

# WJEC (Wales) Biology A-level

## Unit 1.2 - Cell structure and organisation

### Flashcards

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# Define eukaryotic cell



## Define eukaryotic cell

A type of cell that contains a true nucleus along with membrane-bound organelles.



Describe the structure of the nucleus.



## Describe the structure of the nucleus.

- Surrounded by **nuclear envelope** which is semi-permeable and double membraned
- **Nuclear pores** allow substances to enter/exit
- Dense **nucleolus** (made of RNA and proteins) assembles ribosomes



Describe the function of the nucleus.



## Describe the function of the nucleus.

- Contains DNA coiled around **chromatin** into chromosomes
- Coordinates cellular activities



# What is chromatin?





# What is chromatin?

A DNA-protein complex found in eukaryotic cells.



Describe the structure of mitochondria.



## Describe the structure of mitochondria.

- Surrounded by double membrane, **mitochondrial envelope**
- Folded inner membrane forms **cristae** (large surface area)
- Fluid **matrix** contains mitochondrial DNA, respiratory enzymes, lipids and proteins



Describe the function of mitochondria.



Describe the function of mitochondria.

Site of aerobic respiration to produce ATP.



Describe the structure of the endoplasmic reticulum (ER).



Describe the structure of the endoplasmic reticulum (ER).

- Series of flattened membrane-bound sacs (**cisternae**) within the cytoplasm, continuous with the nuclear envelope
- Two types: **rough ER** and **smooth ER**



Describe the function of the smooth endoplasmic reticulum (SER).





Describe the function of the smooth endoplasmic reticulum (SER).

Lipid synthesis



Describe the function of the rough endoplasmic reticulum (RER).



Describe the function of the rough endoplasmic reticulum (RER).

Many ribosomes attached for protein synthesis and transport.



Describe the structure of ribosomes.



Describe the structure of ribosomes.

- Made from **rRNA** and **proteins**
- Found free in the cytoplasm or associated with the RER



Describe the function of ribosomes.



Describe the function of ribosomes.

Site of protein synthesis (translation)

- **Large** subunit joins amino acids
- **Small** subunit reads RNA



Describe the structure of the Golgi body.





## Describe the structure of the Golgi body.

- Planar stack of membrane-bound, flattened sacs
- Cis face aligns with RER
- Molecules are processed in cisternae
- Vesicles leave via trans face by exocytosis



Describe the function of the Golgi body.



Describe the function of the Golgi apparatus.

- Modifies and packages proteins for export
- Synthesises glycoproteins



Describe the structure and function of lysosomes.



## Describe the structure and function of lysosomes.

- Fluid-filled vesicles surrounded by a single membrane, contain enzymes
- Role in phagocytosis, digest unwanted materials in the cytoplasm



Describe the structure of centrioles.



## Describe the structure of centrioles.

- Cylindrical structure
- Organised into microtubules in a 9+0 pattern
- Found in pairs in **centrosomes**



Describe the function of centrioles.





## Describe the function of centrioles.

- Migrate to opposite poles of the cell during prophase
- Involved in the organisation of spindle fibres



Describe the structure of a chloroplast.



## Describe the structure of a chloroplast.

- Disk shaped surrounded by double membrane
- **Thylakoids** - flattened discs stacked to form grana
- **Grana** - contain photosystems with chlorophyll
- **Intergranal lamellae** - tubes attach thylakoids in adjacent grana
- **Stroma** - fluid-filled matrix



# What is the function of a chloroplast?



# What is the function of a chloroplast?

## Site of photosynthesis



Describe the structure of the permanent vacuole in plants.



Describe the structure of the permanent vacuole in plants.

- Surrounded by a single membrane, **tonoplast**
- Contains **cell sap** (mineral ions, water, enzymes, soluble pigments)



Describe the function of the permanent vacuole in plants.





Describe the function of the permanent vacuole in plants.

- Controls turgor pressure
- Water storage
- Isolates harmful waste products
- Maintains pH



# Define plasmodesmata



## Define plasmodesmata

Microscopic channels between plant cell walls that facilitate communication and symplastic transport.



