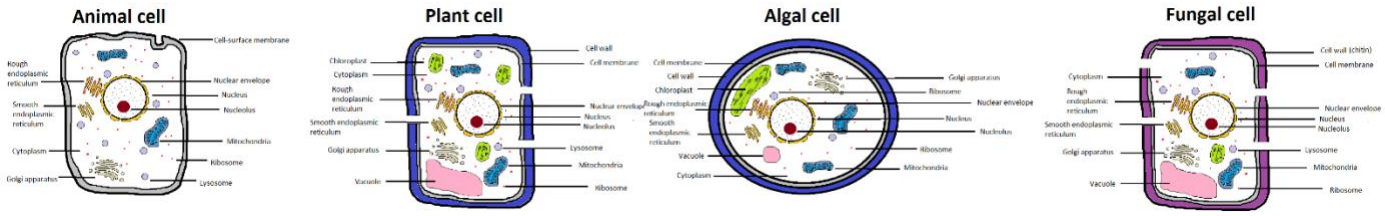
Unit 2: Cells

3.2.1.1 Structure of eukaryotic cells

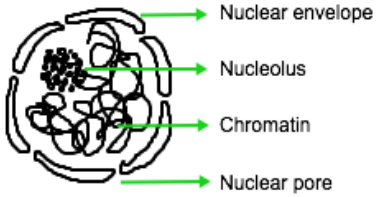
Diagram of eukaryotic cells



Structure and function – cell-surface membrane

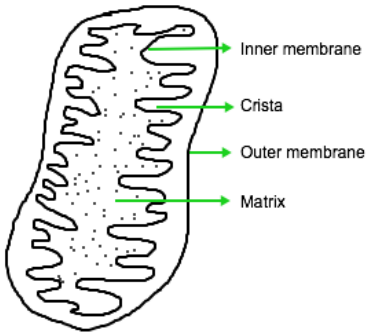
- Phospholipid bilayer with embedded proteins etc.
- Selectively permeable – enables control of passage of substances in and out of cell
- Barrier between internal and external environment of cell

Structure and function – nucleus



- Nuclear envelope, nuclear pores, nucleolus, DNA / chromatin
- Controls the cells activity though transcription on mRNA
- Nuclear pores allow substances e.g. mRNA to move between the nucleus and cytoplasm
- Nucleolus makes ribosomes which are made up of proteins and ribosomal RNA

Structure and function – mitochondria



- Double membrane – inner membrane folded to form cristae. Matrix containing small 70S ribosomes, small circular DNA and enzymes involved in aerobic respiration (glycolysis).
- Site of aerobic respiration producing ATP for energy release

Structure and function – Golgi apparatus

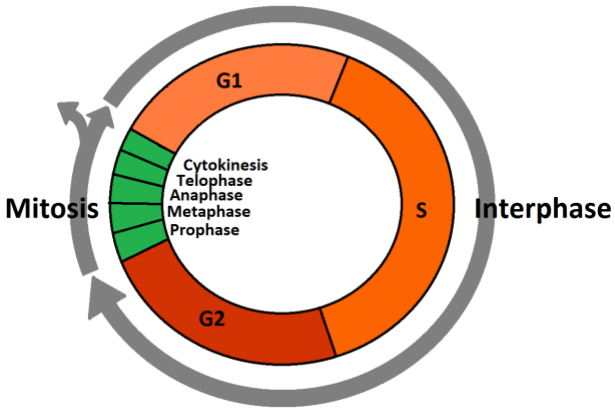
There was a considerable period of time during which the scientific community distinguished between artefacts and cell organelles

- Repeatedly prepared specimens in different ways
- If an object could only be seen with one preparation technique, but not another it was more likely to be an artefact than an organelle

3.2.2 All cells arise from other cells

Cell cycle

- In multicellular organisms, not all cells keep their ability to divide. Eukaryotic cells that do retain the ability to divide show a cell cycle.



