

1 Fig. 1.1 shows some cells from the lining of the trachea.

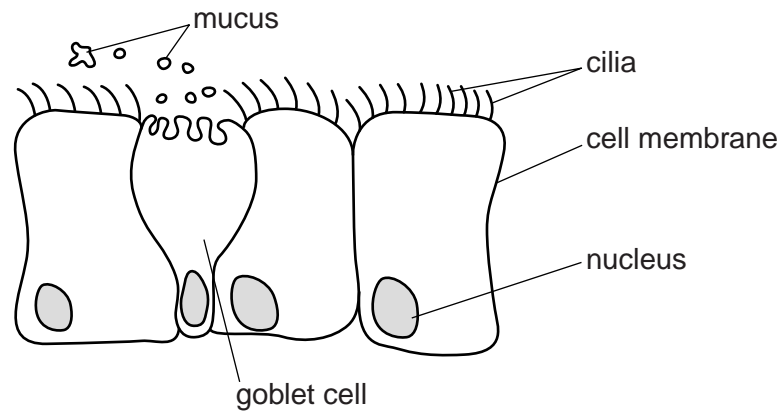


Fig. 1.1

(a) Describe the functions of the nucleus and cell membrane.

nucleus

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cell membrane

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.....

.....

[4]

(b) The cells in Fig. 1.1 form a tissue.

Define the term *tissue*.

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..... [1]

(c) The goblet cell secretes mucus.

Describe the role of mucus and cilia in the trachea.

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..... [3]

[Total: 8]

