

SCIENCE

(Biology)



PRIME NOTES

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Control and Coordination

For survival, an organism's body must respond correctly to various stimuli it receives.

Some important terms:

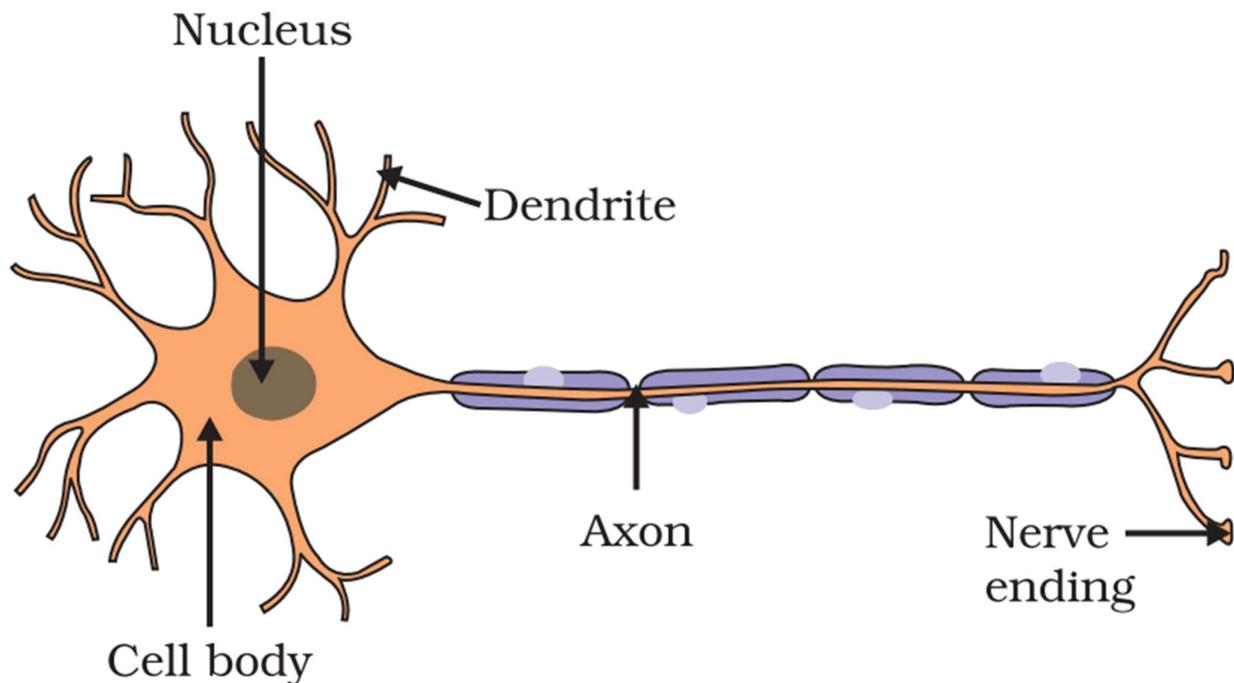
- **Stimulus:** An agent or sudden change in the external or internal environment which causes a change in an organism or any of its body parts.
- **Response:** The change in organisms resulting from a stimulus.
- **Receptors:** Nerve cells which initiate waves of impulses towards the central nervous system on receiving a stimulus.
- **Effectors:** Muscles or glands which contract or secrete substances on receiving an impulse from the brain or spinal cord.

Functions of the Nervous System

- Keeps us informed about the outside world through sensory organs.
- Controls and harmonises all voluntary muscular activities. Example- running and writing.
- Enables us to remember, think and reason.
- Regulates involuntary activities such as breathing and beating of the heart.

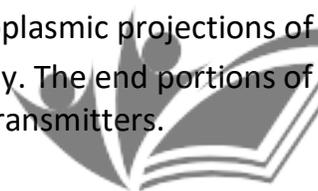
Neuron

A **neuron** is the structural and functional unit of the nervous system.



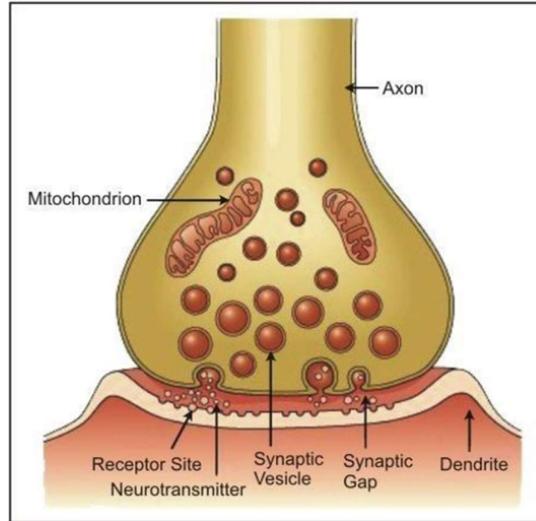
The three main parts of a neuron are:

- **Cell Body-** It has a well defined nucleus and granular cytoplasm.
- **Dendrites-** Dendrites are branched cytoplasmic projections of the cell body.
- **Axon-** It is a long process of the cell body. The end portions of the axons have swollen bulb-like structures which store neurotransmitters.



