

EXCRETION AND EXCRETORY SYSTEM

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EXCRETION

Excretion is the process by which metabolic waste products are removed from the body of all living things. Excretion is different from egestion which is the removal of solid waste (undigested food substances (i.e. faeces) through the anus. Excretion is necessary for the following reasons:

- To avoid or prevent any harm that would be caused by any excretory product.
- Some excretory products are poisonous to the body and should be removed.
- To maintain water balance in the body (homeostasis).
- To avoid interference of waste products with normal metabolic activities in the body.

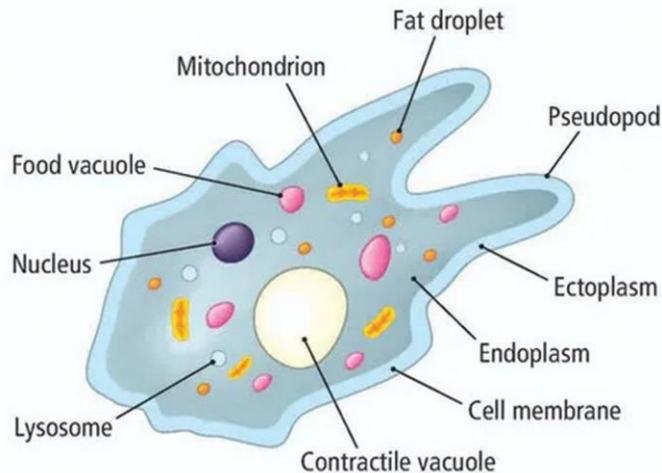
EXCRETORY STRUCTURES AND WASTE IN ORGANISMS

| Organism | Excretory Structure | Excretory Waste Product |
|------------------|-------------------------------|---|
| Protozoa | Contractile vacuole | CO ₂ , ammonia and water |
| Flatworm | Flame cells | CO ₂ , ammonia and water |
| Earthworm | Nephridia | CO ₂ , ammonia and water |
| Crustacean | Green glands | CO ₂ , ammonia and water |
| Insect | Malpighian tubules | CO ₂ , ammonia and uric acid |
| Fish | Kidney | CO ₂ , ammonia and water |
| Amphibian(toad) | Kidney | H ₂ O and salt |
| Reptiles | Kidney | H ₂ O and salt |
| Birds | Kidney and lungs | CO ₂ and water vapour |
| Mammals | Kidney, lungs, skin and liver | CO ₂ , water, urea |
| Flowering plants | Stomata, lenticels and leaves | H ₂ O, CO ₂ , O ₂ , tannins, gum, alkaloids, oil and latex |

TYPES OF EXCRETORY SYSTEMS

CONTRACTILE VACUOLE IN PROTOZOA

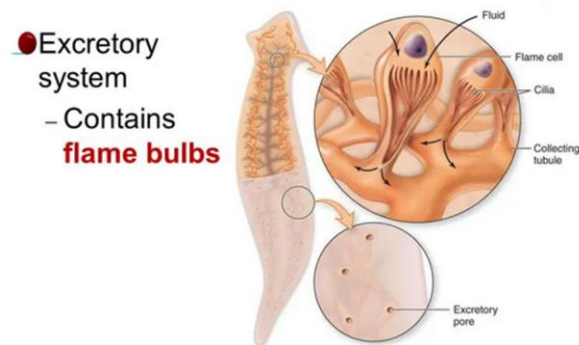
The contractile vacuole is a simple structure found in the cell of freshwater protozoa. Water constantly enters the cell of a protozoan through the selectively permeable membrane because the cell is hypertonic to its environment. As water enters the cell, a contractile vacuole is formed which collects the water and expands, when it reaches the maximum size, it contracts and discharges the water through a temporary break in the cell membrane at the interval. Excretion of carbon dioxide and ammonia is by diffusion through the cell membrane



FLAME CELL IN FLATWORMS

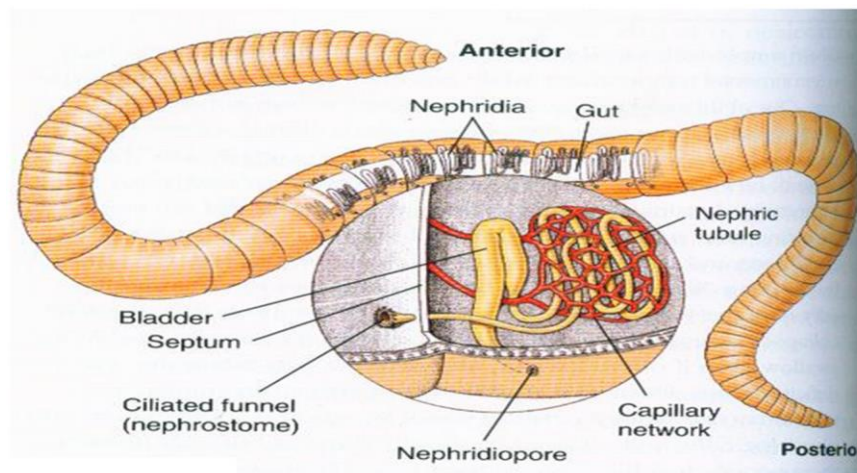
The excretory system consists of two longitudinal canals with branched tubules which end in flame cells. The flame cell has a large hollow called the cell lumen with a bunch of flagella hung on it. The waste product from the surrounding cells enters the flame cells. The flagella help to propel the fluid into the tubules. The fluid passes into the exterior through a narrow tube called duct.

Excretion



NEPHRIDIUM IN EARTHWORM

A pair of nephridia are found on each segment of the earthworm except the three and the last. Each nephridium consists of a ciliated funnel, nephrostome which leads into a long coiled tube (narrow and middle ciliated tubes, wide non-ciliated tubes and muscular tube). The tube opens to the exterior as nephridiopore (excretory pore). The waste product mainly urea is absorbed from blood capillaries surrounding the nephridia. The fluid containing the waste through the long tube of the nephridia, salt and other useful substances are reabsorbed through the wall of the tube. The unabsorbed substances and water gather in the muscular tube and discharge to the exterior through the excretory pore.



MALPIGHIAN TUBULE IN INSECT

Malpighian tubules are found between the mid-gut (small intestine) and the hindgut (large intestine). One end opens into the gut while the other end closed freely floats in the haemocoel. Nitrogenous waste and water in the haemocoel are absorbed in the distal closed end into the tubule. The waste is converted into uric acid as it passes along the malpighian tubule towards the gut. A lot of water is also reabsorbed so that by the time the uric acid reaches the proximal end, it is changed to solid crystals. More water is reabsorbed in the rectum therefore concentrated urine leaves the body as almost dried solid. Contractile vacuole excretion in lower organisms biology flame cells in worms excretion in lower organisms biology nephridium earthworm excretion in lower organisms biology **malpighian tubule excretion in lower organisms biology**

ASSIGNMENT

1. Define excretion.
2. Explain the necessity for an excretory system in animals.
3. Describe the mechanism of excretion in insects.
4. List five excretory products in plants.
5. Differentiate between excretion and egestion.

