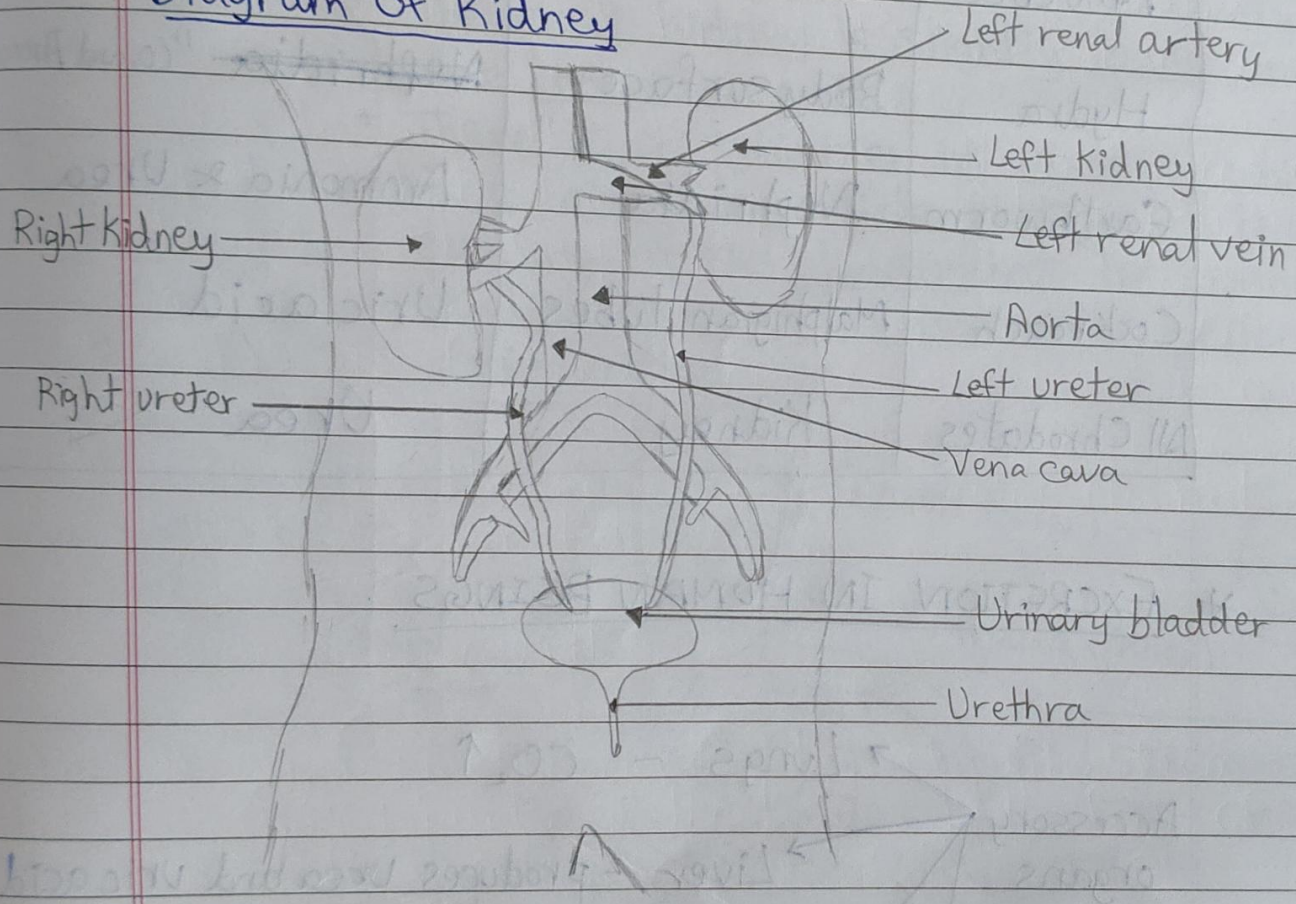
EXCRETION

» Removal of nitrogenous waste
↓
Ammonia, Urea, Uric acid

Diagram of Kidney



» Biological process which removes harmful metabolic waste from the body.

» The waste products in animals include -
(i) Nitrogenous (N_2) compounds like urea, ammonia and uric acid
- uric acid → [birds and reptiles]
- urea → [terrestrial organisms, amphibians]
- ammonia → [aquatic animals like fish, amoeba, etc.]

