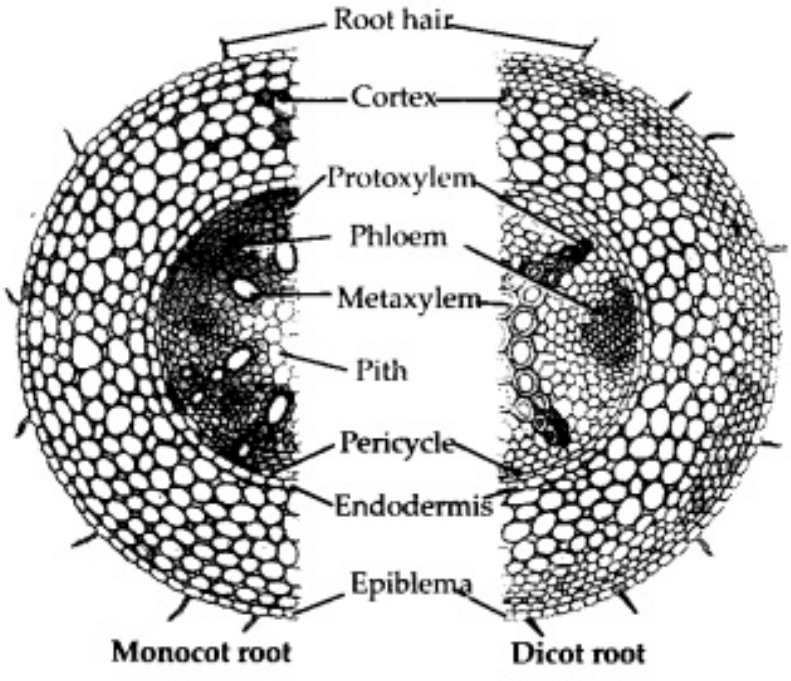
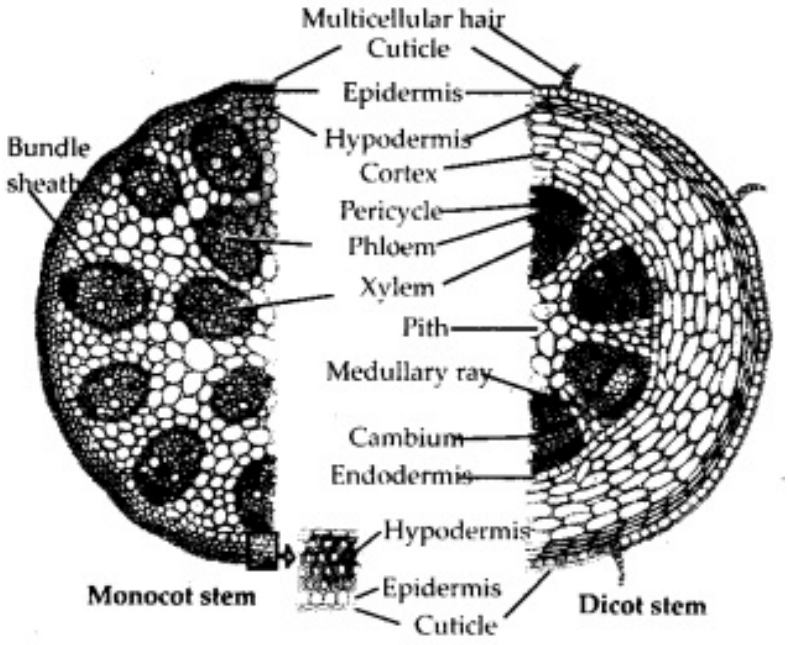
4. Draw illustrations to bring out the anatomical difference between
(a) Monocot root and dicot root
(b) Monocot stem and dicot stem
Solution: (a) Differences between monocot root and dicot root are illustrated in the following figure and table.



	Features	Monocot root	Dicot root
(i)	Cortex	Comparatively narrow.	Very wide.
(ii)	Endodermis	Less thickened and casparian strips are more prominent.	Later become highly thickened. Casparian strips are visible only in young root.
(iii)	Passage cells	Generally absent.	Generally occur opposite the protoxylem point.
(iv)	Pericycle	Produces lateral roots, cork cambium and part of the vascular cambium.	Produces lateral roots only.
(v)	Vascular bundles	2 to 5 or some times 8.	8 or more in number.
(vi)	Pith	Either absent or very small.	Well-developed.

