ANATOMY OF FLOWERING PLANTS

Prepared by

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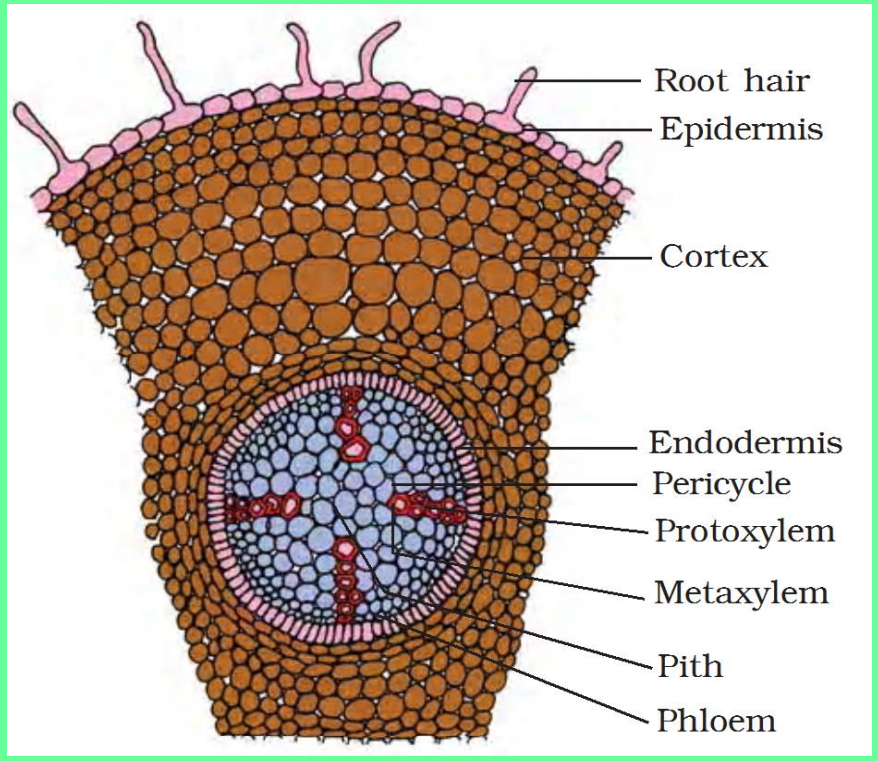
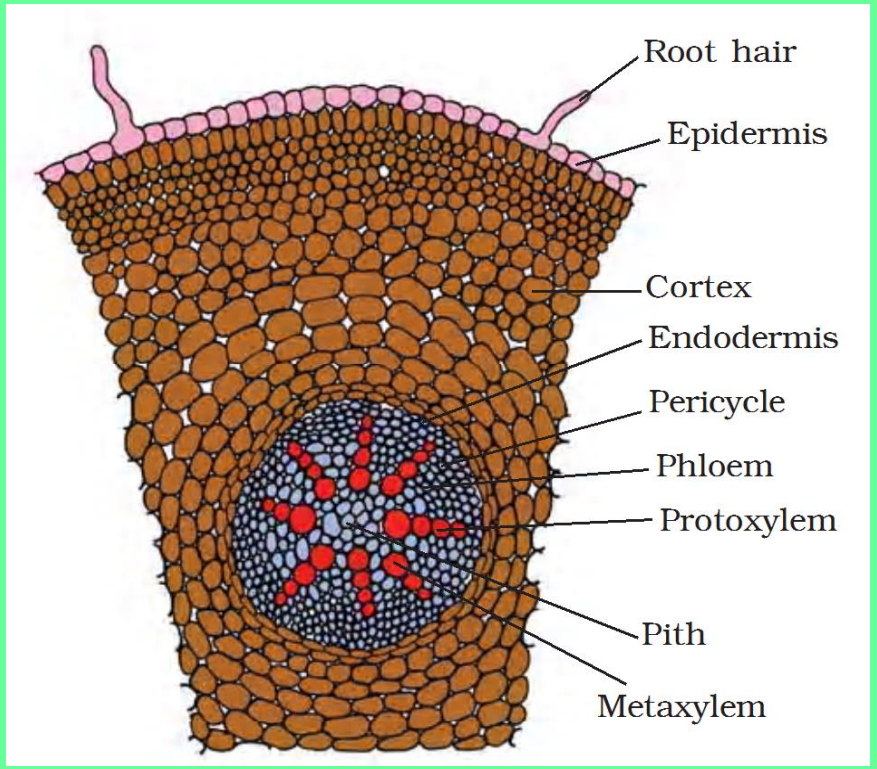
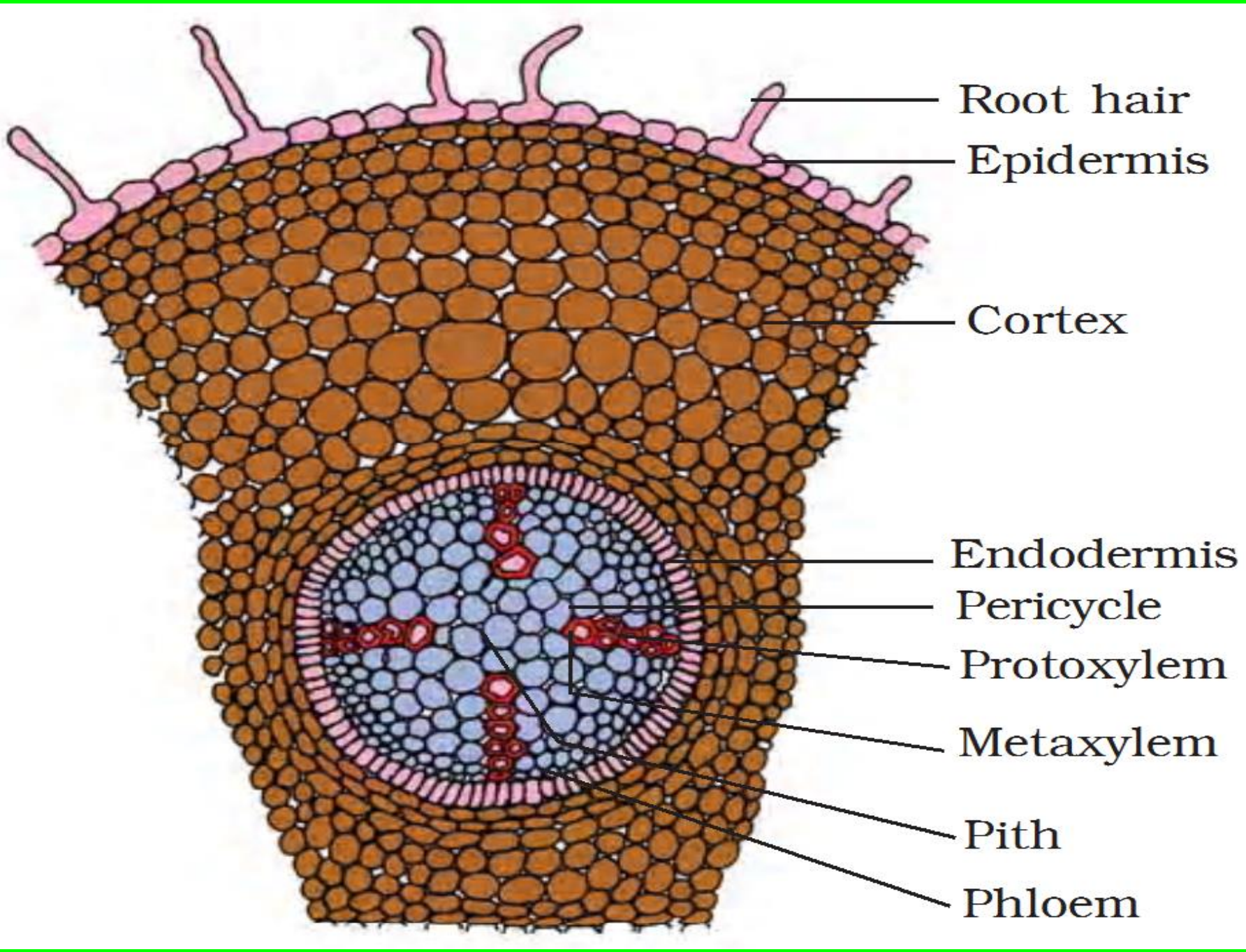
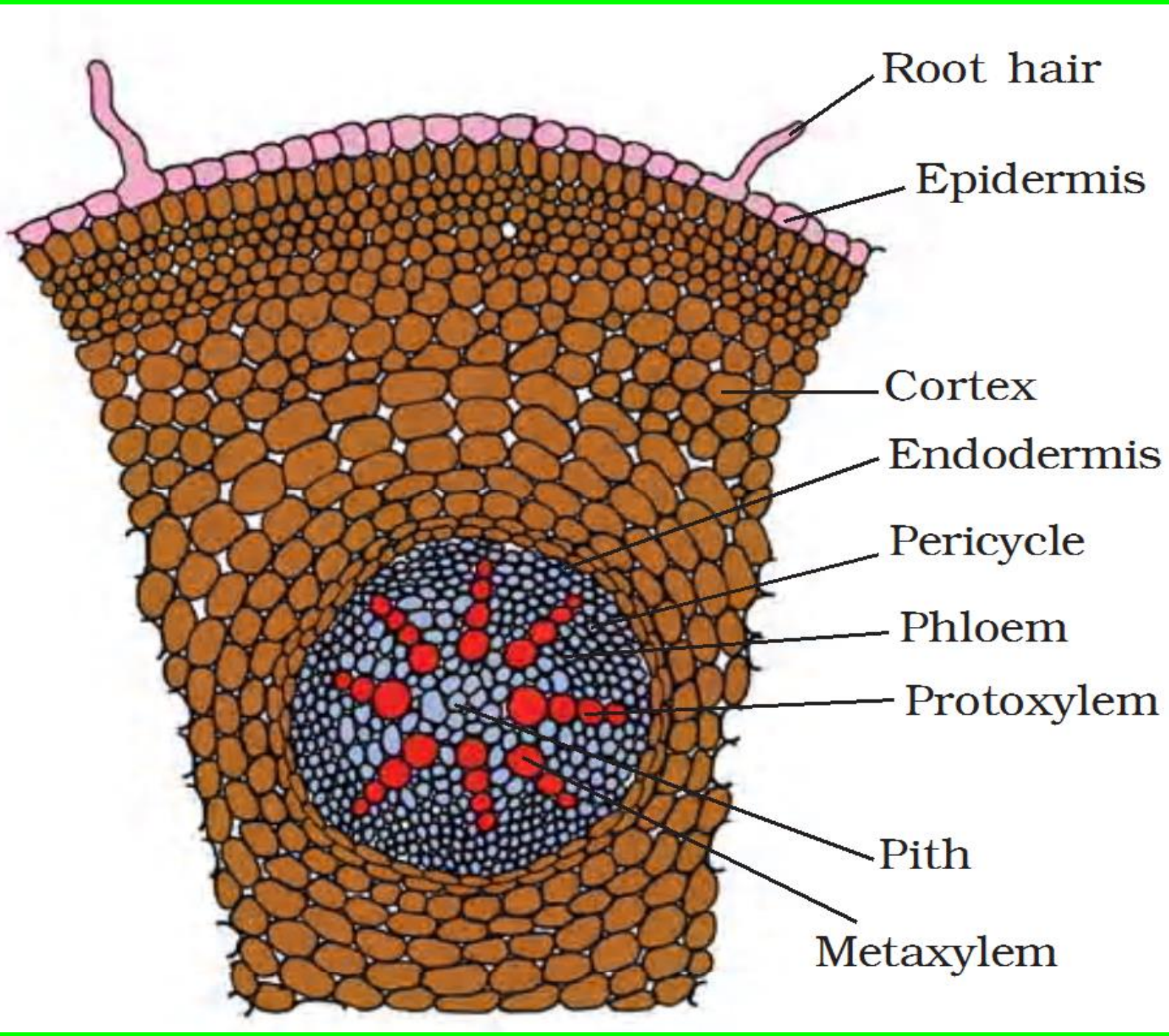
Dicotyledonous Root	Monocotyledonous Root
EPIDERMIS It consists of a single layer of compactly arranged cells It bears a number of unicellular root hairs but lacks cuticle.	**EPIDERMIS** It consists of a single layer of compactly arranged cells It bears a number of unicellular root hairs but lacks cuticle.
CORTEX It consists of several layers of thin-walled parenchyma cells with intercellular spaces. It stores starch grains.	**CORTEX** It consists of several layers of thin-walled parenchyma cells with intercellular spaces. It stores starch grains.
ENDODERMIS The innermost layer of the cortex is called endodermis. It comprises a single layer of barrel-shaped cells without any intercellular spaces.	**ENDODERMIS** The innermost layer of the cortex is called endodermis. It comprises a single layer of barrel-shaped cells without any intercellular spaces.
The tangential as well as radial walls of the endodermal cells have a deposition of water- impermeable, waxy material-suberin-in the form of casparian strips.	The tangential as well as radial walls of the endodermal cells have a deposition of water- impermeable, waxy material-suberin-in the form of casparian strips.

