

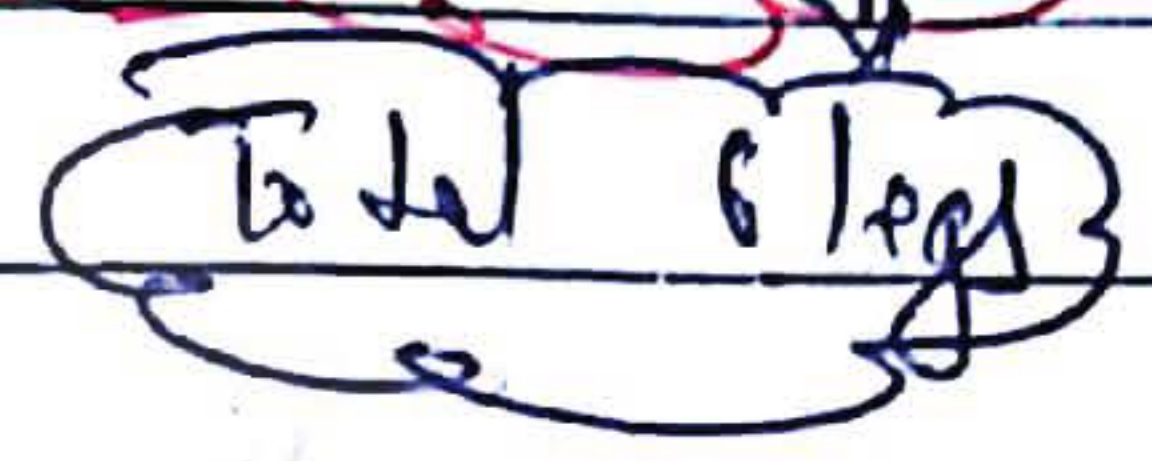
Cockroach

Cucaracha :- Spanish word

Classification: Most digametic feature of class insecta 3 pairs of legs

Phylum :- Arthropoda

Class :- Insecta (3 pairs of leg present)



Subclass :- Pterygota (2 Pairs of wing present)

Order :- Orthoptera (Dissimilar wings)

Genus :- Periplaneta

Species :- Americana

Periplaneta

Genus

Blattella

Periplaneta

Blattella

Size :- Large

Small

Wing :- Well developed

less developed or less developed

♂ ✓

♂ ✓

♀ ✓

♀ vestigial wing

Colour Brown, Black But in Tropical Region Red, Green and yellow Bright colour cockroach found

Size 1/4 to 3.0 inches

0.6 to 7.6 cm

→ Periplaneta americana :- 34 to 53 mm

Species :-

- ** (i) Periplaneta americana (or) American cockroach (or) Ship cockroach (or) Bombay cockroach (or) Big cockroach (or) Common cockroach

Largest in size

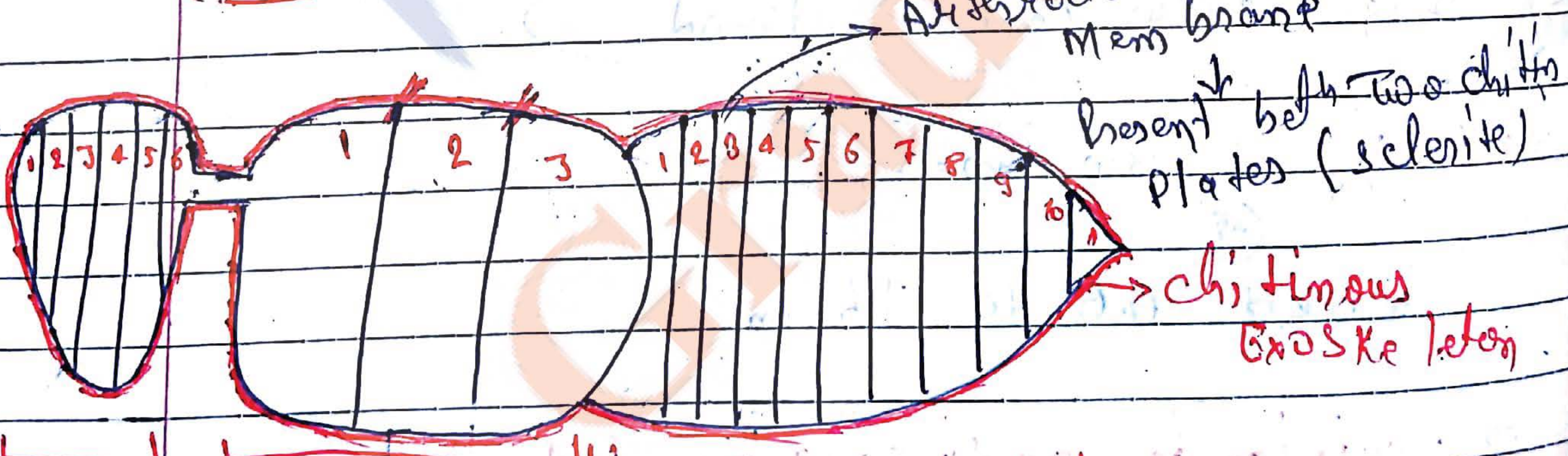
- (ii) *Periplaneta australis*
- (iii) ~~Periplaneta~~ *germanica* :- German Cockroach (or)
- Smallest Cockroach
- ** (iv) ~~Periplaneta~~ *orientalis* :- Native of India

Two common Indian cockroach are (i) *periplaneta americana* and (ii) ~~periplaneta~~ *orientalis*

Habitat:-

- (i) NOCTURNAL → Active At Night, Due to Biological clock effect, not due to light effect.
- (ii) OMNIVOROUS :- If Food is not Available then Cockroach can eat its own members, this phenomenon is known as Cannibalism :-
- (iii) CURSORIAL :- Fast Runner and less able to Fly.

Cockroach :- Morphology



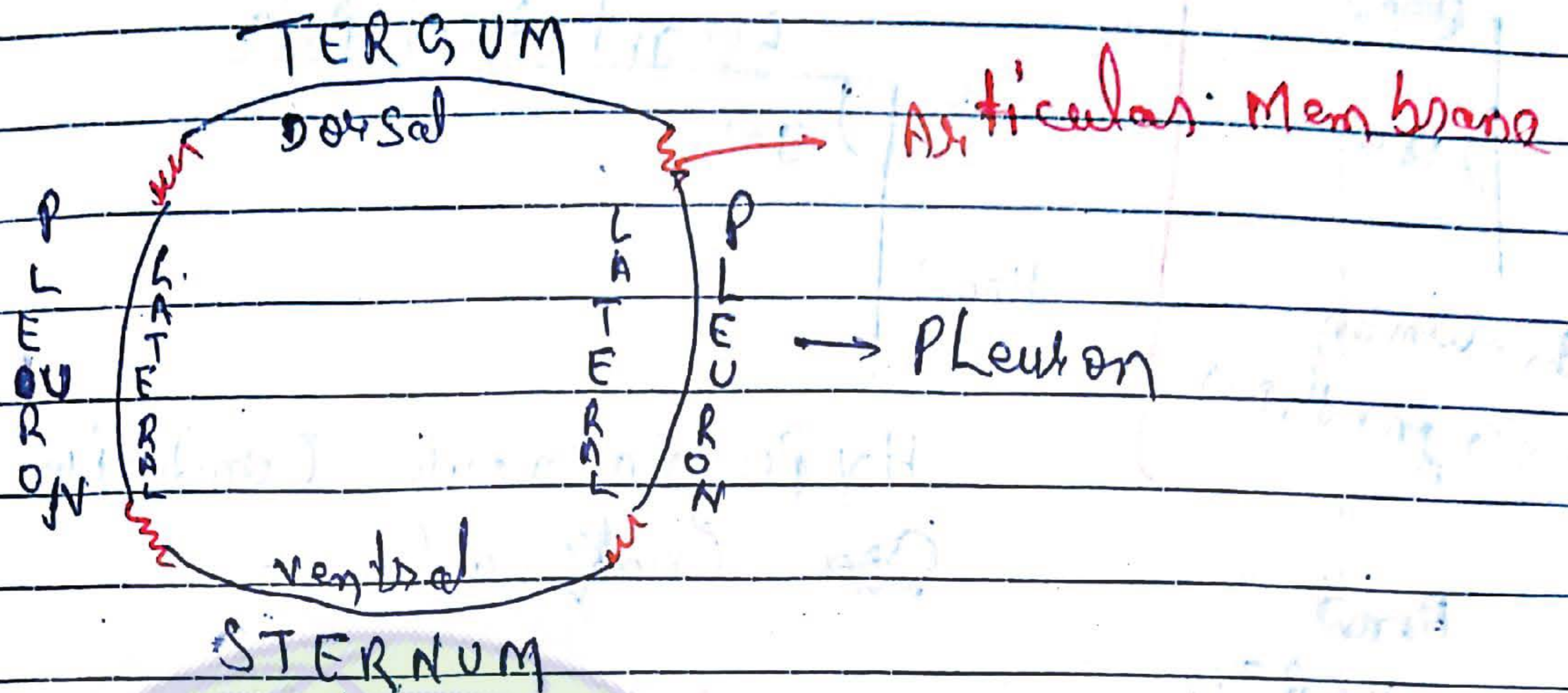
Head
THREE SEGMENTS → 3

THORAX
3

ABDOMEN
11 = 20 Segment
20 = 14 Segment

→ In Adult Stage :-
→ In Embryonic Stage :-

Sclerite (Chitin Plate)



