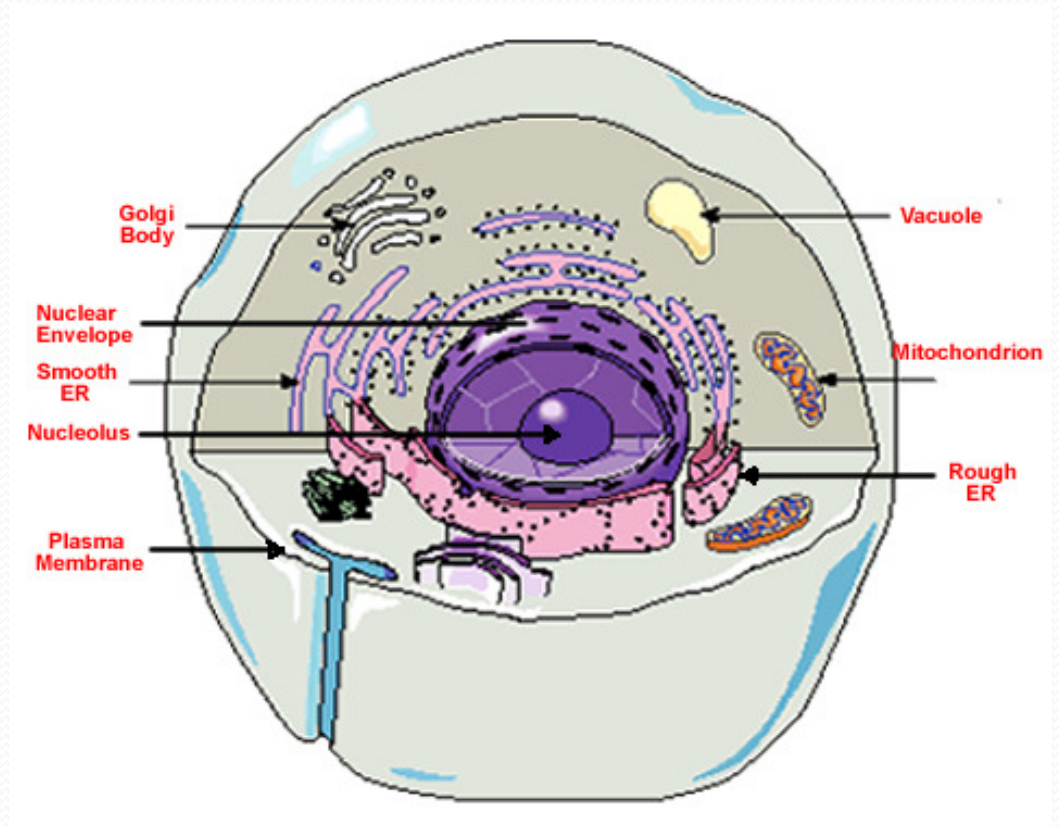
# CYTOSKELETON

- Internal support structure of the cell
- Helps cell to maintain its shape
- Made up of microtubules and protein filaments



