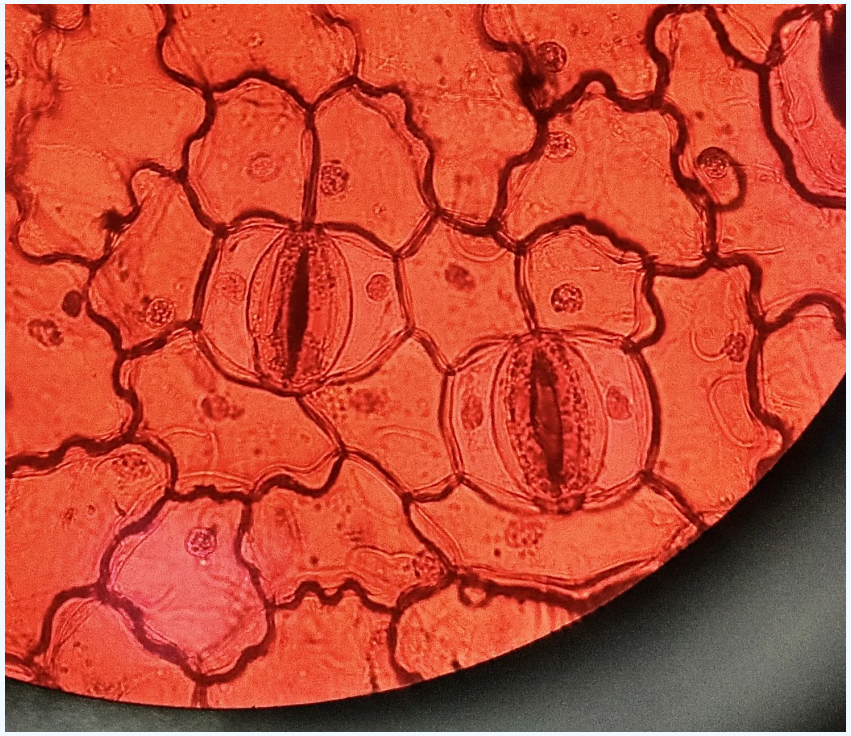
Science 10

Unit C: Cycling of matter in living systems

Gas exchange and tropisms in plants

Stomata and water balance

- Open stomata allow carbon dioxide to enter a leaf but also allow water vapour to leave.
- Guard cells change shape to adjust the pore as water conditions and light change.



Water cost of gas exchange

- Gases move mainly by diffusion; guard cells regulate the opening through which diffusion occurs.
- Carbon dioxide uptake supports photosynthesis, but transpiration increases water loss.
- Describe the diffusion, the water the leaf gives up, the stimulus, and the direction of growth.

Key terms

stoma

A microscopic pore in the leaf epidermis; plural: stomata.

guard cell

A specialized cell that changes shape to regulate a stoma.

transpiration

Loss of water vapour from plant surfaces, mainly through stomata.

phototropism

Directional plant growth in response to light.

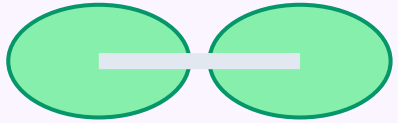
Key terms

gravitropism

Directional plant growth in response to gravity.

Gas exchange

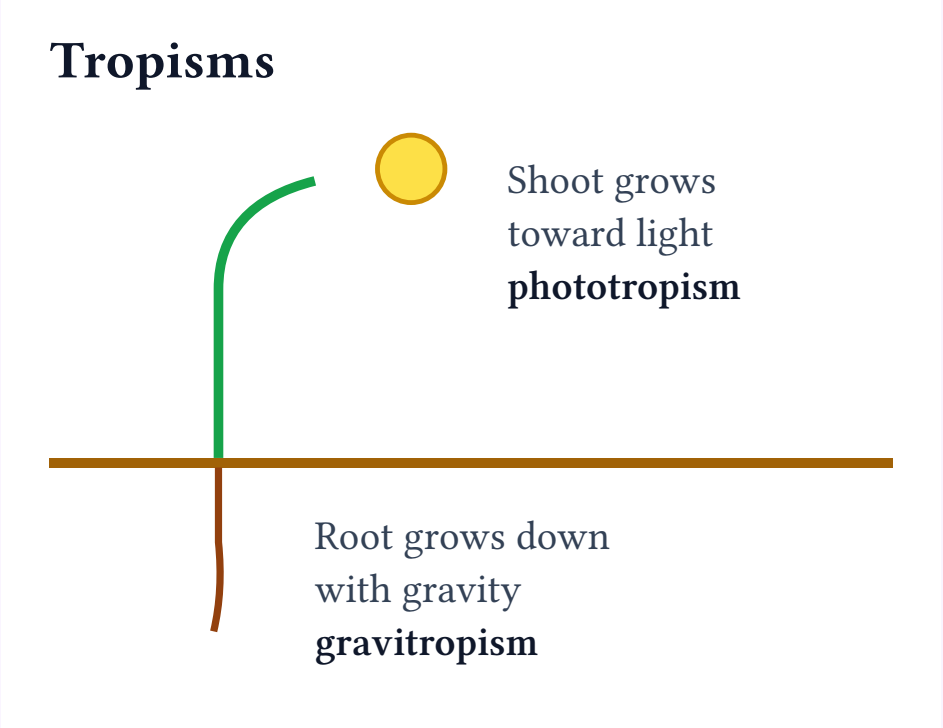
- Carbon dioxide enters a leaf. Oxygen and water vapour can leave.
- Guard cells open or close the stomata by changing their water pressure.
- An open pore gains carbon dioxide and loses water.
- Light, drought, humidity, and temperature all push on that tradeoff.



Open: CO_2 in · H_2O vapour out
Guard cells swell with water to open the pore

Tropisms

- Phototropism is growth bent by the direction of light. Gravitropism is growth oriented by gravity.
- The evidence runs from Darwin's experiments on the shoot tip to Went's chemical signal.



Stimulus and response

- Explain one stomatal response and classify shoot and root growth by tropism.
- A complete answer uses diffusion language, names the water trade-off, names the stimulus, and gets the growth direction right.

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