



6 INTERNAL ORGANS AND THEIR FUNCTIONS - 2

In "Internal organs and their functions - 1", you have already studied those parts of the body which provide support and play a role in the movement of the body. In this chapter, we will get to know about the rest of the internal organs of the body.

The two dissected rats in the kit

In your kit there are two rats dissected in different ways ('a' and 'b') for observation. Both the rats have been dissected from the ventral side (i.e. the abdominal side). For the dissection, the skin is slit right down the middle of the abdomen and moved aside. Then the muscles and ribs below the skin are cut off and removed. By doing this, the various organs underneath the muscles and ribs are made visible in their natural positions.

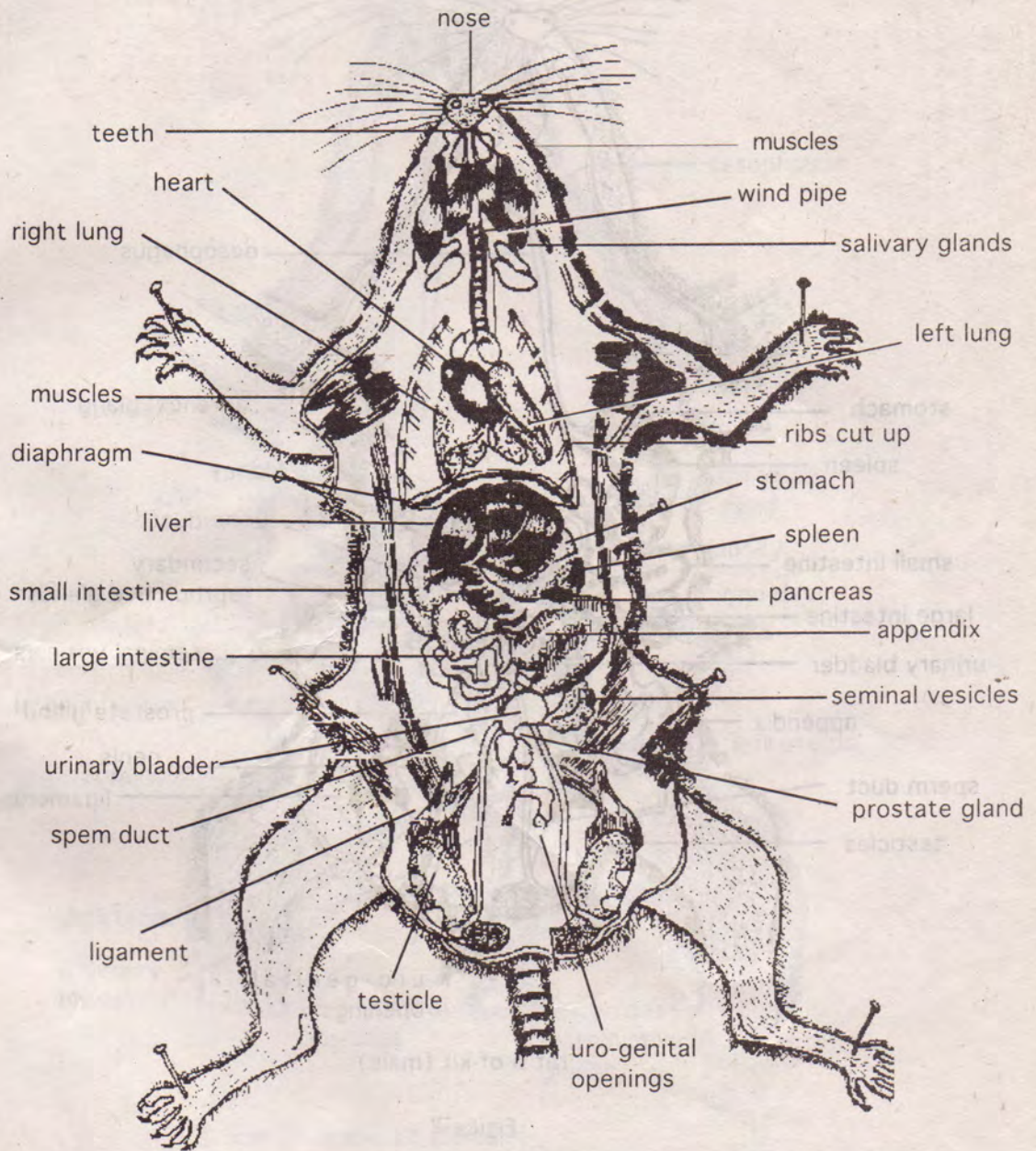
The rat displayed in this manner will be called rat 'a' (Figure-1). However, in rat 'a', hidden beneath these organs are more organs towards the back which are still not visible. In order to display these organs, a few of the organs in the front are cut off and thrown away and a few are moved aside and tied together. The rat in which the organs located at the back can also be seen will be called rat 'b'. In Figure-2, a male rat 'b' and in Figure-3, a female rat 'b' have been shown.

