

CHAPTER – 6

Control and Coordination

Living organisms respond and react to various stimuli like heat, light, cold, touch, pressure etc. Plants and animals both respond to stimuli but in different manner.

Example : withdrawal of hand on touching a hot object.

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 :

Functions

- i) To receive the information from environment
- ii) To receive the information from various body parts. (Stimuli Response)
- iii) To act accordingly through muscles and glands.

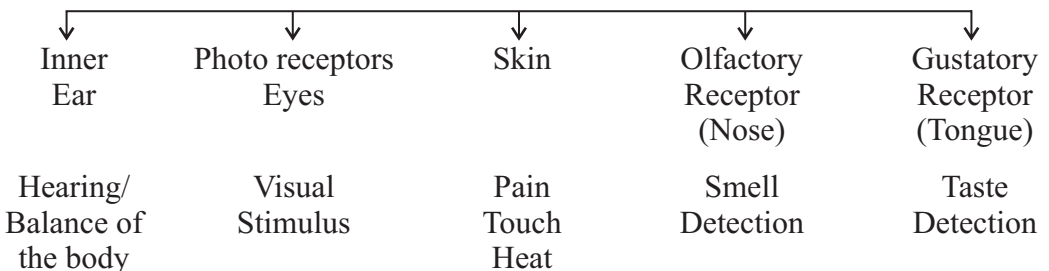
Stimulus : Any change in environment or within that bring about the reaction eg: touching a hot plate.

Response : The reaction of our body to these changes. eg. withdrawal of our hand

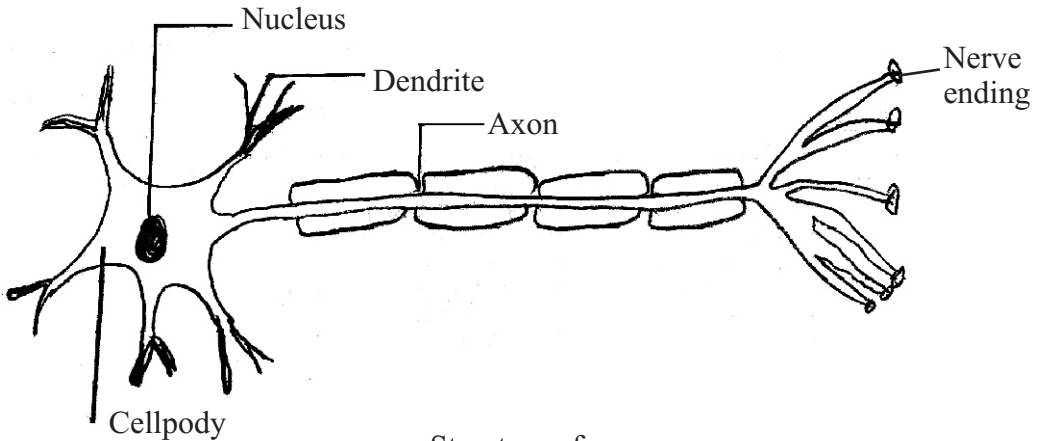
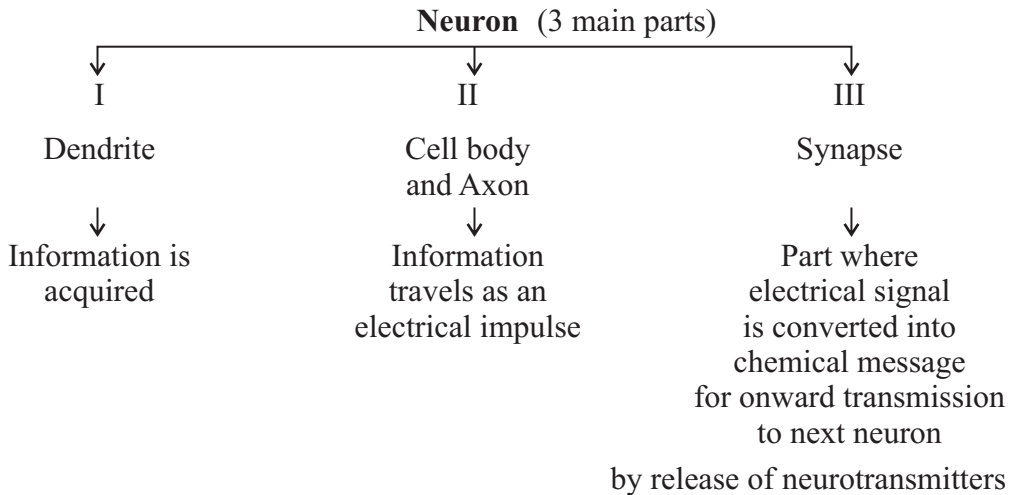
How do we detect that we are touching a hot object?

