GRAVITY CLASSES

"Come Gravity Feel Success"

11th & 12th BOARD
(NEET & JEE)

5th - 10th (All Subject)

NOTES
BIOLOGY

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CONTROL AND COORDINATION

✳ **Introduction:-**

→ The working together of the various organs of an organisms to adjust vital activities of life is called **coordination**.

✳ **Coordination is mainly two types:-**

(i) Nervous Coordination

(ii) Chemical Coordination

✳ **Neuron:-**

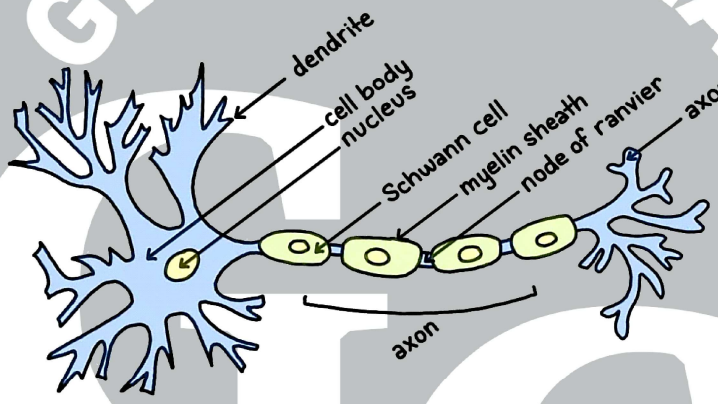
→ The structural and functional unit of the nervous system.

→ Neuron (nerve cell) is the **longest cell** of human body up (up to 100 cm).

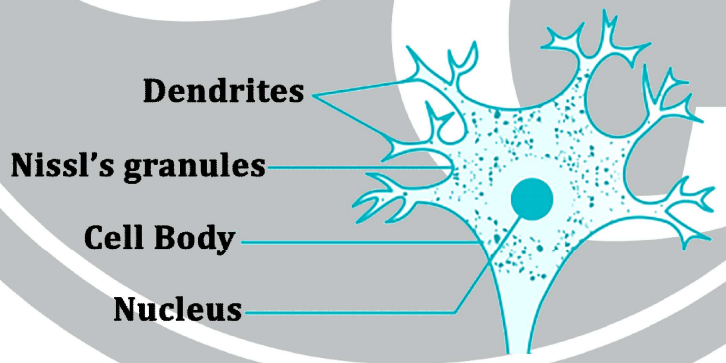
✳ **Neuron is made up of:-**

(i) Cell Body

(ii) Cell processes (axon and dendron).



✳ **Cell Body (or Cyton):-**



→ It contain granular cytoplasm which is called **neoplasm**.

→ A granule like structure called is **Nissl's granule**.

→ A **nissil's** granule is the center of **protein synthesis**.

→ Energy of conduction of nerve impulses is provided by numerous **mitochondria (Power house of Cell)**.

Cell Process:-

(i) Axon

(ii) Dendron

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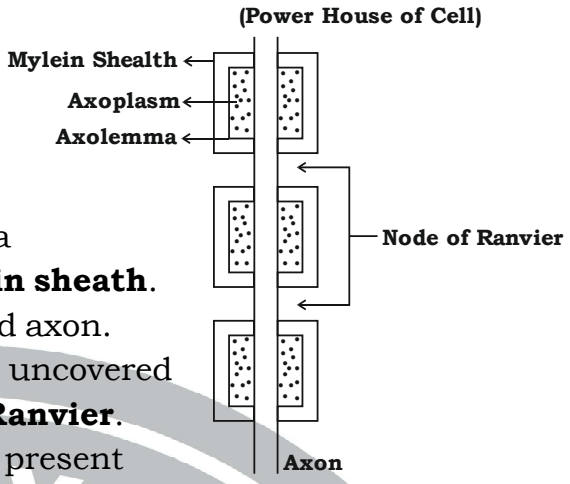
✳ **AXON:-**



→ It is the longest cell process of cyton, its diameter is uniform and it contains **axoplasm**.

→ Axon is covered by **axolemma**.

→ Axolemma may be covered by a layer a **phospholipids** which is called a **myelin sheath**.

→ Myelin Sheath is discontinuous around axon.

→ These interruptions where the axon is uncovered by myelin sheath are called **nodes of Ranvier**.

→ Nerve fibres in which myelin sheath is present are called **medullated** or **myelinated** nerves fibres and nerve fibres without myelin sheath are called non-modulated or **non-myclinated** nerve fibres.

- **Myclinated Nerves:-** Colour found **white matter** of brain and **spinalcord**.
- **Non-Myclinated Nerve:-** Found in **Grey matter** of brain and **Spinal cord** and in **ANS** (Autonomous Nervous System).

✳ **DENDRON:-**

→ It is a small cell process.

→ Its fine branches are called '**dendrites**'.

→ Nerve **impulse** or signal - it is an **electrochemical information** (signal) passing through neuron.

- **Neurotransmitters:-** Chemical substances which either transmit message from one neuron to another. Eg.- Acetylcholine (ACH).

→ **Cell body:-** The cells life support center.

→ **Dendrites:-** Receive messages from other cells.

→ **Axon:-** Passes message away from the cell body to other neurons, muscles or glands.

→ **Neural Impulse:-** Electrical signal travelling down the axon.

→ **Terminal brancehs of axon:-** Form junctions with other cells.

→ **Myelin Sheath:-** Covers the axon of some neurons and helps speed neural impulse.

Q. How do we detect the signals. ?

→ A chemical reaction occurs and creates **electric impulse**.

→ Impulse travels **from dendrites** and finally reach **axon endings** (**synaptic knobs**).

→ Impulse **releases** some chemicals like **acetycholine** from synaptic knobs.

→ By these chemicals, impulse transmits across synapse.

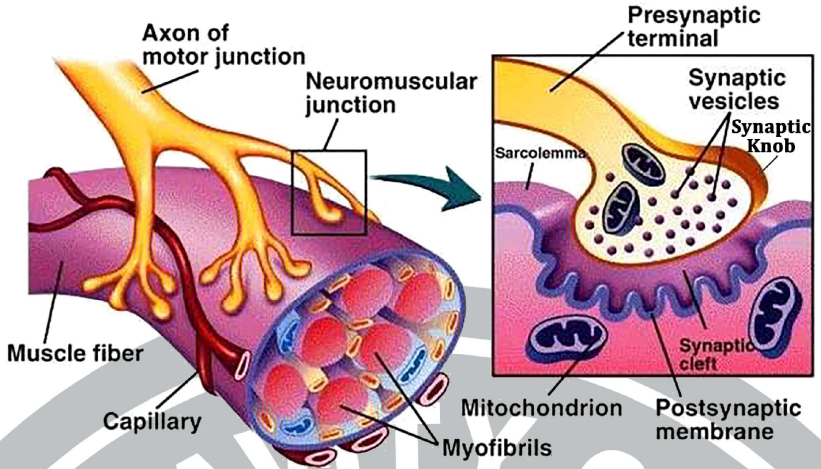
→ This initiates similar **electric impulse** in a dendrite of the next neuron and thus impulse is transfered from one nerve cell to another.

