LIFE PROCESS

Bio - 1 | 10th

The various basic functions performed by the organism to maintain their life on this earth are called Life Process.

The basic life Process includes :-

Nutrition | Respiration | Transportation | Excretion

NUTRITION

The Process by which living organism obtain & utilize food is called Nutrition.

Why?
- Energy
- Growth & Develop.
- Repair of Damage tissue.

NUTRITION

- Autotrophic: Organism Prepare their own food.
  1. Photosynthetic Autotrophic
  2. Chemosynthetic Autotrophic
     * with the help of chemical
     eg:- Purple - Sulfar Bactria.
- Heterotrophic: Organism are dependent on other organism for their food.

AUTOTROPHIC NUTRITION IN PLANT *

Carbondioxide (air) | Water (Soil) | Light (Sun) | Chlorophyll (chroloplast)

** $6CO_2 + 12H_2O \xrightarrow{\text{Sun}} C_6H_{12}O_6 + 6H_2O + 6O_2\uparrow$

Carbondioxide — water — (Sun, chloroplast) — Sugar — water — Oxygen

* [Plant store glucose in starch.
Human store glucose in form of Glycogen]

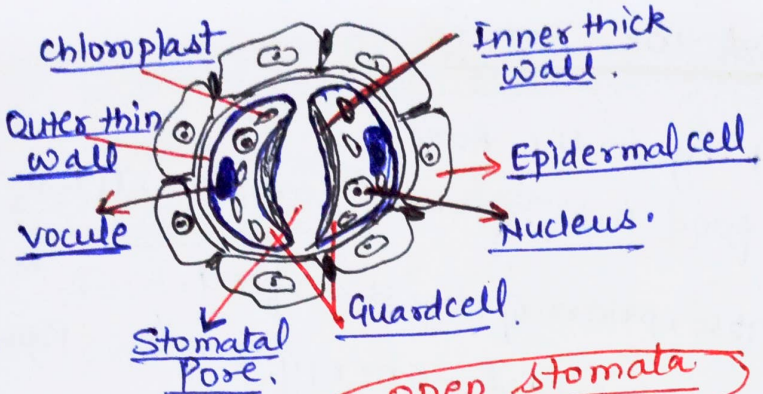
STEPS
1. Absorption of light energy by chlorophyll.
2. Conversion of light energy to chemical energy & split water molecule into Hydrogen & Oxygen.
3. Reduction of Carbondioxide to carbohydrates.

Stomatal Pores

Stomata are tiny pore like structure present on leave surface. function of stomata :-

(1) Transpiration → Removal of excess water in form of water vapour.

(2) Exchanges of gases during photosynthesis & respiration.



Opening & Closing of Stomata

* Stomata opens on swelling (H_2O enters) of guardcell.
* Stomata closed on shrinking (H_2O Moves out) of guardcell.

Open stomata

Photosynthesis in Desert Plant

Malic/Aspartic acid released

At Night → stomata opens → CO_2 → H_2O →

At Day → stomata closed → Glucose → Food.

HETEROTROPHIC

- Holozoic (Human beings)
- Saprotrophic
- Parasite

Holozoic The organism feed by ingesting solid organic matter which is then digested & absorbed into their body.

- Herbivores — Plant eating animals. cow, goat etc.
- Carnivores — Feed on flesh of animals. tiger, lion etc.
- Omnivores — Eat both Plant & Animals products. eg Human, Dog

Saprotrophic Feed on dead & decaying matters. Include Bacteria, fungi which digest the food externally before the nutrient absorbed.

eg: Yeast, Bread Mould, Mushroom etc.

Parasite Nutrition

obtain Nutrients from living organism. The parasite obtain Nutrients by living on (External Parasite) or in (Internal Parasite) the body of the host.

eg:- LICE, TICKS, Leech, Tapeworm.

Note - "Cuscutta" is parasitic Plant because it lacks Chlorophyll.

What happens to the food we eat?

(1) Ingestion - The process of taking in the food.

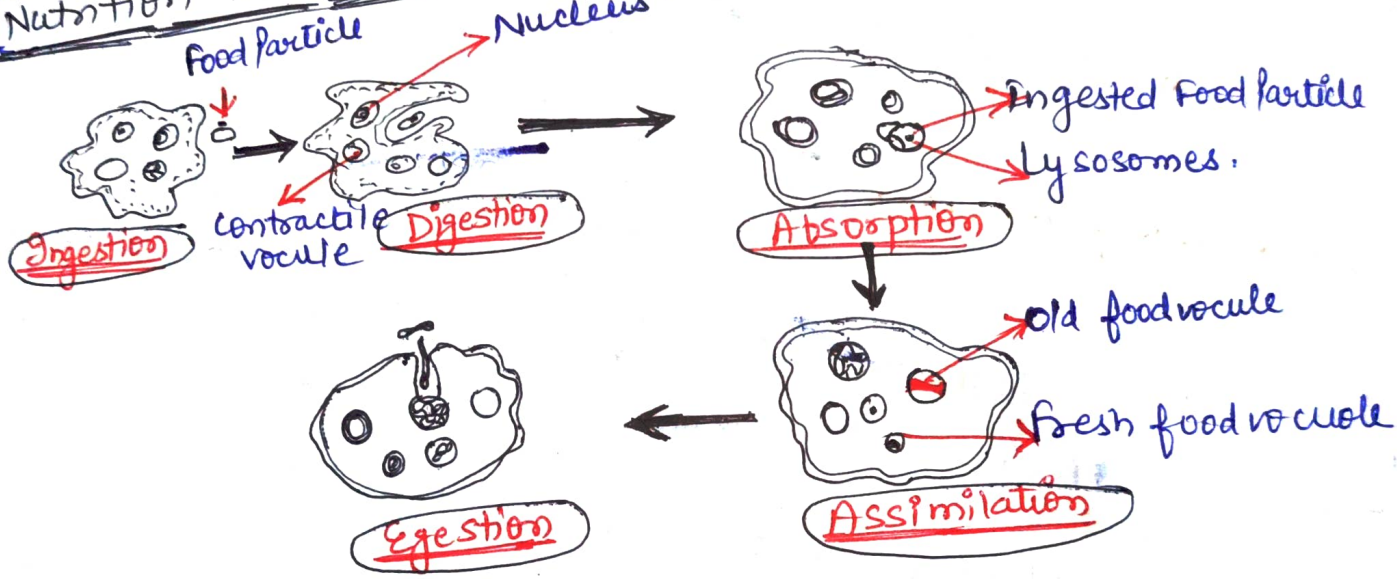
(2) Digestion - Breakdown of food into smaller components that can be absorbed

(3) Absorption - The process of absorption of digested food.

(4) Assimilation - Utilization of digested food for energy & growth & Repair

(5) Egestion - Removing undigested food from body.

Nutrition in Amoeba ***



Nutrition in Humans

Digestive System
- Alimentary Canal
- Associated Organs.