Dicotyledonous Root	Monocotyledonous Root
PERICYCLE It is made of one or two layers of parenchyma cells. It **takes part** in the formation of **secondary roots** and in the **formation of cambium for secondary growth.**	**PERICYCLE** It is made of one or two layers of parenchyma cells. It **does not take part** in the formation of secondary roots and in the formation of cambium for secondary growth.
VASCULAR BUNDLE Vascular bundles are radial. Xylem patches are **2-6. Diarch to Hexarch** Xylem is exarch.	**VASCULAR BUNDLE** Vascular bundles are radial. Xylem patches are **many (polyarch).** Xylem is exarch.
PITH Pith is **very small or absent**. It is made up of parenchyma cells	**PITH** Pith is **large and well developed**. It is made up of parenchyma cells
All the tissues on the inner side of the endodermis such as **pericycle, vascular bundles and pith** form the **stele.**	

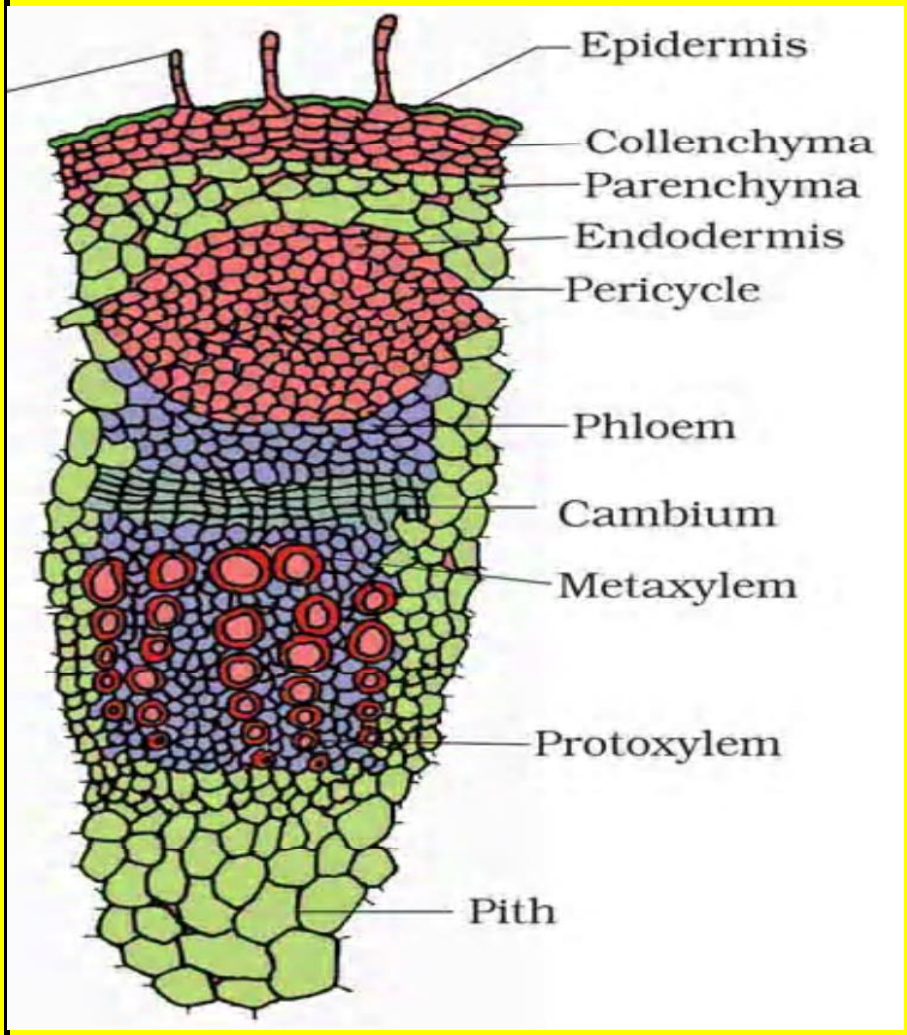
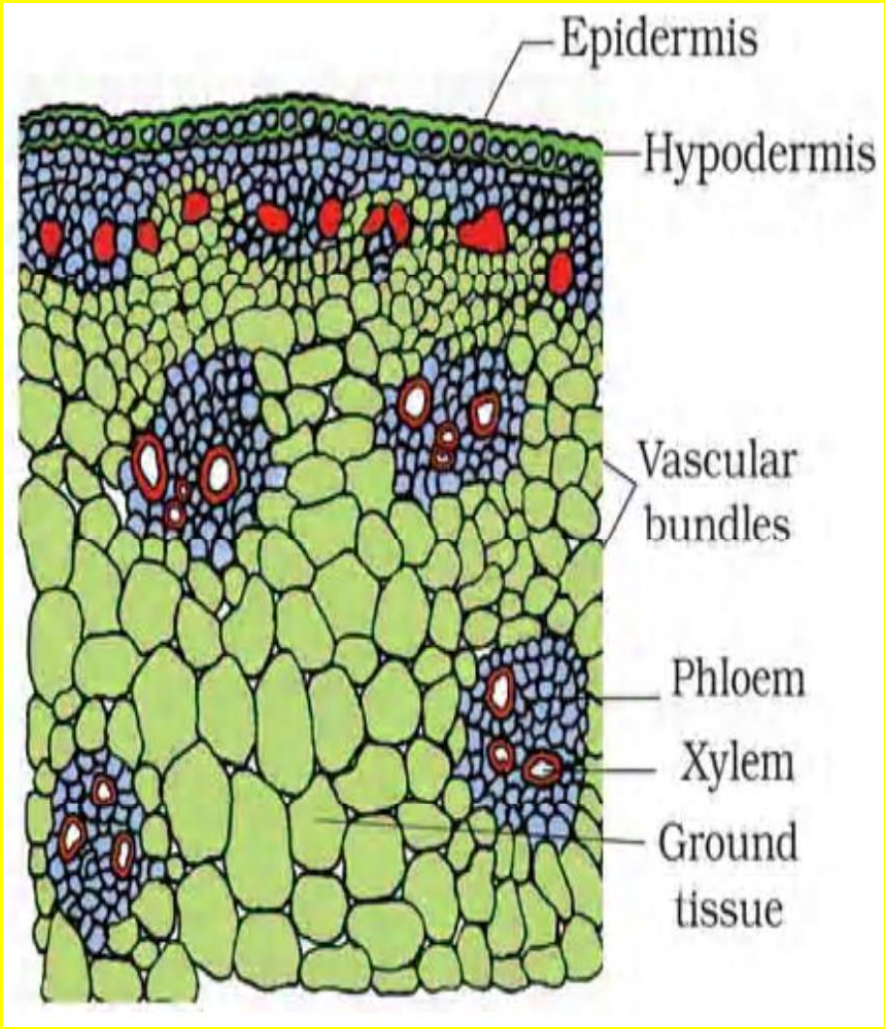
Dicotyledonous Root	Monocotyledonous Root
	