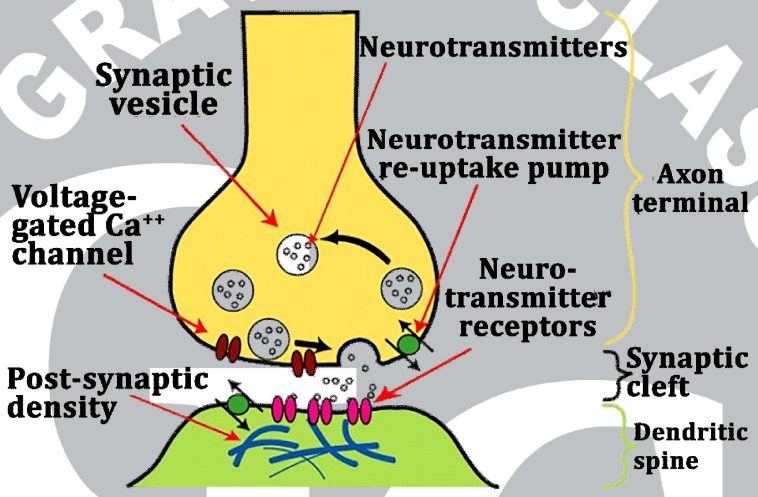
→ Message is **sent to CNS** (Brain and Spinal Cord) **via sensory nerves**.

→ **CNS sends** message to **muscles via motor nerves**.

→ Muscle of **effectors** organ **show response**.

Neuromuscular Junction



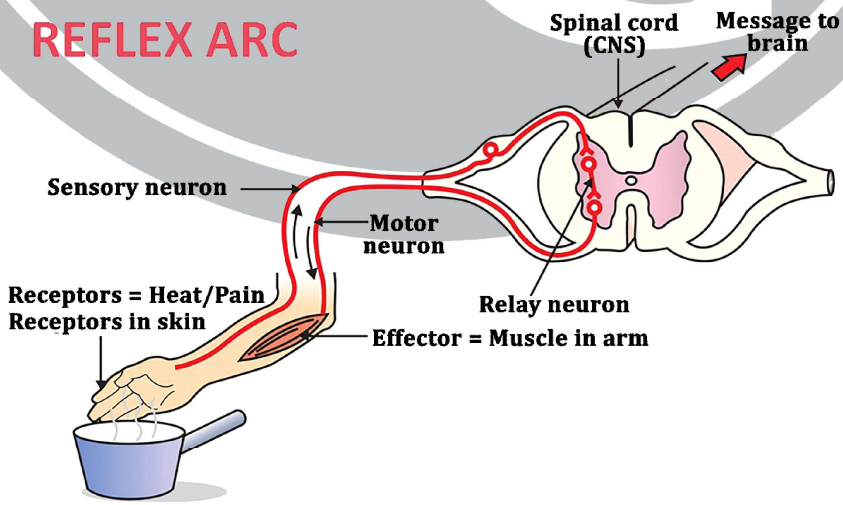


✳ Reflex Action:-

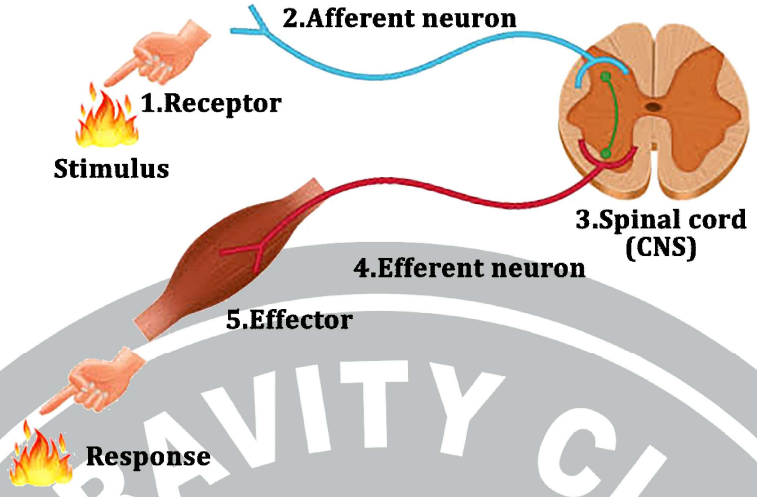
→ 'Reflex' is a word we use very commonly when we talk about some sudden action in response to something in the environment.

→ Reflex actions are completed **very quickly** as compared to normal action.

→ The part of completion of reflex action is called '**Reflex Arc**'.



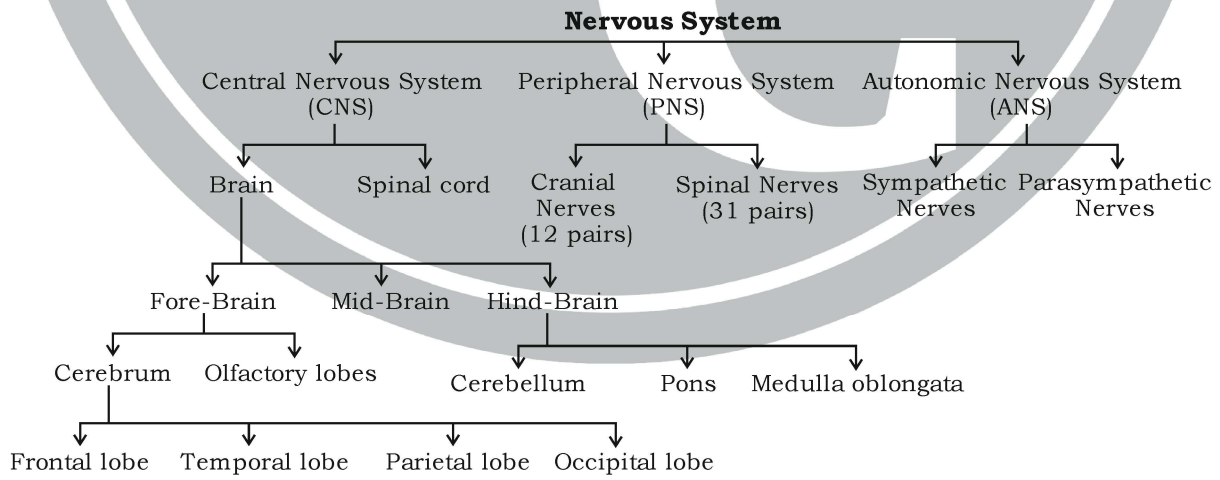
→ Two neurons dominate the pathway, **afferent nerves (receptor)** and the **efferent nerves (effector or excitor)**.



- Firstly, it begins with the receptor detecting the stimulus or a sudden change in the environment, where the instinct again has a role to play.
- The **stimulus** is **received from a sensory** organ.
- Then, the sensory **neuron sends** a signal to the **relay neuron**.
- This is followed with the **relay neuron** sending the signal to the **motor neuron**.
- Further, the **motor neuron** sends a signal to the **effector**.
- The effector producer an **instantaneous response,** for ex. pulling away of the **hand** or a **knee-jerk** reaction.
- In a reflex action, the signal do not route to the **brain instead**, it is **directed** into the **synapse in the spinal cord**, hence the reaction is almost instantaneous.

Human Nervous System:-

- **Central Nervous System (CNS):-**

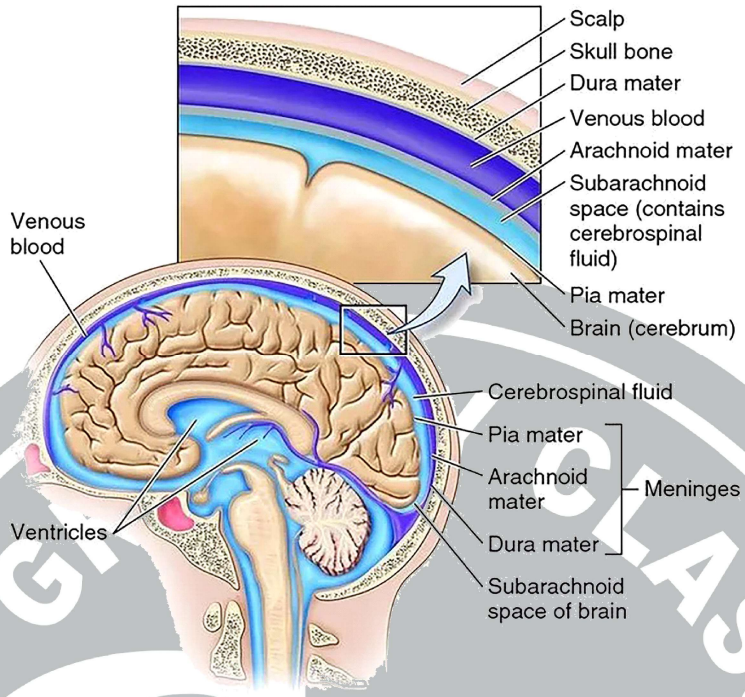


→ CNS (Central Nervous System) consists of a brain and the spinal cord.