- **Alimentary Canal** → A long hollow tube which contains organs through which the food actually passes. (Oesophagus, stomach, small intestine, large intestine).
- **Accessory Organs** → Organs that help in digestion no food passes through them. (Liver, pancreas, salivary gland etc.)

MOUTH — Buccal cavity

1. Food is ingested
2. crushed & chewed with the help of teeth.
3. Food is wetted with saliva to make its passage smooth.
4. Food is mixed with saliva with the help of muscular tongue.

Mouth → salivary gland.
Saliva → water fluid. (Amylase) [Break complex Sugar to maltose / simple]

Oesophagus — Food pipe

* Food is pushed downwards due to rhythmic contraction & relaxation of muscles & is known as Peristaltic (Involuntary) movement.

STOMACH

→ J-shaped organ
→ widest part of alimentary canal.

◉ Gastric juice composition & function:

1. Water Electrolytes
2. * Hydrochloric acid.
   - Conversion of pepsinogen to pepsine.
   - bacteriostatic effect / antiseptic: kills bacteria.
3. * Pepsin → Protein digestion
4. * Mucus → Protective coating, lubricant, Protect from HCL & pepsin. Part of gastric mucosa.

* [Imbalance between Hydrochloric & mucus – Hyperacidity gastic]

LIVER

→ Transfer Bile Juice into food.
→ Bile juice is stored in gall bladder.
→ Bile juice makes food alkaline.
* → Bile juice helps in emulsification of fats.

Emulsification → Break down of Big Fat Globule into small globule

Pancreas

Secretes Pancreatic Juice.

* Trysin – help in digestion of proteins.
* Lipase – help in breaking down of emulsified fats.
* Pancreatic amylase – help in digestion of carbohydrates.

Small Intestine → 5- meter long → site of final digestion of food → secretes intenstinal Juices.

Enzymes present in intestinal Juice

- The wall of the small intestine secretes digestive enzymes to digest food.
- Peptidases to split small peptides into amino acid.
- Maltase acts on maltose & convert it into glucose.
- Sucrase acts on sucrose & convert it into glucose & fructose.
- Lactase acts on Lactose & convert it into glucose & galactose
- Lipases act on Lipid & convert it into fatty acid & glycelor.

Absorption of food in small Intestine.

- Villi are finger-like projections.
- Increase the surface area for absorption.
- Richy supplied with blood vessels which take the absorbed food to each & every cell of the body.
- Food is utilised for obtain energy, building up new tissue, & repair the old tissue the repair of old tissue.

LARGE INTESTINE → Absorption of water

↓

Solid waste transfer to Anus.

(Removal of undigested & Unabsorbed food by Anus)

Why do Herbivores have longer intestine than Carnivores?

Herbivores consume producers like plant which contain cellulose in the cell wall of their cells. Digestion of cellulose in the gut takes longer time, & Hence the gut of herbivores is longer than gut of Carnivores.

Respiration

The process by which living organism obtain energy (ATP) by breakdown of food cells.

$$C_6H_{12}O_6 + 6O_2 \Rightarrow 6CO_2 + 6H_2O + ATP$$

Glucose — oxygen — Carbon dioxide — water — Energy

ATP (Adenosine Triphosphate) is the energy currency of the cell.

Breathing

1. Breathing is a continuous process that involves both inhalation & Exhalation
2. It is physical process
3. Breathing is a part of the respiration.

Respiration

1. The process in which food is broken down in the cell to release energy.
2. It is chemical process.
3. It involves the release of energy

Respiration → Aerobic
Respiration → Anaerobic → Alcoholic fermentation
Anaerobic → lacticacid fermentation

Aerobic

1. Respiration takes place in the Presence of oxygen.
2. It occurs in the cytoplasm & Mitochondria.
3. Usually glucose is broken down into water and CO_2.
4. It occurs in mammals, including human.

Anaerobic

1. It takes place in the absence of oxygen.
2. It occurs only in cytoplasm.
3. Glucose is broken down into ethanol (ethyl alcohol)
4. Anaerobic occurs in yeast, some type of bacteria & also in some plants.

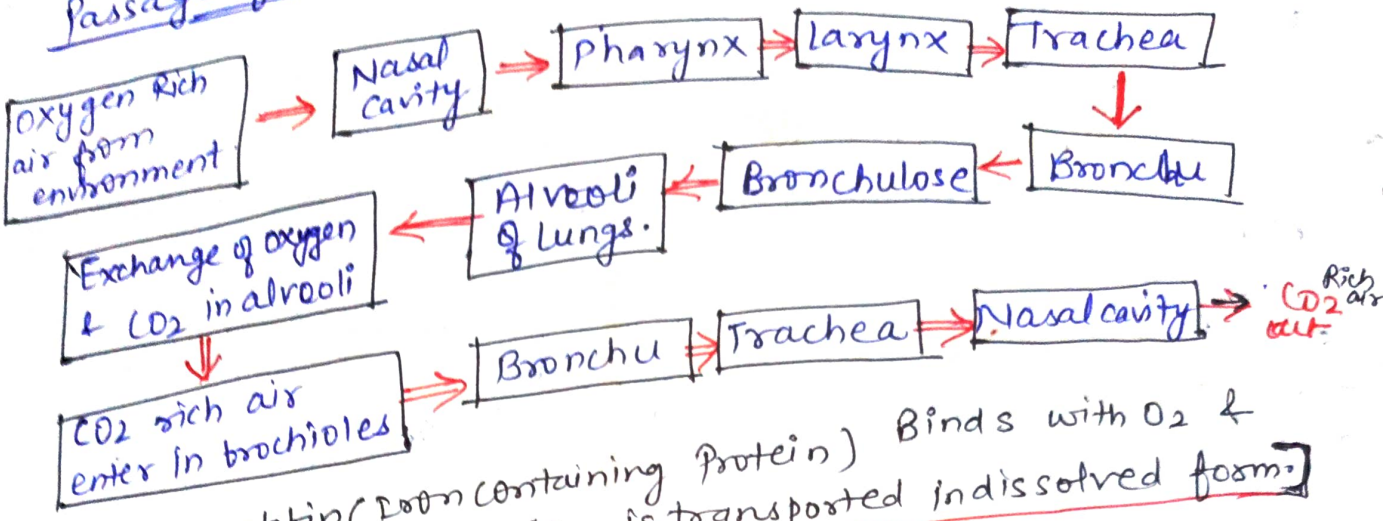
Glucose (6-Carbon molecule) —(In cytoplasm)→ Pyruvate (3-carbon molecule)

- Absence of oxygen (Yeast) → Ethanol + CO_2 + Energy
- Lack of oxygen (human Muscle) → Lactic acid + Energy
- Presence of oxygen (In Mitochondria) → CO_2 + water + Energy

BREAK DOWN OF GLUCOSE BY VARIOUS PATHWAYS

Respiration in Human

Passage of air through the respiratory system



[RBC → Hemoglobin (Iron containing Protein) Binds with O_2 & helps in O_2 transport. CO_2 is transported in dissolved form.]

