



# INDIAN SCHOOL AL WADI AL KABIR



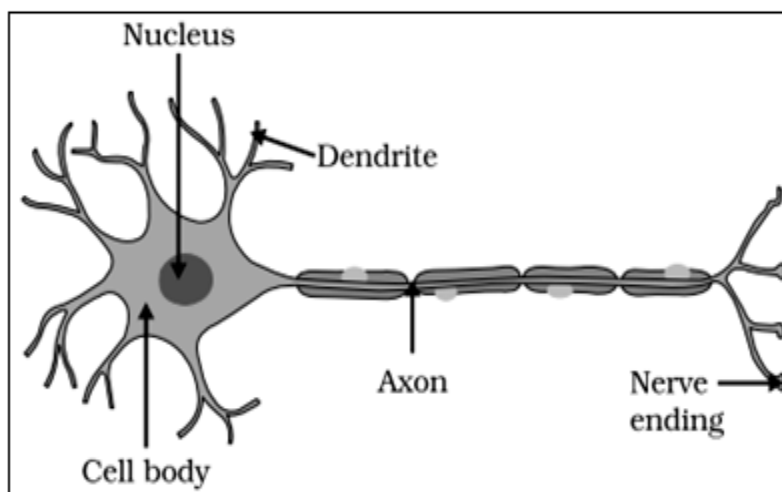
<b>Class: X</b>	<b>DEPARTMENT OF SCIENCE 2022 – 2023</b> <b>SUBJECT: BIOLOGY</b>	<b>Date of submission:</b> <b>05.11.22</b>
<b>Handout</b>	<b>TOPIC: CONTROL AND COORDINATION</b>	<b>Note:</b> <b>A4 FILE FORMAT</b>
<b>NAME OF THE STUDENT:</b> _____	<b>CLASS X &amp;</b> <b>SEC: ____</b>	<b>ROLL NO.</b>

In multicellular organisms, there are many complex organ systems and complex organs which are interdependent and working together in a coordinated manner to maintain an equilibrium within the body. To control all systems and make them work together a control and coordinating system is required. This includes two systems which together control and coordinate activities of the body. They are – Nervous system and Hormonal system.

## NERVOUS SYSTEM – HUMANS

The human nervous system consists of structural and functional units called NEURONS or Nerve cells.

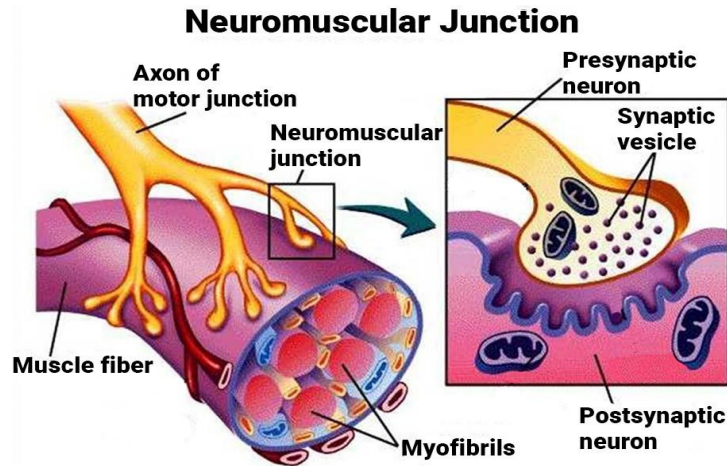
NEURON – Each neuron consists of three major functional regions namely dendrites, cyton and Axon.



**Structure of neuron**

Messages pass through nerve cells in the form of electric signals and this is called an IMPULSE.

**SYNAPSE** – The junctional complex of neurons over which nerve impulse pass from one neuron to the next is called synapse. The impulse transmission through a synapse is electro chemical. The specific chemicals that transmit message through the synaptic gap in a synapse is called a neurotransmitter.



**RECEPTORS**- These are specialized nerve endings that receive stimuli and are located within Sense organs.

S.NO	RECEPTOR	STIMULUS	SENSE ORGAN
1	Photoreceptor	light	Eyes
2	Olfactory receptor	Smell	Nose
3	Auditory/phono receptor	Sound	Ears
4	Gustatory receptor	Taste	Tongue
5	Thermoreceptor	Touch	Skin

Nervous system comprises of the following:

- i. CENTRAL NERVOUS SYSTEM
- ii. PERIPHERAL NERVOUS SYSTEM

**CENTRAL NERVOUS SYSTEM** – It comprises of the brain and spinal cord.

**BRAIN** – It comprises of FORE BRAIN, MID BRAIN & HIND BRAIN

FORE BRAIN – It consists of cerebrum and olfactory lobes.

