Excretion in Animals

- Purpose: Elimination of metabolic wastes (nitrogenous, CO_2, etc.) to maintain homeostasis.

1. Nitrogenous Wastes (Based on habitat & water availability):
   - Ammonia (NH_3): Most toxic, requires lots of water.
     e.g., Aquatic animals (Fish, Tadpoles).
   - Urea: Less toxic, requires moderate water.
     e.g., Mammals (Humans), Adult Frogs, Cartilaginous fish.
   - Uric Acid: Least toxic, requires very little water (paste/pellet form).
     e.g., Birds, Reptiles, Insects.

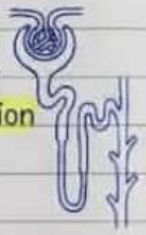
2. Excretory Organs in Different Animals:
   - Protozoa (Amoeba): Simple diffusion through body surface.
   - Flatworms (Planaria): Flame Cells (Protonephridia).
   - Earthworms (Annelids): Nephridia.
   - Insects (Cockroach): Malpighian Tubules.
   - Crustaceans (Prawn): Green Glands (Antennal glands).
   - Vertebrates: Kidneys.

Excretion in Humans

- **Excretion**: Removal of **metabolic waste** from the body.

1. **Human Excretory System**:
   - A pair of **Kidneys** (Bean-shaped, filter blood).
   - **Ureters** (Tubes carrying urine to bladder).
   - **Urinary Bladder** (Stores urine).
   - **Urethra** (Passage for urine out).

2. **Nephron** (Functional unit of Kidney):
   - **Bowman's Capsule & Glomerulus** (Filtration).
   - **Tubule** (PCT, Loop of Henle, DCT) – **Reabsorption** of useful substances (glucose, water).
   - **Collecting Duct** (Final urine collection).



3. **Mechanism**:
   - **Filtration** (Glomerulus) → **Reabsorption** (Tubules) → **Secretion** (Wastes added) → Urine Formation.

- **Major Waste**: **Urea** (produced in liver from ammonia).

- **Other Excretory Organs**:
  - Lungs (CO_2)
  - Skin (Sweat – salt, water)
  - Liver (Bile pigments, Urea).

- **Dialysis**: Artificial kidney for kidney failure patients.

Transportation in Plants

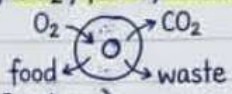
1. Transport of Water & Minerals (Xylem)
   - Tissue: Xylem (Vessels & Tracheids).
   - Direction: Unidirectional (Roots → Leaves).
   - Mechanism:
     - Root Pressure: Active absorption of ions by roots creates a pressure pushing water up. (Effective at night/short heights).
     - Transpiration Pull (Cohesion-Tension Theory):
       - Evaporation of water from stomata (leaves) creates a suction pull.
       - Water molecules stick together (Cohesion).

2. Transport of Food (Phloem) - Translocation
   - Tissue: Phloem (Sieve tubes & Companion cells).
   - Direction: Bidirectional (Source → Sink).
     Source: Leaves (make food)
     Sink: Roots, Fruits, Growing parts (need/store food)
   - Mechanism: Active Transport (uses ATP).
     - Sugar (sucrose) loaded into phloem at source using ATP.
     - Water enters by osmosis → high pressure.
     - Food moves to low pressure areas (sink).

Feature	Xylem	Phloem
Transport	Water & Minerals	Food (Sugar)
Direction	Unidirectional (↑)	Bidirectional (↓)
Energy	No (Physical forces)	Yes (ATP)

Transportation in Animals

- Purpose: Transport of substances (O_2, CO_2, food, waste) to & from cells.



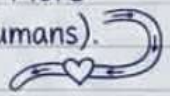
1. Circulatory System (Main Transport System)
   - Blood: Fluid medium. Connective tissue.

   - Heart: The pumping organ.

   - Blood Vessels: Tubes (Arteries, Veins, Capillaries).

2. Types of Circulatory Systems:
   - Open System: Blood pumped into body cavity (haemocoel). Direct contact with tissues. e.g., Insects, Arthropods.

   - Closed System: Blood confined to vessels. More efficient. e.g., Earthworms, Vertebrates (Humans).



- Heart Chambers & Circulation:
   - Fish: 2 chambers (1 atrium, 1 ventricle). Single circulation.

   - Amphibians/Reptiles (most): 3 chambers (2 atria, 1 ventricle). Mixed blood.