Receptors : Are specialised tips of some nerve cells that detect the information from the environment.

Receptors are Sense Organs



Neuron : Structural and functional unit of nervous system.



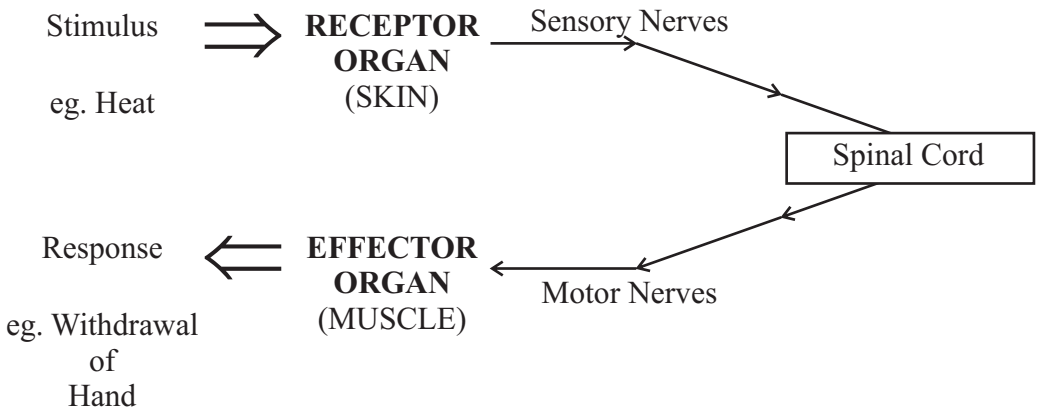
Structure of neuron
Fig. 7.1 (a) P 115

Synapse : The point of contact between the terminal branches of axon of one neuron with the dendrite of another neuron is called synapse.

Reflex Action

A quick, sudden, immediate response of the body to the certain stimuli that involves **Spinal cord**. eg. (not brain) withdrawal of hand, knee jerk etc.

Reflex arc : The pathway through which impulses pass is called reflex arc.



Refer to diagram Fig 7.2 Reflex arc

Response

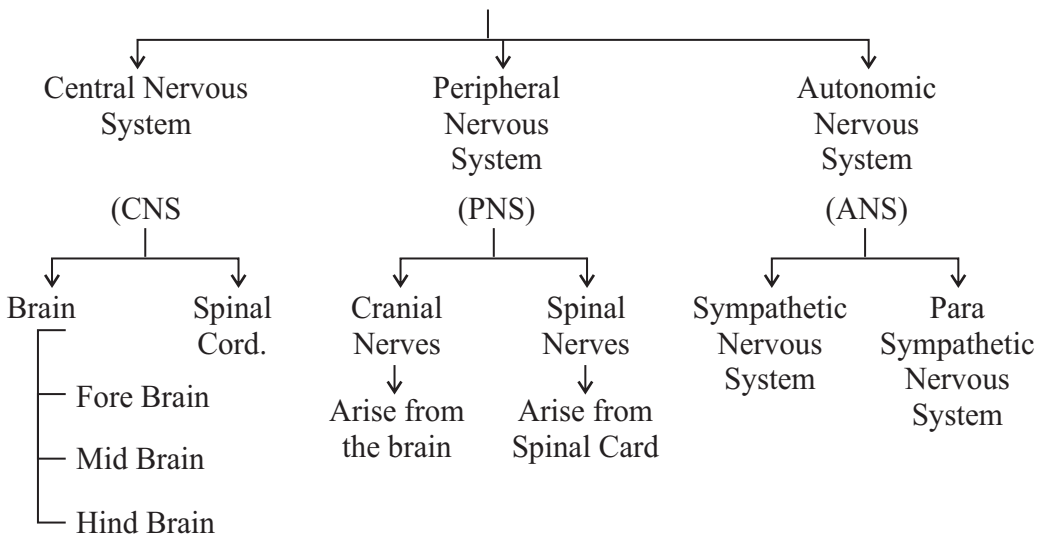
Responses are of three main types

Voluntary : Controlled by fore brain
eg. Talking, Writing

Involuntary : Controlled by mid and hind brain
eg. Heart beat, vomiting, regulation of heartbeat

Reflex action : controlled by spinal cord
eg. Withdrawal of hand on touching a hot object.

