

Anatomy is the branch which deals with the study of **gross internal structure** of plant organs as observed after section cutting.

(*Ana* – asunder (separately) + *tamnein* – to cut).

- Study of this branch started in 1671, when **Marcello Malpighi** and **N. Grew** independently studied the anatomy of vegetable plants.
- **N. Grew** is known as ‘**Father of Plant Anatomy**’.

## **MERISTEMS OR MERISTEMATIC TISSUE**

In the plant embryo, each and every cell has the capacity of continuous division, but as the plant develops from the embryo, this property of cell division is restricted to few specific regions. These regions of indefinitely dividing capacity or regions of **theoretically unlimited growth** are called **meristems** or **meristematic tissue**.

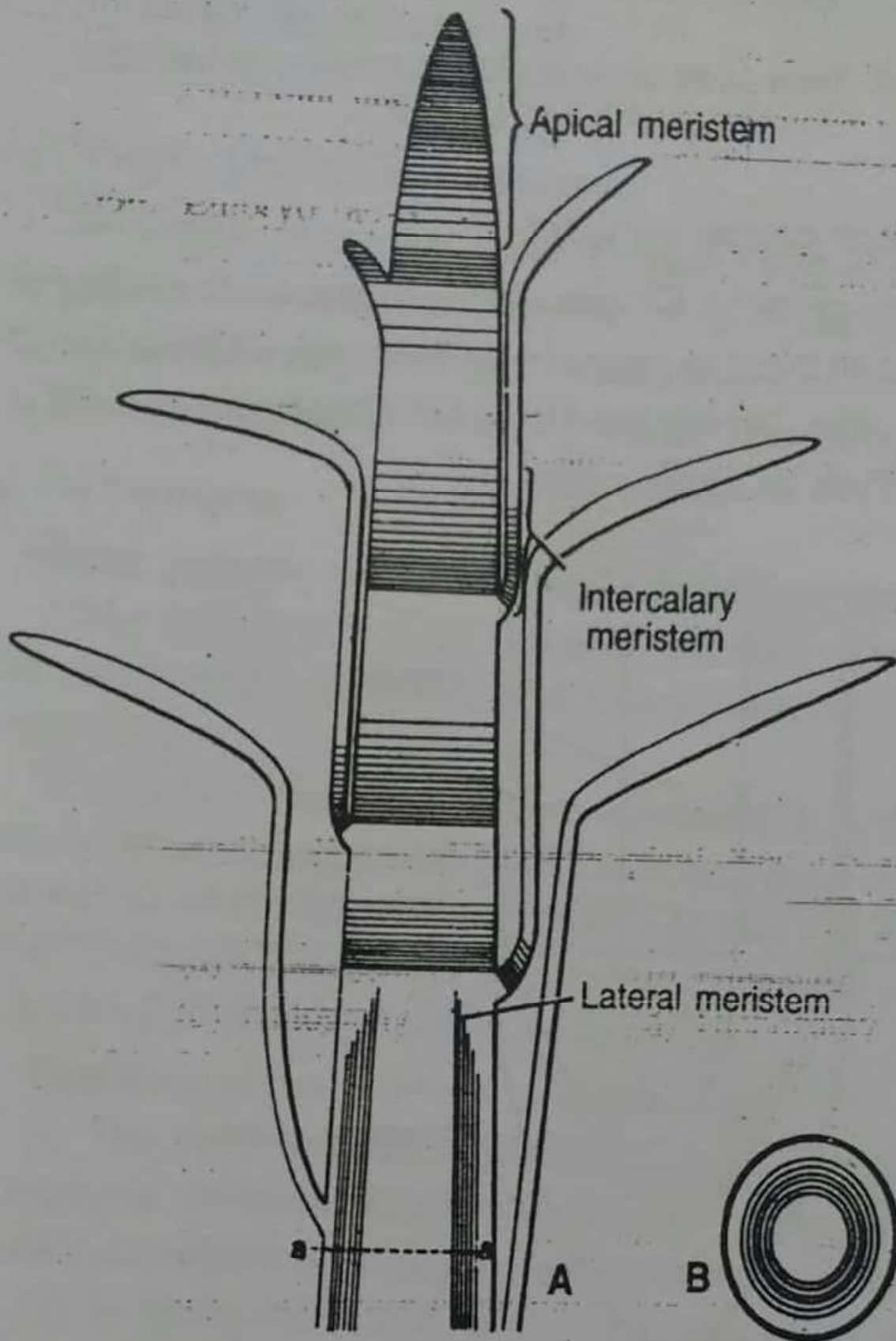
- The term **meristem** has been derived from a Greek word *Meristos*—which means **divisible** or having cell division activity. So meristem is a **group of cells which has power of continuous division**.

*e.g.*, meristem at apex of stem, root, leaf primordia and vascular cambium, etc.

- The term 'meristem' was given by **C. Nageli** (1858) for group of continuously dividing cells.

### Characteristics of Meristems or Meristematic cells

1. The shape of these cells may be oval, spherical, rounded or rectangular but these are **isodiametric** (equal size).
2. These have **thin cellulosic walls**.
3. They have no intercellular spaces.
4. They take deep stain and are with large and prominent nuclei.
5. They have **no reserve food material** and further no ER and plastids in them.
6. Vacuole is small or absent.



**Fig. 18.1.** Different types of meristems on the basis of position in plant body

## **Classification of Meristems or Meristematic tissue**

### **(A) Classification on the basis of origin and development**

On this basis, meristems are of 3 types:

**1. Promeristem or Procambium meristem or Urmeristem :** These are the regions where foundation of organs or their parts is laid down.

The primary product of the promeristem is **primary meristem**.

**2. Primary meristem :** These are the primary products of promeristem. These are present at the apices of root and shoot (**Apical meristems**).

- These divide in different planes.

3. **Secondary meristem** : These are formed after some growth in primary permanent tissue and give rise to secondary permanent tissue, *e.g.*, interfascicular cambium in stem, cambium in roots and also cork cambium (phellogen).



## (B) Classification on the basis of position in plant body

1. **Apical meristem** : This is present at the apices of root and shoot.

- These cells divide in different planes and are responsible for increase in length.

2. **Intercalary meristem** : This is present away from apical meristem in primary permanent tissue. Some workers consider it as a part of apical meristem, which is separated from it by means of primary permanent tissue.

- Intercalary meristem is present at the base of internodes, *e.g.*, in grasses (Gramineae) or at the base of leaves, *e.g.*, in *Pinus* or at the base of nodes, *e.g.*, mint or *Mentha* (Labiatae).
- Intercalary meristem is responsible for increase in length.

3. **Lateral meristem** : It is present on the lateral sides.

- Lateral meristem divides only **periclinally** or radially and is responsible for increase in girth or diameter. *e.g.*, vascular cambium and cork cambium.

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**(C) Classification on the basis of  
plane of cell division**

On this basis, meristems are of 3 types:

1. **Mass meristem** : It divides in all planes and form a mass of cells, *e.g.*, endosperm.

2. **Plate meristem** : It divides in two planes (at right angles to each other) and form a plate of cells, *e.g.*, epiblema (rhizodermis), epidermis, etc.

3. **Rib or File meristem** : It divides in a single plane and thus form a row of cells, *e.g.*, some cells of pith and cortex.