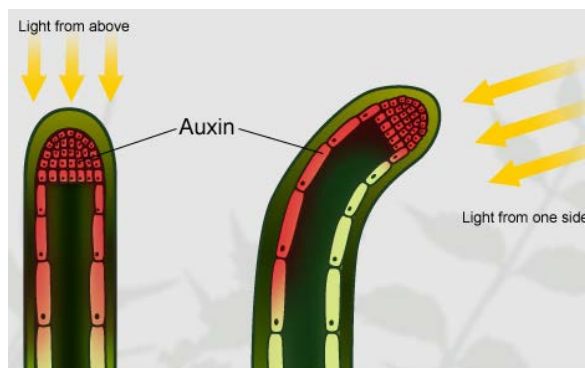


## Phototropism

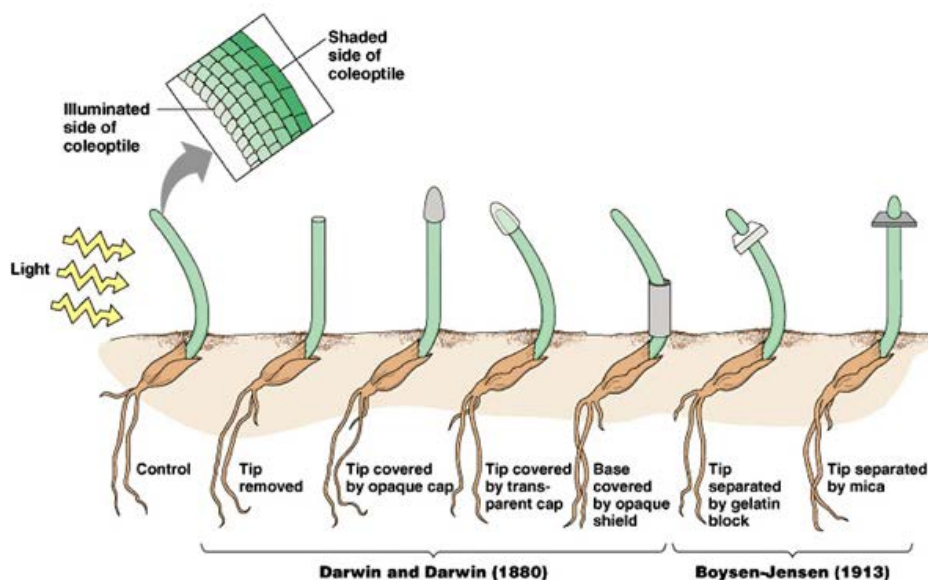
- This is the growth response seen in plants where plants grow either towards light (+) or away from light (-)
- The hormone **auxin** or IAA (indole acetic acid) is responsible
- Auxin is produced in the tip (apical meristem) of the plants shoot
- Auxin is water soluble and can diffuse down stems, through agar but not through mica or glass
- Auxin causes cells to elongate (grow longer than normal)
- Auxin only moves down the dark side of an illuminated stem

### How auxin works



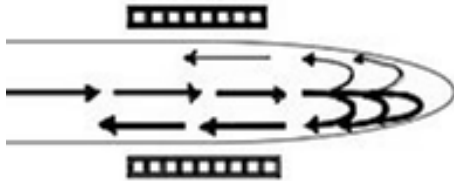
- Cell division (mitosis) occurs at the apical meristem causing more cells to be produced. Auxin is also produced here.
- If light is shone from the side of the shoot, the auxin will diffuse down the dark side, causing the cells on this side to elongate more than the cells on the light side of the stem. This difference in cells size causes the stem to bend towards the light.
- By bending towards the light the plant is able to increase its rate of photosynthesis therefore grow quicker and have a higher chance of survival.

### Other auxin experiments



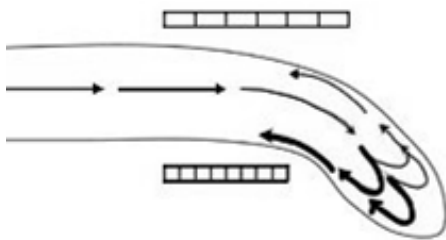
**How auxin affects the shoots and roots of a seed (geotropism)**

- When a seed germinates it uses the hormone auxin to stimulate directional growth, so that it's root grow down into the ground (for support and to find water) and it's shoot grows up (for light to maximise light for photosynthesis)
- Remember auxin is water soluble and is affected by gravity. The lower the point in the seed the higher the auxin concentration will be



Auxin is water soluble so moves to the lower point, therefore the auxin concentration will always be higher on the bottom of the root or shoot

- The concentration of auxin has different effects in the roots to the shoots.
- **High** concentrations of auxin in the ROOTS cause the cells to NOT elongate while **low** concentrations of auxin causes the cells TO elongate. Therefore the roots bend down into the ground



On the lower side of the root there is a higher auxin concentration. This inhibits cell elongation. But the low auxin concentration on the higher side of the root causes these cells to elongate therefore the root bends down

- **High** concentration of auxin in the SHOOT causes the cells
- TO elongate while **low** concentration of auxin causes the cells NOT to elongate. Therefore the shoots bend up out of the ground



On the lower side of the shoot there is a higher auxin concentration. This stimulates cell elongation. But the low auxin concentration on the higher side of the shoot causes these cells not to elongate therefore the shoot bends up

- These are the sudden physical changes that occur in plants and are reversible
- They are not in response to a particular direction so you do not put +ve or -ve in front of your answer
- They are most likely a response to a changeable variable such as touch, light or temperature
- e.g. flowers open and close with light changes = photonastic OR the closing of a venus flytrap when an insect lands on it = thigmonastic