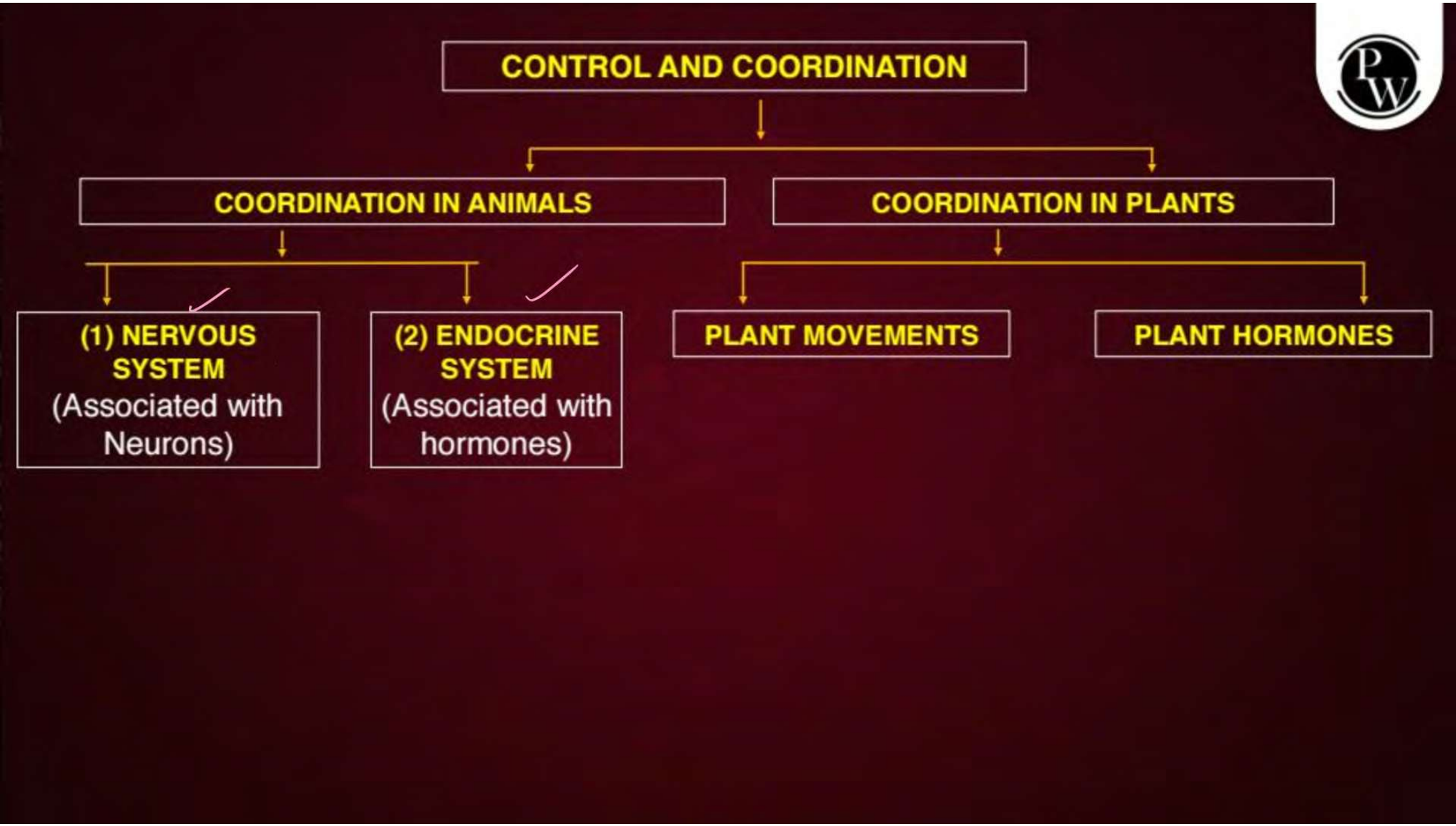
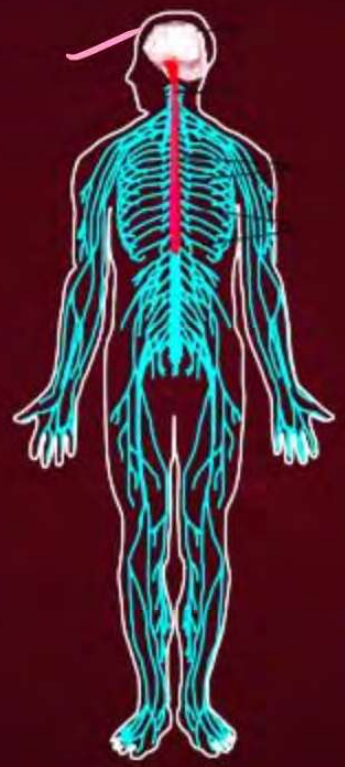