# Define prokaryotic cell



## Define prokaryotic cell

A type of cell that does not contain any membrane-bound organelles or a true nucleus.



Describe the structure and function of the flagella in prokaryotic cells.



Describe the structure and function of the flagella in prokaryotic cells.

- Long, whip-like protrusion made of flagellin
- Rotates to propel the organism
- Sensory organ



# How is genetic information stored in prokaryotes?





## How is genetic information stored in prokaryotes?

- **Plasmids** - small rings of DNA that carry non-essential genes, exchanged between bacterial cells via conjugation
- **Loop of DNA** - circular DNA stored in the nucleoid region of the cell



Describe the structure and function of pili in prokaryotic cells.



Describe the structure and function of pili in prokaryotic cells.

- Hair-like microfibers made of pilin that extend through the cell wall
- Enable the attachment of bacteria to each other and to other surfaces



Describe the structure and function of the mesosome.



Describe the structure and function of the mesosome.

- Infolds of the cell membrane
- Increase the surface area of the cell, aiding cellular respiration



What is the function of the capsule in prokaryotic cells?



# What is the function of the capsule in prokaryotic cells?

- Protective, slimy layer
- Helps the cell to retain moisture and adhere to other surfaces



Which organelles are found in both eukaryotic and prokaryotic cells?





Which organelles are found in both eukaryotic and prokaryotic cells?

- Cell membrane
- Cytoplasm with a form of cytoskeleton (although cytoskeleton of eukaryotes is more significant)
- Ribosomes



# Contrast eukaryotic and prokaryotic cells.



# Contrast eukaryotic and prokaryotic cells.

Prokaryotic	Eukaryotic
Small, unicellular	Large, often multicellular
No membrane-bound organelles, no nucleus	Contain membrane-bound organelles and true nucleus
Circular DNA, not associated with proteins	Linear chromosomes associated with histones
70S ribosomes	80S ribosomes
Reproduce via binary fission	Reproduce via sexual or asexual reproduction
Peptidoglycan cell wall	Cell wall made of cellulose (plants) or chitin (fungi)
Extrachromosomal DNA in plasmids	Extra DNA in some organelles, e.g. mitochondria



# Contrast eukaryotic plant and animal cells.



# Contrast eukaryotic plant and animal cells.

<b>Plant cells</b>	<b>Animal cells</b>
Cellulose cell wall	No cell wall
Large permanent vacuole	Small temporary vacuoles (vesicles)
Contain chloroplasts	No chloroplasts
No pseudopodia	Some may have pseudopodia



# What is a light microscope?



# What is a light microscope?

A type of microscope that uses a series of lenses to magnify the visible light reflecting off a specimen.



# What is magnification?





# What is magnification?

The number of times bigger an image appears compared to the size of the specimen.



How can the magnification of an image be calculated?



How can the magnification of an image be calculated?

$$\text{magnification} = \frac{\text{size of image}}{\text{size of specimen}}$$



# Describe cell theory



# Describe cell theory

- The cell is the fundamental unit of all life forms
- New cells can be formed from existing cells
- Cells contain genetic material which can be transferred to daughter cells



# What is a virus?



## What is a virus?

A non-living microorganism that consists of genetic material surrounded by a protein husk.



How do viruses differ from prokaryotic and eukaryotic cells?





# How do viruses differ from prokaryotic and eukaryotic cells?

<b>Virus</b>	<b>Prokaryotic and eukaryotic cells</b>
Non-living	Living
Smaller and simpler in structure	Larger and more complex structure
Genetic material in the form of DNA or RNA	Genetic material in the form of DNA
Can only reproduce within a host cell	Independent cell division, sexual or asexual
No ribosomes	Contain ribosomes



# How are multicellular organisms organised?



# How are multicellular organisms organised?

- Many cells make up a tissue
- Many tissues make up an organ
- Many organs make up an organ system



# Define tissue



## Define tissue

A group of cells working together to carry out a specific function.



# Define organ



## Define organ

A group of tissues working together to carry out a specific function.



# Define organ system





## Define organ system

A group of organs working together to carry out a specific function.

