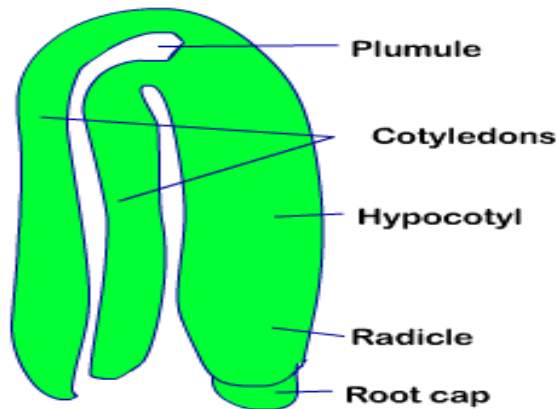


Types of embryo

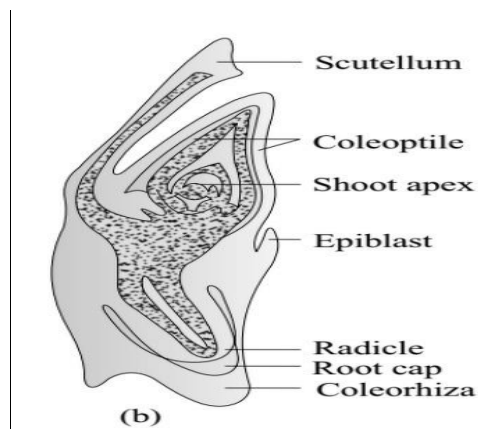
Structure of Dicot Embryo:

A typical dicotyledonous embryo consists of an embryonal axis and two cotyledons. The part of embryonal axis above the level of cotyledons is called epicotyl. It terminates with the stem tip, called plumule (future shoot). The part below the level of cotyledons is called hypocotyl which terminates in the root tip called radicle (future root). The root tip is covered with a root cap (calyptra).



Structure of Monocot Embryo:

The embryos of monocotyledons have only one cotyledon. In grass family (Gramineae), this cotyledon is called scutellum. It is situated towards lateral side of embryonal axis. This axis at its lower end has radicle and root cap enclosed in a sheath called coleorhiza. The part of axis above the level of attachment of scutellum is called epicotyl. It has as shoot apex and few leaf primordia enclosed in a hollow foliar structure called coleoptile. Epiblast represents rudiments of second cotyledon.



(b) L. S. of an embryo of grass

Types of endosperms

- 1. Nuclear Endosperm:** It is the most common type of endosperm found in plants. Here PEN divides repeatedly (mitotic division) without cytokinesis. It results in the formation of a large number of free nuclei in the cell. A large central vacuole is formed, and nuclei get arranged at the periphery. More nuclei are there at the chalazal and micropylar end when compared to the sides. At this stage, cell wall formation takes place from the periphery towards the multicellular endosperm. Examples: maize, rice, wheat, cotton, sunflower.

In the case of coconut, the cell wall formation is incomplete and they result in the formation of outer multicellular solid endosperm and inner multinucleated having free nuclei and a liquid endosperm commonly known as coconut milk.

- 2. Cellular Endosperm:** A type of endosperm development in which cell walls develop starting with the first cell division. It is not very common. In this type of development, division of PEN (karyokinesis) is followed by cytokinesis and two cells are formed due to transverse division, giving rise to the chalazal and micropylar chamber. Further division is similar, which leads to the formation of the cellular endosperm. Examples: Petunia, Balsam, Datura

3. Helobial type:

It is an intermediate type between the nuclear and cellular types. The first division is accompanied by cytokinesis but the subsequent ones are free nuclear. The chamber towards micropylar end of embryo sac is usually much larger than the chamber towards chalazal end. A large number of nuclei are formed in the micropylar chamber by free nuclear divisions while the nucleus of the chamber towards chalazal end divides to form a fewer free nuclei or may not divide at all.



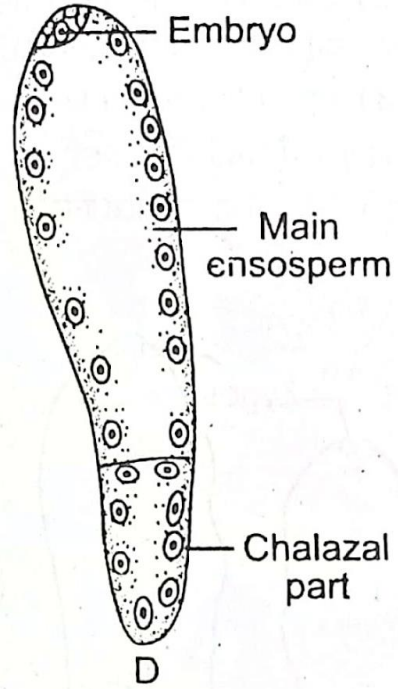
Free nuclei

(a) Nuclear endosperm



endosperm

(b) Cellular endosperm



Embryo

Main endosperm

Chalazal part

D

C) Helobial endosperm

