

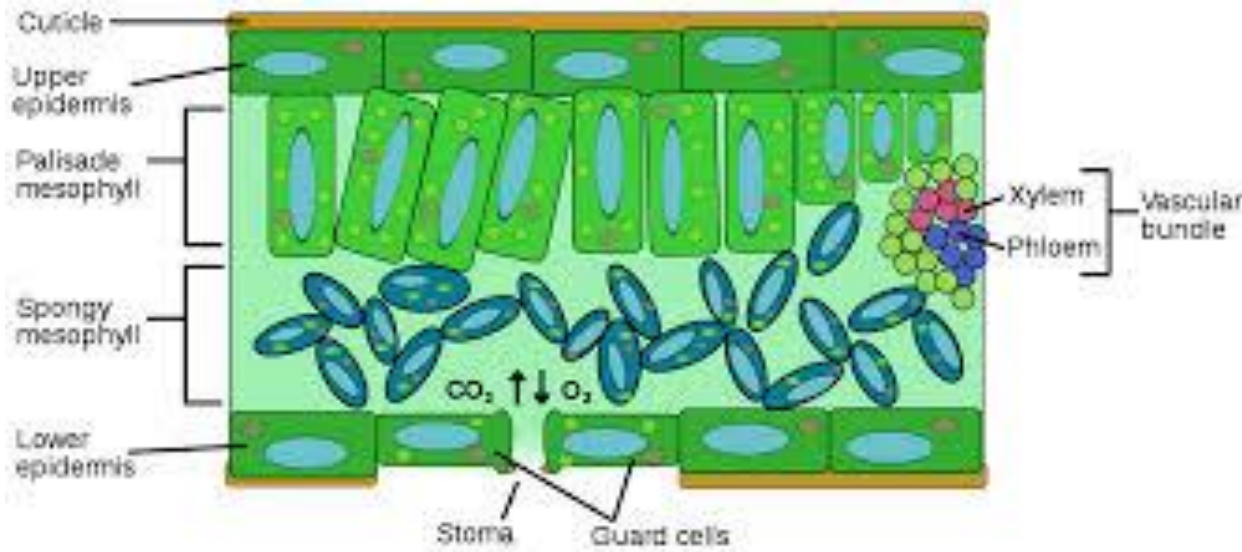
EB Education Revision Guide



How to work with Adaptations of Leaves

Structure of a Leaf

Diagram

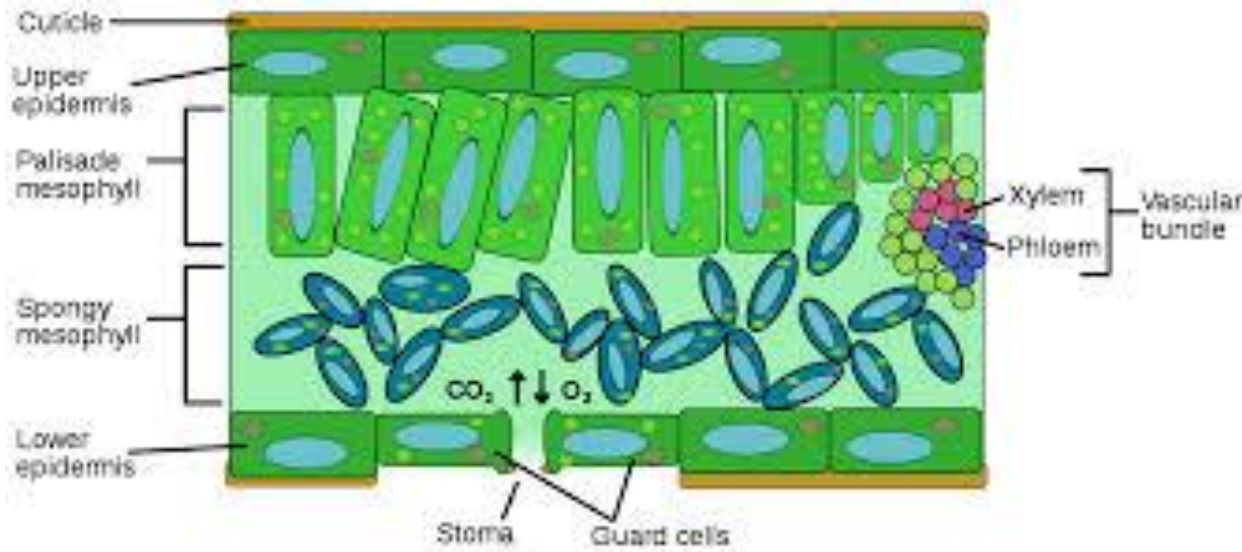


How is it adapted?

