

**Topic: Classification of Meristems**  
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### Classification of Meristems

Various systems of classifying meristems have been proposed by many eminent workers which are based on the characteristics like origin and nature of initiating cells, stages of development, topography and function. No system is exclusive and rigid.

The common important types of meristems according to their origin and development are the following discussed below-

#### **1. Meristems based on stage of Development**

##### **Promeristem or Primordial Meristem:**

It is the very foundation stage, the region of formation of new organs and tissues. It is also known as embryonic meristem. It comprises the apical initials and their immediate derivatives. As soon as the cells of promeristem begin to change in shape, size, wall and cytoplasm characteristics, they do not remain a part of the promeristem.

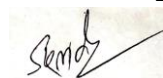
#### **2. Meristems Based on Origin of Initiating Cells**

##### **i. Primary Meristem:**

The cells of which meristem originate directly from the embryonic cells and remain meristematic throughout the plant life is called primary meristem. From the primary meristems primary parts of the plant are produced. The main primary meristems are the stem and root apices and the primordia of leaves and similar appendages.

##### **ii. Secondary Meristems:**

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Secondary meristems are those meristems that develop from permanent tissues. So they are of secondary origin. The cork cambium or phellogen that develops from epidermis, cortical and other cells during secondary increase in thickness is an example of secondary meristem. The secondary meristems add new cells to the primary body forming supplementary tissues during secondary growth or serve in protection and repair of wounds.

### **3. Meristems Based on Position in the Plant Body**

#### **i. Apical Meristem:**

The meristem which occurs at the shoot and root apices of the main and lateral branches is called apical meristem. Apical meristem includes the promeristem and the meristematic zone behind it i.e., primary meristem, in which three basic meristems — the protoderm, the procambium, and ground meristem of the tissue system can be distinguished. Increase in length of the plant axis is mainly achieved by the apical meristems. A single apical cell is found in the apical meristem of pteridophytes; but, in case of higher plants, a group of cells constitute the apical meristem, called apical initials or apical cells.

#### **ii. Intercalary Meristems:**

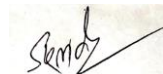
These meristems remain in the intercalary position between the permanent tissues. During development the apical meristems go ahead and certain portions of it remain in between the permanent cells and finally become embedded between masses of permanent tissues. Intercalary meristems are found in different organs of plants like the leaf bases in Pin us, internode bases in the stem of many grasses and *Equisetum* or at the base of the node as in *Mentha sp.* etc.

The main axis and its branches increase in length by the activity of this type of meristem. The lifespan of the intercalary meristem is short. They are converted into permanent tissues after a short period of time.

#### **iii. Lateral Meristems:**

These are laterally situated meristems i.e. parallel to the surface of the plant body and composed of a single layer of rectangular cells which divide mainly periclinally and produce secondary permanent tissues. The fascicular cambium and the phellogen or cork cambium are the

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examples of this type of meristem. By the activity of the lateral meristem the plant body increases in girth or diameter,

#### 4. Meristems Based on Function

On functional basis the meristems are classified into-

##### i. Protoderm:

Protoderm is the outermost cell-layer of the plant body the cells of which divide periclinally to give rise to epidermis. Multiple epidermis in *Ficus*, of course, is formed due to tangential divisions.

##### ii. Procambium:

From the cambium elongated tapering cells are derived in the growing region to constitute procambium. Those derived cell clusters are called procambial strands which occur in a ring in case of dicotyledonous stem. From the procambial strands the vascular bundles are formed, consisting of xylem, phloem and cambium. The strands remain scattered in monocotyledonous stems. In roots only one procambial strand is found in the centre. The procambium strands gradually increase giving rise to pericycle in some stems.

##### iii. Fundamental or Ground Meristem:

Excepting the procambium and protoderm the rest of the meristematic tissue forms the ground meristem. It is gradually differentiated into cortex, medullary rays and the pith.

#### 5. Meristems Based on the Plane of Division

Based on the plane of cell division meristems are classified as mass meristem, plate meristem, and rib meristem.

##### i. Mass Meristem:

Cells of this type of meristem divide in three- or in all planes to produce a mass of cells. Early stages of many embryo development, the endosperm development in many plants, pith and

cortex development in most plants and developing sporangia etc. are examples of mass meristems

### **ii. Plate Meristem:**

In this type of meristem the cells mainly divide anticlinal in two planes. As a result there appears a plate-like increase in area. Single cell-layered plate meristem forms epidermis and 2 to several cell-layered plate meristem is responsible for the development of leaf blade.

### **iii. Rib Meristem:**

In rib meristem continuous anticlinal division takes place to form columns or rows of cells. By the activity of this meristem young roots and pith and cortex of young stems are formed.

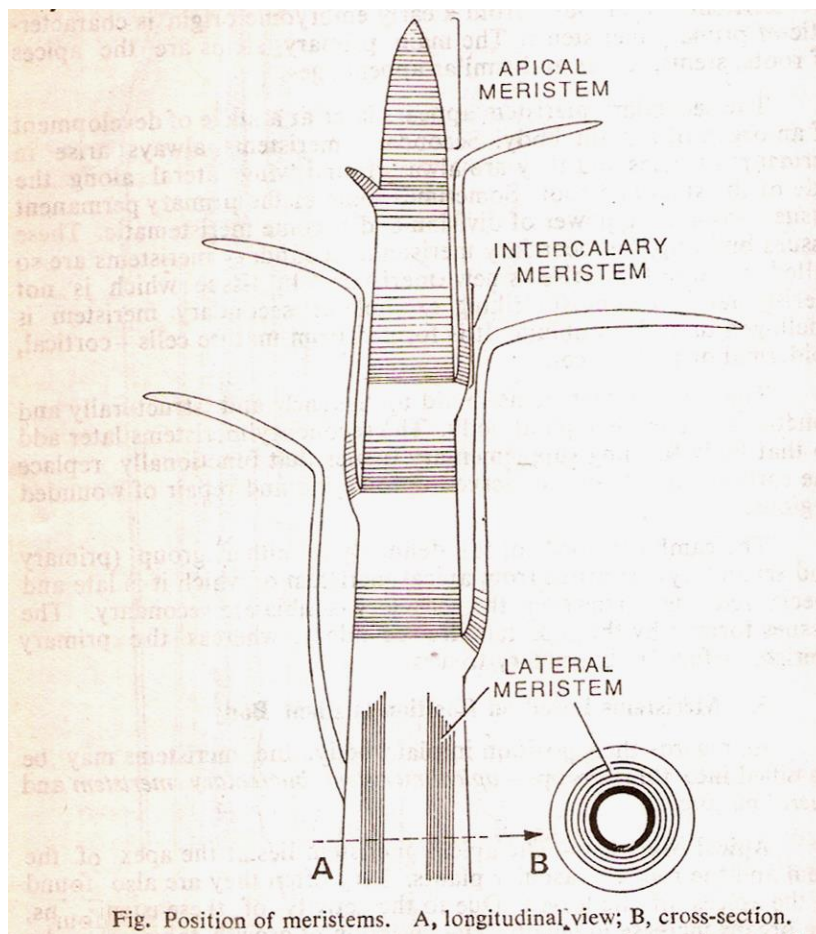


Fig. Position of meristems. A, longitudinal view; B, cross-section.