Collins Student Book

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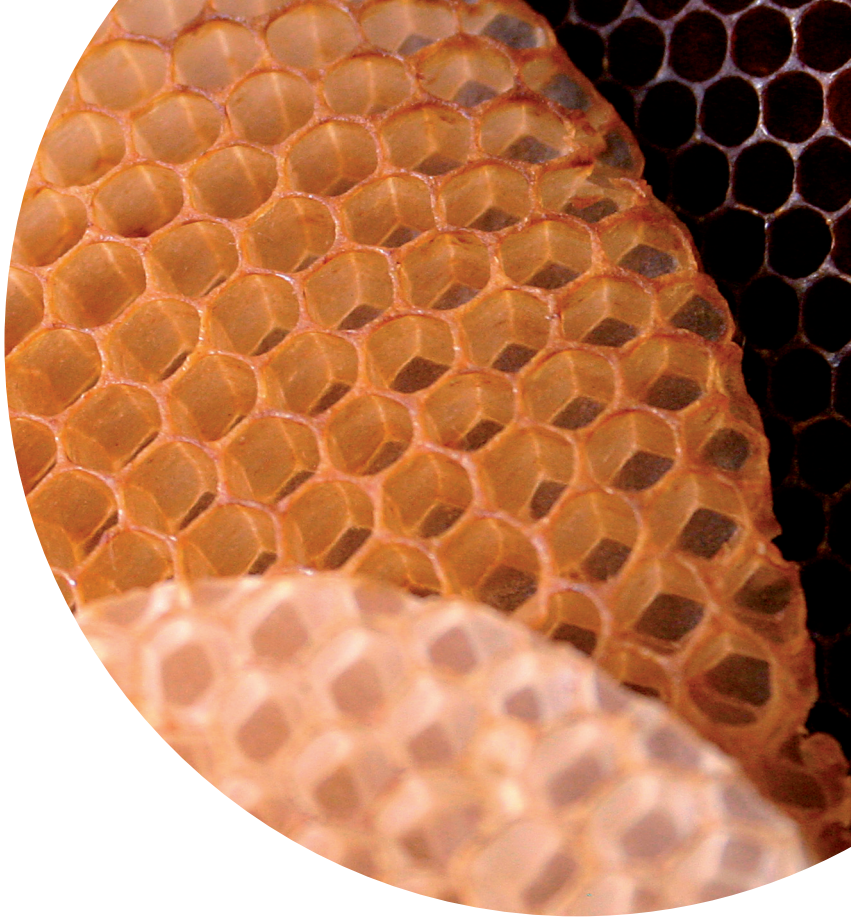
EDEXCEL INTERNATIONAL GCSE BIOLOGY

Matched to the 2011 Edexcel International GCSE Specifications and the 2011 Level 1/Level 2 Edexcel Certificates

Collins



Student Book

EDEXCEL INTERNATIONAL GCSE BIOLOGY

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Contents

Getting the best from the book

Welcome to *Edexcel International GCSE Biology*.

This textbook has been designed to help you understand all of the requirements needed to succeed in the Edexcel International GCSE Biology course. Just as there are five sections in the Edexcel specification, so there are five sections in the textbook: The nature and variety of living organisms, Structures and functions in living organisms, Reproduction and inheritance, Ecology and the environment and Uses of biological resources.

Each section is split into topics. Each topic in the textbook covers the essential knowledge and skills you need. The textbook also has some very useful features which have been designed to really help you understand all the aspects of Biology which you will need to know for this specification.

SAFETY IN THE SCIENCE LESSON

This book is a textbook, not a laboratory or practical manual. As such, you should not interpret any information in this book that related to practical work as including comprehensive safety instructions. Your teachers will provide full guidance for practical work and cover rules that are specific to your school.

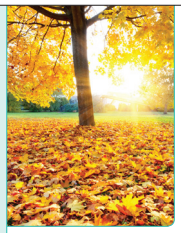
A brief introduction to the section to give context to the science covered in the section.

Starting points will help you to revise previous learning and see what you already know about the ideas to be covered in the section.

The section contents shows the separate topics to be studied matching the specification order.

Knowledge check shows the ideas you should have already encountered in previous work before starting the topic.

Learning objectives cover what you need to learn in this topic.



Δ Fig. 2.101 Shedding leaves is a way of getting rid of waste.