   - Birds/Mammals: 4 chambers (2 atria, 2 ventricles). Double circulation (No mixing). Efficient supply of O_2.

Summary: System ensures efficient delivery & removal for survival!

Transportation in Human

1. **Circulatory System**: Transport system in humans.

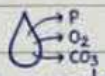
- Components:
  - **Heart**: Pumping organ. (4 Chambers: RA, RV, LA, LV).

  - **Blood Vessels**: Tubes for blood flow.
    - **Arteries**: Carry oxygenated blood AWAY from heart (thick walls).

    - **Veins**: Carry deoxygenated blood TOWARDS heart (thin walls, valves).

    - **Capillaries**: Tiny vessels for exchange (connect arteries & veins).

  - **Blood**: Fluid connective tissue.

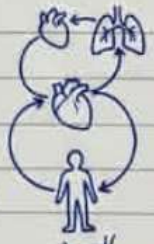


    - **Plasma**: Fluid part (transports food, CO_2, waste).
    - **RBCs**: Carry O_2 (Haemoglobin).

    - **WBCs**: Fight infections (Immunity).

    - **Platelets**: Blood clotting.

2. **Double Circulation**: Blood passes through heart TWICE in one cycle.
   - **Pulmonary Circulation**: Heart ↔ Lungs (Deoxygenated → Oxygenated)
   - **Systemic Circulation**: Heart ↔ Body Organs (Oxygenated → Deoxygenated)

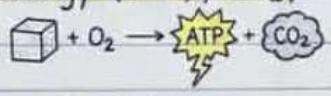


3. **Lymphatic System**: Another transport system.

   - **Lymph** (Tissue Fluid): Similar to plasma but less protein. Transports digested fats & fights infection.

Respiration in Plants

- Respiration: Process of breaking down glucose (food) with O_2 to release energy (ATP), CO_2, and H_2O.

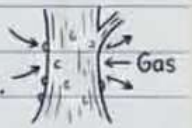


- Site: Occurs in Mitochondria of all living plant cells.

- Timing: Happens ALL THE TIME (Day & Night) for survival.

- Gaseous Exchange (O_2 in, CO_2 out):
  1. Leaves: Through Stomata (tiny pores).

  2. Stems: Through Lenticels (pores on woody stems) & general surface.

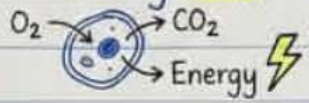


  3. Roots: Through Root Hairs (diffusion from soil air spaces).

Photosynthesis	vs.	Respiration
Makes Food		Breaks Food
Uses CO_2, releases O_2		Uses O_2, releases CO_2
Only in Light		All the time

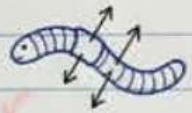
Respiration in Animals

- Process of taking in O_2 & releasing CO_2 to produce energy.



- Different Organs for Respiration:

1. Skin (Cutaneous Respiration):
   e.g., Earthworm, Frog (in water).
   Moist skin allows gas exchange.



2. Gills (Branchial Respiration):
   e.g., Fish, tadpoles.
   Extract O_2 dissolved in water.

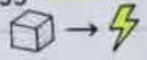
3. Tracheal System:
   e.g., Insects (grasshopper, cockroach).
   Network of tubes (tracheae) opening through spiracles.

4. Lungs (Pulmonary Respiration):
   e.g., Mammals (humans), Birds, Reptiles, Adult Frogs.

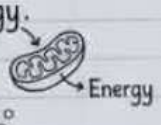
Note: Frogs have dual respiration (Skin & Lungs)!

Respiration in Human

1. Process: Breakdown of glucose to release energy (ATP).



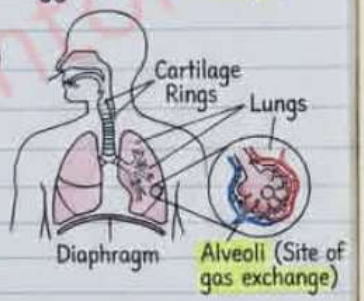
- Two Types:
  a) Aerobic (with O_2): Glucose $\xrightarrow{O_2}$ $CO_2 + H_2O$ + Energy.
  (In Mitochondria).



  b) Anaerobic (without O_2):
  (i) In Yeast (Fermentation):
  Glucose $\xrightarrow{\text{no } O_2}$ Ethanol + CO_2 + Energy.

