

A level Biology A
H420/03 Unified biology

Question Set 14

1 Sago pondweed is an underwater plant that grows in many regions of the world.

Fig. 1.1 shows a transmission electron micrograph of a sago pondweed cell.

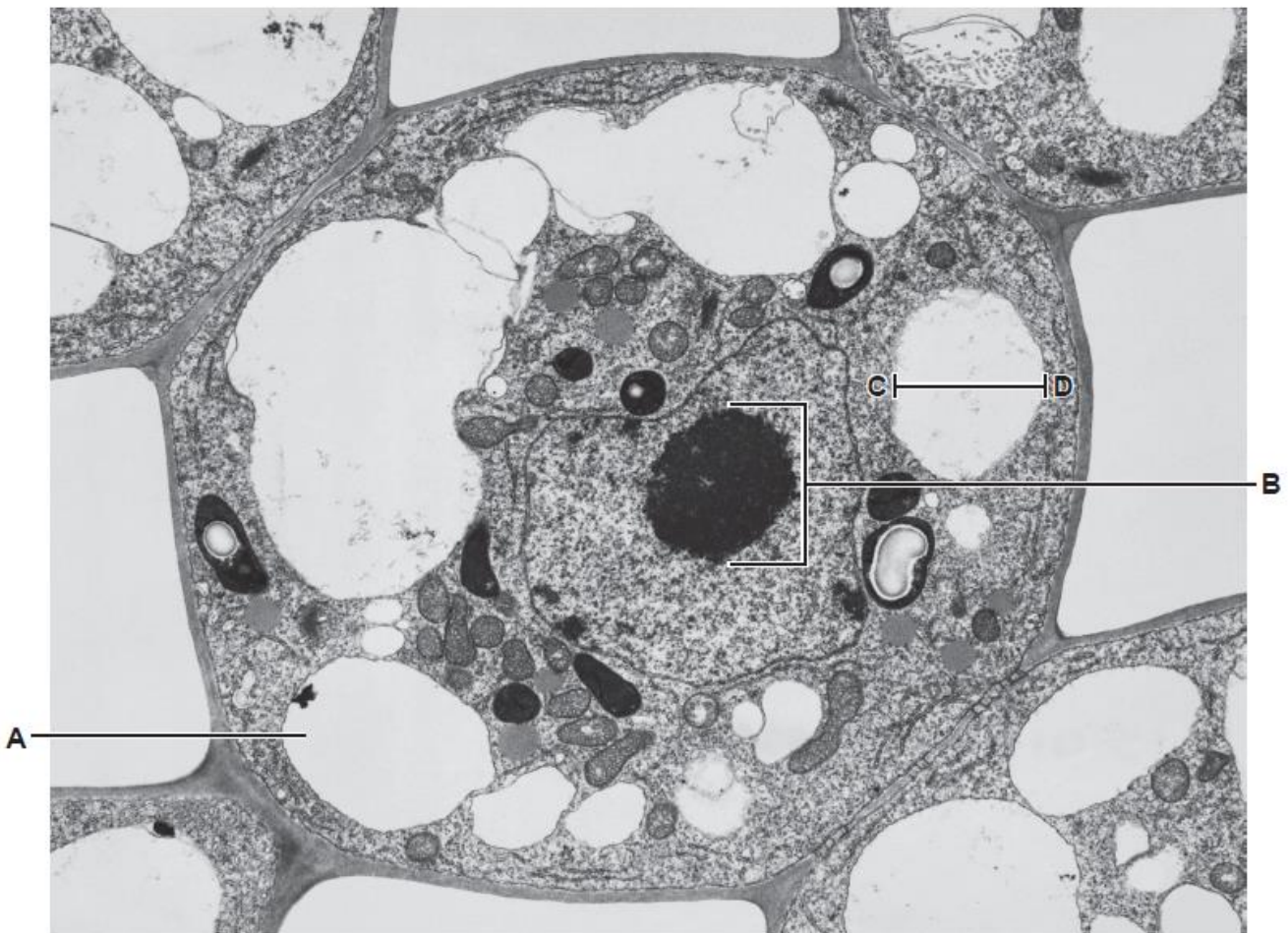


Fig. 1.1

(a) (i) Identify the cellular components shown at A and B.

