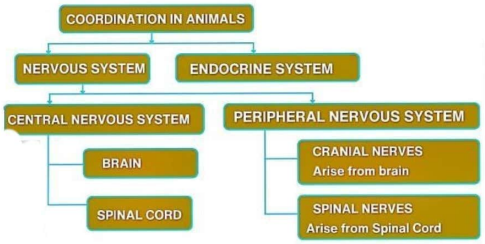
ALAKH SIR ke FARREY

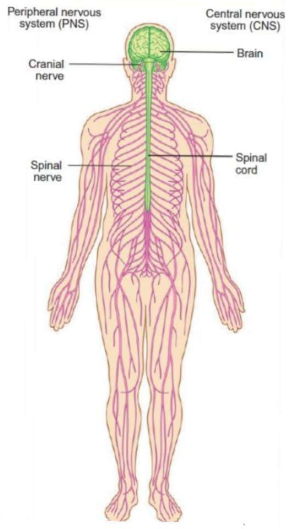
Control & Coordination

Stimuli - change in the environment to which an organism responds.

Response - Reaction of an organism to a stimulus.

Working together of various parts of body to respond to a stimuli is called **Coordination.**





Nervous Tissues :- • made up of a organized network of nerve cells.
• Bundle of neurons.

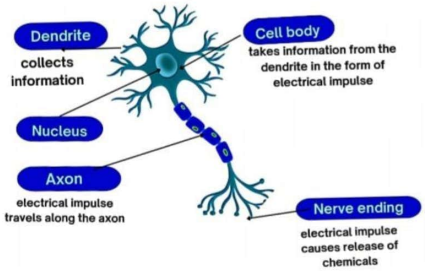
Receptors :- cells, tissue or organs that receive the stimulus.

Effectors :- muscles/tissues/glands which act in response to a stimuli.

Receptor	Sense Organ	Stimuli
Photo receptors	Eyes	Light
Olfactory receptors	Nose	Smell
Gustatory receptors	Tongue	Taste
Phono receptors	Ear	Sound
Thermoreceptors	Skin	Heat/ Cold
Nociceptors	Skin	Pain

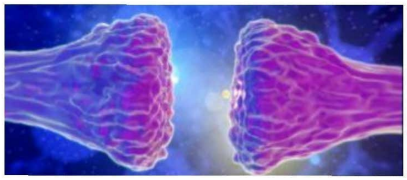
NEURON :-

- structural and functional unit of nervous system.
- largest cell in Body.
- carry messages in the form of electrical impulses.

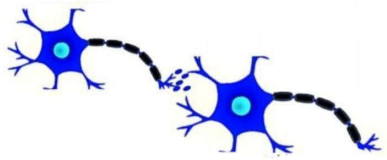


TRANSMISSION OF IMPULSE BETWEEN 2 NEURONS

Receptors receive the stimulus
↓
Information is collected at the end of dendritic tip.
↓
chemical Reaction creates an electrical impulse
↓
Impulse travel from dendrite to cell body.
↓
Impulse travels through the axon.
↓
Reaches nerve endings
↓
Release of chemicals at the synapse



SYNAPSE :- Microscopic junction between two neurons.



- There is a release of chemical substances at the synapse between two neurons which help in the transmission of electrical impulse.

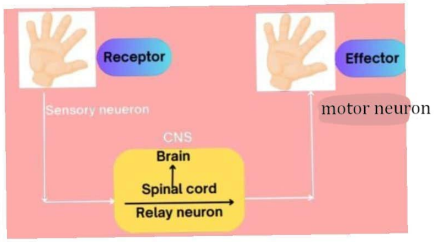
Neurotransmitters :- chemical substances that help in the transmission of nerve impulse.

NEUROMUSCULAR JUNCTION :-
- Junction between nerve ending of a motor neuron and a muscle.

presence of stimulus
↓
Receptors receive the stimulus
↓
Impulse taken by sensory neurons
↓
conduction of impulse through the neurons
↓
Information reaches to CNS
↓
Relay neurons present in CNS transfers impulse from sensory to motor neurons
↓
Motor neurons carry information from CNS to effectors
↓
Effectors (muscles/glands) respond to stimuli.

TYPES OF NEURONS

- **Sensory Neurons** — Transmit impulse from Receptor to CNS.
- **Motor Neurons** — Transmit impulse from CNS to effectors (muscle or gland)
- **Relay Neurons** — Connects sensory and Motor neurons.



