

# CELLS

Cell = the basic structural and functional unit of all living organisms.

## LIVING ORGANISMS

..can be divided into..

### EUKARYOTES

(Multicellular organisms)

### PROKARYOTES

(Unicellular organisms)

Complex cells

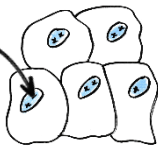
..these organisms are made up of either..

Simple cell

### EUKARYOTIC CELLS

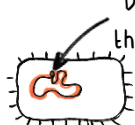
### A PROKARYOTIC CELL

DNA contained  
in a nucleus



The defining feature?

DNA free in  
the cytoplasm



## HAVE A NUCLEUS

## NO NUCLEUS

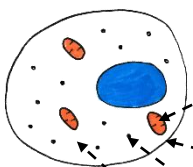
examples

### TYPICAL ANIMAL CELL

### TYPICAL PLANT CELL

example

### TYPICAL BACTERIAL CELL



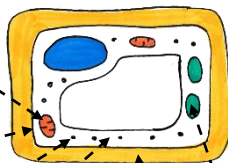
Nucleus

Mitochondria

Cell membrane

Ribosomes

Cytoplasm



Permanent,  
large vacuole

Chloroplasts

Cell wall (cellulose)

Ribosomes

Cytoplasm

Cell membrane

Cell wall  
(polysaccharides  
and protein)

Flagellum

Circular,  
chromosomal  
DNA

Plasmid  
DNA

### SUBCELLULAR STRUCTURES

Some subcellular structures are common to animal, plant and bacterial cells, others can only be found in plant or bacterial cells.

Prokaryotic cells are much SMALLER than eukaryotic cells.

Remember eukaryote/prokaryote describes the organism. Eukaryotic/prokaryotic describes the cell type.



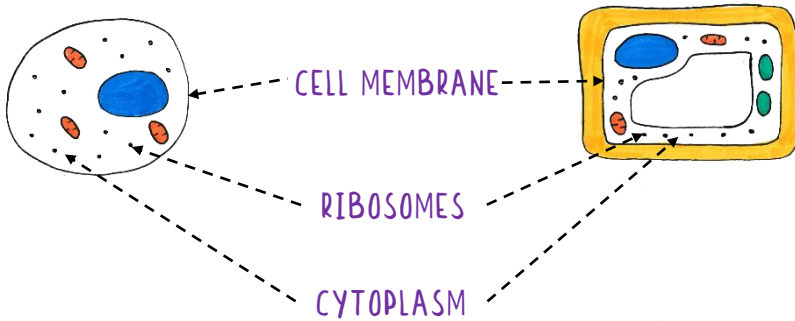
# SUBCELLULAR STRUCTURES

**SUBCELLULAR STRUCTURES** are features of a cell that have a particular function.



For your exam you will need to know the subcellular structures that are found in animal, plant and bacterial cells. You will also be expected to know the function of each subcellular structure.

## COMMON TO ANIMAL, PLANT and BACTERIAL CELLS



There are 3 subcellular structures common to animal, plant and bacterial cells.

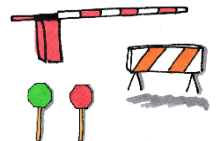
**CYTOPLASM** The gel-like substance containing enzymes. This is where most of the cell's chemical reactions take place.



**RIBOSOMES** Where translation of genetic material occurs, resulting in protein synthesis i.e. where proteins are made.



**CELL MEMBRANE** Barrier that holds the cell together and is responsible for controlling which substances pass in and out of the cell.



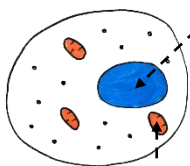
## UNIQUE TO ANIMAL and PLANT CELLS



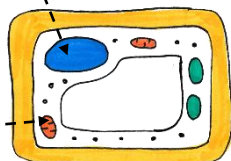
**NUCLEUS** Where the genetic material, that controls the cell's activities, is stored as chromosomes.



Bacterial cells DO NOT contain mitochondria or a nucleus.



**MITOCHONDRIA**



Where the energy, that the cell needs to function, is released in respiration.



Bacterial cells have genetic material (DNA) but it is not contained within a nucleus.





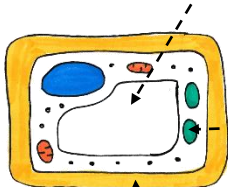
# SUBCELLULAR STRUCTURES

## UNIQUE TO PLANT CELLS



There are 3 subcellular structures unique to plant cells.

**PERMANENT, LARGE VACUOLE;** Filled with **cell sap** (a weak solution of sugar and salt), the large vacuole helps to support the plant cell and keep it **turgid**.



**CHLOROPLASTS;** Where **photosynthesis** occurs. Chloroplasts contain the green pigment **chlorophyll**.

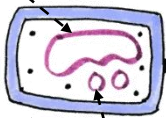
**CELL WALL (CELLULOSE);** Made from the carbohydrate **cellulose**, the cell wall is rigid, providing the plant cell with **structure and strength**.



## UNIQUE TO BACTERIAL CELLS

There are 4 subcellular structures unique to bacterial cells.

**FREE CHROMOSOMAL DNA;** A single, large, circular piece of DNA that controls the cell's activities and replication. This DNA floats in the cytoplasm and is **NOT** contained within a nucleus.



**FLAGELLUM;** A rotating, whip-like tail that allows the bacterial cell to move towards nutrients and away from toxins. Bacterial cells can have more than one flagellum (flagella).



**PLASMID DNA** Small loops of DNA that contain extra genetic information e.g. antibiotic resistance genes. They can be passed between bacteria.



### CELL WALL

**(POLYSACCHARIDES AND PROTEIN)** Made from polysaccharide and protein, the cell wall provides structure to the bacterial cell.

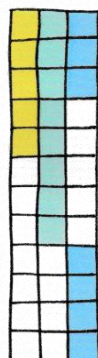


## SUMMARY of SUBCELLULAR STRUCTURES

Where can I find each subcellular structure?

### KEY

- Animal Cell
- Plant Cell
- Bacterial Cell



- Cytoplasm
- Cell Membrane
- Ribosomes
- Mitochondria
- Nucleus
- Cell Wall (cellulose)
- Chloroplasts
- Permanent, Large Vacuole
- Free Chromosomal DNA
- Plasmid DNA
- Flagellum
- Cell Wall (polysaccharide & protein)

### NOTE:

Some bacteria have a cell wall but it is **NOT** made from cellulose.