  (ii) In Muscle Cells (during heavy exercise):
  Glucose $\xrightarrow{\text{lack of } O_2}$ Lactic Acid + Energy (causes cramps).

2. Human Respiratory System: (Path of Air)
Nostrils → Nasal Passage → Pharynx
→ Larynx (Voice Box) → Trachea (Windpipe)
→ Bronchi → Bronchioles → Alveoli
→ Alveoli (Air Sacs).



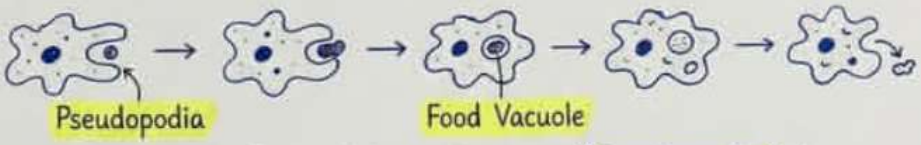
3. Mechanism of Breathing:
- Inhalation: Diaphragm contracts (flattens), Ribs move up & out → Chest cavity volume increases, pressure decreases → Air rushes in.
- Exhalation: Diaphragm relaxes (domes), Ribs move down & in → Chest cavity volume decreases, pressure increases → Air is pushed out.

- Transport of Gases:
  - O_2 carried by Haemoglobin (in RBCs).
  - CO_2 transported as bicarbonate in plasma & by Haemoglobin.

Chapter: Nutrition in Animals (Class 10)

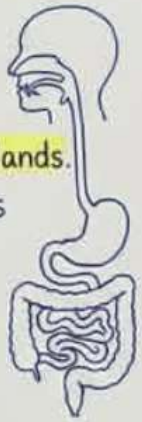
1. **Holozoic Nutrition**: Complex food is taken in & broken down.
   - Steps: Ingestion → Digestion → Absorption → Assimilation → Egestion.

2. Nutrition in **Amoeba** (Unicellular):



Uses temporary finger-like extensions (Pseudopodia) to engulf food.

3. **Human Digestive System** (Alimentary Canal):



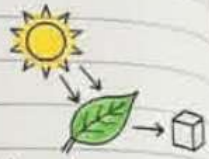
- **Mouth**: Teeth (chew), Tongue (tastes/mixes), Salivary Glands.
  → Secrete Saliva containing Salivary Amylase (breaks starch to sugar).
- **Oesophagus** (Food Pipe): Food moves by Peristalsis (wave-like movement).

- **Stomach**: J-shaped bag. Gastric glands secrete:
  a) HCl (kills bacteria, makes medium acidic for Pepsin).
  b) Pepsin (digests protein).
  c) Mucus (protects inner lining).

Beaumont 322) Martin's omach!

- **Small Intestine**: Site of complete digestion. Receives secretions from Liver (Bile - emulsifies fats) & Pancreas (Pancreatic juice - Trypsin, Lipase).
  Walls have Villi (finger-like projections) for absorption.
- **Large Intestine**: Absorbs excess water. Rest is removed via Anus (Egestion).

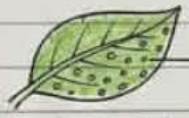
Chapter: Nutrition in Plants (Class 10)



1. **Modes of Nutrition:**
   - **Autotrophic**: Organisms make their own food (e.g., Green plants).
   - **Heterotrophic**: Depend on others for food.

2. **Photosynthesis** (Autotrophic Nutrition):
   Process by which green plants make food using CO_2, H_2O, Sunlight & **Chlorophyll**.

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 \text{ (Glucose)} + 6O_2 + 6H_2O$$

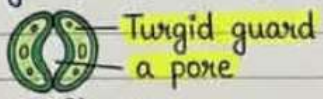


Chloroplasts

Date: 1770 (Priestley's Expt.)

- Requirements:
  a) Sunlight, b) Chlorophyll (green pigment),
  c) CO_2 (from air), d) Water (from soil).

- Site of Photosynthesis: **Chloroplasts** in leaves.
- **Stomata**: Tiny pores on leaf surface for gas exchange (CO_2 in, O_2 out) & transpiration.



Open Stoma Closed Stoma

3. **Heterotrophic Nutrition in Plants (Rare):**
   - **Parasitic**: derive nutrition from host (e.g., Cuscuta/Amarbel).
   - **Saprotrophic**: feed on dead/decaying matter (e.g., Fungi, mushrooms).