Excretion

INTRODUCTION

The shedding of leaves by trees, either all together in the autumn by deciduous trees or a few at a time by evergreens, is a form of excretion. Trees store metabolic waste substances in cells in the leaves, out of the way so that they do not interfere with other life processes. When the leaves are shed, this waste is shed also – we say it has been excreted because it has been removed from the body of the tree.

KNOWLEDGE CHECK

- ✓ Plants produce oxygen from photosynthesis, and plants and animals release carbon dioxide from respiration – these are waste substances if they are not used in other processes.
- ✓ Excess amino acids from digestion are broken down to form urea in the liver.

LEARNING OBJECTIVES

- ✓ Plants lose excess carbon dioxide and oxygen to the environment through stomata in their leaves.
- ✓ In humans, the organs of excretion are the lungs, kidneys and skin.
- ✓ The kidneys are also important in osmoregulation.
- ✓ The urinary system includes the kidneys, ureters, bladder and urethra.
- ✓ A nephron consists of a Bowman's capsule, glomerulus, convoluted tubules, loop of Henlé and collecting duct.
- ✓ Ultrafiltration takes place in the Bowman's capsule and glomerulus, producing the glomerular filtrate.
- ✓ Water is reabsorbed from the kidney tubule in the collecting duct.
- ✓ Selective reabsorption of glucose occurs at the proximal convoluted tubule.
- ✓ ADH is the hormone that is involved in regulation of the water content of the blood.
- ✓ Urine contains water, urea and salts.

EXCRETION IN FLOWERING PLANTS

Excretion is defined as the process or processes by which an organism eliminates the waste products of its chemical activities. (Remember that this is different from egestion.) In flowering plants the waste products that need to be excreted are carbon dioxide and oxygen. Carbon dioxide is produced in respiration while oxygen is a product of photosynthesis. Excess amounts of these gases (not needed for other processes) are excreted through the stomata of the leaves.

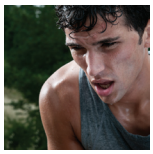
EXCRETION IN HUMANS

The activities in human cells produce many waste products that need to be excreted.

Carbon dioxide is the waste product from respiration. If it remained in cells, it would change their pH and affect the activity of enzymes. It diffuses from respiring cells into the plasma of the blood and is carried around the body until it reaches the lungs. There it diffuses through the capillary and alveoli walls and is breathed out.

The skin plays a minor part in excretion. Sweat, which is secreted on to the skin surface from special cells in the skin, contains water and some minerals such as sodium and chloride ions (salt).

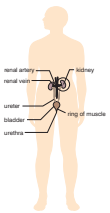
Waste products of many cell processes dissolve in the blood and are carried to the kidneys, where they are excreted. These products include urea, produced from the breakdown of excess amino acids by the liver.



Δ Fig. 2.102 Sweat is water and salts that have been secreted from the body via the skin.

THE URINARY SYSTEM

Humans have two kidneys situated just inside the rib cage at the back of the body, about halfway down the spine. The kidneys are well supplied with blood via the renal arteries and veins. Inside the kidneys, the blood is filtered to remove waste substances no longer needed by the body. These include excess water, urea and mineral ions, which together form **urine**. Urine flows out of the kidneys down the **ureters** and into the **bladder**. The urine is stored in the bladder until a ring of muscle at the base is released (usually when you go to the toilet). The urine then flows out of the bladder, through the **urethra** to the environment.



Δ Fig. 2.103 The human urinary system.

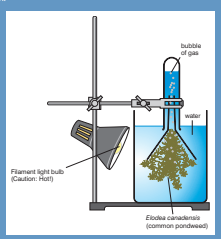
QUESTIONS

1. Which is the main organ of excretion in plants? Explain your choice.
2. Which are the main organs of excretion in humans? Explain your choices.
3. Draw up a table to list the main structures of the urinary system and their functions.

Questions to check your understanding.

Developing investigative skills

You can investigate the effect of light on photosynthesis by shining a light on a water plant and measuring how quickly bubbles are given off, as shown in the diagram.



Δ Fig. 2.43 The results below were gathered using this apparatus.

	Distance to lamp in cm				
	5	10	15	20	25
Gas bubbles given off in 5 minutes	67	57	40	20	4

Devise and plan investigations

❶ **a)** Explain why the rate of producing bubbles can be used as a measure of the rate of photosynthesis.

b) Explain how you would identify the gas produced by the plant.

Analyse and interpret data

❷ **a)** Use the data in the table to draw a suitable graph.

b) Describe and explain the shape of the graph.

