

First: Skin

→ Biggest organ

→ Structure: ▷

→ Epidermis

→ Dermis

1 Epidermis

Epithelial cells

Surface layer

- Dead Cells
- full of horny substance called "Keratin"
- Subjected to friction
- Compensated from beneath.

Inner layer

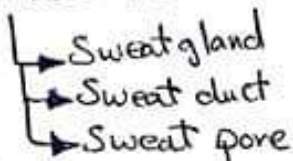
- pigment cells
- melanin "skin color"

2 Dermis

Connective tissue

Sweat gland

- Functional unit
- Structure



- Function

- ↳ Extract sweat (Excess water - Excess salts - nitrogenous wastes (small per cent))

↳ dec. body temp.

→ Skin adheres to the body by a fatty layer that present under the dermis.

Hair

- Hair follicle
- Erector muscle
- Blood Capillaries
- Hair shaft
- Fat (sebaceous) gland

Soft

Hair exit

Sensory nerve ending

- Respond to
 - ↳ touch
 - ↳ pain
 - ↳ temperature
 - ↳ pressure

Excretion

→ Excretion

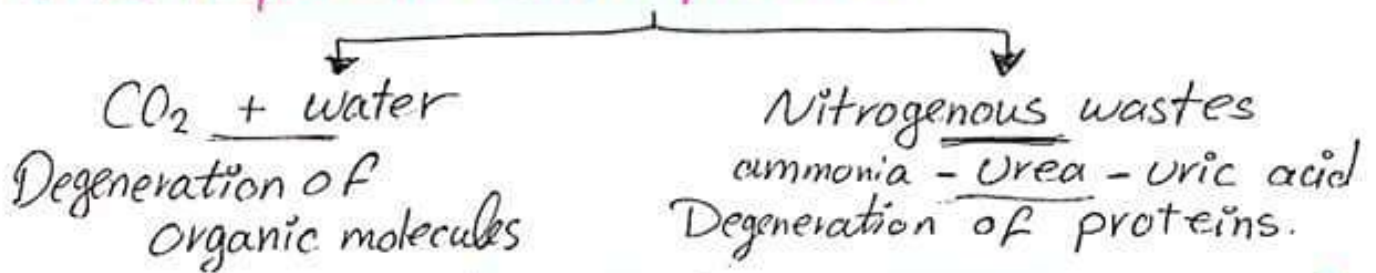
It is a vital process by which the living organisms get rid of the waste products produced from metabolic reactions.

Excretion in animals

The excretion process refers only to the materials that leave the body through "plasma membrane"

→ Some materials aren't considered as excretory products
 Such as → undigested food "faeces"
 → Nitrogen.

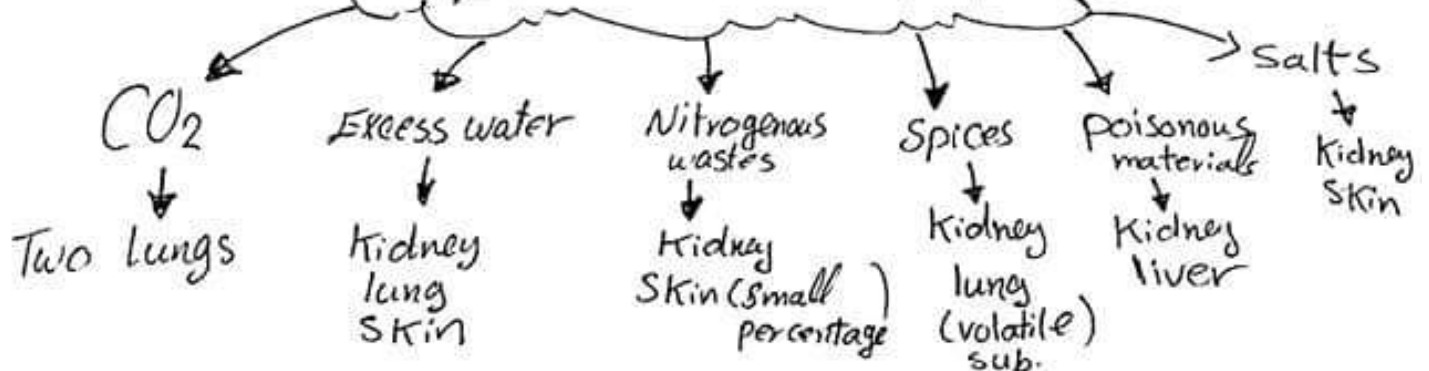
* The important waste products



* The important excretory organs in animals



Excretion in Man



Second: Kidney

* Each vertebrate animals has two Kidneys

Lower vertebrate
 - Long
 - Thin
 - Along two sides of vertebral column

Higher vertebrates
 - more firm
 - Behind peritoneum

Kidney in the human body

→ Site :: - upper part of abdominal cavity
 - One at each side of vertebral column.

