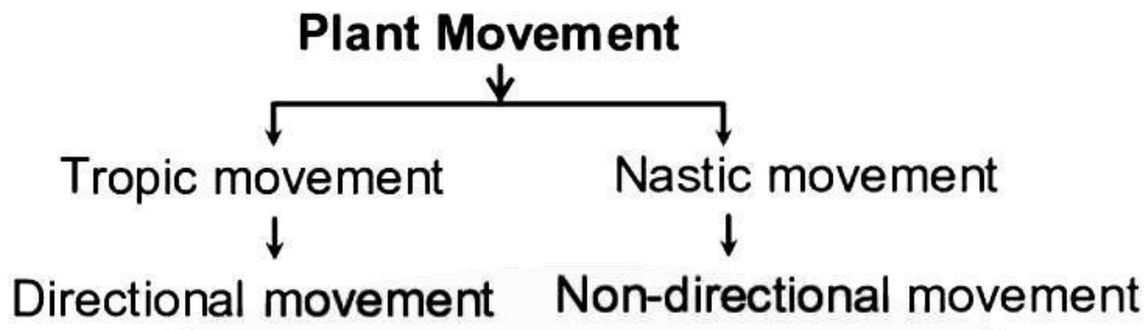
CONTROL AND COORDINATION

CONTROL AND COORDINATION IN PLANTS



(A) Tropic Movement

Phototropism	In response to light
Chemotropism	In response to chemical
Hydrotropism	In response to water
Geotropism	In response to gravity
Thigmotropism	In response to touch

(B) Nastic Movement

(i) Thigmonasty (e.g. *Mimosa Pudica*)
(ii) Photonasty (e.g. Dandelion flower)

ROLE OF PHYTOHORMONES

S.No.	Hormone	Functions
1.	Auxin	• Promotes cell enlargement and cell differentiation (e.g. growth of stem). • Promotes fruit growth.
2.	Gibberellins	• Promotes cell enlargement and cell differentiation in presence of auxin.
3.	Cytokinin	• Promotes cell division i.e. cytokinesis (e.g. in fruits and seeds). • Helps in breaking the dormancy of seeds and buds. • Promotes opening of stomata.
4.	Abscisic Acid (A growth inhibitor)	• Promotes the dormancy in seeds and buds. • Promotes the closing of stomata. • Promotes the wilting and falling of leaves.

Mechanism of Auxin action

Normal growth

Shoot tip

↓ incident sun light

Auxin distributes down the stem uniformly

↓

Shoot grows uniformly

In experimental condition

Shoot Tip

↓ sun light incident on tip

Auxin starts secreting

↓

Move towards shaded plant part

↓

Increases cell division and cell enlargement

↓

Shaded area elongates

↓

Shaded area grows faster than lighted area

↓

Shoot bends

CONTROL AND COORDINATION IN ANIMALS

Types of receptors (specialized cells sensitive to a particular stimulus)

S.No.	Receptor	Types of Stimulus	Sense organ
1.	Photo receptors	Detects light	Eye
2.	Phono receptors	Detects sound	Ear
3.	Olfactory receptors	Detects smell	Nose
4.	Gustatory receptors	Detects taste	Tongue
5.	Thermo receptors	Detects heat or cold	Skin

Three types of Neuron (Nerve cell)

Sensory Neuron — Motor Neuron — Relay Neuron

Nerve Impulse
(Electrical or Chemical signals)

↓

Transmission of nerve impulse)

↓

Information detected by dendrite tip of a nerve cell

↓

A chemical reaction sets up

↓

Creates an electric impulse

↓

Electrical impulse travels from dendrite

↓

To cell body of nerve cell

↓

Along the Axon

↓

At the end of the axon, chemicals are released

↓

Chemical cross synapse (gap between 2 neurons)

