

## Control and Co-ordination

- The working together of various organ systems is called co-ordination. Control and coordination are the functions of the nervous system and of hormones.
- The nervous system in human beings consists of three main portions: **central nervous system, peripheral nervous system and autonomic nervous system**.
- The nervous system is made up of several functional units called **neurons or nerve cells**. A nerve cell is basically made up of a cell body or cyton with dendrites, axon or nerve fibres.
- Two neurons are connected only by the passage of impulses across neuromuscular junction which is called **synapse**.
- The information passing through neurons is in the form of chemical and electrical signals called **nerve impulse**.
- Chemical substance which transmits the message from one nerve cell to another is known as **neurotransmitter** or **chemical transmitter, e.g.**, Acetylcholine.
- The nerves that carry impulses from brain or spinal cord to effector organs are called **efferent nerves or motor nerves**. Nerves from receptors and sense organs to a specific area in brain and spinal cord are called **sensory or afferent nerves, e.g.**, cranial nerves.
- A mixed nerve has both sensory and motor nerve fibres, **e.g.**, spinal nerves.
- The central nervous system consists of brain and spinal cord.
- Brain is enclosed in a protective covering called **cranium**.
- The outer brain consists of grey matter. All the cell bodies or cytons are present in this part. The inner part of brain is made up of white matter and it consists of axons.
- The ridges of brain are called **gyri** and the grooves are called sulci.
- Brain consists of three parts: **fore brain, mid brain** and **hind brain**. The fore brain is the largest part of brain and it consists of olfactory lobes, cerebrum and diencephalon. Cerebrum is the seat of intelligence and memory. The mid brain consists of optic lobes and cerebral peduncles. The hind brain consists of cerebellum, pons varoli and medulla oblongata.
- Medulla oblongata is concerned with respiration, heartbeat, blood pressure, temperature and secretions by salivary glands.
- Spinal cord is the extension of medulla oblongata and is protected by vertebral column. It is concerned with reflex actions.
- Cerebrospinal fluid serves as a shock absorber and protects brain.

- The peripheral nervous system consists of 12 pairs of cranial nerves and 31 pairs of spinal nerves. The tenth cranial nerve is called **vagus**. It controls the rate of heart beat.
- The autonomic nervous system consists of pair of chains of nerves and ganglia found on both the sides of vertebral column. It involves sympathetic and parasympathetic system.
- Reflexes are fast, involuntary responses of the body and occur without thinking.
- The path through which a stimulus passes is called **reflex arc**.
- **Gustatory receptors** detect taste and **olfactory receptors** detect smell.
- Spinal cord is concerned with reflex actions. They are of two types-conditioned and unconditioned.
- **Phytohormones** are chemical substances which are produced naturally in plants and are capable of translocation and regulating one or more physiological reactions when present in low concentration. Phytohormones may be growth regulators or growth inhibitors.
- **Auxins** and **gibberellins** stimulate cell elongation and induce parthenocarpy or production of seedless fruits. **Cytokinins** promote cell division. Abscissic acid is a growth inhibitor.
- **Ethylene** promotes transverse or isodiametric growth and also help in the ripening of fruits.
- The movement of plant towards light is **phototropism**, towards gravity is **geotropism** to chemical stimulus is **chemotropism**, towards support is **thigmotropism**.
- The influence of relative day length (light period) on flowering is called **photoperiodism**.
- **Endocrine** glands are the ductless glands that secrete chemical substances called **hormones** directly into blood.
- **Pituitary gland, thyroid gland, thymus, adrenal** and pancreas secrete hormones. The female ovaries and male testes also secrete hormones.
- The tissues on which hormones act are called **target tissues**.