**Question:6**

Answer the following.

a. Explain chemical co-ordination in humans and give the names and functions of some hormones.

b. Explain the difference between the excretory system of humans and plants.

c. Explain co-ordination in plants with the help of suitable examples.

a. Coordination in humans occurs in two levels i.e. nervous coordination and chemical coordination. The coordination which occurs with the help of hormones is called chemical coordination. Hormones are the orga chemicals produced by the body, which are released into the blood. The key feature of the hormones is that t are secreted by the ductless glands. The glands that secrete hormones do not have ducts. Hormones are rele directly into the bloodstream and reach the target organ. The endocrine system works in association with ner system to control and coordinate our bodies.

Characteristics of Hormones

- Hormones are the organic chemicals that are secreted in response to environmental changes in or outsi body.
- Hormones are secreted by ductless glands and transported along with the blood stream to the site of the action. The site of their production and the organ of their influence are different.
- They can be amino-acid derivatives, proteins, or steroids.
- Being low molecular weight substances, they can easily diffuse through the cell membrane.
- They are produced in small quantities and are effective in extremely lower concentrations.
- Abnormal production of hormones (be it less or more) affects the body in a negative manner.

**i.** Some of the hormones produced by pituitary are:

- Prolactin- Growth of mammary glands and formation of milk in them.
- TSH- Synthesis and release of thyroid hormones.
- Adrenocorticotrophic hormone (ACTH)- Stimulates synthesis and secretion of steroid hormones called glucocorticoids from the adrenal cortex.

**ii.** Thyroxine hormone is produced by thyroid gland and its functions are:

- Control of BMR (Basal metabolism rate)
- Control of working of kidney and urine formation
- Regulation of physical, mental, and sexual growth

- Regulation of growth of CNS and bones
- Regulation of carbohydrate and fat metabolism

b.

| Excretion in plants | Excretion in animals |
| --- | --- |
| 1. Plants do not have specialised structures for excretion. | 1. Animals have specialised structures like nephrons for excretion. |
| 2. Process of excretion occurs through stomata and lenticels. | 2. Process of excretion occurs through kidney, skin, lungs etc. |
| 3. Waste is produced in the form of $CO_2$ and $O_2$. | 3. Waste is produced in the form of nitrogenous waste like urea, uric acid and ammonia. |

c. Since plants do not have nervous and muscular system like animals, coordination in plants occurs in response to particular stimuli. Tropism/tropic movement is the term used for the movement or growth of any plant part in response to an external stimulus.

**These tropic movements can be of various types like:**

Phototropism: The growth movement in plants in response to light stimulus is known as phototropism. For example, the flower head of a sunflower is positively phototropic as it moves from East to West, along with the movement of the Sun.

Geotropism: The growth movement in plants in response to the force of gravity is known as geotropism. In geotropism, the roots of the plant always grow downwards, while the shoots always grow upwards, away from the earth.

Chemotropism: The growth movement in plants in response to chemical stimuli is known as chemotropism. For example, the growth of pollen tube towards the ovule in the ovary (through the stigma and style) is an example of positive chemotropism.

Hydrotropism: The growth movement in plants in response to water is known as hydrotropism. For example, the roots of some plants grow towards the water source, even when the water source is not present directly below it.

Thigmotropism: The growth movement in plants in response to a touch stimulus or contact with a solid object is known as thigmotropism. For example, in some plants, the coiling of tendrils occurs when they come in contact with objects for support.

**Question:7**

Explain in your own words with suitable examples.

a. What is meant by co-ordination?
b. How does excretion occur in human beings?

c. How is excretion in plants useful to human beings?
d. Describe the transportation system in plants.

a. Coordination is defined as the working together of various organs of the body of an organism in a proper manner to produce appropriate reaction to a stimulus is called coordination. Coordination is achieved by different mechanisms in plants and humans.

**Coordination in humans:**

In humans coordination is achieved by two systems-
Nervous system
Endocrine system

The human nervous system is comprised of two parts- Central neural system (CNS) and Peripheral neural system (PNS).
The CNS is composed of brain and spinal cord.
The PNS is composed of nerves associated with CNS. These nerves are of two types- afferent and efferent.

Afferent fibres: Transmit impulses from tissues to CNS
Efferent fibres: Transmit impulses from CNS to tissues

Chemical coordination in humans is achieved by hormones. Hormones are the organic chemicals produced by the body, which are released into the blood. The key feature of the hormones is that they are secreted by the ductless glands. The glands that secrete hormones do not have ducts. Hormones are released directly into the blood stream and reach the target organ. The endocrine system works in association with nervous system to control and coordinate our bodies.

