Cell = ?

- Cell
  - Cell wall
  - Cell membrane
  - Protoplast
    - Cytoplasm
      - Living
        - Cyto-organales
          - Chloroplast
          - Mitochondria
          - Ribosome
          - Endoplasmic Reticulum
      - Non-living
        - Cyto inclusion
    - Nucleus
      - Nucleolus
      - Nuclear membrane
      - Nucleoplasm
      - Chromosome

Protoplast :-

⇒ It is whole living and non-living part of cell

⇒ Cell wall is product of protoplasm because cell wall is non-living and protoplast es contain living parts.

Protoplasm :-

⇒ It is only living part of the cell.

⇒ Cell membrane is product of protoplasm because cell membrane is living and protoplasm contain living part of the cell.

⇒ Cell containing protoplasm which perforns all the functions of the body. Therefore, protoplasm is called the physical basis of life.

Cytoplasm :-

⇒ Whole protoplast without nucleus cytoplasmic or living part of cytoplasm.

Cytoplasmic Inclusion (Metaplasm) :-

⇒ It is non living part of cytoplasm.

Deutoplasm (old) :-

⇒ Substances formed by protoplasm, ergastic substances, waste product of cell.

Nucleoplasm (Karyoplasm) :-

⇒ That protoplast which found in side the nucleus.

Parasomorpha :-

⇒ Liquid part of nucleolus. It is responsible for formation of nucleolus.

⇒ DNA which form r-RNA & r-RNA form ribosome.

Hence nucleolus is called centre of formation of Ribosome.

Parsagranulosa :-

⇒ Granular part of nucleolus is called parsagranulosa.

⇒ It contain ribosome.

Cell sap :-

⇒ It is liquid part which found in vacuoles.

⇒ Vacuoles are non-living.

⇒ Cell sap is hypertonic in nature

Tonoplast :-

⇒ It is wall of vacuoles.

Cell Wall

- Cell wall is outer most covering in plant cells
- It is protective in Nature
- Cell wall is product of protoplast and it is non-living
- The total thickness of cell wall is 18μ.
- It is divided into three layers — Middle lamella, Primary wall & Secondary wall.

1) Middle lamella →

⇒ It is the outer most wall in plant cell.
⇒ It's thickness is 5μ.
⇒ It is product of protoplast both nucleus & cytoplasm
⇒ It is non-cellulosic layer.
⇒ It contains calcium pectate. calcium come from nucleus and pectene come from cytoplasm
⇒ Middle lamella & joint two addjecent cell due to presence of calcium pectate hence ie. also known as cementing layer.
⇒ In isolation of cells using enzyme pectinase and dissolve the pectic substance of calcium pectate & cell isolate.

2) Primary wall →

⇒ It is the middle layer of plant cell. PW are cellulosic layer means containing carbohydrate
⇒ It's secretion product of is cytoplasm.
⇒ Primary wall is the thinest layer having 3μ in

thickness
⇒ It is chemically made up of cellulose & hemi cellulose
⇒ To see the details of cellulose we will see the electron microscopic structure (E.M.S.) of cellulose orientation in detail. Then we will get it is characterized by bidirectional movement of cellulosic microfibril.
⇒ They form net like str and acts like filter.
⇒ They consume minimum amount of cellulose

3> Secondary wall →

⇒ Secondary wall is the inner most layer in plant cell.
⇒ It is also cellulosic layer but hemicellulose appears in form of deposition.
⇒ SW is the thickest layer having 10μ in thickness.
⇒ It's secretion product is cytoplasm.
⇒ It is differenciated into three parts called outer, middle and inner layer all having 3-3μ in thickness.
⇒ To mark the details of cellulose we will see the E.M.S of cellulose orientation in detail in all 3 layers of secondary wall.
⇒ Outer most layer of SW is unidirectional in movement of cellulosic microfibrel
⇒ They consume maximum amount of cellulose.

⇒ The arrangement of microfibrels are dense.