Human Nervous System



Human Brain

Human brain has three major parts or regions

a) Forebrain b) Mid Brain c) Hind Brain

FOREBRAIN

Most complex/specialized part of the brain is **CEREBRUM**

FUNCTIONS :

1. Thinking part of the brain
2. Control the voluntary actions.
3. Store information (**Memory**)
4. Centre associated with **HUNGER**
5. Receives sensory impulses from various body parts and integrates it

Mid Brain :

- HYPOTHALAMUS** : Chemical co-ordination
- PITUITARY GLAND** : Secretes hormones

Hind Brain :

- CEREBELLUM** i) Controls posture and balance
ii) Control precision of voluntary actions
- MEDULLA** Controls involuntary actions
eg. blood pressure, salivation, vomiting
- PONS** Involuntary action, regulation of respiration

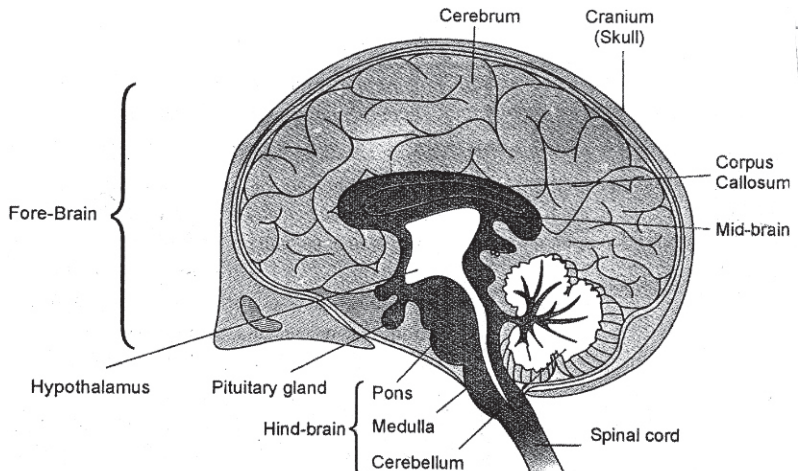


Fig 7.3 Human Brain

PROTECTION OF BRAIN AND SPINAL CORD

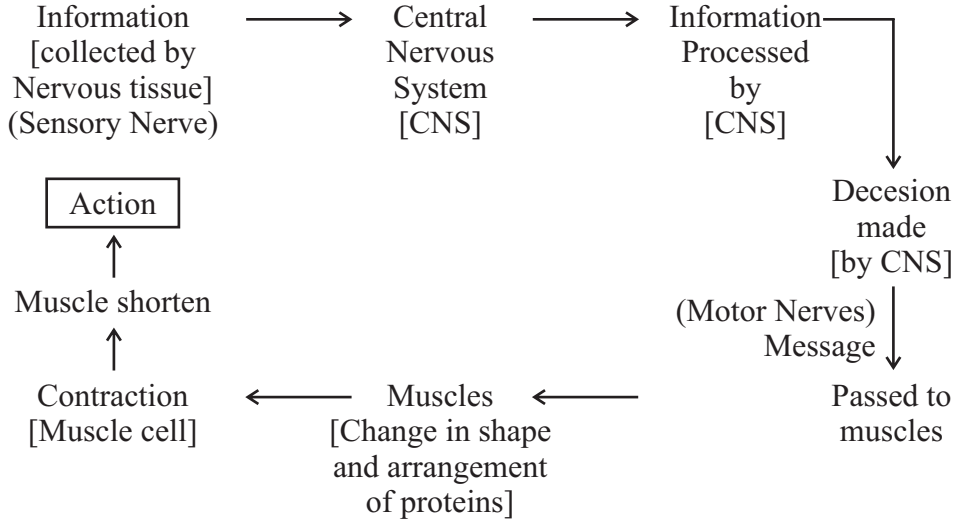
Brain :

Brain is protected by a fluid filled balloon which acts as shock absorber and enclosed in cranium (Brain Box)

Spinal Cord :