CONTROL AND COORDINATION
COORDINATION IN ANIMALS
COORDINATION IN PLANTS
(1) NERVOUS SYSTEM (Associated with Neurons)
(2) ENDOCRINE SYSTEM (Associated with hormones)
PLANT MOVEMENTS
PLANT HORMONES

NERVOUS SYSTEM

CENTRAL NERVOUS SYSTEM (CNS)

(i) Brain

(ii) Spinal cord

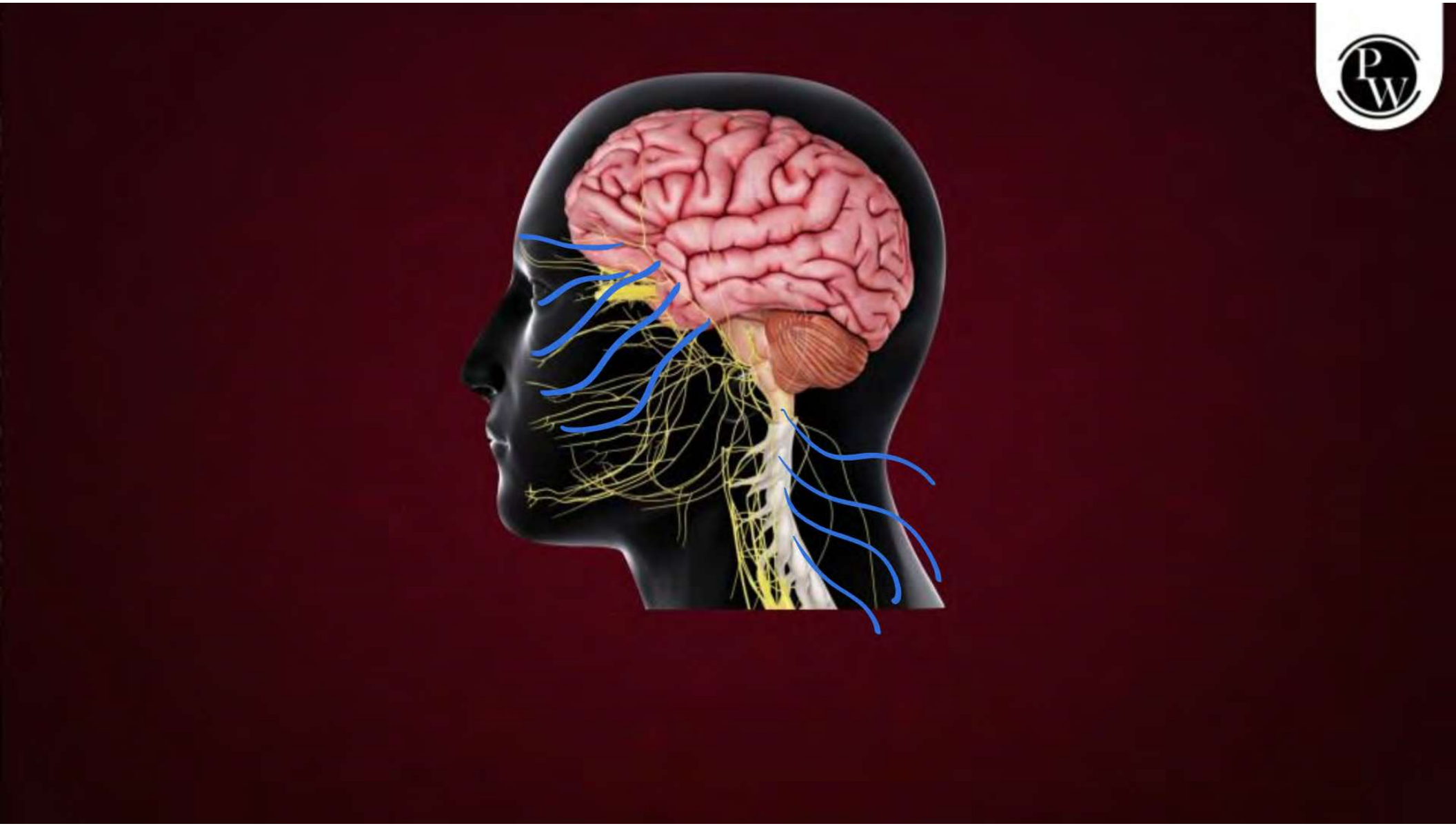


PERIPHERAL NERVOUS SYSTEM (PNS)