- **Brain:-** Brain is the most important part of the human body.

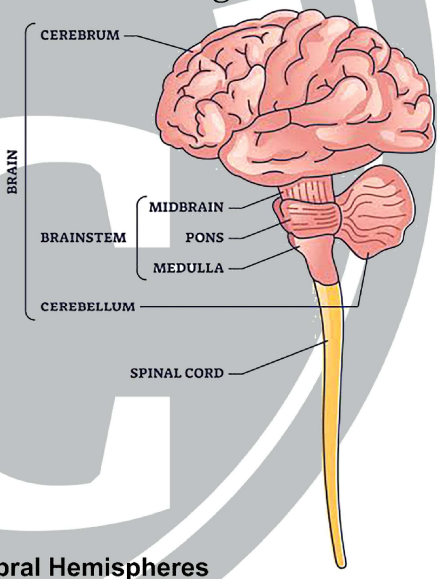
→ Brain is situated in a **Cranial box (cranium)** which is made of bones.

- **Meninges:-** Brain is covered by three membranes of connective tissue, temed as meninges.

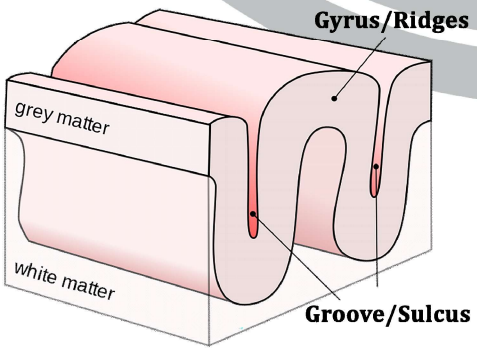


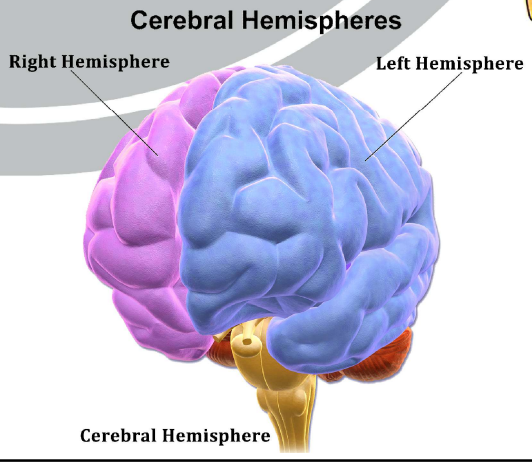
- **Meningitis:-** Any **inflammation** of meninges is called Meningistis.
- **Weight of Brain:-** In adult **male 1400 gm, Female 1250 gm**.
- **PARTS OF BRAIN:-**

1. Fore Brain:-
(a) Cerebrum.
(b) Diencephalon (Hypothalemus).
2. Midbrain
3. Hindbrain:-
(a) Cerebellum.
(b) Pons.
(c) Medulla Oblongata (M.O.)



1. Fore Brain:-

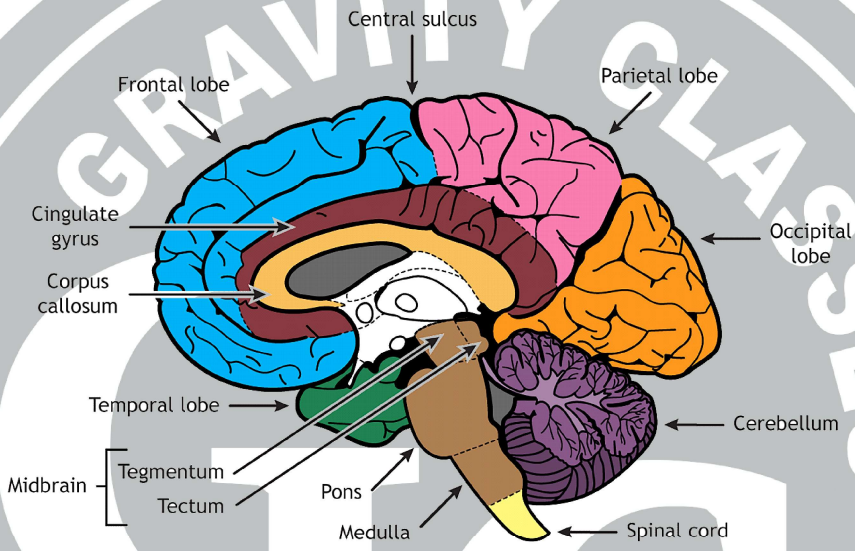




- **Cerebrum:-**

→ It is the **most developed** and most **complex** part of the brain.
→ It makes **2/3 part** of the total brain.
→ Cerebrum consists of **two cerebral** hemisphere (left and right cerebral hemispheres).
→ Many **ridges** and **grooves** are found on the dorsal surface of cerebal hemisphere.
→ **Ridges** are known as **gyri,** whereas **grooves** are known as **Sulci.**
→ These **gyri and sulki** increase the **surface area** of the brain.
→ If the **surface** area of brain is more the storage of **memory is more** and the **person** is become more **intelligent**.

- **Function of Cerebrum:-**



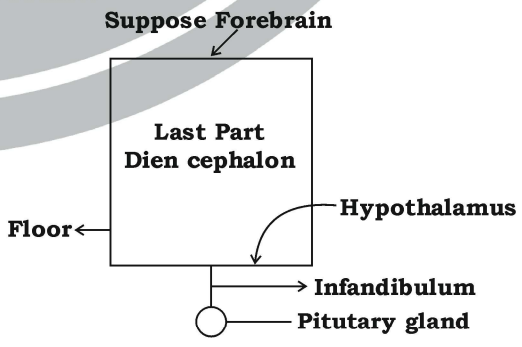
(i) Intelligence, knowledge, abstract, reasoning, creative ideas and memory **(Frontal Lobe)** → Near Forhead.
(ii) Taste, writing, pain, touch and pressure **(Parietal Lobe)** → Near Side brain above ear.
(iii) Language, hearing and smell **(Temporal Lobe)** → Near Ear.
(iv) Vision **(Occipital Lobe)** → Near eyes.

- **Fore Brain:-**

→ Diencephalon/**Hypothalamus (Last part of Forebrain).**
- It is a small and **posterior part** of the forebrain.
- It is covered by cerebrum.

- **Functions:-**

(i) Thermoregulation **(Fever)**.
(ii) Behaviour and Emotion → (Death Cry).
(iii) Endocrine control **(Hormonal Control)** to other organ → [**order to flow**]
(iv) **Biological clock** system (automatically day and night sleep).



(v) The centres of **feeling pain**, **hunger** and **thirst are present** in it.

- **Note:-** If **hypothalanus** get **damaged** person got **died**.

2. MIDBRAIN:-

→ It is a **small** and **contracted** part of the brain.

→ They connect the **medulla oblongato** of hindbrain to cerebrum of fore brain.

→ It controls the **limb muscle movement**.

→ These mainly **control vision**.

✳ **Signal Transmission from One to Another Neuron:-**

3. HINDBRAIN:-

(a) Pons:- It regulates the **breathing action**. (Dog chase) → It connect of forebrain and cerebellum.

