Chapter 14

EXCRETION IN LIVING ORGANISMS

You know that as a result of metabolic activities in living systems, many useful as well as waste products are formed in the body. The waste products are toxic for the body if they remain inside it for a long time. Therefore, it is necessary to remove them from the body. The process of removal of waste products from the body is called excretion.

14.1 Excretion in animals

Make a list of substances that our body naturally removes. Urine is one of the important excretory substances in this list. There are special organs in our body which help in removing urine; these are collectively called the urinary system (Fig.14.1). Let us see which organs make up this system.

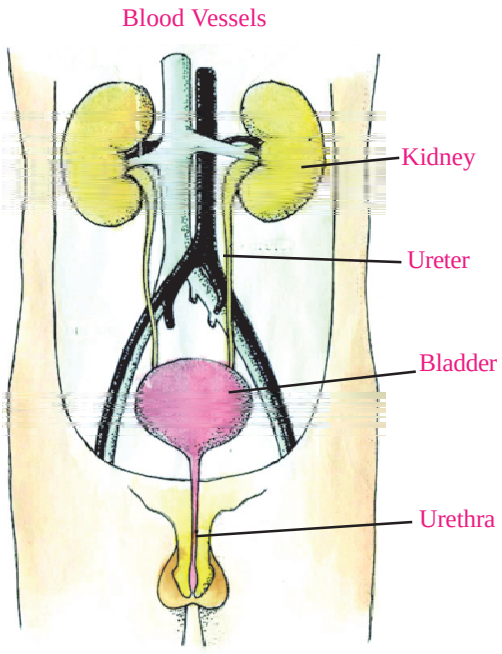

Fig 14.1 Human excretory system

1. **A pair of kidneys-**

   Kidneys are situated just below the diaphragm, inside the abdomen on either side of the vertebral column. They are bean-shaped and deep red in colour.

2. **Blood vessels -**

   Two blood vessels are connected to the inner part of each kidney. Out of these, one brings blood to the kidney and the other takes away the filtered blood from the kidney.

3. **Ureter -**

   A tube called ureter comes out from the inner margin of each kidney. This carries the filtered urine from the kidney to the urinary bladder.

4. **Urinary bladder and urethra –**

   Urinary bladder is a sac like structure made of muscles. Urine is collected in this bladder and once the bladder is full, urine is removed from the body through the urethra.

14.2 How is urine formed in the body?

Ammonia gas is formed as a result of digestion in the small intestine, (especially digestion of proteins). It is necessary to remove this gas since it is harmful. This gas cannot be removed directly from the body. It

reaches the liver along with blood, where it forms urea after combining with carbon dioxide. Urea is less harmful than ammonia. Urea reaches the kidneys along with the blood, where it is filtered and removed from the body as urine. Urine thus consists mainly of urea and water.

$$\text{Ammonia} + \text{Carbon dioxide} \xrightarrow[\text{(in the liver)}]{} \text{Urea}$$

Apart from urine there are other excretory products in our body which are formed as a result of various processes. It is also necessary to remove these products from the body. Some harmful substances are removed through the intestine in the form of faeces, while carbon dioxide and moisture are removed through the process of breathing out. Some unwanted minerals are removed in the form of sweat through the sweat glands present in the skin. Let us see how excretory products are removed in other organisms—the majority of terrestrial organisms remove urea through urine but there are certain organisms who do not produce liquid urine. In organisms living in dry environments—such as lizards, snakes, pigeons, cockroach, etc., ammonia is converted to solid uric acid. These organisms excrete solid uric acid. You must have seen bird-droppings. These are white and black in colour. The white part in bird droppings is uric acid, and the black part consists of undigested food.

Aquatic organisms like fishes remove the ammonia from their body directly through the skin which then gets dissolved in the surrounding water. In micro organisms like—Amoeba, Euglena, paramecium, Hydra etc., ammonia is formed as an excretory substance. Their body is simple and the entire body is surrounded by water so that as ammonia gas is formed, it comes out of the body and passes into the surrounding water.

14.3 Excretion in plants

You must have observed that the leaves and the bark of many trees dry up and fall off. The unwanted metabolic products are stored in these leaves and barks and as they fall, the waste products are also removed. Thus, plants also excrete like other organisms but they do not have special organs for excretion.

In some plants, excretory products formed as a result of metabolic activies accumulate in the cells in the form of calcium oxalate or calcium carbonate crystals. These remain in the cells throughout the life of the plant.

