

Photosynthesis as an energy transfer process

Question Paper 5

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Photosynthesis
Sub Topic	Photosynthesis as an energy transfer process
Booklet	Theory
Paper Type	Question Paper 5

Time Allowed : 63 minutes

Score : / 52

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 1 Fig. 4.1 is an electron micrograph of a chloroplast from a mesophyll cell in a leaf.

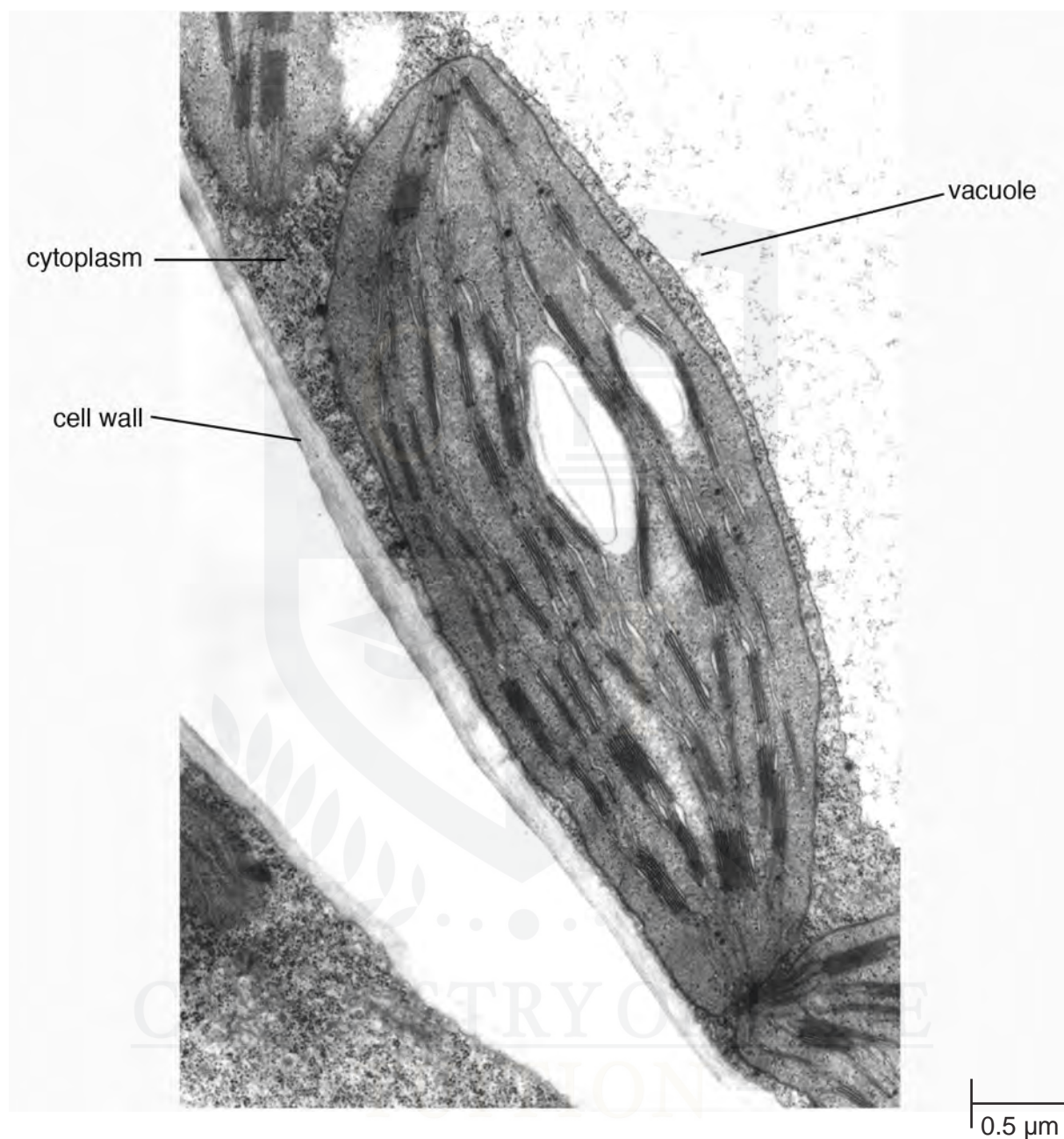


Fig. 4.1

- (a)** Calculate the magnification of the electron micrograph in Fig. 4.1.

Answer =[1]

(b) State two features **visible in Fig. 4.1** that identify the organelle shown as a chloroplast.

1.

2.[2]

(c) Chloroplasts absorb phosphate ions from the surrounding cytoplasm. Suggest one way in which chloroplasts use phosphate ions.

.....[1]

(d) Starch grains in plant cells contain both amylose and amylopectin.

Explain how **both** of these substances are formed from glucose in plant cells.

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.....[4]

(e) State three functions of the water stored in the vacuoles of plant cells.

1.

2.