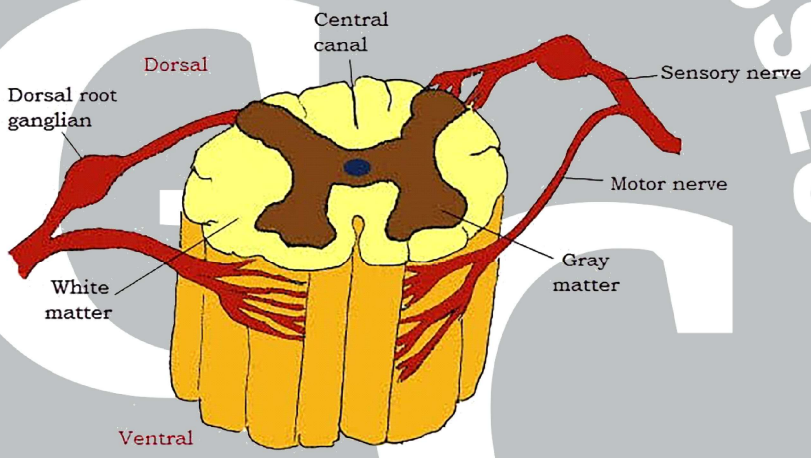
(b) Cerebellum:- To maintain **body balance (Behoosh)** and **posture**. It is responsible for **precision** by voluntary actions.

(c) Medulla Oblongata (MO) [Mera Man]:-

(i) It controls all the **involuntary activities** of the body. eg:- **heart beats**, **respiration**, blood pressure, salivation.

(ii) It is also concerned with some reflexes sneezing reflex, coughing reflex, vomiting reflex, yawning reflex.

✳ **Spinal Cord (SC):-**



→ It is a downward continuation of the **medulla oblongata**, which lies in the **vertebral** column (S.C. is protected by this).

● **Functions of Spinal Cord:-**

(i) Spinal cord regulates and conducts the **reflex actions**.

(ii) It acts as a **bridges** between the brain and organs of the body.
(Brain ⇆ S.C ⇆ Organ).

(iii) It also provides a **relay path** mediator (hold sometimes) for the impulses coming from the brain.

● **PERIPHERAL NERVOUS SYSTEM**

→ All the **nervous** arising from the **brain** and **spinal cord** are included in peripheral nervous system.

● **PNS consists of two sets of nerves:-**

(a) Cranial Nerves (12 Pair).

(b) Spinal Nerves (31 Pair).

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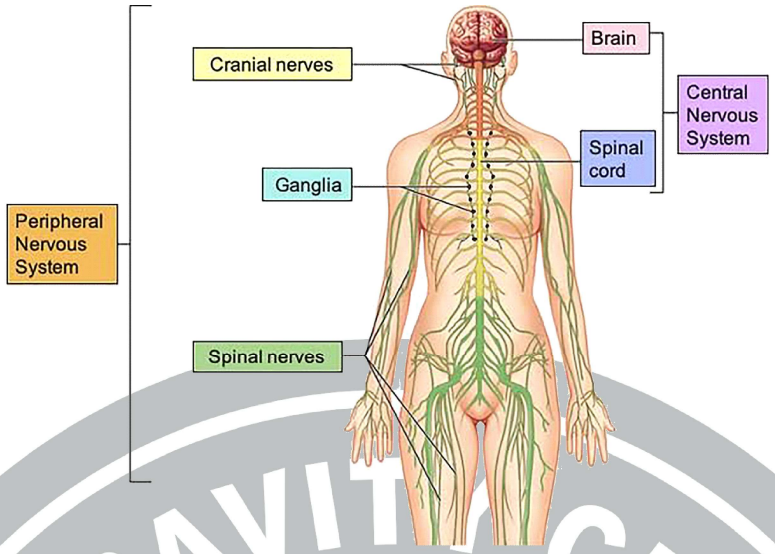


- **Autonomic Nervous System (ANS):-**

→ The autonomic nervous system is that part of the peripheral nervous system which **controls activities inside** the body that are normally **involuntary**.

→ ANS plays an important role in maintaining the constant environment **(Homeostasis)**. Balance → Blood supply, Respiration, Posture, Voluntary, Involuntary.

- **There are two divisions of the ANS:-**

(a) **Sympathetic Nervous System** (Horror Film, Fear excited).

(b) **Parasympathetic Nervous System** (Forget all fear and Relax motion).

PLANT MOVEMENT

→ The movements in plants are not as apparent as in case of animals.

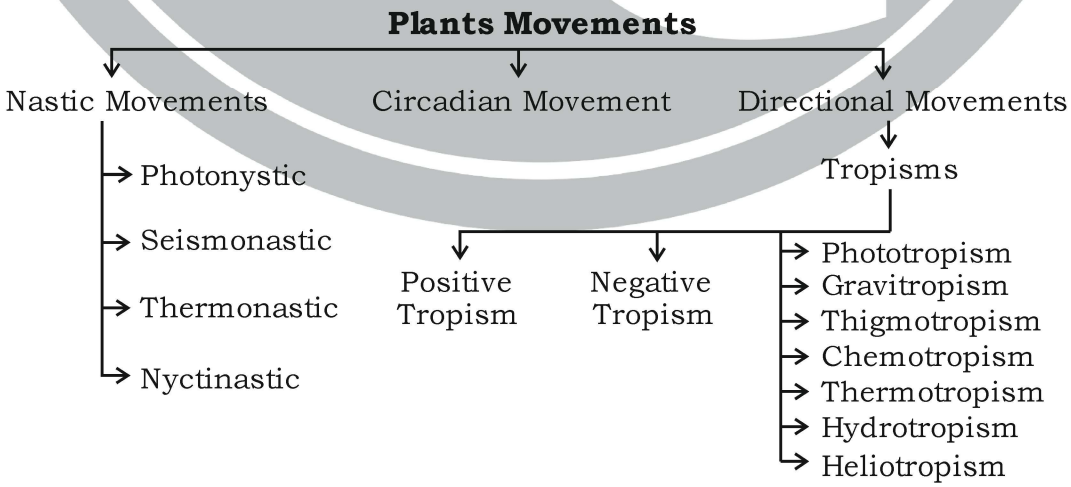
→ Plants generally show movement at a very **slow rate**.

→ The higher plants are fixed to the **substratum** (attached to soil, wall, gamla) by means of roots.

→ They can not move from one place to another.

→ They show movement of their organs only (flowers, leaf, steam, root).

Classification of Plant Movement:-



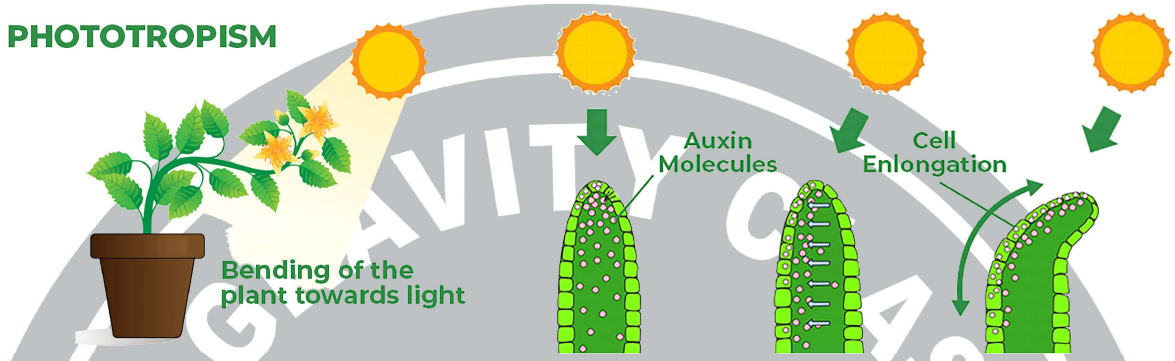
✳ Tropic Movement:-

→ **Directional movements** or orientataions of specific parts of a plant in response to external stimuli such as **light, force** of **gravity, chemicals** and **water** are called **tropisms** for tropic movements.