REFLEX ACTIONS (Reflex Movement)

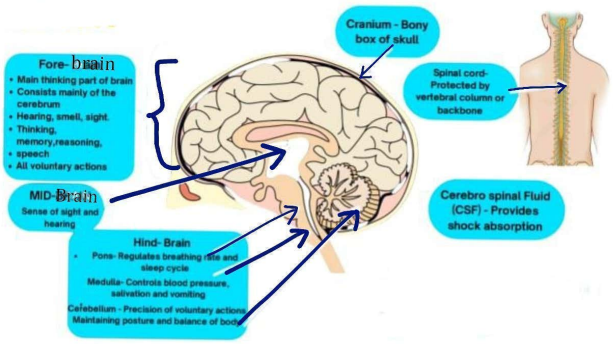
- sudden and Quick movement.
- Involuntary movement.
- Brain not involved (directly not involved)
- Reflex actions are controlled by spinal cord.

Type of Action	Description	Examples
Voluntary Actions	- Controlled by will- Thinking and brain involved	Walking, Writing, Dancing
Involuntary Actions	- Uncontrolled- No thinking- Brain involved	Blood pumping, Peristalsis
Reflex Actions	- Uncontrolled- No thinking- No brain involved	Hand withdrawal, Sneezing

Reflex Arc :- Path followed by nerve impulse during reflex action.

BRAIN :-

- CNS → Brain + spinal cord
- Main coordinating center of the body.



HORMONES IN ANIMALS

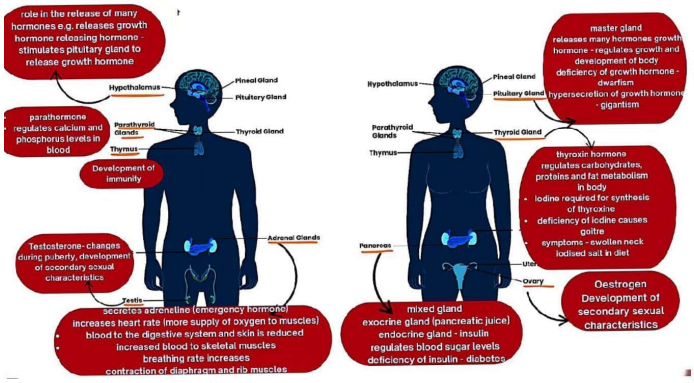
Hormones- chemical substances that act like messenger molecules in the body.

Gland- a structure that secretes a specific substance.

Types of Glands

(1) Endocrine- ductless glands, secrete products directly into the bloodstream

(2) Exocrine - have ducts.



Gland	Hormone	Function	Related disease
Hypothalamus	Releasing hormones	Stimulates pituitary gland to release hormones	
Pituitary gland	Growth hormone	Body growth, development of bones & muscles	Excess - Gigantism Deficiency - Dwarfism
Thyroid gland	Thyroxine	Regulates carbohydrate, protein \ fat metabolism	deficiency of Iodine - Goitre
Pancreas	Insulin	Control blood sugar levels	diabetes
Adrenal gland	Adrenaline	Prepare body to cope with emergency situations.	
Testes in males	Testosterone	Development of secondary male characters the deep voice, beard, and sex organs	
Ovaries in females	Oestrogen	Development of secondary female characters like mammary glands, menstrual cycle and sex organs.	

- feedback mechanism - the timing and amount of hormone released are regulated by feedback mechanism.

e.g

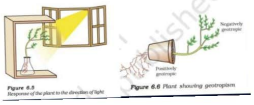
- Blood sugar levels increase - pancreas produces more insulin.
- Blood sugar levels decrease - insulin secretion is reduced.

COORDINATION IN PLANTS :-

TROPIC MOVEMENT :-

- Tropic Movement - growth dependent
- growth movement of a plant part in response to external stimuli is called tropism.
- direction of stimulus determines the direction of response.
- Growth of plants towards stimulus → positive tropism.
- Growth of plants away from stimulus → Negative tropism.

Phototropism	Growth of plant part towards or away from Light	• POSITIVE PHOTOTROPISM - movement towards light • eg. stem of a growing plant bends towards light	• NEGATIVE PHOTOTROPISM - movement away from light • eg. roots of a plant moves away from light
Geotropism	Growth of plant part towards or away from Gravity	• POSITIVE GEOTROPISM - movement towards gravity • eg. roots of a plant moves downward towards gravity	• NEGATIVE GEOTROPISM - movement against gravity • eg. stems of a plants moves upwards against gravity
Hydrotropism	Growth of plant part towards or away from water	• POSITIVE HYDROTROPISM - movement towards water • eg. roots of a plant grow towards water	• NEGATIVE HYDROTROPISM - movement away from water
Chemotropism	Growth of plant part towards or away from chemicals	• POSITIVE CHEMOTROPISM - movement towards chemical • eg. growth of pollen tube towards ovule during fertilisation	• NEGATIVE CHEMOTROPISM - movement away from chemical
Thigmotropism	Growth of plant part towards or away from touch	the direction of growth movement of a plant part in response to the touch of an object	e.g. climbing parts of a plant such as tendrils grow towards support and wind around them



NASTIC MOVEMENT :-

- Non-directional movement in plant in response to stimuli.
- Growth independent movement.

e.g When we touch the leaves of a sensitive plant like Mimosa pudica, they fold.

