CHAPTER 1
CELL STRUCTURE AND FUNCTION

THICKNESS OF

1. Centrioles 0.3 - 0.5 μm long and 0.2 μm in diameter
2. Peroxisomes 0.5 μm
3. Middle lamella (in cell wall) 1 μm
4. Primary Wall (of cell wall) 1 - 3 μm
5. Chloroplasts 4 - 6 μm
6. Secondary Wall (of cell wall) 5 - 10 μm
7. Nucleus 10 μm
8. Plasma Membrane 7nm
9. Ribosomes 20nm
10. DNA 2nm
    Distance b.w base pairs 0.34nm
11. Tracheids 80 μm

Scientists And Year Of Discovery

1.	Cell Wall	Robert Hooke	1665
2.	Nucleus	Robert Brown	1838
3.	Mitochondria		1850
4.	Golgi Bodies	Camillo Golgi	1898
5.	Lipid Bilayer	Gorter and Grendel	1925
6.	Cytoskeleton	Koltzoff	1928
7.	Sandwitch Membrare	Danielle and Davon	1935
8.	Lysosomes	De Duve	1949
9.	Ribosomes	Palade	1955
10.	Unit Membrane Model	Robertson	1959
11.	Fluid Mosaic Model	Singer and Nicholson	1972
12.	Cytoskeleton [confirmed views of koltzoff]	Cohen	1977
13.	Determined sequence of amino acids in insulin molecule	Sanger	1951

14. Lock and key Hypothesis Fischer 1890

PRIMARY WALL COMPOSITION:

→ cellulose
→ hemi cellulose
→ pectic compounds mostly polysaccharides

SECONDARY WALL COMPOSITION:

→ cellulose
→ hemi cellulose
→ non-cellulosic polysaccharides
→ Mineral salts of ca, Mg, K and Some silica

PROPERTIES

* PRIMARY CELL WALL	* SECONDARY CELL WALL
→ elastic and extendable	→ rigid
→ crystalline	→ crystalline
→ optieally active	→ strongly optically active

CYTOSKELETON

1. Microfilaments → Cyclosis
2. Microtubules → Cell Division
3. Intermediate filaments → maintain cell shape

ENZYMES

1. Lysosome → Hydrolases (food digesting enzymes)
   → Acid phosphatase enzymes

2. Glyoxisomes → Glycolic Acid Oxidase
   → Catalase

3. Lysozyme → destroys bacterial cell wall

* Resolution Power

1. Compound Microscope = 250nm
2. Electron Microscope = 0.5nm
3. Human Naked Eye = 1mm

* Magnification Power

1. Compound Microscope = 10,000 x
2. Electron Microscope ≠ 100,000x

CELL FRACTIONATION

→ Heaviest cell organelle is nucleus

→ Intermediate cell organelle is chloroplast + Mitochondria

→ Lightest cell organelle is Ribosome

* 10 min, 800 Gravity → Nucleus is isolated
* 15 min, 20,000 Gravity → chloroplast / mitochondria
* 1hr, 100,000 Gravity → Microsome
* 3hr, 150,000 Gravity → Ribosome

→ Offspring produced through tissue culture will be sterile in nature.

→ Shoot Formation: Low Auxin and High Cytokinin

Root Formation: High Auxin and Low Cytokinin

Callus Formation: Same ratio auxin and cytokinin

Absorption:

1. Chlorophyll a : 380 nm – 430 nm
2. Chlorophyll b : 670 nm – 730 nm
3. Carotenoid : 500nm – 600nm

→ Tissue culture is in vitro / ex vivo technique.

→ Non-Membranous cell organelles : Ribosome, Centriole, Nucleolus, Axoneme.

→ Centrioles are absent in higher plants

→ Each centriole consist of 27 (9x3) tubules.

→ Single Membranous cell organelles : Vacuole, Peroxisome, Glyoxisome, Lysosome.

→ The outermost layer of vacuole is called Tonoplast

→ 70S ribosome and haploid, circular double stranded DNA is present in mitochondria and chloroplast.

→ Cell wall of prokaryotic cell is made of murein.

→ Murein further consist of peptidoglycan (Amino Acid + Carbohydrate)

* In Any Disorder:

Type I → Genetic Disorder

Type II → Environmental Factors

→ Pectin is found in primary cell walls of terrestrial plants.

→ In cell wall, the cellulose fibrils are cemented by pectin

→ The stiffness of the secondary wall is due to lignin.

→ Plasma Membrane Models :

1. Lipid Bilayer → Gorter and Grendel
2. Lipid Bilayer covered with proteins → Danielle and Davon
3. Unit Membrane Model → Robertson
4. Fluid Mosaic Model → Singer and Nicholson

→ Cell membrane is negatively charged due to phosphate group.

→ Selective permeability is due to protein

→ Differential permeability is due to lipid