

Chapte - 7 Structural Organisation in Animals

Question-1

Write a note on gaseous exchange in cockroach.

Solution:

Cockroach has a system of trachea. Hence, tracheal respiration occurs in these animals. It is a complicated system of air tubes. They divide and form tracheoles. Tracheoles are connected to the spiracles located in the segments of thorax and the abdomen. The body cells are filled with fluid, which come in direct communication with the air. Thus, gaseous exchange takes place.

Question-2

What is nerve ring?

Solution:

The nervous system is exhibited by ganglia arranged segment-wise on the ventral nerve cord in earthworms. A ganglion is a mass of nerve cells. The nerve cord in the anterior region bifurcates laterally encircling the oesophagus and uniting dorsally in the form of a nerve ring. The nerve ring along with cerebral ganglia represents the brain.

Question-3

Write a note on blood vascular system of cockroach.

Solution:

Blood vascular system of cockroach is of the open type. The blood vessels are poorly developed and open into spaces rather than the capillaries. All the visceral organs are in the blood, which is also called haemolymph. Haemolymph consists of colourless plasma and many corpuscles called haemocytes. Respiratory pigments are absent in the blood. The blood flow is maintained by the elongated tube with muscular wall lying in the mid dorsal segment of the thorax and abdomen region. The heart of a cockroach consists of thirteen funnel-shaped chambers, which are arranged segment ally. Each chamber shows one heart-like structure. At the lateral sides of each chamber, two pores or ostia are present one on each side. The ostium is guided by a valve to allow blood flow only in one direction.



Question-4

Write a note on body wall of earthworm.

Solution:

The body wall of earthworm is covered by a thin non-cellular cuticle. The cuticle is followed by an epidermis, two muscle layers and an innermost coelomic epithelium. The epidermis consists of a single layer of columnar epithelial cells. It contains many other types of cells, including secretory gland cells. The body wall of earthworm also contains muscle layers, which are made up of circular and longitudinal muscle fibres.

Question-5

Describe the digestive system of cockroach.

Solution:

In cockroach, the alimentary canal is present in the body cavity.

It is divided into three parts, (i) fore gut, (ii) mid gut and (iii) hind gut.

The mouth opens into a short tubular pharynx. It passes and bends into a narrow tubular passage called oesophagus. The oesophagus opens into a sac-like crop. The crop is followed by the gizzard. It has an outer thick layer of circular muscles and a thick inner cuticle forming six chitinous plates called teeth. The gizzard helps in grinding hard food particles. The entire fore gut is lined by a cuticle. The mid gut is a narrow tube of uniform diameter without an inner lining of cuticle. A ring of blind caeca called hepatic caeca is present at the junction of the mid gut and hind gut. There is a ring of about 150 thin yellowish malphagian tubules. Malphagian tubules help in excretion of nitrogenous waste material. The hind gut is broader than the mid gut. It is lined internally by a cuticle. It opens by the anus. Digestive juices are produced by the wall of the mesenteron and hepatic caeca as well as by a pair of large salivary glands. These salivary glands open into the pharynx.



Question-6

Give an account of reproductive system in earthworm.

Solution:

The earthworm is a hermaphrodite. The testes and ovaries are present in the same individual. There are two testes present in the 10th and 11th segments. Ducts called vasa deferentia arise from them. They run up to the 18th segment where they join the prostatic duct. Accessory glands are fused on the ventral side of the 17th and 19th segments. The prostate and spermatic duct open to the exterior by a pair of male genital pores on the ventro-lateral side of the 18th segment. The sperm thecae are found on each of the 6th to 9th segments. There are 4 pairs. They receive the stored spermatozoa during copulation. Two ovaries are attached at the inter-segmental septum of the 12th and 13th segments. Ovarian funnels are found beneath the ovaries. They continue into oviducts, where they join together and open on the ventral side as a single female genital pore on the 14th segment. The development is direct. There are no larval forms in earthworm.

Question-7

What is clitellum?

Solution:

Clitellum is a circular band of glandular tissue surrounding the 14th, 15th and 16th segments of the earthworm.

Question-8

What is the difference between male and female cockroach?

Solution:

The difference between male and female cockroach are as follows

Male cockroach	Female cockroach
(i) The abdomen is long and narrow.	(i) The abdomen is short and broad.
(ii) Anal styles are present.	(ii) Anal style is absent.
(iii) Nine abdominal segments are visible.	(iii) Seven abdominal segments are visible.



Question-9

Write the difference between male and female frog.

Solution:

The difference between male and female frog are as follows

Male frog	Female frog
(i) It has a vocal sac on the ventro-lateral sides of the throat.	(i) Vocal sacs are absent.
(ii) Fore limbs are muscular.	(ii) Fore limbs are not muscular.
(iii) Amplexusory pads (nuptial pads) are present on the ventral side of the index fingers.	(iii) Amplexusory pads (nuptial pads) are absent.
(iv) During the breeding season, there is no change in the abdomen.	(iv) During the breeding season, the abdomen swells up, because it is full of ova, which is released from the ovary.

