CHAPTER 7 – CONTROL & COORDINATION

KEY CONCEPTS & GIST OF THE LESSON

❖ Coordination-The working together of various organs of the body of an organism in a proper manner to produce appropriate reaction to a stimulus is called coordination.

❖ Stimulus- The changes in the environment to which an organism responds and reacts is called Stimulus.

❖ Control & coordination in animals- takes place by (i) Nervous system & (ii) Endocrine system.

❖ Nervous system
  Stimulus → Receptor organ → Sensory nerve → Brain/Spinal cord
  ↓
  Response ← Effector organ ← Motor nerve

❖ Endocrine system
  Stimulus → Endocrine organ → Secrete hormone → Hormone in blood
  ↓
  Response ← Target organ

❖ Parts of the Nervous system – (i) Brain (ii) Spinal cord (iii) Nerves (Neurons)

❖ A Neuron is the structural & functional unit of Nervous system

❖ Parts of a neuron- (i) Dendrites (ii) Cell body (iii) Axon

❖ Synapse- Space/junction between two adjacent nerves is called Synapse.

❖ Passing of information takes place—(i) By Electric impulse (inside the neuron) and (ii) In the form of chemicals (At synapse)

❖ Reflex action- Spontaneous, involuntary and automatic response to a stimulus to protect us from harmful situations. Eg. On touching a hot object unknowingly we instantly withdraw our hand.

❖ Reflex arc- The pathway of the reflex action is called Reflex arc.
  Stimulus → Receptor organ → Sensory nerve → Spinal cord → Effector organ → Response
  Refer to figure 7.2 page no. 117 of N.C.E.R.T Text book

❖ Nervous system- (1) Central Nervous system (CNS) (2) Peripheral Nervous system (PNS)
  (i) Brain (ii) Spinal cord
  (i) Autonomic Nervous system (ii) Voluntary Nervous system

❖ Brain (i) Centre of coordination of all activities (ii) Thinking is involved (iii) Complex process

❖ Parts of brain- Refer to figure 7.3 page no. 118 of N.C.E.R.T Text book
Fore brain | Mid brain | Hind brain
---|---|---
(i) Cerebrum | (i) Cerebellum | (i) Cerebellum
(ii) Thalamus | (ii) Pons | (ii) Pons
(iii) Hypothalamus | (iii) Medulla oblongata | (iii) Medulla oblongata

- **Fore brain**
  - Cerebrum- (i) Main thinking and largest part of the brain.
    (ii) It has 3 main areas-
      a. Sensory area- to receive impulses from sense organs via Receptors
      b. Motor area- control voluntary movements.
      c. Association areas- Reasoning, learning & intelligence.
  - Thalamus – It relays sensory information to the Cerebrum
  - Hypothalamus- It forms the link between Nervous system & Endocrine system

- **Mid brain-** It connects Fore brain and Hind brain. Controls reflex of eyes & ears

- **Hind brain-** Connects the Fore brain & Hind brain
  - Cerebellum – Controls & coordinates muscular movements, maintaining body posture and equilibrium.
  - Pons- Acts as a bridge between brain & spinal cord
  - Medulla oblongata- Controls involuntary actions like blood pressure, salivation, vomiting, etc.

- **Spinal cord-** Cylindrical or tubular structure extending downwards from the Medulla oblongata.

- **Protection of the brain & the spinal cord-**
  - (i) Bony outer covering: skull for the brain & vertebral column for the spinal cord.
  - (ii) Cerebrospinal fluid present in between the three membranes.

- **Action caused by Nervous tissue**
  - Information → Nervous tissue → Brain Muscles → Causes action

- **Path or action-**
  - Nerve impulse → Muscle cell → Changes shape due to special proteins

  Downward arrow

  Action caused ← Shorter form of muscles ← Change shape & arrangement of cell

- **Chemical communication by hormones-** (advantages)
  - (i) Electrical impulses have their limitations because they reach only those cells connected to the nervous tissue.
  - (ii) Also the nerve cells cannot generate & transmit impulses continuously.
  - (iii) Electrical communication is slower.

- **Hormones-** (i) are chemical messengers secreted by endocrine glands
  - (ii) Are secreted in small amounts & may act in nearby places or distant places.
  - (iii) Do not take part in the reaction & are destroyed immediately.
Hormones are secreted by-

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Endocrine glands</th>
<th>Exocrine glands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ducts absent</td>
<td>Ducts present</td>
</tr>
<tr>
<td>2.</td>
<td>Secrete hormones</td>
<td>Secrete enzymes</td>
</tr>
<tr>
<td>3.</td>
<td>Secreted in blood</td>
<td>Secreted in ducts of glands</td>
</tr>
<tr>
<td>4.</td>
<td>Situated away from the site of action</td>
<td>Situated near the site of action</td>
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Some glands which act as both endocrine & exocrine

<table>
<thead>
<tr>
<th>Gland</th>
<th>Endocrine function</th>
<th>Exocrine function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreas</td>
<td>Produces insulin &amp; Glucagon hormone.</td>
<td>Produces digestive enzyme. (pancreatic amylase)</td>
</tr>
<tr>
<td>Testes</td>
<td>Produces hormone Testosterone</td>
<td>Produces male gametes (reproductive cells)</td>
</tr>
<tr>
<td>Ovaries</td>
<td>Produces hormone Oestrogen</td>
<td>Produces female gametes (reproductive cells)</td>
</tr>
</tbody>
</table>

Important Endocrine glands, the hormone they secrete & their function

<table>
<thead>
<tr>
<th>Endocrine gland</th>
<th>Hormone</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pituitary gland</td>
<td>Growth hormone</td>
<td>Body growth, development of bones &amp; muscles (If excess- Gigantism) (If less- Dwarfism)</td>
</tr>
<tr>
<td>Thyroid gland</td>
<td>Thyroxine</td>
<td>Regulates carbohydrate, protein &amp; fat metabolism( If less- Goitre_)</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Produces insulin &amp; Glucagon hormone</td>
<td>Regulates blood sugar levels (if less diabetes is caused)</td>
</tr>
<tr>
<td>Testes in males</td>
<td>Produces hormone Testosterone</td>
<td>Development of secondary male characters like deep voice, beard, etc.</td>
</tr>
<tr>
<td>Ovaries in females</td>
<td>Produces hormone Oestrogen</td>
<td>Development of secondary female characters like mammary glands, menstrual cycle, maintenance of pregnancy.</td>
</tr>
</tbody>
</table>

Coordination in plants- Only chemical coordination is present in plants.

Tropic movements- The movements of plants in the direction of stimulus (positive) or away from it (negative) are called tropic movements. E.g. Phototropism, Geotropism. Chemotropism.

Refer to figure 7.4 & 7.5 page no. 121 of N.C.E.R.T Text book)

Nastic movements -The movements of plants independent of stimuli are called nastic movements. E.g.- Touch me not plant leaves close when touched.

Plant hormones (Phytohormones)

2. Gibberellins- Help in vegetative growth
3. Cytokinins- Promote cell division
4. Abscisic acid - Inhibits growth & causes wilting (falling) of leaves

Important diagrams-
Important activities-
1. To compare taste of sugar and food with open & blocked nostrils.
2. To demonstrate the response of a plant to the direction of light.
3. To demonstrate hydrotropism.