2 Fig. 1.1 is a photomicrograph of a leaf of the tea plant, *Camellia sinensis*.

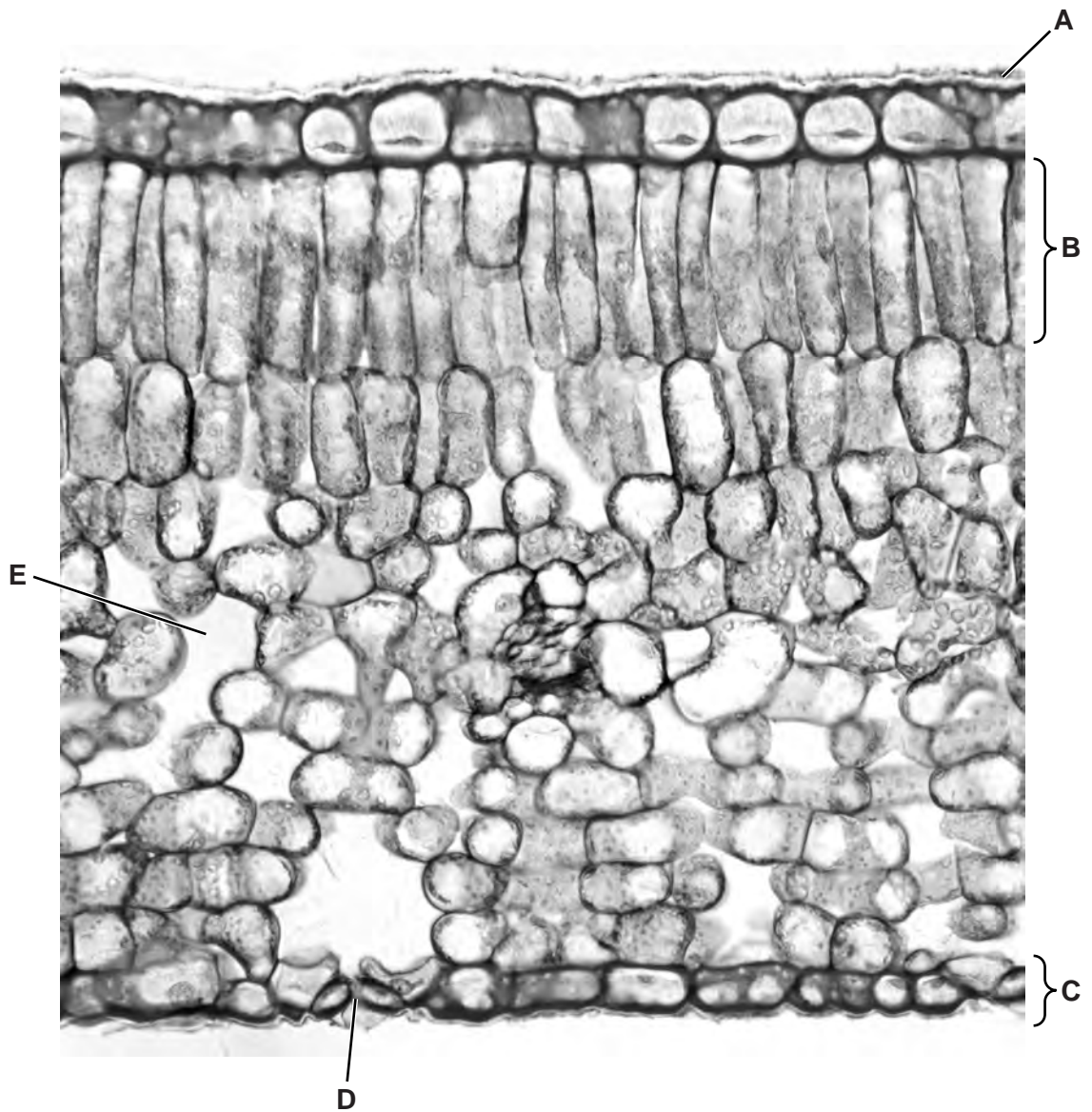


Fig. 1.1

(a) Name A to E.

- A
- B
- C
- D
- E [5]

(b) Fig. 1.2 shows a cell from region **B** of the leaf shown in Fig. 1.1.

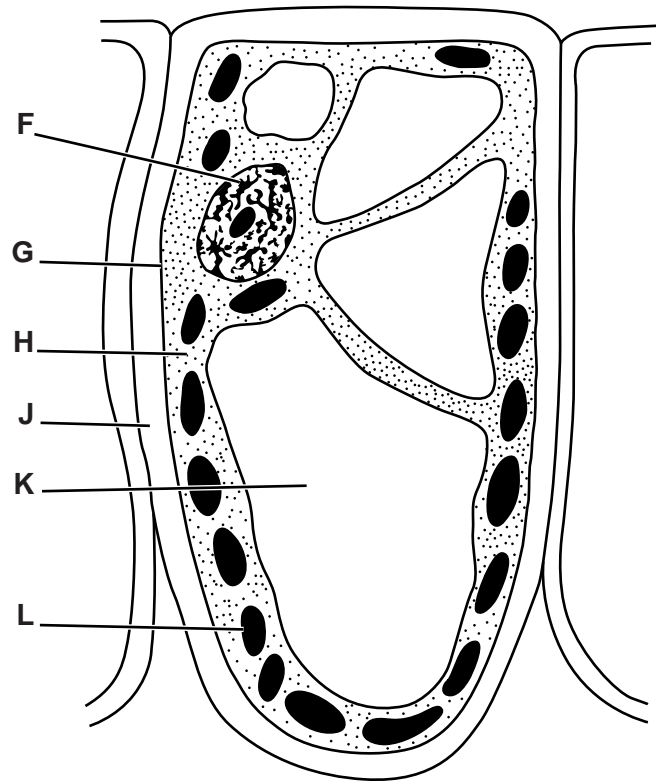


Fig. 1.2

Use the letters from Fig. 1.2 to complete Table 1.1.

Write **one** letter only in each box to identify the function. You may use each letter once, more than once or not at all.

Table 1.1

function	letter from Fig. 1.2
controls movement of substances into and out of the cell	
exerts a pressure to help maintain the shape of the cell	
produces sugars using light as a source of energy	
withstands the internal pressure of the cell	
controls all the activities of the cell	

[5]

(c) The enzyme catalase is found in lettuce leaves.

A student investigated the activity of this enzyme by grinding some lettuce leaves and adding them to a solution of hydrogen peroxide. The volume of oxygen produced was measured until the reaction stopped.

The student's results are shown in Fig. 1.3.