→ Size :: - length (12 cm)
 - width (7 cm)
 - Thickness (3 cm)

→ Shape :: - Bean shaped
 - Outer convex
 - inner concave (pelvis)

Renal artery
 (come from aorta)

Renal vein
 (connects to posterior vena cava)
 (inferior)

→ Structure ::
 → Cortex (outer - narrow)
 → Medulla (inner - broad)

→ Nephron :: - functional unit of kidney
 - one million in each kidney

Bowman's Capsule
 - swollen
 - cup shaped
 - Thin, double walled
 - in cortex

Nephric tubule
 - 1st coiled tubule (cortex)
 - Loop of Henle (medulla)
 - 2nd coiled tubule (cortex)

Collecting duct
 - open in the pelvis

Third: Liver

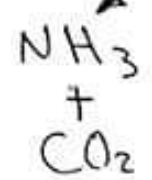
→ Other functions → Digestion
→ Metabolism

→ Excretory functions

Break down
Poisonous substances
absorbed by Small intestine
[purified blood]

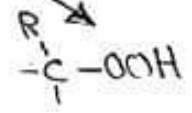
Deamination of amino acids

amino acid



↓
Urea

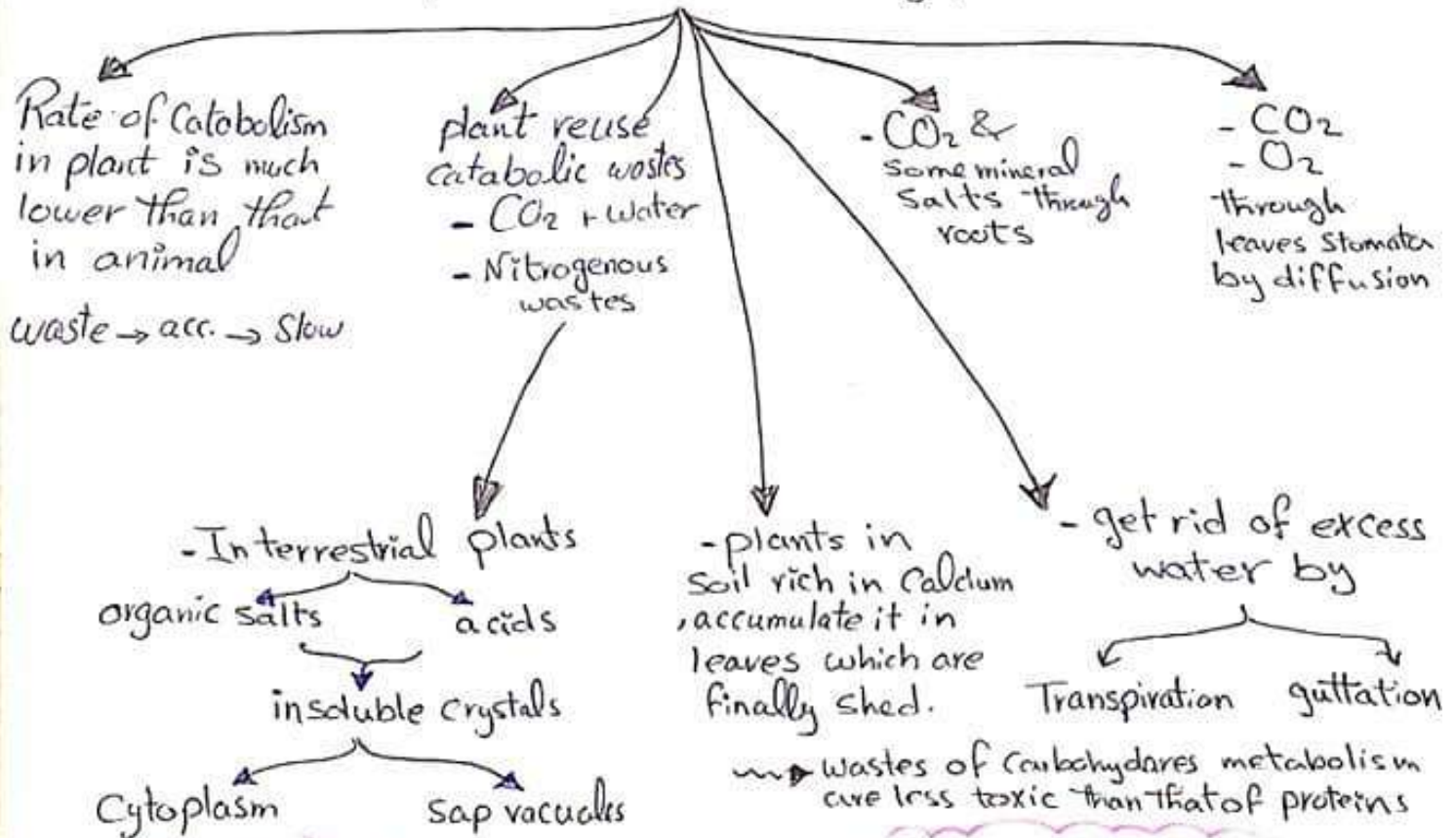
↓
Kidney



Recycled
or
oxidized
for energy

Excretion in Plants

- No specialized excretory systems
- Excretion in plant doesn't cause any problem ⇒



1] Guttation

→ Loss of water in the form of drops at the leaf tips of some plants



- In early morning at end of spring
- Special system (one cell or many cells) opening by water Stomata (hydathode)
- Hydathode is permanently opened
- Water drops contain other substances
- Little amount of water drops