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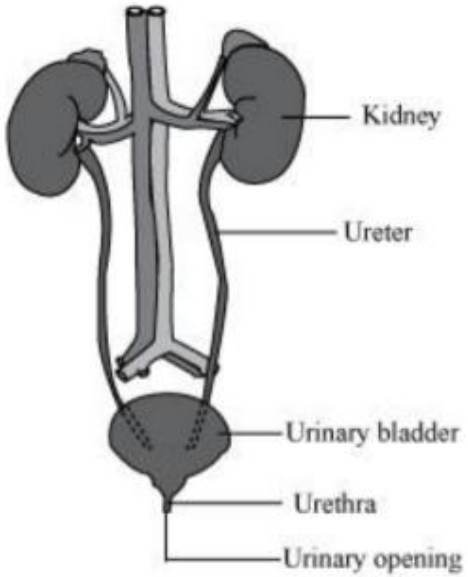
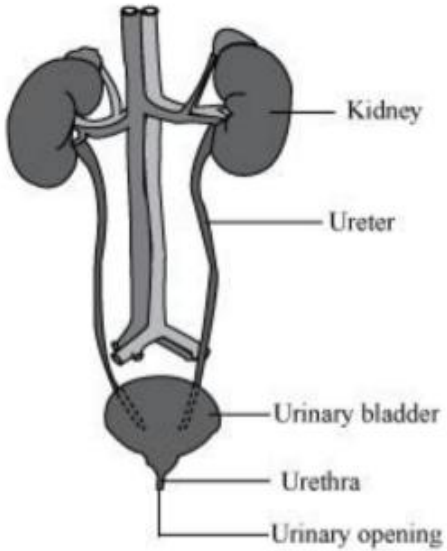
b. The removal of waste products from the body is known as excretion. In the human body, kidneys, lungs and skin perform the function of excretion. Lungs remove carbon dioxide as waste. Skin helps in the removal of waste in the form of sweat. However, the major organ involved in excretion is the urinary system, which contains the kidneys to filter the blood and form urine.

In human beings, excretion is performed by the excretory system consisting of a pair of kidneys, a pair of ureters, a urinary bladder and urethra.






The urine is formed in kidneys and passes on to the urinary bladder via the ureters. The urinary bladder stores the urine until it is excreted through the urethra.

The kidney contains numerous filtration units called the nephrons. Nephron is the structural and functional unit of the kidney. The nephrons consist of a network of capillaries associated with a cup-shaped end of a tube in which the filtered urine is collected. When the blood passes through the tube, some substances such as glucose, amino acids, salts, and water are selectively reabsorbed. The final filtrate is collected in the collecting tubule and eventually enters the ureters.

The other organs which are involved in the excretory process include:

(i) Lungs: They remove $CO_2$ and water. About 18 L of carbon dioxide is eliminated per day with the help of lungs.

(ii) Liver: It excretes bile pigments (such as bilirubin, biliverdin), vitamins, cholesterols and drugs along with digestive wastes.

(iii) Skin: Sweat and sebaceous glands present on the skin eliminate substances such as sterols, hydrocarbons, wax sebum, etc.

c. Excretion in plants results in the production of various kinds of excreta which are waste for the plant but are equally important for human use. The following examples are helpful in proving the above fact:

1. Oxygen which is an excretory product of photosynthesis is an absolute requirement for human beings to survive on earth.
2. Tannin is a waste plant product which is stored in leaves and bark. it is used in making tea all over the world.
3. Plants store waste products in their leaves and barks which are shed off regularly. These shed offs are used to make manure.
4. Essential oils are also waste products of plants which are stored in their leaves. These essential oils are used for various purposes by us.

d. Transportation is a life process where substances synthesised or absorbed in one part of the body are carried to other parts of the body. The transportation system in plants moves the energy stored in leaves to different parts. It also helps in moving raw materials absorbed from the roots to various organs of the plant. However, these are entirely different pathways. The transportation system in plants consists of two different types of conducting tissues. Xylem conducts water and minerals obtained from soil (via roots) to the rest of the plant. Phloem transports food materials from the leaves to different parts of the plant body.

**Transportation of water**

The first step in transportation of water is absorption of water by roots of plants. As the water is absorbed by the roots from the soil and moved to the vascular system, it has to be transported to various parts of the plant. Two forces responsible for transporting the water up in a plant are root pressure and transpiration pull.

Root Pressure is the positive pressure created inside the xylem when water follows the ions transported along the concentration gradients into the vascular system. However, majority of water is transported through transpiration pull.

Transpiration pull is the pull of water as a result of tension created by transpiration is the major driving force of

water movement upwards in a plants. It accounts for loss of 99% of water taken by the plant and this loss is mainly through stomata. As the water is released by leaves into the atmosphere, the water level in the epidermal layer decreases. To compensate this water loss, water is brought to the leaves through xylem. Transpiration helps in the absorption of water and minerals to all the parts of the plants.

**Transportation of food**

The transportation of food from the leaves to other parts of the plant occurs in the vascular tissue, phloem and this process of transporting food is known as translocation. The phloem also transports amino acids and other substances to storage organs of the plant (along with the growing organs) such as roots, fruits, and seeds. The phloem consists of companion cells, sieve tubes, phloem parenchyma, and fibres.

The translocation of food occurs in the sieve tubes with the help of companion cells.

Translocation in the phloem, unlike the xylem, is achieved by utilizing energy from ATP. For example, a food material such as sucrose is transported into the phloem tissue using ATP energy. As a result, the osmotic pressure in the tissue increases, causing the water to move into it. This pressure moves the material in the phloem to the tissues, which have less pressure. This is helpful in moving materials according to the requirements of the plant.