MID BRAIN – Not divided further

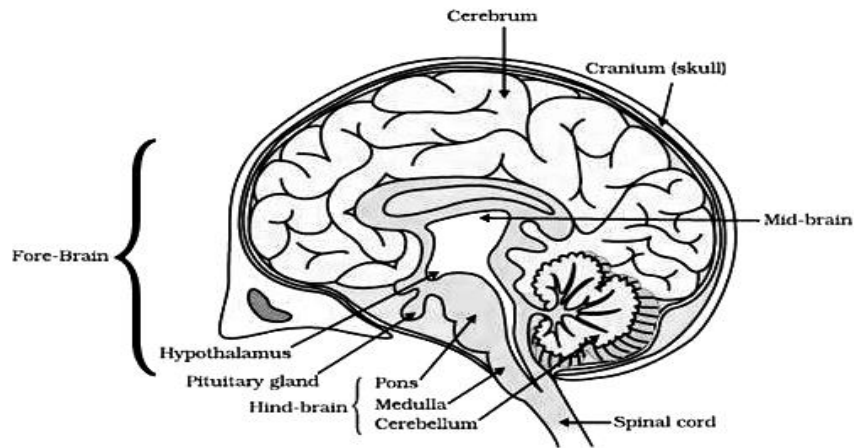
HIND BRAIN –It consists of cerebellum, brain stem (Pons and Medulla)

Functions – i) Cerebrum – Seat of intelligence, memory, feelings, emotions, voluntary actions related to receptors.

ii) Olfactory lobes – Sense of smell

iii) Cerebellum –Control posture and equilibrium of the body

iv) Pons & Medulla –Controls heart rate, respiratory rate and blood pressure etc.

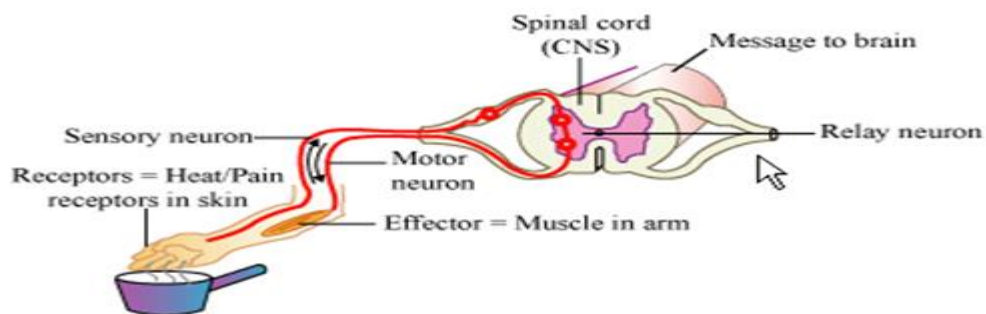


**Figure:** Human brain

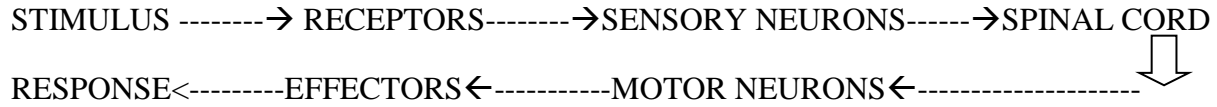
**Spinal Cord-** Conducts messages to and from the brain. It is the decision-making Centre in reflexes.

**REFLEXES-** It is the unconscious a stimulus and involuntary response of effectors to a stimulus coordinated by the spinal cord.

**REFLEX ARC** –It is the pathway taken by the nerve impulse and response in a reflex action.



**PATHWAY OF REFLEX ARC**



Advantages of reflexes –i) Quick responses to harmful stimulus to protect the body.

ii) Avoid overloading of brain

**HUMAN ENDOCRINE SYSTEM**

The human endocrine system consists of endocrine glands which are also called ‘**Ductless Glands**’ as they don’t have ducts of their own and so secrete their hormones directly into the venous blood.

Characteristics of hormones –i) They are protein molecules.

ii)They are secreted in very small amounts.

iii)They are specific in action. They act only on the target organs

iv)They are slow in action but have a long-term effect.

<b>ENDOCRINE GLAND</b>	<b>HORMONES</b>	<b>FUNCTIONS</b>
Hypothalamus	Releasing factors	Regulation of the secretion of hormones from pituitary gland.
Pituitary	Trophic hormones	Regulation of the secretion of hormones from other endocrine glands
	Growth hormone	Development of bones and muscles.
	ADH/Vasopressin	Regulation of water –salt balance
	Prolactin	Regulation of function of mammary gland.
	Oxytocin	Helps in child birth
Thyroid	Thyroxine	Regulation of metabolism of carbohydrates, fats and proteins
	Calcitonin	Regulation of blood calcium and phosphate

Parathyroid	Parathormone	Regulates blood calcium
Pancreas	Insulin	Lowering of blood glucose
	Glucagon	Increasing of blood glucose
Adrenals	Adrenalin	Regulation of blood pressure, heart rate etc.
Sex glands (Gonads) Testes(male)	Testosterone	Regulation of male accessory sex organs and secondary sexual characters
Ovaries(female)	Estrogen	Regulation of female accessory sex organs and secondary sexual characters

Why is it important for us to have iodized salt in our diet?

Iodine is necessary for the thyroid gland to make thyroxin hormone. **Thyroxin** regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth. Iodine is essential for the synthesis of **thyroxin**. In case iodine is deficient in our diet, there is a possibility that we might suffer from **goiter**. One of the symptoms in this disease is a **swollen neck**.

