1. **Plant cell . structure and function .**

2. **The differences between plant cell and animal cell .**

The plant cell structure

Structure of plant cell :

The size and shape of plant cells are :

1- Cell shape : * cubical * prismatic * tubular * cylindrical
* spherical * oval * polyhedral .

2- Cell size : 10-100 microns average except latex cell is 5 meters .

Plant cell components :

1- Cytoplasmic components .

2- Non-cytoplasmic components (non-living components).

1- Cytoplasmic components :

1- Cytoplasmic membranes .

A- Plasma membranes or Ectoplast.

B- Vacuolar membranes or Tonoplast .

C- Nuclear membranes or Envelope .

2- Endoplasmic Reticulum :

1- Rough E.R.

2- Smooth E.R.

3- Plant cell organelles :

1- **Nucleus :** the structure of nucleus :
   1- Nuclear membrane (envelope).
   2- Nuclear sap (karyolymph) .
   3- Nuclear reticulum (chromatin) or chromosome .
   4- Nucleolus (nucleoli) .

2- **Plastids :** they are present in the cytoplasm of plant cell . the colourless portion of plastids is known as stroma in which are dispersed a large numbers of coloured granules which have been classified as follows , on basis of their colour .
   1- **Chloroplasts** : these are the green pigments present in the cell called
      " chloroplasts " structure of these plastids are :
      1- Grana (sinqular = granum) .
      2- Lamella .
      3- Inter grana .
      4- Outer and inner membranes .
      5- Photosynthetic starch .

The shape of plastids are :

1- Astral . 2- disk . 3- saucer . 4- spirilum . 5- reticulum .

The chloroplast pigments are :

1- Chlorophyll A / blue – green $C_{55}H_{72}O_5N_4Mg$
2- Chlorophyll B/ green $C_{55}H_{70}O_6N_4Mg$
3- Carotene / orange $C_{40}H_{56}$

4- Xanthophyll / yellow $C_{40}H_{56}O_2$

2- Chromoplasts : these are of various colours but generally , they are red , orange , and yellow , due to presence of carotene and xanthophyll .

Chloroplasts are mostly present in the : flowers , fruits .

3- **Leucoplast :** these are colourless plastids which are present in such part of the plants which do not get sunlight . these are mostly present in the roots or in underground stems (starch in the potatoes)

3- **Mitochondria :** site of Krebs – cycle or energy product .

4- **Golgi complex :** (Golgi apparatus or Dictyosomes) :

- Helps in excretion of wast product .
- Helps in formation of cell plate at the time of cell division .

5- Centrosomes :

They are present in certain fungi and few algae like chlamydomonas .

6- Lysosomes : (Microbodies) :

- Helps in Digestion of granular .
- Destroy the cells in which they are formed .

7- **Microsomes :** microbodies .

8- **Lomasomes :** membranous or vesicular

Present between the cell wall membrane of both lower and higher plants .

- Play in secretion .
- Increasing the surface area for the diffusion .

2- <u>Non – cytoplasmic components :</u>

Non – livings components or non – protoplasmic components

1- **Vacuoles .**
2- **Ergastic substances :**

1- Starch grains 2- cellulose 3- aleurone grains

4- oil or lipids (oil droplets) 5- crystal 6- rubber 7- mucilage 8- latex

9- Tannins 10- alkaloids .

3- **Cell wall :** is non – living component of a cell . the structure of cell wall is cellulose and poetic (component) compounds , hemi cellulose, lignin , suberin , cutin , pectic and fats . a plant cell wall can be differentiated into three regions :

1- Primary cell wall .
2- Middle lamella .
3- Secondary cell wall .

The function of the cell wall is the following :

1- It provides a mechanical support and gives a definite shape and protection to the cell .
2- It is capable to inhibited water and thus helps in the movement of water and solutes towards protoplasm .

The difference between plant cells and animal cells :

1- Plant cells have rigid walls , while animals cells are bounded by a flexible membrane .
2- Plants are not activity motile , but most animals are mobile .