Evaluate data and methods

❸ Light is not the only factor that can affect the rate of photosynthesis.

a) Which other factor might have had an effect on these measurements.

b) Suggest how the method could be changed to avoid this problem.

QUESTIONS

1. List three factors that affect the rate of photosynthesis.
2. Explain how each of these factors affects the rate of photosynthesis.
3. Explain as fully as possible why a variegated leaf tested for starch only causes the iodine/potassium iodide solution to turn from brown to blue/black where the leaf was green.

MINERALS IN PLANT GROWTH

Photosynthesis produces carbohydrates, but plants contain many other types of chemical. Carbohydrates contain just the elements carbon, hydrogen and oxygen, but the amino acids that make up proteins also contain nitrogen. So plants need a source of nitrogen.

Other chemicals in plants contain other elements: for example, chlorophyll molecules contain magnesium and nitrogen. Without a source of magnesium and nitrogen, a plant cannot produce chlorophyll and so cannot photosynthesise.

These additional elements are dissolved in water in the soil as **mineral ions**. The plant absorbs the mineral ions through their roots, using active transport because the concentration of the ions in the soil is lower than in the plant cells.

Plants that are not absorbing enough mineral ions show symptoms of deficiency. For example, a plant with a nitrogen deficiency has stunted growth, and a plant with magnesium deficiency has leaves that are yellow between the veins, particularly in older leaves as the magnesium is transported in the plant to the new leaves.

Δ Fig. 2.44 A plant with nitrogen deficiency.

Δ Fig. 2.45 A plant with magnesium deficiency.

QUESTIONS

1. Explain why plants need a supply of mineral ions.
2. Describe the deficiency symptoms in a plant for the following mineral ions
   a) nitrogen
   b) magnesium.
3. Explain why plants show the deficiency symptoms for **a)** nitrogen and **b)** magnesium that you described in Question 2.

Examples of investigations are included with questions matched to the investigative skills you will need to learn.

Getting the best from the book *continued*

Improved yield can be produced in many ways:

- increasing the size of the part of the plant we eat, such as seeds in wheat, maize and rice; tubers in potatoes and carrots; leaves in cabbages
- decreasing the size of the parts of the plant we don't eat, such as stalks in wheat, because less energy is then 'wasted' by the plant growing parts that we don't want and it is easier to harvest
- improving pest and disease resistance, as less damage to the plant means it will grow faster
- improved growth in adverse conditions, such as drought or cold
- improving the taste or colour of the crop.

Other factors can also help, such as reducing stalk length so that rice and wheat plants aren't blown over as easily in strong winds and so are easier to harvest.

SCIENCE IN CONTEXT

TULIP MANIA

Plants are also bred in horticulture, for gardens, for houseplants and cut flowers, to improve the colour, shape and form of the flowers and leaves. This is because people like new things.

For example, tulips were introduced to Europe in the 1500s from Turkey. They were so exotic that they became a luxury item that all wealthy people had to have. Plant breeders rapidly developed new varieties through selective breeding, such as flowers with different-coloured lines or specks on the petals.

Δ Fig. 5.19 A completely black flower is almost impossible to breed, but that doesn't stop people trying to produce it because many people would pay a lot of money for something so rare.

At the peak of 'tulip mania' in the Netherlands in the 1630s, single tulip bulbs were being sold for more than 10 times the annual income of a skilled craftsman. Prices suddenly collapsed in 1637.

Selective plant breeding is not all a success story. For example, rice plants from around the world were crossed in breeding experiments to produce so-called 'miracle rices'. But the plants required extra fertiliser and plenty of water to produce the high yields. The modern seeds were also very expensive. If conditions were not perfect, the new varieties could sometimes do worse than the traditional varieties, and in some countries productivity actually went down. Scientists began to appreciate how important the environment was to the way the genes worked. The old-fashioned varieties had evolved over thousands of years to cope with local environmental conditions.

QUESTIONS

1. a) Explain why some characteristics can be bred for in selective breeding programmes.
   b) Explain why some characteristics cannot be bred for in selective breeding programmes.
2. Give three characteristics that have been selectively bred for in crop plants to improve crop yield.
3. For each of the characteristics you have given in Question 2, explain how these improve crop yield.
4. Explain why plants are selectively bred in horticulture.

