

## 8. Plant tissues and Anatomy

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1. Choose the correct option

A. Location or position of meristematic regions is divided into \_\_types

a. one

b. two

**c. three**

d. none of the above

B. Cambium is also called\_\_

a. apical meristem

b. intercalary meristem

**c. lateral meristem**

d. none of the above

C. Collenchyma is a type of\_\_tissue.

**a. living**

b. dead

c. living and dead

d. none of the above

D. \_\_ is a complex permanent tissue.

a. Parenchyma

b. Sclerenchyma

c. Chlorenchyma

**d. Xylem**

**E. Mesophyll tissue is present in\_\_**

a. root

b. stem

**c. leaf**

d. flower

**2. Answer the following questions:**

**A. A fresh section was taken by a student but he was very disappointed because there were only few green and most colourless cells. Teacher provided a pink colour solution. The section was immersed in this solution and when observed it was much clearer. What is the magic ?**

**Ans.** The magic is due to the staining of the section teacher provided safranin which stains the lignified tissues like sclerenchyma and xylem. Owing to staining the lignified tissues which were stained were clearly differentiated from non lignified tissues like parenchyma which appeared green and colourless.

**B. While observing a section many scattered vascular bundles could be seen. Teacher said but in spite of this large number the stem cannot grow in girth. Why?**

**Ans.** The growth in girth is due to the activity of cambium which lies in between the xylem and phloem of a dicot stem. Monocot stem, though possess number of vascular bundles do not grow in girth, as their vascular bundles lack cambium i.e. are of closed type.

**C. A section of the stem had vascular bundles, where one tissue was wrapped around the other. How will you technically describe it ?**

**Ans.** When phloem wraps the xylem on its both the sides, the vascular bundle described is conjoint bicollateral where phloem is present on outside and on inside of xylem. In some stem we come across vascular bundles which are of concentric type where phloem is in the centre and surrounded by xylem.

**D. There were two cut logs of wood lying in the campus. One had growth rings and other didn't. Teacher said it is due to differences in their pattern of growth which is dependent on season. How ?**

**Ans.** The growth rings that are seen in one log of wood is due to secondary growth in which a ring of xylem is formed every year resulting in the formation

of a ring of wood. The other log which does not show rings because it lacks secondary growth. In a growth ring we can see spring wood and autumn wood.

**E. While on the trip to Kashmir, Pintoo observed that cut portions of large trees show distinct rings, which he never found in Maharashtra. Why is so ?**

**Ans.** In Kashmir, the trees are very large and grow for many years, while in Maharashtra, the trees are comparatively small and do not grow for many years. Owing to this, trees in Kashmir show many growth rings while in Maharashtra the trees show few growth rings.

**F. A student was observing a slide with no label under microscope. The section had some vascular bundles scattered in the ground tissue. It is section of a monocot stem! He exclaimed. No! It section of fern rachis, said the teacher Teacher told to observe vascular bundle again. Student agree, Why?**

**Ans.** The teacher is right, because the fern rachis has few scattered vascular bundles in its ground tissue while monocot stem has many scattered vascular bundles in the ground tissue. Vascular bundles in fern rachis are arranged in a horseshoe pattern.

**G. Student found a wooden stopper in lab. He was told by an old lab attendant that it is there for many years. He kept thinking how it did not rot ?**

**Ans.** The stopper did not rot, because it was made up of cork which is made up of dead tissue. The cork cells have deposition of suberin.

**H. Student while observing a slide of leaf section observed many stomata on the upper surface. He thought he has placed slide upside down. Teacher confirmed it is rightly placed. Explain.**

**Ans.** The monocot leaf has more stomata on upper surface therefore teacher was right. Monocot leaf has stomata on lower epidermis also.

**3. Write short notes on the following:**

**A. Structure of stomata :**

**Ans.** (1) Stomata are minute apertures present on the surface of leaves.

(2) Each stoma (plural stomata) consists of an elliptical pore guarded a pair of specialized cells called guard cells. GHETTO

(3) The stomata play an important role during transpiration.