# CYTOPLASM

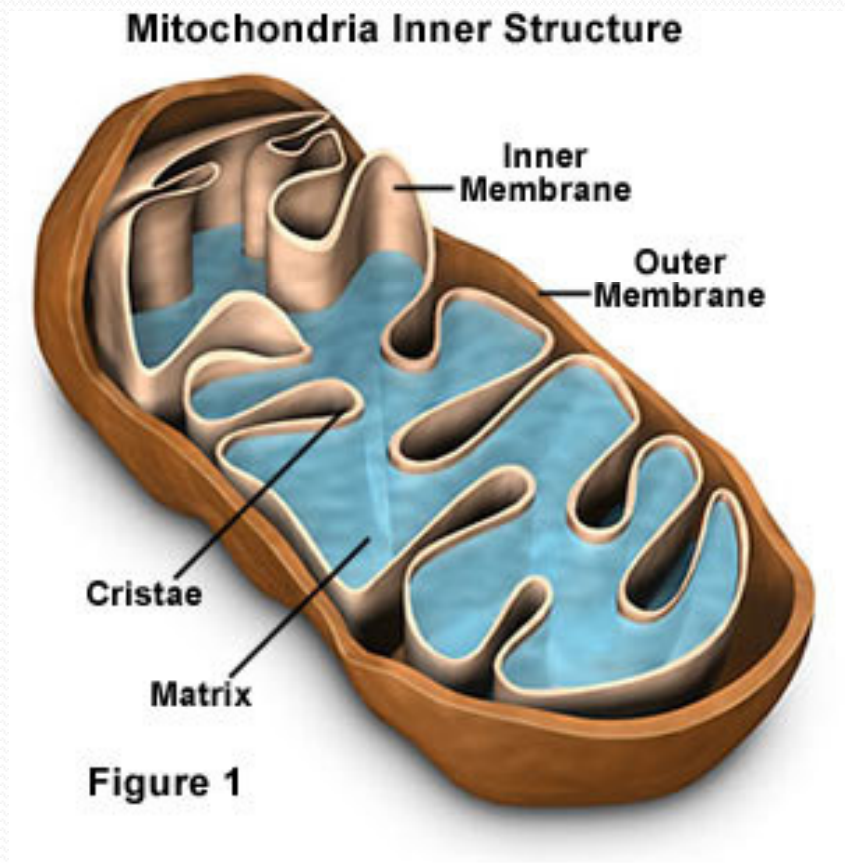
- The jelly-like material that fills the space between the cells organelles





# MITOCHONDRIA

- The 'powerhouse' of the cell where cellular respiration takes place
- The inner fluid-filled space is called the matrix
- The inner folded membrane forms the cristae (provides more surface area for ATP production).

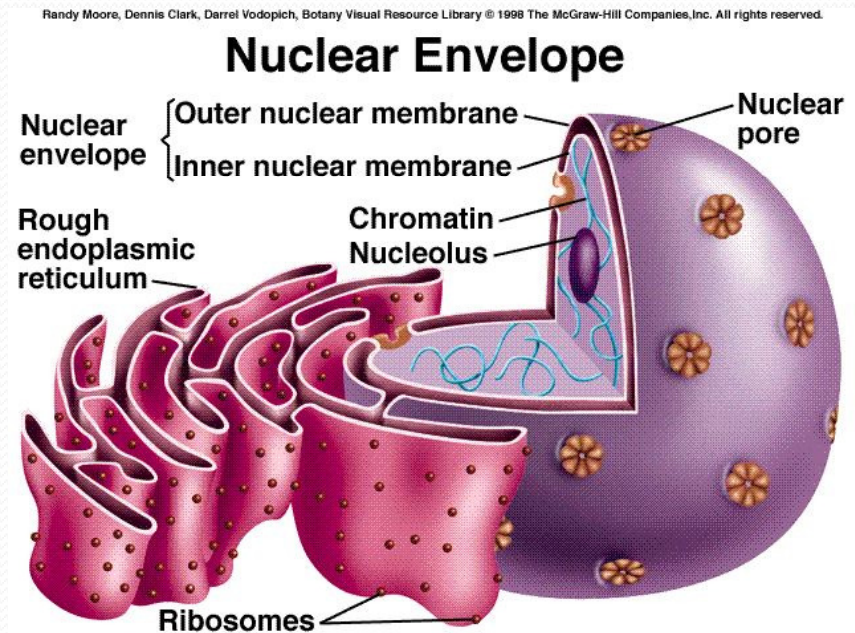


# MITOCHONDRIA

- This is the site of cellular respiration
- Carbohydrate (glucose) + oxygen →  
carbon dioxide + water + energy
- $C_6H_{12}O_6 + 6 O_2 \rightarrow 6 CO_2 + 6 H_2O + ATP$
- ATP (adenosine triphosphate) is the energy molecule used in cellular reactions

# NUCLEUS

- Control centre of the cell
- Stores genetic information as DNA
- Surrounded by the nuclear envelope – a double membrane containing pores that separates the contents of the nucleus from the cytoplasm



# NUCLEUS

- DNA in the nucleus is normally in the form of **chromatin** (long strands of DNA and protein)
- Just before the cell divides the chromatin condenses into **chromosomes**