EXTENSION

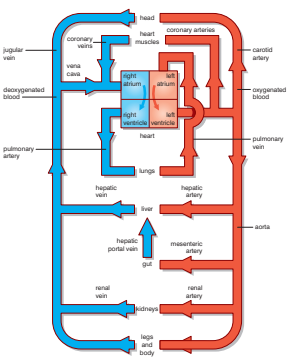
One of the problems with selective breeding is that, when you breed from only a small number of individuals, you reduce not only the variation in the characteristics you are selecting for, but also the variation in other alleles. This means that you can lose other characteristics which might be useful in the future.

To protect against this, many wild varieties of rice, wheat, potatoes and other plants are collected and grown in case we need their characteristics in the future.

Δ Fig. 5.20 There are many wild varieties of rice, but we eat only a few varieties selectively bred for particular characteristics such as larger grain size.

1. Using what you know about sexual reproduction, suggest why the amount of variation between selected individuals is smaller than in wild populations of a plant.
2. Why is it useful that selectively bred varieties have only limited genetic variation? Explain your answer as fully as you can.
3. Why could it be a problem in the future that selectively bred varieties have only limited genetic variation? Explain your answer as fully as you can.
4. Growing wild varieties of crop plants to keep them for the future takes a lot of space and time to look after them. This space and time could be used to grow varieties that produce more food. Do you think it is worth keeping wild varieties like this? Explain your answer as fully as you can.

Science in context boxes put the ideas you are learning into real-life context.



Δ Fig. 2.93 Plan of the human circulatory system.

REMEMBER

The heart muscles have their own blood supply: the coronary arteries that branch from the aorta and link to the coronary veins that drain into the right atrium.

The name of a major blood vessel is often related to the organ it supplies: coronary for heart (from the Latin *corona* for 'crown' because the blood vessels surround the top of the heart like a crown), *hepatic* for liver (from the Greek *hepatos* meaning 'liver'), *renal* for kidneys (from the Latin *renes* meaning 'kidneys'), *pulmonary* for lungs (from the Latin *pulmonis*, 'lungs'). Learn the names of these blood vessels that are associated with the heart, the lungs, liver and kidneys.

EXTENSION

The circulatory system in mammals such as humans is a *double circulatory system*. This means that the blood flows twice through the heart for every one time it flows through the body tissues. The advantage of this is that the blood pressure in the circulation through the body can be kept higher than the blood pressure in the circulation through the lungs. A lot of force is needed to pump the blood down to the legs and back, but this force could damage the tiny capillaries in the lungs, which are much closer to the heart.

BLOOD VESSELS

The blood vessels are grouped into three different types: arteries, capillaries and veins.

REMEMBER

Remember: **a** for **a**rteries that travel **a**way from the heart. **V**eins carry blood into the heart and contain **v**alves.

Arteries

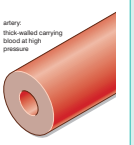
Arteries are large blood vessels that carry blood flowing away from the heart. Blood in the arteries is at higher pressure than in the other vessels. The highest pressure is in the aorta, the blood vessel that leaves the left ventricle.

Arteries have thick muscular and elastic walls, with a narrow lumen (centre) through which the blood flows. The thick walls protect the arteries from bursting when the pressure increases as the pulse of blood enters them. The recoil of the elastic wall after the pulse of blood has passed through the artery helps to maintain the blood pressure and even out the pulses.

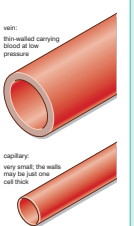
By the time the blood enters the fine capillaries, the change in pressure during and after a pulse has been greatly reduced.

Capillaries

Capillaries are the tiny blood vessels that flow through every tissue and connect arteries to veins. Capillaries have very thin walls, which helps to increase the rate of diffusion of substances. All exchange of substances between the blood and tissues happens in the capillaries.



Δ Fig. 2.94 Arteries vary in diameter from about 10 to 25 mm.



Δ Fig. 2.95 Veins vary in diameter from about 5 to 15 mm. Capillaries are very small, with a diameter of around 0.01 mm.

Extension boxes take your learning even further.

Remember boxes provide tips and guidance to help you during the course and in your exam.

The first question is a student sample with examiners' comments to show best practice.

Each section includes exam-style questions to help you prepare for your exam in a focussed way and get the best results.