Gills → availability of oxygen is less in the aquatic environment so the breathing rate of aquatic organism is faster.

TRANSPORTATION

It is a life process where substance synthesized or absorbed in one part of body are carried to other part of the body.

[Food, CO_2, O_2, Metabolic waste, Hormone] → BLOOD

Circulatory System
- → Blood → fluid connective tissue
- → Blood vessel → Tubes.
- → Heart → Pumping organ.

BLOOD
- → Blood Plasma
  - → Serum
  - → Fibrinogen
- → Blood Corpuscles
  - → RBC → Transport O_2 with Haemoglobin
  - → WBC → Protect virus infection.
  - → Platelets → Blood clotting

Blood is liquid connective tissue which circulate throughout body by pumping action of Heart

RBC → Circular Biconcave & Disc shaped. Appear red due to presence of Haemoglobin.

WBC → Large, nucleated & colourless.

Platelets → cell fragments.

Function of Blood

1. Deliver O2, Nutrient to all body cells.
2. Transport waste products cells for elimination.
3. Transport Hormones.
4. Maintain body temp. (distribute Heat)
5. Maintain PH (carry Buffer)
6. Maintain fluid volume.
7. Prevent blood loss (clotting)
8. Prevent infection (WBC, Antibodies)

Blood vessels:

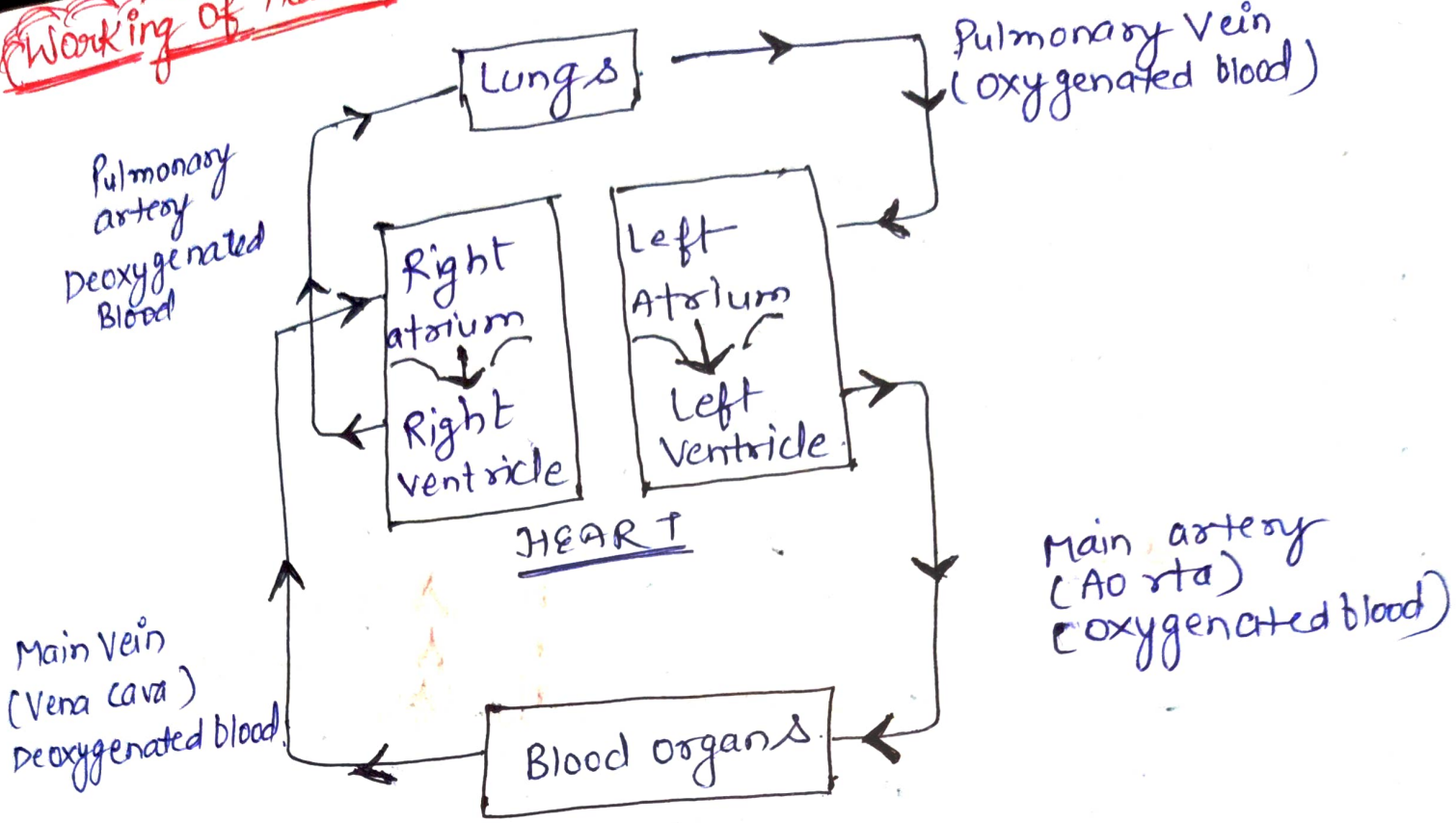
Transportation is a life process where substance synthesized or absorbed from one part to other parts of body.