(4) They also play a vital role during gaseous exchange during the process of photosynthesis and respiration.

(5) Guard cells are kidney shaped in dicots and are dumb-bell shaped in monocots.

#### **B. Secondary growth :**

**Ans.** (1) Increase in thickness or girth of a plant body.

(2) Increase in thickness occurs due to the addition of new tissues.

(3) The new tissues are formed due to the activity of cambium.

(4) The cells of the cambium possess the ability to divide forming new cells.

#### **C. Peculiarity of sclerenchyma cell wall :**

**Ans.** (1) The sclerenchyma wall is thick.

(2) The thickening of wall is due to lignin which is deposited on the wall.

(3) The cell wall of sclerenchyma possesses pits.

#### **4. Differentiate**

##### **A. Vascular bundle of monocot and dicot.**

<b>Vascular bundle of monocot stem</b>	<b>Vascular bundle of dicot stem</b>
1. Vascular bundles of a monocot are scattered.	1. Vascular bundles of a dicot are arranged in a ring,
2. Vascular bundles of monocot are closed.	2. Vascular bundles of a dicot are open.
3. Vascular bundles of a monocot are surrounded by a bundle sheath.	3. Vascular bundles of dicot are not surrounded by a sheath.
4. Xylem in vascular bundles of a monocot are with y-shaped.	4. Xylem in vascular bundles of dicot are not with y-shaped

##### **B. Xylem and Phloem functioning :**

<b>Xylem</b>	<b>Phloem</b>
1. Dead complex tissue, thick walled cells.	1. Living complex tissue, thin walled cells.
2. Components of xylem are vessels, tracheids, xylem fibres and xylem parenchyma.	2. Components of phloem are sieve tubes, companion cells, phloem parenchyma and phloem sclerenchyma.

3. Conducts water and minerals in the plant body and also provides mechanical strength.	3. Conducts organic food in the plant body.
4. It is also known as wood.	4. It is also known as bast.

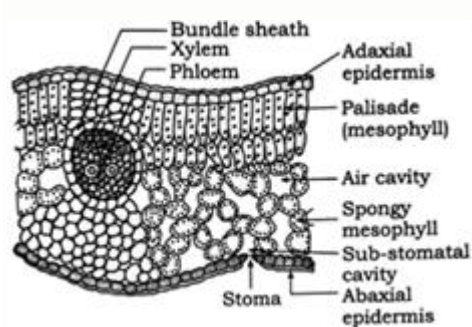
### C. Internal or anatomical difference between monocots and dicots :

Ans.

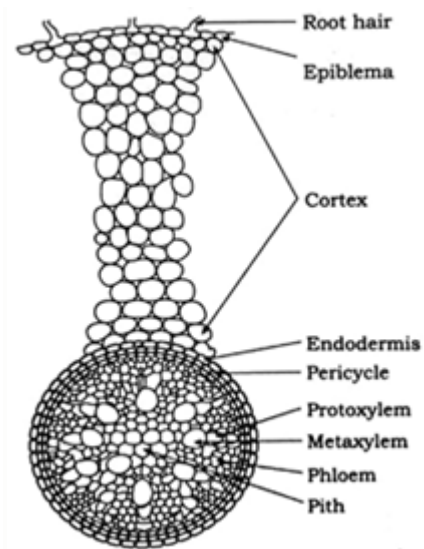
Monocots	Dicots
1. The root shows polyarch condition with broad pith.	1. The root shows tetrarch and exarch condition with narrow pith.
2. The stem shows scattered vascular bundles.	2. The stem shows vascular bundles that are arranged in ring like manner.
3. Vascular bundles are conjoint collateral closed without cambium in stem.	3. Vascular bundles are conjoint collateral and open with fascicular cambium.
4. In stem, epidermis is without trichomes and hypodermis which is of sclerenchyma.	4. In stem, epidermis is with trichomes and hypodermis which is of collenchyma.
5. Leaf is isobilateral with undifferentiated	5. Leaf is dorsiventral with mesophyll differentiated into palisade and spongy.
6. Leaf shows stomata on both upper and lower epidermis.	6. Leaf shows stomata which are mainly on lower epidermis.
	7. Guard cells of stomata are kidney shaped.