→ Tropic movements are very slow. The movements of the plant part can be either **towards stimulus (+ve tropism)** or **away from the (-ve tropism)**.

(i) Phototropism:- Definite direction movements in relation to light.

(a) **Positive (+ve):** Eg. Stem (b) **Negative (-ve):** eg. Root.

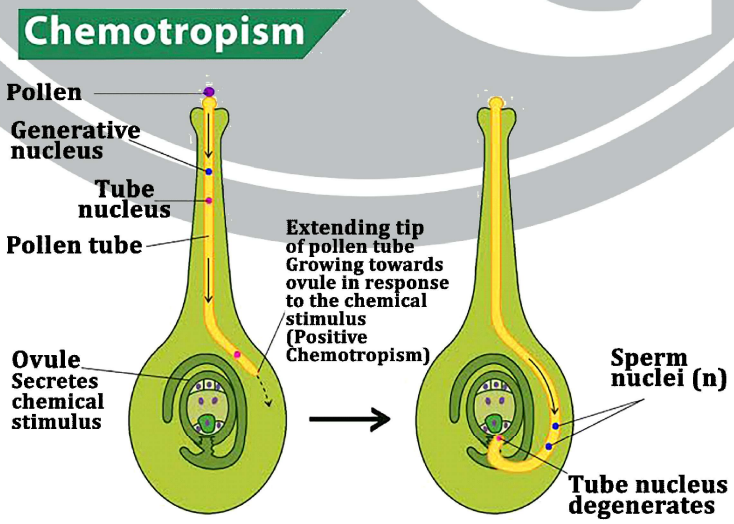


(ii) Geotropism:- Definite direction movement in relation to gravity.

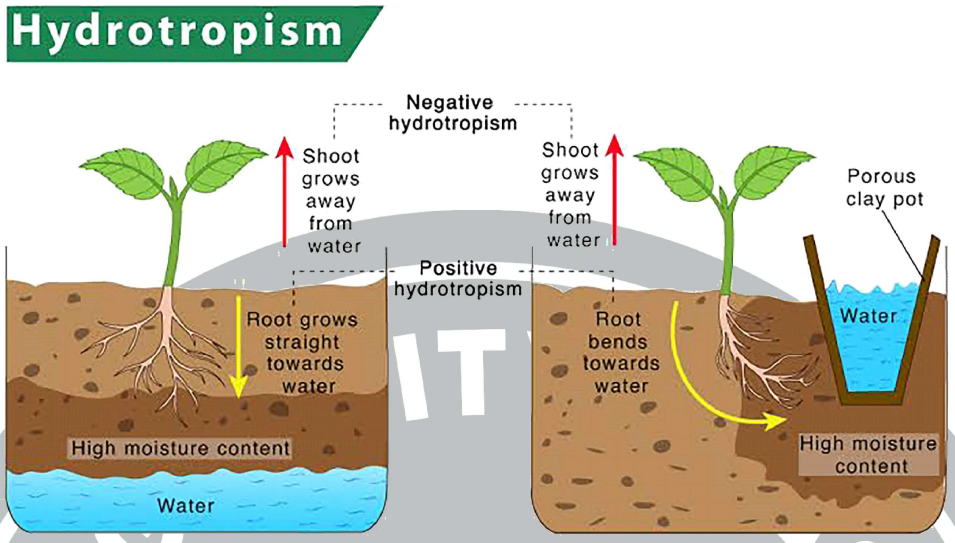
(a) **Positive (+ve):** eg. Root (b) **Negative (-ve):** eg. stem

(iii) Chemotropism:- Definite direction movement in relations to chemicals. Eg.- Movement of polln tubes and **fungal hyphae**.

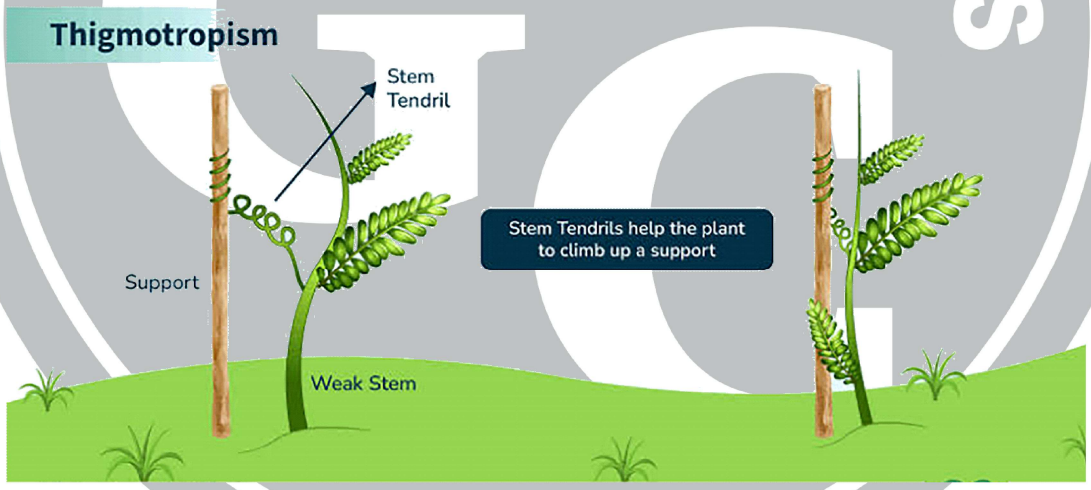
- Dirt release chemical which attract fungus/pollan grain toward dirt rotten ovary respectively.



(iv) Hydrotropism:- Definite direction movement in relation to water.
E.g- Roots of seedings.



(v) Thigmotropism (Haptotropism):- Definite direction movement in relation to contact or support. The pea plant develops **tendils** which **help it to climb** up other plants or fences or some other support. These tendrils are sensitive to touch. Eg.- Tendrils, Haustoria of Cuscuta.

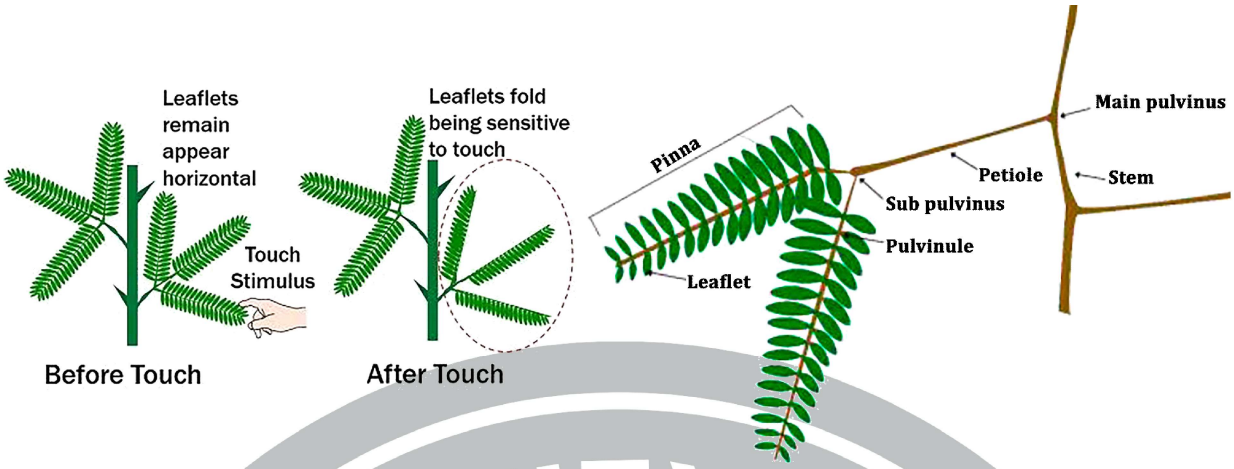


- **Nastic Movements:-** Induced by external stimulus such as light, temperature, touch .

