AUXIN

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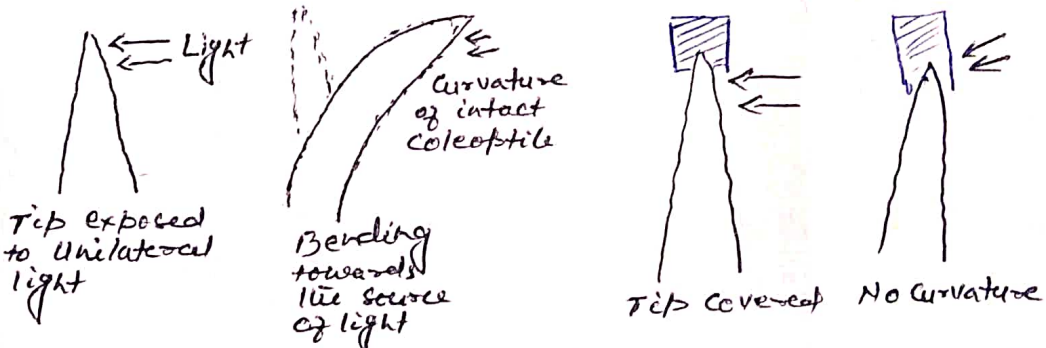
- The term AUXIN was derived from a Greek word "AUXEIN" — means "to grow"
- F.W. Went (1928) was the first person to isolate auxin diffused out from the tip of oat coleoptiles in the gelatin block.
- Auxin was later on chemically confirmed as Indole-3 acetic acid (IAA), and isolated from various sources including human urine, from fungi and also from higher plants.

Works leading to the discovery of AUXIN:

1. Charles Darwin (1881):

- First person who suspected the presence of a growth regulator in the tips of plants.
- He studied the effect of gravity and unilateral light on the movement of plants and reported the same in his book "The Power of movement in plants" in 1881.
- Darwin found that when the grass coleoptile is exposed to a unilateral light, it bends towards the source of light [The bending later termed as ~~Photobopism~~].



- Darwin further observed that if the tip of the coleoptile was covered or removed, the coleoptile did not bend.

CONCLUSION: Darwin concluded that some stimulus is transmitted from upper to lower part causing later to bend.

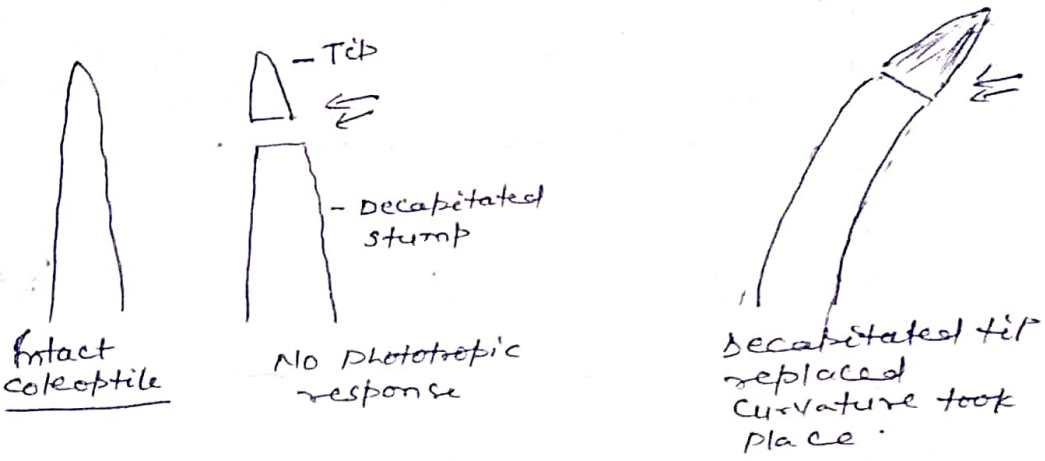
2. Boysen-Jensen (1910):

