

Cell wall

- nonliving, rigid, permeable
↓
inextensible.
↳ cellulosic cw.
- present around protoplast / outer to PM.

Occurrence:

plants, fungi, algae, PK (bacteria)

Note: Mycoplasma → PK without cw.

composition of cw

variable.

① PK (bacteria) → peptidoglycan (murein)

② fungi → chitin (fungal cellulose)

↳ polymer of NAG.

↳ N-acetyl glucosamine

③. Algae → cellulose, galactan, mannan, minerals

↓
red algae (some) CaCO_3

④. plants → cellulose, hemicellulose, pectin, protein

Structure of typical cw (plant cw)

consists of primary wall, secondary wall, middle lamella.

Primary wall (1st wall)

• only cw structure in meristematic cells, young plant cells, parenchymatous cells.

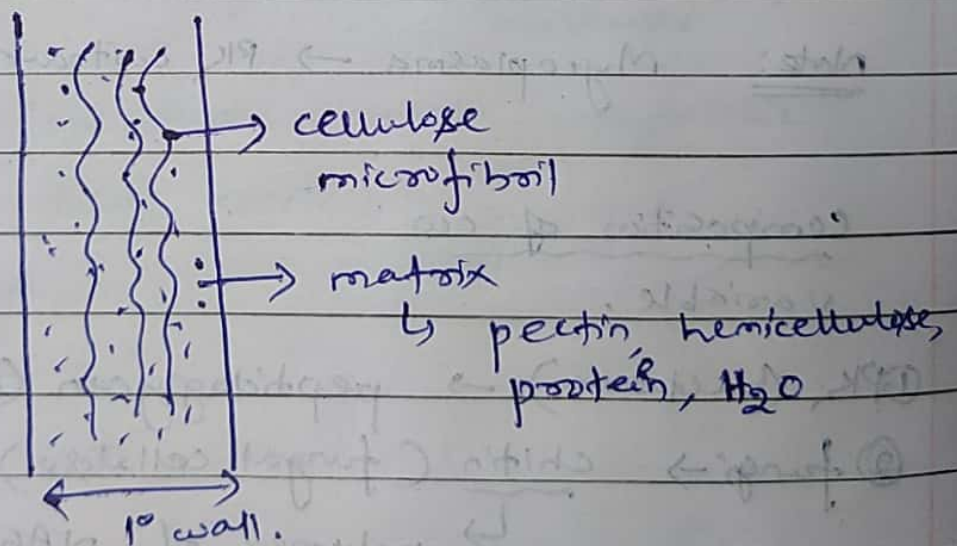
• 1st structure of cw to be formed during cytokinesis.

• single layered.

• cellulose → 20%.

hydration → 60%.

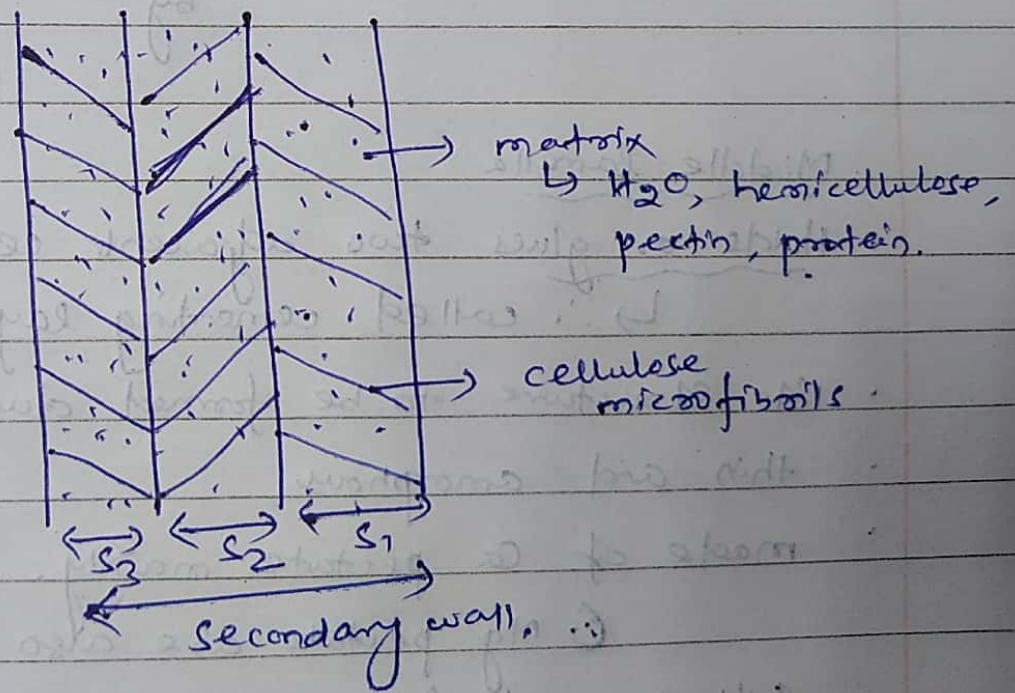
- cellulose microfibrils are loosely packed to form network.
- capable of growth
 - ↳ by intussusception
 - ↓
 - deposition of matter ~~in~~
 - within existing structure.
- diminishes as cell matures.
(reduces)