→ However these are **non directional movements**. Here the part of the plant **does not respond** towards or away from **the stimulus.**

I. Seismonasty:- The **turgor** changes (chemical change) occur in thin walled cells of **pulvinus**, causing folding and droping of the compound leaves. Such movements occur in response to touch (shock).

→ These movements are very quick and are best seen in '**touch-me-not**' plant (**Mimosa, Pudica)** also called '**Chhui-mui**' or '**Lajwanti**' or **sensitive plant**.



II. Nyctinasty:- Sleep movements due to day and night.
Eg.- Daily movement of flowers, leaves, stomata.

Difference between Tropic Movement and Nastic Movement	
Tropic Movement	**Nastic Movement**
Direction of movement is in the direction of the stimulus.	Direction of movement is **not determined** by the direction of stimulus.
Growth takes place.	Growth does not take place.
Movements are **slow.**	Movements are **fast.**
Eg.- **Growth** movements of shoot towards light.	Eg.- The **folding** up and dropping of leaves in the sensitive plants.

- **Chemical Coordination in Plants:-**

→ A Phytohormone can be defined as a chemical substance which is produced naturally in plants and is capable of translocation and regulating one or more physiological presses.

→ Different plant hormones help to coordinates growth development and responses to the movement.

→ They are synthesized (milna) at places away from where they act and simply diffuse to the area of action.

→ The **1st Plant hormone** discovered by **"Went was Auxin".**

- **Chemical Coordination:-**

→ Main Phytohormones (Plant Hormones) are:-

(a) Auxins
(b) Gibberellin } Growth Promoter
(c) Cytokinins

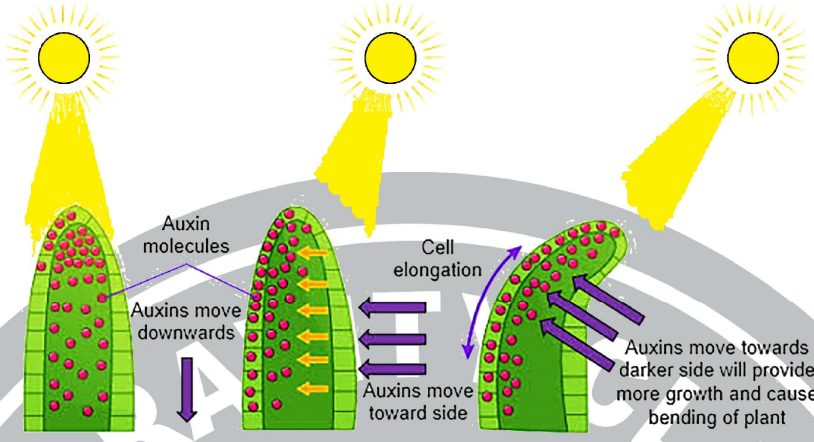
(d) Abscisic Acid (ABA)
(e) Ethylene } Growth Inhibitor

(a) AUXINS:- When growing platns detect light, a harmone called **Auxin, synthesized** at **shoot tips, helps** the cells to **grow** longer.

→ When light is coming from **one side** of the plant, **auxin diffuses towards** the **shady** side of the shoot.

→ This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light. Thus, the plant appears to bend towards light.

Mechanism of "PHOTOTROPISM"



- **Functions of Auxin:-**

→ Promote cell division and elongation.

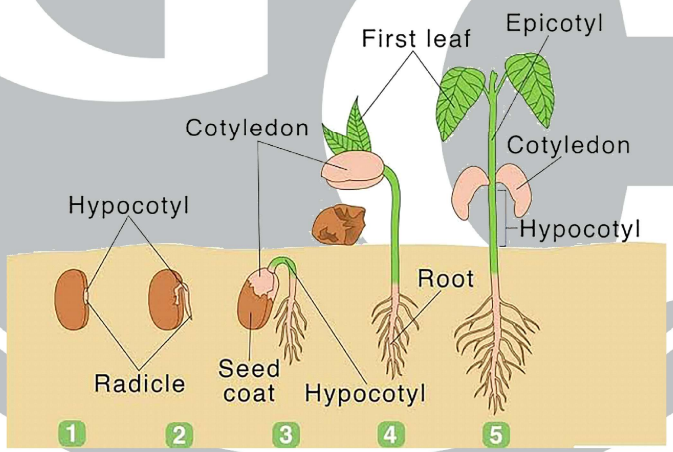
→ Cause **apical dominance** (terminal or apical bud inhibits the developments of lateral buds).

→ Used in **parthenocarpy (production** of seedless **fruits without** pollination and **fertilization).**

→ Help in root initiation in cutting or in callus differentiation.

(a) Gibberllins (GA):- Yabuta and Sumiki (1938) were the first to extract a substance from the Gibberella fungus, which they named as Gibberellin.

- **Functions of Gibberellins:-**



→ Stimulate stem **elongation** (Sky).

→ Help in seed germination.

→ Rosette plants show a bolting effect (leaf falling → to stop leaf falling) when treated with gibberellins.

(c) Cytokinins (CK):- Cytokinins promote cell division and it is natural then that they are present in greater concentration in areas of **rapid cell division** such as in **fruits** and **seeds**.

- Size big but No taste → Nutrient also present less.

- **Functions of Cytokinins:-**

→ Promote **cell division** and **elongation**.

→ **Suppress apical dominance** (**Promotes lateral** branches in the presence of apical bud).

→ Help in **secondary growth** (growth in **thickness girth**).

→ Promote production of femal flowers.

→ It helps in breaking the dormancy of seeds and buds.

(d) Abscisis Acid (ABA):-

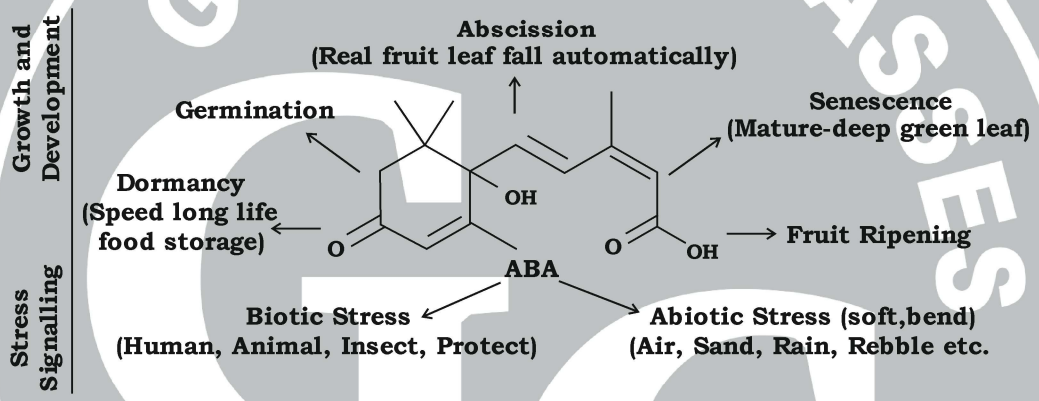
→ It is also known as **Stress hormone** or **dormin**. (Atmosphere temp.↑, temp↓)

- **Functions of Abscisic Acid (ABA):-**

→ Inhibit growth hence caled antiauxins or antigibberellins.

→ **Reduce transpiration** by **closing stomata** under water store stress conditions, hence called **stress hormone.**

→ Stimulates the formation of the abscission zone (zone of separation), cause wilting of leaves.



