

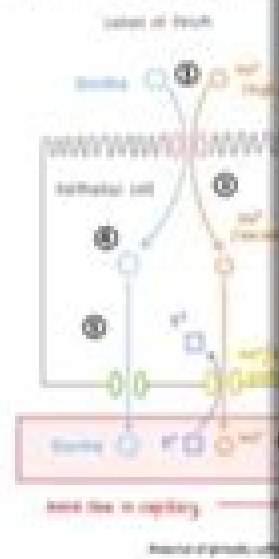
# A\* A-LEVEL BIOLOGY TOPIC 2 NOTES

## CELLS

How do transport work for this example?

1. Surface ions are actively transported on the back, into the blood, by the gullies.
2. Maintaining a concentration gradient of potassium ions in lumen than in cell.
3. Surface ions and glucose move by facilitated diffusion from the lumen, via a carrier.
4. Creating a concentration gradient of all glucose in epithelial cell than blood.
5. Glucose moves out of cell into blood through a protein channel.

Diagram showing the absorption of water



### Water potential

**Definition:** High movement of water molecules across water potential gradient. They point water always

Water potential = the likelihood ('potential') of water

- Pure water has the highest water potential (0 kJ mol<sup>-1</sup>)
- Adding solutes to a solution lowers the water potential
- Measured in kilojoules mol<sup>-1</sup>
- Can be denoted by the symbol  $\psi$

How about osmosis?

- Osmosis = net  $H_2O$  / energy required
- Factors affecting rate = surface area, water potential difference, thickness of exchange surface / diffusion distance

Application example:

Red blood cells contain a variety of solutes dissolved

- If a red blood cell is placed in pure water, it will gain water potential than pure water
- The cell surface membrane will break and burst the cell

- However, if a red blood cell is placed in a solution of pure water, water will leave the cell by osmosis
- The cell shrinks and becomes crenated

Key takeaway point: Water will always move to a cell

Diagram showing red blood cells in different solutions



### Antibodies

Remember the definition of an antibody

**Antibody:** a protein, specific to an antigen, which

Structure of antibodies - key points

- Quaternary structural protein (links to 1.1.4.2)
- Composed of 4 polypeptide chains (2 heavy and 2 light) joined together by disulphide bridges
- Each chain has a specific amino acid sequence
- Each chain has a specific amino acid sequence

Exam question example

Describe and explain how the structure of an antibody

- Polypeptide chains of protein = composed of amino acids
- The sequence of amino acids determines the specific shape of the protein
- Quaternary structure = 4 polypeptide chains held together by disulphide bridges
- Each chain has a specific amino acid sequence
- Each chain has a specific amino acid sequence

Diagram of an antibody



Diagram of antibody structure



### Meiosis

The stage of the cell cycle where the cell repeats most of its life or DNA replication occurs at this stage (this is about as much as you need to know) -> you need comprehensive understanding from 1.1.5.2

- During meiosis, in addition to DNA replication, these processes are also occurring:
  - DNA replication
  - Random assortment
  - Replication of centromeres

Meiosis

- Parent cell 'divides' into two in the output divides into four
- Results in the formation of four genetically identical daughter cells (diploid of parent = 2n)

Compare mitosis and meiosis - where is not actually the process where the cell divides into two daughter cells. Rather

- Meiosis is the division of the cell, resulting into four genetically identical cells

Diagram of mitosis

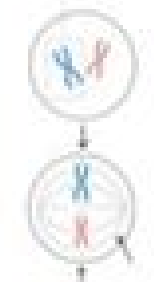
- Prophase - key points:
  - Chromosomes condense, becoming shorter and thicker (they appear as two sister chromatids, joined by a centromere)
  - Centromeres become visible under a microscope
  - Nuclear envelope breaks down and granules move to surround cells, forming the spindle network (needed for later stages)

Diagram of mitosis

- Metaphase - key points:
  - Chromosomes align along the equator / middle of the cell
  - Spindle fibres attach to chromosomes by their centromeres

Diagram of mitosis

Diagram of mitosis



# As Level Biology Revision Notes

**M Lipman**



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