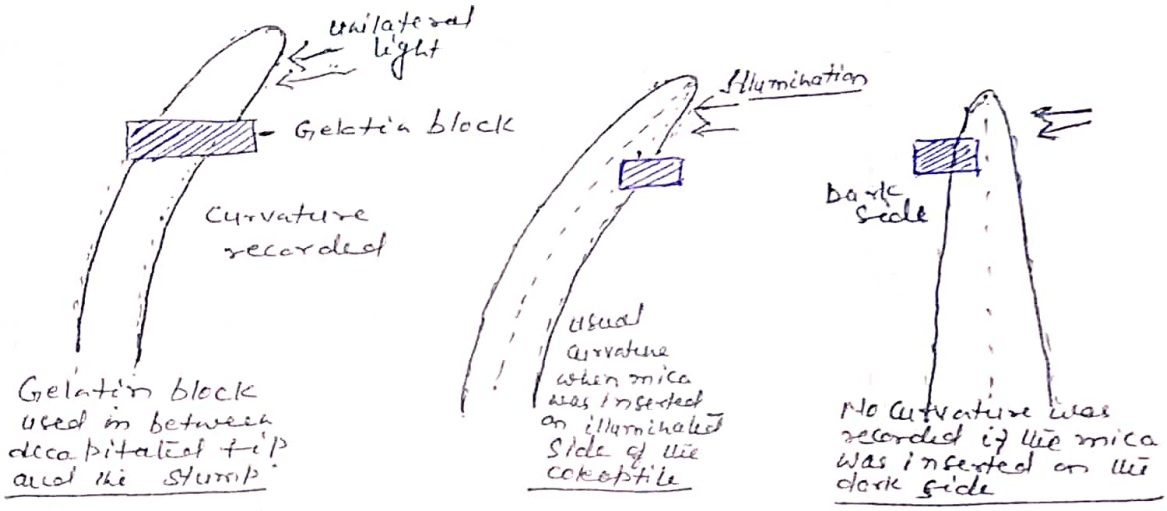
- He performed several experiments with the cut coleoptile tip and insertion made in the coleoptile

(a) By decapitation of coleoptile tip, the ability to make phototropic response was lost.

(b) The phototropic response was recovered by replacing the decapitated tip.

(c) The phototropic response could also be recovered by placing a piece of gelatin block in between the stump and the decapitated tip.





(d) He further observed that if a transverse slit was made on the illuminated side and a piece of mica was inserted into the slit, the phototropic response with curvature was recorded.

(e) If the transverse slit was made on the dark side and a piece of mica was inserted into it, there was no phototropic response.

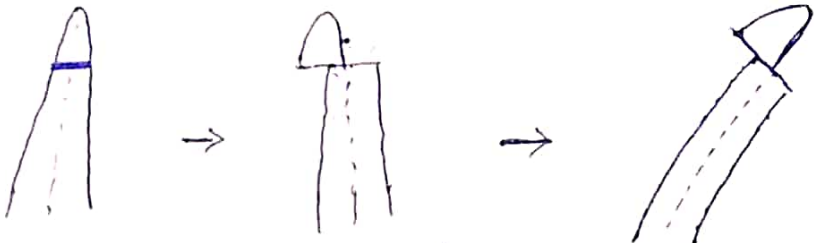
Although Boysen-Jensen didn't give any explanation but it was evident that -

(i) The "stimulus" mentioned by Darwin was infact a "material substance" which was in control of growth.

(ii) The suspected chemicals passed down the darker side of the coleoptile when illuminated.

3. Paal (1919).

- He gave the real explanation to the bending effect of the suspected substance.
- He cut off the coleoptile tip and replaced it as asymmetrically on the stump and discovered that the coleoptile bent away from the side bearing the tip even in the absence of any illumination.