- i) Dorsal Sclerite → Terga @ Tergite @ Tergum
- ii) Ventral " → Sterna @ Sternite @ Sternum
- (iii) lateral " → Pleura @ Pleurite @ Pleuron

→ Head of cockroach is made by fusion of six Segment

→ Interior body of co. covered by cuticle
Exoskeleton

→ Cuticle is present in the form of cuticle plate, this cuticle plate known as Sclerite

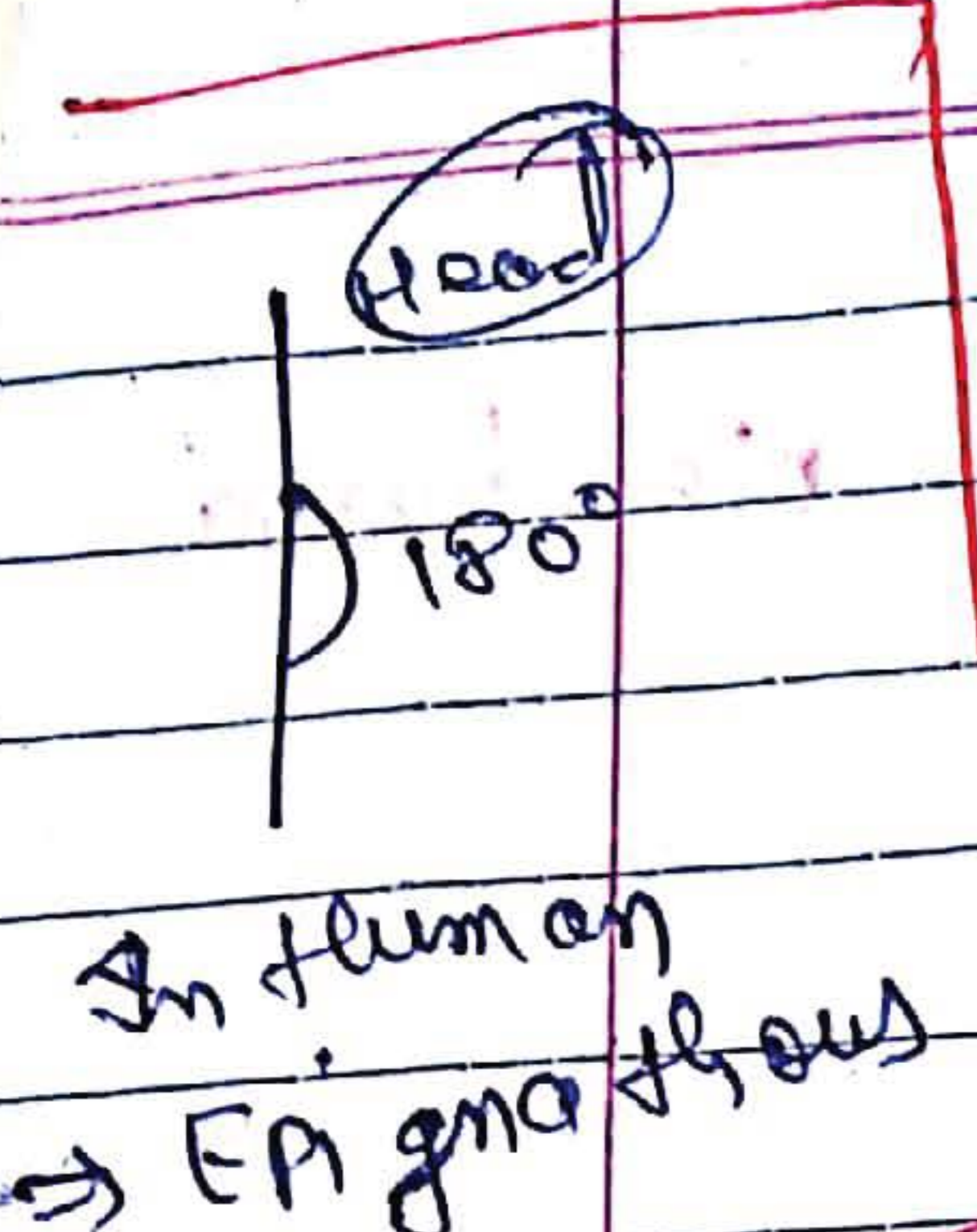
Two Sclerite / cuticle plate, in cockroach joined together by thin and flexible membrane is known as ~~Articular~~ Articular Membrane.

→ This membrane provide articulation betⁿ in two segment

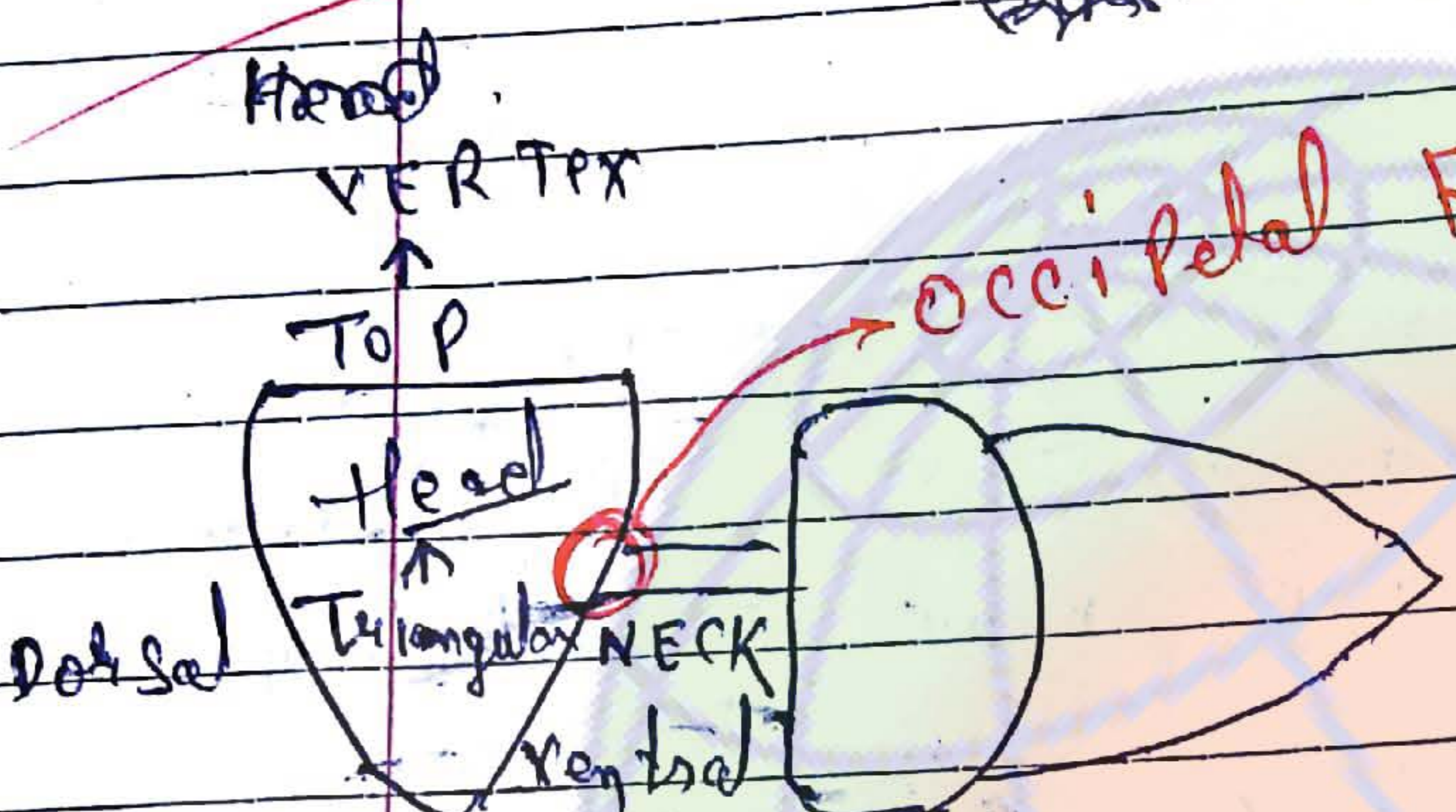
→ In cockroach endo skeleton skeleton is present only in head. form by cuticle.
Terga, Sterna & Pleura are joined together by articular Membrane.