↓ ↓

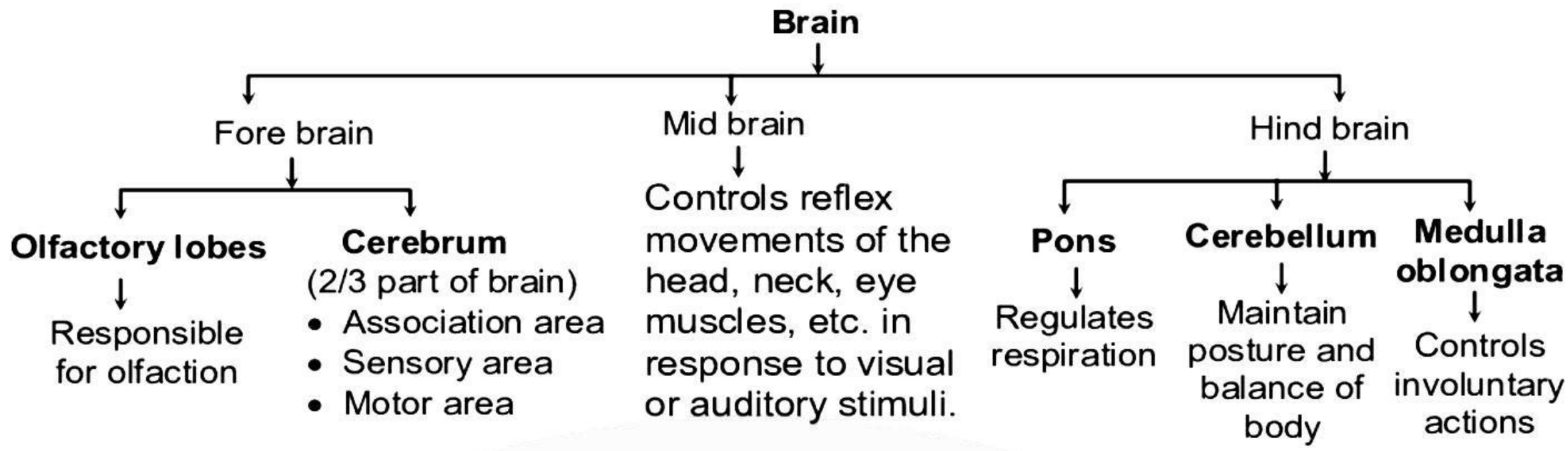
Transmits nerve impulse to a muscle cell or gland through neuromuscular junction (synapse) ← Starts a similar electrical impulse in next neuron and so on

↓

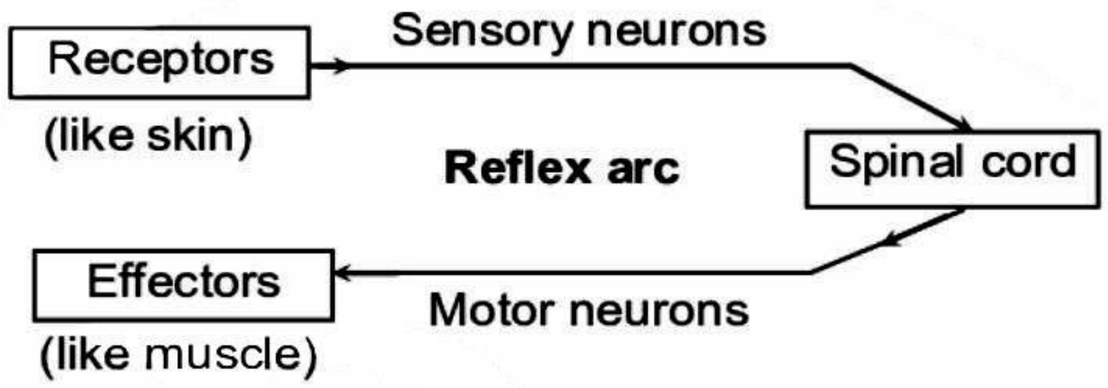
Action by muscle / gland

Nervous System in Humans

- **Central Nervous System (CNS)**
  - **Brain**
    - **Fore-Brain**
      - Cerebrum
        - Frontal lobe
        - Temporal lobe
        - Parietal lobe
        - Occipital lobe
      - Olfactory lobes
    - **Mid-Brain**
    - **Hind-Brain**
      - Cerebellum
      - Pons
      - Medulla oblongata
  - **Spinal cord**
- **Peripheral Nervous System (PNS)**
  - **Cranial Nerves (12 pairs)**
  - **Spinal nerves (31 pairs)**
- **Autonomic Nervous System (ANS)**
  - **Sympathetic Nerves**
  - **Parasympathetic Nerves**

