Q.11 Root apex organisation?

Ans During the later stages of development of embryo, the cells at the root pole become arranged in a pattern characteristics of the species. This group of cells comprises the apical meristem of the primary root. The cells of this region are all relatively undifferentiated & meristematic, densely protoplasmic & with large nuclei & they all undergo active division. The tissues of the mature root are eventually derived from a no. of these cells of the apical meristem, which are termed initials. Regarding the root apex organisation the following theories have been put forward given —

(1) Apical cell theory ⟹ This theory was put forth by Nageli.

In the roots of vascular cryptogams (pteridophytes) eg- Dryopteris, a single tetrahedral apical cell is present, it is generally thought that by its division this gives rise to all the tissues of the root. However the apical cell theory was

superceded by the histogen theory.

In monocot roots, the initials range from one to many. Where the initials are more than one, they are arranged in one to four fairly distinct, concentric groups. In each group there are one to many initials. Where there is more than one group, the groups lie adjacent to one another on the longitudinal axis of the root. Each of these groups quickly develops one or more growth zones. In many plants these zones appear to represent "the histogens".

The terms dermatogen, periblem & plerome are no longer in general use in description of stem ontogeny but they have been continued to indicate general zones in studies of root development. A forth histogen the Calyptrogen is also known which is concerned with the formation of root cap.

In many gymnosperms there are two groups of initials - the inner forms the plerome, the outer forms the periblem & the cap

The Cap appears as a distal proliferation of the pesiblem. A dermatogen is not set off at the very apex, as in all other groups but is formed from the layers of the pesiblem a little away from the apex where the base of the Cap is separated from the pesiblem.

In angiosperms there are three, rarely four groups of initials. In the dicots the distal group forms the Cap & the dermatogen, the median group - the pesiblem, the innermost the plerome. The most characteristic is the common origin of Cap & dermatogen.

In monocots there are three groups of initials which form four zones, but the outermost, independently forms the Cap, & that next beneath, the dermatogen & Pesiblem. The most characteristic of this type is that the origin & structure of Cap is independent. Moreover the two zones that are formed by one group of initials (dermatogen & pesiblem) & differs from those (Cap dermatogen) similarly