Characteristic	Tropic Movements	Nastic Movements
Response to Stimulus	Unidirectional Response to Stimulus	Non-directional Response to Stimulus
Dependency on Growth	Growth-dependent movements	Growth-independent movements
Nature of Movement	Permanent and irreversible	Temporary and reversible
Occurrence in Plants	Found in all plants	Found only in a few specialized plants
Speed of Movement	Slow action	Immediate action

ANIMALS	PLANTS
Specialised tissues for conduction of information	No specialised tissues for conduction of information
They change shape because of specialised proteins in muscles	They change shape because of change in amount of water in cells (resulting in swelling/shrinking)

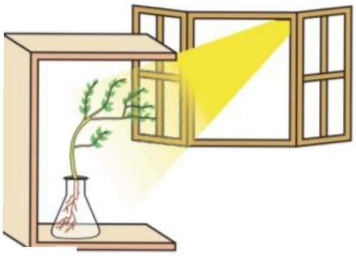
HORMONES IN PLANTS

AUXINS:- promotes cell enlargement and cell differentiation.
promotes food growth.
Auxin is made by cells at the tip of stems and roots.
moves away from light and moves towards gravity.

CYTOKININS:- promotes cell division.
present in greater concentration in areas of rapid cell division (such as fruits and seeds)

GIBBERELLINS:- help in growth of the stem.

ABSCISIC ACID:-
- growth inhibitor.
- wilting of leaves.



BENDING OF PLANT :-

light comes on one side of plant.
- Auxin diffuses toward shady side of shoot.
- Cells grow longer on the side of shoot away from light.
- Thus plant appears to bend towards light.

CONTROL AND COORDINATION
[CYQ]

Question-1) (i) What is meant by receptors in the human body?
(ii) Name any four types of receptors with their locations.
(iii) Why is chemical coordination better than electrical impulses for communication in multicellular organism? (CBSE 2018, 2020, 2023, 2024)

Question-2) Draw a diagram of neuron and label its parts.
(i) Where information is acquired,
(ii) through which information travels as an electric impulse, and
(iii) where the electric impulse must be converted into a chemical signal for onward transmission. (CBSE 2018, 2019)

Question-3) (i) identify which parts of the brain are responsible for
(a) maintaining posture and balance.
(b) controlling heartbeat.
(c) enabling thinking
(d) Regulating blood pressure.
(ii) Explain how the brain and spinal cord are protected from shocks and injuries.
(iii) What constitutes the central and peripheral nervous systems?
(CBSE 2020, 2023)

Question-4) CBQ

Ravi accidentally touches a hot pan while cooking and immediately pulls his hand away. This rapid response saves him from a severe burn.
(i) Define reflex action. Using a flowchart, illustrate the path of the reflex action Ravi experinced when he touched the hot pan.
(ii) Why are reflex arcs considered more efficient for quick response and why have they evolved in animals like humans?
(iii) Describe the role of sensory and motor neurons in this reflex arc.
(CBSE 2024)

Question-5)
(i) Define geotropism. Draw a well-labeled diagram of a plant showing geotropic movement of its parts. what is meant by positive and negative geotropism?
(ii) Name a plant hormone responsible for bending of a shoot towards unidirectional light. How does it promote phototropism?
(iii) How do auxins promote the growth of a tendril around a support?
(CBSE 2019, 2020)

Question-6) (i) The leaves of 'chhui-mui' plant begin to fold up and droop in response to a stimulus. Name the stimulus and write the cause for such a rapid movement. Is there any growth involved in the movement?

(ii) state the types of movements seen in plants due to water and chemical stimulus and explain with the help of diagrams respectively.

(CBSE 2016, 2024)

Question-7) (i) Where is the thyroid gland located in the human body? Name the hormone secreted by the thyroid gland and explain its function.

(ii) What is hypothyroidism? How can it be managed? What dietary changes can help regulate TSH levels?

(iii) What hormone is secreted by the adrenal gland durning stressful situtions. and What are three responses the body exhibits when this hormone is released into the blood?

(CBSE 2020, 2023, 2024)

Question-8) CBQ

Rahul, a 14 year-old boy, has been experiencing abnormal growth patterns. His parents are concerned as he is much shorter than his peers. The doctors conducts a series of tests and finds that he has a deficiency of a particular hormone responsible for growth regulation. Meanwhile, his grandfather has been advised to reduce sugar intake due to high blood glucose levels.

(i) What disease is Rahul's grandfather likely experiencing? identify the hormone and the gland responsible for the imbalance.

What hormone deficiency is Rahul likely facing which gland secretes it and how does it impact growth regulation?

How does the timing and amount of hormone release get regulated in the body? Explain with an example.

(CBSE 2016, 2018, 2020)
