



# learnkwniy

## CHAPTER - 6

### Control and Coordination

## **ANIMALS – NERVOUS SYSTEM**

**Nervous tissue is made up of an organised network of nerve cells or neurons, and is specialised for conducting information via electrical impulses from one part of the body to another.**

**All information from our environment is detected by the specialised tips of some nerve cells. These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on. So gustatory receptors will detect taste while olfactory receptors will detect smell..**

**This information, acquired at the end of the dendritic tip of a nerve cell, sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals. These chemicals cross the gap, or synapse, and start a similar electrical impulse in a dendrite of the next neuron. This is a general scheme of how nervous impulses travel in the body.**

### **What happens in Reflex Actions?**

**The simplest form of response in the nervous system is reflex action.**

**The pathway taken by nerve impulses in a reflex action is called the reflex arc. Reflex arcs allow rapid response. A reflex action is an automatic response to a stimulus.**

### **Human Brain**

**Spinal cord is made up of nerves which supply information to think about. Thinking involves more complex mechanisms and neural connections. These are concentrated in the brain, which is the main coordinating centre of the body. The brain and spinal cord constitute the central nervous system. They receive information from all parts of the body and integrate it.**

**The communication between the central nervous system and the other parts of the body is facilitated by the peripheral nervous system consisting of cranial nerves arising from the brain and spinal nerves arising from the spinal cord. The brain thus allows us to think and take actions based on that thinking.**

### **Brain**

**The brain has three such major parts or regions, namely the fore-brain, mid-brain and hind-brain. The fore-brain is the main thinking part of the brain. It has regions which receive sensory impulses from various receptors. Separate areas of the fore-brain are specialized for hearing, smell, sight and so on. There are separate areas of association where this sensory information is interpreted by putting it together with information from other receptors as well as with information that is already stored in the brain. Based on all this, a decision is made about how to respond and the information is passed on to the motor areas which control the movement of voluntary muscles.**

**Many involuntary actions are controlled by the mid-brain and hind-brain. All these involuntary actions including blood pressure, salivation and vomiting are controlled by the medulla in the hind-brain.**

**The activities like walking in a straight line, riding a bicycle, picking up a pencil. These are possible due to a part of the hind-brain called the cerebellum. It is responsible for precision of voluntary actions and maintaining the posture and balance of the body.**

## **COORDINATION IN PLANTS**

**Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli?. the plant must actually move its leaves in response to touch. But there is no nervous tissue, nor any muscle tissue.**

information that a touch has occurred must be communicated. The plants also use electrical-chemical means to convey this information from cell to cell, but unlike in animals, there is no specialized tissue in plants for the conduction of information.

## **Movement Due to Growth**

Environmental triggers such as light, or gravity will change the directions that plant parts grow in. These directional, or tropic, movements can be either towards the stimulus, or away from it.

Plants show tropism in response to other stimuli as well. The roots of a plant always grow downwards while the shoots usually grow upwards and away from the earth. This upward and downward growth of shoots and roots, respectively, in response to the pull of earth or gravity is, obviously, geotropism. If 'hydro' means water and 'chemo' refers to chemicals.

Different plant hormones help to coordinate growth, development, and responses to the environment. They are synthesized at places away from where they act and simply diffuse to the area of action.

When growing plants detect light, a hormone called auxin, synthesized at the shoot tip, helps the cells to grow longer. When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light. Thus, the plant appears to bend towards light.

plant hormones are gibberellins which, like auxins, help in the growth of the stem. Cytokinin promote cell division, and it is natural then that they are present in greater concentration in areas of rapid cell division, such as in fruits and seeds. These are examples of plant hormones that help in promoting growth. But plants also need signals to stop growing. Absciscic acid is one example of a hormone which inhibits growth. Its effects include wilting of leaves.

## **HORMONES IN ANIMALS**

**Adrenaline is secreted directly into the blood and carried to different parts of the body. The target organs or the specific tissues on which it acts include the heart. As a result, the heart beats faster, resulting in supply of more oxygen to our muscles. The blood to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs. This diverts the blood to our skeletal muscles. The breathing rate also increases because of the contractions of the diaphragm and the rib muscles.**

**Such animal hormones are part of the endocrine system which constitutes a second way of control and coordination in our body.**

**Thyroxin regulates carbohydrate, protein, and fat metabolism in the body to provide the best balance for growth. Iodine is essential for the synthesis of thyroxin.**

**Growth hormone is one of the hormones secreted by the pituitary. As its name indicates, growth hormone regulates growth and development of the body. If there is a deficiency of this hormone in childhood, it leads to dwarfism.**