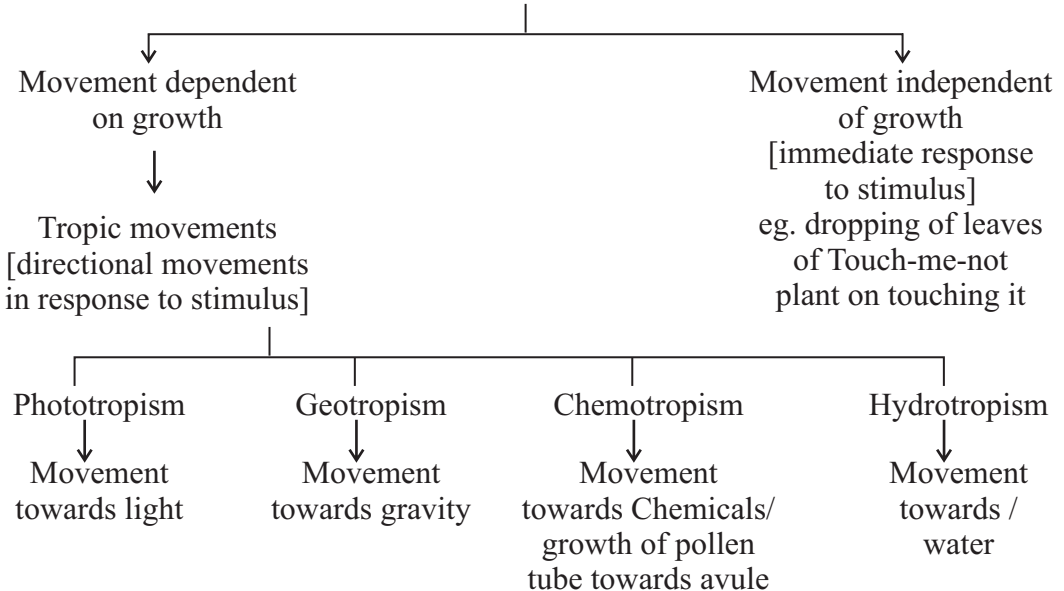
Spinal Cord is enclosed in Vertebral column.

Coordination between Nervous and Muscular Tissue



Coordination in Plants

Movement in Plants



Plant hormones :

Are chemical compounds which help to coordinate growth, development and responses to the environment.

Plant hormones : Main plant hormones are :

a) **Auxin :** [Synthesized at shoot tip]

Function :– Helps in growth

Phototropism : more growth of cells towards light.

b) **Gibberellin :** Helps in the growth of the stem

c) **Cytokinins :** Promotes cell division

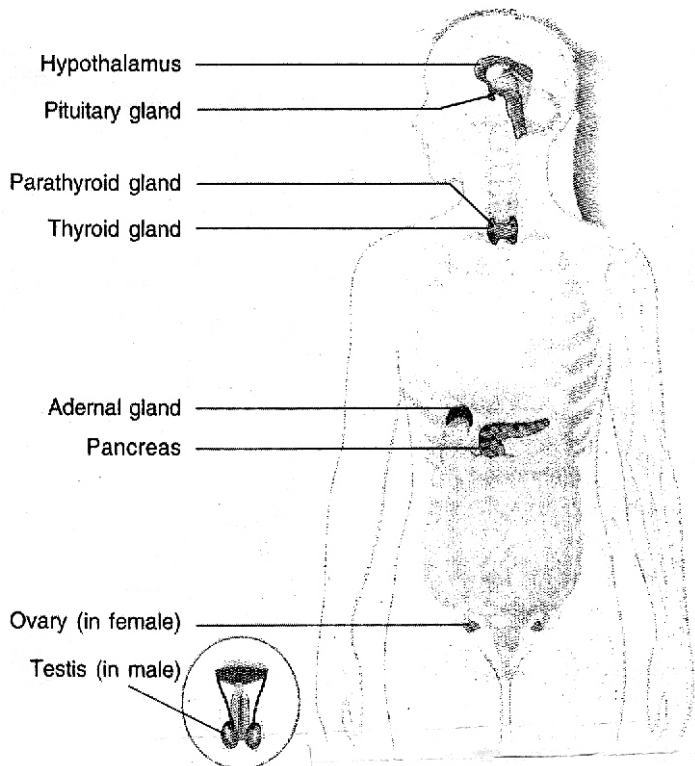
d) **Abscisic acid :** Inhibits growth, cause wilting of leaves.