bleed 2018

Cockroach → Head

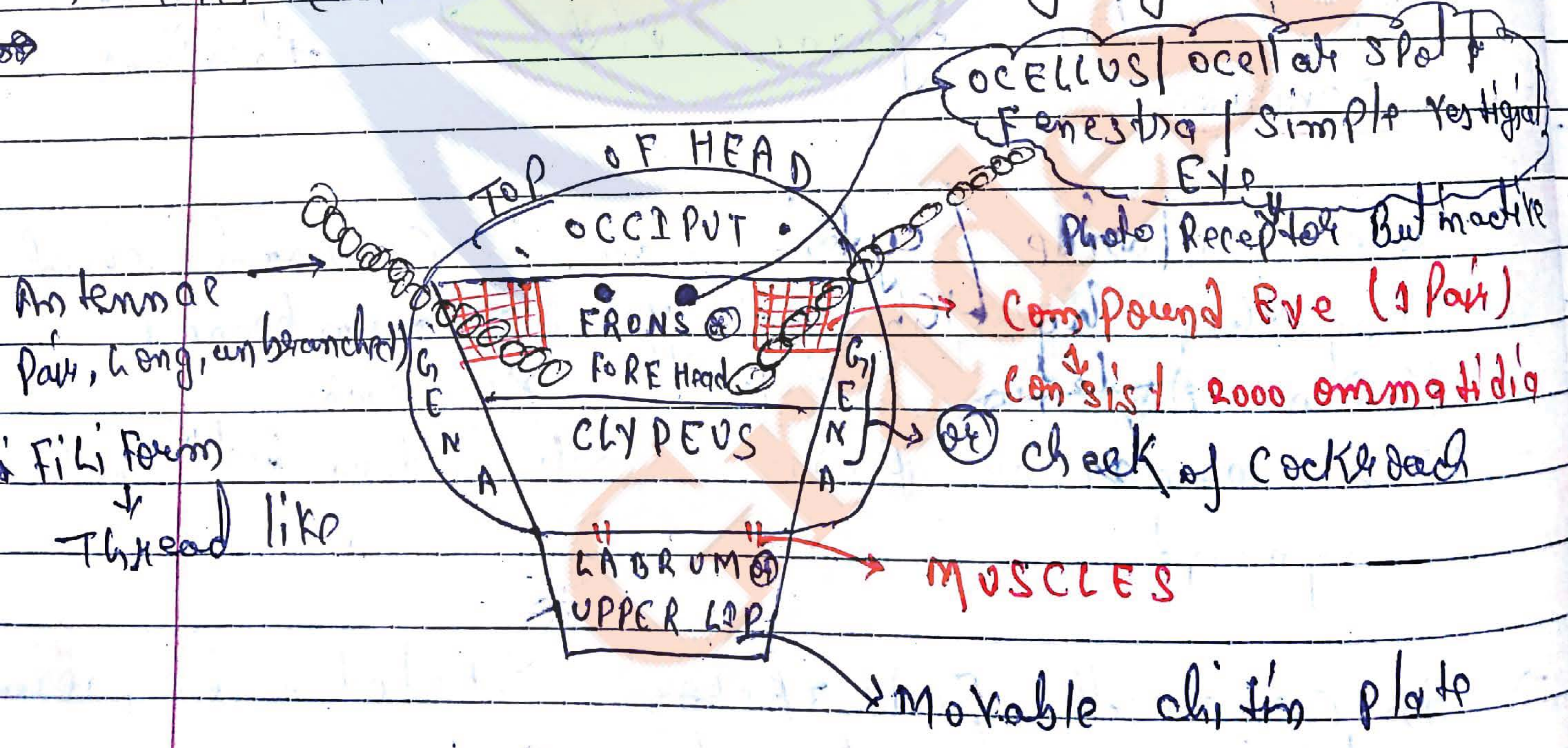


Hypognathous Condition of Head in Cockroach



→ Head of cockroach is triangular is present on anterior side and bend down wards at Right angle to longitudinal ^{body} Axis

→ This condition is known as Hypognathous Condition





Sensory setae (or) Bristles
↓
Felt

Antennary socket
(Membranous)

- (i) Touch :- Tactile / Thigmo / Tingo Receptor
- (ii) Vibration :- Prothoreceptor
- (iii) Temperature :- Thermoreceptor
- (iv) Smell :- olfactory
- (v) Sound :- Audio Receptor

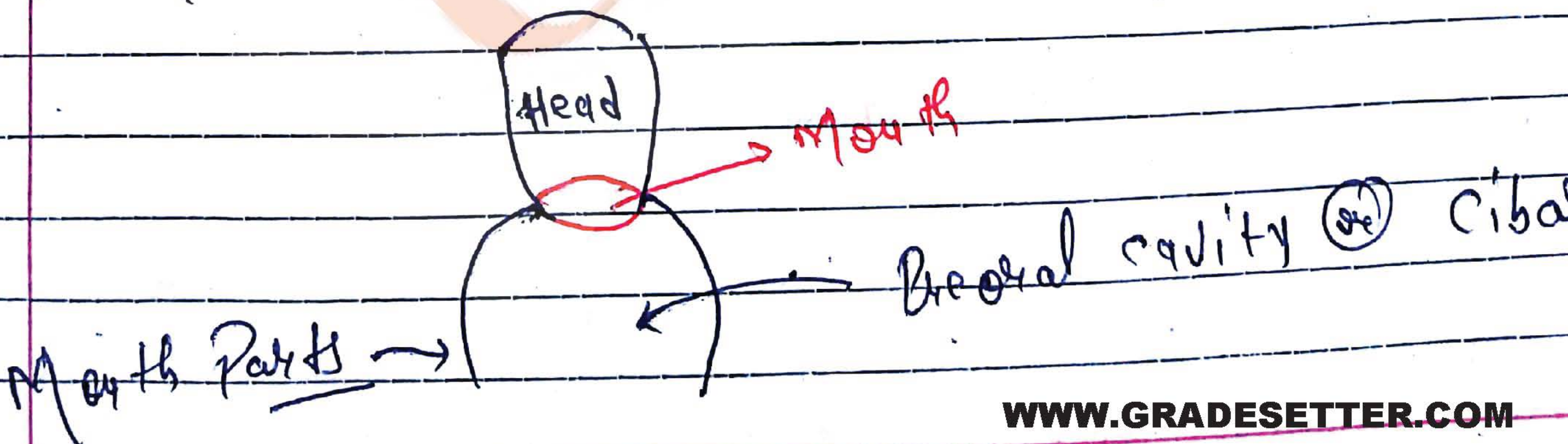
Two light colour spots are present both the compound eye to cockroach, is known as ocellus.

→ These are photoreceptors in insects and not function is cockroach.