**Growth hormone** is one of the hormones secreted by the pituitary. As its name indicates, growth hormone regulates growth and development of the body. If there is a deficiency of this hormone in childhood, it leads to **dwarfism**.

We have noticed many dramatic changes in our appearance as well as that of our friends as we approached 10–12 years of age. These changes associated with **puberty** are because of the secretion of **testosterone** in males and **oestrogen** in females.

People are advised by the doctor to take less sugar in their diet because they are suffering from **diabetes**? As a treatment, they might be taking injections of **insulin**. This is a hormone which is produced by the **pancreas** and helps in **regulating blood sugar levels**. If it is not secreted in proper amounts, the sugar level in the blood rises causing many harmful effects.

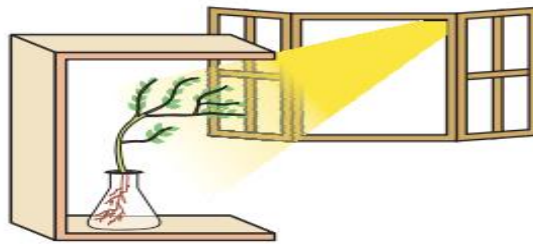
Hormones should be secreted in precise quantities, we need a mechanism through which this is done. The timing and amount of hormone released are regulated by **feedback mechanisms**.

For example, if the sugar levels in blood rise, they are detected by the cells of the pancreas which respond by producing more insulin. As the blood sugar level falls, insulin secretion is reduced.

## COORDINATION IN PLANTS

Movement in plants are categorized into two – GROWTH DEPENDENT and GROWTH INDEPENDENT

**Growth dependent movements** –These are directional movements in which specific growth of plant organs in response to an external stimulus is visible. The different types of these are- Phototropism- Movement in response to light. The growth response of plant parts to the stimulus of light, producing a bending towards the light source.

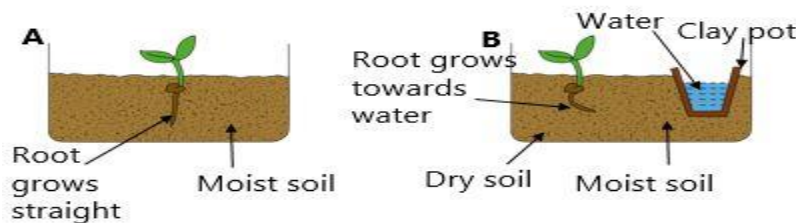


**Figure 7.5**  
*Response of the plant to the direction of light*

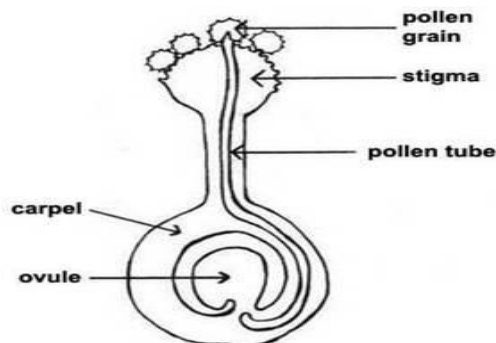
Geotropism –Movement in response to gravity. Geotropism in plants is **the phenomenon of plants sensing the effects of gravity and growing in accordance with the force of gravity.**



Hydrotropism- Movement in response to water. Hydrotropism is **a plant's growth response in which the direction of growth is determined by a stimulus or gradient in water concentration.**



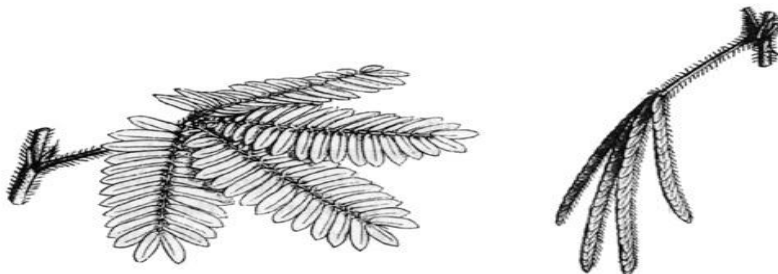
Chemotropism- Movement in response to chemicals. Chemotropism is **the movement of plant in response to the chemicals** e.g., movement of pollen tube towards ovule in response to the sugary molecule.



**Phytohormones** –Plant growth is regulated by certain chemicals produced naturally in them called phytohormones. They are synthesized at places away from where they diffuse to the area of action and act.

PHYTOHORMONES	FUNCTIONS
Auxins	Associated with cell elongation and root formation
Gibberellin	Internode elongation, seed germination and flowering
Cytokinin	Promotes cell division, delays ageing in leaves
Abscisic acid	Growth inhibitor, dormancy in seeds
Ethylene	Ripening of fruits, promotes ageing in leaves

**Immediate Response to Stimulus (Growth independent movements)** – These are movements in which growth is not involved. The plant uses electro chemical means to transmit information from cell to cell. Some cells change shape by changing the amount of water in them which in turn bring about movement. E.g.; -Folding of leaves of mimosa plant when touched.



Prepared by Mr. Gerard Thomas	Checked by: HOD SCIENCE
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