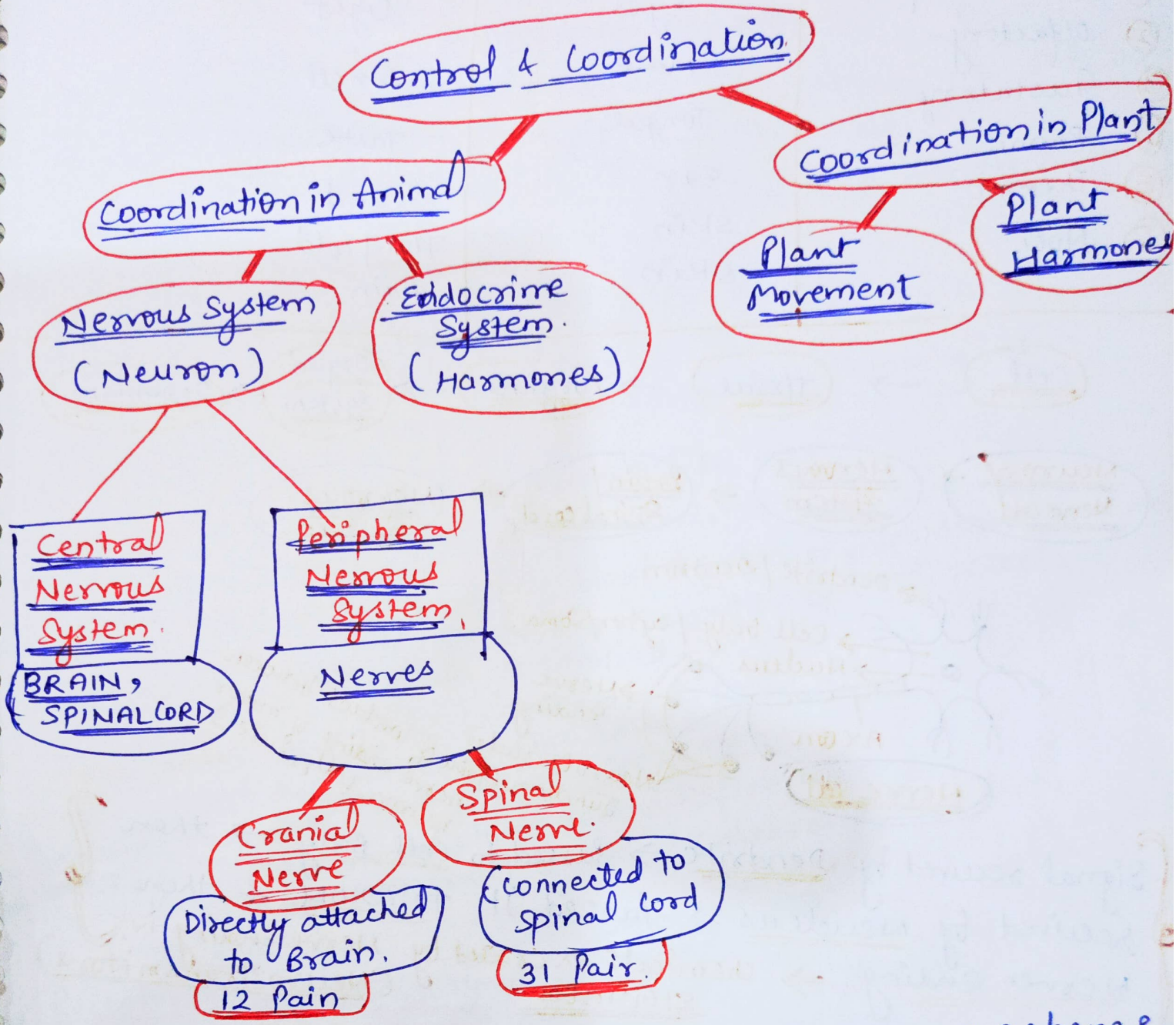
Arteries	Veins	Capillaries
(1) Carry blood away from Heart.	Carry blood toward the Heart.	Link. artery to vein
(2) Outer coat is thin middle coat is thick	Outer coat is thick & middle coat is thin.	Outer & middle coats are absent.
(3) Lumen is small	Lumer is large in veins.	Lumer is small in capillary.
(4) Pure oxygenated * blood is passed except Pulmonary artery.	Impure deoxygenated blood passed except Pulmonary vein.	First Part - oxygenated Last Part - Deoxygena-
(5) Semi lunar valves are	semi lunar valve are present to prevent back flow of blood.	Semi Lunar values are absent
(6) Pressure of blood is * high.	Pressure of blood is low	Pressure is falling
(7) Blood flow is rapid through artery.	Blood flow is slow through veins.	Blood flow is slow through capilliary.

- Largest Artery → Aorta
- only artery that carries deoxygenated blood → Pulmonary Artery
- Largest vein → Vena Cava
- Only vein that carries Oxygenated blood → Pulmonary Vein.

Working of Heart



Bio CH-2 Control & Coordination



Stimulus — Any change, factor or agent which causes a change in activity or behaviour of an organism.
eg:- when we beat table it can't sense but living organism can sense

Receptor / Sense organs — Receptor are the cells, tissue, or organ that receive the stimulas.
eg:- Tongue is used to sense taste. Ear is used to hear. etc.

Effector — Effector are tissue, gland, or muscle which act in response to stimulus received.

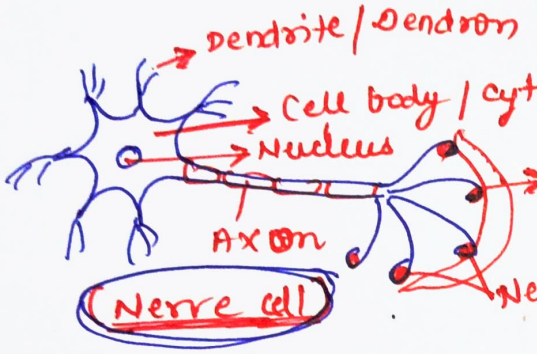
Response — Response is the reaction toward a stimulus by an organism.

Synapse — Microscopic gap between two adjacent Neurons.

Receptor	Sense Organ	Stimuli
① Photo receptor	Eyes	Light
② Olfactory	Nose	Smell
③ Gustatory	Tongue	Taste
④ Phono	Ear	Sound
⑤ Thermo	Skin	Hot / cold
⑥ Noci	Skin	Pain.

Cell → Tissue → Organs → Organ system → Organism

Neuron / Nerve cell → Nervous system → Brain / Spinal cord → Nervous system.



Signal received by Dendrite → passed to Cell Body → then received by Nucleus → passed it to AXON & then Nerver ending. → chemicals excreted by Nerve Ending i.e, SIGNALS (Neuro Transmitors)

THIS CHAIN IS REPEAT TILL LAST DESTINATION.

Type of Neurons

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

Interneurons / Relay Neuron.
They connect sensory & Motor Nerves.

Motor Neuron
They help in transmitting nerve impulse from central nervous system to a muscular or gland

Stimulus (Heat) → Receptor (Thermo Receptor) → Sensory Neuron → CNS (InterNeuron) → Motor Neuron → Effector Muscle → Removal of Hand

(Flow of Neurons)

Motor Neuron

1. Long AXON
2. No Receptor
3. Cell Body terminal & Has dendrites.
4. Many short Dendrons.

Sensory Neuron

1. Short AXON.
2. Receptor.
3. Cell body at the side no dendrite.
4. One long Dendron.

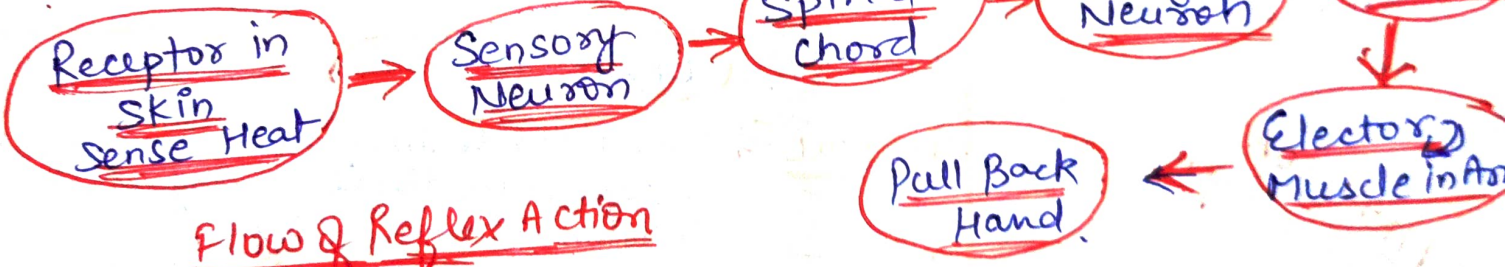
Voluntary Action
- Can be Controlled by us.
- Thinking Involved
- Brain is involved
- Walking, writing, Dancing, Jumping. etc.