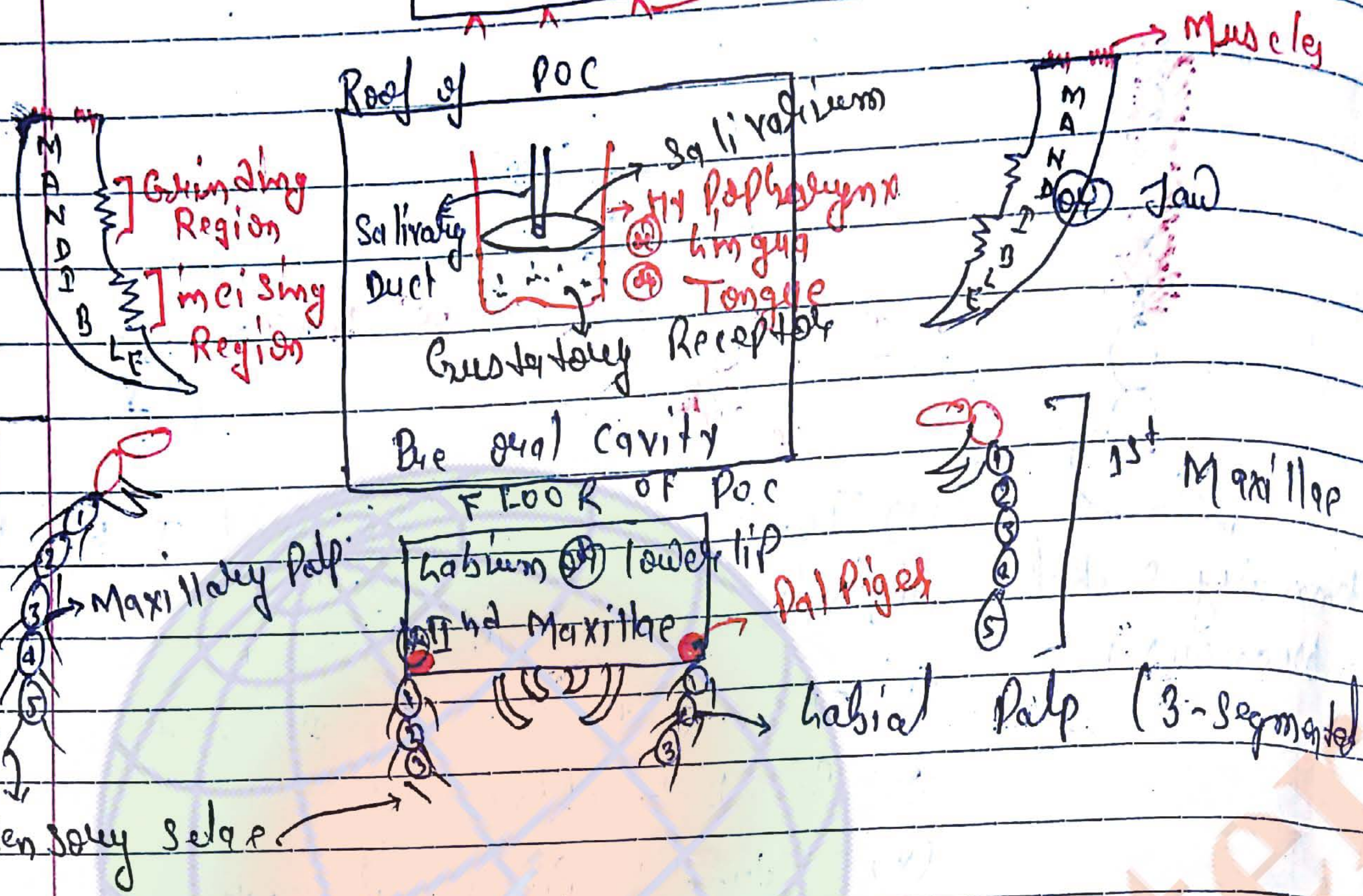
→ Antennary socket is present in front of eye.

Mouth Parts

→ Biting and chewing type (or) cutting and chewing
(or) Mandibulate Type



LABRUM (upper lip)
 Glands for taste setae

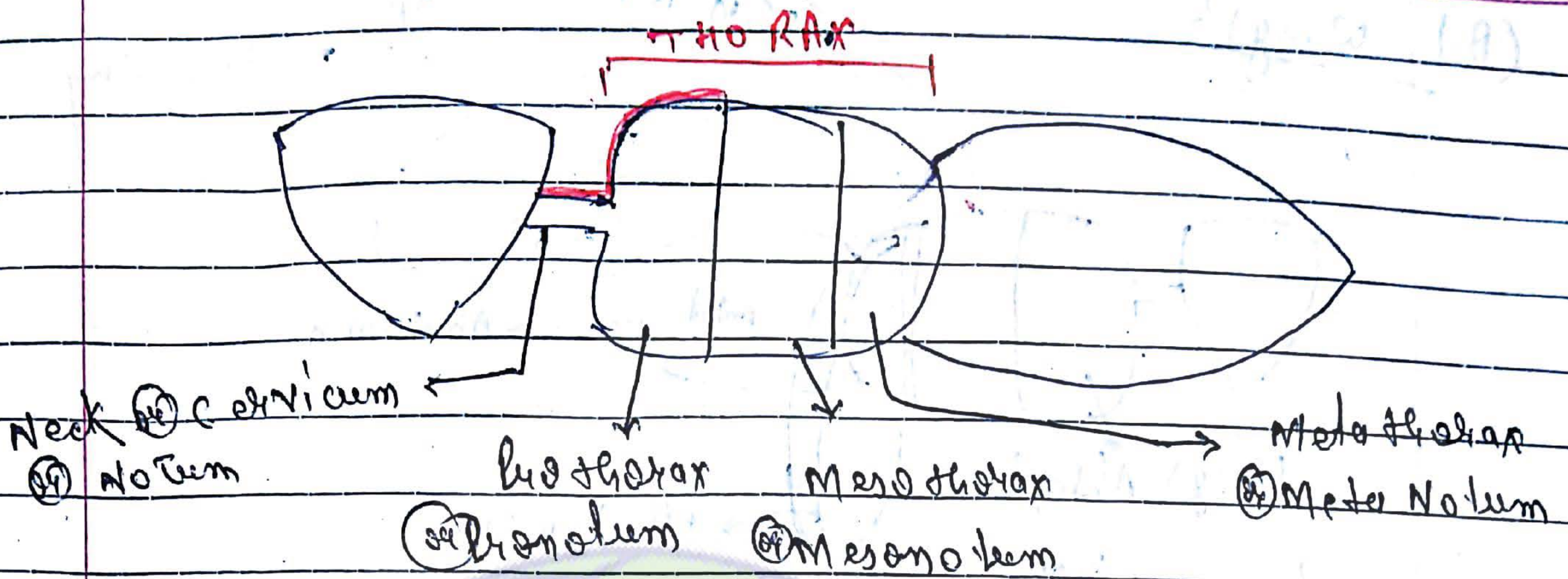


→ If Mandible is ^{will} Remote from cockroach, then grinding and incising both are affected

→ Function of Maxillary Palp - ^{Oral cavity}
i) To pick up food and keep it in ~~body~~ ^{mouth}
ii) it works as brush to clean antenna and wings.

→ Hypopharynx is medial flexible lob present on the Floor of POC
→ It is known as ~~know~~ ^{new} clypeus
→ Salivary duct opens at the base of hypopharynx.

THORAX



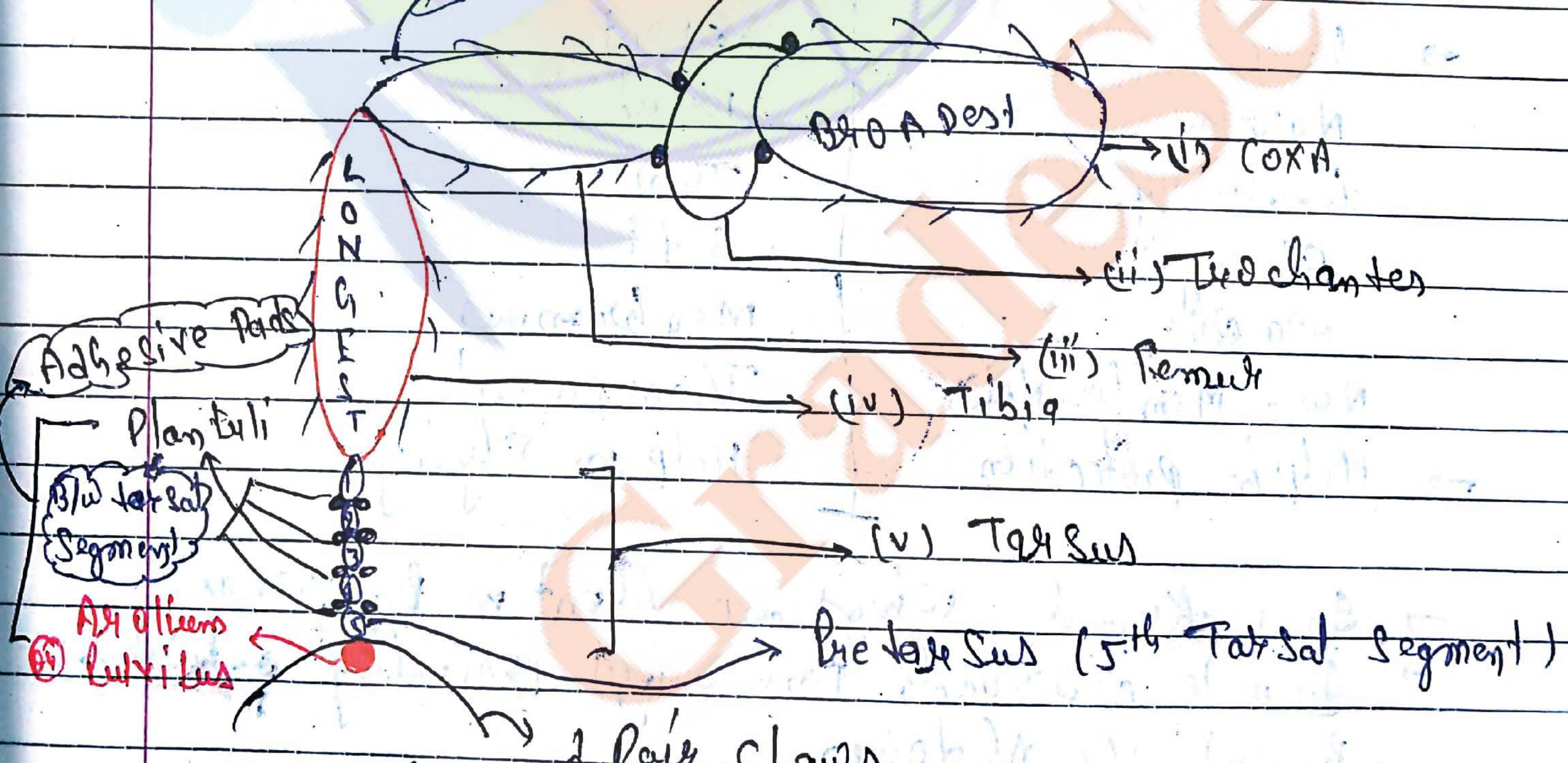
→ Neck is the short extension of Prothorax