Intact coleoptile → Decapitated tip placed asymmetrically on the stump → Bending of the coleoptile away from the side on which the decapitated tip placed

- He concluded that

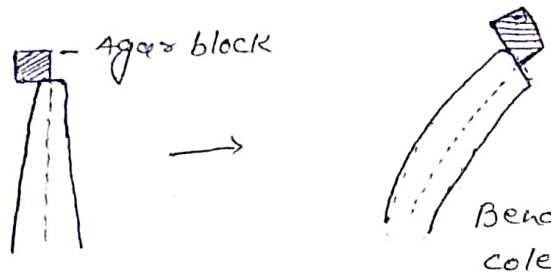
(a) the tip secrets a substance which promotes growth of the part below it. When the tip is intact and receiving uniform light from all sides, the growth is symmetrical and continuous

(b) the asymmetrical growth of the coleoptile, resulting in curvature towards unilateral light, must have been due to the asymmetrical distribution of the growth substances. Larger amounts of this substance on the shaded side caused that side to grow more and thus resulting the coleoptile to bend towards the source of light.

Many workers performed similar experiments and confirmed the presence of growth substances on the tip of coleoptile. Prominent among them are Stark (1917-21) and Soding (1925)

(4). Stark (1917):

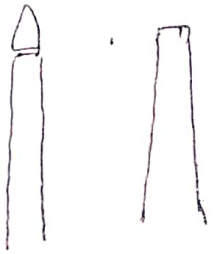
- He took the cap from the tip on the agar block and found the similar result as was found in case of asymmetrical placement of the tip by Paal.



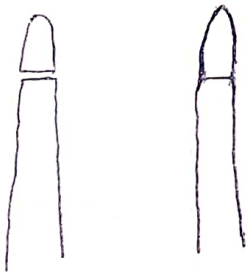
Bending of the coleoptile stump.

5. Soding (1925):

- He compared the growth of decapitated tip to that of replaced stump and reported more growth in case of later



Growth in the decapitated coleoptile tip.

