

Tissue

→ Group of cells of similar structure combined together to perform a specific function forms a tissue.

Types of cell

- Animal cell → Animal tissue
- Plant cell → plant tissue

organism

Unicellular      Multicellular

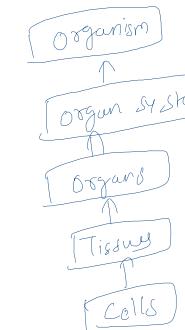
Single cell  
which is responsible  
for performing all  
life activities.



↑ respiration  
↑ digestion

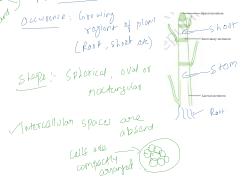
### Importance of tissue

- Causes division of labour in multicellular organisms.
- Decrease workload on individual cells.



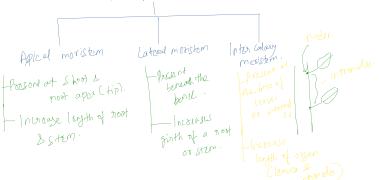
Responsible for growth & division

### Meristematic Tissue



- ✓ Vacuoles are absent → Storage
- ✓ Active cells → Continuously dividing
- ✓ Nuclei → prominent

### Type of Meristematic Tissue



### Permanent Tissue

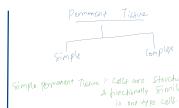
Tissues which can't divide further so further division is not possible.

- ✓ Cells lose their ability to divide
- ✓ Take up a specific role
- Differentiation - Process of taking up permanent shape, size and function.

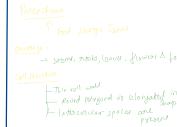
Structure:  
Flange central vacuole  
Cell wall is thin/thick

- Functions:
- ✓ Protection
  - ✓ Support
  - ✓ Storage
  - ✓ photosynthesis

### Meristematic Tissue



### Type of Permanent Tissue



### Functions:

- Food storage tissue.
- In some leaves → get colour due to chlorophyll, thus called Chlorophyllous.
- When loosely packed, intercellular spaces are present called Aerenchyma.
- Aerenchyma provides buoyancy to plants & helps them to float.

### Type of Permanent Tissue: Collenchyma

- ✓ Occurrence:
- In leaf stalks & stem & buds.



### Functions of Collenchyma

- Mechanical tissue provides mechanical strength.
- Provides flexibility.
- Allowed bending of plant.
- Eg: Tendons & stems of climbers.

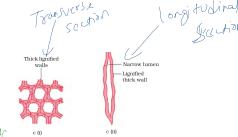
### Structure of cells:

- ✓ living
- ✓ elongated
- ✓ irregularly thickened at the corner.
- ✓ very little intercellular space

# Sclerenchyma

### Occurrence

- In strand around vascular bundles.
- In veins of leaves.
- Hard covering of seeds & nuts: Eg - Walnut, Husk of coconut.



### Structure

- long & narrow
- walls are thickened by lignin.
- Cell cavity is absent due to excessive thickness.
- Intercellular spaces absent.
- cells are dead.

### Functions

- Provides strength to plant cells
- Provides protection.

## Complex Protective Tissue

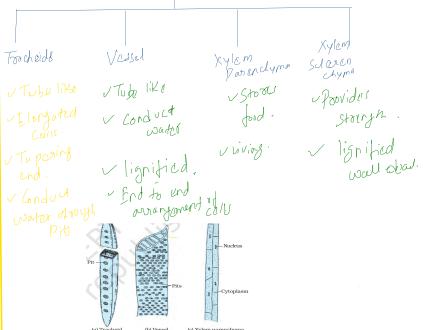
- made up of more than one type of cells.
- Cells coordinate to perform common function
- Function:
  - Used for transporting water, minerals & food materials to different parts of the plant



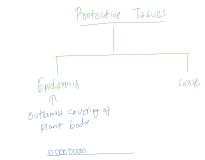
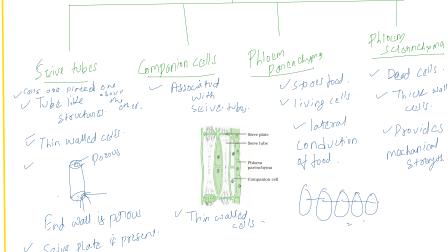
## Xylem

- Conducting tissue.
- Conducts water & minerals from Roots → shoot.

Xylem is made up of 4 types of cells



Phloem is made up of 4 types of cells



- Structure:
- Made of single layer of cells
  - Cells are elongated flat
  - No intercellular spaces

Occurrence:

- outermost layer of all the plant parts
- Ex: leaves, stems, roots, flower, fruits etc.

Functions:

- Protects all parts of plants.
- plants of dry habitats have thicker cuticles
- Prevents water loss
- plants in desert areas, like cactus, these plants epidermal cells secrete waxy material which is known as cetyl, & outer layer of cuticle is formed on it. Known as cirella.



→ Cuticle is water impermeable. Leaves, stem, roots

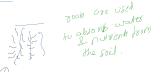
Epidermal cells on the aerial parts

function: Secrete waxy substance

- Water loss
- Fungi infection

Cuticle aids in protection against water loss, injury & invasion by fungi.