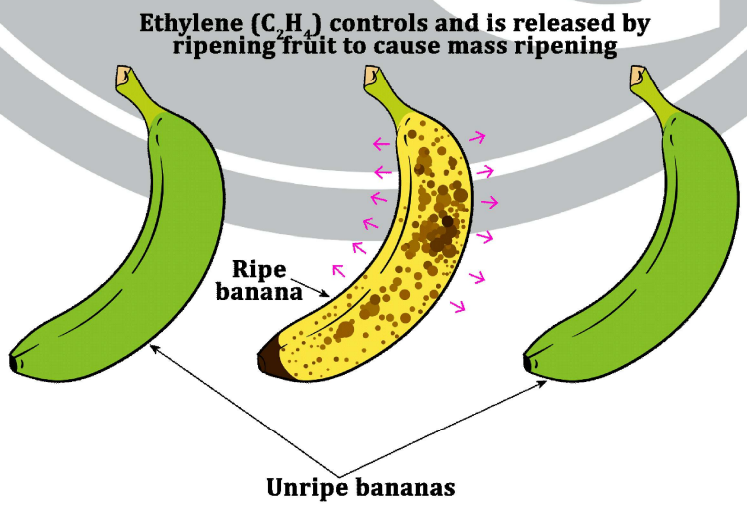
(e) Ethylene (Gaseous Hormone):-

- **Function of Ethylene (Gaseous Hormone):-**

→ Promote fruit **growth** and **ripening.**

→ Cause aging (Senscence) [Older/Adult].

→ After 7 days at 20° C.



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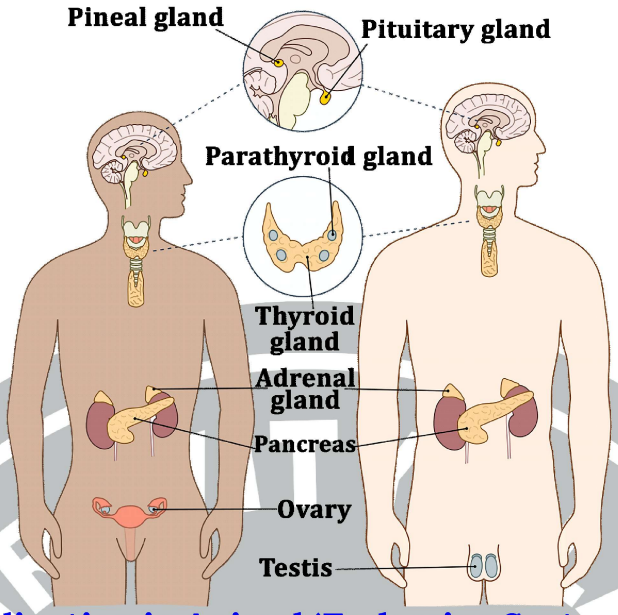
ENDOCRINE SYSTEM



Chemical Coordination in Animal (Endocrine System):-

→ The branch of biology which deals with study of the **endocrine system** and its physiology is known as "**endocrinology**".

→ "**Thomas Addison**" is known as **Father of Endocrinology**.

→ The Endocrine glands which **pour** their **secretion directly** in the **blood** are called **endocrine glands**. These glands lack ducts, so these glands are called **ductless glands**. eg.- Thyroid gland, parathyroid gland.

→ Whereas the glands **with duct** are called **exocrine glands**. eg.- Sweat gland, salivary gland.

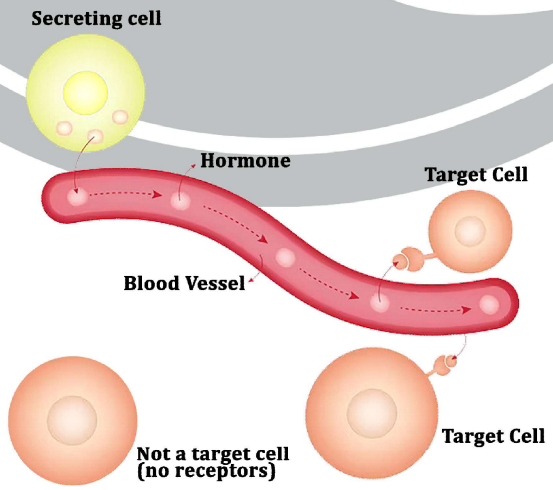
→ **Pancreas** (Pancreatic juice→Small Intestine) through duct has both **exocrine** (pancreatic juice) and **endocrine** (insuline mix → blood) parts, so it is also called gland or common gland or heterocine gland.

HORMONES IN ANIMALS:-

→ Chemicals secreted by endocrine glands are called "**Hormones**".

→ The term hormone was coined by '**Starling Scientist**' **(secritine)** 1st hormone discovered.

→ Hormones are also called '**Primary messengers**' (proper growth) or '**Chemical messengers**'.



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- **Hormones:-** Physical and Chemical properties of hormones.

→ There are **secreted** by **endocrine glands.**

→ Hormones are **secreted** only when **required**.

→ Their secretion is regulated by **feedback mechanism** (if growth hormone ↑ so stop).

→ These are generally released in the bloodstream (mix).

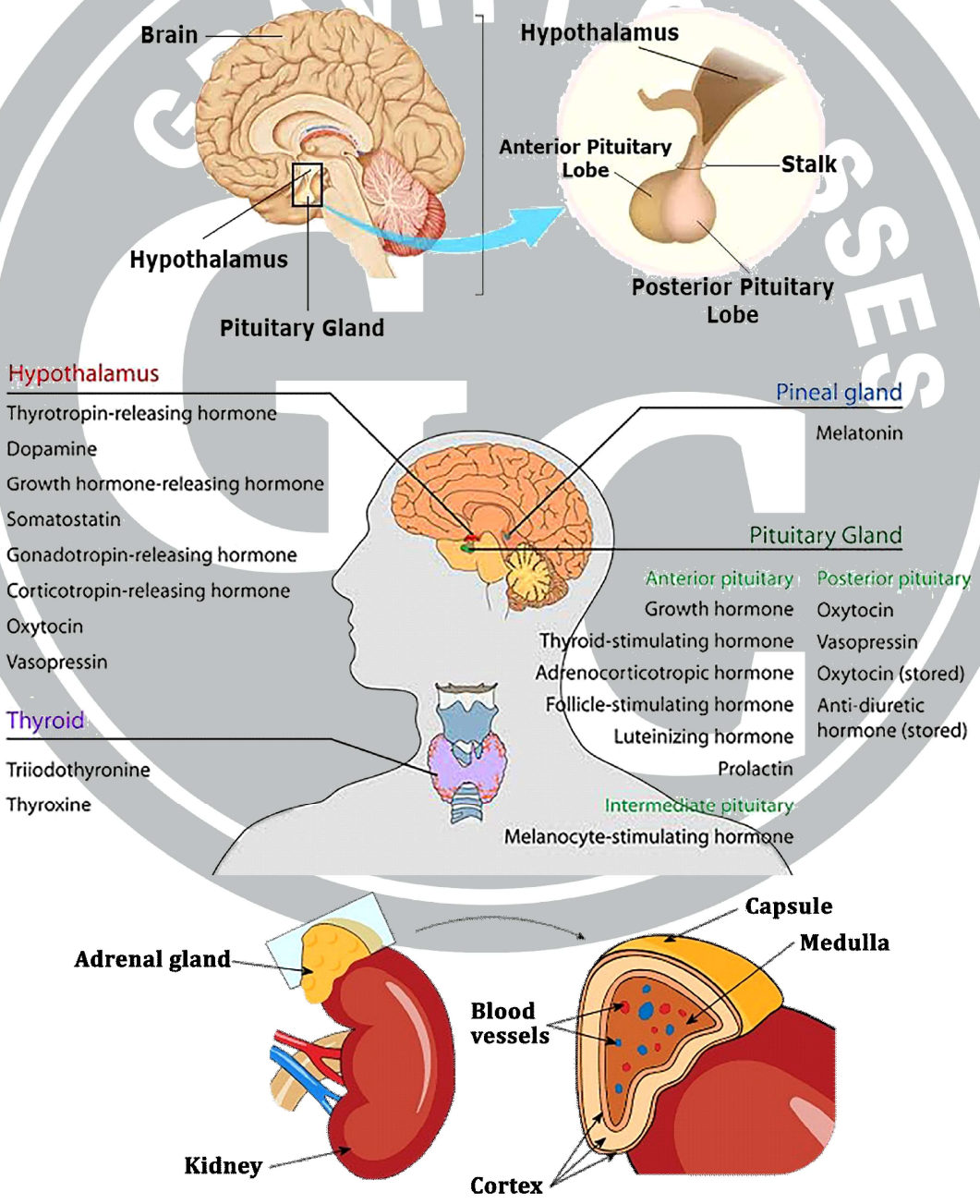
→ The molecules of most of the hormones are small (cell > hormone).