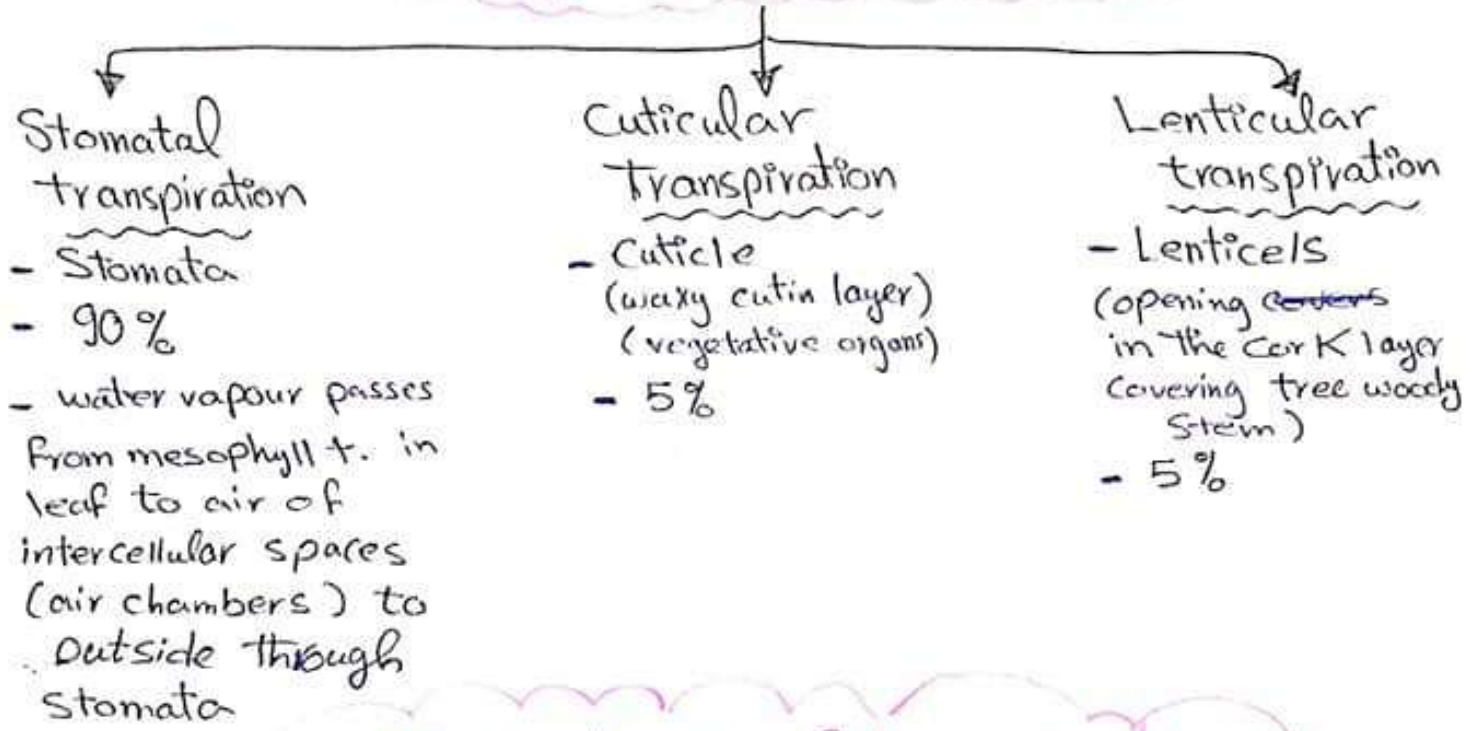
2] Transpiration

→ Loss of water in the form of water vapour

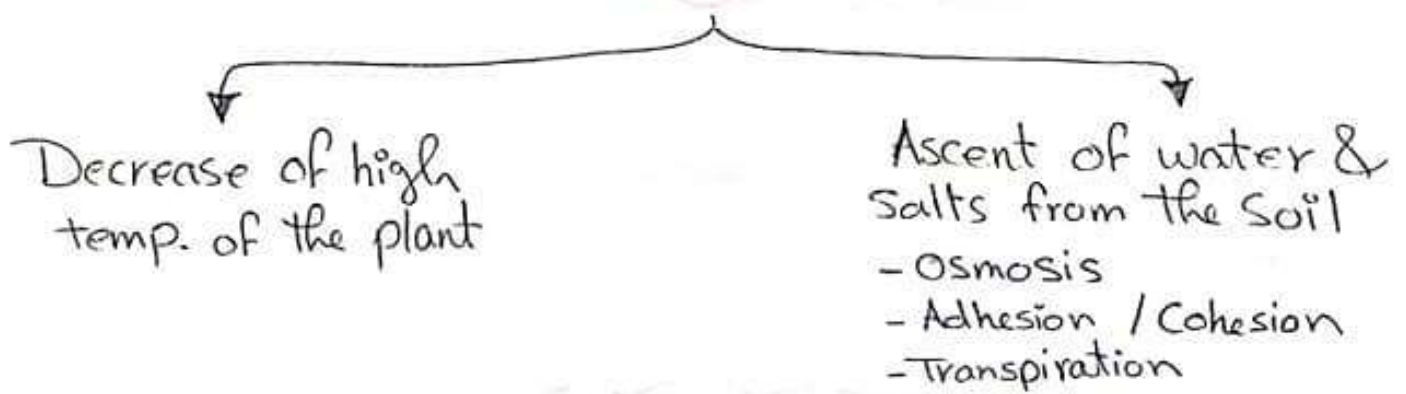


- In all seasons, / inc. in sunny & warm days
- - stomata - cuticle layer - lenticels
- Stomata are opened & close
- Transpired water doesn't contain any other substances
- Large amount of transpired water

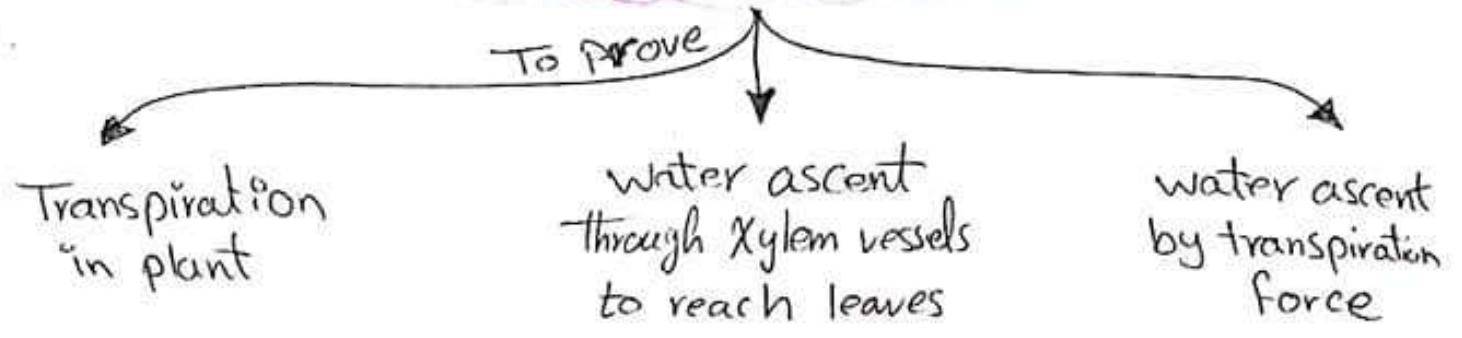
Types of transpiration



Importance of transpiration for the plant



Experiments



Sensation

Less obvious in plant

More obvious in animals

Highest efficiency & accuracy in Human

Sensitivity (Irritability)

It is the response of living organism to the internal & external stimuli with a suitable response to maintain its life

Sensitivity in plants

Response to touch & darkness

Tropism

First: Response to touch & darkness

Mimosa plant

- Structure
- leave are compound & pinnate
 - Primary & Secondary pulvinus
 - " & " rachis
- ↓
2 rows of leaflets

- ① Response to touch
- leaflets droop
 - leaf petiole droops

- ② Response to darkness
- wake movement
in day time, leaflets are held in horizontal position
 - Sleep movement
At night, leaflets hang downwards & fold their upper surface.