Nerves

(i) Cranial nerves (12 pairs)

(ii) Spinal nerves (31 pairs)



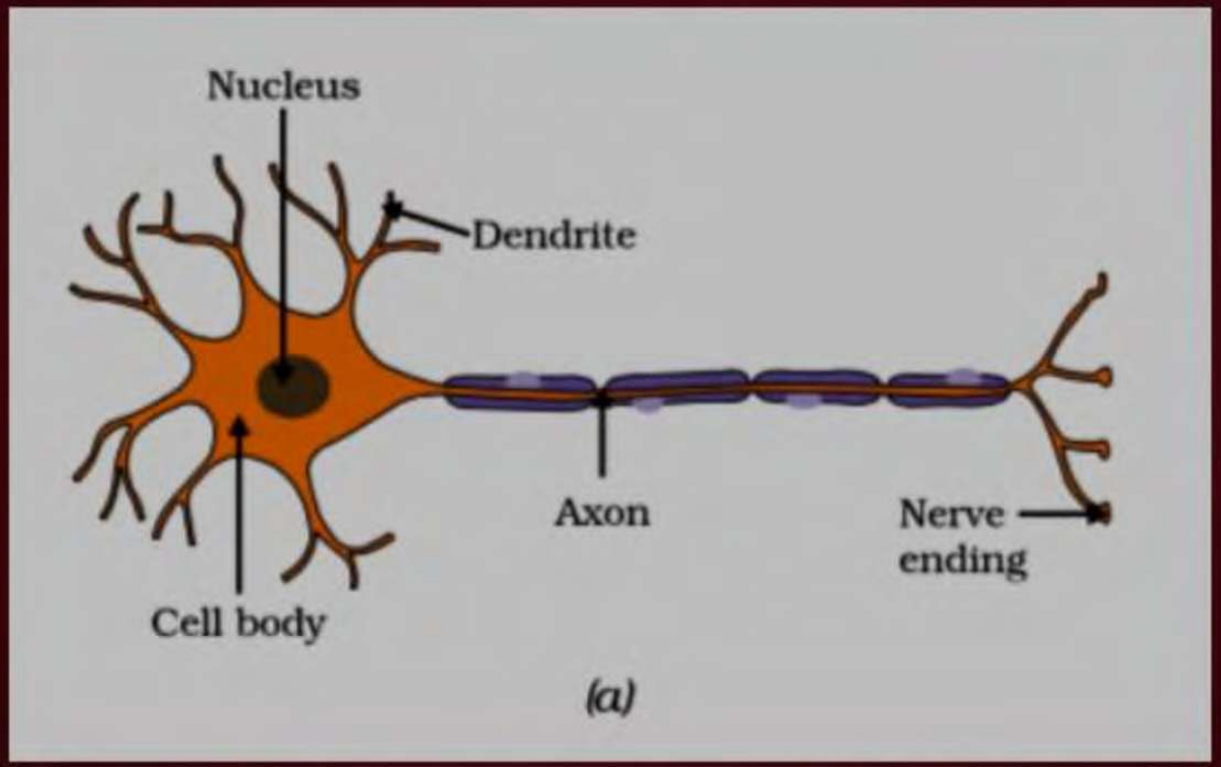
Key terms to understand the functioning of Nervous system:

Stimulus	• Any the change, factor or agent which causes a change in activity or behaviour of an organism.
Receptors	• Receptors are the cells, tissues or organs that receive the stimulus
Effector	• Effector are tissues, glands or muscles which act in response to stimulus received
Response	• Response is the reaction towards a stimulus by an organism.