Question-10

Give an account on the alimentary canal of frog.

Solution:

Alimentary canal is a short tube starting from the mouth to the cloaca. The mouth opens into the buccopharyngeal cavity. It has many maxillary teeth at the margin of the upper jaw. Vomerine teeth are on the floor of this cavity. The tongue is bilobed and muscular. It is used to capture prey. The gullet opens into the oesophagus, which extends into the stomach. The stomach leads to the small and large intestines. The rectum opens into the cloaca. The liver and pancreas are digestive glands.



Question-11

How do respiration and excretion take place in earthworm?

Solution:

The earthworm absorbs oxygen and gives off carbon dioxide through a thin skin. This skin is protected by a thin cuticle secreted by the epidermis and is kept moist by a slimy mucus also produced by epidermal cells. A moist surface is necessary for oxygen to be absorbed and carbon dioxide to be given off. If the worm is dried by the sun, it will die because the exchange of gases can no longer take place.

Nitrogen-containing waste materials from cell activities are removed to the outside of the body by little tubes. There are two such structures, called nephridia, in each segment except the first three and the last.

Question-12

Write a short note on blood vascular system of Pheretima.

Solution:

As food is digested, the blood in the circulatory system picks it up for distribution to all the cells of the body. In simpler forms we have studied so far, the digested food had only to diffuse a short distance in order to reach all the cells of the body. But in higher forms, the distances are greater, and more food material is needed by the many specialized and active cells of the body. The blood of the earthworm moves through a series of closed tubes, or vessels. It flows forward to the anterior end in a dorsal blood vessel and moves to the posterior end in a ventral blood vessel.

Small tubes connect the dorsal and ventral vessels throughout the animal, except in the segments 7 and 11. Here there are five pairs of connecting tubes, which are large and muscular. By means of alternate contraction and relaxation, they keep the blood flowing. Not true hearts, they are called aortic arches.



Question-13

Describe the digestive system of earthworm.

Solution:

The prostomium is the mouth of the earthworm. Since it has no jaws or teeth. The earthworm uses its muscular pharynx to suck in soil containing food. The food particles and soil go through a long esophagus into a round organ called a crop. The crop stores the food temporarily. Then it is forced into the muscular organ called the gizzard. The gizzard contracts and expands, causing grains of sand and food to rub together. In this way, the food is ground up. Food is digested in the intestine, which stretches from segment 19 to the end of the worm. Here enzymes chemically break down the food. Then the digested food is absorbed by the blood circulating through the intestine walls. The earthworm's digestive system can be thought of as a tube within a tube. The earthworm ingests large amount of soil, which has organic matter in it. The useless inorganic matter goes through the worm with no change. This is often left on the surface of the ground in the form of worm castings.

Question-14

In the following animals, cockroach, earthworm, frog, rat, where is haemocoel seen?

Solution:

The haemocoel is seen in the body cavity of cockroach.

Question-15

What is phallomeres?

Solution:

The phallomeres are the chitinous plates situated around the male genital pore in the cockroach.



Question-16

Describe the digestive system of earthworm.

Solution:

The prostomium is the mouth of the earthworm. Since it has no jaws or teeth. The earthworm uses its muscular pharynx to suck in soil containing food. The food particles and soil go through a long esophagus into a round organ called a crop. The crop stores the food temporarily. Then it is forced into the muscular organ called the gizzard. The gizzard contracts and expands, causing grains of sand and food to rub together. In this way, the food is ground up. Food is digested in the intestine, which stretches from segment 19 to the end of the worm. Here enzymes chemically break down the food. Then the digested food is absorbed by the blood circulating through the intestine walls. The earthworm's digestive system can be thought of as a tube within a tube. The earthworm ingests large amount of soil, which has organic matter in it. The useless inorganic matter goes through the worm with no change. This is often left on the surface of the ground in the form of worm castings.

Question-17

Give an account of digestive system of frog.

Solution:

The frog's digestive system, like most other digestive systems, starts in the mouth. Prey, which is sometimes caught by the frog's sticky tongue, is diced by tooth-like structures in the mouth. The food then moves down through the esophagus, into the stomach, where, the food is softened, broken down and stored. From the stomach, food moves into the small intestine, where most of the chemical digestion (i.e. the pancreas secretes pancreatic juice, the liver secretes bile, etc.) and nutrient absorption takes place. The small intestine possess villi which increases the surface area and allow more nutrient absorption. Wastes from the small intestine enter the large intestine, where the water in them is reabsorbed. They then exit through the cloaca, the common exit of the digestive, reproductive and excretory systems.