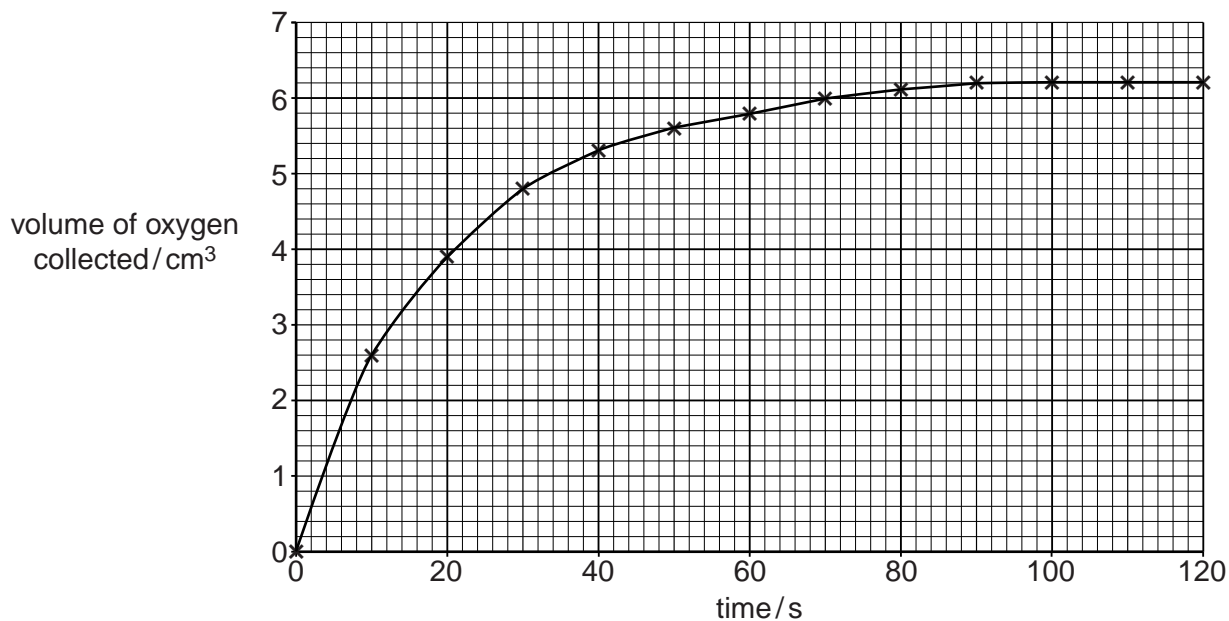


Fig. 1.3

(i) Describe the results shown in Fig.1.3. You will gain credit if you use the data in your answer.

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.....[3]

(ii) Explain the action of enzymes during a reaction.

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.....[3]

[Total: 16]

3 Fig. 1.1 shows an animal cell and a plant cell as seen with a light microscope.

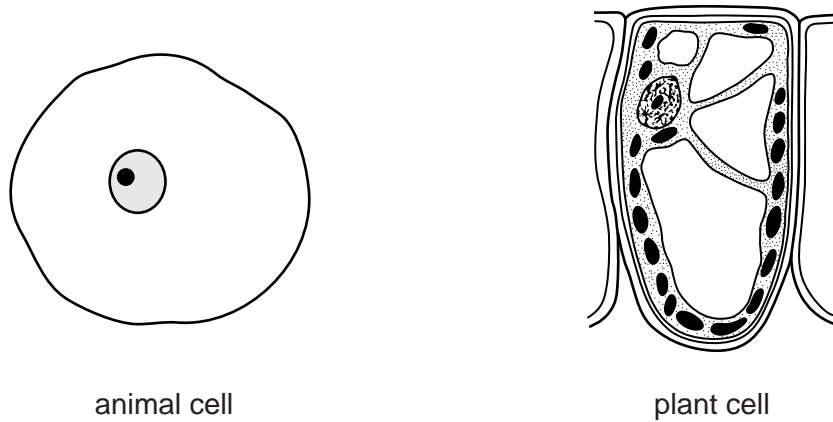


Fig. 1.1

(a) Table 1.1 shows some structural features of the animal cell and the plant cell in Fig. 1.1.

Complete the table by

- finishing the row for nucleus
- adding **three** structural features, visible in Fig. 1.1, and indicating whether they are present (✓) or absent (✗) in the animal cell and in the plant cell.

Table 1.1

structural feature	animal cell	plant cell
cell wall	✗	✓
nucleus		

[4]

(b) The cells were kept in a dilute salt solution. They were then transferred to distilled water.

Explain what will happen to each of these two cells when they are placed into distilled water.

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.....[4]

(c) Magnesium is a plant nutrient. Scientists think that magnesium is involved in the transport of sucrose from the leaves to the rest of a plant.

(i) Name the tissue that transports sucrose in plants.

.....[1]

The scientists grew some tomato plants with their roots in a solution that contained all the mineral nutrients that plants require. After a while, the plants were divided into two groups.