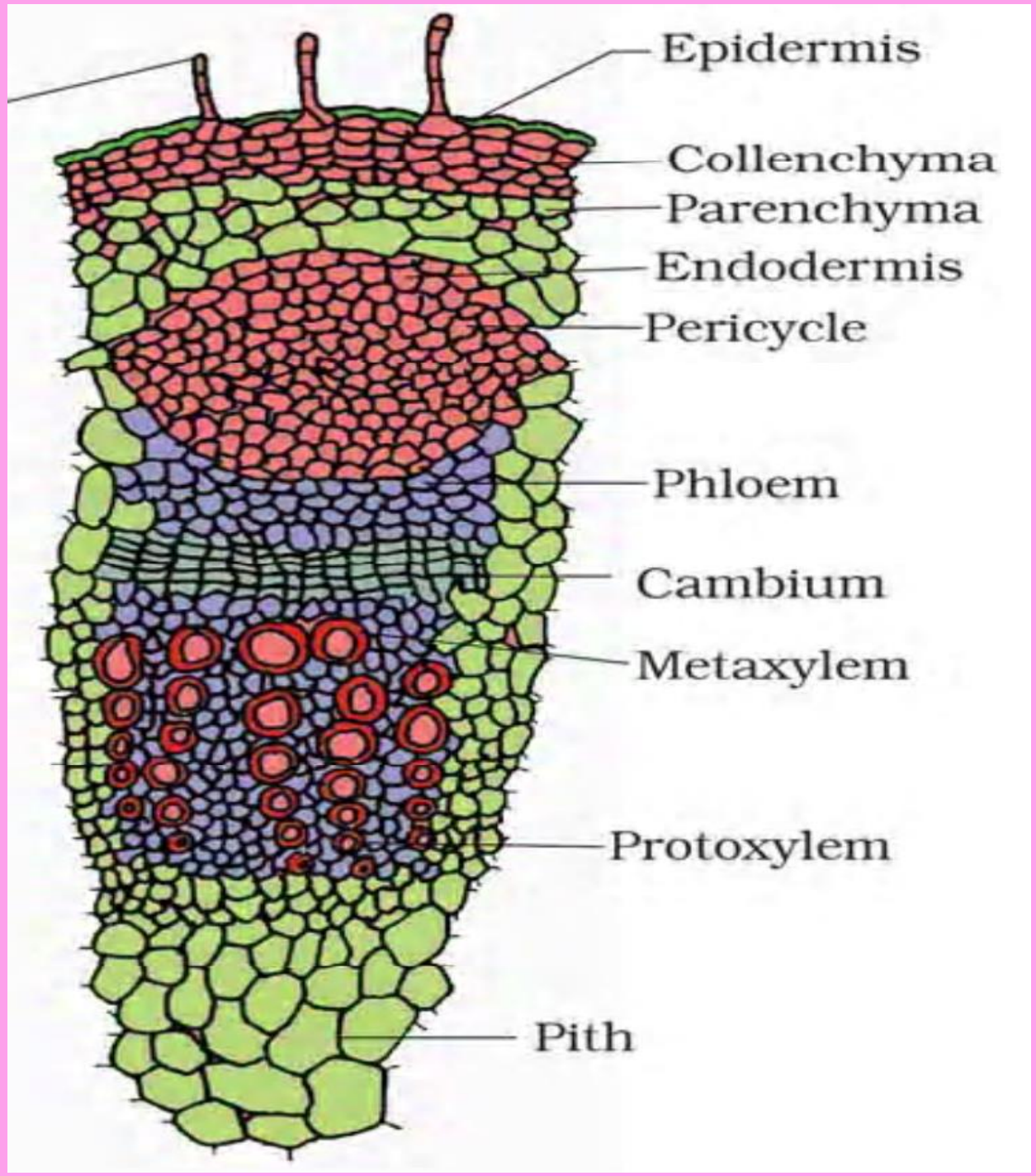

Root hair
Epidermis
Cortex
Endodermis
Pericycle
Protoxylem
Metaxylem
Pith
Phloem


Root hair
Epidermis
Cortex
Endodermis
Pericycle
Phloem
Protoxylem
Pith
Metaxylem

DICOT STEM	MONOCOT STEM
Epidermis Multicellular **trichomes present**	**Epidermis** **Trichomes absent**
Hypodermis **2 or 3 layers of collenchymatous cells** provide mechanical strength to the young stem.	**Hypodermis** **2 or 3 layers of sclerenchymatous cells**
Cortex Rounded thin walled **parenchymatous** cells with conspicuous intercellular spaces.	**Ground Tissue** The Ground tissue is not differentiated into cortex and pith. It is parenchymatous.
Endodermis The cells of the endodermis are rich in **starch grains**	**Endodermis** **Absent**
Pericycle Pericycle is present above the phloem in the form of semi-lunar patches of **sclerenchyma cells.**	**Pericycle** **Absent**

DICOT STEM	MONOCOT STEM
Vascular bundle Arranged in the form of a **ring** **Conjoint, open, and endarch.**	**Vascular bundle** **Scattered** **Conjoint closed and endarch.** Peripheral vascular bundles are smaller than the centrally located ones. The **phloem parenchyma is absent** and water-containing cavities are present within the vascular bundles.
Pith **Parenchymatous** cells with large intercellular spaces.	**Pith** **Absent**

DICOT STEM	MONOCOT STEM
	


Epidermis
Collenchyma
Parenchyma
Endodermis
Pericycle
Phloem
Cambium
Metaxylem
Protoxylem
Pith

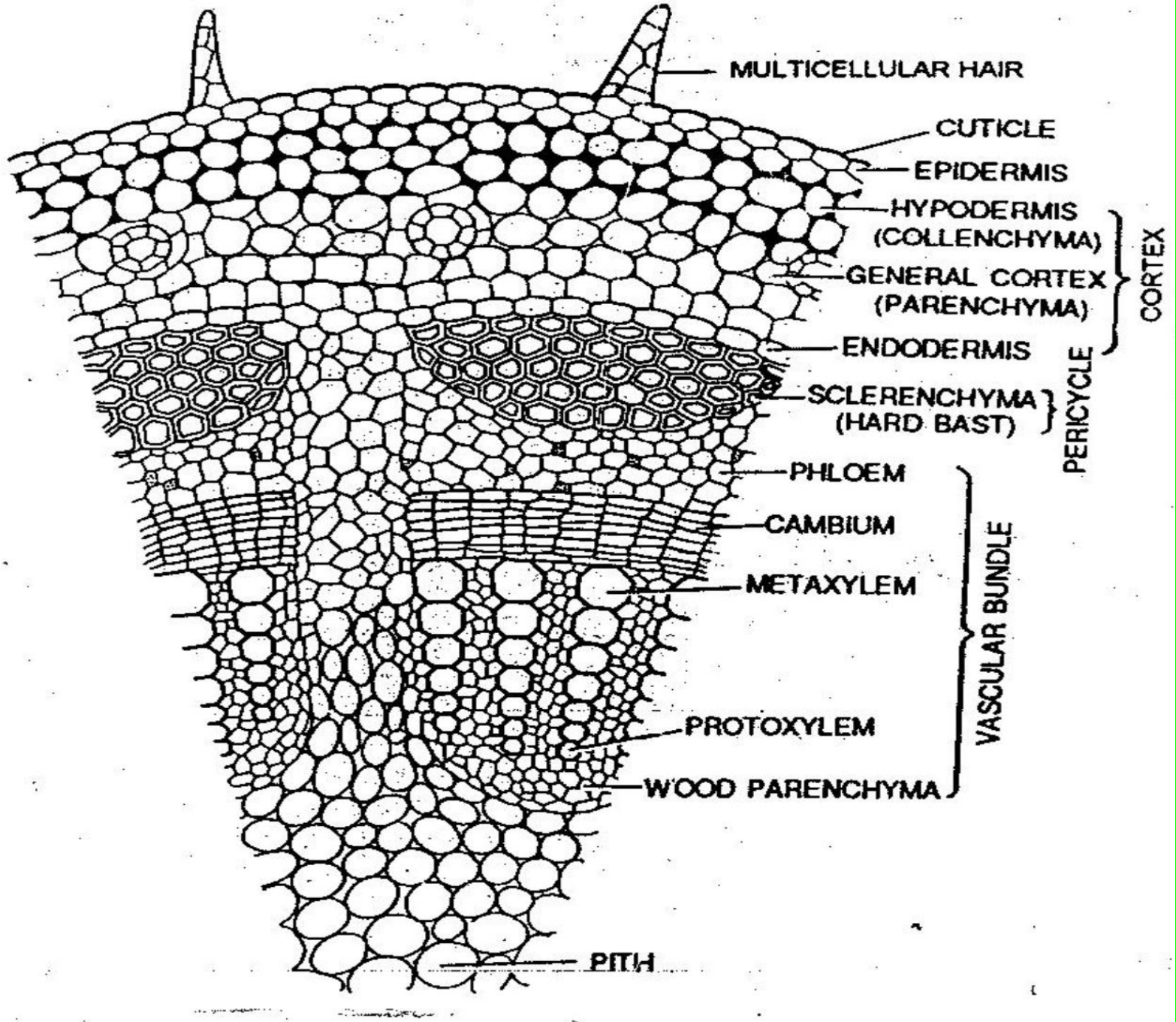


Fig. 2.38. Part of the T.S. of Sunflower stem (magnified).

