

cell structure

Titles
Categories
Sub-categories
Description

TYPES OF MICROSCOPES :

∴ light microscope

∴ electron microscope

↳ two kinds : transmission electron microscope & scanning electron microscope

- 2D appearance
- beam of electrons pass through specimen before being viewed
- internal structures and its membranes can be viewed

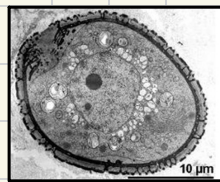
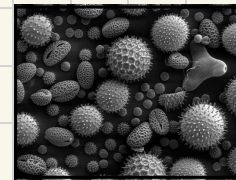


image of a pollen grain

- 3D appearance
- scans the surface of specimens thus only the external is viewed
- lower resolution than TEM



Comparison

Feature	Light microscope	Electron microscope
Source of radiation	visible light	electron beam
wavelength of radiation	approx. 400 - 700 nm	approx. 0.005 nm
maximum resolution	approx. 200 nm	approx. 0.5 nm
lenses	glass	electromagnetic
specimen	living or dead	non-living or dead (dehydrated)
stains	colored dyes	heavy metals
image	colored	black & white (can be artificially colored)

Magnification :

→ the number of times an image is enlarged compared to the actual size of the object

i.e. $\times 10$, $\times 100$, $\times 150$

* Increase in magnification ≠ Increase in resolution

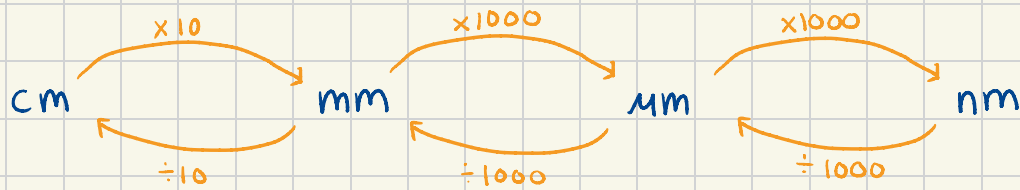
* Shorter the wavelength, higher the resolution

* Max. resolution = $\frac{1}{2}$ wavelength used

Resolution :

→ the ability to clearly distinguish two points as separate

units



→ Suitable unit for light microscope is 'μm'

→ Suitable unit for electron microscope is 'nm'

Functions of key organelles/structures of eukaryotes :

∴ Cell surface membrane

- ↳ phospholipid bilayer embedded proteins
- ↳ outer boundary of cell responsible for what enters/leaves the cell

∴ Nucleus

- ↳ control center of cell, housing genetic material in the form of DNA
- ↳ surrounded by a double membrane called the **nuclear envelope**
- ↳ contains the **nucleolus**, which is involved in ribosome production

∴ Rough ER

- ↳ network of membranes studded with ribosomes
- ↳ involved in protein synthesis and modification

∴ Smooth ER

- ↳ lacks ribosomes
- ↳ involved in lipid synthesis, detoxification and calcium ion storage

∴ Golgi body

- ↳ processes, sorts & packages proteins & lipids for delivery/secretion to other organelles

∴ Mitochondria

- ↳ powerhouse of the cell involved in ATP production through cellular respiration
- ↳ contains small circular DNA

∴ Ribosomes

- ↳ site of protein synthesis
- ↳ 80S ribosomes are found in the cytoplasm while 70S ribosomes are found in the mitochondria and chloroplasts as well as some prokaryotic cells

∴ **Lysosomes** (absent in plant cells)
↳ membrane-bound vesicles containing digestive enzymes
↳ involved in breaking down waste materials and cellular debris

∴ **Centrioles** (absent in plant cells)
↳ involved in cell division
↳ help organize microtubules that form part of the cytoskeleton

∴ **Chloroplasts** (absent in animal cells)
↳ organelles that carry out photosynthesis
↳ contain small circular DNA

∴ **Cell wall** (absent in animal cells)
↳ rigid outer structure providing structural support & protection
↳ is made of cellulose in plants/protists, chitin in fungi, and peptidoglycan in bacteria

∴ **Plasmodesmata** (absent in animal cells)
↳ a channel between cell walls
↳ allows communication & transport between adjacent cells