Exam-style questions
Sample student answer

Question 1

People are either able to roll their tongue into a U-shape, or unable to roll their tongue. Tongue rolling is controlled by a single gene which has two alleles, T and t.

a) The diagram shows a pair of chromosomes:

Genotype TT: can roll tongue

i) Is the allele for tongue rolling dominant or recessive? Explain your answer. (2)

Dominant ✓ (1)

The letters are capitals ✗

ii) Write down the other possible genotypes related to tongue rolling, along with their phenotypes. (2)

Tt - the phenotype is a tongue roller ✓ (1)

tt - the phenotype is non tongue roller (cannot roll tongue) ✓ (1)

EXAMINER'S COMMENTS

a) i) Correct

This answer is too vague and would not be given any benefit of doubt.

It should be more specific – The two letters making up the genotype are written in upper case.

b) i) The answer is correct, but could be better worded. Rather than saying 'the couple', it is better to say that the man could be TT or Tt, and the woman could be TT or Tt.

ii) Both statements are correct, but only two marking points have been addressed. The student is correct, that unless both parents were Tt, all children would be tongue rollers, but the answer would benefit from two statements of explanation.

First of all, it should be made clear that as both the man and woman can roll their tongue, they must have at least one T allele.

There should then be a sentence of explanation to link the statements, such as:

Without the presence of a t allele in both parents, all the children would be tongue rollers.

iii) The diagram illustrates the cross correctly, but lacks detail.

The best way of illustrating the cross is to use a Punnett square, showing each stage of the cross:

the genotypes of the parents

the different alleles that could be passed on to the offspring from the mother and father (the alleles in the egg cells and sperm cells)

the possible combinations of alleles in the offspring (genotypes)

the possible phenotypes produced.

Father possible alleles in sperm	Mother possible alleles in eggs: T	Mother possible alleles in eggs: t
T	TT Tongue roller	Tt Tongue roller
t	Tt Tongue roller	tt Non tongue roller

A further point is the way in which the student has written the third possible genotype in their answer, as tT. Although not incorrect, the convention is to write the dominant allele first, so it should be written Tt.

Exam-style questions continued

b) A couple who can both roll their tongues have children.

i) Give the possible genotypes of the man and the woman. (2)

The couple could be TT ✓ (1)

or Tt ✓ (1)

ii) The couple have children. Their first child cannot roll his tongue; the second one can. What does this tell you about the genotypes of the couple? Explain your answer fully. (4)

The genotype of both the man and women must be Tt ✓ (1)

Because otherwise, all the children would be tongue rollers ✓ (1)

iii) Show the genetic cross involved. (4)

Tt x Tt ✓ (1)

↓

TT Tt tT tt ✓ (1)

(Total 14 marks)

9/14

A full checklist of all the information you need to cover the complete specification requirements for each topic.

End of topic checklist

Biomass is the mass of living material, such as the mass of a living organism.

A **decomposer** is an organism that causes decay of dead material, such as many fungi and bacteria.

A **primary consumer** is an animal that eats plants (also a herbivore).

A **producer** is an organism that produces its own food, such as plants using light energy in photosynthesis to produce glucose.

A **pyramid of biomass** diagram shows the biomass in different trophic levels of a food chain, often a pyramid shape.

A **pyramid of energy** diagram shows the energy content of different trophic levels of a food chain, always a pyramid shape.

A **pyramid of number** diagram shows the number of individual organisms in different trophic levels of a food chain, often a pyramid shape.

A **secondary consumer** is an animal that eats primary consumers.

A **tertiary consumer** is an animal that eats secondary consumers.

A **trophic level** is a feeding level in a food chain or food web, such as producer, primary consumer.

The facts and ideas that you should know and understand by studying this topic:

- ❍ Explain the meaning of the names of the different trophic levels, including *producers, primary consumers, secondary consumers, tertiary consumers* and *decomposers.*
- ❍ Define the following terms: food chain, food web, pyramid of number, pyramid of biomass and pyramid of energy.
- ❍ Describe how to construct a pyramid of number, a pyramid of biomass and a pyramid of energy.
- ❍ Explain why a pyramid of energy is always a pyramid shape, but the other two kinds of pyramid diagrams may not always be so.
- ❍ Describe the gains and losses of energy between one trophic level and the next.
- ❍ Explain why the energy transfer to the next trophic level is always a small proportion of the energy gained.

End of topic questions

End of topic questions allow you to apply the knowledge and understanding you have learned in the topic to answer the questions.