- Leaves have a large surface area which is exposed to light, which is needed for photosynthesis.
- There is a **waxy cuticle** which helps reduce water loss by evaporation.
- The **upper epidermis** is transparent. This means light can pass through it easily to reach the **palisade** layer.
- There are many chloroplasts in the palisade cells for photosynthesis to take place. These are found at the top of the leaf so they can get the most light possible. They are arranged vertically, allowing for more cells and more chloroplasts.

Structure of a Leaf

Diagram



How is it adapted?

- The **spongy mesophyll** layer contains many air spaces. This allows for efficient gas exchange, of oxygen and carbon dioxide.
- A network of vascular bundles containing **xylem** and **phloem** is found in this layer. The xylem provides the leaf with water for photosynthesis. Phloem removes the glucose which is produced.
- There are many holes called stomata in the lower epidermis (singular is stoma). The guard cells control whether these are open or not. The stomata allow carbon dioxide to diffuse directly into the leaf. They can close to reduce water loss in hot or dry conditions.

Adaptations

Some plants are adapted to live in extreme environments, for example in the desert, where it is very dry and hot.

Plants which live in these conditions have adaptations to prevent water loss.

- Small leaves or spines to reduce surface area and water loss
- Spines to prevent animals eating the plant to obtain water
- Thick waxy cuticles to prevent water loss by evaporation
- Curled leaves, or hairs on the surface of the leaves. This helps to trap water vapour near the surface by reducing air flow close to the leaf, reducing diffusion from the leaf to the air
- Long vertical roots growing deep in the soil to reach water, or roots growing horizontally in top layers of soil to collect surface water.



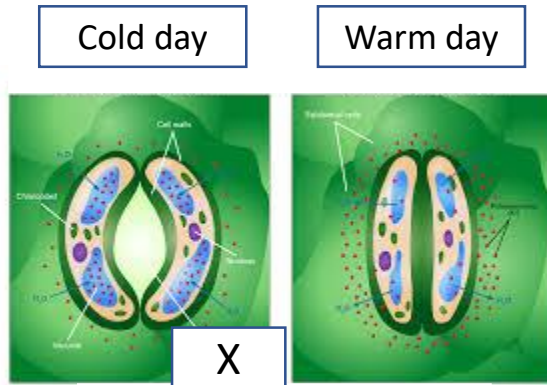
Adaptations

- Thick fleshy stems which store water
- Stomata are found sunken in pits. This means the stomata are lower than the surface of the leaf, and so air flow close to the stomata is reduced, and water loss by diffusion is reduced
- Fewer stomata to reduce water loss by evaporation



Your turn:

1. The diagrams below show the bottom of a leaf on a cold day, and on a warm day.



a) Name the part labelled X.

.....

b) Explain how carbon dioxide moves into the plant.

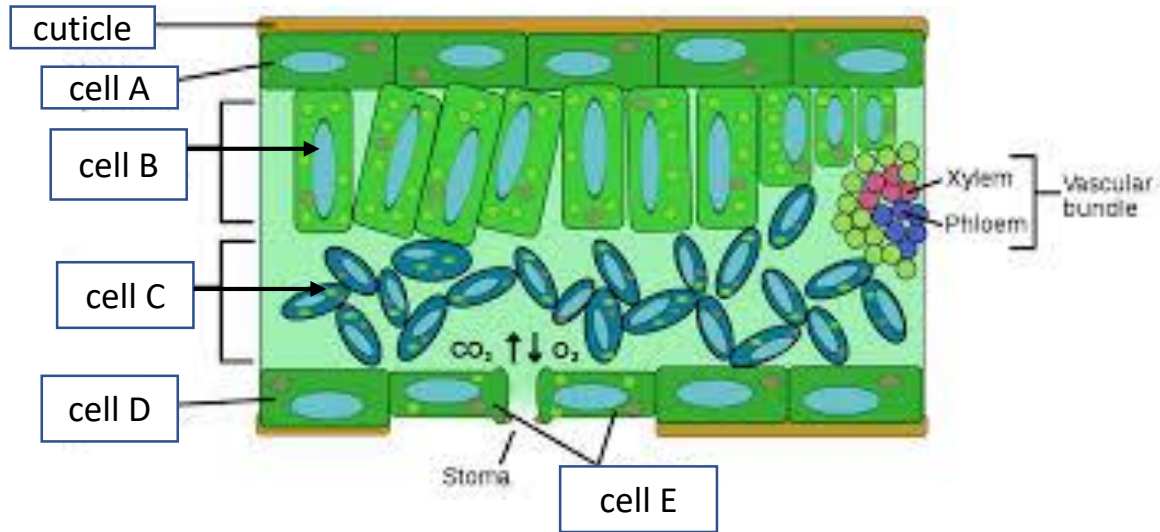
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c) Explain what happens to the guard cells on warm days to help the plant survive.