### 5. Draw neat labelled diagrams

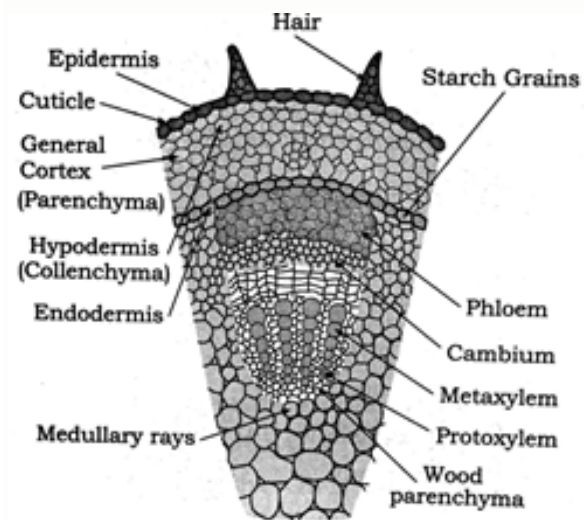
#### A. T.S. of dicot leaf:



#### B. T.S. of a dicot root:

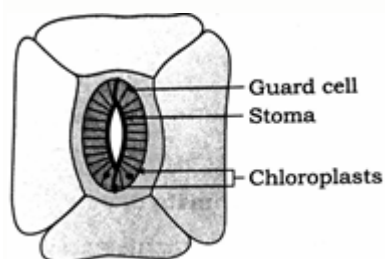


C. T.S. of dicot stem:



6. Write the information related to diagrams given below:

Ans.

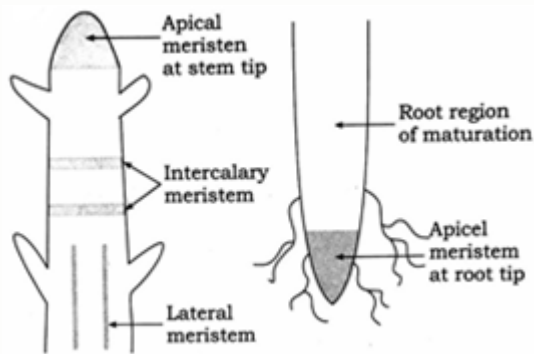


(1) The given diagram is of stomata.

(2) It is dicot stomata because the guard cells are kidney shaped.

(3) The stoma are openings in the epidermal cells.

- (4) The guard cells are surrounded by subsidiary cells.
- (5) The guard cells have chloroplasts hence they are photosynthetic in nature.
- (6) Gaseous exchange and exchange of water vapour is the main function of stomata.



**Ans.** (1) The given diagram is of location of meristematic tissue.

(2) The diagram shows three types of meristems present in plant body.

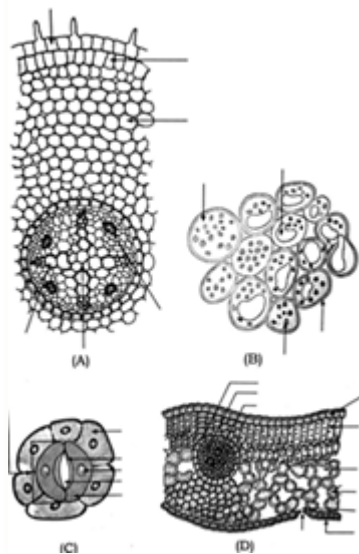
(3) Apical meristem is present at the growing tips of stem and root.

