

Cytoplasm

- * appears as transparent semi-fluid
- * water 85% - 95%
- * Proteins constitute the most important component
- * viscous material inside cell
- * it causes streaming.

Ecto Plast

- * next to wall
- * Control Passage of materials into and out of cell (selective)

Protoplasmic Component

Chloroplast

leucoplast

chromoplast

Pigment

Chlorophyll

Carotenoids

Carotenoids

Mitochondria

outer membrane smooth

inner membrane forming cristae

Matrix contain DNA, ribosomes, respiratory enzymes

Function

Photosynthesis

Angiosperms coloring of most

oil - elaioplast and

Fats

Nucleus

- * Centre of activity, the site of the hereditary
- * Central
- * Peripherical
- * Consist of nucleus
- * DNA
- * Deoxyribonucleic acid
- * Ribose sugar
- * Phosphate
- * Nitrogenous bases
- * RNA
- * Nuclear membrane
- * Chromatin

Endoplasmic reticulum

Rough

have ribosomes

connected between nuclear membrane and plasma membrane

smooth

No ribosomes

scattered at cell

lipid

enzymes

I - According to origin & development

Promeristem	Primary	Secondary
early young stage small at tips cell division give Primary meristem	Present in apices stem & root Primordia of leaves Protoderm, ground meristem develop to Primary body	

II - According to Position

Apical	intercalary	lateral
- at shoot apex - at root apex * responsible for increase in length	* Part of apical meristem separated from apex * Found between regions of permanent tissue * ex meristem at base of leaves, internodes * responsible for increase in length	* Along the sides, divide in one plane * increase in diameter * ex vascular cambium

III According to Plane division

Mass meristem	Plate meristem	Rib meristem
* cell divide in all planes increase in volume * develop of cortex, pith	* cell divide in two planes increase the area of organ * ex epidermis * growth to leaf formation	* cell division in one plane * Formation of cells in pith, cortex in young stem

Meristem

③ Secondary meristem

- originated From mature living or Permanent tissue and secondary meristems

ex cork cambium develop
From ePiderms / cortex
Pericycle

- develop to secondary body of plant.

Primary meristem

→ Protoderm → ePiderms

→ Procambium → Xylom & Phloem

→ ground m. → root cap

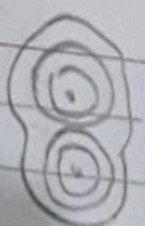
Types of starch grains

according to structure

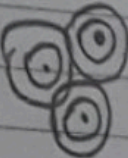
Simple
one hilum



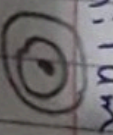
Semicond
two and more
bounded by
common envelope



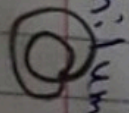
Compound
two or more
not bounded



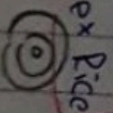
Centric
hilum



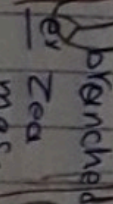
Position
Acentric
hilum



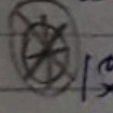
Point
Form
ex Rice



Shape
elongated
and branched
ex Zea
mas.



stallat
and
branched
ex Pisum



Solitary

Rosette

Needle
Rafinides

Ca-carbonate
- cystolith

Ca-oxalate

Crystals

Crystals

Wast Product
B₂ product

Catabolism

Pro ducts of metabolism

Cell wall

Vacuole

Non-living components

ergastic materials

Anabolism

Reserve Food

Starch

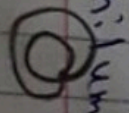
Formed of thousands
of glucose units

Consist of

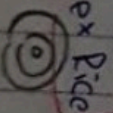
hilum + concentric
layers

Position

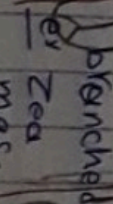
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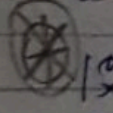
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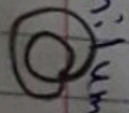
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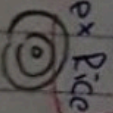
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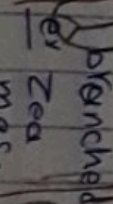
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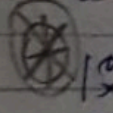
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B₂ product

Catabolism

Cell wall

1 Middle lamella

* Formed from cell plate during cell division

* Consists of Calcium, magnesium, Pectate

2 Primary wall

* two new layers lay on both sides of middle lamella

* It's mainly formed of cellulose

3 Secondary wall

* It's formed on the inner surface of the primary wall

* Formed from cellulose, hemicellulose, lignin, cutin, suberin, waxes

Germination of Cell wall

Intussusception
increase in surface

Addition

increase in thickness

Vacuole

* They are cavities within the cytoplasm filled with a liquid called cell sap

* a vacuoles of cell called

tonoplast → double membrane

Types of Vacuoles

Oil Vacuole

store oil eg cell of endosperm

water vacuole

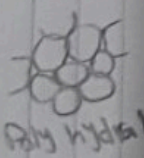
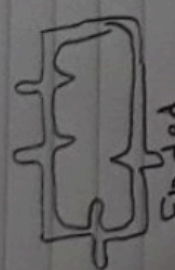
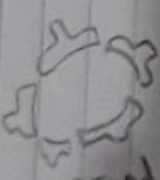
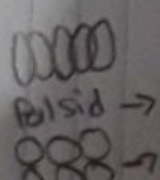
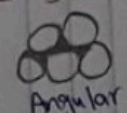
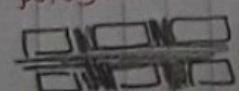
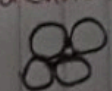
store water organic & inorganic substance → numerous → large and one only

* vacuole in meristematic → numerous

* vacuole in permanent → large and one only

Permanent simple tissues

	Parenchyma	Collenchyma	Sclerenchyma
Comp	* Thin cellulosic wall * living cell	* Thick walled without lignification * Their wall made up cellulose, hemicellulose and Pectin * living cell	* Thick wall * lignified cell * Dead cell at maturity
Origin	* ground meristem Pro Cambium	* ground meristem Pro Cambium	
Function	* mainly storage - Respiration - conduction of water - Photosynthesis	- storage - Photosynthesis - mechanical support	- mechanical support

Types	Parenchyma	Collenchyma	Sclerenchyma
	- chlorenchyma with chloroplast for Photosynthesis - aerenchyma with wide intercellular spaces for gas exchange  Poly hydral  aerenchyma  Aerenchyma  Aerenchyma	① Angular التشبيك في الزوايا بين الخلايا ex corners  Angular ② Lamellar التشبيك في السطوح  ③ Lacunar التشبيك بين الزوايا بساقي لشقوقها يردود  ④ Annular التشبيك حول الخلايا 