

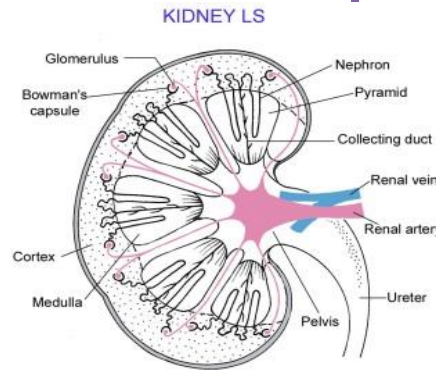
3.4.6 Excretion

Homeostasis is the maintenance of a stable internal environment in an organism.

- **Ectotherms** are animals that obtain their heat from external sources.
- **Endotherms** generate their heat with their own body reactions.

The main excretory organs are:

- lungs (water and carbon dioxide)
- skin (water and salts)
- kidneys (water, salts, and urea)



The functions of the kidneys are:

- excretion of water, salts, and urea
- osmoregulation:
 - control the water content of the blood
 - control the salt concentration of the blood
- control the pH of the blood (and body fluids)

The kidneys make urine in the following way:

- blood (containing waste) enters the kidneys through the renal arteries
- the kidneys filter waste and useful materials from the blood
- useful materials are reabsorbed from the kidneys back into the blood
- some materials are secreted from the blood into the kidneys
- urine formed in the kidneys flows to the bladder through the ureters
- blood (low in waste) leaves the kidneys in the renal veins
- **The bladder** stores urine.
- **Urine is excreted** through the urethra.

Nephrons:

- carry out the functions of the kidneys
- are located in the cortex and medulla of the kidney.

A nephron makes urine as follows:

- **filtration:**
 - blood enters the nephron in the afferent arteriole
 - this forms many capillaries called the glomerulus
 - high pressure in the glomerulus forces water and small molecules out of the blood
 - glomerular filtrate is a dilute solution of waste and useful molecules

reabsorption takes place in the following parts of the nephron:

- **proximal tubule** = water by osmosis, useful molecules and most salts by diffusion and active transport
- **loop of Henle**
 - (i) descending limb = water by osmosis
 - (ii) ascending limb = salts by diffusion and then by active transport
- **distal tubule** = water by osmosis and some salts by active transport
- **collecting ducts** = water by osmosis