.....

Your turn:

2. The diagram below shows a section through a leaf.



a) Which cell will make the most glucose?

.....

b) Describe how carbon dioxide enters the leaf.

.....

c) Describe the process which takes place in the leaf to produce glucose.

.....

Your turn:

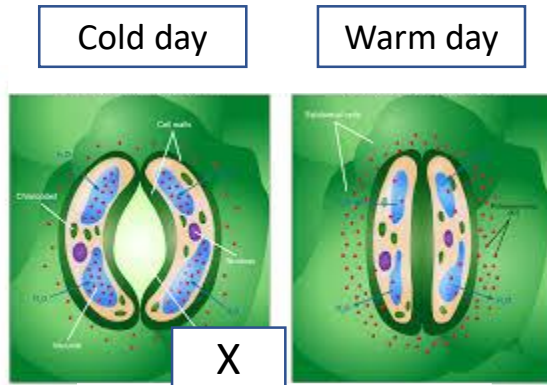
d) Using the diagram, complete the table below.

Cell	Name of structure	Function
A		
B		
E		
	Cuticle	
	Xylem	



Answers:

1. The diagrams below show the bottom of a leaf on a cold day, and on a warm day.



a) Name the part labelled X.

Stomata

b) Explain how carbon dioxide moves into the plant.

Carbon dioxide will move by diffusion into the leaf through the stomata

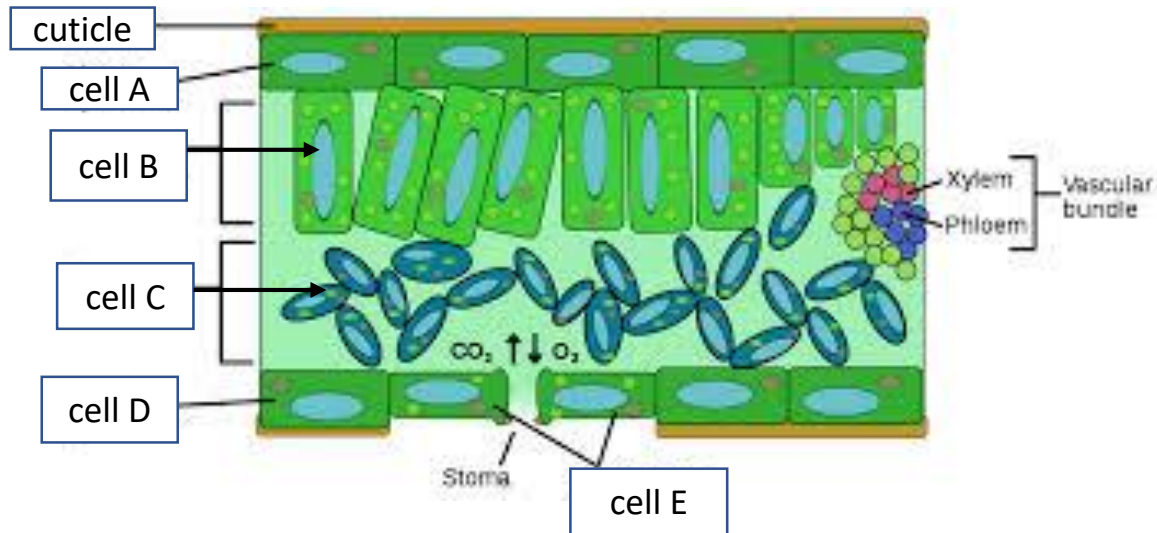
c) Explain what happens to the guard cells on warm days to help the plant survive.

Guard cells will change shape and close the stomata.

This prevents water loss/reduces the rate of transpiration

Answers:

2. The diagram below shows a section through a leaf.



a) Which cell will make the most glucose?

B

b) Describe how carbon dioxide enters the leaf.

Diffusion from an area of high concentration outside the leaf, to an area of lower concentration inside the leaf through the stomata

c) Describe the process which takes place in the leaf to produce glucose.

Photosynthesis takes place in the chloroplasts. It requires carbon dioxide and water, and uses light energy to produce glucose and oxygen.

Answers:

d) Using the diagram, complete the table below.

Cell	Name of structure	Function
A	Epidermis	Allows light through to the palisade cells
B	Palisade cells	Where photosynthesis occurs
E	Guard cells	Open and close the stomata
	Cuticle	Prevents water loss from the leaf
	Xylem	Transports water to all parts of the plant

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