Chromosome

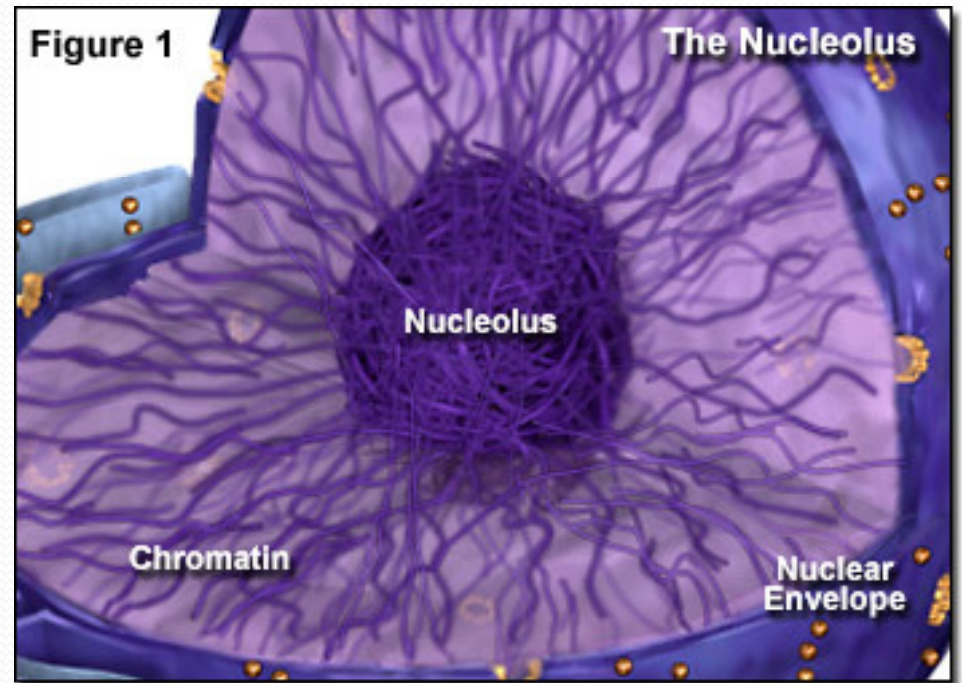


DNA



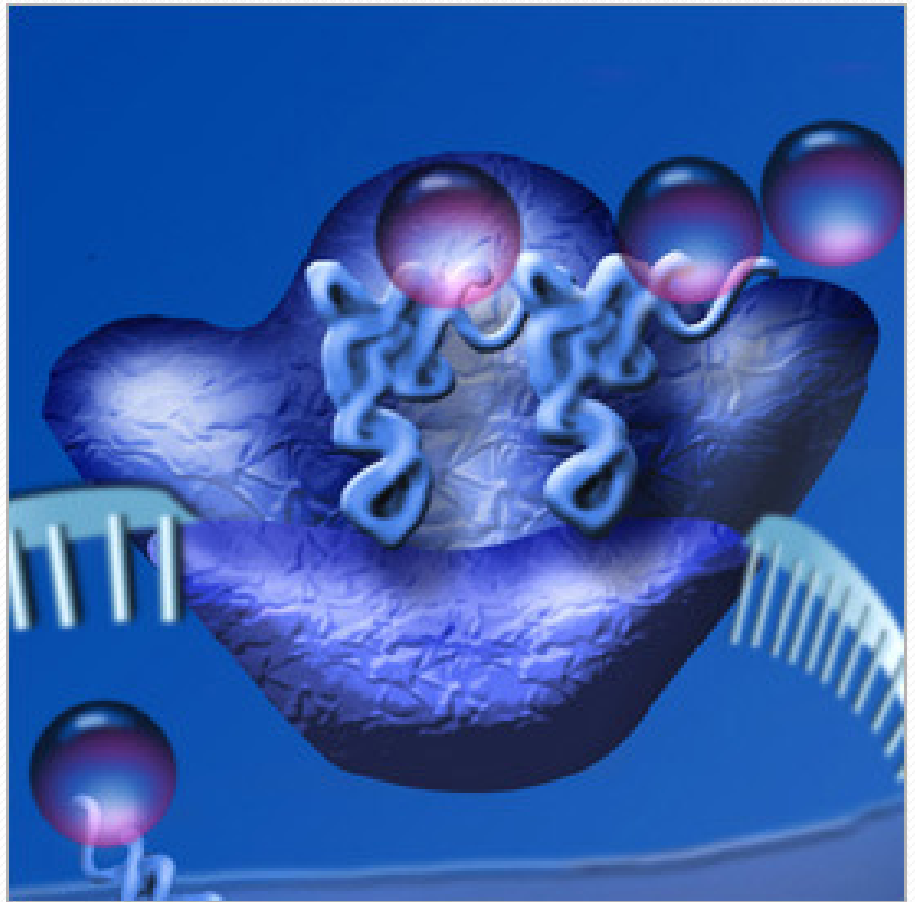
# NUCLEOLUS

- Appears as a darker section within the nucleus of a cell
- Produces ribosomal RNA (rRNA) which is a subunit of the ribosome
- Ribosomes are also assembled in the nucleolus



