



DEPARTMENT OF BOTANY

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HONOUR'S PART - II

GROUP A - ANATOMY

ROOT AND SHOOT APEX ORGANISATION

1. Apical cell theory - It was proposed by Hofmeister (1857) and supported by (1878). According to them a single cell is responsible for the growth but this theory is applicable only to cryptogams and not to the seed plants.

2. Histogen theory - It was proposed by Hanstein (1870). According to this theory apical meristems of stems and roots of seed plants are differentiated into three zones (the so-called histogens or tissue builders) :

(i) Dermatogen - The outermost uniseriate layer whose cells divide anticlinally and form the epidermis of the stem as well as the epiblema in roots and unicellular root hairs.

(ii) Plerome - The massive central core of cells extending longitudinally and forming the stele, consisting of primary vascular tissues together with pith, pith rays (medullary rays) and the pericycle.

(iii) Periblem - Lying between dermatogen and Plerome, having isodiametric cells and giving rise to cortex and endodermis of stems and roots. However, the hypodermis of stems are also

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derived from it.

Calyptrogen - It is the fourth histogen layer of the roots, situated apical to the dermatogen and gives rise to the root-cap.

Quiescent centre - Clowes (1956) discovered in the root tips of *Zea mays* a cap-like region of inactive cells between the root cap and the active meristematic region. He named it as quiescent centre, whose cells divide rarely and synthesize DNA very slowly. It functions as a reserve of cells that are less sensitive to injury and have the capacity to restore growth of the root, once it is stopped.

3. Tunica-Corpus Theory - It is the most accepted theory of shoot apex organization in higher plants, as proposed by Schmidt (1924). This recognises only two zones of tissues in the apical meristems namely -

(i) **Tunica** - It is the cover or envelope layer of smaller cells, which divides anticlinally and forms the outer layer of the plant body.

(ii) **Corpus** - It is the central core of larger cells, which divide in various planes to assist the increase in volume of the plant.

Korper-Kappe Theory - This theory proposed by Schuepp (1917) applies only to the root apices of higher plants. The apical meristems of roots are said to contain a korper(body) and kappe(cap), comparable with the "Tunica and Corpus of the shoot

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apex".

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