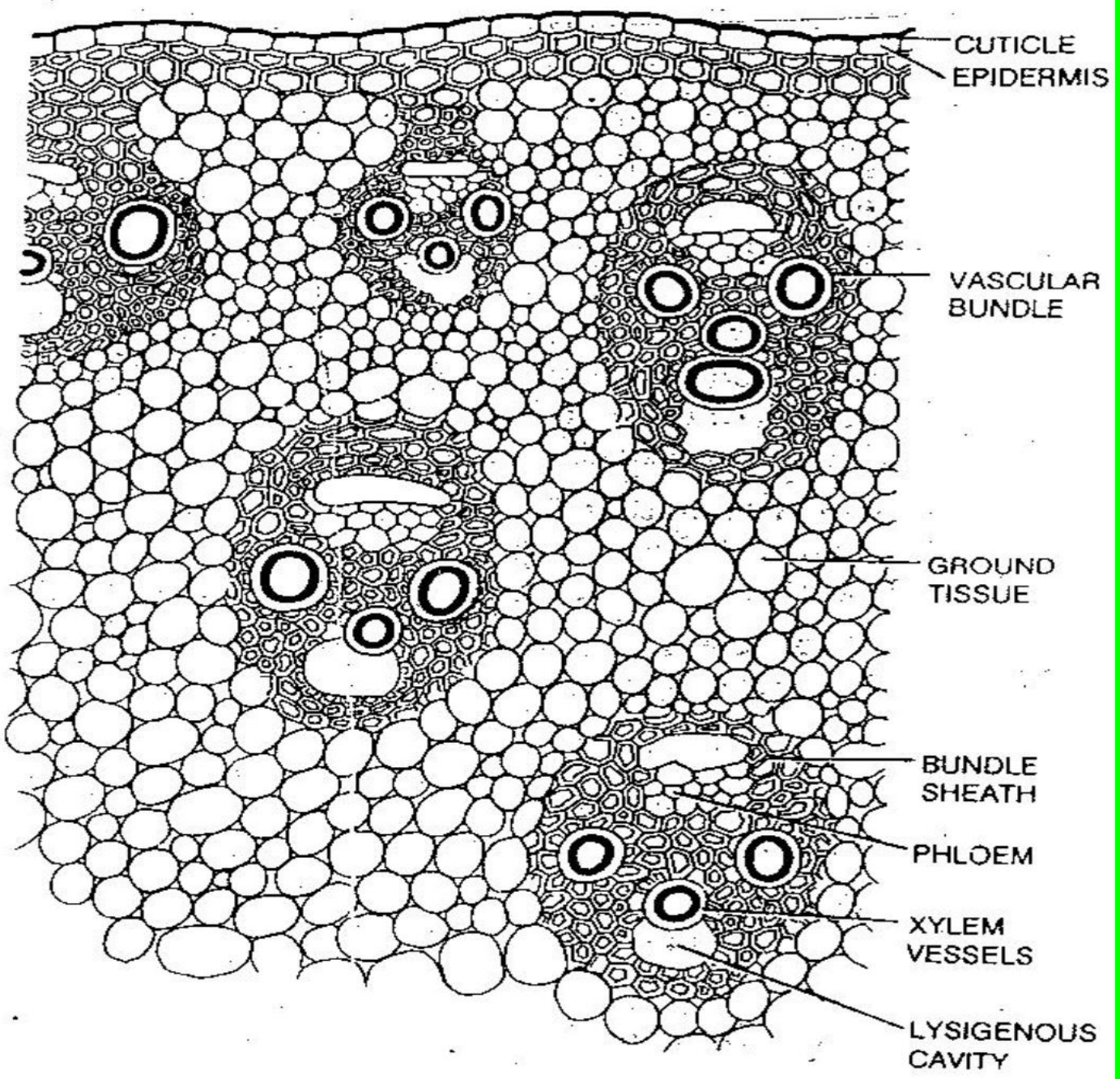
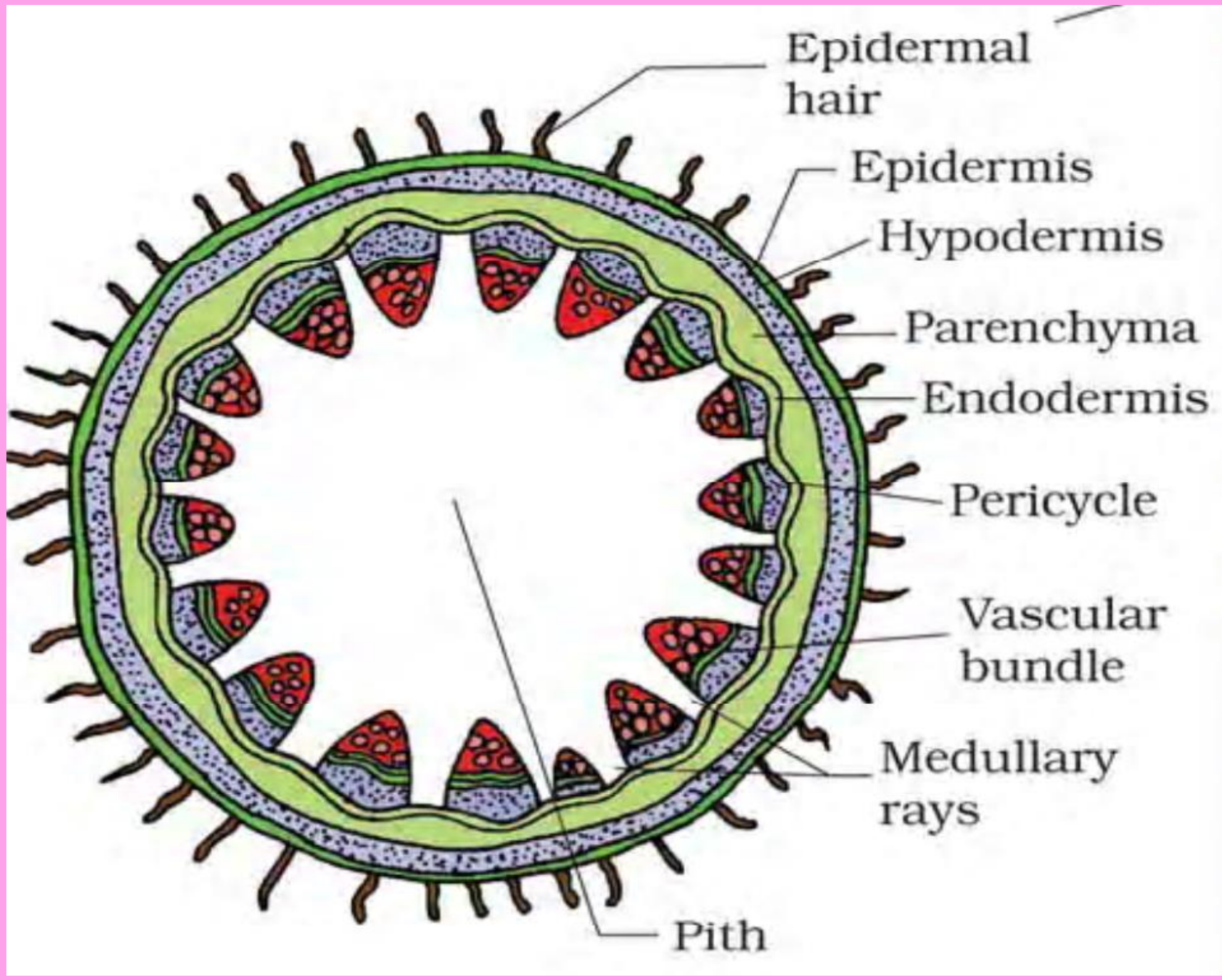
