Cell structure and organisation ...1

Ribosomes

Ribosomes are involved in protein synthesis. They are made of a large and a small subunit constructed from rRNA and protein.

They occur in 2 different sizes - the smaller 70s in prokaryotes and 80s in eukaryotes.

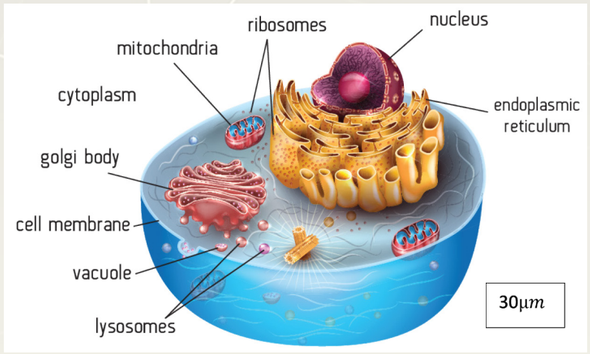
Endoplasmic reticulum

These are a series of flattened sacs - double membraned cisterna leading on from the nuclear envelope.

1 Rough Endoplasmin Reticulum - Covered in ribosomes for protein synthesis, cisterna then transport the protein.

2 Smooth Endoplasmin Reticulum - Synthesis and transport of lipids.

Animal cell



Vacuole

Contains cell sap, surrounded by the tonoplast membrane.

Cell Wall

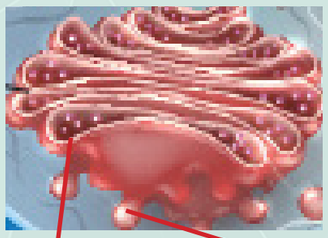
A structure made from cellulose microfibrils and pectin.

- Is fully permeable for transport of substances.
- Provides strength to the plant.
- Communication through the cell wall via plasmodesmata.

Golgi body

The golgi body modifies and packages proteins.

- Produces secreting enzymes
- Secreting carbohydrates
- Produces glycoproteins
- Transporting-storing lipids
- Forms lysosomes and digestive enzymes.



Centrioles

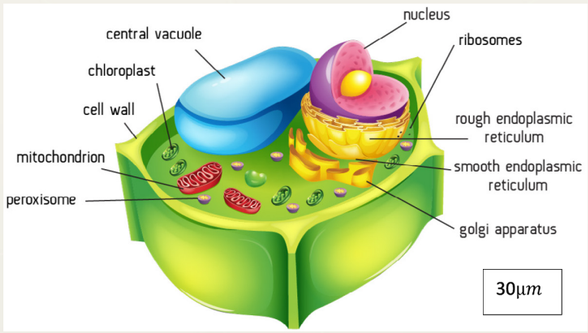
Found in animal cells. They are 2 rings of microtubules that form the spindle in cell division.

Cell Theory

Cell theory states that new cells are formed from other existing cells and that the cell is a fundamental unit of structure, function and organisation in all living organisms.

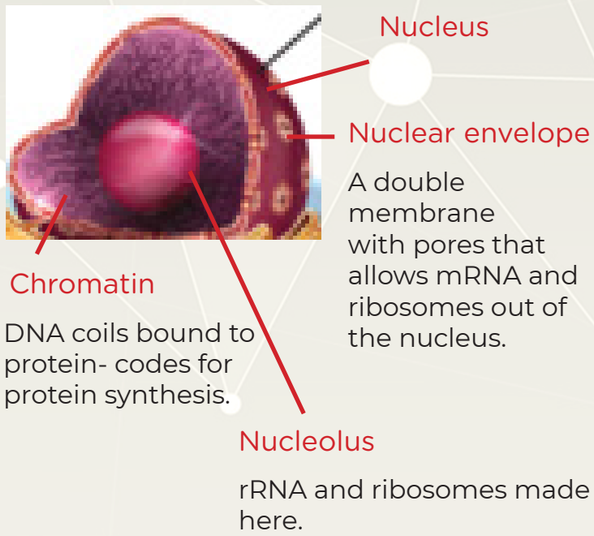
Animal and plant cells are **eukaryotic**. They contain membrane-bound organelles, DNA is found within a nucleus, **cell walls are made of cellulose, ribosomes are 80s** and aerobic respiration occurs within mitochondria.

Plant cell

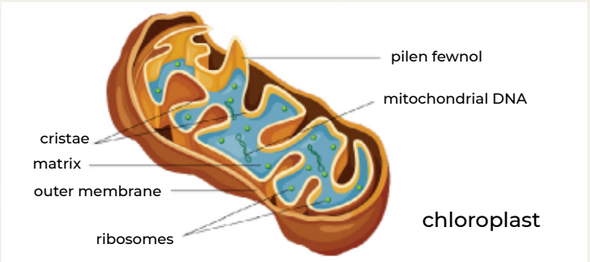


Endosymbiotic theory

The presence of 70s ribosomes and DNA in both mitochondria and chloroplasts suggests they were once free-living cells engulfed by ancient bacteria and developed a symbiotic relationship with them.

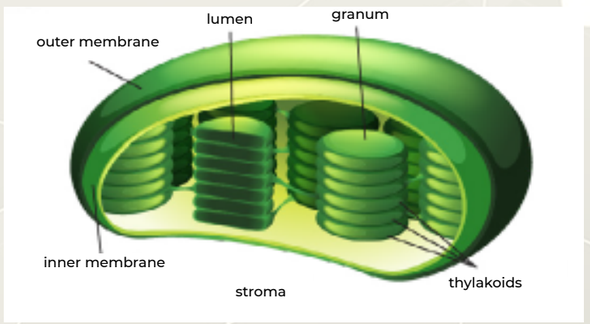


Mitochondria



Aerobic respiration occurs in the mitochondria. They are cylindrical in shape for a large surface area and reduced diffusion distance.