- Group **A** continued to receive the solution containing all the nutrients.
- Group **B** received a solution that did not contain any magnesium.

After 12 days, measurements were made on the leaves and the results are shown in Fig. 1.2.

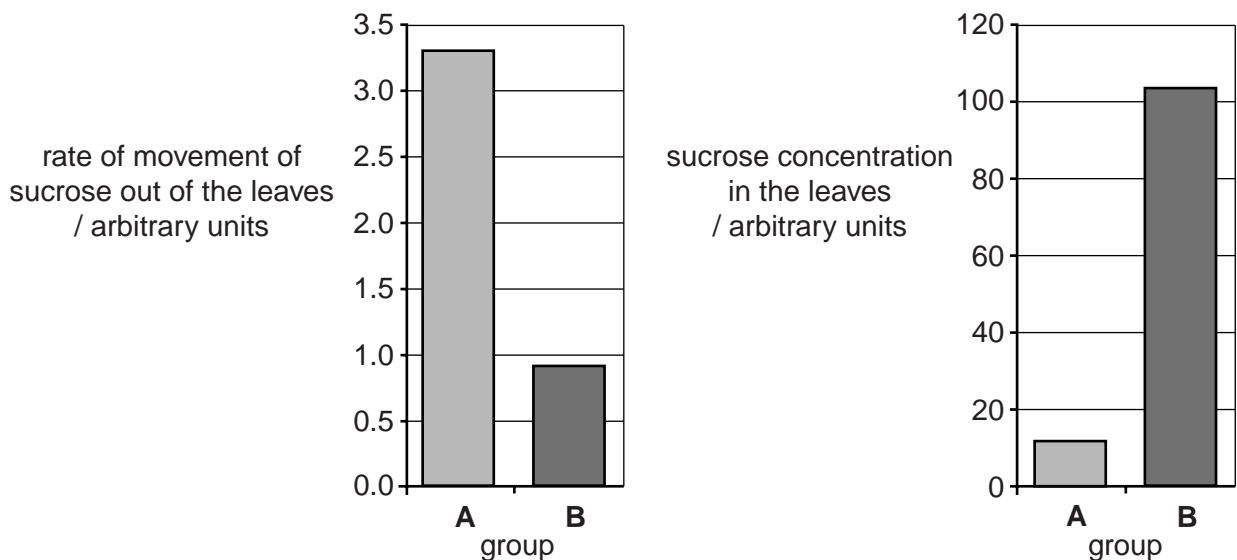


Fig. 1.2

- (ii) Describe the effect of magnesium deficiency on the transport of sucrose out of the leaves and the sucrose concentration in the leaves.

transport of sucrose out of the leaves

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concentration of sucrose in the leaves

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.....[4]

- (iii) The plants in Group **B** remained in the magnesium-deficient solution for longer than 12 days. At the end of this time they showed symptoms of magnesium deficiency.

Describe and explain the symptoms that the plants would show.

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.....[3]

[Total: 16]

4 Cicadas are insects that make a lot of noise.

Fig. 1.1 shows an adult chorus cicada, *Amphipsalta zelandica*, that is only found in New Zealand.



Fig. 1.1

(a) State three features, **visible in Fig. 1.1**, that show that the chorus cicada is an insect.

- 1
- 2
- 3 [3]

(b) Insects are classified in the same group as crustaceans, arachnids and myriapods.

Name the group that contains all these animals.

..... [1]

Evolutionary relationships between different species are investigated by examining DNA.

(c) State precisely where DNA is found in a cell.

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..... [2]

Small sections of DNA in 14 species of cicada found in Australia, New Caledonia and New Zealand (1 to 14) were examined for similarities and differences.

The results of the DNA examination of these species were used to make a diagram showing how these cicada species may have evolved. Species that are closely related are grouped together on the right of Fig. 1.2.

The brackets show that the cicada species in New Zealand are in two separate groups.

