Oxford Cambridge and RSA

GCSE Biology B (Twenty First Century Science)

J257/02 Depth in Biology (Foundation)

Question Set 17

1 Mistletoe is a very unusual plant. Instead of growing in the ground, mistletoe grows on another plant such as a tree, as shown in **Fig. 5.1**.

Fig. 5.1

(a) Mistletoe takes most of the sugar it needs from a tissue in the tree. This tissue transports sugars around the tree.

A diagram of the tissue in the tree is shown in **Fig. 5.2**.

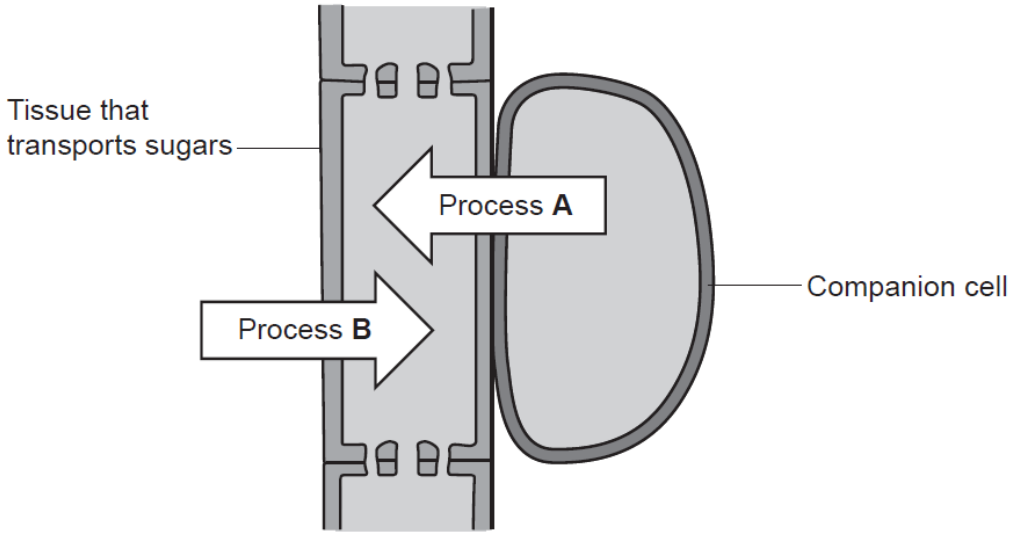

Fig. 5.2

(i) What is the name of the tissue in the tree that the mistletoe takes sugars from? **[1]**

phloem

(ii) Process **A** transports sugars into the tissue in the tree.

What is the name of process **A**?

Put a ring around the correct answer.

active transport **osmosis** **translocation** **transpiration** **[1]**

(iii) Process **B** transports water into the tissue in the tree.

What is the name of process **B**?

Put a ring around the correct answer.

active transport **osmosis** **translocation** **transpiration** **[1]**

(b) Mistletoe does not have roots in the soil.

Mistletoe takes all the water it needs from a **different** tissue in the tree. This tissue transports water from the tree's roots to the tree's leaves.

A diagram of this tissue in the tree is shown in **Fig. 5.3**.

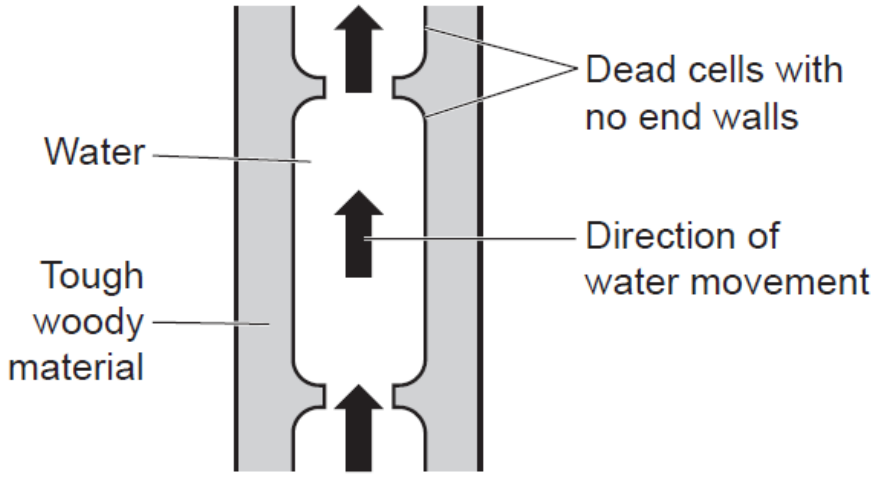

Fig. 5.3

(i) What is the name of the tissue in the tree that the mistletoe takes water from? **[1]**

xylem

(ii) Explain why water moves through this tissue from the roots to the leaves in a normal tree. **[4]**

More water is present in the soil than in root hair cell so water diffuse into the roots down the concentration gradient (osmosis). Water taken up by the roots is transported through a plant to the leaves where some of it diffuse out into the air. Water molecules move up the xylem vessels to leaves where some evaporate out of the stomata. This process is called transpiration (water is pulled upwards to replace water that has been lost through evaporation)

(c) Mistletoe can catch diseases from the tree it is growing on.