Involuntary Actions
- can't be controlled by us.
- Thinking not involved,
- Pumping of blood by Heart, Peristatic movement
- Contraction & Relaxation of blood vessel
- Brain is involved.

Reflex Action

Sudden Action in response to Something

- can't be controlled.
- Thinking Not Involved
- BRAIN NOT INVOLVED
- Spinal chord control Reflex action
- withdrawl of Hand when touch hot object.
- Brain involved only for memory At last info transfered.



Flow of Reflex Action

Reflex ARC Path followed by nerve impulse during reflex action.

Bright light focused on eye?

Question.

Human BRAIN

- Soft, whitish & flattened Organ.
- Protected by Cranium, Bony box in skull.
- About 1200-1400gms. & 10,000 neurons.

Brain

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

Fore Brain (voluntary action)

Cerebrum
(i) Main thinking & largest part of the brain.
(ii) It has seat of mental abilities, control thinking memory reasoning, perception, emotion & speech.

Thalamus It relays sensory information to the Cerebrum.

Hypothalamus it controls sleep, hunger, thirst etc It form the link between Nervous sys & Endocrine System.

MID Brain

- Connect fore brain & Hind Brain
- Concerned with sense of sight & hearing.

Hind Brain (involuntary)

Connect fore brain & Hind brain.

Cerebellum → Balance. Control & coordinate muscular movement maintaining body balance & Posture.

Pons concerned with regulation of breathing rate sleep cycle.

Medulla Oblongata
Controls involuntary action like blood pressure salivation, vomitting etc

CRANIUM PROTECTS THE BRAIN.

SPINAL CORD PROTECTION

(i) Shielded by vertebral columns vertebrae.
(ii) Three protective layer of tissue called Meninges.
(iii) Cerebrospinal fluid cushions the spinal Cord.

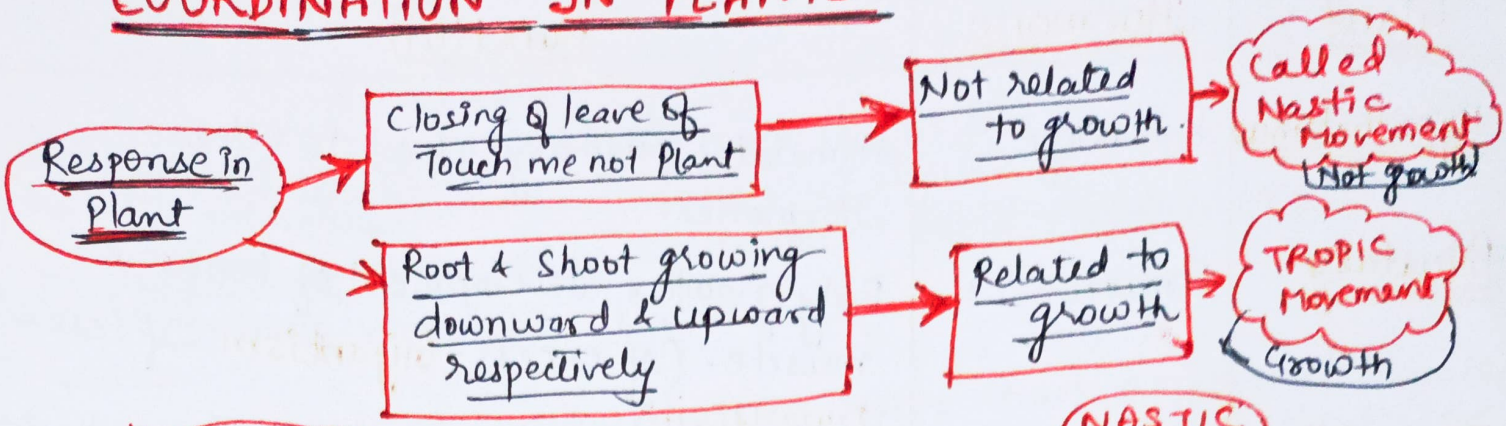
BRAIN Protection

(i) **SKULL** → Protect our brain from injury without it soft brain tissue damage easily. Cranium is part of skull.

(ii) **CEREBROSPINAL FLUID (CSF)** Fluid surrounding the brain. Act as a shock absorber & stops our brain bumping around in skull.

(iii) **Menings** 3 layer of protective tissue with CSF bet'n each layer also help to protect the brain & act as shock absorber.

COORDINATION IN PLANTS

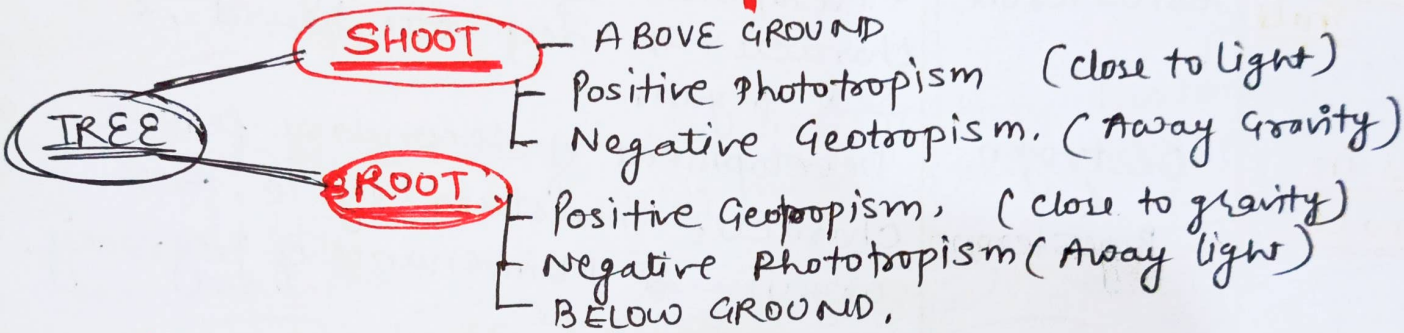


TROPIC

- Growth dependent Movement
- Directional with respect to stimulus.
- More or less permanent & irreversible.
- Found in all plants
- Slow action

NASTIC

- Growth Independent Movement
- Non - Directional Movement
- Temporary & reversible.
- Found in few plants.
- Immediate action



PLANT HARMONES

AUXIN →
- Promotes cell elongation in shoots
- Control phototropism / gravitotropism
- Stimulate fruit development

GIBBERLLINS →
- Stimulate stem elongation
- Help in seed germination
- Fruit & Flower development.