Getting to know the internal organs

Look carefully at rats 'a' and 'b'. With the help of Figures 1, 2 and 3, identify the organs of rat 'a' and rat 'b' respectively. Is your rat 'b' male or female?

Now close your book, and looking at rats 'a' and 'b', draw a picture of each in your note book.

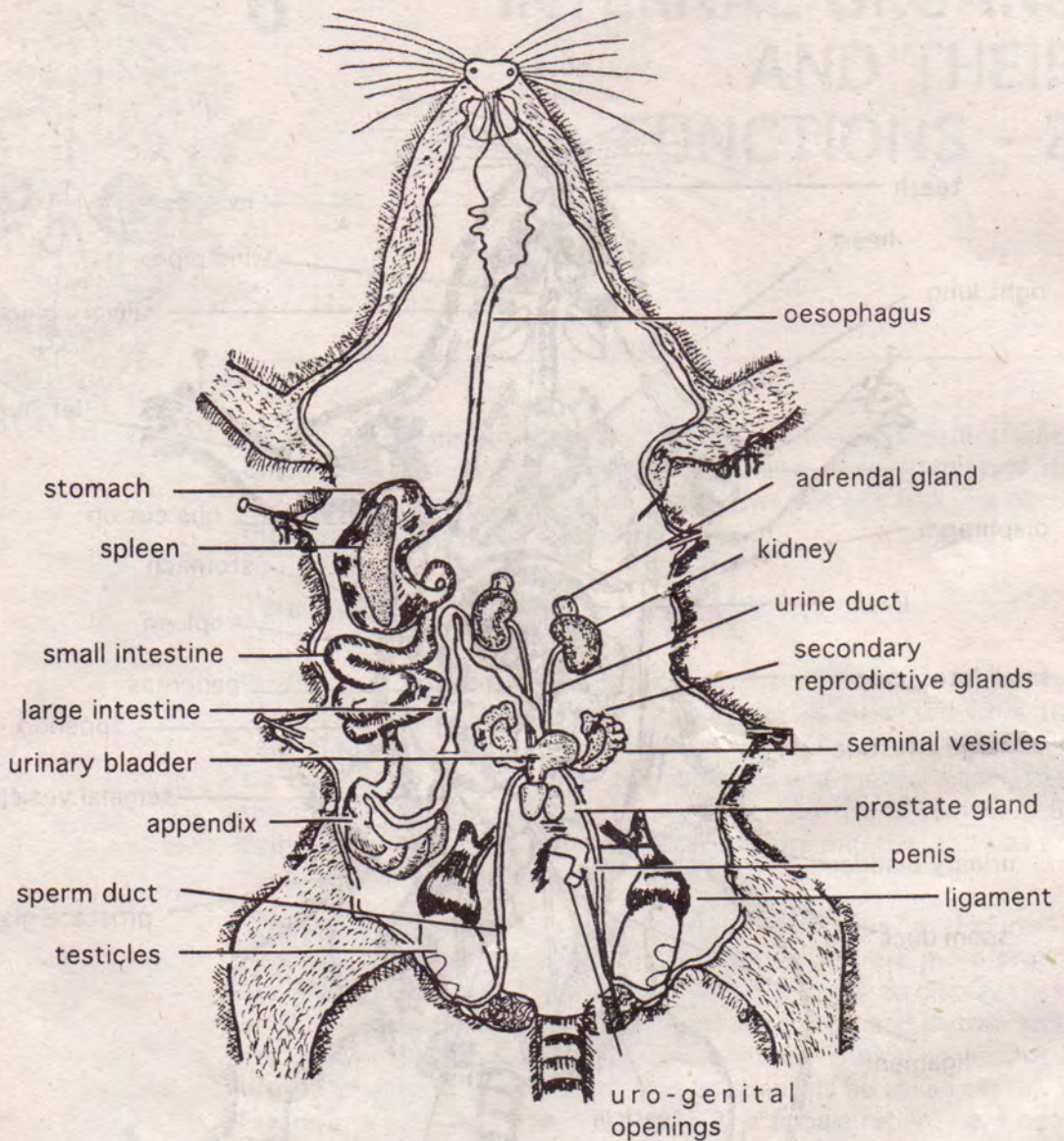
With the help of Figures 1, 2 and 3, label your pictures.