3.[3]

[Total: 11]

-
- The graph shows the rate of photosynthesis (y-axis, 0 to 250) against light intensity in arbitrary units (x-axis, 0 to 7). Three curves are plotted: A (0.04% CO₂, 20°C), B (0.04% CO₂, 30°C), and C (0.13% CO₂, 30°C). Curve A plateaus at a rate of 60. Curve B plateaus at a rate of 95. Curve C plateaus at a rate of 210. All curves show an initial increase in rate with light intensity, followed by a plateau.
- | Light Intensity (arbitrary units) | Rate of Photosynthesis (A) | Rate of Photosynthesis (B) | Rate of Photosynthesis (C) |
|-----------------------------------|----------------------------|----------------------------|----------------------------|
| 0 | 0 | 0 | 0 |
| 0.5 | 40 | 40 | 40 |
| 1.0 | 60 | 70 | 80 |
| 2.0 | 60 | 90 | 125 |
| 3.0 | 60 | 95 | 175 |
| 4.0 | 60 | 95 | 200 |
| 5.0 | 60 | 95 | 210 |
| 6.0 | 60 | 95 | 210 |
| 7.0 | 60 | 95 | 210 |

(a) With reference to Fig. 2.1,

- [3]

(ii) explain the reasons for the difference between curves **B** and **C**.

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.....[4]

(b) Suggest **two** ways in which a commercial grower of cucumbers may increase the yield of the growing crop.

1

.....

2

.....[2]

[Total: 9]

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- 3 Fig. 4.1 is a diagram of a section through the undersurface of a dicotyledonous leaf.

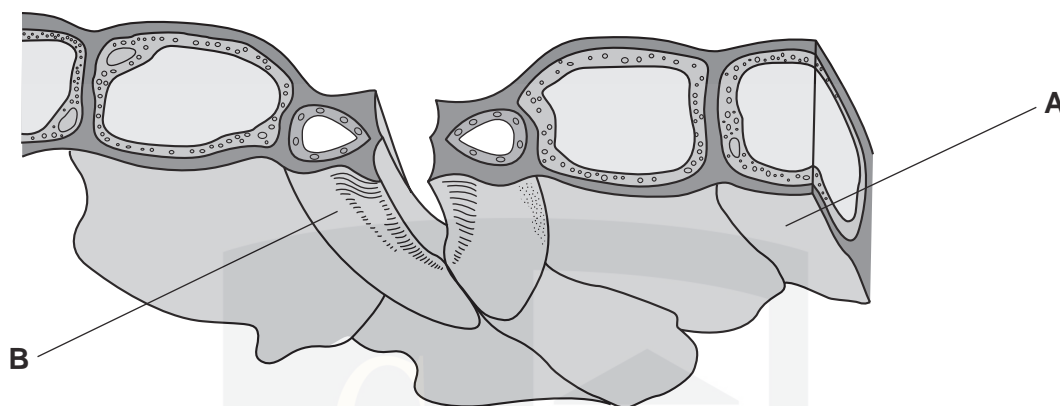


Fig. 4.1

- (a) Name the cells **A** and **B**.

A

B[2]

- (b) Explain the role of the pore shown, in relation to photosynthesis in the leaf.

.....

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[4]

- (c) With reference to Fig. 4.1, list two visible features of the cell **B** that allows the pore to open and close.

feature 1

.....

feature 2

.....[2]

[Total: 8]

- 4 Fig. 5.1 shows the main stages of the Calvin cycle.

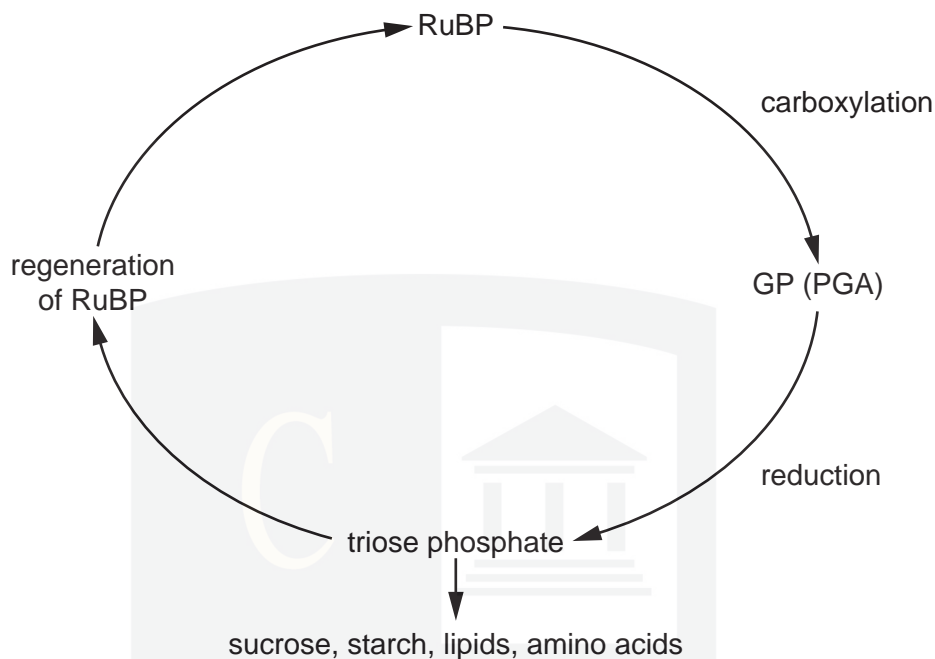


Fig. 5.1

- (a) State precisely where the Calvin cycle occurs in plant cells.

.....[1]

- (b) Describe how carbon dioxide is fixed in the Calvin cycle.

.....

[2]

- (c) Explain how the products of photophosphorylation are used in the Calvin cycle.

.....

[3]

- (d) Explain what initially happens to the concentration of RuBP and GP if the supply of carbon dioxide is reduced.

RuBP

 GP
[3]

- 5 (a)** Outline the main features of the Calvin Cycle. [9]

- (b)** Explain the role of NADP in photosynthesis. [6]

[Total: 15]



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