Interphase

- S phase – DNA replicates semi-conservatively leading to two sister chromatids
- G1 and G2 – Number of organelles and volume of cytoplasm increases; protein synthesis; ATP content increased

Mitosis

- Parent cell divides = two genetically identical daughter cells, containing identical/exact copies of DNA of the parent cell.
- Stages - 'PMAT'

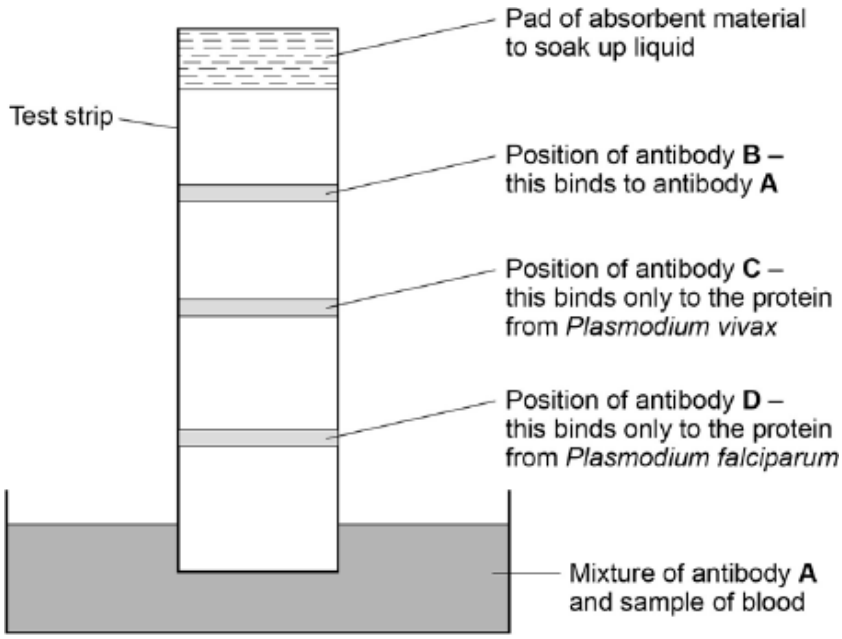
Stages of mitosis (the behaviour of chromosomes and the role of spindle fibres attached to centromeres in the separation of chromatids)

Prophase

- Chromosomes condense, becoming shorter and thicker = appear as two sister chromatids joined by a centromere
- Nuclear envelope breaks down and centrioles move to opposite poles forming spindle network

Metaphase

- Chromosomes align along equator



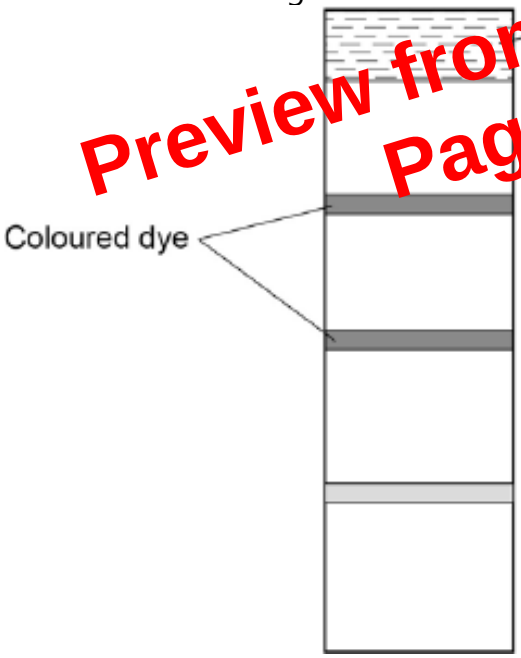
(a) Explain why antibody A attaches only to the protein found in species of Plasmodium. (2 marks)

- ✓ Antibody has tertiary structure
- ✓ Complementary to binding site on protein

(b) Antibody B is important is this test shows a person is not infected with Plasmodium. Explain why antibody B is important. (2 marks)

- ✓ Prevents false negative results
- ✓ (Since) shows antibody A has moved up strip / has not bound to any Plasmodium protein

(c) One of these test strips was used to test a sample from a person thought to be infected with Plasmodium. Figure 2 shows the result.



What can you conclude from this result? Explain how you reached your conclusion. (4)

- ✓ Person is infected with Plasmodium / has malaria
- ✓ Infected with (plasmodium) vivax
- ✓ Coloured dye where antibody C present
- ✓ That only binds to protein from vivax / no reaction with antibody for falciparum

The use of antibodies in the ELISA (enzyme linked immunosorbent assay) test

- Can determine if a patient has