

Edexcel IGCSE Biology

Topic 1: The Nature and Variety of Living Organisms Notes

Characteristics of living organisms

Functions of all living organisms (1.1)

Movement: can change position

Reproduction: can have offspring either sexually or asexually

Sensitivity: can detect stimuli, such as light, and respond to them

Control: can control their internal environment (homeostasis)

Growth: can increase mass

Respiration: can produce energy either aerobically or anaerobically

Excretion: can remove toxic or waste produced produced by reactions in the body

Nutrition: can absorb nutrients in order to use them for growth and repair

These can be remembered under the acronym of **MRS C GREN**.

Variety of living organisms

Eukaryotes (1.2)

Eukaryotes are organisms that have a nucleus and organelles that are found within a plasma membrane. The functions of these subcellular structures will be described in more detail in Topic 2.

Subcellular structures found in plant and animal cells:

Structure	Function
Nucleus	<ul style="list-style-type: none"> Contains the genetic material, which codes for a particular protein Enclosed in a nuclear membrane.
Cytoplasm	<ul style="list-style-type: none"> Liquid substance in which chemical reactions occur. Contains enzymes (biological catalysts, i.e. proteins that speed up the rate of reaction). Organelles are found in it
Cell membrane	<ul style="list-style-type: none"> Contain receptor molecules to identify and selectively control what enters and leaves the cell
Mitochondria	<ul style="list-style-type: none"> Where aerobic respiration reactions occur, providing energy for the cell
Ribosomes	<ul style="list-style-type: none"> Where protein synthesis occurs. Found on a structure called the rough endoplasmic reticulum.

Plants

- E.g. cereals (such as maize) or herbaceous legume (such as peas)
- **Multicellular** organisms
- Cells contain **chloroplasts** which is the site of **photosynthesis**: **chlorophyll** pigments within the chloroplast structure absorb light from the Sun
- **Cellulose** cell walls which provide strength to the cell

- Contain a **permanent vacuole**, which stores cell sap and improves the cell's rigidity
- Store carbohydrates as **starch or sucrose**

Animals

- E.g. mammals (such as humans) and insects (such as flies)
- **Multicellular**
- Cannot photosynthesise
- Do not have cell walls
- Have **nervous systems** in order to coordinate movement
- Store carbohydrates as **glycogen**

Fungi

- Body is usually organised into a **mycelium** of thread-like structures called **hyphae** which have **many nuclei** but some are **single-celled**
- E.g. *Mucor* has typical hyphal structure, yeast is single-celled
- Cell walls are made of **chitin**
- Feed by extracellular secretion of digestive enzymes which break it down into smaller pieces, which can then be absorbed (**saprotrophic nutrition**)
- May store carbohydrates as **glycogen**

Protoctists

- **Single-celled** organisms
- Some have features **like animals cells**, such as *Amoeba*, that live in pond water
- Others are more **like plants** and have chloroplasts, such as *Chlorella*

Prokaryotes (1.3)

Prokaryotes do not have a nucleus or membrane-bound organelles

Bacteria

- E.g. *Lactobacillus bulgaris* (rod-shaped bacterium used to make yoghurt), *Pneumococcus* (spherical bacterium that causes pneumonia)
- **Single-celled** and very small
- Have a **cell wall, cell membrane, cytoplasm and plasmids**
- **Lack a nucleus** but have **circular chromosomes** of DNA
- Some can carry out photosynthesis but they mainly eat off of other organisms, either dead or alive

Pathogens (1.4)

Pathogens are disease-causing organisms and can be fungi, bacteria, protoctists or viruses.

Viruses

- E.g. tobacco mosaic virus which prevents chloroplast formation, influenza virus, HIV virus leading to AIDS
- Viruses are small particles (much smaller than bacteria) - **not living organisms**

- **Parasitic**
 - Can only reproduce within living cells
 - Can infect every type of living organisms
 - Hijacks the cell mechanisms to create millions of copies of itself and then spreads within the host by cell bursting
- They come in a wide variety of shapes and sizes
- Do not have a cellular structure but have one type of **nucleic acid** (either DNA or RNA) and a **protein coat**

Bacteria

- E.g. Salmonella (food poisoning)
- Can reproduce many times through **binary fission**
- Produce toxins that can damage cells

Protists

- E.g. malaria
- **Parasitic** - use animals as their hosts to live in

Fungi

- E.g. Athlete's foot
- Produce **spores** that can spread in the wind or between people
- Can treat with **fungicides**