→ Thorax has two type of Appendages

- a) 3 pairs of legs
- b) 2 pairs of wings

A) Legs:

Tactile and Pressure Receptor

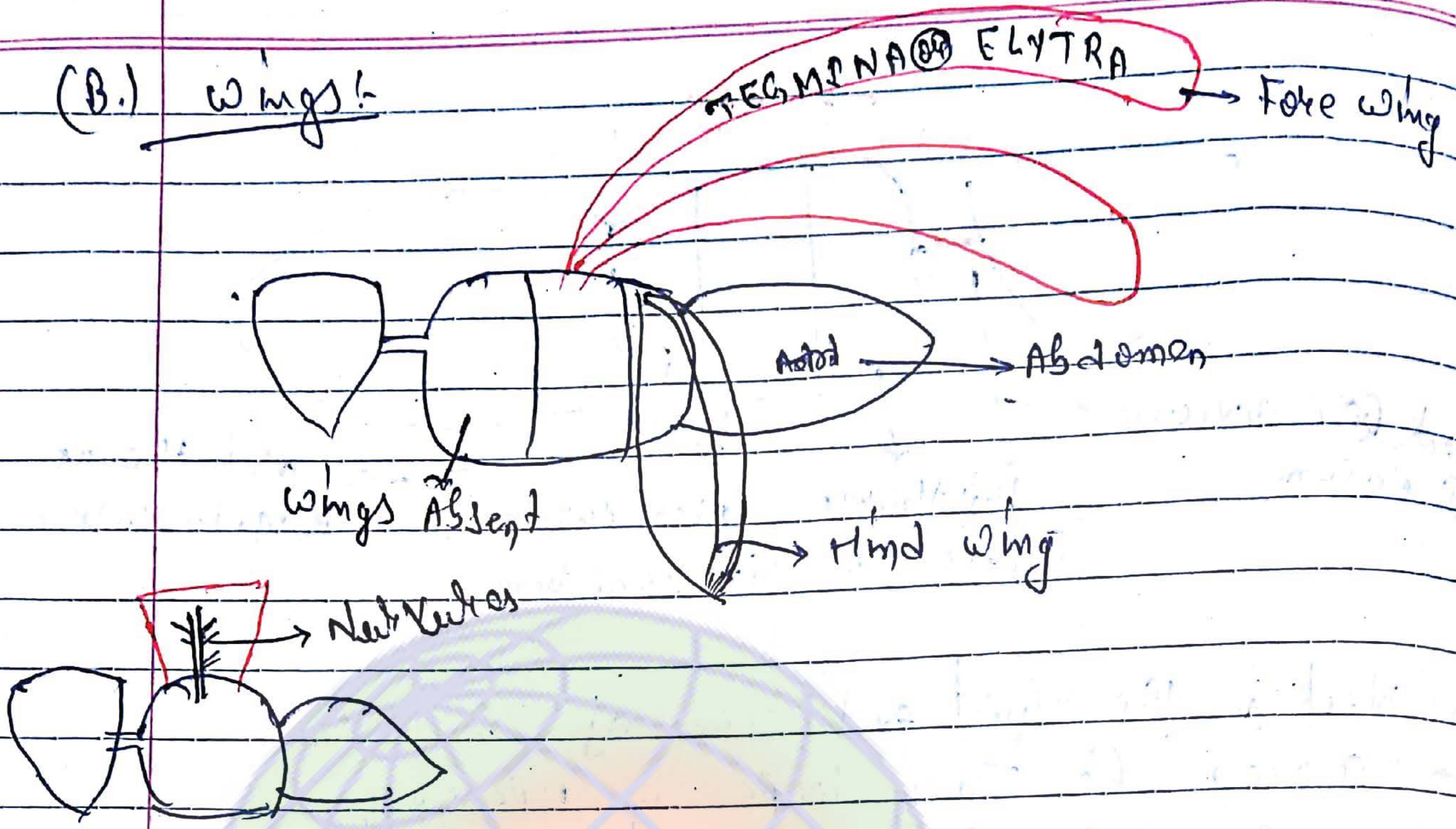


→ Coxa each move on Rough surface with the help of claws

→ move on smooth surface Arrolia

→ Coxa each climb on wall on the help of plantuli and Arrolia

(B.) Wings:-



Fore wing	Hind wing
→ Mesothorax	→ Metathorax
→ 1st pair of wings	→ 2nd pair of wings
→ Long	→ Short
→ Narrow	→ Broad
→ Leathery	→ Thin
→ Strong	→ Soft
→ Opaque	→ Membranous
→ Non-Membranous	→ Transparent
→ Help in protection	→ Help in Flying

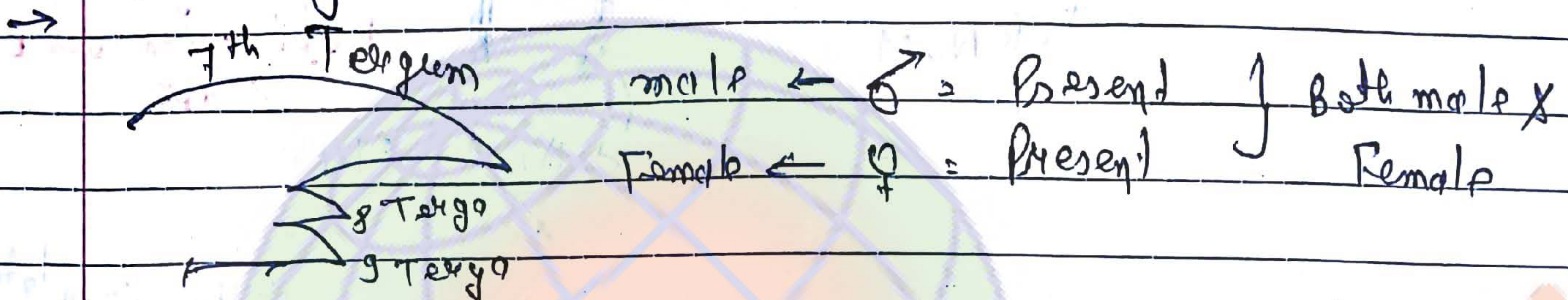
- In cockroach wings are absent in prothorax
- In male cockroach fore wings projecting outwards beyond the abdomen
- During Rest fore wing covered the hind wing
- A fine network of tubules supplying blood to wings is called Nerve tubes
- The main function of wings in cockroach is protection.