(ii) CO_2 and H_2O
(iii) Excessive salts and vitamins
(iv) Unwanted medicines

Animals	Excretory organ	Waste product
Amoeba	Cell surface	CO_2 and Ammonia
Hydra	Body surface	~~Nephridia~~ " CO_2 and Ammonia
Earthworm	Nephridia	Ammonia & Urea
Cockroach	Malphigian tubes	Uric acid
All Chrodates	Kidney	Urea

* EXCRETION IN HUMAN BEINGS

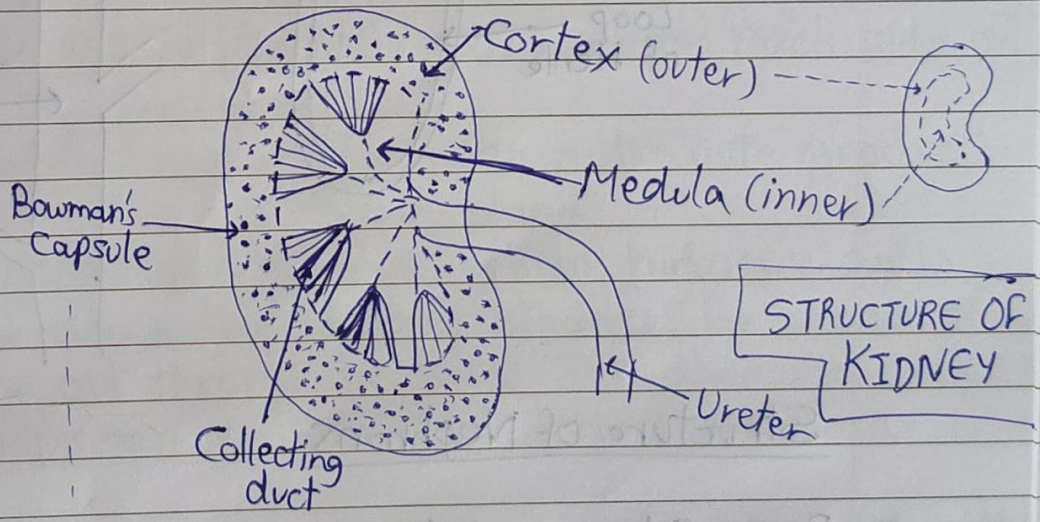
Accessory organs
- Lungs - CO_2 ↑
- Liver - produces urea and uric acid as a by-product of proteins
- Skin - Removes excess water, salts and uric acid
- Urinary System - Kidney filters blood to from urine which is excess water + salts + urea + uric acid

Human ~~ext~~ Urinary System (excretory system)