1. The photograph shows lions feeding on the carcass of a zebra. When a lion catches a zebra, it will share the meat with other lions. Before the lion started chasing the zebra, the zebra has been feeding on grass.

a) Is the lion a carnivore or herbivore? Explain your answer. (2 marks)

b) At which trophic level does the zebra feed? (1 mark)

c) Draw a food chain for the organisms shown in the photograph. (2 marks)

d) Lions also feed on the herbivores gazelle and wildebeest. Use all these organisms to draw a food web for the African grassland. (3 marks)

2. In a community of organisms in a garden there are 5 lettuces. There are 40 caterpillars feeding on the lettuces until 2 thrushes (insectivorous birds) eat all the caterpillars.

a) Draw a pyramid of number for this community. (3 marks)

b) Describe the limitations of this pyramid. (2 marks)

c) Describe the difficulty of preparing the data for a pyramid of biomass for these organisms. (2 marks)

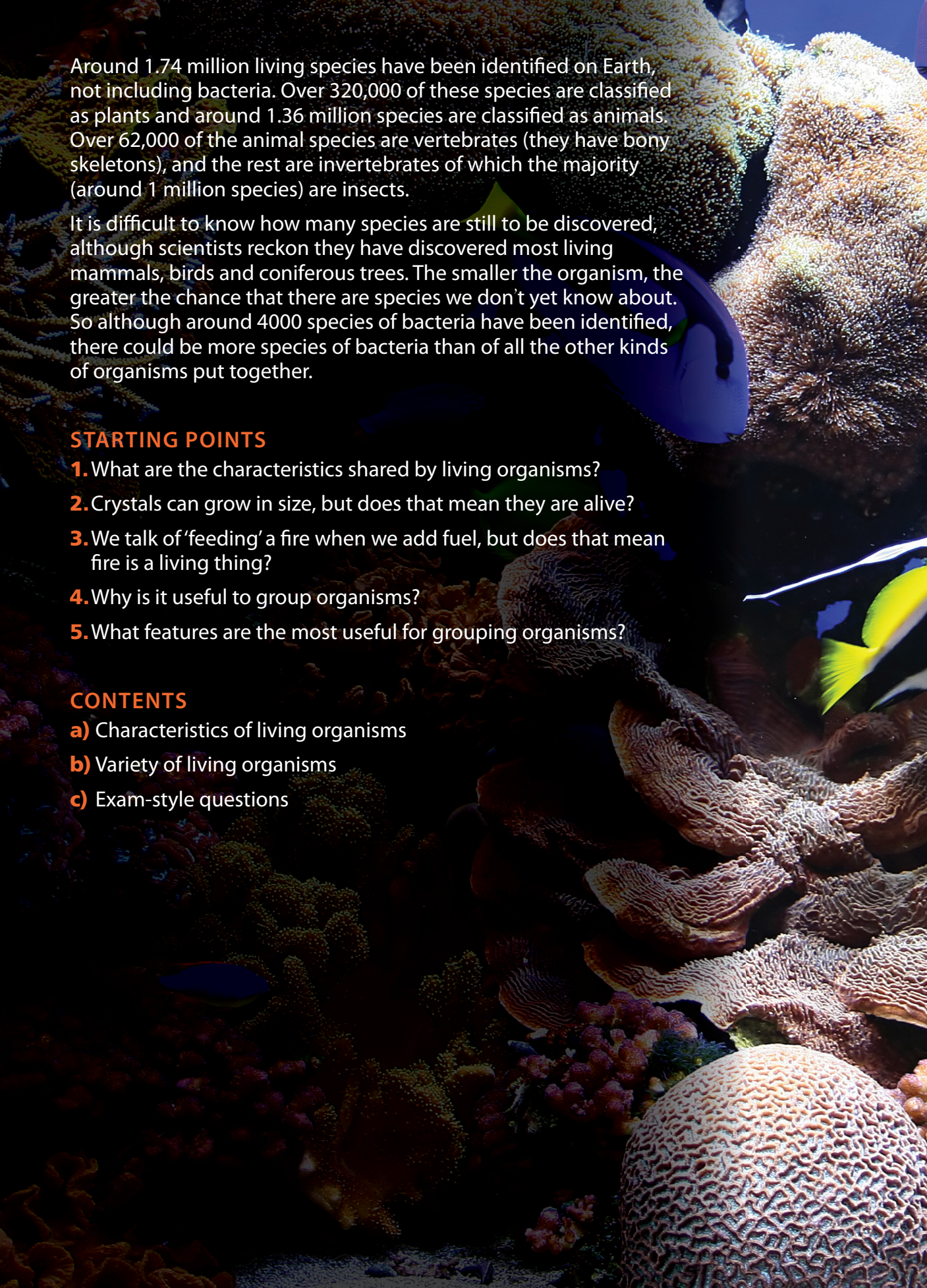
3. Use the food web on page 263 to predict what would happen to the following species if all the herbivorous insects were killed by insecticide. Explain your answers.

a) predatory insects (2 marks)

b) insectivorous birds (2 marks)

c) mice (2 marks)

d) snakes. (2 marks)



Around 1.74 million living species have been identified on Earth, not including bacteria. Over 320,000 of these species are classified as plants and around 1.36 million species are classified as animals. Over 62,000 of the animal species are vertebrates (they have bony skeletons), and the rest are invertebrates of which the majority (around 1 million species) are insects.