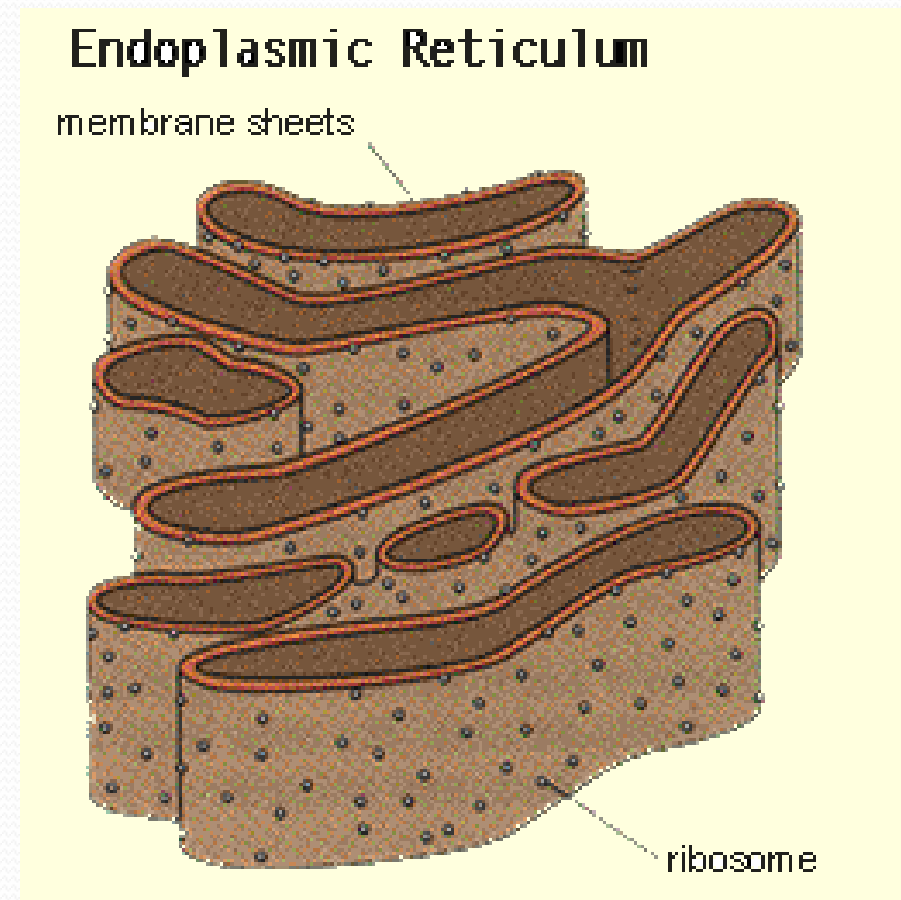
# RIBOSOMES

- Each ribosome is made up of 2 subunits
- Each subunit contains rRNA and proteins
- Ribosomes function as the site of protein synthesis
- Can be either free floating in cytoplasm or attached to rough ER