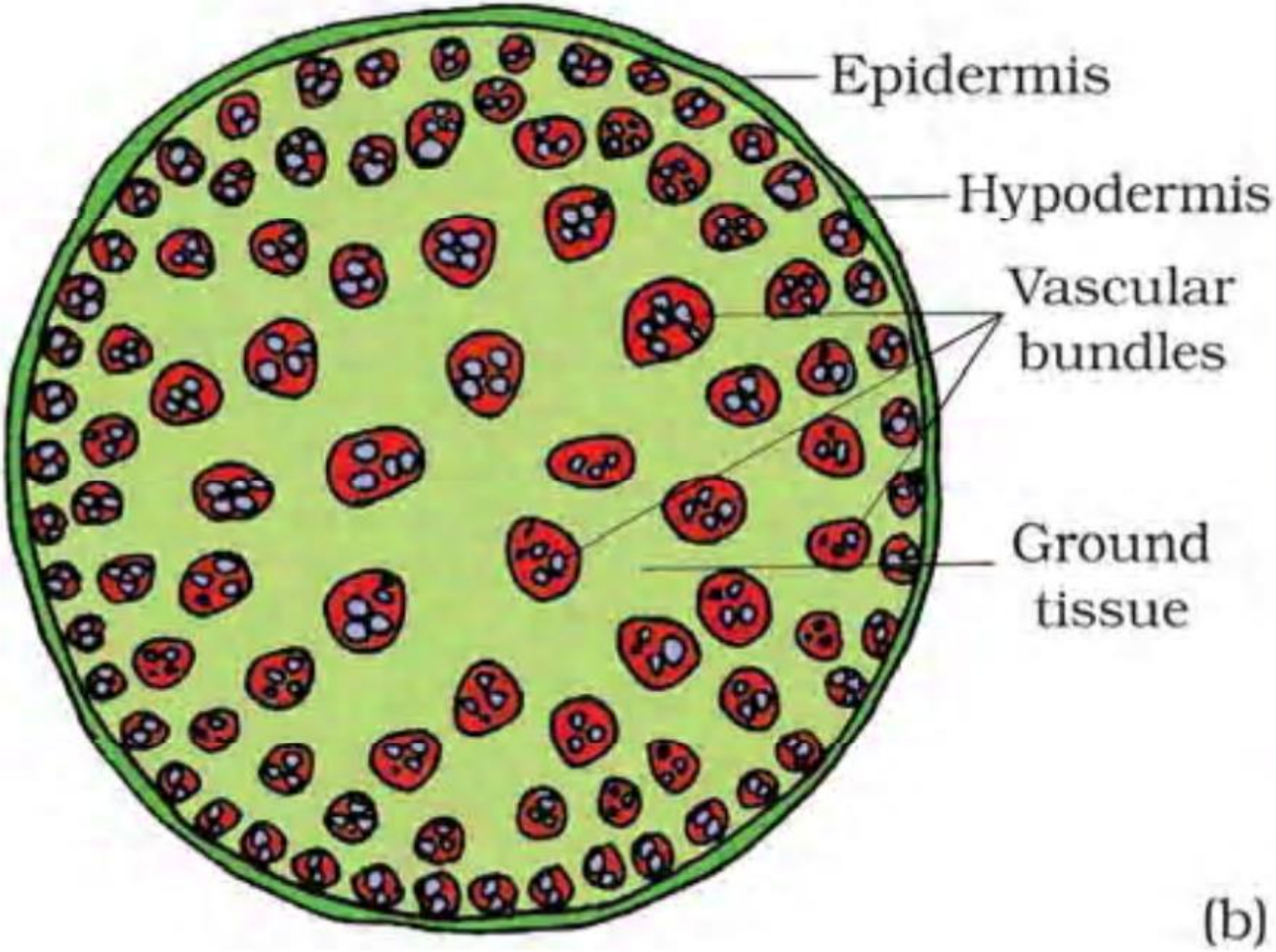
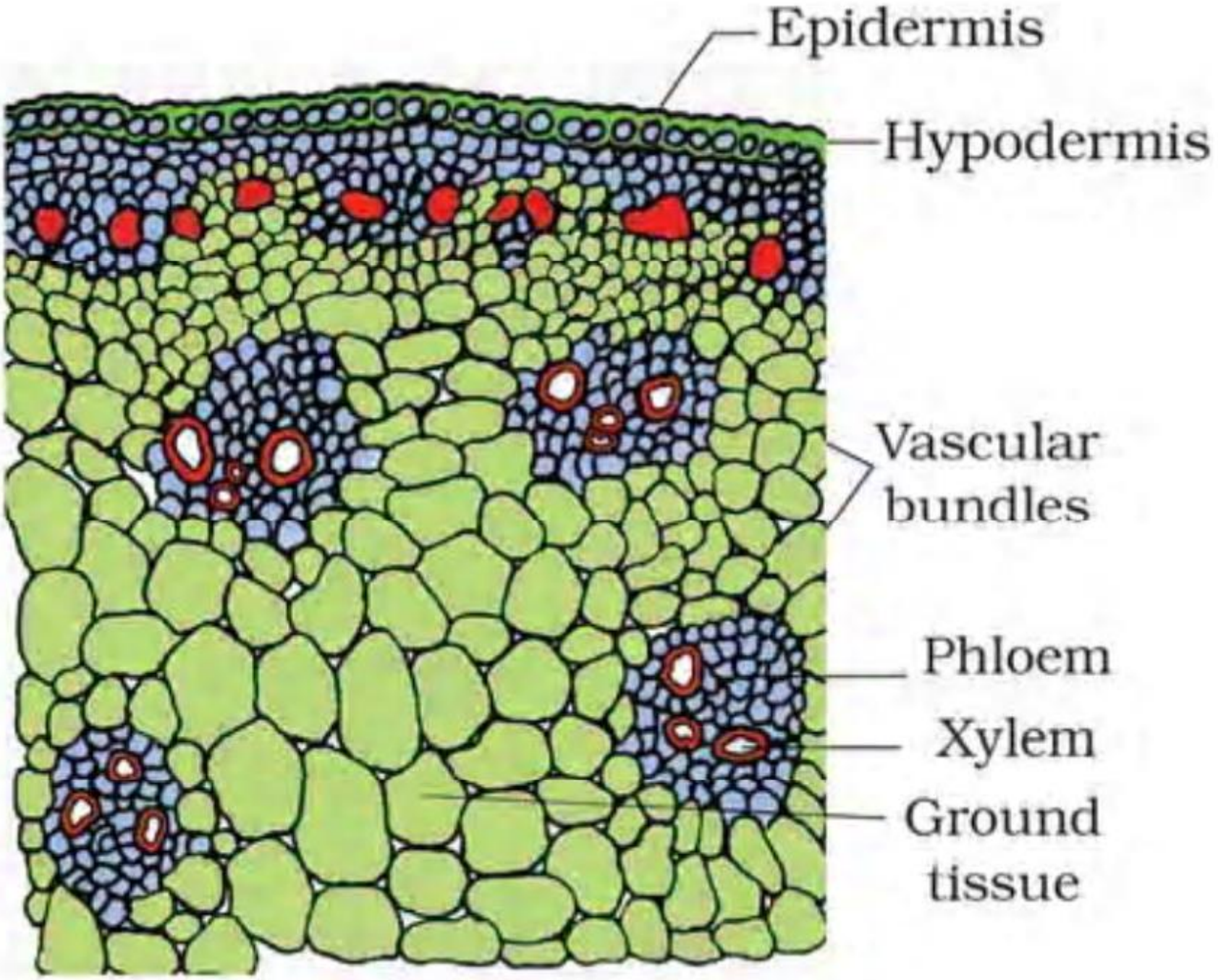