A permanent vacuole

B nucleus

[2]

(ii) The real size of the line between C and D on Fig. 1.1 is 1.4×10^{-6} m.

Calculate the magnification that was used to produce the image in Fig. 1.1.

Give your answer to 2 significant figures.

$$M = \frac{I}{A}$$

magnification = $\times 14000$ [2]

$$M = \frac{20 \times 10^{-3} \text{ m}}{1.4 \times 10^{-6} \text{ m}} = \times 14286 \approx \times 14000$$

- (iii) Fig. 1.2 shows a student's drawing of another sago pondweed cell, which was observed under a light microscope. The student used a sharp pencil but did not label the drawing.

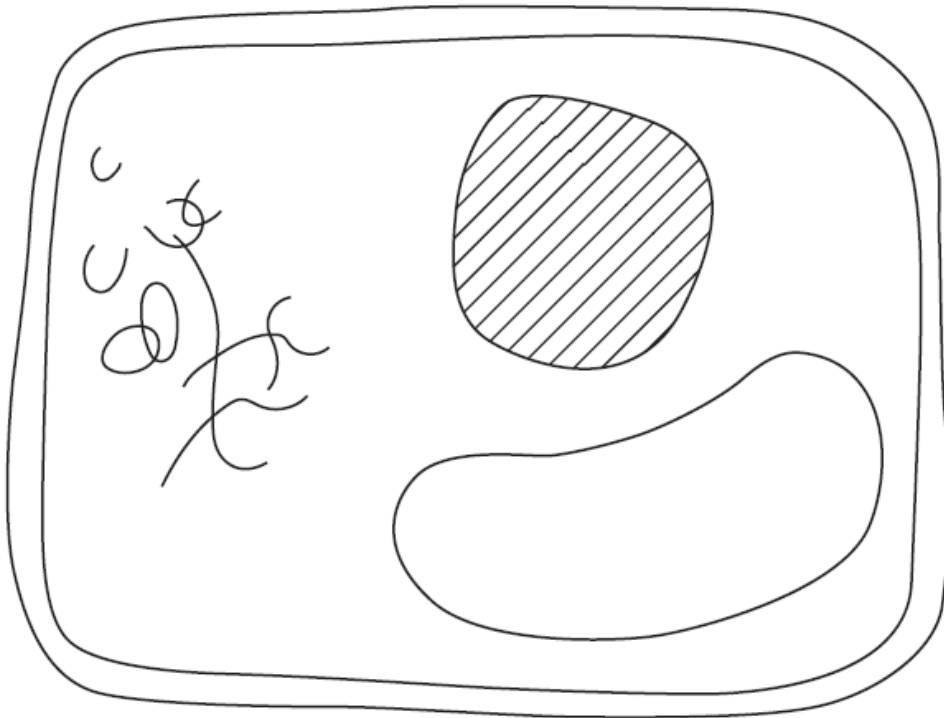


Fig. 1.2

Describe **two other** ways in which the drawing could be improved. [2]

-no shading/cross hatches -add magnification

- (iv) The student stained a sago pondweed sample to improve the contrast between cellular components when viewed under a microscope.

The student used the following procedure to stain the sample:

- Use forceps to place the sample on a glass slide.
- Use a pipette to place two drops of the stain in the centre of the sample.
- Carefully lower a cover slip onto the sample, ensuring that the cover slip is parallel with the slide as it is lowered.

Describe **two** improvements the student should make to their staining procedure.

- 1 lower cover slip at an angle by using mounted needle
- 2 use blotting paper to remove excess stain

[2]

(b) Sago pondweed has evolved many adaptations to its aquatic environment. Three such adaptations are described below.

Explain the advantage of each adaptation.

Adaptation 1: No waxy cuticle

Advantage ... *water loss is not an issue under water*

Adaptation 2: Stem tissue that contains air spaces

Advantage ... *buoyancy allows it to float*

Adaptation 3: A thin, flexible stem

Advantage ... *can move more in water without breaking* [3]

Total Marks for Question Set 14: 11



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