

- Study of macerated xylem & Phloem:-  
Complex tissue-

- > A group of more than one type of cell having common origin and working together as a unit, is called complex tissue.
- ii) They are called vascular or conducting tissues. The most important complex tissue in vascular plants are.
- 1) Xylem -
  - 2) Phloem -
- 1) Xylem (Wood) - Xylem (Gk. Xylos - Wood)
- i) Is complex permanent tissue of vascular plants which conduct water and minerals from root to the leaves.

- ii) It also provide mechanical strength.
- iii) Xylem consist of four types of elements, i.e Tracheids, vessels, xylem fibers and xylem parenchyma.
- A) Tracheids -
- ① They are elongated dead cells having lignified walls and wide lumen. Their end walls are tapered, rounded or oval.
  - ② In T.S. tracheids appears angular or polygonal. The wall of the tracheids possess various type of secondary thickening. viz.,
- i) Annular - Ring like band of thickening.

- ii) Spiral :- spiral or helical thickening.
- iii) Reticulate :- Reticulum or network.
- iv) Scalariform :- Ladder like appearance.
- v) Pitted :- a) A uniformly thickened secondary wall is deposited except for minute unthickened area called pit. Pit may be simple or bordered.
- b) The pit with uniform width is called simple pit.
- c) The pit with narrow mouth and flask shaped chamber is called bordered pith.
- d) The unthickened area in the walls of tracheid are permeable to water.
- e) The main function of the tracheids is conduction of water and minerals from roots to leaves.

- f) Also provide mechanical support due to presence of thick and rigid walls.
- B) Vessels :- a) vessels are made up of row of cells, placed one above the other with their intervening walled absent due to dissolution. Vessels at maturity like tracheids lack protoplasm hence dead. The cell cavity or lumen is wide.
- b) on the basis of thickening the vessels are following types i.e. annular, spiral, scalariform, reticulate, and pitted. The wood is with the vessels is porous e.g. angiosperm.
- c) The wood is without vessels is known as non-porous e.g. Gymnosperm.



d) They transport water and molecules from root to leaves like tracheids. It provide mechanical support to the plant body.

C) Xylem fibers :-

a) They are the sclerenchymatous cells associated with xylem.

b) They are more abundantly present in secondary xylem, and provide mechanical strength.

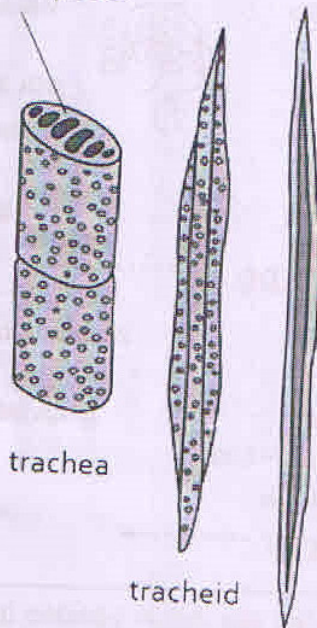
c) They are extremely thick walls and have narrow lumen.

d) They possess simple or bordered pits.

D) Xylem parenchyma :-

a) These are living parenchymatous cells

perforation plate

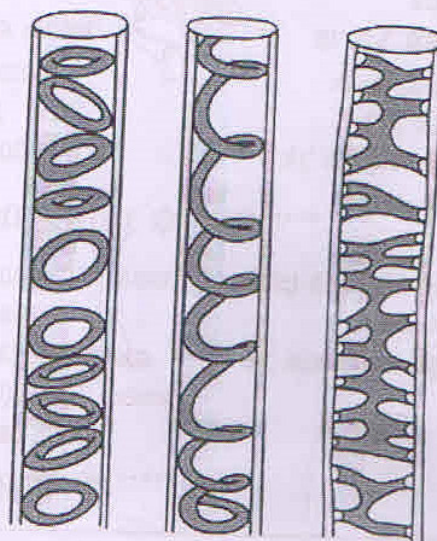


trachea

tracheid

libriform fiber

Trachea types by cell wall thickening



annular

spiral

reticulate



associated with xylem.

b) The walls are thin and made up of cellulose

d) Main function is storage of reserve food in the form of starch and fats. Also helps the conduction of water and minerals

Function of Xylem —

1) Conduction of water and mineral elements

2) Mechanical strength.

Phloem / bast :—

It is a complex tissue. It is composed of

a) Sieve tubes, sieve cells —

i) Elongated tube like cells. Sieve tubes are placed end to end.

ii) They are thin walled shows larger lumens.

iii) Their transverse walls are oblique and perforated to form sieve plates.

iv) Sieve plate bears numbers of sieve pores in sieve area.

v) Sieve plate may be with single sieve area or compound sieve plate having more than one sieve area.

vi) Sieve tubes are tubular channels form row of cells.

vii) A young tubes cells have protoplasm, nucleus and other organelles. Later on nucleus is lost.

viii) Sieve tubes are responsible for conduction of food from leaves to other ~~parts~~ of part of plant.



- ix) sieve tubes are found in angiosperm.  
Sieve cells are elongated and narrow cells.
- x) They have sieve pores but sieve areas are not specialized.
- xi) Sieve cells are usually found on Pteridophytes and Gymnosperms.
- b) Companion cells -
- i) These are specialized thin walled parenchymatous cells found to be associated with sieve tubes. Both sieve tube and companion cells appear from the same mother cells.
- ii) They are thin walled and contain dense cytoplasm and prominent nuclei. Companion cells are found only in angiosperm.

c) phloem parenchyma -

- i) These are thin walled living parenchymatous cells associated with phloem. Cells are elongated with rounded ends.
- ii) The cells contain cytoplasm and nucleus. They store preserved food material. They may show presence of crystals, tannins, mucilage latex. They help in lateral conduction of food.
- d) Phloem fibers / Bast fibers :-
- i) These are sclerenchymatous cells found inside the phloem.