(Stress hormone)

Hormones in Animals

Hormones : These are the chemical messengers secreted in very small amounts by specialised tissues called ductless glands. They act on target tissues/organs usually away from their source.

Endocrine System helps in control and coordination through chemical compounds called HORMONES



| S. No. | Hormone | Endocrine Gland | Location | Functions | | | |
|----------------------|-------------------------------------|--|---------------------------|---|---------|--------------------------------------|---|
| 1. | Thyroxine | Thyroid | Neck/ Throat region | Regulation of metabolism of carbohydrates, fats and proteins. | | | |
| 2. | Growth hormone | Pituitary | Mid | Regulates growth and development. | | | |
| 3. | Adrenaline | Adrenal | Above both kidneys | Regulation (increasing) of blood pressure, heart heat, carbohydrate metabolism (during emergency) | | | |
| 4. SEX Hormone | (Testosterone in Males estrogen) | <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Testes</td> <td rowspan="2" style="text-align: center; vertical-align: middle;">G O N A D S</td> </tr> <tr> <td>Ovaries</td> </tr> </table> | Testes | G O N A D S | Ovaries | Genital/ lower abdomen area | Changes associated with puberty (Sexual maturity) |
| Testes | G O N A D S | | | | | | |
| Ovaries | | | | | | | |
| 5. | Insulin | Pancreas | Below stomach | Reduces and regulates blood sugar level | | | |

IODISED SALT IS NECESSARY BECAUSE :

Iodine mineral is essential part of thyronine hormone so it is important that we must consume iodised salt as in turn it is essential for thyroid gland as it controls carbohydrate, proteins and fat metabolism for best balance of growth deficiency of iodine might cause disease called **goitre**

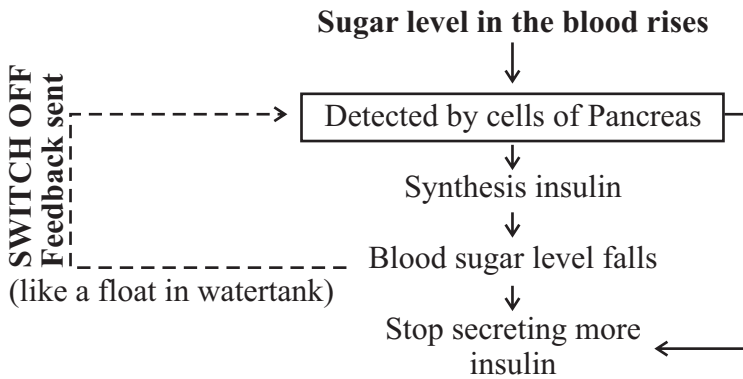
Diabetes :

Cause : It is due to deficiency of Insulin hormone secreted by Pancreas that is responsible to lower/control the blood sugar levels.

Treatment : Patients have to internally administer injections of insulin hormone which helps in regulating blood-sugar level.

Feedback Mechanism

makes sure that hormones should be secreted in precise quantities and at right time, which is regulated by feedback mechanism.



EXERCISE

(Question Bank)

Very Short Answers (1 Mark)

1. Where is auxin synthesized in plants?
2. Which gland is known as Master gland?
3. Name the hormone that regulates blood sugar level.
4. What is synapse.
5. What are tropic movements? Give one examples
6. Define hormones
7. Which hormone has inhibiting effect on growth of plants
8. What is phototropism?
9. What are the components of central Nervous System.
10. What happens at synapse between two neurons.

Short Answers (2 Marks)

1. Draw diagram of neuron and label cell body, dendrites and axon.
2. What is reflex arc? Explain with the help of a flow-chart.
3. Mention one function of each of the following
 - i) Cerebellum
 - ii) Pons.
4. What is the cause of diabetes? How it can be controlled.
5. Why it is advisable to use iodised salt.

6. What are the different receptors present in our body? What are their functions.
7. What are plant hormones? Name a plant hormone that promotes growth in plants.
8. What are sensory and motor neurons? Write their functions.

Long Answers (5 Marks)

1. What are hormones (in animals) List four characteristics of hormones. Name the hormone required for the following.
 - i) Development of moustache and beard in human male
 - ii) Lowering of blood glucose.
2. Mention the functions of
 - a) Fore brain
 - b) Mid brain
 - c) Hind brain