Synapse

- The **synapse** is the point of contact between the terminal branches of the axons.



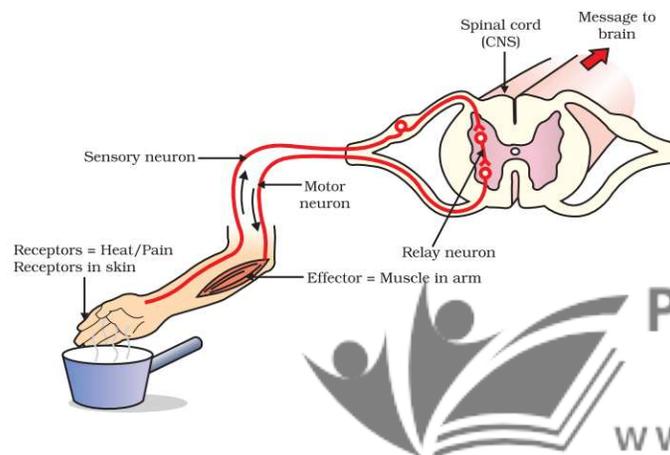
- Axon terminals of a neuron and the dendrites of another neuron are separated by a fine gap, i.e. a synaptic cleft.
- The nerve impulse is sent across the synaptic cleft with the help of the neurotransmitter acetylcholine.

Reflex Action

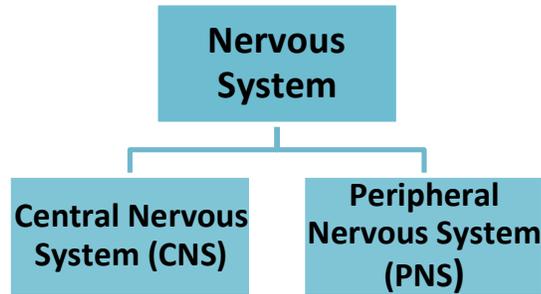
- Involuntary actions in response to external or internal stimuli are termed as **reflex actions**.
- The peripheral nervous system and spinal cord are involved in controlling reflex actions.
- The path travelled by the impulse during a reflex action is called a reflex arc.
- A reflex arc can be represented as follows:
Stimulus → Receptor in the sense organ → Afferent (sensory) nerve fibre → CNS (spinal cord) → Efferent (motor) nerve fibre → Muscle/Gland → Response

Examples of Reflex Arc

- When you touch a hot object, you withdraw your hand from it immediately.
- Shivering when it is too cold or sweating when it is too hot.
- Dilation of the pupils of the eye to look in the dark and *vice versa*.
- When you smell your favourite dish, your mouth waters.



Divisions of the Nervous System

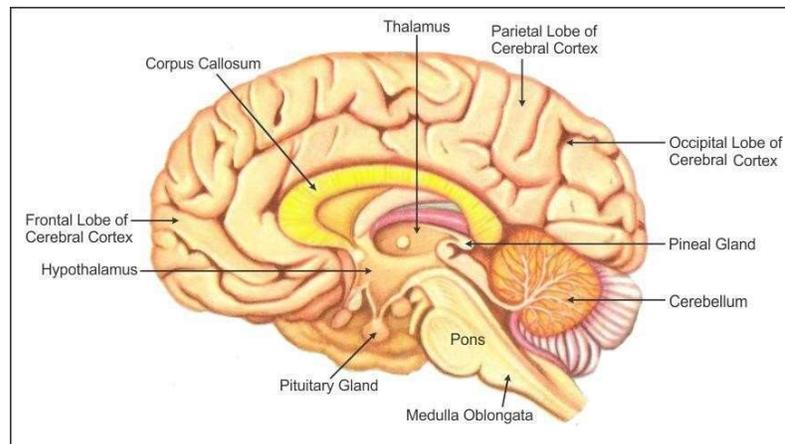


The Central Nervous System

The central nervous system includes the brain and the spinal cord.

A. The Brain

- The human brain is the largest among all animals.



- It is well protected by the cranium or the skull.
- Three membranous coverings called meninges cover the brain.
- Inflammation of the meninges is called meningitis.
- The space between the covering membranes, central spaces of the brain and the central canal of the spinal cord is filled with **cerebrospinal fluid**.
- Three primary regions of the brain are forebrain, midbrain, and hindbrain.