A rat of kit

Figure-1

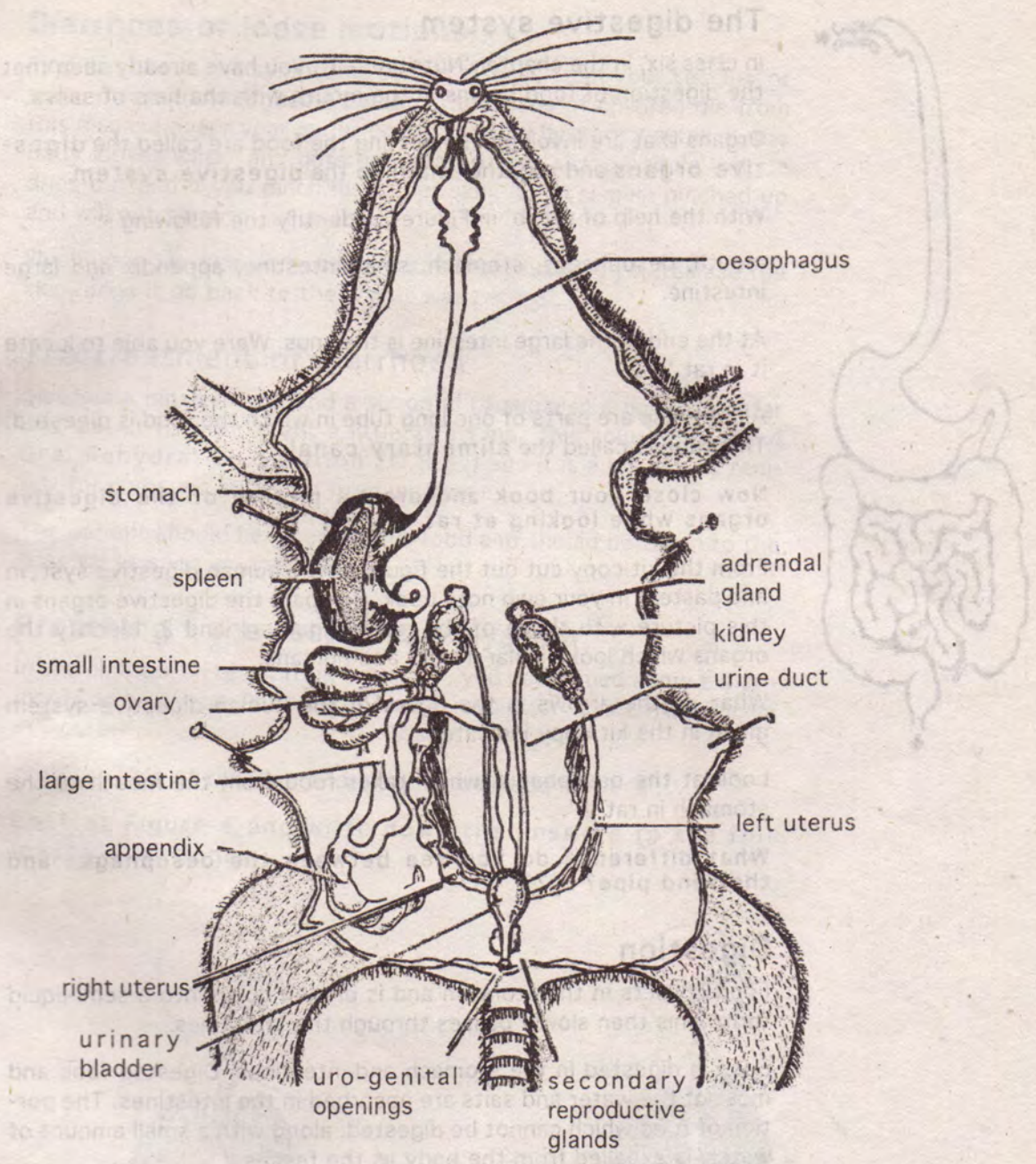
In this figure, the skin above the testicles has been opened showing the testicles. It may happen that the rat 'a' in your kit has not been opened in this way to reveal the testicles. It is also possible that the 'a' in your kit is female and therefore has no testicles.



rat b of kit (male)

Figure-2

The stomach, small intestine and large intestine seen in male and female rat 'a' have been moved off to the left in the rat 'b'. In addition, the membrane joining these organs has been cut to show each organ separately. Because the pancreas remains joined to this membrane, cutting the membrane makes it hard to identify this organ. In this figure, the liver, diaphragm, heart, lungs and wind pipe are not shown so that the oesophagus can be seen easily.



rat 'b' of the kit (female)

Figure- 3

In this figure, the left uterus looks like a straight tube. In the right uterus, four puffed-up ball-like formations are seen. Inside these formations are fetuses. Foetuses are often seen in both uterus.



The digestive system

In class six, in the chapter 'Nutrition - 1', you have already seen that the digestion of food begins in the mouth with the help of saliva.

Organs that are involved in digesting the food are called the **digestive organs** and together make up the **digestive system**.

