SHOOT APEX ORGANIZATION IN ANGIOSPERM

INTRODUCTION → It was investigated by C.F. Wolff (1759) on bud development that leaves and stems tissues are traceable to the delicate tip of the shoot. This region was called by Wolff (1759) as the "Punctum Vegetation". Which has been rather freely translated as growing points. Now this term growing point has been replaced by more appropriate and non committal designation of shoot apex.

SHAPE OF SHOOT APEX → It varies greatly in forms and dimension. It is commonly a form of round of lowdome. In Elodea, Myriophyllum and in many grasses, the shape of shoot apex is that of a slender, blunt tipped cone. The apex of dicotyledons with decussate phyllogeny such as of Syringa, Legustrum etc. are particularly suitable for study.

In Angiosperms the shoot is made up of small apices that varies in diameter from 90μ in grasses to 130-200 μ in some of dicot stem. Thus the nature size form morphology primary anatomy etc. are highly complex.

STRUCTURE OF SHOOT APEX → At the begining of modern period of Cytohistological inves-

-tigation of apical meristem the following two very ~~sim~~ stimulating theories have been proposed, regarding shoot apex of Angiosperm.

① The Histogen theory.
② The Tunica corpus theory.

① The Histogen theory → It has been ventila-ted by Hansteims (1868). This theory has been discussed critically in detail a series of modern reviews of Foster (1941), Sifton (1944) and Majumdar (1945).

According to this theory the angiospermic shoot consists of a central core of plerome of more or less irregularly arranged cells. It is enveloped by a variable number of mantle like layers. It has been sub divided into outer dermatogen middle periblem and inner most plerome. In Hanstein interpretation these 3 zone arise from seperate sets of initials and function as descrete histogen as follows

1. Dermatogen propagates the epidermis.
2. Periblem give rise to inner tissue of leaf and cortex of stem. (Cortex endodermis).
3. Plerome forms the vascular system and pith.

OBJECTION → This theory has strongly influenced the study and inter-pretation of shoot apex in Gymnosperms and Angiosperms for many years but it

proved adequate for the following reasons
ⓐ In many Angiosperm apieces, a clear distinction between a periblem and a plerome does not exis.
ⓑ The respective roles in tissue develop-ment has assigned by Hanstein to 3 histogens can not be demonstrated. (Foster, (941).

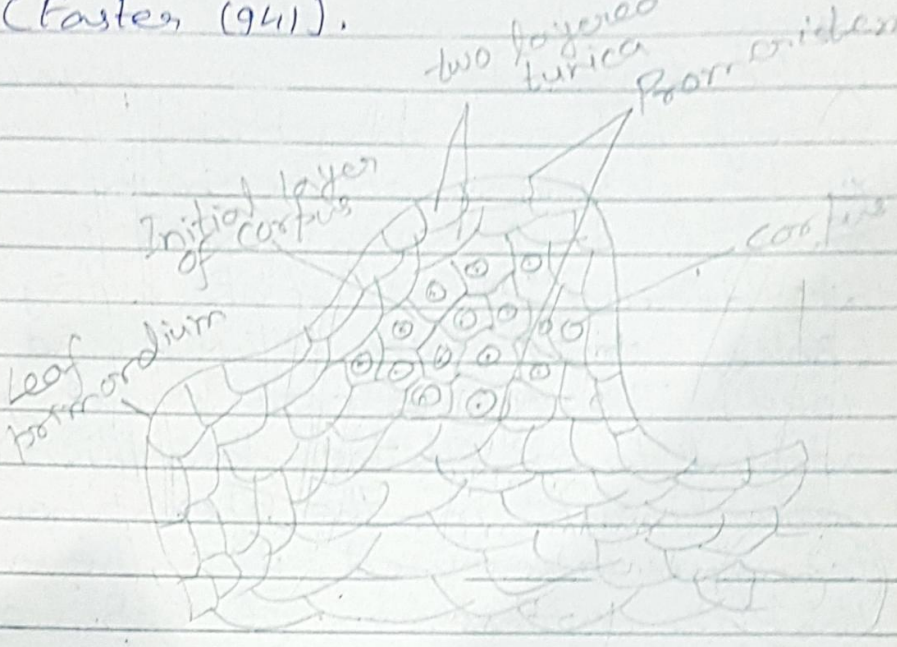

Fig - L.S of shoot Apex

② The Tunica Corpus theory → This theory has been advanced ~~the~~ by Schmitt (1924). He has recognised the following 2 major zones in the shoot apices of Angiosperms.
ⓐ Tunica , ⓑ Corpus.
ⓐ Tunica → It conectively designates the layer or layers in which anticlinal plane of division predominant, except at the points of origin of leaves and

axillary bud primodia.

⑤ Carpus → It is the zone in which the planes of division fluctuate and result in more or less regularly arranged cells.

The tunica and carpus reflects respectively surface and volume growth within the apex. This show the following characteristics.

(i) The number of tunica layers varies widely between species and genera.

(ii) The sharpness of the boundry between many fluctuate even within the species at different phases of its ontogeny (Boke 1941-47 Reeve 1942-48 and Engard 1944). The tunica carpus theory is adopted to a flexible description of cells arrangement in the apex. When modern techniques are used, it is the evident that the cytohistology of carpus of shoot apex of a no. of angiosperms resemble to a marked degree. Zonation typical of many gymnosperm. For example in Opuntia Trichocerous etc. It has been noted by Boke (1941-44) that the carpus show 3 zones, distinguished by size, structure and planes of cell division. Similar zonation occurs in certain palms (Ball 1941), Bamboo and Sinocalomus (Philipson 1947).

Further, Sahand and Vnikrishnan (1968) have studied that the shoot apex

organization of Discorea alata. They have found that cytohistological zonation of shoot apex is variable. This supports the Alsops (1962) conclution that the zones are not descrete entities but are evidence of differential activity in the shoot apex.

Sahand and Unikrishnan (1968) further reported that in D. alata the central meristem zone fluctuate without being co-related with final changes of flowering. This support the view that the ontogenic changes in zonation with the apex may be different in plants with different morphogenic features.

Kundu and Saha (1968) have studied the shoot apex of Mimosa pudica. The shoot apex of plant indicates the following interesting observation
1. Under normal condition, the T.L.S of meristem shows the following 4 zones.
(a) Tunica
(b) Corpus
(c) Flank - meristem.
(d) Rib - meristem.