Sarah collects some microorganisms from a piece of mistletoe. She wants to use a light microscope, as shown in **Fig. 5.4**, to look at the microorganisms.

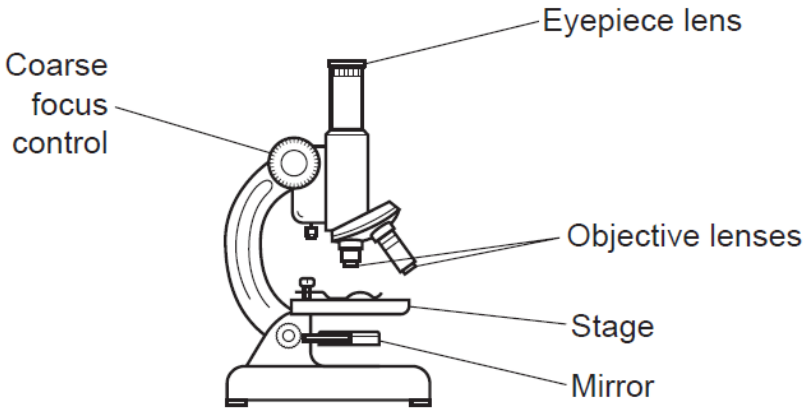

Fig. 5.4

(i) Sarah puts a slide with a sample of the microorganisms on the microscope stage. She plans to use the microscope's mirror to reflect direct sunlight through the slide so she can see the microorganisms.

Explain why this is dangerous, and suggest what Sarah could do instead to be safer. **[2]**

Looking through the lens where sunlight is shining very bright could lead to damage to the retina. This can be prevented by starting from lowest brightness (by adjusting how much light can reflect on the mirror)

(ii) Sarah looks into the eyepiece lens and turns the coarse focus control to move theobjective lens towards the slide.

Explain why this is dangerous, and suggest what Sarah could do instead to be safer. **[2]**

The slide could crack / break if the stage touches the objective lens. Start from lowest power objective lens to leave maximum gap between the lens and the stage then turn the coarse focus control.

(d) **Fig. 5.5** shows an image of some of the microorganisms from the mistletoe.

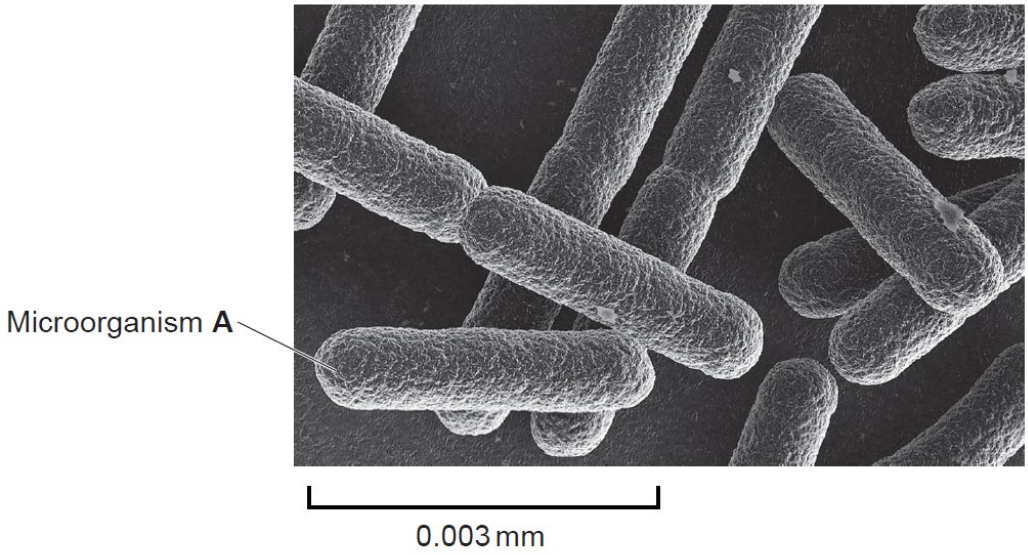

Fig. 5.5

The actual length of microorganism **A** is 0.003 mm. In the image in **Fig. 5.5** it appears to be 45 mm long.

Calculate the magnification of the image in **Fig. 5.5**.

$\frac{45}{0.003} = 15000$

Use the equation: magnification = measured size ÷ actual size

Magnification = × 15000 **[2]**

(e) In Sarah's light microscope:

- The magnification of the eyepiece lens is ×10.
- The magnification of the most powerful objective lens is ×40.

Was the image in **Fig. 5.5** taken using Sarah's light microscope?

Yes ☐

No ☑

Explain your answer. **[2]**

the maximum magnification of the microscope is 400 (40 x 10), which is too weak given the image magnification was 15000.

Total Marks for Question Set 17: 16