With the help of rat 'b' in Figure-2, identify the following -

mouth, oesophagus, stomach, small intestine, appendix and large intestine.

At the end of the large intestine is the anus. Were you able to locate it in rat 'b'?

All of these are parts of one long tube in which the food is digested. This tube is called the **alimentary canal**.

Now close your book and draw a picture of the digestive organs while looking at rat 'b'. (1)

From the kit copy cut out the figure of the human digestive system and paste it in your own note book. Compare the digestive organs in this picture with those of the rat in Figures-1 and 2. Identify the organs which look similar in rats and humans.

What do the arrows in the figure of the human digestive system given in the kit copy indicate?

Look at the oesophagus which takes food from the mouth to the stomach in rat 'b'.

What difference do you see between the oesophagus and the wind pipe? (2)

Digestion

Food collects in the stomach and is broken down into a semi-liquid form. This then slowly passes through the intestines.

Food is digested in the stomach and intestines. Digested food and most of the water and salts are absorbed in the intestines. The portion of food which cannot be digested, along with a small amount of water, is expelled from the body as the faeces.

Two glands of the digestive system

Look at the liver in rat 'a'. In a living rat this gland is big and red.

Bile is produced in it. Bile helps in the digestion of fats.

In the picture of rat 'a' you can see the pancreas. This is a small and spread out gland. Juices produced in it break down food.

Diarrhoea or loose motions

Find out about the symptoms of this disease from your teacher or some other knowledgeable person. Thousands of children die from this disease every year in our country. When diarrhoea attacks, the body loses water and gets dehydrated. The sick person's tongue dries out and if you pinch his or her skin, it will remain pinched-up and will not smooth out easily.

Pinch your own skin and watch what happens. When you release the skin, does it go back to the way it was before?

The treatment of diarrhoea

Dissolve a pinch of salt and a spoonful of sugar in a glass of water and give it to the patient a little at a time. This solution is called **Oral Rehydration Solution (O.R.S.)** and it is a life saving remedy for someone suffering from diarrhoea.

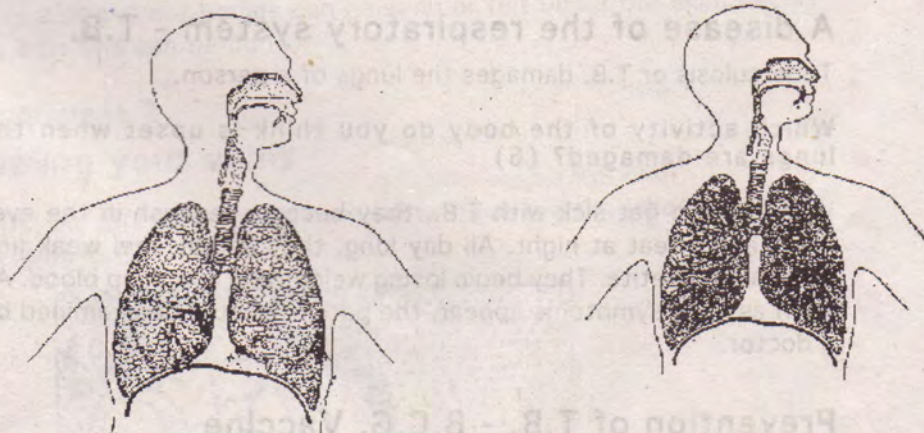
The patient should be given normal food and should be taken to the hospital as soon as possible.

Breathing - the respiratory system

In the chapter on respiration in class 7, you performed some experiments on breathing. Parts of the human respiratory system are shown in Figure-4.

With the help of this figure identify these parts in rat 'a'.

Look at Figure-4 and write down the answers to the following questions -



The human respiratory system

internal structure of lungs

Figure-4

What would be the effect on the lungs when the ribcage expands and the diaphragm is pushed downwards. Why does this happen? (3)

When the ribcage contracts inwards and the diaphragm rises upwards, what effect will this have on the lungs? (4)

Experiment-1

Where are the lungs located in our body and how do they get affected by breathing air in and out? In order to find out, let us do this experiment.

Get a measuring tape or a string.

Measure the chest of your friend with the help of a tape or string.

Tell your friend to take a deep breath, hold the two ends of the tape together lightly around his chest and then ask him to slowly release his breath (Figure 5).

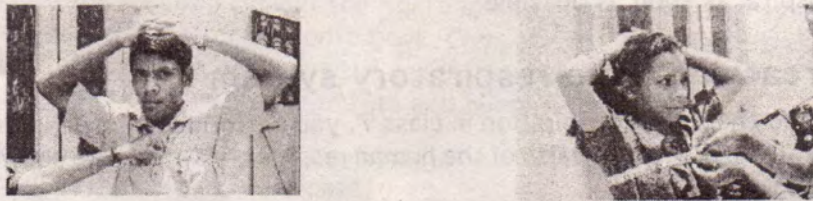


Figure-5

When air is breathed in and out, what happens to the size of the chest? (5)

A disease of the respiratory system - T.B.

