

### key words

**membrane bound** - surrounded by a membrane

**linear** - the ends of the DNA molecule is in a chromosome

**nucleus** - the organelle that contains the cell DNA and the control center of the cell

**cytoplasm** - where metabolic reactions take place

**cell wall** - protects and supports each cell and the whole plant

**lysosomes** - the organelle that digests food particles, wastes, cell parts, and foreign invaders

**golgi vesicle** - responsible for transporting, modifying, and packaging proteins and lipids into vesicles to be transported where needed

**rough ER** - has ribosomes attached; it synthesises and transports proteins

**smooth ER** - flattened cavities surrounded by a thin membrane which do not have anything attached. These synthesise carbohydrates and lipids

**cell membrane** - separates the interior of the cell from the outside environment

**mitochondrion** - the organelle that breaks down food molecules to make ATP

**golgi apparatus** - here newly made proteins are modified and then packaged into vesicles

**nucleolus** - dense spherical structure inside the nucleus that produces ribosomes and RNA

**centriole** - take part in cell division

**ribosome** - the organelle in which amino acids are hooked together to make proteins

**chloroplast** - the organelle that uses the energy of sunlight to make food

**endoplasmic reticulum** - the organelle that makes lipids, breaks down drugs and other substances, and packages proteins for golgi complex

**golgi complex** - the organelle that processes and transports proteins and other materials out of the cell

**large central vacuole** - the organelle that stores water and other materials

**pits** - all water to enter and leave the xylem vessels

**vacuole** - maintains turgor to ensure a rigid frame work in the cell

**vesicle** - these transport materials around the cell or out the cell

### cell theory

all living things are composed of cells products

new cells are formed only by the division of pre-existing cells

the cell contains inherited information (genes), which is used as instructions for growth, functioning and development

the is the functioning unit of life; the metabolic reactions of life take place within the cells

### Magnification equation triangle

Image size (I) = actual size (A) x magnification (M)

Actual size (A) = image size (I) / magnification (M)

Magnification (M) = image size (I) / actual size (A)

### bacteria cells (cont)

Transcription and translation can occur simultaneously because the genetic material is free in the nucleoid surrounded by ribosomes.

The newly made protein toxin is moved to the surface membrane ready to be secreted to cause infection.

### red blood cells

### Light microscopy vs electron microscopy

### white blood cells

Neutrophils are a type of white blood cell and they play an important role in the immune system. They have multi-lobed nuclei, which enables them to squeeze through small gaps when travelling to the site of infection. The cytoplasm holds lysosomes that contain enzymes that are used to digest pathogens that are ingested by the neutrophil.

### root hair cell

### bacteria cells

*bacteria cells like many other animals and plants, produce and secrete toxins that have an effect on other organisms*

DNA is free in the cytoplasm of a prokaryotic cell in the area called the nucleoid

A section of DNA containing a genetic code for a metabolite unwinds and hydrogen bonds break.

RNA nucleotides line up (complementary base pairing).

Messenger RNA is formed. This process is known as transcription.

The next process is the production of the bacterial protein. This is called translation and it occurs at the ribosomes.

Red blood cells or erythrocytes are a biconcave shape. This increases the surface area to volume ratio of an erythrocyte. They are flexible so that they can squeeze through narrow blood capillaries. Their function is to transport oxygen around the body. In mammals, erythrocytes do not have a nucleus or other organelles. This increases space for the haemoglobin molecules inside the cell that carry oxygen.

### eukaryotic and prokaryotic

eukaryotic	prokaryotic
eukaryotic cells make up multicellular organisms such as plants and animals. they are complex cells with a nucleus and membrane-bound organelles	prokaryotic cells are single celled organisms. they are simple structures and do not have a nucleus or any membrane-bound organelles
plants and animals	bacteria

### light microscopy

Light microscopes use visible light and magnifying lenses to observe small objects

**Positives:** can observe sub-cellular structures

**Limitations:** lower magnification (x500) and resolution (x200nm)

### electron microscopy

They use a beam of electrons in a vacuum with a wavelength less than 1nm to visualise the specimen.

**Positive:** x500000 magnification, high resolution (0.1nm) electron micrographs produced.

**Limitations:** destroy the sample.

These cells are found at a plants roots, near the growing tip. They have long hair like extensions called root hairs. The root hairs increase the surface area of the cell to maximise the movement of water and minerals from the soil into the plant root

### key functions of a cell

one of the key functions of a cell is to synthesise proteins for use inside the cell, to lead to cell multiplication and for secretion out of the cell for example, insulin

proteins are synthesised on ribosomes attached to rough endoplasmic reticulum

the newly synthesised proteins are transported through the cisternae of the rough ER and packaged into vesicles

they are transported to the golgi apparatus, where vesicles fuse with the surface of the golgi apparatus and the apparatus enters



### key functions of a cell (cont)

it is here that the newly synthesised proteins are modified and then packaged into vesicles. secretory vesicles will transport proteins that are to be released from the cell to the cell surface membrane

they will fuse with the membrane and release the protein by exocytosis

### gram staining

gram positive	gram negative
if you see a purple stain when observing the smear under a microscope it shows that gram-positive bacteria are present	if the smear has retained the pink safranin stain, this shows that gram-negative bacteria are present. this is because their thinner cell walls and lipid membranes allow ethanol (applied during the method) to wash off all the crystal violet purple stain and to then retain the pink safranin stain

doesn't have an outer membrane	has an outer membrane
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Positive Purple

### squamous epithelial tissue

location

### sperm cell

sperm cells are male gametes in animals. They have a tail like structure called a flagellum so they can move. They also contain many mitochondria to supply the energy needed for his movement. The sperm head is 3 µm wide and 4 µm long. it is made up of an acrosome, which contains digestive enzymes .

These enzymes are released when the sperm meets the egg, to digest the protective layer and allow the sperm to penetrate. The sperm's function is to deliver genetic information to the egg cell or ovum (female gamete). This is fertilisation

### Time line about the cell

1665	Robert Hooke first described a cell
	Anton Van Leeuwenhoek was the person who observed bacteria and protoctists
1674	The first living cell was observed protoctists
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1683	from pond water samples, after developing powerful glass lenses
1831	The nucleus is observed
	Robert Brown an English botanist was the first to observe and describe the nucleus in a plant cell

1674	Universal cell theory
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1683	

### Time line about the cell (cont)

Matthias Schleiden suggests that all plant material is composed of cells. Jan Purkyně observed that animal tissue is composed of cells and the structure is similar to plant tissue. The scientist credited for the universal cell theory is Theodore Schwann, a German physiologist. He proposed that 'all living things are made of cells'.

1852	Evidence of the origin of the new cell
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Robert Remak observed cell division in animal cells. His findings were not accepted at the time, but in 1855 Rudolf Virchow published the findings as his own to show new cells form from existing ones

1860	Spontaneous generation disproved
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Louis Pasteur demonstrated that bacteria will only grow sterile nutrient broth after it has been exposed to air. This disproved the theory of spontaneous generation of cells.