Chapter 6 - Control and Coordination

- All the living organisms respond and react to changes in the environment around them.
- The changes in the environment to which the organisms respond and react are called stimuli such as light, heat, cold, sound, smell, touch etc.
- Both plants and animals respond to stimuli but in a different manner

Control and Coordination in Animals

It is brought about in all animals with the help of two main systems

a) Nervous system
b) Endocrine system

Nervous System

In animals including humans, the nervous system along with muscular tissue is the control center of the body.

It consists of highly specialized cells called **neurons**, **nerves** and **neural organs** that link, coordinate and control the activities of different organs in the body. Information from environment is detected through receptors, present in sense organs such as inner ear, nose, tongue, etc.

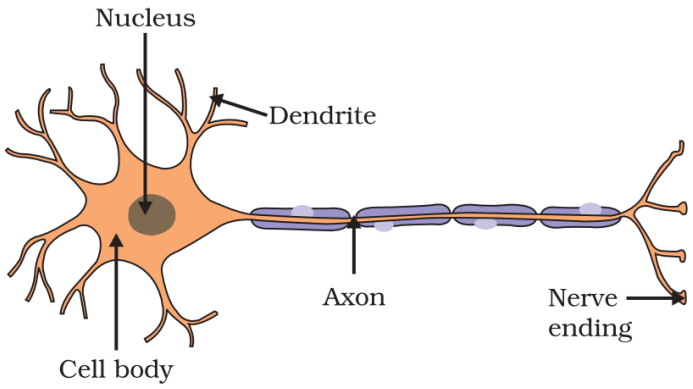
In animals, nervous system is comprised of nervous tissue which have specialized cells called **neurons** or **nerve cells**. These nerve cells help in responding to external stimuli.

Neuron

It is the structural and functional unit of nervous system

Parts of Neuron

a) **Dendrite**: Acquires information.
b) **Cell body**: Acquired information travels as an electrical impulse.
c) **Axon**: Longest fiber on the cell body is called axon. It transmits electrical impulse from cell body to dendrite of next neuron.
d) **Nerve ending:** these are the fine branch like termination of neurons.



Synapse

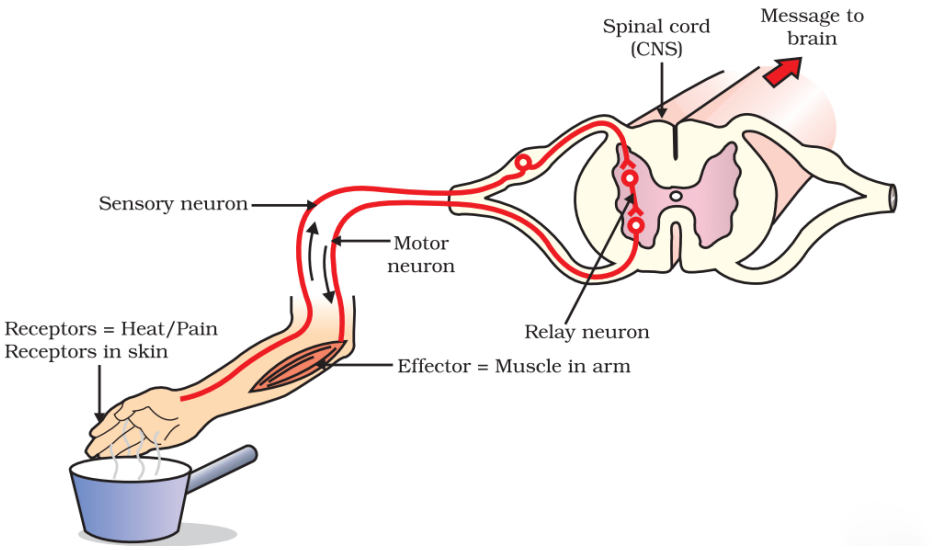
It is the gap between the nerve ending of one neuron and dendrite of the other neuron. Here electrical signal is converted into chemical signal for onward transmission.

Reflex action

Reflex action is quick, sudden and immediate response of the body to a stimulus. E.g., Knee jerk, withdrawal of hand on touching hot object.

Reflex arc

The pathway through which nerve impulses pass during reflex action is called reflex arc.



Response

Responses are of three main types:

a) **Voluntary**- Controlled by fore brain. E.g., talking, writing.
b) **Involuntary**- Controlled by mid and hind brain. E.g., heartbeat, vomiting, respiration.
c) **Reflex action**- Controlled by spinal cord. E.g., withdrawal of hand on touching a hot object.

Parts of Human Nervous System

Human nervous system consists of two main parts:

- **Central Nervous System (CNS)** consisting of brain and spinal cord. The brain and spinal cord receive information from all parts of the body and integrate it.
- **Peripheral Nervous System (PNS)** having two components: voluntary and involuntary. Voluntary peripheral nervous system is under the control of will and consists of nerves that arise from brain (cranial nerves) and spinal cord (spinal nerves). Through the nerves, the nervous system communicates with the muscles. Involuntary peripheral nervous system

or autonomic nervous system (ANS) is made up of parasympathetic and sympathetic nervous systems. Though connected with the CNS, it works independently and regulates involuntary activities of the body like heart beat and peristaltic movements of alimentary canal.

Human brain

Brain is the main coordinating center of the body. It has three major parts:

a) Fore-brain
b) Mid-brain
c) Hind-brain

Fore brain

It is the most complex or specialized part of the brain. It consists of cerebrum.

Functions:

(i) Thinking part of the brain.
(ii) Control the voluntary actions.
(iii) Store information (Memory).
(iv) Receives sensory impulses from various parts of the body and integrate it.
(v) Centre associated with hunger.

Mod brain

Controls involuntary actions such as:

- Change in pupil size.
- Reflex movements of head, neck and trunk.

Hind brain

It has three parts

i. **Cerebellum**: Controls posture and balance. Precision of voluntary actions e.g., picking pen.
ii. **Medulla**: Controls involuntary actions e.g., blood pressure, salivation, vomiting.
iii. **Pons**: Involuntary actions, regulation of respiration.