» The main part of excretory system —

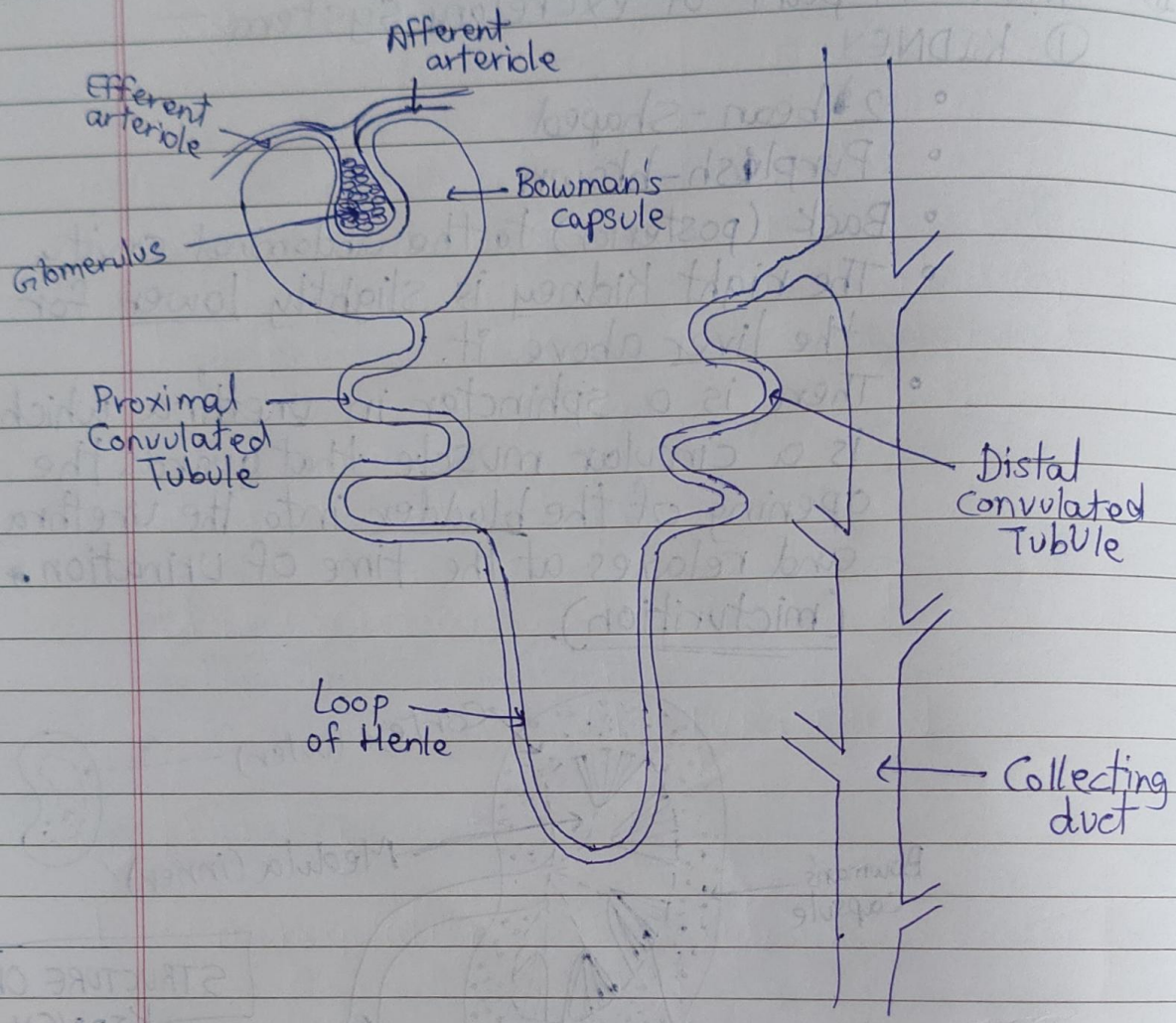
① KIDNEY

- 2 bean-shaped
- Purplish-brown
- Back (posterior) to the abdominal cavity
- The right kidney is slightly lower for the liver above it.
- There is a sphincter in urethra which is a circular muscle that guards the opening of the bladder into the urethra, and relaxes at the time of urination (micturition).



[Clearer and larger structure in 'Nephron' diagram]

NEPRON



Structure of Nephrons

- Basic fitering unit
- Long coiled tubule whose one end is connected to the double-walled cup-shaped structure - Bowman's capsule. The other end is connected to the urine collecting duct.
- Bowman's capsule contains a bundle of blood capillaries known as glomerulus that is followed by tubular part of nephron forming loop. (Proximal Convulated Tubule, Loop of Henle, Distan convulated tubule.)

Functions of Nephrons

(i) Glomerulus filters the blood passing through it.
(ii) It also ensures to move out only harmful substance from the body that include nitrogenous material.
(iii) Useful substances like glucose, amino acids, salts and major amount of water is selectively reabsorbed by Proximal Convulated Tubule, Loop of Henle and Distal Convulated Tubule.

~~Function of~~ Kidney

- To remove nitrogenous waste like urea
- Includes pair of kidneys, pair of ureters, urinary bladder and a urethra
- Location - In the abdomen, one on each side of backbone
- Purpose of urine - To filter out waste products from blood
- The wastes are removed from kidneys and passed down the urinary bladder by a pair of ureters out through urethra. This phenomena is called urination.

- EGESTION - The discharge of undigested matter from the digestive tract via anus in the form of faecus. VS

- EXCRETION - The removal of nitrogenous waste products from the body.

- Accessory excretory organs - liver, skin, lungs, intestine and salivary glands.

Formation of Urine

(1) Ultrafiltration	(2) Reabsorption
» Occurs in the Bowman's capsule where the glomerulus (blood capillaries) create high pressure where almost everything is filtered down except blood cells and proteins	» As lots of water, salts, etc. is filtered down, it is reabsorbed by the blood capillaries and sent back to the body.

Urine excretion – happen due to relaxation of the sphincter muscle.
» This is called MICTURITION.

Functions of Kidney

1. Osmoregulation – Removing excess water from the body
2. Excretion – Remoral of nitrogenous waste
3. Maintains blood plasma concentration.

Abnormal constituents in Urine

1. Haematuria – Blood passes with urine. (UTI – Urinary Tract Infection)
2. Glycosuria – Excess glucose passes with urine due to diabetese.

3. Diuresis — Much water in water due to ADH hormone
[If ADH is less, increased production of urine happens]

4. Renal Calculi (stone) — Oxalate crystals develop causing frequent / painful urination.

Artificial Kidney [Haemodialysis]

A device to remove nitrogenous waste products from the blood due to infection, injury, restricted blood supply which leads to the accumulation of poisonous waste in the body.

EXCRETION IN PLANTS

⇒ Plants release waste in the form of solids, liquids and gases.

① Gaseous waste
- CO_2 [during respiration]
- O_2 [during photosynthesis]

② Liquid waste
- Water [due to transpiration]
  But, during monsoon, transpiration is slow, so in some plants like bananas and strawberries, the water comes at the top of the leaves. [Hydrathodes]
- Gums, ~~raisins~~ resins
  [From old xylem stems]

- Essential oils
  [sandalwood oil, clove oil, olive oil, etc.]

③ Solid waste
- Oak tree releases TANNIN, which is used in the treatments of leather
- Gums for adhesive
- Resins - varnishing, glazing agents
- Natural rubber for tyre industry.