* Explanation of movement

- pulvinus act as joints.
- cell walls of lower half of pulvinus are more sensitive than upper half
- when touching or at darkness, pulvinus lower surface shrink → water diffusion to neighbouring tissues (lose turgidity)
- when stimulus is removed, leaflets open once more (regain turgidity)

Second: Tropism

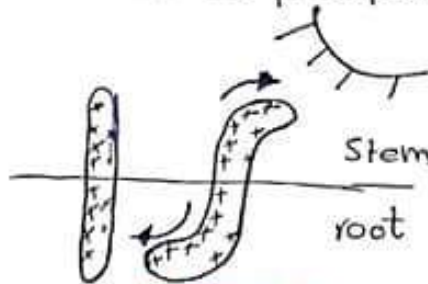
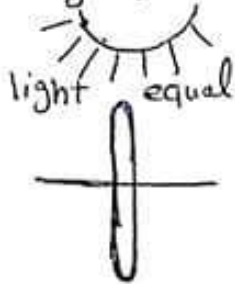
→ It is the Curvature of Stem or root of a plant, when its sides are subjected to one of the factors (Stimuli) such as light, humidity & gravity in an unequal form.

Types of Tropism

Phototropism Geotropism Hydrotropism

1) Phototropism

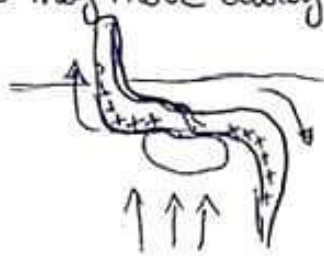
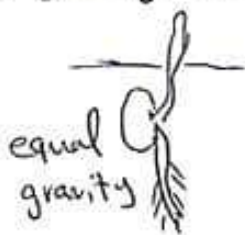
It is the response of growing plant parts to an external stimulus which is light, causing the curvature of plant parts towards it or away from it.



- Stem → +ve phototropic
- Root → -ve phototropic
- Stimulus is light
- Auxins go away from light

2) Geotropism

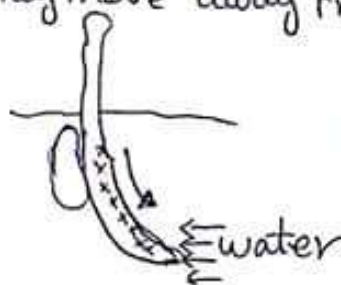
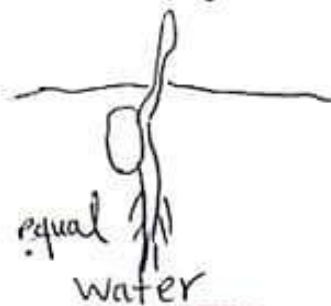
It is the response of growing plant parts to an external stimulus which is gravity, where they move away from or towards it.



- Stem → -ve geotropic
- Root → +ve geotropic
- Stimulus is gravity
- Auxins go towards gravity

3) Hydrotropism

It is the response of growing plant parts to an external stimulus which is humidity, where they move away from or towards it.



- Root → +ve hydrotropic
- Stimulus is humidity
- Auxins go towards water.

Phototropism experiments

* Experiment ①

Conclusion : Stem is +ve phototropic
 Root is -ve phototropic

Explanation : The curvature is due to difference in the growth of the two sides of stem & root (unequal)

* Experiment ② (Boysen Jensen)

→ Oat (Avena) seedling Coleoptile

Conclusion : The tip of coleoptile synthesized chemical sub. called "auxins" that affect the growth & cause tropism

Explanation : Unequal growth is due to unequal concentration of auxins on the two sides of stem & root.

Auxins chemical sub. that are secreted from the coleoptile's tip of the plant & affected greatly by external factors.
 most common → Indole-acetic acid (IAA)

* Experiment ③ (Went)

Conclusion : Auxins move from the side facing light to the dark side by diffusion.

inc → Auxins → inc. growth of stem
 → dec. growth of root.

→ 35% light
 → 65% dark

Geotropism experiments

* Experiment ①

Conclusion : Auxins accumulate in the lower side of both root & stem facing gravity

Auxins → 33% upper side
 → 67% lower side