CYTOKININ →
- Promote cell division
- Delays ageing of leave flower.

ABSCISIC ACID →
- cause stomato to close
- Maintain dormancy in seed.

ETHYLENE →
- Stimulates sepenning of fruits,
- promote fruit & leaf drop.

Gland	Hormone	Function
Hypothalamus	Releasing	stimulates pituitary gland to release Hormones.
Pituatary	Growth	Body growth, development of bones & muscle. (If excess - Gigantism if less - Dwarfism)
Thyroid	Thyroxine	Regulate carbohydrate, protein / fat metabolism (if less — Goiter)
Pancreas		Control blood sugar level. (if less — Diabetes is caused)
Adenal	Adenaline	Prepare body to cope with emergency situation
Testes in male	Testosterone	Development of secondary male character the deep voice, beard, & sex organ.
Ovaries in female	Oestrogen & Progesterone	Development of secondary female character menstrual cycle, sex organ. * Maintenance of Pregnancy.

Timing & Amount of Harmones controlled by feedback Gland.

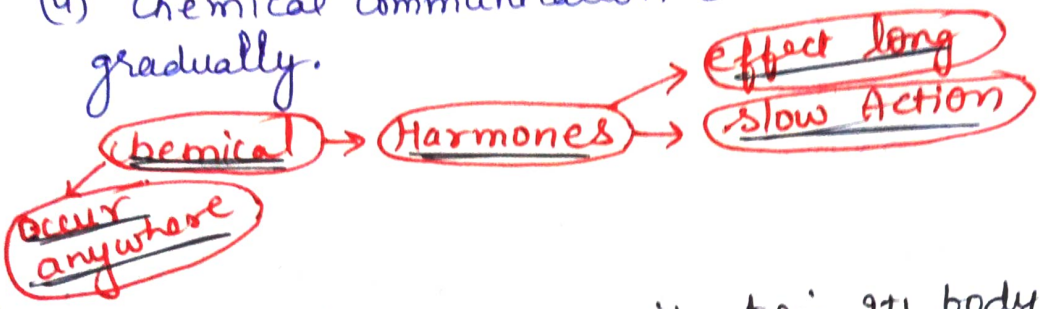
eg:- Blood sugar level rise & the body receive a positive response the pancreas stimulate to secrete insulin. Insulin will store sugar as lipid & glycogen in ~~Hey~~ Hepatocytes & adipose tissue.

Q1. How is the mode of action in ~~bree~~ beating the heart different from reflex action. Give four example?

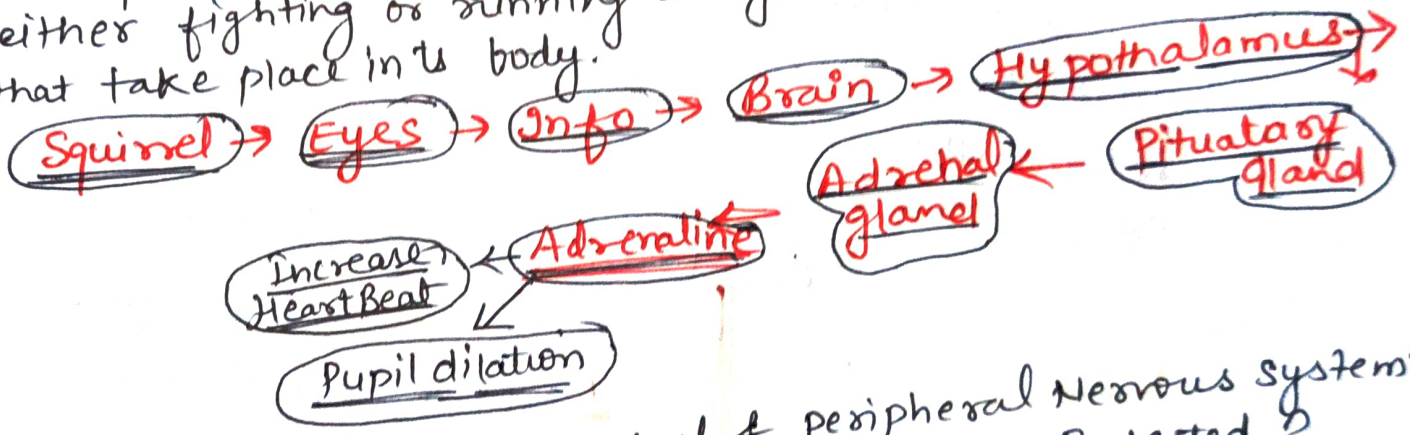
Ans Beating of Heart → Involuntary Action
(i) stimulus not involved. (ii) Take place Regular (iii) Decrease of pupil.
Reflex action → Spontaneous rapid Involuntary action.
(i) Stimulus Involved, (ii) When Required (iii) Coughing, yawning

Q2 why is chemical communication better than electrical impulse as a means of communication between cells in multicellular organism?

Ans (1) It Involves Harmones. (2) Doest not require special tissue. (3) Chemical coordination can occur anywhere in Body. (4) Chemical communication can occur continously and gradually.

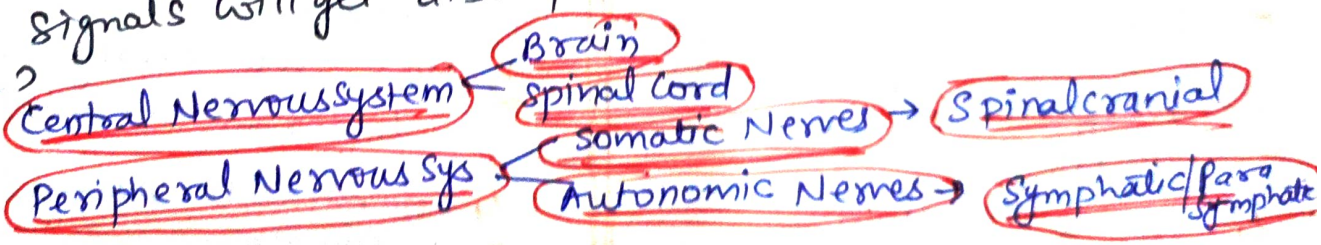


Q3 A squirrel in a scary situation its body has to prepare for either fighting or running away. state immidiate change that take place in its body.



Q4 What constitute the central & peripheral Nervous system? How are the component of Nervous system Protected? Which signals will get disrupted in case of a spinal cord injury?

