

**GCSE Biology B (Twenty First Century Science)**  
**J257/04** Depth in biology (Higher Tier)

**Question Set 16**

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. 4.1**.



**Fig. 4.1**

**(a)** Mistletoe does not have roots in the soil.

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

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

[1]

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

[4]

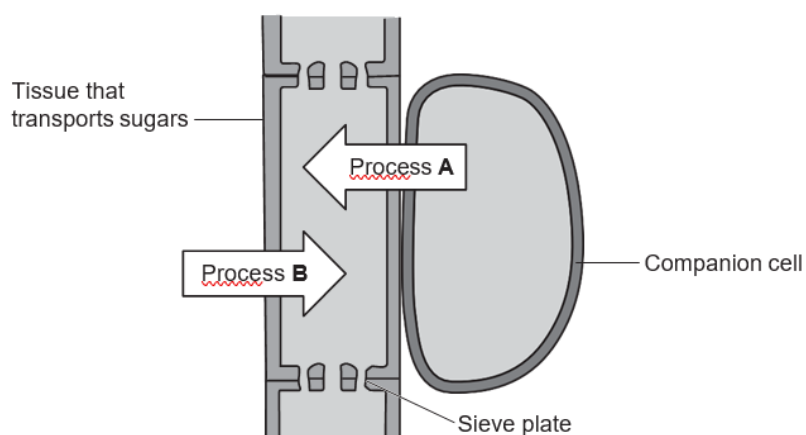
**(iii)** Suggest one **other** substance that the mistletoe could take from this tissue in the tree.

[1]

**(b)** Very little photosynthesis takes place in the mistletoe.

It takes most of the sugar it needs from phloem tissue in the tree. Phloem transports sugars around the tree.

A diagram of the phloem tissue is shown in **Fig. 4.2**.



**Fig. 4.2**

- (i) Process **A** and process **B** move substances into the phloem tube.

Describe process **A** and process **B**.

In your answer you should include:

- the names of the processes
- what is moved by each process.

[4]

- (ii) Explain how sugars are moved along a phloem tube

[3]

- (iii) The phloem tube is made of living cells, but these cells do not have any mitochondria.

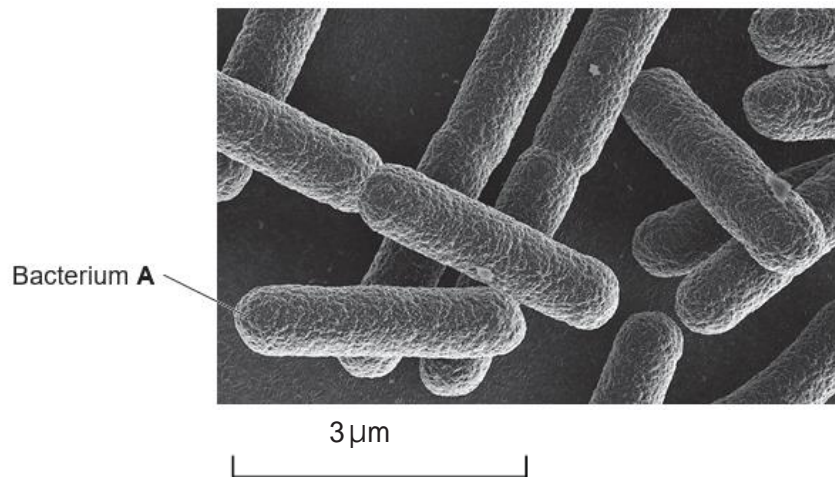
Explain why they depend on the companion cells, which do have mitochondria.

[2]

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

A scientist thinks some bacteria have spread from a tree to some mistletoe that is growing on it. They collect a sample of the bacteria from the mistletoe.

**Fig. 4.3** shows an image of some of the bacteria from the mistletoe.



**Fig. 4.3**

- (i) The actual length of bacterium **A** is  $3\ \mu\text{m}$ .

In the image in **Fig. 4.3** it appears to be  $4.5\ \text{cm}$  long.  $1\ \mu\text{m} = 0.0001\ \text{cm}$

Calculate the magnification of the image.

Use the equation: magnification = measured size  $\div$  actual size

Magnification =  $\times$  .....

[2]

- (ii) Each bacterium from the tree is  $3 \times 10^{-4}$  cm long.

Is it possible that the bacteria from the tree are the same bacteria as bacterium **A** from the mistletoe?

Yes

No

Explain your answer.

[2]

- (d) The scientist has made some monoclonal antibodies that recognise the bacteria from the tree.

- (i) Describe how scientists make monoclonal antibodies that recognise the bacteria from the tree.

[4]

- (ii) The monoclonal antibodies are designed to recognise the bacteria from the tree.

The scientist wants to test whether they also recognise the bacteria from the mistletoe.

Describe how the scientist could do this in a diagnostic test **and** what the scientist would see if the result was positive.

[3]

**Total Marks for Question Set 16: 26**

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