



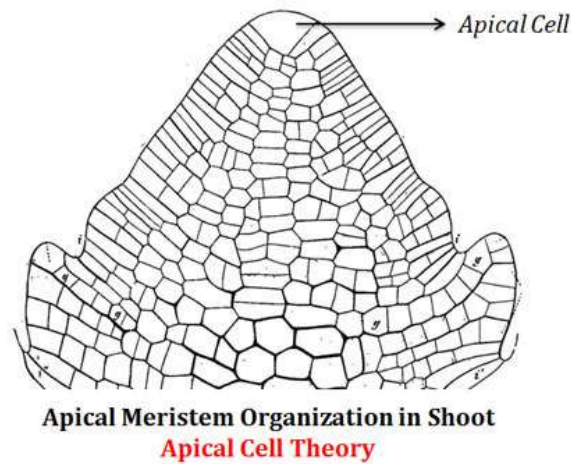
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## **THEORIES OF STRUCTURAL DEVELOPMENT AND DIFFERENTIATION OF MERISTEMS**

The apices of the root and the shoot represent the first formed self-perpetuating promeristems through various times constituting of meristematic cells. According to most workers a distinct zonation is noted. Hence structural development means distinction of prominent regions, different from each other in the presence of several characters such as number and nature of cells, position of cells, plane of cell division, shape of cells and rate of maturation of cells.

Several theories have been put forward to explain their origin and they are as follows:

**Apical cell theory** - In the growing region of many algae, bryophytes and pteridophytes a single apical cell has been found to be constantly present which leads to the growth of the whole plant body. The apical cell theory was proposed by Hofmeister in 1857 and supported by Nageli in 1878. According to the apical cell theory, a conspicuous vacuole is present within the apical cell. The apical cell theory may hold good for higher algal groups, bryophytes and a few pteridophytes but controversy arose over the interpretation of the complex analysis of gymnosperms. Hence this theory was not applicable to seed plants.



**Histogen theory** - The older apical cell theory was replaced by the histogen theory. The histogen theory was proposed by Hanstein in the year 1868. According to this theory, the main body of the plant arises from a mass of meristem of considerable depth. This mass of meristem consists of three zones that is histogens which may be differentiated by their origin and course of development into Dermatogen, the periblem and the plerome. This theory has been developed with reference to both the shoot and root apex. Hanstein believe that these three zones that is histogens arise from separate sets of initials and give rise to tissues-

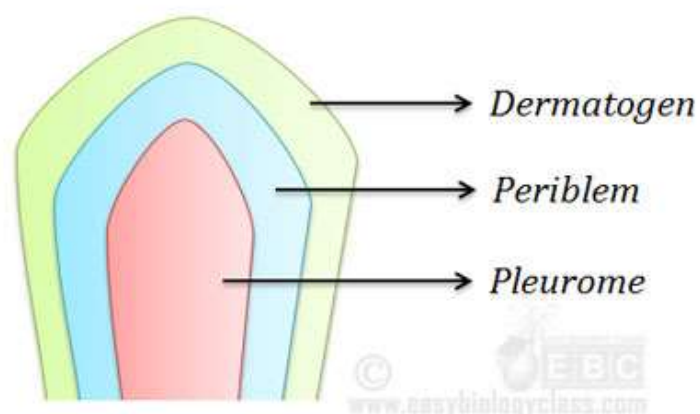
**Dermatogen:** It is the outer layer of cells. This region usually divide by radial walls and give rise to epidermis. In rare case, the cells of this layer divide by tangential as well as by radial, giving rise to multiple epidermis.



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**Periblem:** It is the region lying between the dermatogen and the pleurome. This zone is composed of isodiametric cells. Cells of this zone by active division give rise to the parenchyma of the cortex differentiates out from the periblem the cells of which divide both by radial and transverse was the endodermis is also derived from the periblem round medicines

**Pleurome:** It is a central core of the plant. The cells by division in all directions give rise to central cylinder, that is the stele consisting of pith, pericycle and primary vascular tissue.



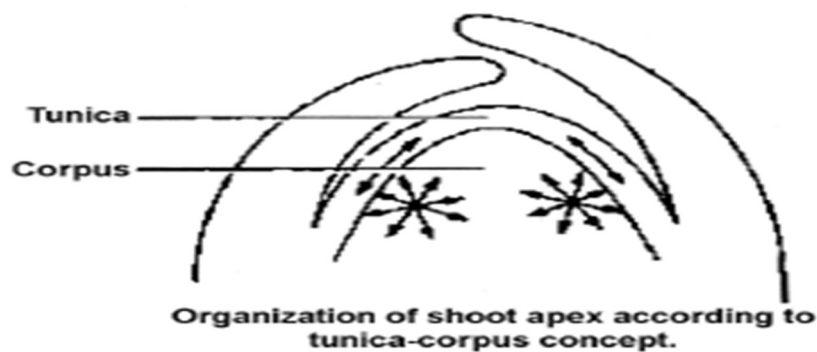
**Apical Meristem Organization in Shoot**  
**Histogen Theory**



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**Tunica corpus theory**- This theory of apical structure that is the tunica corpus theory was propounded by Schmidt 1924 and supported by Foster 1949. This theory was an outcome of observations on angiosperm shoot apices. According to this theory two tissue regions occur in the apical meristem namely

- 1) **the tunica** and
- 2) **the Corpus**



**The tunica:** It is the outer and developing region consisting of one or more peripheral layers of cells which envelope essential mass of tissue. The plane of cell division in the tunica is mainly anticlinal that is they are undergoing surface growth. Each layer of tunica arises from a small group of separate initial. In other words, the number of tiers of initial is equal to the number of layers of tunica, that is, each tier of tunica has its own layers or initials in the tunica. The cells are smaller than the corper cells.

Endodermis arises from the outermost layer of the tunica but depending on plant species and the number of layers, other tissues, cortex, pith, vascular tissue, may have their origin in the tunica or the Corpus or both.

**The Corpus** : It is the center massive regions surrounded externally by tunica layers. Corpus cells are larger in size as compared to the cells in the tunica. The corpus cells divide in various planes that is anticlinal, periclinal, radial, tangential resulting in the growth in volume. The Corpus arises from its own initial located beneath those of the tunica. The pith, the vascular region and a part of the cortex originate from the Corpus.

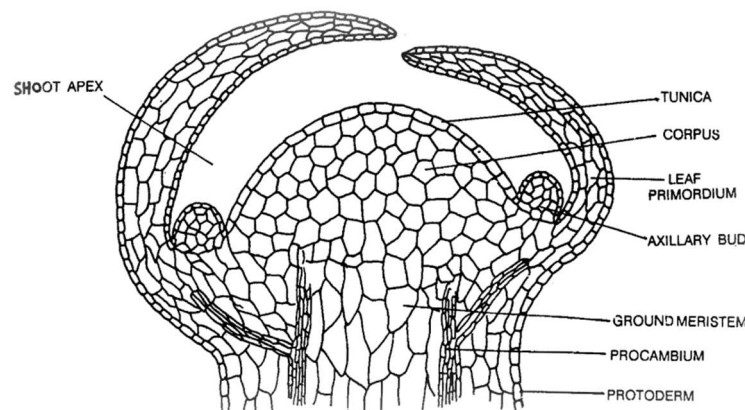


Fig: The region of tunica and corpus in the plant apex.

## REFERENCE

Mitra.J.N, Mitra.D, Chauradhy.S.K (1966) Studies in Botany. Moulik Library. Sixth edition.