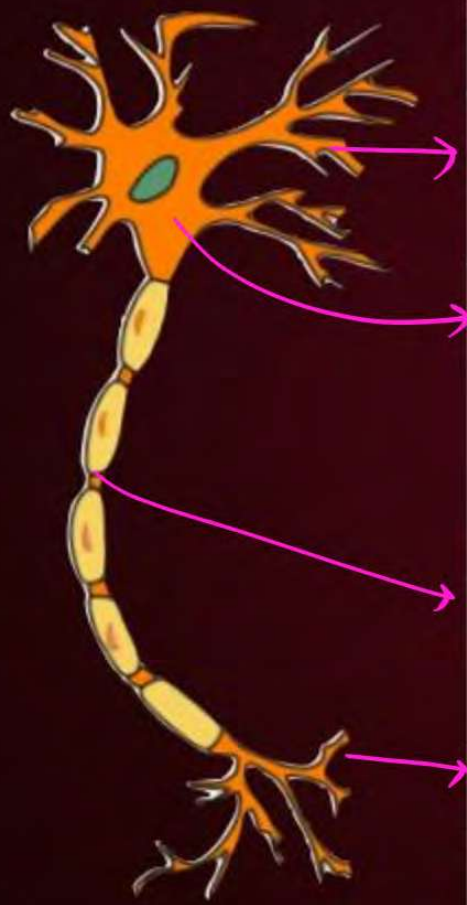
BASIC SENSORY RECEPTORS IN HUMAN

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 / Nerve Cell



Neuron



Part	Details
Dendrites	Branched structure that collect information from previous neuron and passes on to the cell body.
Cell body	It is the broad, rounded part of the neuron that contains the nucleus, abundant cytoplasm (neuroplasm) and other organelles like mitochondria, endoplasmic reticulum, Golgi body etc.
Axon	long tube-like , carries information from the cell body to the nerve endings.
Nerve endings	Terminally branched portion