(b) Differences between monocot and dicot stems are illustrated in the following figure and table.



	Features	Monocotyledonous stem	Dicotyledonous stem
(i)	Vascular bundles	(a) Scattered (b) Conjoint, collateral, closed (c) Bundle sheath usually present. (d) Phloem parenchyma absent. (e) Xylem vessels arranged either in Y or V shaped manner.	(a) Vascular bundles in ring (b) Conjoint, collateral or bicollateral and open. (c) Bundle sheath absent. (d) Phloem parenchyma present. (e) Not so.
(ii)	Pith (Medulla)	Absent	Made up of parenchymatous cells situated in the centre of stem.
(iii)	Ground tissue	Ground tissue is not differentiated into the cortex and pith	Differentiated into the cortex and pith.
(iv)	Hypodermis	Usually sclerenchymatous	Collenchymatous.
(v)	Endodermis	Absent	One layered, starchy sheath which is usually not well differentiated.
(vi)	Pericycle	Absent	Made up of one or more layers of parenchymatous and/or sclerenchymatous cells.
(vii)	Medullary rays	Absent	Found in between vascular bundles.

5. Cut a transverse section of young stem of a plant from your school garden and observe it under the microscope. How would you ascertain whether it is a monocot stem or a dicot stem ? Give reasons.
Soln. Vascular bundles in dicot stem are arranged in a ring whereas in monocot stem vascular bundles are scattered throughout the ground tissue. On the basis of arrangement of vascular bundles it can be ascertained whether the young stem is dicot or monocot. Besides undifferentiated ground tissue, sclerenchymatous hypodermis, oval or circular vascular bundles with Y shaped xylem are other differentiating features of monocot stem.

6. The transverse section of a plant material shows the following anatomical features -
(a) the vascular bundles are conjoint, scattered and surrounded by a sclerenchymatous bundle sheath.
(b) phloem parenchyma is absent. What will you identify it as?
Solution: The plant material is identified as monocot stem.

7. Why are xylem and phloem called complex tissues?
Solution: A group of different types of cells which perform common

function is called complex tissue. Xylem and phloem are called complex tissues as all cells that work as a unit for a common function have different structural organisation. Xylem has four types of cells-tracheids, vessels, xylem parenchyma and xylem fibres. Phloem consists of sieve tube elements, companion cells, phloem parenchyma and phloem fibres. Xylem is associated with conduction of water and minerals from roots to top of plants and phloem is responsible for transport of organic food.

8. What is stomatal apparatus? Explain the structure of stomata with a labelled diagram.
Solution: Stomata are structures present in the epidermis of leaves. Stomata regulate the process of transpiration and gaseous exchange. Each stoma is composed*of two bean shaped cells known as guard cells which enclose stomatal pore. The outer walls of guard cells (away from the stomatal pore) are thin and the inner walls (towards the stomatal pore) are highly thickened. The guard cells possess chloroplasts and regulate the opening and closing of stomata. Sometimes, a few epidermal cells, in the vicinity of the guard cells become specialised in their shape and size and are known as subsidiary cells. The stomatal aperture, guard cells and the surrounding subsidiary cells are together called stomatal apparatus.

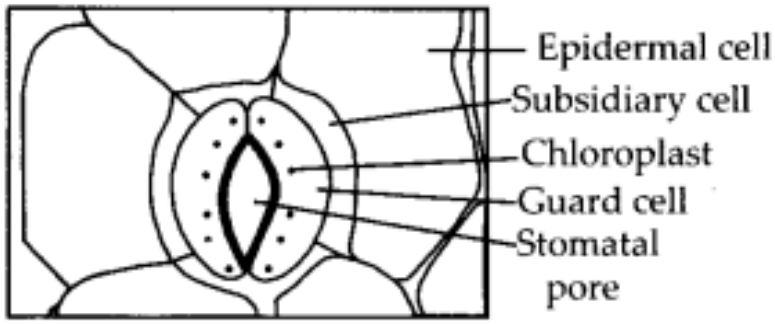


Fig.: Diagrammatic representation of stomatal apparatus

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