

Ques Shoot apex organisation?

Ans The terminal part of the shoot with the leaf primordia is the shoot apex where primary organisation of the shoot is initiated. In size & shape it varies enormously but in a general way it can be said that the shoot apex is more or less convex in longitudinal section. The shoot apex was first recognised by Wolff (1759) as an undeveloped region from which the growth of the plant proceeded.

Zonal structure of shoot apex ⇒

According to recent cytohistological study two theories have been proposed to explain shoot apex.

At early stage Apical cell theory came into light (Nageli) but later on this was discarded because, this theory may hold good for cryptogams but is not applicable to the phanerogams. The apical cell theory was superseded by the histogen theory ⇒

① The histogen theory ⇒ This theory was introduced by Hanstein (1870) who considered that the primordia

Meristem may be divided into three distinct zones or histogens. According to the

they the apical meristem of the stem and root are composed of small mass of cells which are all alike & are in a state of division. These meristematic cells constitute promeristem. The cells of the promeristem is differentiated into three regions :-

(A) Dermatogen \Rightarrow This is the single outermost layer of the cells which later gives rise to the epidermis of the stem. In the root it is also single layered but at the apex it merges into the periblem & just outside the periblem, the dermatogen cut off many new cells resulting into small celled tissue the calygen, which is also meristematic & gives rise to root cap.

(B) Periblem \Rightarrow This region is internal to the dermatogen & is middle region of the the apical meristem. It is single layered at the apex but in central part becomes multilayered. It develops into the cortex of the stem.

In roots it is also single layered at the apex & many layered in the central portion. In the case of root, it also develops into cortex.

© Plerome \rightarrow It is the central meristematic region of stem apex & lies internal to the periblem. It is also composed of thin walled isodiametric cells. ultimately it develops & differentiates into central stele consisting of primary vascular tissues & ground tissues, such as pericycle medullary rays & medulla.

In the roots the function of pleroms practically same as in stem. At a little distance behind the apex certain strands of cells show a tendency to elongate, these strands of elongated cells make the procambium. This procambial strands ultimately become differentiated into vascular bundles.

Demerits \Rightarrow Though this theory is followed even now in case of root apex but not followed fully in shoot apex due to two regions:
9) Sharp distinction between