→ Their molecular **weight is low.**

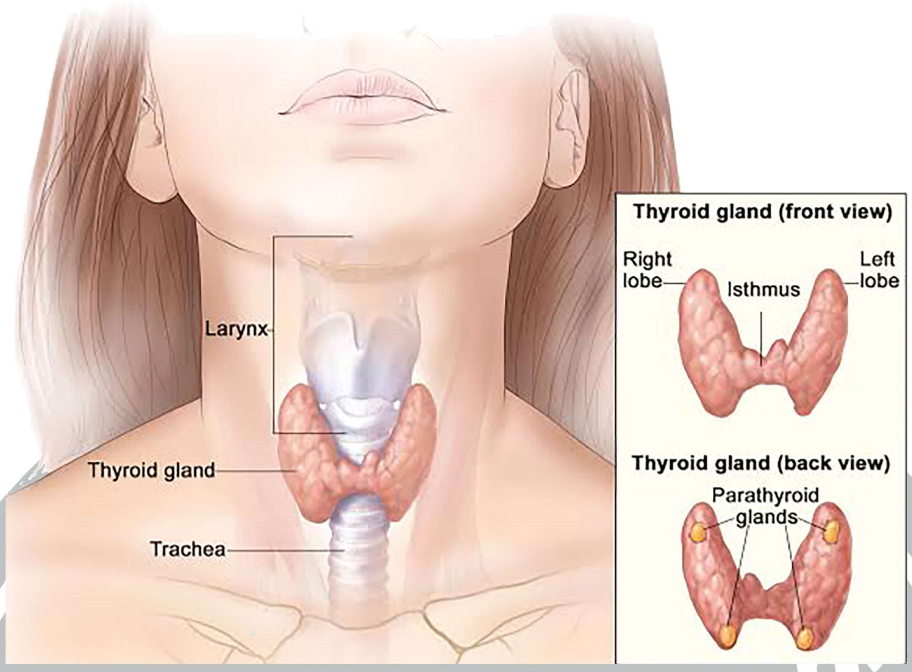
→ The secretion of hormone is always in **very small** quantity.

→ Hormones are **destroyed** after **use** i.e. hormones can't be stored in the body. **Thyroxine** is an exception.

- **Endocrine Glands:-**



Anatomy of the Thyroid and Parathyroid Glands



Name of Endocrine Gland	Position in Body	Hormone (S)	Chemical Nature of Hormone	Function	Hypo/ Hyperse-cretion causes	Special Points
Andrenal Gland	Above Kidney	Corticoids Mineralo corticoids gluco-corticoids sexcorticoid Andernaline	Steroid Amino	Maintain the level of Na^+,K^+ & Cl^- in body carbohydrate metabolism secrete androgens & estrogens increase heart beat, blood pressure & blood glucose level	Hyposecretion of corticoids causes Addison's disease Hypersecretio n of corticoids causes cushing's & conn's disease	Also called 3F gland, life saving gland, 4.S gland emergency gland
Testes	Outside the abdominal cavity	Testosterone	Steroid	Stimulate spermatogenesis Promote secondary sexual character in males		
Ovaries	Inside the abdominal cavity	Estrogen Progesterone	Steroid Steroid	Stimulate Oogenesis (ova) Promote secondary sexual characters in females. Maintain pregnancy (kill dangerous germ)		Progesterone is also called antiabsortion hormone Also called throne of immunity
Thymus	Near heart	Thymosin	Protein	Increase immunity of body		

Name of Endocrine Gland	Position in Body	Hormone (S)	Chemical Nature of Hormone	Function	Hypo/ Hyperse-cretion causes	Special Points
Pituitary	Below Hypothalamus	GH (Growth Hormone)	Protein	Body growth, growth is even everywhere	No sexual activity problem, Hyposecretion ↓ cause dwarfism in children	Also called master gland of the body
					Hypersecretion ↑ leads to gigantism	
Pituitary		TSH (Thyroid stimulating Hormone) FSH [Follicle-(testis/ovary x sperm ova) Stimulating Hormone]	Protein	Regulate the secretion of hormones from thyroid, Stimulate spermato-gensses & oogenesis (female)		
Pituitary		Oxytocin	Protein	Contraction of uterine muscles during pregnancy (after 9th month) causes releases of milk after delivery		Also called birth hormone
		Vasopressin	Protein	Reabsorption of water from DCT of nephron and collecting duct DCT-distilled convulated tubule:- It is part of nephron	Hyposecretion causes diabetes insipidus → Feeling more thirsty. → Feeling more pee. → More dehydration	Also called ADH-Anti diuretic hormone one.
Thyroid	Located in the neck between the trachea and larynx	Thyroxin (Iodine is used to make Thyroxin)	Amine Any group → NH_2 → $CONH_2$	Regulate BMR of body. BMR-Basal Metabolic Rate Digestion rate↑ Respiration rate↑ Circulation rate↑ Digestion rate↑ BMR↓→FAT↑→ Thyroid ↓ BMR↓→Thin↑→ Thyroid ↑	Hyposecretion in children causes cretinism (look), madness, hair style life	Thyroxine is the only hormone store in body

Name of Endocrine Gland	Position in Body	Hormone (S)	Chemical Nature of Hormone	Function	Hypo/ Hyperse-cretion causes	Special Points
Thyroid		Calcitonin	Protein	Decrease the level of calcium in blood and deposit to the bone and bone become hard	→Hyposecretion ↓ in adults cause myxoedema. IQ=zero → Generally say hyposecretion of thyroxine causes simple goiter.	Main element in the thyroxine
					→Hypersecretio n of thyroxine causes exophathalmic goitre eye outside.	
Para-thyroid	Attached to thyroid	Parat-hormone (PTH)	Protein	Increases the level of calcium in blood	Hypersecretion of PTH causes osteoporosis (Bone hole, weak) Hypersecretion causes	Also called collip's hormone
Pancreas	In the loop of duodenum	Insulin	Protein	Decrease ↓ the level of glucose in blood	Hyposecretion↓ of insulin causes Diabetes Mellitus:- more hunger, more urine, more thirst	World diabetes day 14th Nov.
		Glucagon	Protein	Increases ↑ the level of glucose in blood		Endocrine part of pancreas is called Islets of Tangerhans
Andrenal gland	Above kidney	Corticoids:- (i) minerals corticoids (ii) Glucocorlicold (Dogchase):- Provide energy (Food, Protein, Fat). (iii) Sex corticoid Andrenaline→ Medulla→Inner 3F-harmone (lion)-Flight, Fight,Fear 4S harmone-salt, sugar, sex, stress	Steroid- →Fats, →Lipids Amine	→ Maintain the level of Na^+, K^+ and Cl^- in body. →Carbohydra te metabolism →Secrete androgens and (Male) estrogens (female). Increases heart beat ↑, blood pressure (BP) and blood glucose level	Hyposecretion↓ of corticoids causes Addison's diseases (less of mineral → Feel dehydration, →Feel weakness, → Faint. →Hypresecretion ↑ of corticoids causes cushing's and conn's disease	Also called 3.F gland. 4.S gland emergency gland Life Saving Gland