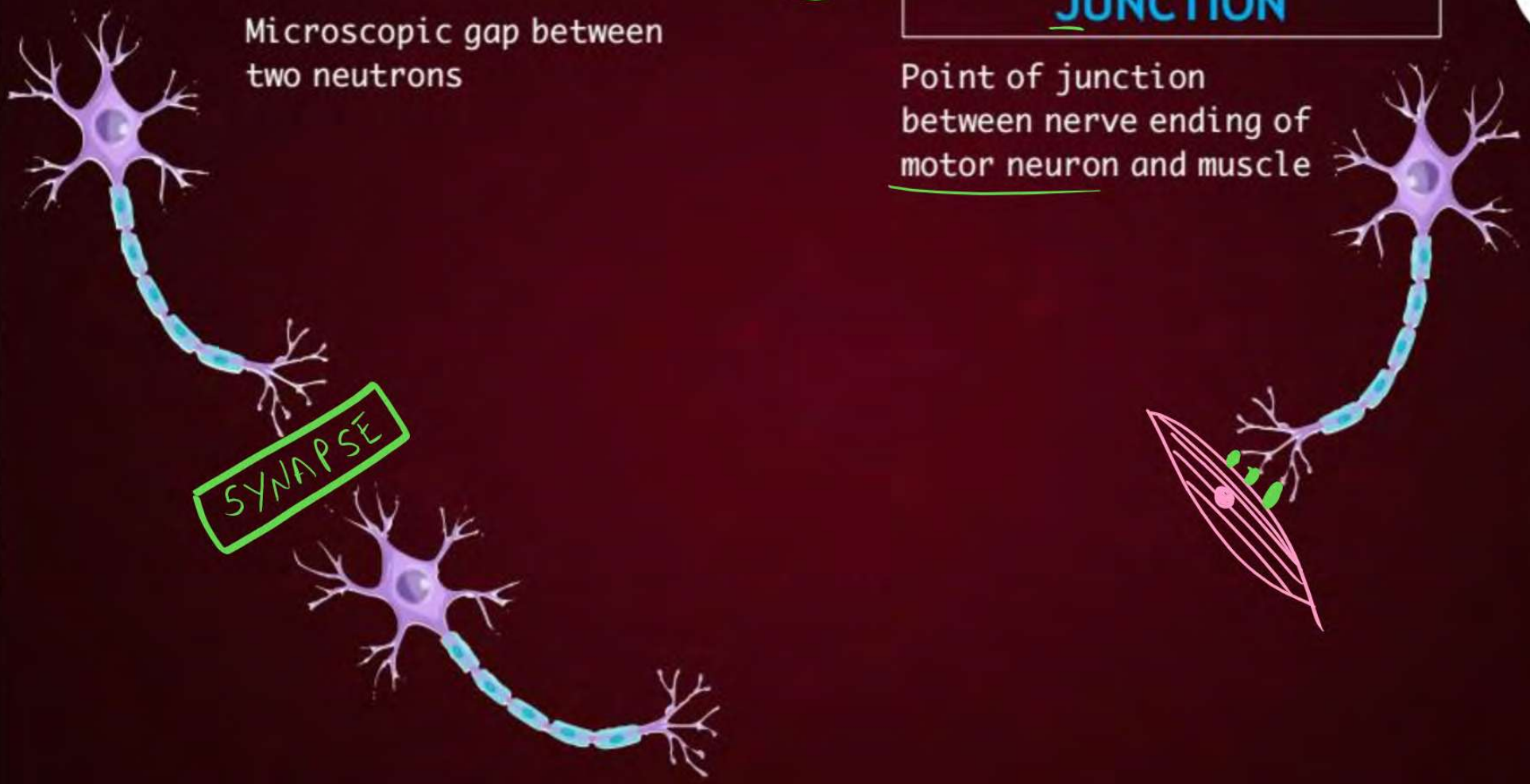
SYNAPSE

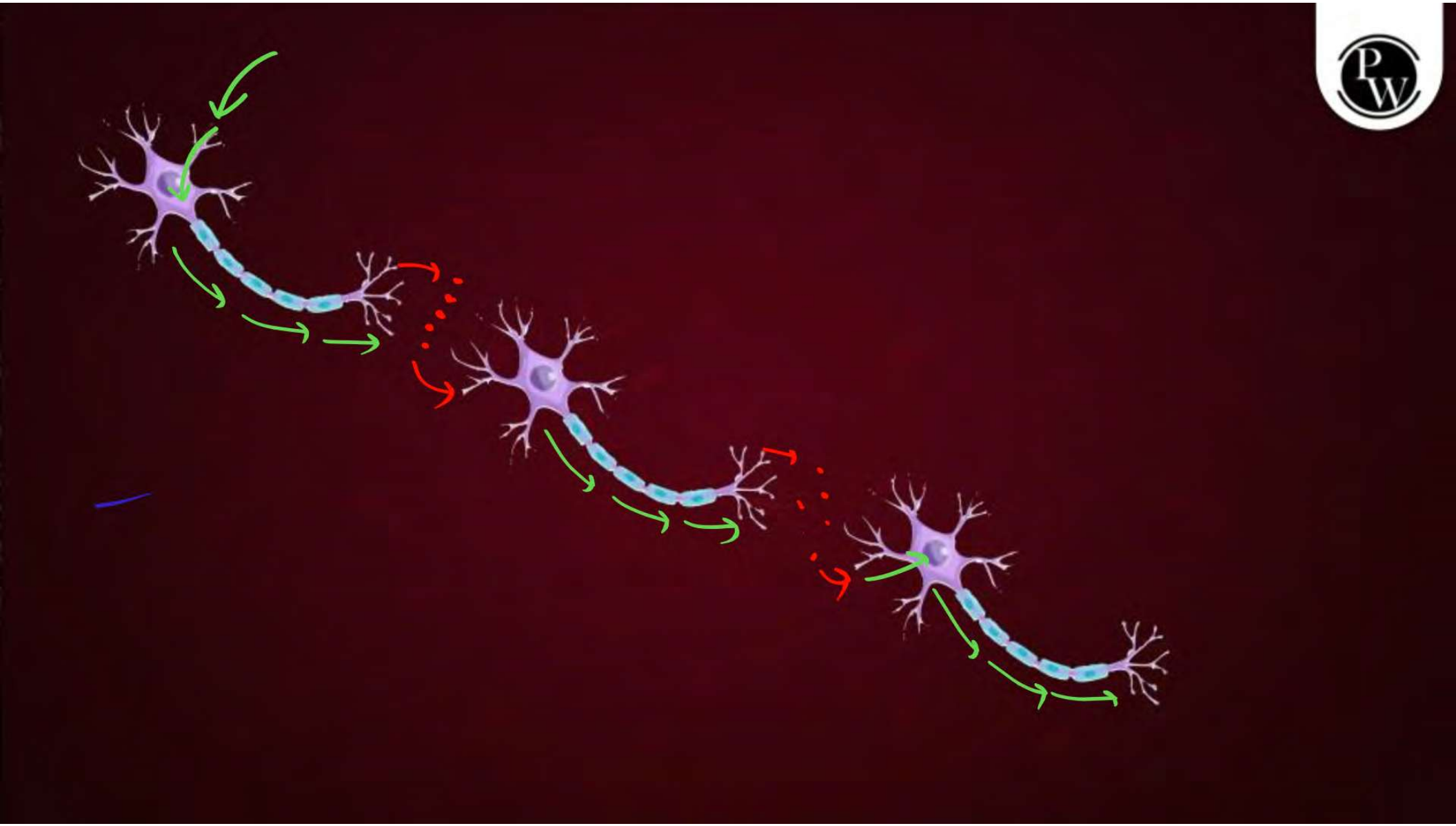
Microscopic gap between two neutrons

NMJ

NEUROMUSCULAR JUNCTION

Point of junction between nerve ending of motor neuron and muscle





Types of neurons

Sensory neurons

They help in transmitting nerve impulse from receptor to central nervous system

Interneurons

They connect sensory and motor neuron

Motor neurons

They help in transmitting nerve impulse from central nervous system to a muscle or gland

NERVOUS ACTIONS

Voluntary actions/ movements

- These actions can be controlled by our own will
- Thinking involved
- Brain is involved
- Walking
- Writing
- Dancing
- Jumping

Involuntary actions/ movements

- These actions can not be controlled by our own will
- Thinking is not involved
- Brain is involved
- Pumping of blood
- Peristaltic movements
- Contraction relaxation of blood vessels

Reflex actions/movements

- These actions can not be controlled by our own will
- Thinking is not involved
- Brain is not involved

Spinal Cord

- Withdrawal of hand when touch an hot object.
- Closing of eyelids when some particles enter the eye.
- Shivering when it is too cold.
- Sneezing

The pathway of the reflex action is called Reflex arc.