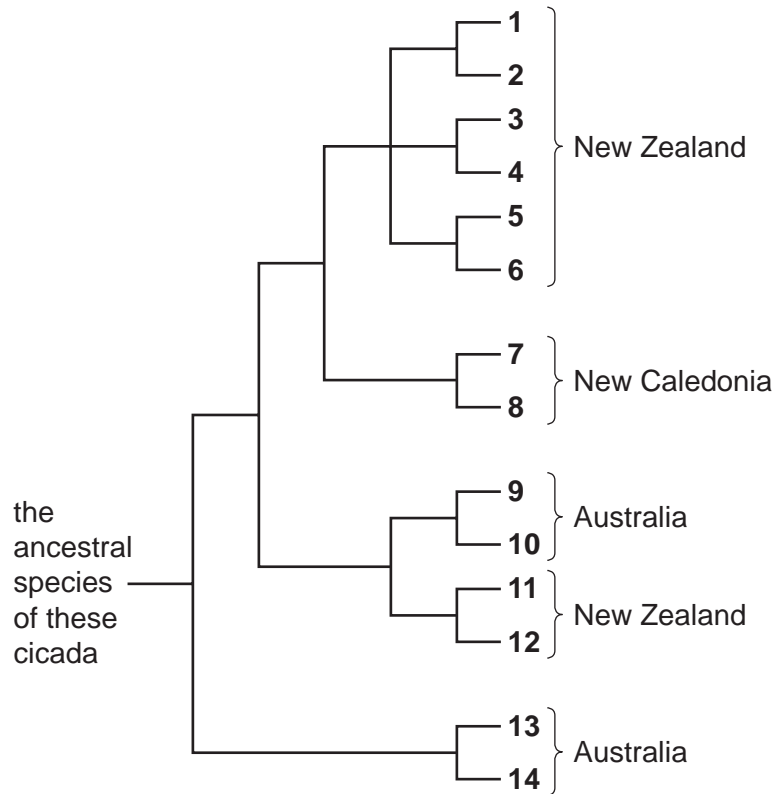


Fig. 1.2

(d) It is suggested that the eight cicada species in New Zealand originated from two migrations, **A** and **B**, from Australia as shown in Fig.1.3.

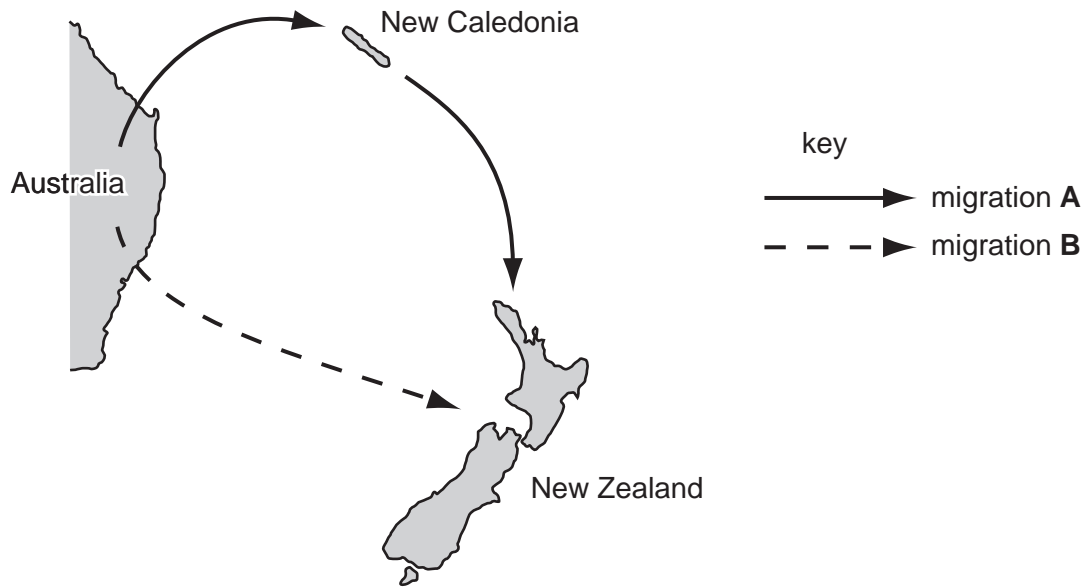


Fig. 1.3

Explain how the results in Fig. 1.2 support the idea that the eight cicada species in New Zealand originated from two migrations of cicadas as shown in Fig. 1.3.

You can use the numbers from Fig. 1.2 in your answer.

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[3]

Islands in the Pacific have been colonised by populations of animals that have migrated from Australia, mainland Asia and the Americas. Over many generations these populations have changed. Now they are unable to breed with animals of the original populations in Australia, mainland Asia and the Americas.

(e) Explain how natural selection has resulted in changes in the populations of animals on islands in the Pacific.

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..... [4]

[Total: 13]