# Chapter 1: Organisms and Life Processes

## Textbook pages

2–13

## Chapter overview

This chapter covers the shared characteristics of life and some of the features of eukaryotic organisms (plants, animals, fungi and protoctists), prokaryotic cells (bacteria) and viruses. Named examples of each group are considered along with the concept of pathogens.

## What to expect

### Specification areas covered:

1.1 understand how living organisms share certain characteristics:

* they require nutrition
* they respire
* they excrete their waste
* they respond to their surroundings
* they move
* they control their internal conditions
* they reproduce
* they grow and develop.

1.2 describe the common features shown by eukaryotic organisms and describe the features common to plants, animals, fungi and protoctists

1.3 describe the common features shown by prokaryotic organisms such as bacteria

1.4 understand the term pathogen and know that pathogens may include fungi, bacteria, protoctists or viruses

This section of the specification seems to have a lot of content and is very clear on the features that candidates are expected to know. Despite this, no more than two or three lessons should be spent on it; many of the concepts can be revisited when studying different sections of the specification.

For example:

* Plants: Multicellular nature, possession of chloroplasts, cell walls, starch and sucrose can be revisited when studying cell biology and/or plant nutrition.
* Animals: Lack of chloroplasts and cell walls can be revisited when studying cell biology. Possession of a nervous system can be revisited during the co-ordination topic and glycogen when considering insulin.
* Fungi and protoctists: The characteristics of fungi and protoctists will need separate consideration and emphasis should be placed on the key vocabulary.
* Bacteria: Bacterial cell structure will need separate consideration but can be revisited when teaching about white blood cells and immunity, the use of fermenters, yoghurt production and genetic technology.
* Viruses: Virus structure will need separate consideration but can be revisited when studying the section about white blood cells and immunity.

Effective homework tasks can include:

* producing a poster to illustrate the presence or absence of features from each group
* producing a glossary of terms
* worksheet exercise classifying different organisms based on their photographs.

## Teaching notes

### 1.1 Characteristics of life

* This is a very straightforward section. Students need to be able to state the characteristics of living things. They could compare how named animals and plants meet the characteristics of life and why viruses and non-living objects (such as a car) do not.

### 1.2 The variety of living organisms

* Students can make an A3-sized poster summary chart that lists the presence/absence or nutrition modes of each group. This can be differentiated by either giving them the groups and asking them to summarise them (high demand) or by giving them the groups and the features with more scaffolding (lower demand).
* There are terms that many students will not have encountered before, particularly for fungi. Students should make a glossary of terms in their books and if possible add diagrams to help their definitions. Key terms that may not have been encountered include: *mycelium*, *hyphae*, *chitin*, *extracellular secretion of enzymes*, *saprotrophic nutrition*, *plasmid*, *pathogen*, *RNA*.
* Bring examples of each group into the laboratory for students to see. Animals and plants are easy to find. Food that has been left to go mouldy and yeast can be used to demonstrate fungi. Protoctists can often be ordered from some biological suppliers or alternatively pond water can be viewed under the microscope. If none are available, photographs or images projected onto a screen can be used. This topic is best presented visually so that students can associate an image with a name or term.
* Students can be asked to classify a range of organisms that are shown projected onto a screen. Protoctists with animal and plant characteristics make good discussion points.
* Students will need to be familiar with the specific examples listed in the specification and understand which are pathogens. These include: Fungi (yeast, *Mucor*), protoctists (*Amoeba*, *Chlorella*, *Plasmodium*), bacteria (*Lactobacillus bulgaricus*, *Pneumococcus*), viruses (tobacco mosaic virus, influenza virus, HIV).
* Students could be asked to make a dichotomous key to classify any of the examples given. Students could test each other’s keys.

## Possible misunderstandings

* Many students are not clear that starch is only found in plants while glycogen is found in animals and fungi.
* Many students are not aware of the structure of fungi – this should be stressed by the teacher and the mode of nutrition explained. There are time-lapse video clips available on the Internet that show the growth of fungi on dead plant material, clearly showing hyphae and mycelia.
* Students often confuse the terminology. Many students are not aware that the fungal cell wall is made of chitin and mix up HIV with AIDS. Producing a glossary of terms along with showing the students the structures and organisms is a useful way for them to learn.
* Students should be clear that pathogens are infectious, disease-causing microbes.

## Differentiation

* When making summary posters of the groups, the amount of scaffolding provided can be adjusted for individual students. More-able students can be asked to produce a summary poster and find example organisms. Less-able students should be given the features, groups and examples of organisms and asked to compare the features.
* When making a glossary, more-able students can be given the required terms and asked to define them. Less-able students can be given the key terms along with mixed up definitions and asked to match them up.
* More-able students could research further examples of each group.

## Practicals

Practicals listed in the textbook

There are no practicals in this chapter.

Additional practicals and demonstrations

* Demonstrate examples of plants, animals, fungi and bacteria in the laboratory. Fungi may be available from shops (edible mushrooms) or can be observed on food left to decay. Protoctists may be purchased from some scientific suppliers or found in pond water. Students can look at fungi and protoctists using microscopes and, if a mixed sample of protoctists is available, a classification key can be used to identify some of them.
* Nutrient agar plates can be used to demonstrate the presence of fungi and bacteria in substances such as soil and tree bark or on bench surfaces. (The agar plates must not be opened and need to be autoclaved as they may represent a biohazard.)