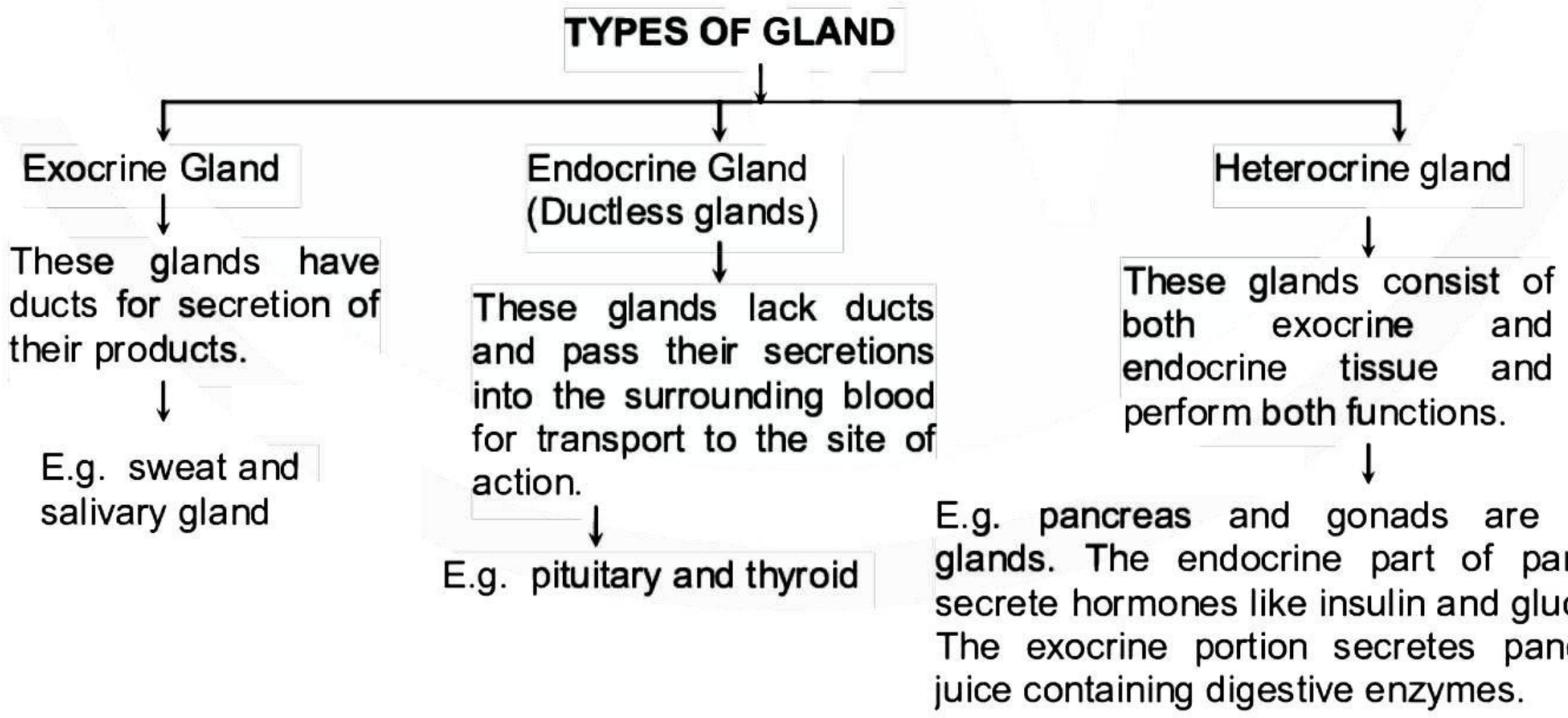


Spinal Cord: It is rod-like structure enclosed in a bony cage called **vertebral column** and it is concerned with **reflex actions** and conduction of nerve impulses to and from the brain.



Autonomic Nervous System

S. No.	Name of Organ	Sympathetic System	Parasympathetic System
1.	Heart	Increase contraction and rhythm	Decrease contraction and rhythm
2.	Bronchi	Dilation	Constriction
3.	Eye	Dilation of pupil	Constriction of pupil
4.	Urinary bladder	Relaxation	Contraction



S.No.	Name of Gland	Hormones(chemical messengers)	Functions

1.	Hypothalamus	Releasing Hormones	Regulates the secretion of hormones from the pituitary.
2.	Pituitary	Growth Hormone	Regulates the development of bones and muscles.
		Oxytocin	Regulates the secretion of milk during lactation and regulates uterine contractions.
		Vasopressin	Regulates the water and electrolyte balance in the body.
		Prolactin	Regulates the function of mammary gland.
		Trophic Hormones	Regulates the secretion of hormones from other endocrine glands like thyroid, adrenal, ovary and testis.
3.	Thyroid	Thyroxin	Regulates the metabolism of carbohydrates, fat and proteins in the body.
		Calcitonin	Controls calcium and phosphorus balance.
4.	Parathyroid	Parathormone (PTH)	Regulates calcium and phosphorus balance in the blood.
5.	Adrenal	Corticoids	Regulates carbohydrate, fat and protein metabolism and maintains electrolyte balance.
		Adrenaline	Regulates heart rate, breathing rate, blood pressure and carbohydrate metabolism.
6.	Pancreas	Insulin	Lowers the blood sugar level
		Glucagon	Increases the blood sugar level
7.	Testes	Testosterone	Regulates the development of male reproductive organs and accessory sexual characters like beard, moustache, etc.
8.	Ovaries	Estrogen	Regulates the development of female reproductive organs and accessory sexual characters like development of mammary gland.
		Progesterone	Maintenance of Pregnancy.

FEEDBACK CONTROL OF BLOOD GLUCOSE LEVEL