Fig. 2.40. T.S. maize stem (magnified).

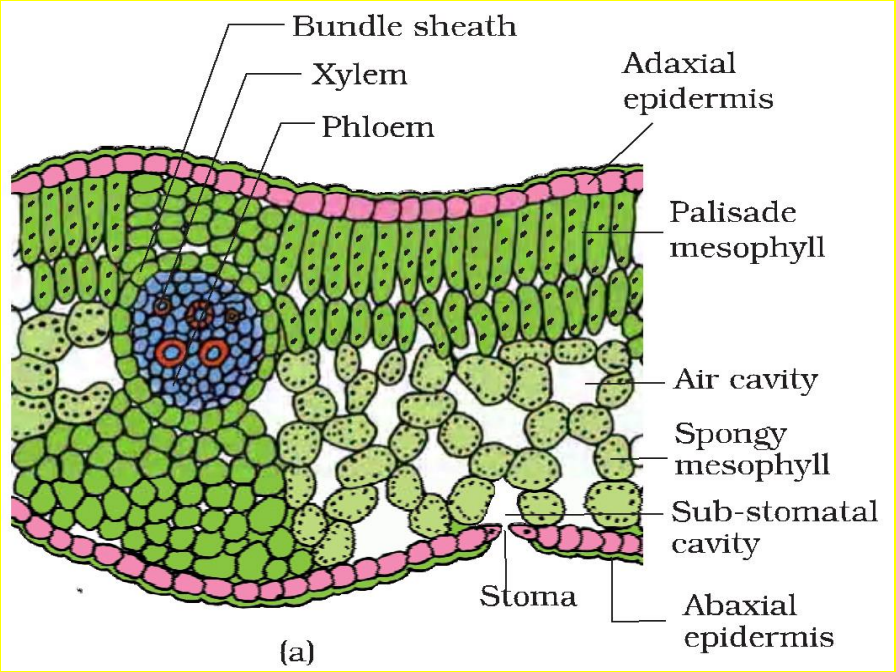

Epidermal hair
Epidermis
Hypodermis
Parenchyma
Endodermis
Pericycle
Vascular bundle
Medullary rays
Pith


Epidermis
Hypodermis
Vascular bundles
Ground tissue
(b)