→ Epidermal cells of the root form hair like structures



Hair like structures increase the surface area which helps in absorption

Q) Epidermis: true, stem, leaves etc.  
How the gaseous exchange happens?



- In leaves, Epidermal Cells form stomata.  
→ Stomata are guarded by guard cells.  
→ guard cells are kidney shaped.  
→ guard cells regulate gaseous exchange.

## Cork

Structure:

- External protective tissue.
- Dead.
- Compactly arranged cells.
- Intercellular spaces absent.
- Walls have suberin.

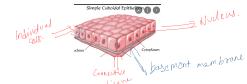
Occurrence:

- Substitute Epidermal cells in mature roots & shoot

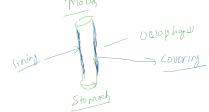
## Function

- Protection to mature roots & shoot.
- Suberin regulates gaseous exchange & water passage.

## Animal Tissue : Epithelial Tissue



- Function:
- i) Protection to body from injury, infection or damage.
  - ii) Form lining of mouth & alimentary canal.



Alimentary canal - Oesophagus, Stomach, Small Intestine, Large intestine.

(i) Absorption of water & nutrients.  
(ii) Elimination - waste

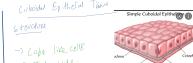
### Squamous Epithelial Tissue

→ Cell are Extensively Thin

→ Cell are flat.

→ Irregularly shaped

- Single layer of cells
- forms delicate lining
- Mouth & Oesophagus



Occurrence:

- e.g. sweat glands, salivary glands
- mammary glands, lining of fallopian tubes

Endorse:

- Plasma
- Secretion
- Respiration

### Cuboidal Epithelial Tissue

✓ all of life cells.

✓ Tall > wide



Occurrence:

- lining of intestine
- lining of stomach, gallbladder

Function:

- Absorption, Secretion, Protection

### Ciliated Epithelial Tissue

Structure:



→ ciliated or columnar epithelium

→ cilia-hair like projections

→ Cells have cilia on free surface

→ also facilitates movement

Occurrence:

→ Respiratory tract

→ Nasal cavity

→ Mouth

→ Fallopian tubes

→ Uterus

→ Ovaries

→ Mammary glands

→ Uterus

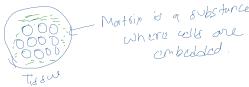
→ Fallopian tube

→ Uterus

→ Ovary

## Connective Tissue

- Connects various body parts
- Prevents organ from getting displaced by body movements
- Acts like binding, supporting and packing materials
- Cells are loosely spaced.



Matrix is a substance where cells are embedded.

- Matrix may be jelly, fluid, dense or rigid.

### Dense Connective Tissue



### Apticular Connective Tissue: Tendo Connective Tissue

#### Structure:

- Cells & loose gel like matrix.
- Between skin & muscles.
- In bone marrow.
- In space inside organs.
- Around blood vessels & nerves.



loose connective tissue cells  
matrix Fibres

#### Function:

- connects skin & muscle.
- Fills the space inside organs.
- Supports internal organs.
- Helps in repair of tissues.

## Dense Connective Tissue



When the cells are present in a solid or dense matrix.

## Tendons

- Skeletal muscles are attached to skeleton using tendon
- Fibrous tissue
- Great strength
- Limited flexibility
- Lenient muscle to bone



### Ligaments

- Considerable strength
- little matrix is present
- Present in joints
- Connects bone with bone
- Connection of skin & muscle
- Connection of muscle to bone



## Connective Tissue - Reticular Connective Tissue

- Aggregate of fibroblasts
- Fibroblast - fibroblast for points
- Cells are rounded oval
- Cells secrete large fibres around them

#### Functions:

- Outer skin
- Between the internal organs
- Protects body from mechanical stress
- fat reservoir
- acts as an insulator
- i.e., poor conduction of heat & less heat loss from body

#### Temperature regulation

### Solid Tissue

#### Bone

- widely spaced = a lot
- Extracellular matrix = protein & sugars
- Matrix is slightly elastic
- Cartilage is flexible

#### Osteocyte

- Ear, pinnae, nose tip, trachea, larynx
- Smoothens bone surface at joints

#### Function:

- Support, flexibility to body parts

## Bones

- Nature
- very strong
- Non flexible
- Hard & rigid
- Bone cells are embedded in hard matrix
- Matrix is composed of calcium & phosphorus compounds

- Function
- forms a framework
- supports the body
- provide shape to the body
- protect vital body organs (like brain, lung etc.)

## Connective Tissue - Blood Connective Tissue

- Continuity in the body → Present in the whole body
- Connects different part of a body

#### Layers:

- Blood
- Lymph

#### Blood

→ Tissue made up of blood cells/blood components

→ Fluid connective tissue

→ Blood cells move in liquid matrix blood plasma

#### Blood cells

- RBC
- WBC
- Platelets

## Lymph

- colourless fluid
- RBC's & blood proteins are present.
- Absorb fats from digestive tract.

#### Function:

- Blood flows & transports gases, digested food, hormones & waste materials

#### RBC

- Red color
- Pigment haemoglobin

#### WBC

- Soldiers

#### Platelets

- Before mechanism

- Defense against bacteria & foreign materials

- Stoppage of bleeding