Tuberculosis or T.B. damages the lungs of a person.

Which activity of the body do you think is upset when the lungs are damaged? (6)

When people get sick with T.B., they become feverish in the evenings and sweat at night. All day long, they cough, feel weak and lose their appetite. They begin losing weight and cough up blood. As soon as such symptoms appear, the patient should be examined by a doctor.

Prevention of T.B. - B.C.G. Vaccine

If a baby is given a B.C.G. vaccination before the age of one year, then it will never get T.B.

The respiratory system and smoking

There are several harmful substances in cigarette and *bidi* smoke. Those who smoke a lot are unable to do strenuous work because the smoke damages the insides of the lungs, making them out of breath very soon. They cough a lot and run a greater risk of getting serious diseases like cancer of the lungs and of the wind pipe.

The flow of blood in the body - the circulatory system

Have you ever wondered just where the blood is in your body and how it reaches all the parts?

Look at the dissected rat 'a' and identify the heart. The heart is an organ which beats continuously and sends blood to different parts of the body through various tubes called arteries. Through another set of tubes called veins, the blood returns to the heart. The heart and these tubes together make up the circulatory system.

Put your ear on the left side of the chest of a friend for a few moments. Did you hear something? That is the sound of the heart beating.

Can you also feel this beating with your hand? (7)

When a doctor examines a patient by holding a stethoscope to his or her chest, she listens to the heart beat in addition to the sound of breathing.

It is easy to see the heart in the dissected rat 'a' preserved in formalin solution, but all the tubes which carry blood to and from the heart cannot be seen clearly. However, some of the veins which carry blood in our bodies can be seen or felt under our skin. Let us see how this can be done.

Experiment 2

Feeling your veins

With your left hand, clasp your right arm above the elbow as shown in Figure-6.

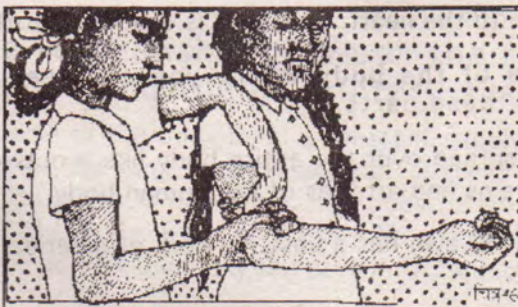


Figure-6



Now, make a fist with your right hand, then bend and straighten your right arm 4 or 5 times. Watch your arm carefully.

Do you see any tubes protruding under the skin? (8)

Now release your arm and open your hand.

Did the Swollen tubes return to normal?

Those swollen tubes you just saw are some of veins which carry blood from your hand to the heart.

After claspng your arm above the elbow the veins started to swell up. Why? Take a moment to think about this and give your answer. (9)

You may have seen a doctor or *vaidya* taking the pulse of a patient. Now we shall try and do this ourselves.

Experiment-3

Beat of the pulse - a feature of arteries

Put the fingers on your wrist as shown in Figure-7. Now press the wrist lightly with the fingers.

Do you feel any beats?



Figure-7

Using a watch, count how many beats there are in one minute. Write down the number in your note book. (10)

When the blood from the heart is pushed into the arteries, the arteries also beat along with the heart. This beat is called the pulse.

Look for other parts of the body where you can feel the pulse. Make a list of these parts. (11)

Arteries and veins are spread over the entire body like a network. Figure-8 shows major veins and arteries of the human body.

Similarly, the body of a rat also has a vast network of arteries and veins.