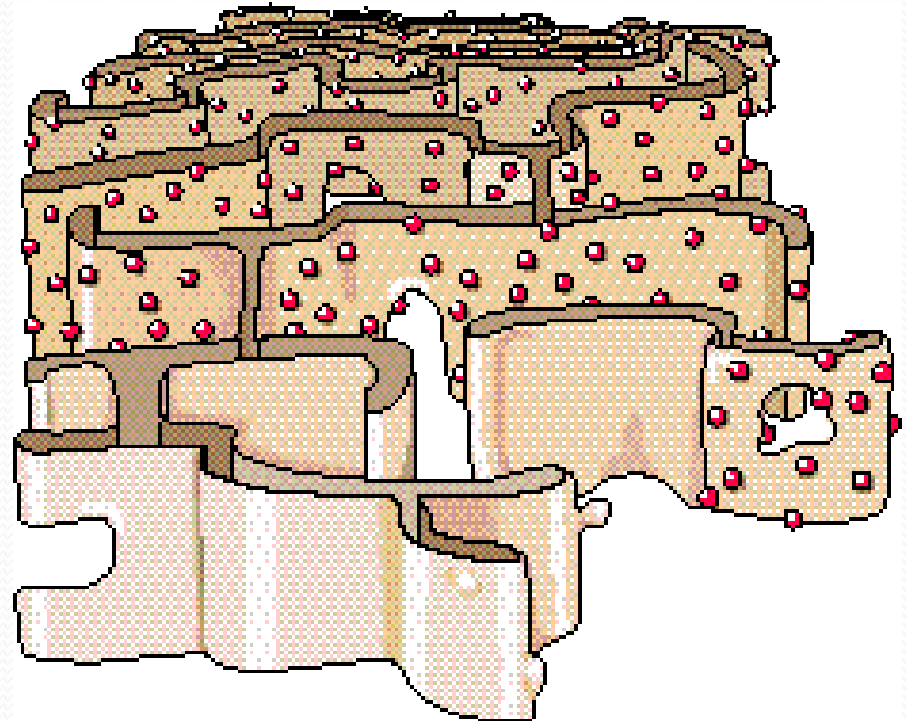
# ENDOPLASMIC RETICULUM

- A series of membranous channels or tubes – usually seen as being attached to the nucleus
- Act as a transport system within the cell
- 2 types: smooth ER (sER) and rough ER (rER)



# SMOOTH ENDOPLASMIC RETICULUM

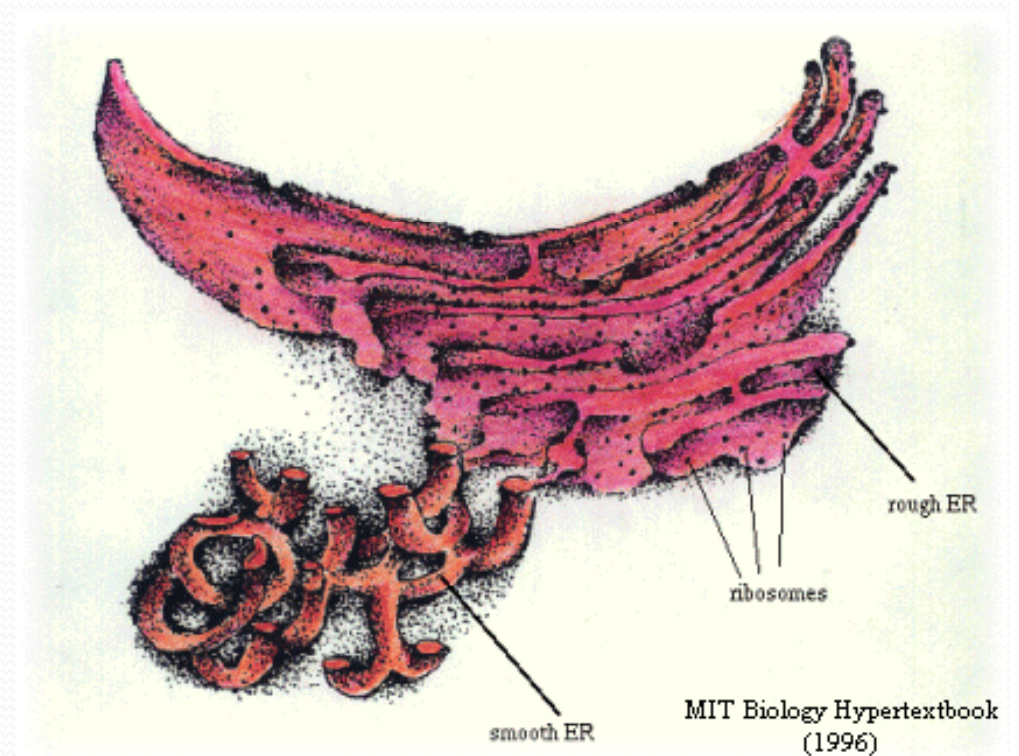
- sER has no ribosomes
- Synthesizes hormones (such as sex hormones) and lipids (including phospholipids)
- Detoxifies drugs and alcohol in the liver with the help of enzymes