It is difficult to know how many species are still to be discovered, although scientists reckon they have discovered most living mammals, birds and coniferous trees. The smaller the organism, the greater the chance that there are species we don't yet know about. So although around 4000 species of bacteria have been identified, there could be more species of bacteria than of all the other kinds of organisms put together.

STARTING POINTS

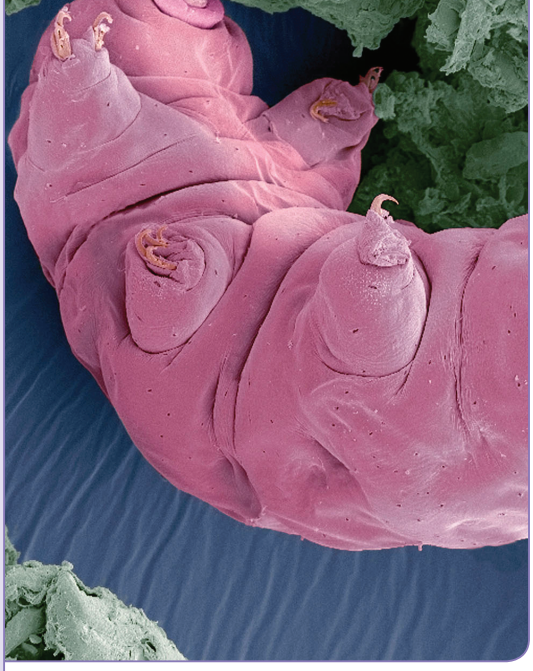
1. What are the characteristics shared by living organisms?
2. Crystals can grow in size, but does that mean they are alive?
3. We talk of 'feeding' a fire when we add fuel, but does that mean fire is a living thing?
4. Why is it useful to group organisms?
5. What features are the most useful for grouping organisms?

CONTENTS

1

The nature and variety of living organisms

Δ Many species of different kinds of organisms live on a coral reef.



Δ Fig. 1.1 Tiny tardigrades (about 1 mm long) are the toughest organisms known. They can survive temperatures below –200 °C, 10 days in the vacuum of space and over 10 years without water!

Characteristics of living organisms

INTRODUCTION

Sometimes it is easy to tell when something dies: an animal stops moving around; a plant wilts and all the green parts collapse. But does a tree die in winter, when its leaves have dropped off? Are animals 'dead' when they hibernate underground for months? As technology gets increasingly sophisticated, and we can create machines with 'brains' and new organisms from simple chemicals, distinguishing between living and dead could get even more difficult. We need a set of 'rules' that work for most organisms, most of the time.

KNOWLEDGE CHECK

✓ Living organisms show a range of characteristics that distinguish them from dead or non-living material.
✓ The life processes are supported by the cells, tissues, organs and systems of the body.

LEARNING OBJECTIVES

✓ Name the eight characteristics shown by living organisms.
✓ Describe each of the characteristics of living organisms.
✓ Explain that not all living organisms show every characteristic all of the time.

THE EIGHT CHARACTERISTICS OF LIFE

There are eight life characteristics that most living **organisms** will show at some time during their lives.

- **Movement:** In all living cells, structures in the **cytoplasm** move. In more complex organisms, the whole structure may move. Animals may move their entire bodies; plants may move parts of their body in response to external stimuli such as light.

Δ Fig. 1.2 Sunflowers follow the Sun as it moves across the sky through the day.