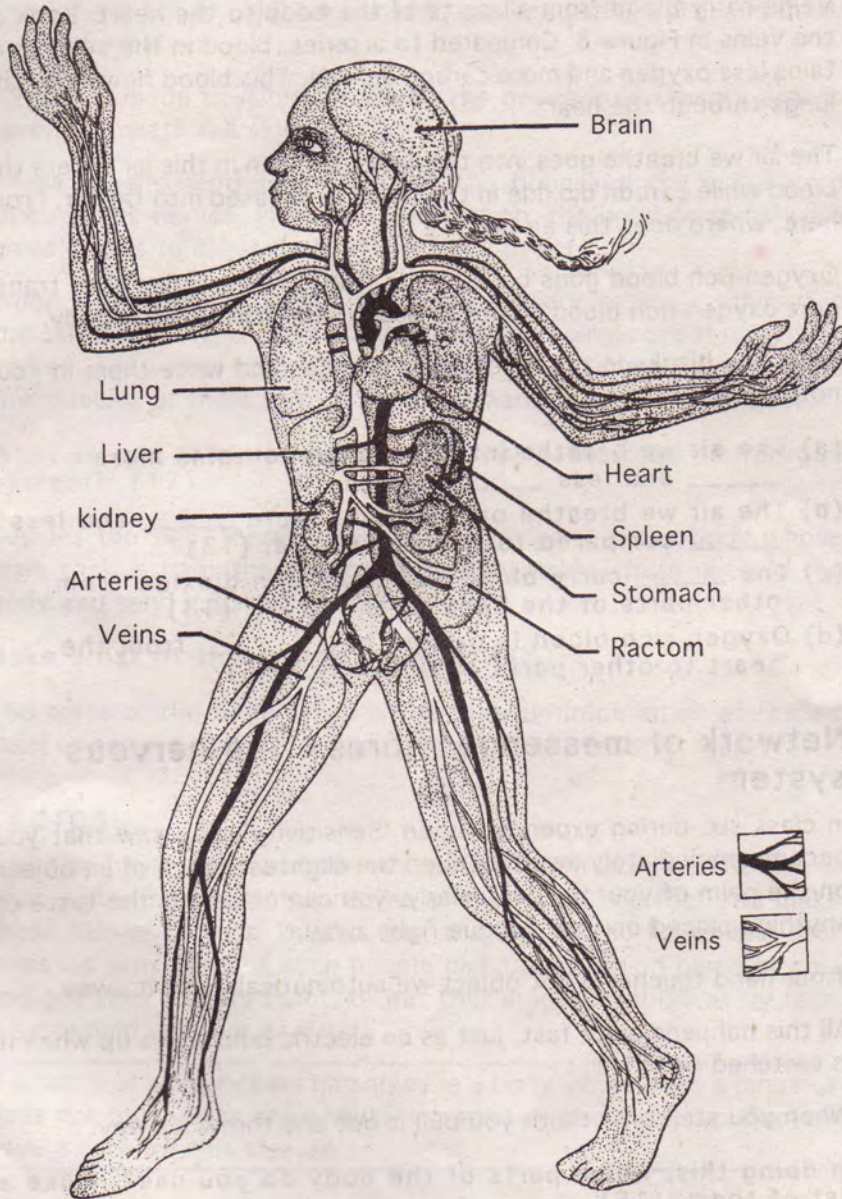


Figure-8 The human blood circulatory system

The relationship between the respiratory system and the circulatory system

All parts of the body need a constant supply of oxygen for respiration. At the same time, respiration in these parts produces carbon dioxide which is harmful to the body. It is necessary to remove it from the body. Both of these jobs are performed by blood. From where do you think oxygen gets into the blood?



Veins carry blood from all parts of the body to the heart. Look at the veins in Figure-8. Compared to arteries, blood in the veins contains less oxygen and more carbon dioxide. This blood flows into the lungs through the heart.

The air we breathe goes into the lungs. Oxygen in this air enters the blood while carbon dioxide in the blood is released into the air. From here, where does this air go?

Oxygen-rich blood goes back to the heart. The arteries then transport oxygen-rich blood from the heart to all parts of the body.

Fill in the blanks in the following sentences and write them in your note book -

- (a) The air we breathe into our lungs contains more _____ and less _____. (12)
- (b) The air we breathe out contains more _____ and less _____ compared to the air outside. (13)
- (c) The _____ carry blood rich in carbon dioxide from other parts of the body to the heart. (14)
- (d) Oxygen-rich blood is carried by _____ from the heart to other parts of the body. (15)



Network of messenger fibres - the nervous system

In class six, during experiments on 'Sensitivity', you saw that you become immediately aware of even the slightest touch of an object on the palm of your hand. Similarly, you can make out the taste of anything placed on your tongue right away.

If our hand touches a hot object we automatically pull it away.

All this happens quite fast, just as an electric bulb lights up when it is switched on.

When you step on a thorn you pull it out and throw it away.

In doing this, which parts of the body do you use? Make a list of them. (16)

Have you ever wondered how your hand finds out **where** the thorn is in your foot that needs removing?

Do you think there could be wires like telephone wires connecting your feet and hands?

Figure-9 shows the human nervous system. Thread-like nerves spread out in a network from the brain and spinal cord throughout the body. In this figure, only the main nerves of the human body are shown.

You have seen that whenever something touches our body, we become aware of it through our skin. Not only that, we also come to

know if it is hot or cold, hard or soft, gas or liquid or solid, and other such information.

All this is made possible thanks to the network of sensory organs spread beneath the skin.

These organs send information to the brain and the spinal cord through the nerves. From this information, the brain or spinal cord gives orders to other parts of the body to act.

When a hot object touches the hand, sensory organs scattered in the skin of the hand send a message to the spinal cord through the nerves. The spinal cord, through other nerves, immediately causes the muscles of the arm to remove the hand from the hot object.