Abdomen

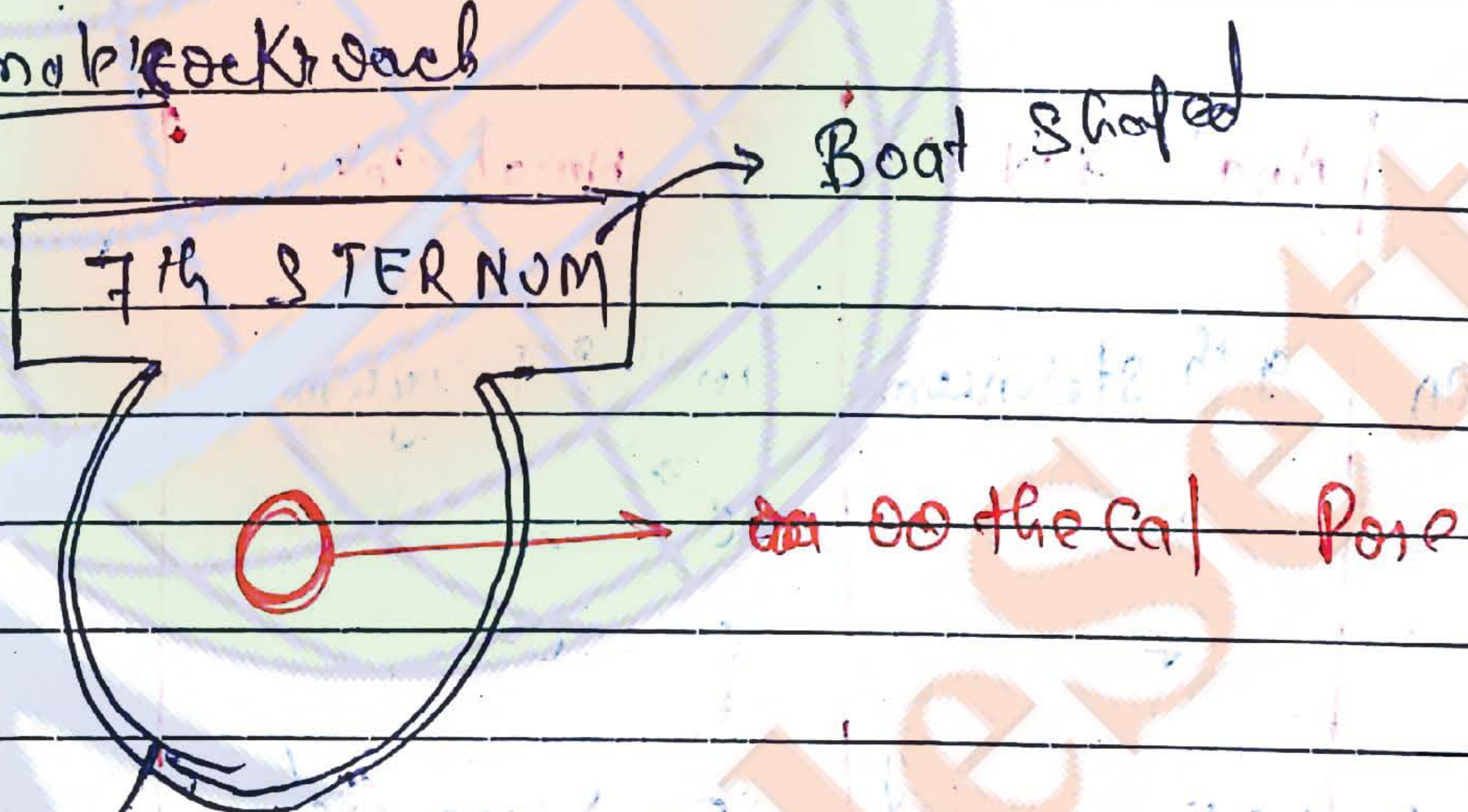
→ No. of Segments = ♂ = 10
♀ = 10

But OB view is seen
♂ = 9
♀ = 7

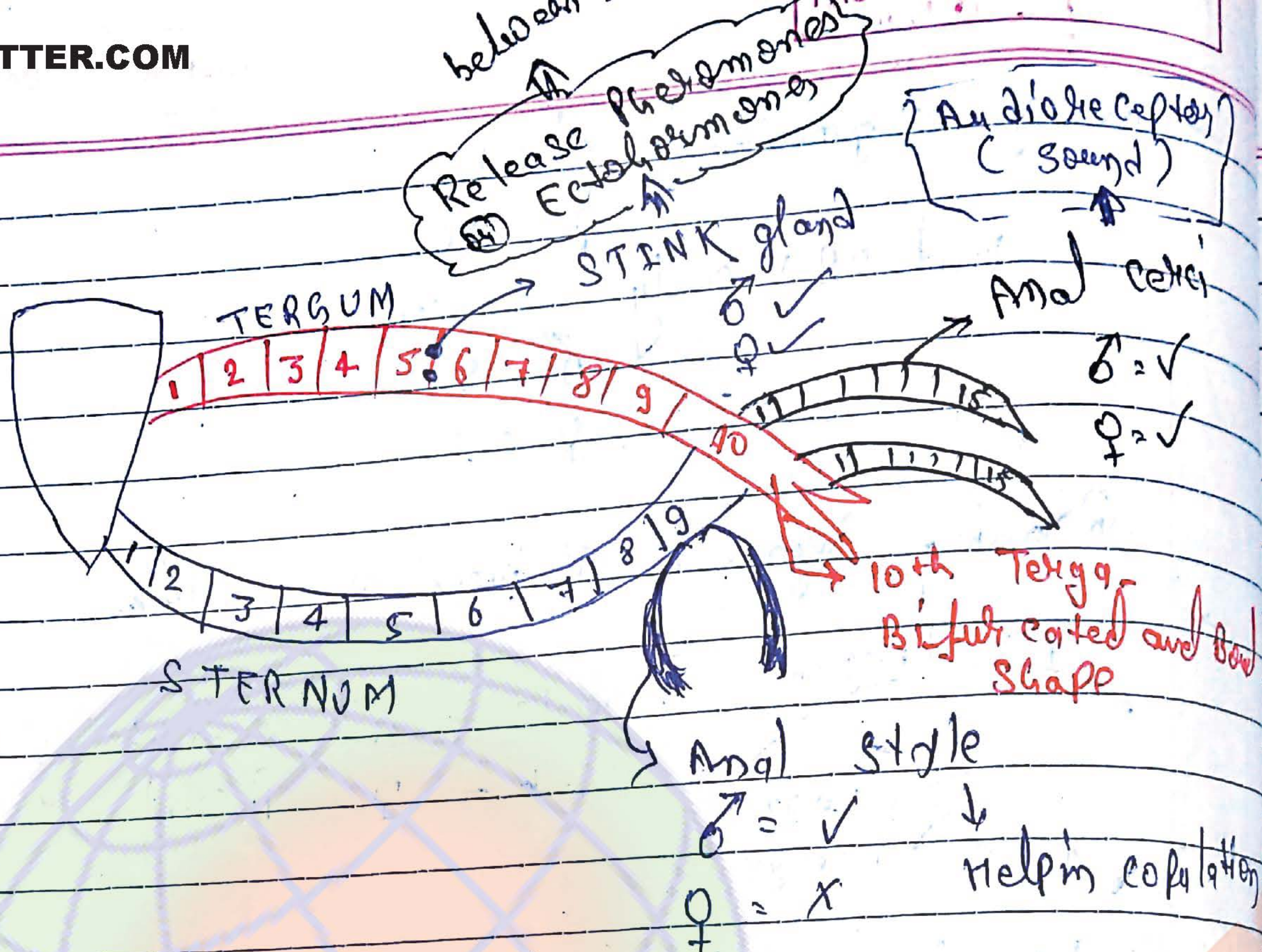
Remaining segment Reduced or modified.



→ only Female back sac



Apical lobe
 (a) Gyna valve (or) Plate
 modified 7th sternum.