(4) Intercalary meristem is situated at the top of or base of node.

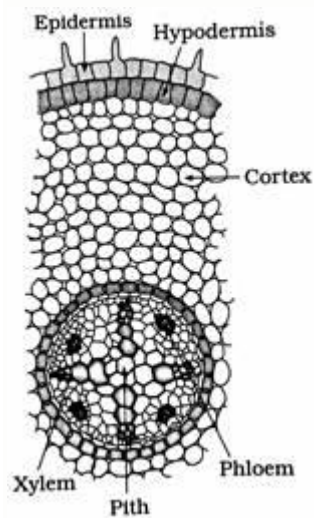
(5) Lateral meristem is present along the sides.

E.g. cambium. It is concerned with increase in girth of stem and root.

**7. Identify the following diagrams, label it and prepare a chart of characteristics :**



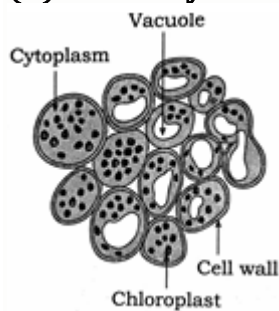
**(A) T.S. of a dicot root:**



**Characteristics :**

- (1) Epidermis with unicellular hairs.
- (2) Cortex - parenchymatous.
- (3) Vascular bundles radially arranged.
- (4) Xylem exarch.
- (5) Small pith.

**(B) Parenchyma :**



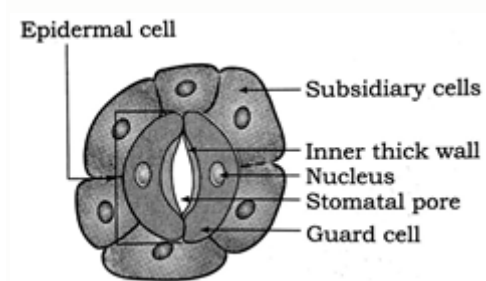
**Characteristics :**

- (1) Simple permanent tissue.
- (2) Thin walled round cells.
- (3) Intercellular spaces.
- (4) Living cells.



(5) Photosynthetic.

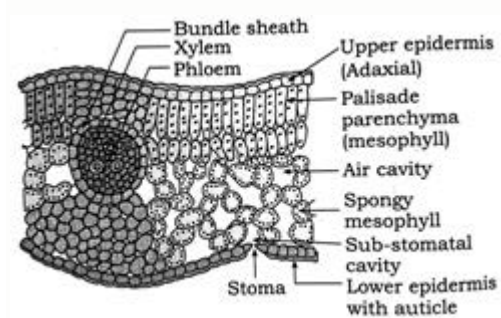
(C) Dicot stoma:



**Characteristics :**

- (1) Presence of a small elliptical pore surrounded by a pair of thin walled guard cells.
- (2) The guard cells contain chloroplast.

(D) T.S. of a dicot leaf :



**Characteristics :**

- (1) Upper epidermis on the outer surface.
- (2) Lower epidermis lying on the lower surface.
- (3) Presence of stomata more on the lower surface.
- (4) Mesophyll differentiated palisade parenchyma and spongy parenchyma.

**8. Distinguish between Dicot and Monocot leaf on the basis of following characters.**

Characters	Dicot	Monocot
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<b>Stomata</b>	(1) Guard cells are kidney shaped. (2) Present on lower epidermis.	(1) Guard cells are dumbbell shaped. (2) Present on both the epidermis.
<b>Intercellular space</b>	Large space, more in number.	Small spaces, less in number.
<b>Venation</b>	Reticulate.	Parallel.
<b>Vascular bundles</b>	(1) With parenchymatous bundle sheath. (2) Xylem is not 'y' shaped.	(1) With sclerenchymatous bundle sheath. (2) Xylem is 'y' shaped.
<b>Mesophyll cells</b>	Palisade and spongy parenchyma.	Spongy parenchyma only.