What do you think would happen if our bodies had no nervous system? (17)

Besides the skin, there are some other organs in the body whose main task is to gather information (sensations) from outside the body and send it to the brain.

Make a list of these other organs. (18)

The parts of the body which gather outside information are called the **sensory organs**. The skin is one of the sensory organs.

Leprosy

You may have seen someone who suffers from leprosy. The germs of this disease attack the nerves of the hands and feet and make these nerves useless. Due to this, the skin of the hands and feet loses its sensitivity. If such people pick up a burning piece of coal and get their fingers burnt, or get their fingers nibbled at by rats, they remain unaware of it.

If a patch of skin appears on someone's body where even a pin prick does not hurt, he or she should immediately see a doctor. Doctors have a cure for this disease.

Organs removing harmful substances from the body - the urinary system

You are aware that when urine of humans, cows, buffaloes etc. collects in one place, it starts stinking after a while. You have already studied the properties of some gases in the chapter on gases.

Which gas might be responsible for this smell? (19)

In the body, several chemical reactions are always taking place. In some of these reactions, this gas is produced. This gas is harmful to the body. Therefore, it is necessary to remove it.

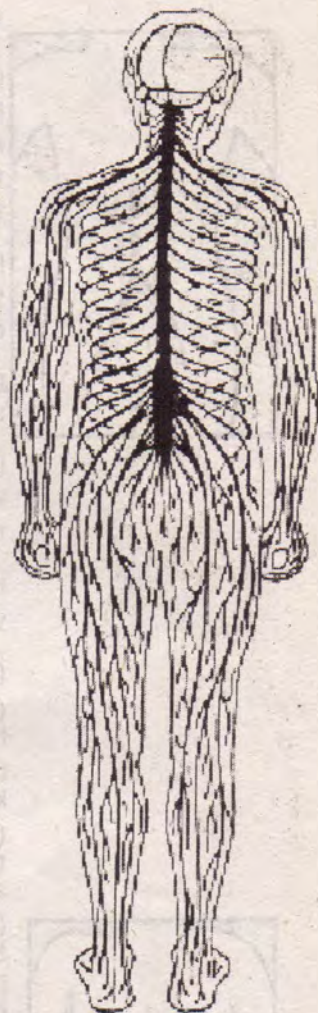
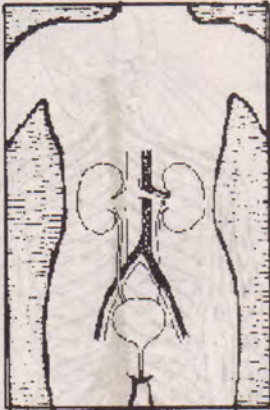


Figure-9 Human nervous system





This gas is converted into urea in the liver.

In the liver this urea gets dissolved in the blood and is carried to the heart. From there it reaches the kidneys through the arteries. In the kidneys, the urea is filtered out and is removed from the body in the form of urine. In rat 'b' look at the kidneys. You may use the figure to locate them.

In the kit copy, a picture of the human urinary system is given. Cut this out and paste it in your note book. Compare it with the picture of the urinary system of a rat.

Based on the comparison, label various parts of the human urinary system. (20)

Look at the arrows shown in the figure of the urinary system in the kit copy. With the help of these arrows, try to understand the function of the kidneys.

Now fill in the blanks in the following sentences and copy them in your note book:

(a) Urine is mainly a solution of _____ in water. (21)

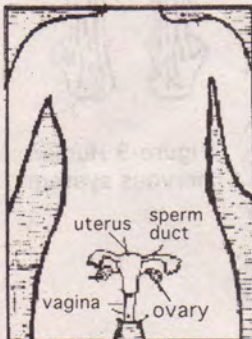
(b) From the liver, blood containing urea is carried to the heart by the _____. (22)

(c) From the heart, blood containing urea is carried to the kidneys by the _____. (23)

(d) In the kidneys _____ is filtered from the blood and there it dissolves in _____ along with other harmful substances. (24)

(e) The urine which is removed from the kidneys goes into the _____ through the _____. (25)

(f) After the _____ fills up, _____ is expelled from the body along with many harmful substances. (26)



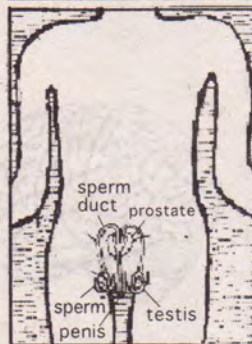
Organs of reproduction - the reproductive system

Look at the reproductive organs in rat 'b' of the kit and with the help of the picture, try to identify them.