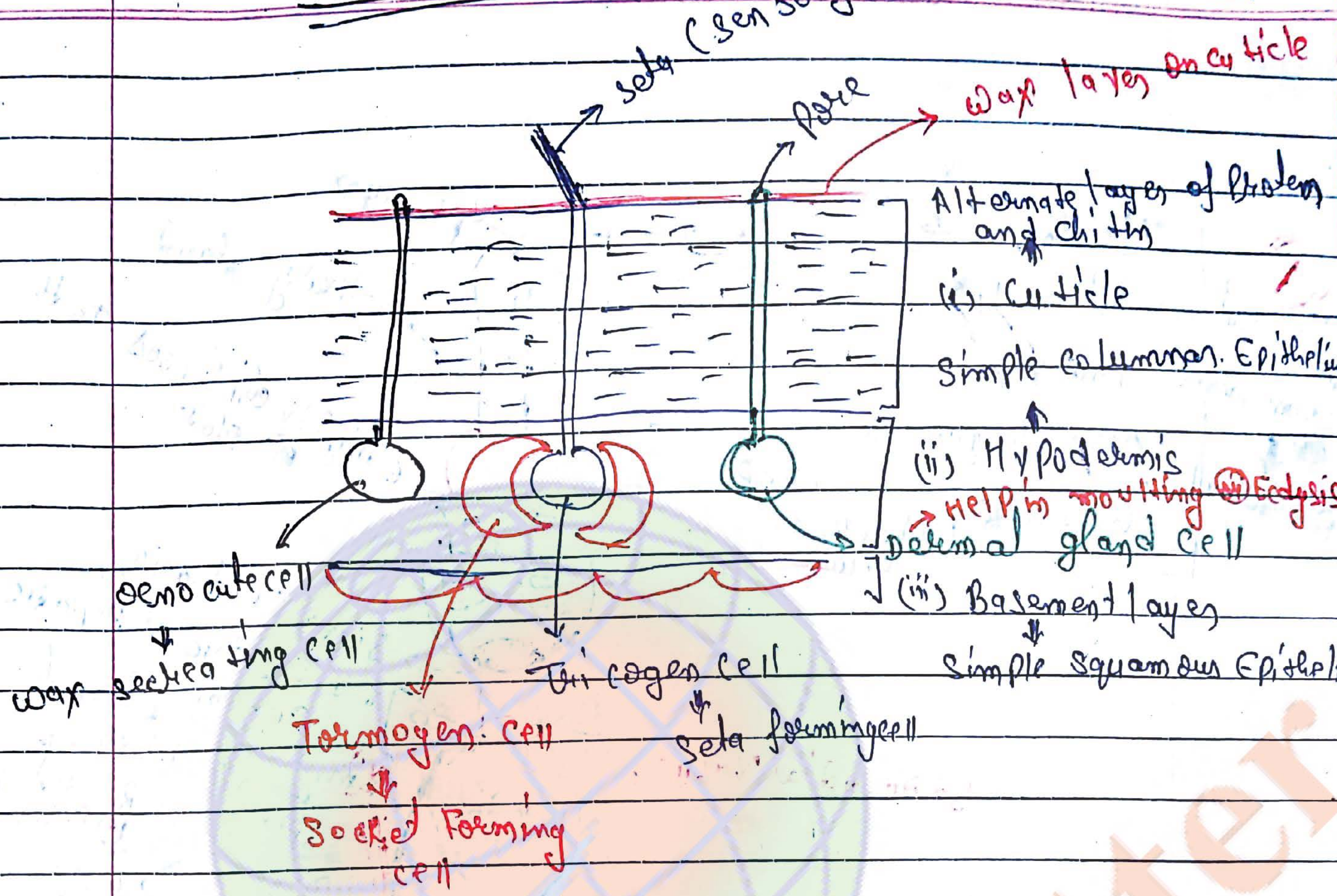


	Anal style	Anal cecum
i) location	9 th sternum	10 th & Tergum
ii) ♂	✓	♂ = ✓
♀	✗	♀ = ✓
iii) Seg. / unseg and spinous	unsegmented	15 - Segmented

→ All the characters of Sexual Dimorphism Present in the Abdomen of cockroach.

→ Stink gland Release Pheromone or Acetohormones (chemical messengers), Their smell Repel they enemies and help in Sexual attraction.

Body Wall

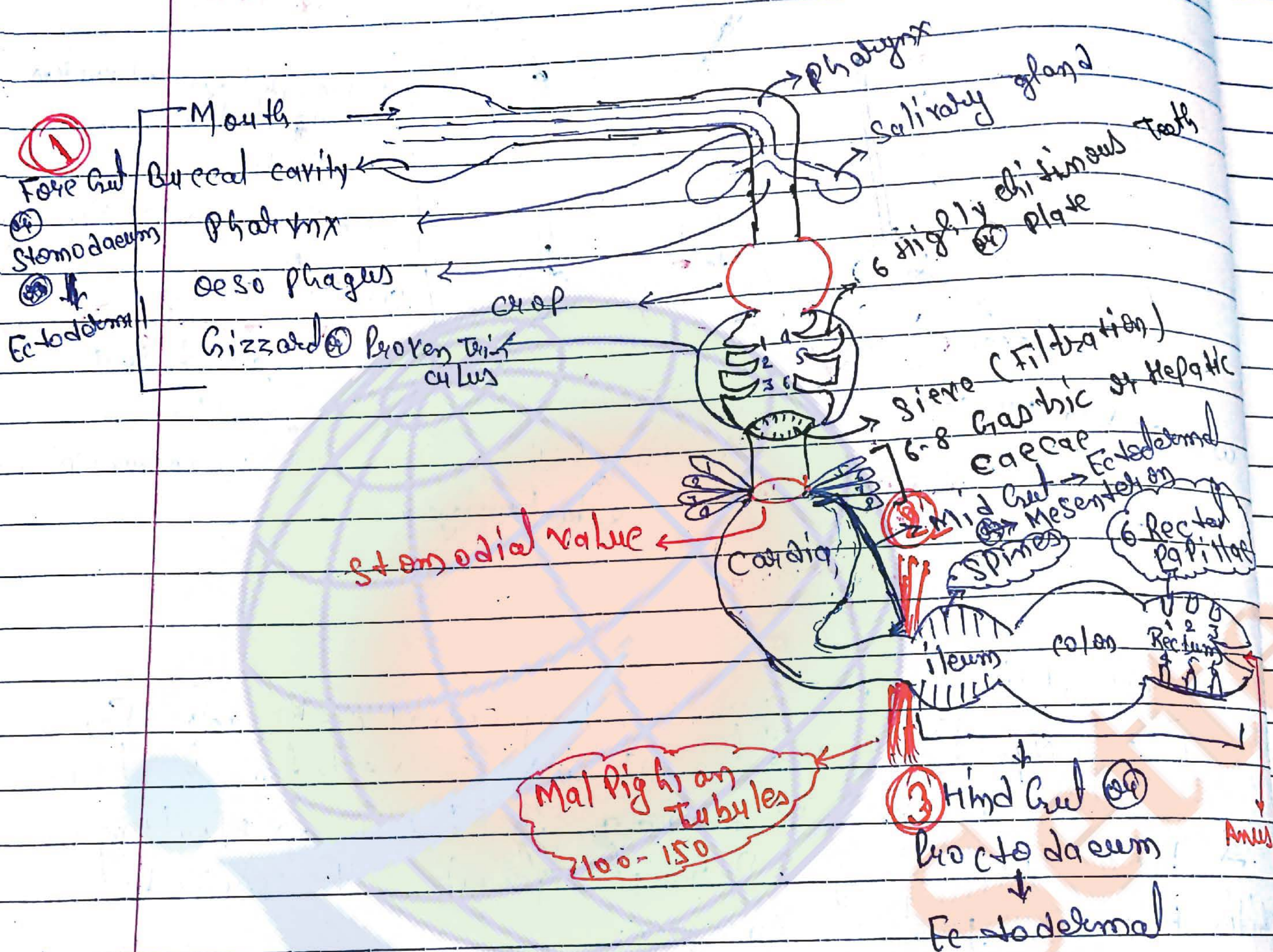


Moulting: For growth young ones of cockroach. For 9 (Nymph) shed out its exoskeleton about 13 times, this phenomena is known as moulting.

→ For moulting Dermal gland cell secrete chitin & protein enzymes.

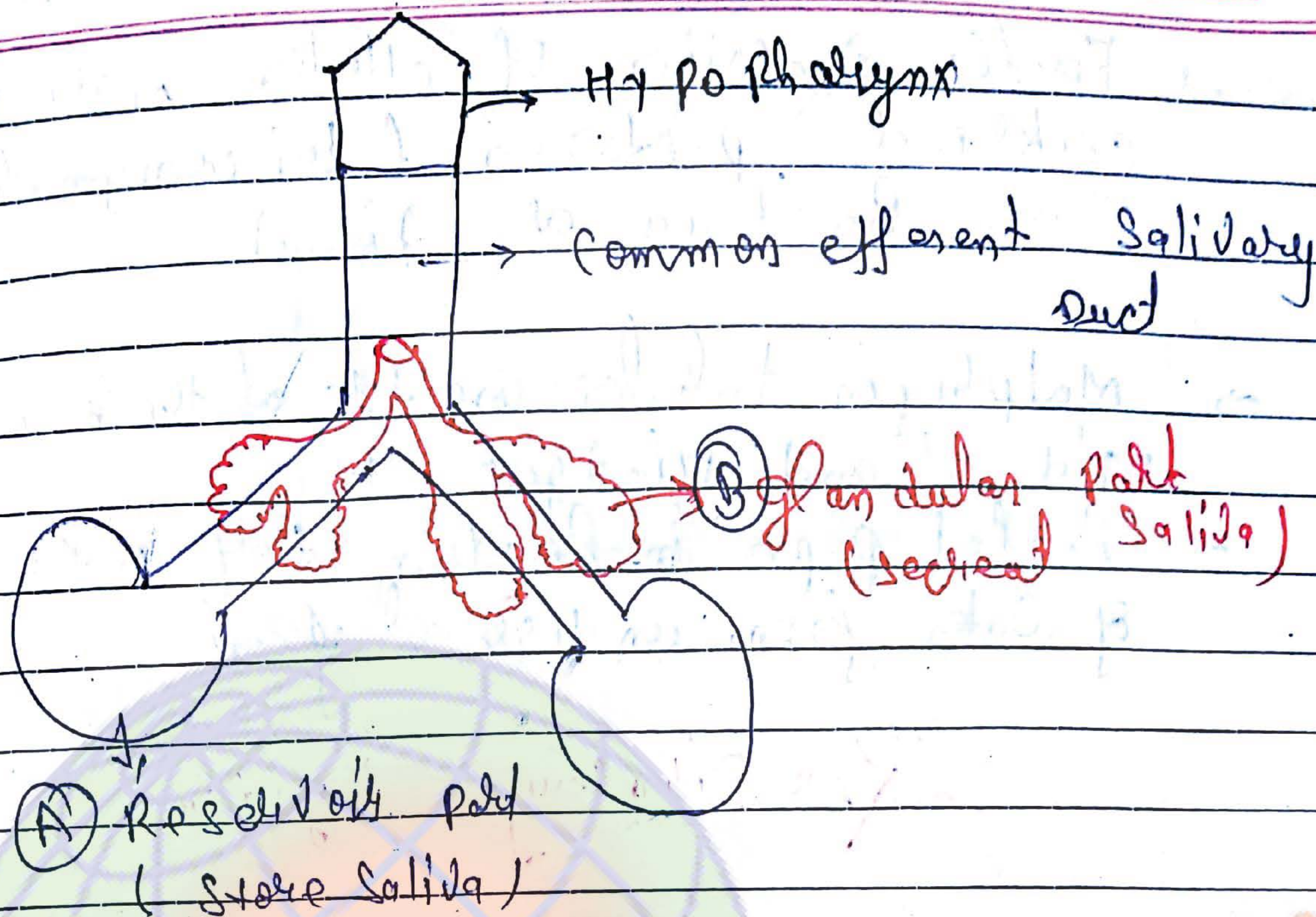
→ In cockroach coelom is true coelom but highly reduce and present around gonads.