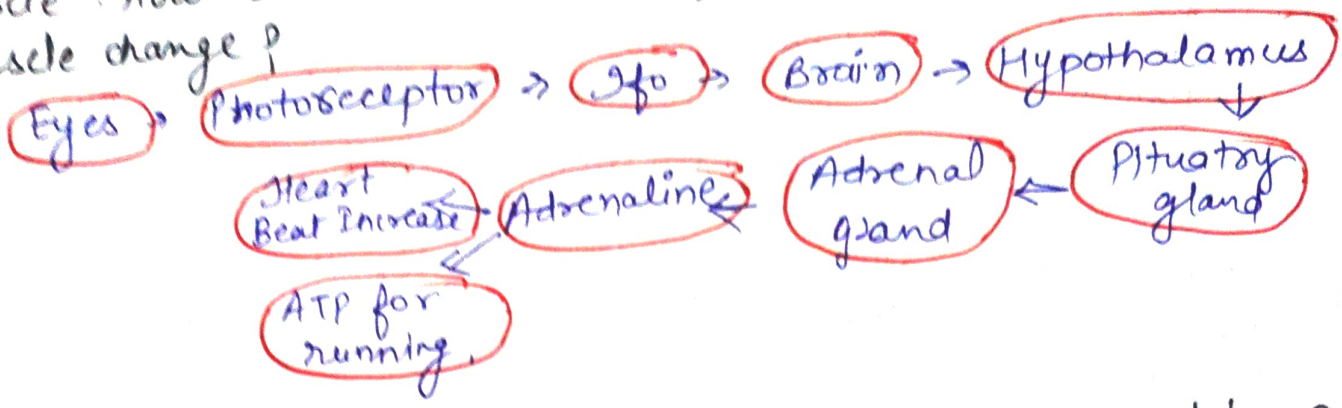
Ans



when our Spinal cord in injured then Reflex action can't be done. because it involve in spinal reflex arc.

6Q A cheetah, on seeing a prey, moves towards him at a very high speed. What cause the movement of his muscle. How does the chemistry of cellular component of muscle change?

Ans



7Q What is nerve impulse? State the direction followed by a nerve impulse while travelling in the body of an organism?

Ans Nerve impulse - an electrical signal transmitted along a nerve fiber. this impulse travel from the dendrite to cell body & then axon & to cell end.

8Q Why does the flow of signals in a synapse from the axonal end of one neuron to the dentritic end of another neuron take place but not in reverse direction?

Neurotransmitter presents in Axon terminals. In Dendrite no neurotransmitter. Neuron is travered by electrical impulse..

9Q Difference between Cerebrum & Cerebellum?

Cerebrum	Cerebellum
1 Part of forebrain	1 Part of hindbrain.
2 It has two cerebral hemisphere	2 It has two cerebellar Hemi Sphere & one central vermis
3 cavity is nearly absent.	3 Has two cavity called lateral ventricals.
4 Seat of Intelligence & Memory.	4 coordinate Masculer Power,
5 Maintain Posture equilibrium of the body.	5 Control sight, smell & taste hearing etc.

Control & Coordination

BIO - 10th

When various parts of a body work in regulated manner is known as control & coordination.

CORDINATION

- **Nervous** (Animals only)
  - Message electrical impulse - Fast
  - Not connected to each & every cell.
- **Hormonal** (Plant & Animal Both)
  - Message chemical impulse - Slow
  - Growth functions are managed by this

Nervous Coordination in Human

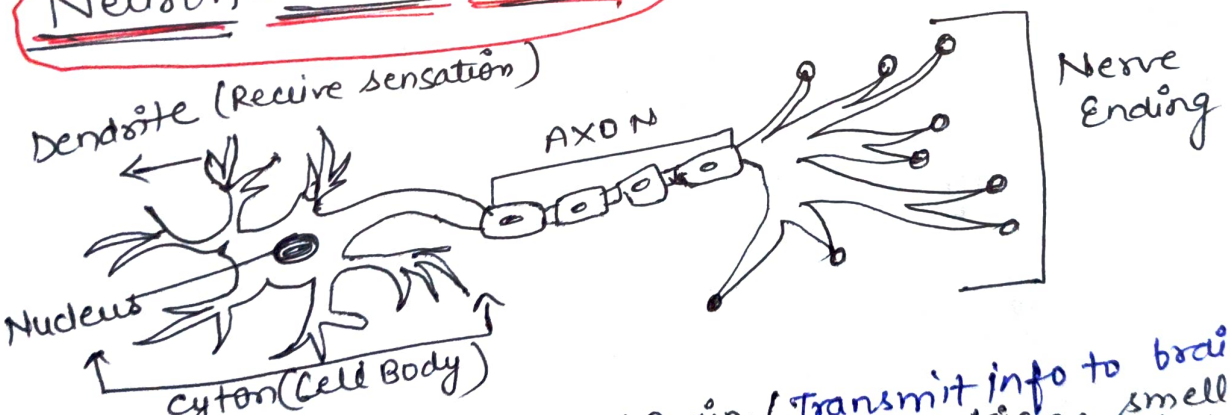
- Central Nervous Sys. (CNS)
- Peripheral Nervous Sys. (PNS)

Central Nervous System → BRAIN + SPINAL CORD

Peripheral Nervous Sys → Cranial Nerve + Spinal Nerve

- **Somatic** — Control voluntary muscle & transmit Sensory info to CNS eg- Moving Head.
- **Automatic** — Controls Involuntary Body functions eg: Heart beat
  - **Sympathetic** — Arouses body to expend energy (Arouses Body)
  - **Para-Sympathetic** — Calm body to conserve & maintain energy (calm down body)

Neuron - The Nerve cell



Sensory Neuron → Toward Brain. (Transmit info to brains)
(Touch, taste, Hearing, vision, smell)
(Tmigmoreceptor) (Skin) (Gustato) (Tongue) (Audio) (Ear) (photo) (eye) (Nose) (olfacto)

Interneuron → Middle Part (Connecting Sensory to Motor.)

Motor Neuron → Toward Body (Transmit info from brain)

Human Brain

- Left → Analysis, Logic, Idea, Facts, Maths.
- Right (Left hand) → Creativity, Intitution, Arts, Creation, feeling & Imagination.

Each hemisphere controls the opposite part.

★ Right - brain - Left brain of body.

Protection of Brain [Meninges = DAP]

SKIN → aponeurosis → periostem → bone →
Dura Mater → Arachnoid mater → Pia Mater

MENINGES | DAP

CSF Cerebro Spinal Fluid
Filled between Arachnoid & Pia Mater
Work as cusion to Protect Brain & spinal cord

Arachnoid Mater ⇢ CSF ⇢ Act as shock absorber
Pia Mater

Parts of Brain → Forebrain

- It is the complex & specified part of brain.
- It consist of Cerebrum.

Function of forebrain ★

- Thinking Part of Brain.
- Control the voluntary actions.
- Store Information (Memory)
- Recive sensory impulses from various parts of body & integrate it
- Central associate with hunger.

