9.3 Growth in Plants

Meristems

Define meristems

Meristems are undifferentiated cells in plants capable of indeterminate growth (analogous to stem cells)

Meristematic tissues have specific regions of growth in plants (allows regrowth or vegetative propagation)

Compare growth due to apical and lateral meristems

Apical Meristems	Lateral Meristems
Occurs at the tips of roots and shoots	Occurs at the cambium
Responsible for primary growth (adds length)	Responsible for secondary growth (adds width)
Develops into primary xylem and phloem	Produces secondary xylem and phloem
Produces new leaves and flowers	Produces the bark on trees

Plant Signalling

Identify one function of each of the following plant hormones

Auxin: Involved in primary growth and tropic responses

Gibberellin: Involved in seed germination

Cytokinin: Involved in secondary growth (e.g. branching)

Abscisic Acid: Responsible for abscission and regulating transpiration

Ethylene: A gas which stimulates ripening

Describe the role of auxin in apical dominance

Auxin released by the apical meristem in shoots promotes apical growth (verticality)

It additionally inhibits growth in lateral buds (a condition called apical dominance)

As shoots grow further from lateral buds, inhibition is diminished, allowing spread

Outline how auxin concentration gradients may be established within plant tissue

Auxin efflux pumps set up concentration gradients of auxin in response to stimuli

These pumps control growth direction by determining areas with high auxin levels

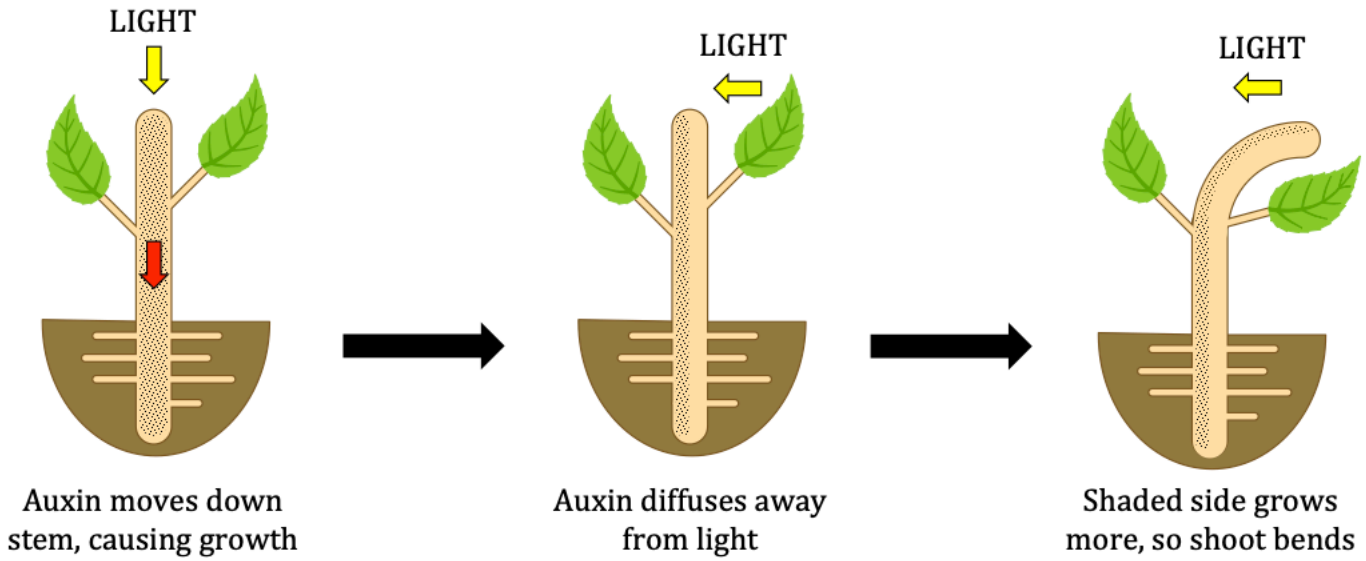
Tropisms

Define tropism and give two specific examples

Tropism is the turning of an organism in response to a directional external stimulus

1. Phototropism: Growth response to light
2. Geotropism: Growth response to gravity

*With the aid of the diagram, explain the role of auxin in phototropism in shoots **and** roots*



Plant tropisms are caused by a differential elongation of cells in response to stimulus

Auxin controls growth rates by changing patterns of gene expression in plant cells

In shoots, auxin promotes cell elongation, whereas in roots, auxin inhibits cell elongation

Plant turns away from side with cell elongation, so the shoots grow towards light (positive tropism)

and the roots grow away from light (negative tropism)

Describe the process of micropropagation and provide three examples of potential applications

The process of micropropagation involves:

1. Tissue sample (explant) grown in nutrient agar
2. Development prompted by growth hormones
3. Growing shoots divided (multiplication phase)
4. Cloned plants transferred to new soil

1. Rapid bulking: Cloning desirable stock plants
2. Virus-free strains: Cloning non-infected tissue
3. Propagating rare species: Prevents extinction