∴ **Vacuole** (absent in animal cells)
↳ stores water, sugar, other nutrients, and waste products
↳ has a membrane surrounding it called the tonoplast

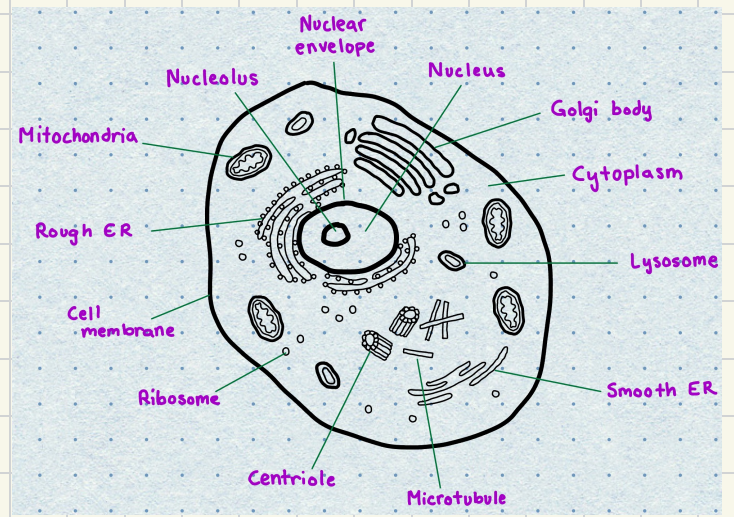
Endosymbiotic theory

∴ the fact that mitochondria & chloroplasts have small circular DNA, supports the endosymbiotic theory, which suggests that the two were once free-living prokaryotes that were engulfed by ancestral eukaryotic cells. Thus overtime they became symbiotic organelles, while still maintaining some of their original structures, such as 70S ribosomes and small circular DNA

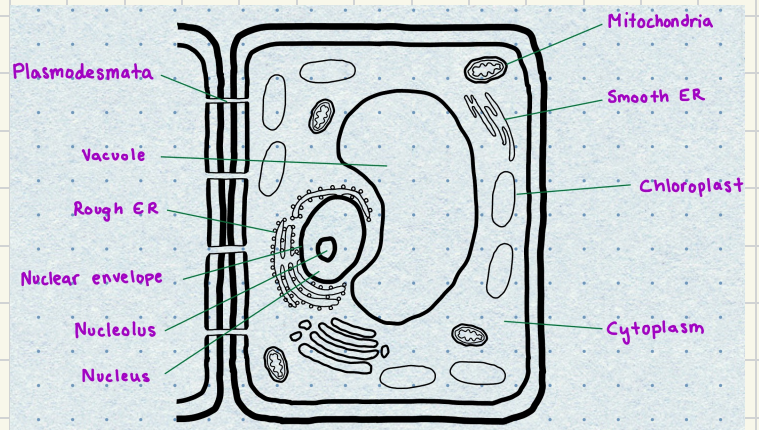
Diagrams ∴

∴ eukaryotes ⇒ animal & plant cells
∴ prokaryotes ⇒ bacterial cells
∴ non-cellular ⇒ virus

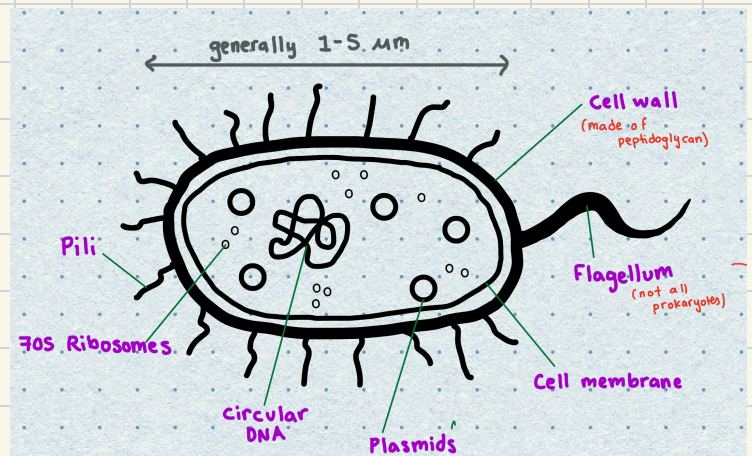
Animal Cell



Plant Cell



Bacterial Cell



Virus