Is this rat a male or a female? (27)

What is the basis of your answer? (28)

Close your book and looking at the dissected rat 'b', draw a labelled diagram of the reproductive system. (29)



The testicles of the male rat produce sperm. In the same way, in the female rat, ova are produced in the ovary. It is the union of sperm and ovum which produces offspring.

The foetus then develops in the uterus.

In Figure-2, look at the two tubes (sperm ducts) which, in the male

rat, carry sperm out of the testicles.

What will happen if both these tubes are tied shut? (30)

Look at the female rat's ovaries in Figure-3.

What will happen if ova from both the ovaries are prevented from getting into the uteri? (31)

- The operation to tie up the tubes carrying sperm out of the testicles is called **vasectomy**. The operation to tie up the tubes carrying ova from ovaries into the uterus is called **tubectomy**.

A model of internal organs

From your kit copy, carefully cut out the outline of the body. Inside it, in a few places letters (a, b, etc.) are written. Cut a slit with a blade on the black lines drawn next to the letters.

Now carefully cut out the organs along their outer edges from your kit copy. Small tabs which are labelled with letters, stick out from

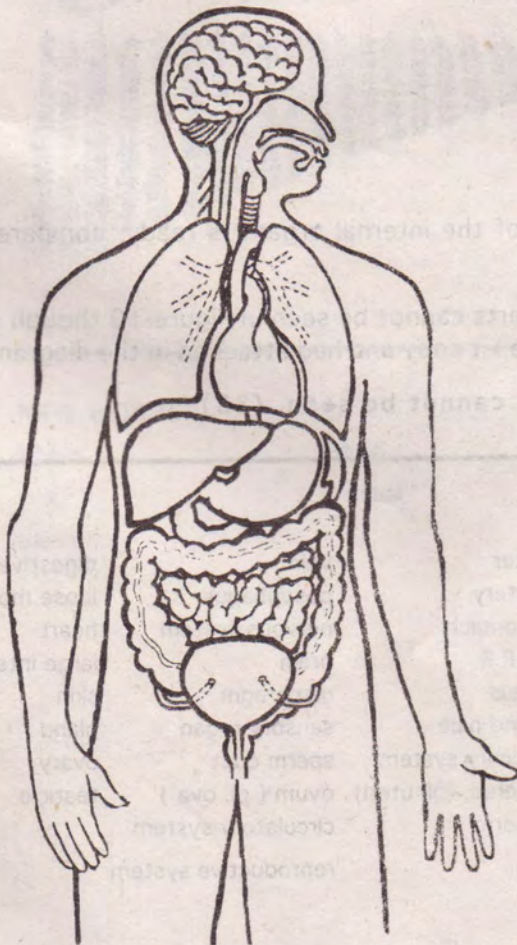


Figure-10



these organs. With the help of these tabs, attach the parts in their proper serial order at the designated places, in the diagram of the body which you had cut above. You will see that on doing this some organs and systems overlap. In our bodies too, organs and systems are placed like this. In making this model take the help of figure-10.

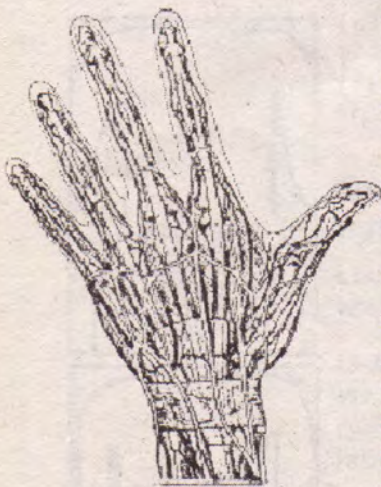
The order of cutting out the parts is:

- a-b kidneys
- c1-d1 mouth and the upper part of the oesophagus
- c2-d2 mouth and the upper part of the wind pipe
- e-f lungs
- g-h stomach
- i-j heart
- k-l urinary duct
- m-n small intestine
- o-p large intestine
- q-r spleen
- s-t liver
- u bladder
- v-w brain

After your model of the internal organs is ready, compare it with Figure 10.

Which important parts cannot be seen in Figure-10 though you had cut them out of the kit copy and had attached in the diagram? (32)

Explain why they cannot be seen. (33)



NEW WORDS:

- | | | | |
|--------------------|---------------------|---------------------|------------------|
| dissected | liver | vein | digestive system |
| pancreas | artery | oesophagus | loose motion |
| diarrhoea | stomach | nervous system | heart |
| small intestine | O.R.S. | brain | large intestine |
| spinal cord | anus | diaphragm | skin |
| alimentory canal | wind pipe | sensory organ | gland |
| kidney | urinary system | sperm duct | ovary |
| bladder | uterus, (pl. uteri) | ovum (pl. ova) | testicle |
| urinary duct | sperm | circulatory system | |
| respiratory system | | reproductive system | |