- **Respiration:** This is a series of reactions that take place in living cells to release energy from nutrients. This energy is used for all the chemical reactions that keep the body alive.
- **Sensitivity:** Living organisms are able to detect and respond to changes in their external and internal conditions.
- **Homeostasis:** This is the control of internal conditions, to provide the best conditions inside cells for all the reactions needed for life to exist. For example, when we eat and drink we take in water – our body controls how much water is absorbed and removed from the blood, so that cell processes can continue to work efficiently.
- **Growth:** This is the permanent increase in the size and/or dry mass (mass without water content) of cells or the whole body of an organism. Your mass changes throughout the day, depending on how much you eat and drink, but your growth is the amount by which your body increases in size when you take nutrients into cells to increase their number and size.
- **Reproduction:** This includes all the processes that result in making more individuals of that kind of organism, such as making gametes and the fertilisation of those gametes.
- **Excretion:** Living cells produce many products from the reactions that take place inside them. Some of these are waste products – materials that the body does not use. For example, animals cannot use the carbon dioxide produced during respiration. Waste products may also be toxic, so they must be removed from the body by excretion.
- **Nutrition:** The taking of nutrients, such as organic substances and mineral ions, into the body. Nutrients are the raw materials that cells need to release energy and to make more cells.

QUESTIONS

1. For each of the eight characteristics, give one example for:

a) a human

b) an animal of your choice

c) a plant.

2. For each of the eight characteristics, explain why they are essential to a living organism.

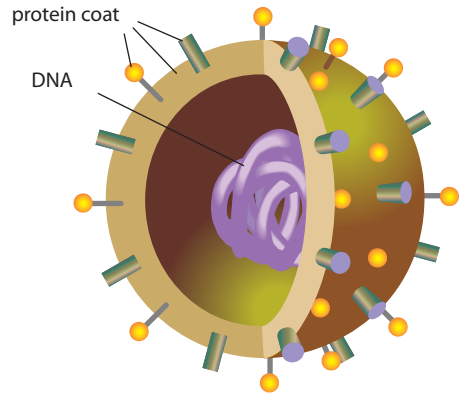
REMEMBER

An easy way to remember all eight characteristics is to take the first letter from each process. This spells MRS H GREN. Instead, you may make up a sentence in which each word begins with same letter as one of the processes: for example, My Revision System Here Gets Really Entertaining Now.

EXTENSION

Viruses are very simple structures, consisting of an outer protein coat that protects the genetic material inside. They have no cell structures or cytoplasm, so they do not respire or sense their surroundings. They also do not take in substances to build more cells, or excrete anything. In many ways they behave like simple crystalline chemicals. However, when they infect a cell, such as a bacterial, plant or animal cell, they cause that cell to produce many copies of the virus. So they do reproduce.

Not everyone agrees on whether viruses can be called *living* organisms.



Δ Fig. 1.3 The structure of a virus.

1. Which characteristic of living organisms do viruses have?

2. List the other characteristics of living organisms, and for each one describe what viruses can and cannot do.

3. Using what you know about viruses, prepare an argument for classifying them as living organisms.

4. Using what you know about viruses, prepare an argument for *not* classifying them as living organisms.

REMEMBER

Be prepared to make a decision and use your knowledge to argue your point of view about difficult examples such as viruses.

End of topic checklist

Excretion is the removal of waste (often toxic) substances that have been produced from chemical reactions inside the body, such as carbon dioxide and urea in animals.

Growth is the permanent increase in body size and dry mass of an organism, usually from an increase in cell number or cell size (or both).

Respiration is the chemical process in which glucose is broken down inside cells, releasing energy and producing carbon dioxide and water.

Sensitivity refers to the detection of changes (stimuli) in the surroundings by a living organism, and its responses to those changes.

Nutrition is the taking in of substances for use in the body as food or to make food.

Homeostasis is the maintenance of a constant internal environment, such as body water content and body temperature.

Reproduction is the production of new organisms.

The facts and ideas that you should know and understand by studying this topic:

- ❍ All living organisms show the eight characteristics of life at some point in their lives.
- ❍ The characteristics of life are: movement, respiration, sensitivity, homeostasis, growth, reproduction, excretion and nutrition.

End of topic questions

1. Name the eight processes of life. Try making up your own sentence to help you remember them all. **(9 marks)**

2. Name two life processes necessary for an organism to release energy. **(2 marks)**

3. Explain why dry mass is used to measure growth. **(2 marks)**

4. When you place a crystal of copper(II) sulfate in a saturated solution of the same compound, the crystal will increase in size. Does this mean that the crystal is alive? Explain your answer. **(2 marks)**

5. Plants cannot move about, as animals can. Does that mean animals are more alive than plants? Explain your answer. **(2 marks)**

6. During winter, an oak tree will lose its leaves and not grow. Is the tree still living during this time? Explain your answer using all the characteristics of life. **(4 marks)**