It is a common experience that eating yam (jamikand) and leaves of Colocasia*(arvi)*, can cause irritation in the throat. The reason for this is that the sharp ends of crystals which are present in the cells of the leaves prick the inside of the throat. These are called Raphides. Similarly, calcium carbonate crystals acumulate in the leaves of Banayan trees in the form of bunches.

Activity - 1

Materials required :- Banyan leaf, glycerine, water, slides, a new blade, red ink, microscope.

Put a part of the Banyan leaf in a piece of potato or pumpkin. Cut thin uniform sections out of it with the help of a new blade. Put the sections in a watch glass containing water and add two drops of red

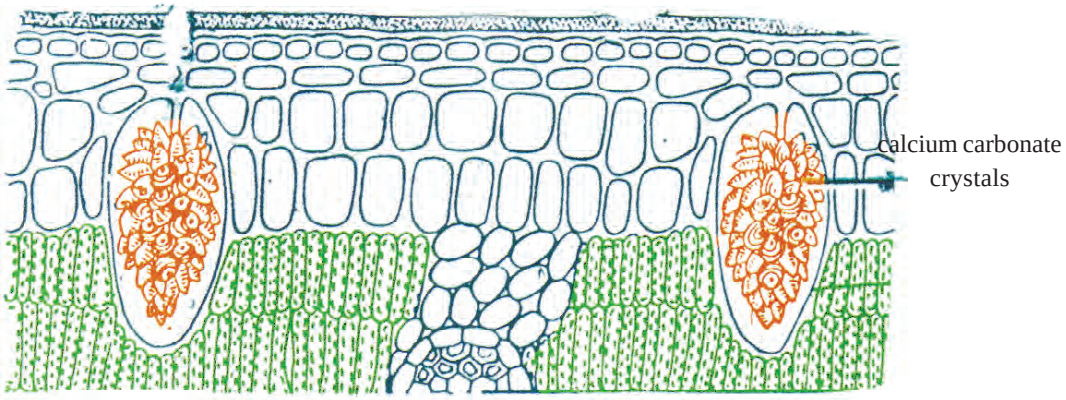

Fig 14.2 V.S. of a Banyan leaf

ink to it. Observe a thin section under the microscope and compare it with Fig 14.2. Could you identify the calcium carbonate crystals in the section?

Repeat the same activity using Nerium *(kaner)*, Ziziphus *(ber)*, Money-plant and Arum *(arvi)* leaves and identify the crystals under the microscope. Certain excretory products of plants like gum, rubber, etc. are useful for man.

We have learnt

- The process by which unwanted metabolic products are removed from the body is called excretion.
- Kidneys, Ureter, Urinary bladder and Urethra together form the excretory system in man.
- Ammonia is converted to urea in the liver.
- Kidneys filter out unwanted substances from the blood.
- Organisms, living in dry environments produce solid uric acid as an excretory product.
- In simple micro organisms excretion takes place through the body surface.
- Special organs are present for excretion in animals but not in plants.
- In some plants, unwanted substances are accumulated in the leaves, bark, stem, etc. Rubber, Gum, Raphides are examples of such unwanted substances.

Questions for practice

1. Choose the correct answer

1. Unwanted substances are filtered from the blood by-

a) Heart b) Lungs c) Kidney d) Stomach

2. The main excretory substance in man is-

a) Uric acid b) Urea c) Water d) Sweat

3. In bird droppings the colour of uric acid is-

a) Black b) White c) Green d) Green & White

4. In our body, which organ is responsible for conversion of ammonia to urea-

a) Liver b) Kidney c) Lungs d) Heart

5. In which organism does ammonia get directly dissolved in water through the body surface-

a) Mosquito b) Parrot c) Lizard d) Amoeba

2. Answer the following questions:

1. Why it is necessary to remove unwanted metabolic products from the body?
2. Where are the kidneys situated?
3. How is urine formed?
4. Name some of the excretory substances formed in plants.
5. How does excretion takes place in birds and insects?
6. Draw a labelled diagram of the excretory system in human beings.

Do these also

1. Make a list of various organisms found around you like lizard, snake, bird, cockroach, cow, cat, fish, squirrel etc. and write the main excretory substance they produce:—

S.no.	Name of the organism	Main excretory substance
1.	Fish	Ammonia
2	Pigeon	Uric acid
3.	_____	_____
4.	_____	_____

2. With the help of your friends and teachers identify some of the plants around you which produce rubber, gum, raphides , etc. as excretory substances.