1. CELL WALL

DISCOVERY

The cell wall was discovered by Robert Hooke in 1665 earlier than the protoplast.

PRESENCE

The cell wall is present in plant cells, prokaryotes and fungi.

CHEMICAL COMPOSITION

The cell wall of plants is made of small thread like structure known as cellulose. The cell wall of fungi is composed of chitin while that of bacteria is composed of murein.

LAYERS

The cell wall has three fundamental parts:

1. Middle lamella
2. Primary layer
3. Secondary layer

1. MIDDLE LAMELLA

It is outermost layer in newly formed cells. ~~It is the firstly formed layer.~~ It is common between cells of a

tissue and is present only in young cells.

COMPOSITION

It is formed of sticky, gel-like magnesium and calcium salts (pectates) and some proteins. They are present in different proportion in different plants. In woody tissues the middle lamella is commonly lignified.

THICKNESS

It is usually thin and about 1 μm in thickness.

FUNCTION

Cell walls of neighbouring cells are held together by middle lamella. In woody tissues the middle lamella is commonly lignified.

* Young fruits have middle lamella that's why they are tough.

IN MATURE CELLS

Middle lamella stretches and dissolves in developed and mature cells.

2. PRIMARY LAYER

Primary cell wall is a true wall and develops in newly growing cell i-e during cell division. It is the first wall formed in a developing cell.

PROPERTIES: More or less elastic and extendible, crystalline and optically active.

COMPOSITION

It is composed of cellulose, pectic compounds mostly polysaccharides and hemicellulose. STRUCTURE OF CELLULOSE

More than 95% of primary cell wall is composed of cellulose. Cellulose is made up of small thread like structure known as fibrills. Fibrills are paralled to eachother. The second layer forms an angle with the first layer. This arrangement is known as criss-cross arrangement. The spaces between fibrill are filled with mixture of inorganic salts (Ca, Mg, K), Tannin, Lignin, Cubaine, Cutine. All the spaces are not filled. For the exchange of material, small pores are present.

THICKNESS

It is usually 1-3μm in thickness.

3. SECONDARY WALL

It is the the inner most layer formed between primary cell wall and plasma membrane.

COMPOSITION

The secondary cell wall consist of cellulose, hemocelluloses and lignin. Lignins cements and anchors cellulose fibres together. Its microfibrils ale at

criss-cross arrangement.)

(It is mainly composed of cellulose, non-cellulosic polysaccharides, hemicelluloses and mineral salts of Ca, Mg, K, and some silica.)

PROPERTIES

The secondary cell wall is more or less rigid, crystalline and strongly optically active.

THICKNESS

It is usually thick about 5-10 μm.

DEVELOPMENT

The secondary wall follows the order of primary wall in development. It is laid down inside the primary wall. The secondary wall develops only when the cell has reached maximum size i-e completes its growth. When this layer is formed completely, the cell dies.

FUNCTION

The secondary wall provides mechanical support to the cell and those to the plant as it is present in xylem and sclerenchyma.