Chloroplasts

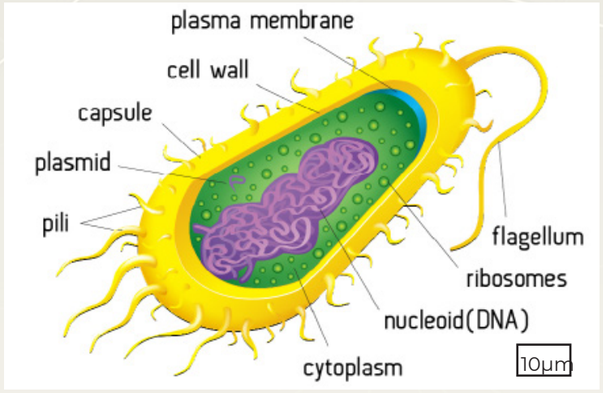


The thylakoids of the chloroplasts contain chlorophyll, a pigment that traps light energy for photosynthesis.

1 kilometre (km) = 1000 meters (m)	1 metre(m) = 1000 millimetres (mm)	1 millimetre (mm) = 1000 micrometres (μm)	1 micrometre (μm)= 1000 nanometres (nm)

Cell structure and organisation ...2

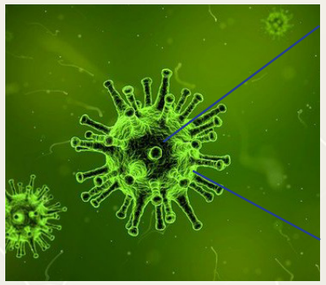
Prokaryotes



Bacteria are prokaryotic cells. They contain no membrane bound organelles and this gives some essential differences between prokaryotes and eukaryotes.

Prokaryotes	Eukaryotes
DNA free in cytoplasm	DNA in nucleus
Ribosomes 70s	Ribosomes 80s
Peptidoglycan cell wall	Cellulose cell wall
Mesosome for aerobic respiration	Mitochondria for aerobic respiration

Viruses



Nucleic acids inside DNA or RNA

Capsid, a protein coat.

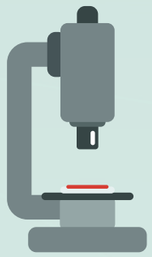
A virus is not a living thing, it is not a cell. It has no cytoplasm or organelles. It injects its genetic material into a living cell which then creates more virus particles.

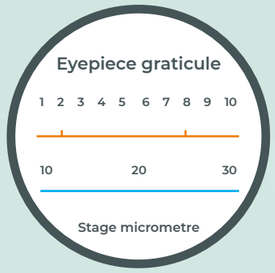
Microscopy

Viruses are too small to be seen under a light microscope. A light microscope can be used to view eukaryotic and prokaryotic cells.

Light microscopes can magnify up to x2000 however the ones in school are likely to have a maximum magnification of x400 or x1000.

Electron microscopes have a much higher magnification of over x100,000. They also have a better resolution - the ability to distinguish between different structures.





Magnification of microscope drawings

A - Actual size (measured using the eyepiece graticule)

I - Image size measured using a ruler

M - Magnification. How many times bigger the drawn image is than the actual size

Calibrating the microscope

1. Under a particular magnification, line up the smaller eyepiece graticule and larger stage micrometre.

2. Count how many eyepiece units (epu) fit into the stage units. In this example, the scales clearly line up. 80 epu fit into 20 stage units.

3. The size of each stage micrometre unit is known (shown on the slide), e.g. 0.1mm

4. Calculate using the data the size of each epu.

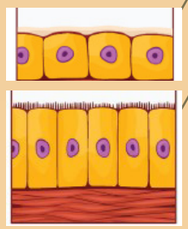
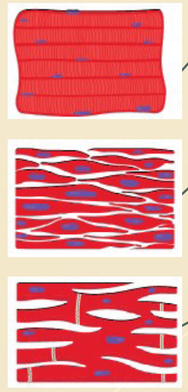
$\frac{20}{80}$ x 0.1 = 0.025mm

5. Convert 0.025mm into µm. E.g. 0.025mm x1000 = 25µm

6. Remove the stage micrometre slide and replace with a slide you want to observe. You can now measure the specimen on your slide as you know under this magnification each eyepiece unit is 25µm in length.

7. Draw an image of your specimen, use clear lines, no shading and label structures clearly.

Organisation of eukaryotes

Cell	**Cells are the basic unit of life.**
Tissue	A group of cells with the same structure and function working together. Epithelial tissue - continuous layers of cells on internal and external surfaces.  Cuboidal - simplest, one cell thick, e.g. PCT kidney Columnar - elongated, have cilia e.g. trachea Squamous - flattened e.g. alveolar walls Muscle tissue - tissue able to contract Skeletal - striated (striped), voluntary, attached to bones for locomotion.  Smooth - spindle shaped cells, no stripes, involuntary e.g. skin and digestive tract. Cardiac - heart mus-cle, striated, short fibres, contracts with-out nerve stimulation. Does not tire. Connective tissue - separates tissues and organs Elastic and collagen Blood bone and carti-lage
Organ	A group of tissues working together to perform a particular function.
Organ system	A system of organs working together with a particular role.
Organism	All the systems working together forming a discrete individual.