Secondary wall (2nd wall)

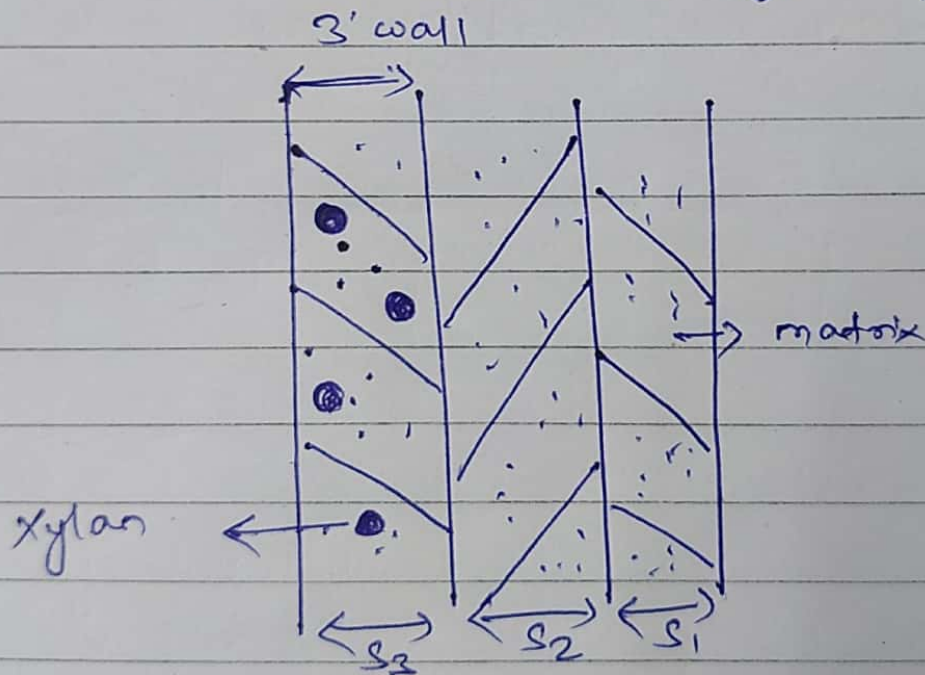
- present only in mature plant cells.
- multilayered \rightarrow atleast 3 layers.
 - $\hookrightarrow S_1, S_2, S_3, S_4, \dots$
 - \hookrightarrow 1st formed.
- lies b/w PM and primary wall.
- lies outer to PM and inner to primary wall.
- growth
 - \hookrightarrow intussusception and accretion (aposition)
 - \downarrow
 - new structure is formed in the form of layer over existing structure.
- shows deposition of special chemicals like cutin, suberin, lignin, etc.

- Relatively thicker than primary wall,
- Cellulose content $\rightarrow 20-40\%$,
hydrozation $\rightarrow 30-40\%$.
- Cellulose microfibrils are parallel and their orientation is different in different layers of secondary wall.



Teritary wall (3' wall)

- distinct innermost layer of 2' wall.
↳ due to deposition of xylan
- present in tension wood of gymnosperm,



Functions of cell wall

- provides shape to cell.
- Barrier to macromolecules.
- cell-cell interaction
- protection from \rightarrow mechanical injury
 \rightarrow infections
by \rightarrow virus, bacteria,
fungi

Middle lamella

- Holds or glues two adjacent cells
↳ \therefore called cementing layer.
- 1st structure to be formed during cytokinesis.
- thin and amorphous.
- made of Ca pectate mainly.
(Mg pectate are also there)
- Softening of fruit during ripening is due to solubilization of pectate of middle lamella.