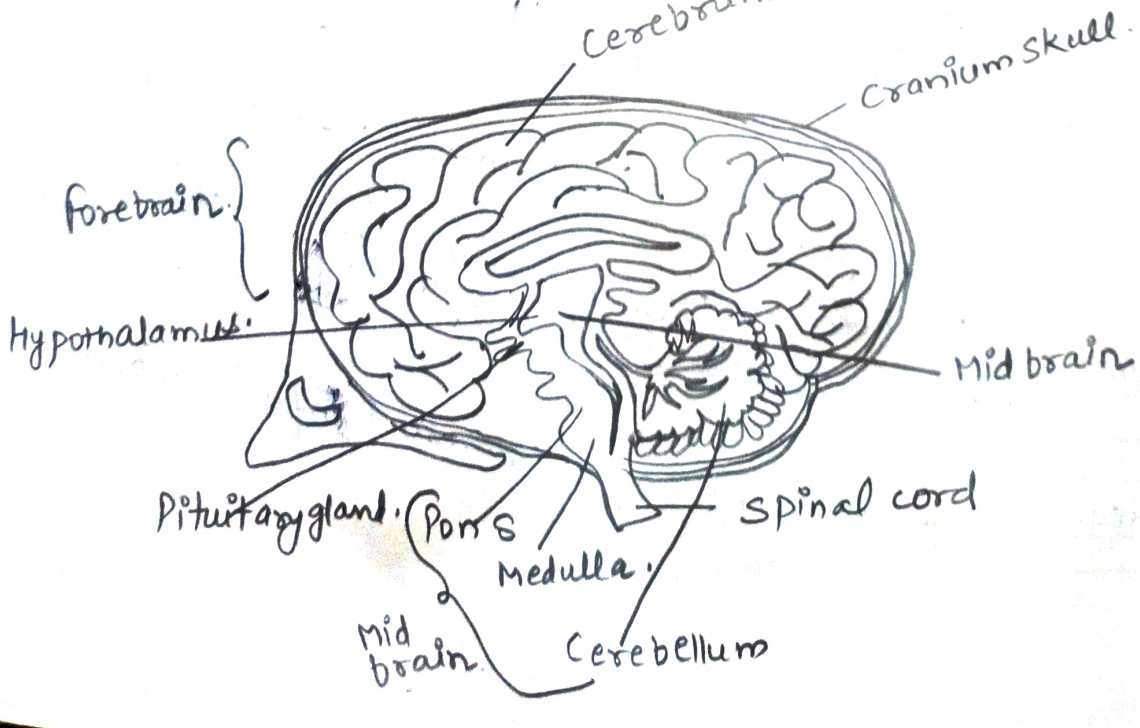
MID Brain & Hind Brain

→ Midbrain, Pons, Medulla, Basilar artery, vertebral artery

Cerebellum → control Posture & Balance. It control precision action eg:- Picking Pen.

Medulla → controls involuntary actions eg:- Salivation. Blood pressure, vomiting.

Pons → Involuntary action regulation of respiration



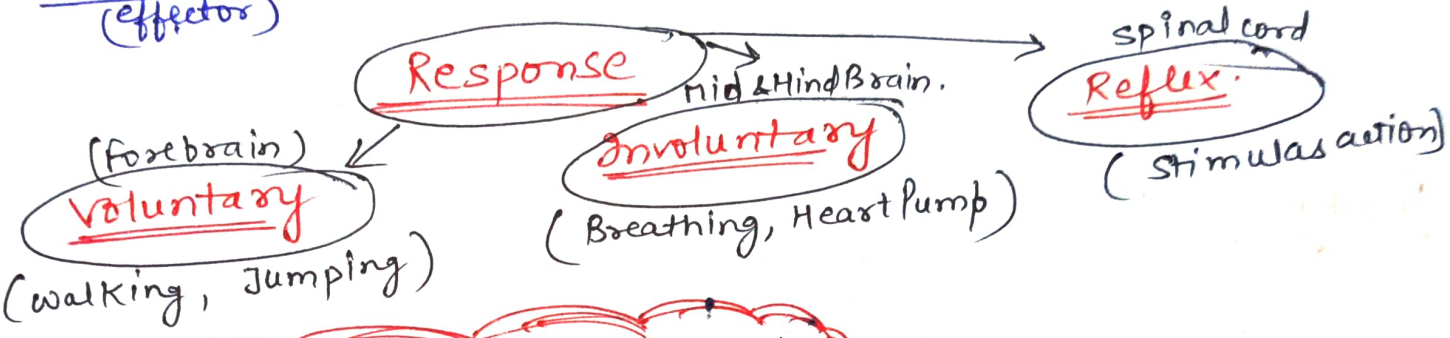
SPINAL CORD

(1) It connect large part of peripheral Nervous system to brain.

(2) Reflex action Quick sudden & immediate response of body to a stimulus. Eg :- Knee jerk, withdrawl of hand on touching a hot object.

Reflex arc :- It is the nerve pathway that is followed by reflex action. An example of the reflex arc is it happens when we accidently touch something hot. the change in temperature is detected by the receptor first.

(Muscle) Move back (effector) ← SKIN (Receptor) → FIRE



HORMONAL COORDINATION

Plant Hormone (Phytohormone)

Growth Promoters

(1) Auxin - Cell Elongation (Light sensitive)
(2) Gibberellin (stem elongation & leaf expansion)
(3) Cytokinnins → Promotes rapid cell division. (eg :- Building of fruits, seeds as they require rapid cell div for growth)

Auxin

Growth Inhibitors

(1) ABSCISIC ACID
(2) ETHYLENE. (Ripening of fruits, the opening of flower & abscission of (shedding) leaves. (

	Germination	Growth to Maturity	Flowering	Fruit Development	Abscission Shedding of leave	Seed
Gibberlin	✓	✓	✓	✓	✗	✗
Auxin	✗	✓	✓	✓	✗	✗
Cytokennin	✗	✓	✓	✓	✗	✗
Abscisic	✗	✗	✓	✓	✓	✓
Ethylene.	✗	✗	✗	✗	✓	✓

HUMAN HORMONE (ENDOCRINE)

Glands	Hormones	Functions.
Pituitary	Growth Hormone.	★ Regulates growth. ★ Control the functioning of endocrine glands.
Thyroid	Thyroxine	★ control the metabolism rate ★ It also brings about balanced growth.
Parathyroid	Parathormone.	★ Controls calcium balance of body
Adrenal.	Adrenaline.	★ Prepare body for emergency
Pancreas.	Insulin	★ Control glucose level of the blood.
Testes	Testosterone	★ control growth & development of male reproductive system.
Ovaries.	Oestrogen Progestrone.	★ Control growth & development of female reproductive system.

Feedback Mechanism:

⊙ A feedback mechanism regulates the action of the hormones. (eg:- सर्दी में कांपना (Heating), गर्मी में पसीना (cooling))

Movement In Plants

- Tropic Movement
- Nastic Movement

Growth Development → Response is slow.
* is Direction of light. (as they have phototropism)
Growth Indepent → Response is slow.
eg:- (Dropping of leaves of Mimosa plant on touching.)
* is not in direction of sun.



↑ Phototropism: (Movement toward light)

- Hydrotropism (Response to water)

Geotropism (Response to gravity)

* tendril (Thigmotropism) (Response to touch.)
eg:- Grapes. spring supported,