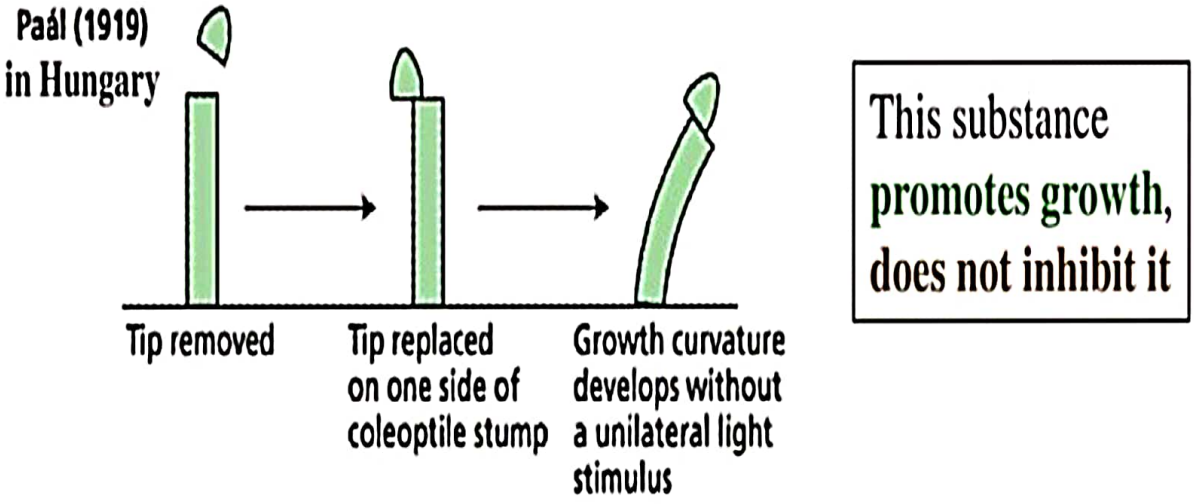


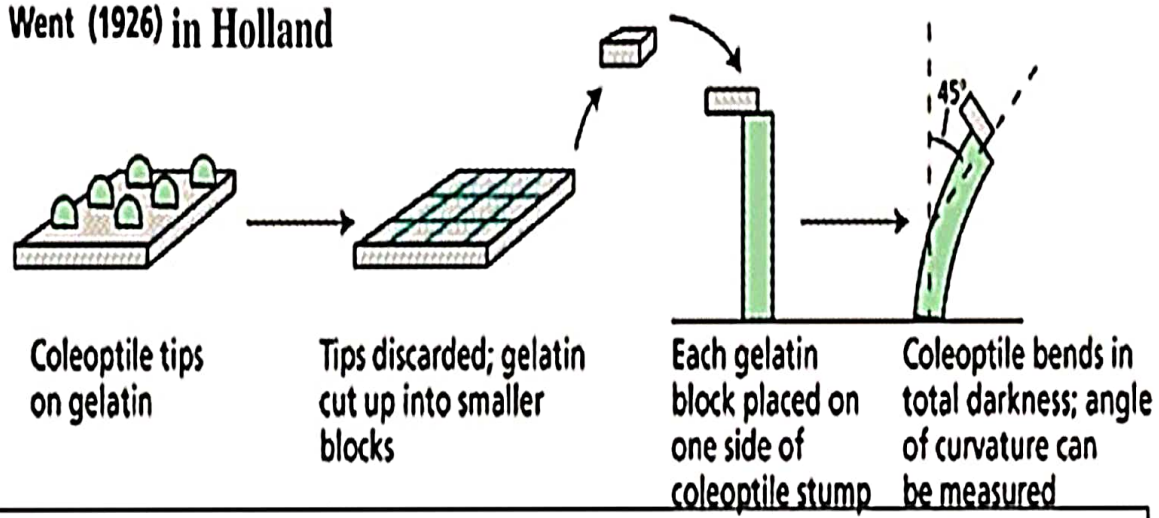
Growth when the tip was replaced.

6. F.W. Went (1928):

- Very important break through in the discovery of Auxin.
- He was successful in isolating this growth substance from Avena coleoptile tips.
- He cut off the tips of oat coleoptile and placed them on agar block for certain period of time.
- Agar block was then cut off into small cubes and used to record the increase in length and curvature test.
- The coleoptiles showed typical curvature even in the absence of illumination (unilateral light).

- F.W. Went further showed that the degree of curvature of the stump was directly proportional to the concentration of growth substance or auxin.
- This technique formed the basis of a bioassay for auxin and is popularly known as Avena coleoptile curvature test.





Substances from the tip can permeate through gelatin and lead to stimulate cell elongation, Went called them "auxin" from Greek auxein-to increase

- Due to extremely small amount of this growth substance in the Avena coleoptile tips and lack of accurate methods of separating the constituents of the cells, it couldn't be possible to chemically analyse this growth substance at that time. This led to the exploration of other sources, chief among them were human Urine, Rhizopus culture, corn germ oil etc.

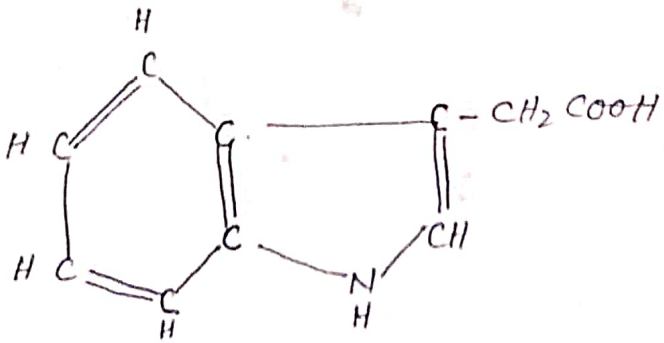
7. Kogl and Haagen-Smit (1931) isolated an active substance from human Urine and named it Auxin-A (Auxen trioic acid).

8. Kogl, Erxleben and Haagen-Smit (1934) isolated another active substance from corn germ oil and named it Auxin-B (Auxenolonic acid)

9. Reexamination of human Urine by Kogl, Haagen-Smit and Erxleben (1934) the same year led to the isolation of a different substance which they named Heteroauxin (other auxin), or as it is known today, Indole-3-acetic acid (IAA).

10. Auxin-A and Auxin-B never isolated in subsequent investigations and there is considerable doubt as to their existence.

IAA have been isolated many times in crystaline form from different sources. It has been considered as the Prencipal auxin in higher plants.



Indole-3-acetic acid
(a monocarboxylic acid)