3- Only plants contain chlorophyll and perform photosynthesis .

4- Plant store their food reserves as starch , but animals have glycogen and fat as their principle food reserves .

The comparison (compare) between plant cell and animal cell :

Plants	Animals
1- Nucleus well defined.	1-Nucleus well defined.
2- Cell wall rigid .	2-cell membrane flexible .
3- Not actively motile .	3- Actively motile (mobile).
4- Stored food principally starch.	4- Stored food principally glycogen and fats.
5- Energy source is photo – synthesis.	5-energy obtained from organic materials.
6- Chlorophyll present in plant cells.	6-chlorophyll is absent in animal cells.
7- Flagella is absent in plant cells.	7-flagella is present in the animal cells.
8- Vacuole is largest in the plant cell center .	8-vacuoles are numerous in the animal cell and smallest .

Summary of cell structure and functions :

Some cell organelles and their function :

Organelles	Description	Function
1- Nucleus :	Spherical structure, double membrane , and contains chromosomes .	1. Control of cell . 2. Protein synthesis . 3. Reproduction .
2-Nucleolus :	Site on chromosomes of rRNA synthesis.	1. Protein synthesis. 2. Control cell division
3- Chromosome :	Long threads of DNA associated with protein .	1.ultimate control of cell. 2. carrier of genes .
4-Nuclear membrane :	Double layer with pore in it	Regulates the entrance and exit from cytoplasm
5-Endoplasmic reticulum:	Network of internal membranes .	1.provides attachment surface , acts as secretion channel and maintains connection between cell parts and cell to cell .
6- Granules and vacuoles:	Cell cavities .	1.transport, 2. Storage , 3. processing centers
7-Ribosomes :	Small, complex, assemblies of protein and RNA, often bound to ER.	site of protein synthesis.
8-Mitochondria :	Saclike “ cristae ” spherical bodies “ oxysomes ” .	1.Site of Krebs . 2. site of oxidative metabolism.

9- Golgi complex :	Stacks of flattened vesicles.	1.site of synthesis of lytic enzymes. 2.suports cell wall formation.
10- Microbodies :	Vesicles containing collections of oxidative and other enzymes.	Isolate particular chemical activities from rest of cell.
11- Lysosomes :	Microbodies containing digestive enzymes .	1.site of hydrolytic enzymes 2.play-role in cell death.
12- Chloroplasts :	Vesicles containing chlorophyll .	Site of photosynthesis
13- Cytoskeleton :	Network of protein filaments .	1. Structural support. 2.cell movement .
14- Spherosomes :	Membrane and vesicles.	Site of hydrolytic energy .
15- Peroxisomes :	Membrane and vesicles.	Concerned with photo respiration .
16- Glyoxysomes :	Membrane and vesicles.	Concerned with glyoxylate metabolism .
17- Lomasomes :	Membrane and vesicles.	Cell wall synthesis .

Kingdom … Monera

Most biologists continue to recognize plantae, animalia and fungi , but not monera and Protista . the Kingdom monera is

obsolete because it would have members in two kingdoms (plantae and animalia) or into two different domains also Protista .

Kingdom … plantae and animalia .

- In plant cell : exist but is not in animal cell.
  1- Chloroplast .
  2- Central vacuole .
  3- Cell wall .
  4- Plasma desmat .
- In animal cell but is not exist in plant cells :
  1- Lysosomes .
  2- Centrosomes and centrioles .
  3- Flagella (but present in some plant sperm).
  4- Cell membrane .

Comparison between flagella and cilia

Cilia (cilium)	**Flagella (flagellum)**
1.a short cellular appendage containing microtubules .	1.a long cellular appendage containing microtubules .
2.present in large numbers per cell.	2.present in few numbers per cell.
3.present in prokaryotic cell and unicellular eukaryotic cell usually .	3.present in prokaryotic cell usually and unicellular eukaryotic cell common, human sperm , and plants sperm .
4.use for locomotion .	4.use for locomotion .
Containing (9+2) microtubules .	Containing (9+2) microtubules .

The End