Question-18

What is typhlosole?

Solution:

Typhlosole is a longitudinal fold of the intestinal wall in certain invertebrates and lower vertebrates that increases the absorptive and digestive surface area of the intestine.

Question-19

Name two proteins found in striated muscles?

Solution:

Actin and myosin

Question-20

How do we call the conduction of nerve impulse along the myelinated nerve fibre?

Solution:

The conduction of nerve impulse along the myelinated nerve fibre is called is called Saltatory conduction.

Question-21

From which germ layers do the following organs differentiate:-

(a) Kidney (b) Urinary bladder

Solution:

(a) Kidney-mesoderm (b) urinary bladder:- endoderm

Question-22

What are cell junctions?

Solution:

Cell junctions are the structures which hold the adjacent cells of a tissue together, when they are separated widely by extracellular material.

Question-23

What is contractibility of muscle fibres?

Solution:

The contractibility is the property of shortening (contraction) of muscle fibres and their return to relaxed state (relaxation) based on relative position of different intracellular filaments.

Question-24

Which type of epithelium is seen lining the proximal convoluted tubule of the kidney?

Solution:

Brush bordered epithelium (cubical epithelium).

Question-25

Define glands?

Solution:

Glands are secretory structures formed of epithelial tissue.

Question-26

What are endocrine glands?

Solution:

They are ductless glands which secrete hormones directly into the blood stream.

Question-27

Name two anticoagulants present in the blood of man?

Solution:

Heparin and antithrombin.

Question-28

Name the type of mouth part found in cockroach?

Solution:

Biting and chewing type.

Question-29

What is heamolymph?

Solution:

Heamolymph is the blood of cockroach made of colourless plasma and corpuscles called heamocytes.

Question-30

Distinguish between myosin and actin filaments.

Solution:

Myosin filaments	Actin filaments
a) It is found only in A -band	a) It is found I-band and also project in A-band
b) It's thickness is $100\text{\AA}$	b) It is thinner than myosin filament and is $50\text{\AA}$ thick
c) Cross bridges are present	c) cross bridges are absent

Question-31

Where are bipolar nerve cells present in human body?

Solution:

The bipolar cells are found in retina and in the spinal ganglion.

Question-32

Write a note on gaseous exchange of cockroach?

Solution:

The cockroach has a system of trachea. Hence tracheal respiration takes place in these animals. The stracheas are complicated system of air tubules. They divide to form tracheoles. Tracheoles are connected to the spiracles. They are located in thorax and abdomen. The body cells or the fluid comes in direct contact with the air.

Question-33

What are leucocytes? Mention their different kinds?

Solution:

Leucocytes are known as White blood cells (WBC) They are oval/ rounded or irregular in shape. They posses nucleibut are devoid of heamoglobin. They are of two kinds (a)granulocytes and (b) agranulocytes. Granulocytes posses varying nucleus and have lobed nuclei. They are of three kinds (a) Basophils (b) acidophils and neutrophils Agranulocytes are of two types (a) Monocytes and lymphocytes. They are non-granular and have one nuclei in individual cell.

Functions:- (i) Monocytes :- engulf bacteria (ii) Lymphocytes :- Non-phagocytic but help in healing process. (iii) Basophils:- They release heparin and histamine into the blood (iv) Acidophils:- They are essential to dissolve the clot (v) Neutrophils:- They are phagocytic in nature.



Question-34

Give an account of the digestive system of frog?

Solution:

It is a short tube starting from the mouth and ending in cloaca. The mouth opens into the bucco-pharyngeal cavity. A large, thick muscular tongue is attached to the lower jaw at front, while its free anterior end is bifid and kept folded within the buccal cavity. A row of small pointed teeth is found on the inner margin of the upper jaw. The lower jaw is devoid of teeth. In addition to these the vomerine teeth are also present. The buccal cavity leads to the pharynx. **Pharynx**:- It serves as a common pathway for both nutrition and respiration. The pharynx leads into the oesophagus.

Oesophagus:- The oesophagus is a short, wide tube. It leads to the stomach through a small opening.

Stomach:- The stomach is located towards the left side and has a wider anterior part (cardiac part) and posterior narrower part (pyloric part). The wall of the stomach has many infoldings and is quite thick. The stomach leads to intestine. **Intestine**:- The long, narrow anterior part is about 20cms long. The wider posterior part is 4 to 5 cms long. The small intestine is thin walled and is divisible into duodenum and ileum. The ileum is coiled. The large intestine is short and straight and is divided into colon and rectum. The rectum leads to cloaca. Liver and pancreas are the glands associated with the digestive system. **Cloaca**:- It is the region into which the ureter also opens. The cloacal aperture serves as a common opening (both as anus and urino-genital aperture).