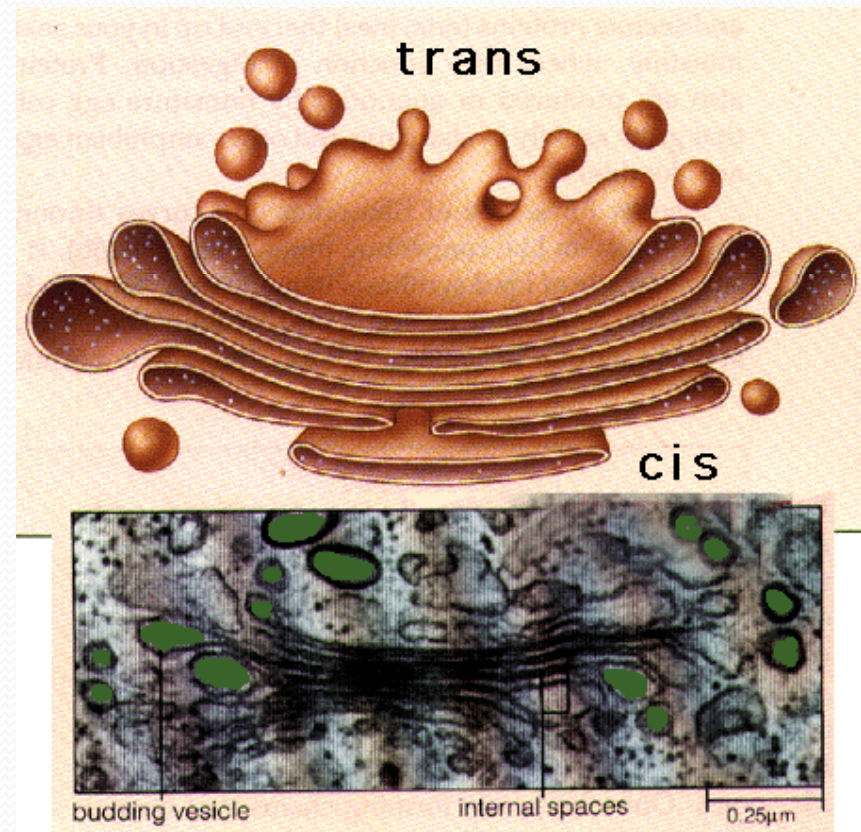
# ROUGH ENDOPLASMIC RETICULUM

- The attached ribosomes produce proteins which then enter the rER
- Proteins are then modified and transported through the rER
- Modified proteins are packaged in vesicles and exported to the Golgi apparatus



# GOLGI BODIES

- A series of flattened saccules between the ER and the cell membrane
- Receives protein vesicles from rER and lipid vesicles from sER
- Modifies, repackages, stores, and exports the proteins and lipids in secretory vesicles
- Produces lysosomes





# LYSOSOMES

- Vesicles formed by the Golgi bodies which contain hydrolytic enzymes
- Also called ‘suicide sacs’ as they can be used by multicellular organisms to digest unwanted cells
- Auto-digestion of old or worn-out cell parts/organelles
- Intracellular digestion of food-filled vesicles (unicellular organisms)



# VACUOLES & VESICLES

- A vacuole is a large membranous sac used for storage in the cell
- Plant cells have large central vacuoles
- Vesicles are small vacuoles and there are different types
- Secretory vesicles transport materials out of the cell (by exocytosis)
- Lysosomes are a specialized type of vesicle