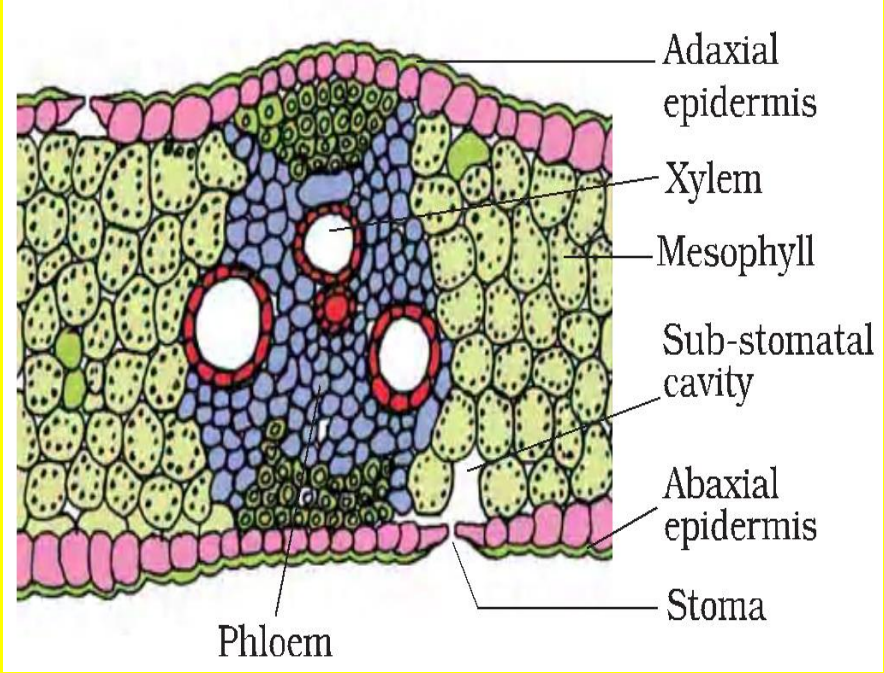

Epidermis
Hypodermis
Vascular bundles
Phloem
Xylem
Ground tissue

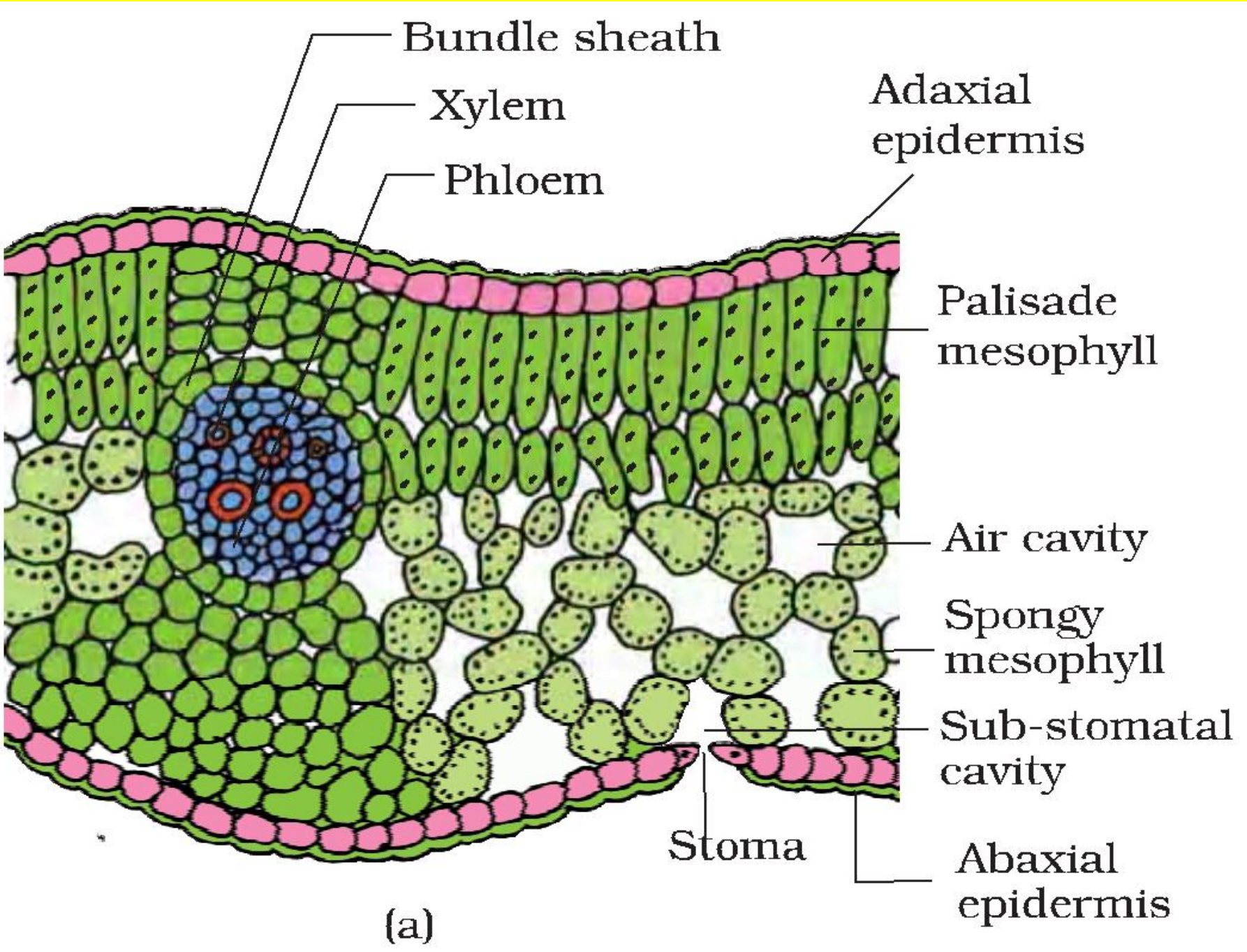
DICOT LEAF	MONOCOT LEAF
It is a dorsiventral leaf.	It is an Isobilateral leaf.
Bulliform cells are absent in epidermis	Bulliform cells are present in the epidermis
Guard cells are kidney shaped.	Guard cells are dumb bell shaped.
Stomata are fewer in the upper epidermis, more in the lower epidermis	Stomata are equally distributed in the upper epidermis and lower epidermis
Mesophyll is differentiated into Palisade and spongy parenchyma	Mesophyll is not differentiated into Palisade and spongy parenchyma
Bundle sheath cells are parenchymatous	Bundle sheath cells are sclerenchymatous

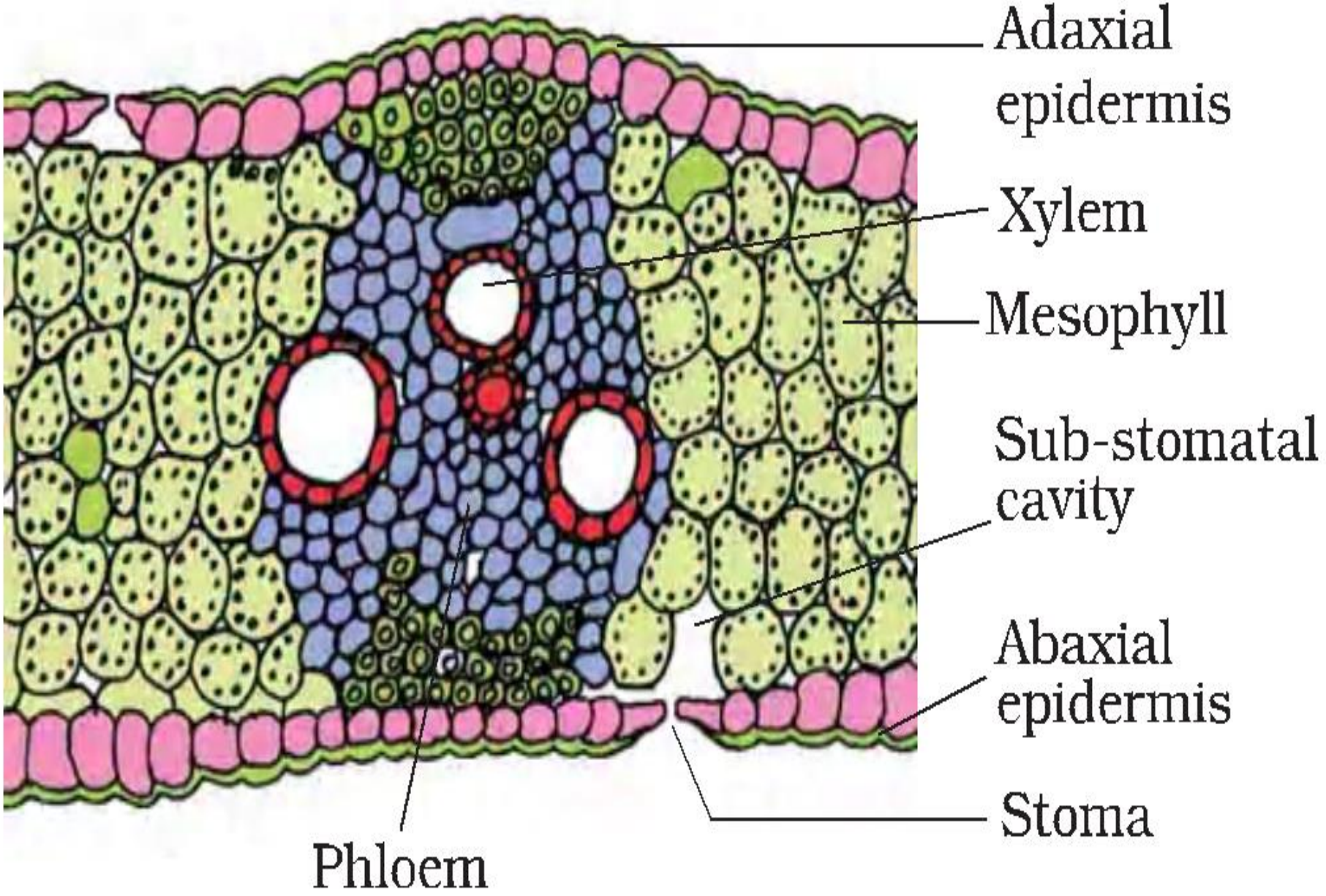
DICOT LEAF



MONOCOT LEAF




Bundle sheath
Xylem
Phloem
Adaxial epidermis
Palisade mesophyll
Air cavity
Spongy mesophyll
Sub-stomatal cavity
Stoma
Abaxial epidermis
(a)


Adaxial epidermis
Xylem
Mesophyll
Sub-stomatal cavity
Abaxial epidermis
Stoma
Phloem