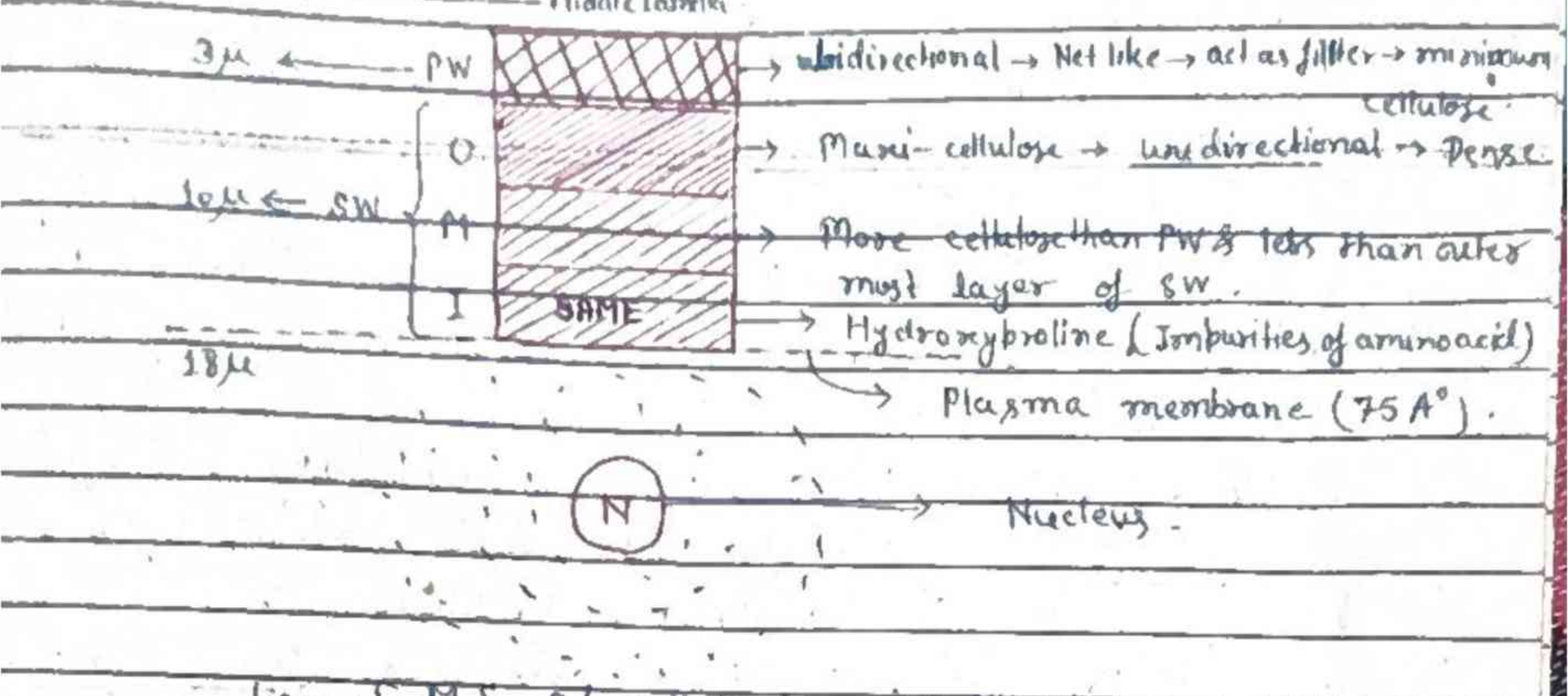

fig - E.M.S. of cellulosic microfibril

⇒ In middle & inner most layer of secondry wall the unidirectional movement is mark but they consume more amount of cellulose than primary wall but less amount of cellulose than outer most layer of SW.

⇒ In the inner most layer of secondry wall there is deposition of hydroxyproline which is an impurities of amino acid.

⇒ Hydroxyproline make inter into cytoplasm or not depending upon the activity of Plasma membrane ie. why plasma membrane is called selective membrane.