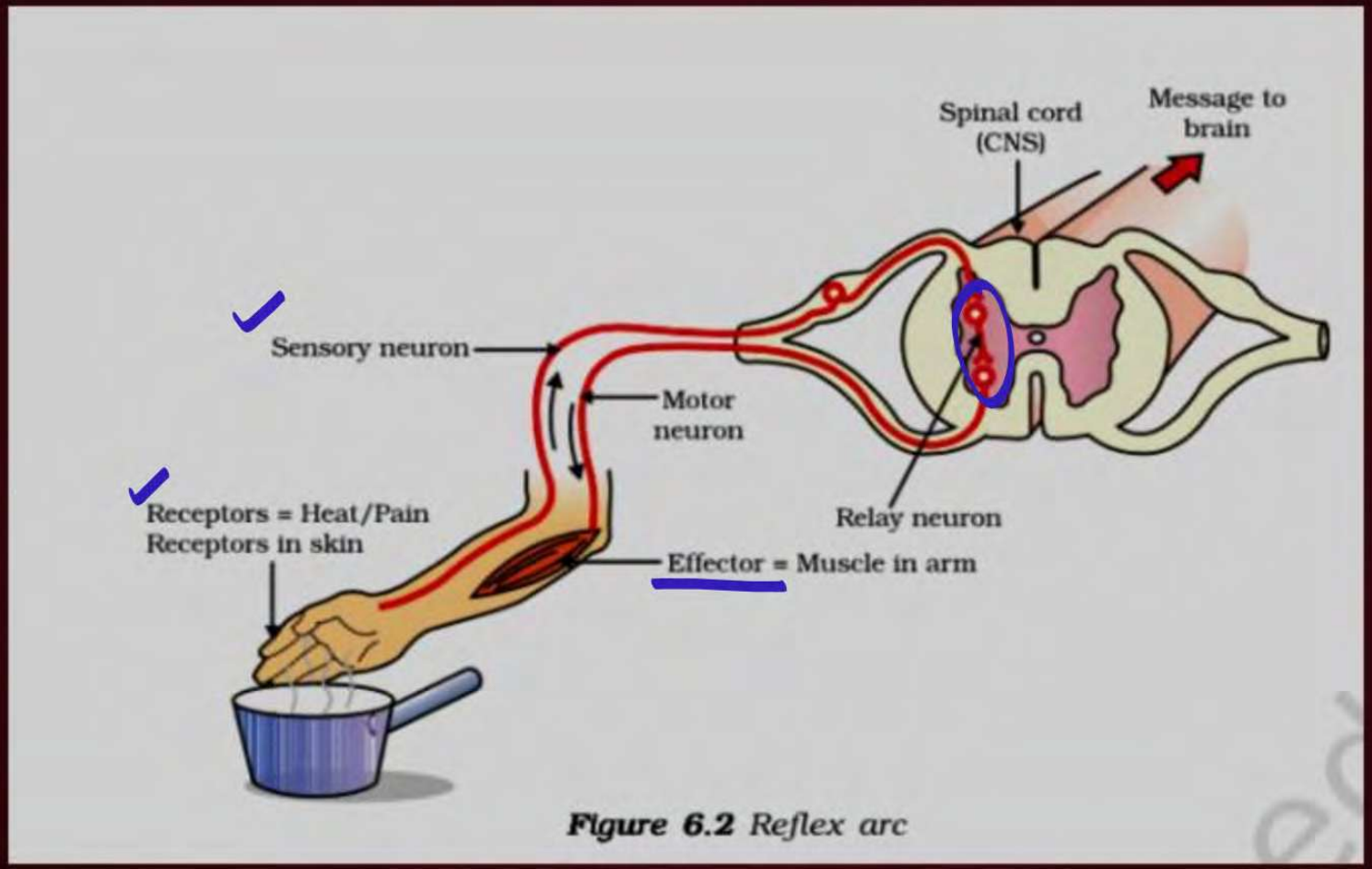


Figure 6.2 *Reflex arc*

BRAIN

(i) Centre of coordination of all activities
(ii) Involved in thinking
(iii) Divided into three parts-

(1) FORE BRAIN

Cerebrum :
(i) Main thinking and largest part of the brain.
(ii) It has Seat of mental abilities, controls thinking, memory, reasoning, perception, emotions, and speech.

Thalamus: It relays sensory information to the Cerebrum.
Hypothalamus it controls sleep, hunger thirst etc. It forms the link between Nervous system & Endocrine system .

(2) MID BRAIN

- Connects Fore brain and Hind brain.
- Concerned with sense of sight and hearing.

(3) HIND BRAIN

Connects the Fore brain & Hind brain

Cerebellum: Controls & coordinates muscular movements, maintaining body balance and posture.

Pons: concerned with regulation of breathing rate, sleep cycle.

Medulla oblongata: Controls involuntary actions like blood pressure. salivation, vomiting, etc.

Gland	Hormone	Function
Hypothalamus	Releasing hormones	Stimulates pituitary gland to release hormones
Pituitary gland	Growth hormone	Body growth, development of bones & muscles (if excess-Gigantism) (if less- Dwarfism)
Thyroid gland	Thyroxine	Regulates carbohydrate, protein \ fat metabolism (if less iodine intake - Goitre)
Pancreas	Insulin & Glucagon	Control blood sugar levels (if less - diabetes is caused)
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 and progesterone	Development of secondary female characters like mammary glands, menstrual cycle and sex organs. Maintenance of pregnancy

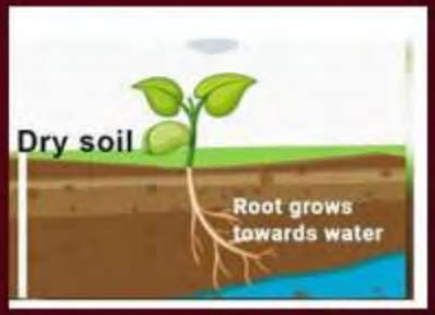
COORDINATION IN PLANTS

Only chemical coordination is present in plants.

(1) TROPIC MOVEMENT

The Growth movements of plants in the direction of stimulus (positive) or away from it (negative) are called tropic movements.

Phototropism	Growth of plant part towards or away from Light
Geotropism/ Gravitotropism	Growth of plant part towards or away from Gravity
Hydrotropism	Growth of plant part towards or away from water
Chemotropism	Growth of plant part towards or away from chemicals
Thigmotropism	Growth of plant part towards or away from touch



(2) NASTIC MOVEMENTS

The Growth independent movements of plants in response to stimuli are called nastic movements.

E.g.- Touch me not plant leaves close when touched.

PLANT HORMONES

Plant Hormone	Function
• Auxin	•Promotes cell elongation in shoots •Controls phototropism / gravitotropism •Stimulates fruit development
• Gibberellins	•Stimulates stem elongation •Helps in seed germination, •fruit and flower development
• Cytokinin	•Promote cell division •Delays ageing of leaves, flower
• Abscisic Acid	•Causes stomata to close •Maintains dormancy in seeds
• Ethylene	•Stimulates ripening in fruits •Promotes fruit and leaf drop