→ The cavity present around gonads is gonocoel.



Malpighian Tubules
200-150

3 Hind Gut
Proctodaeum
Ectodermal



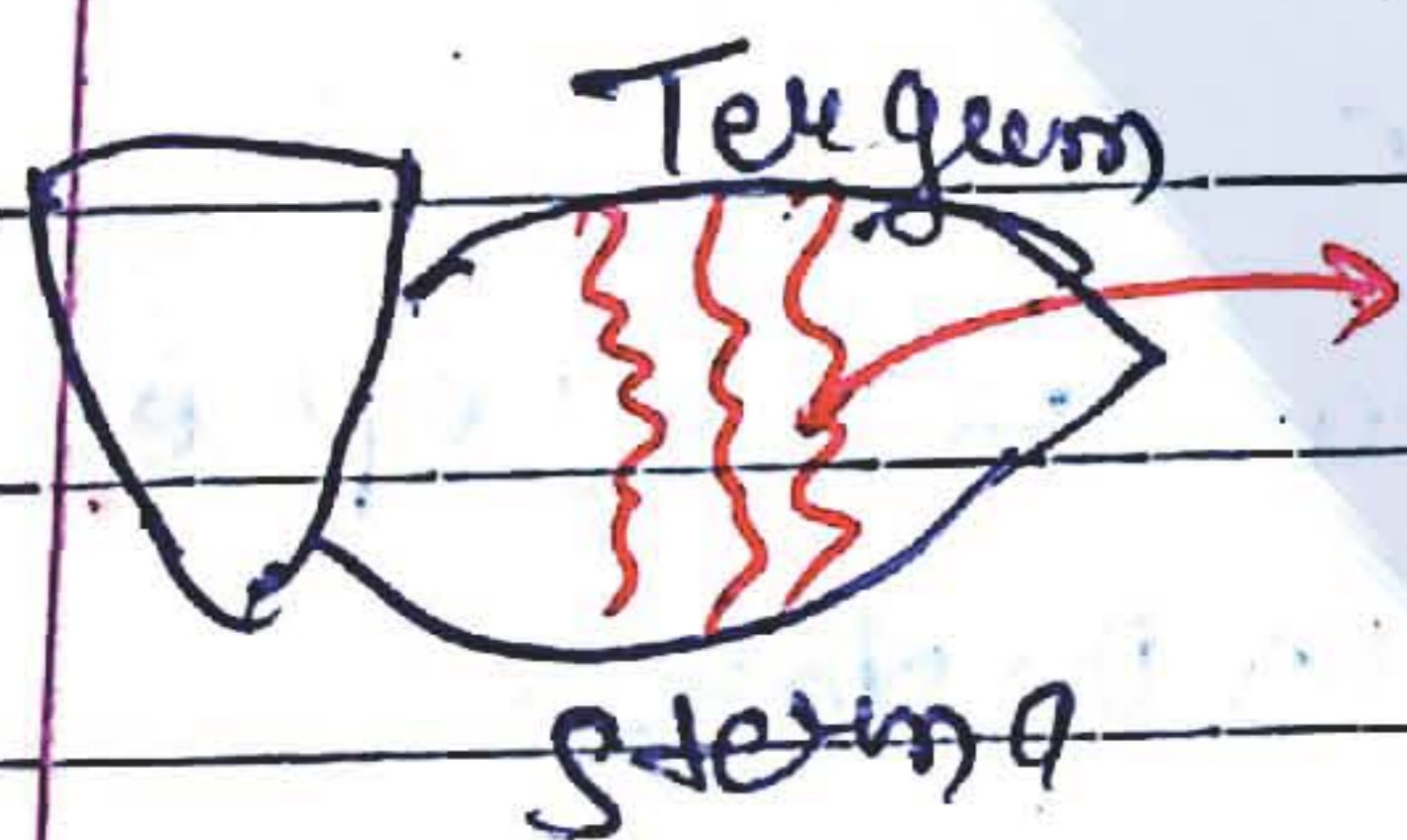
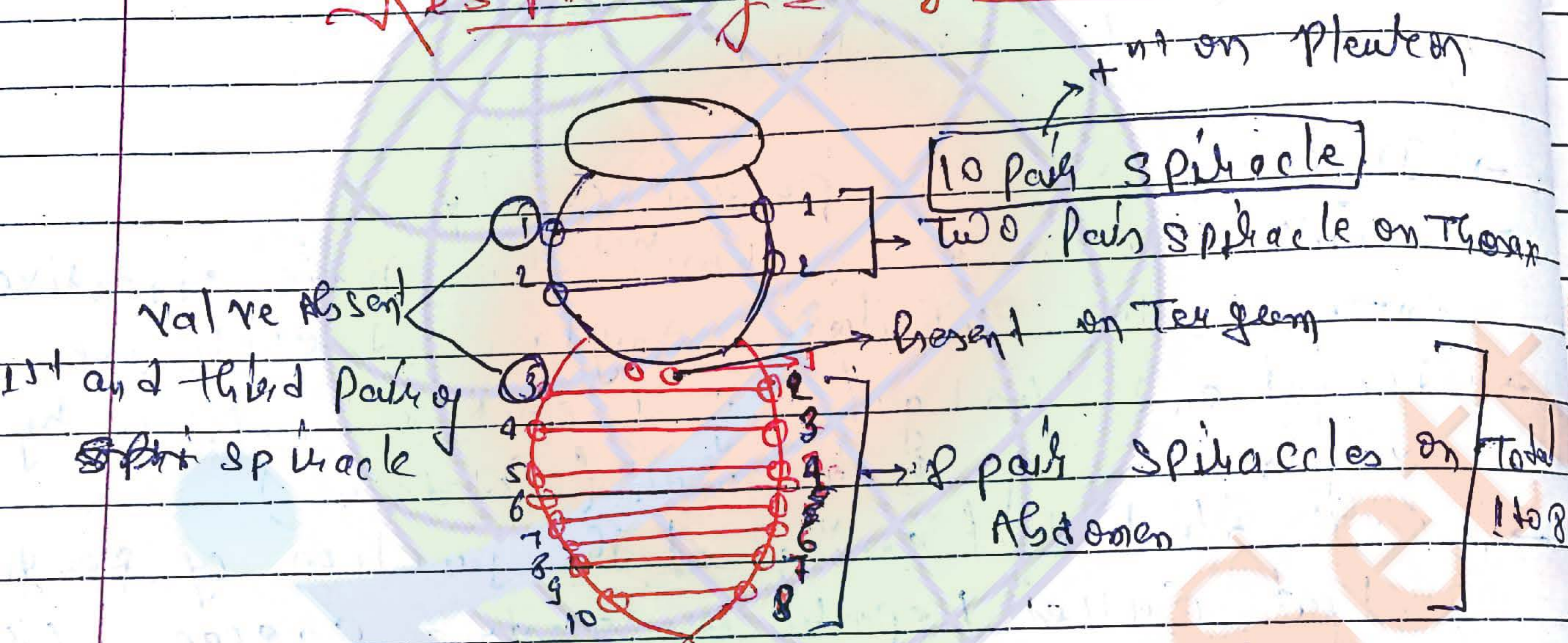
- Digestion starts in preoral cavity
- Saliva of cockroach contains ^{only} carbohydrate digestive enzymes like cellulase, Amylase and chitinase
- Foregut and hindgut of cockroach form by the invagination of body wall (Endoderm)
- 6-8 blind duct present at the junction of foregut and midgut called hepatic or gastric caecae, which release complete digestive juice.
- Maximum digestion in peripalata in crop and digestion complete in the midgut on mesoderm
- Site of food for complete digestion & absorption of food, mesoderm and midgut

→ Peritrophic Membrane - It is secreted by wall of caecid around the food in midgut. It is made up of glycongen and protein and permeable for digestive enzyme and digested food, it protects the wall of midgut / mesoderm from the friction of hard food particles.

→ For the Digestion of cellulose in the Midgut of cockroach procton (termitomypha) and some bacteria are found.

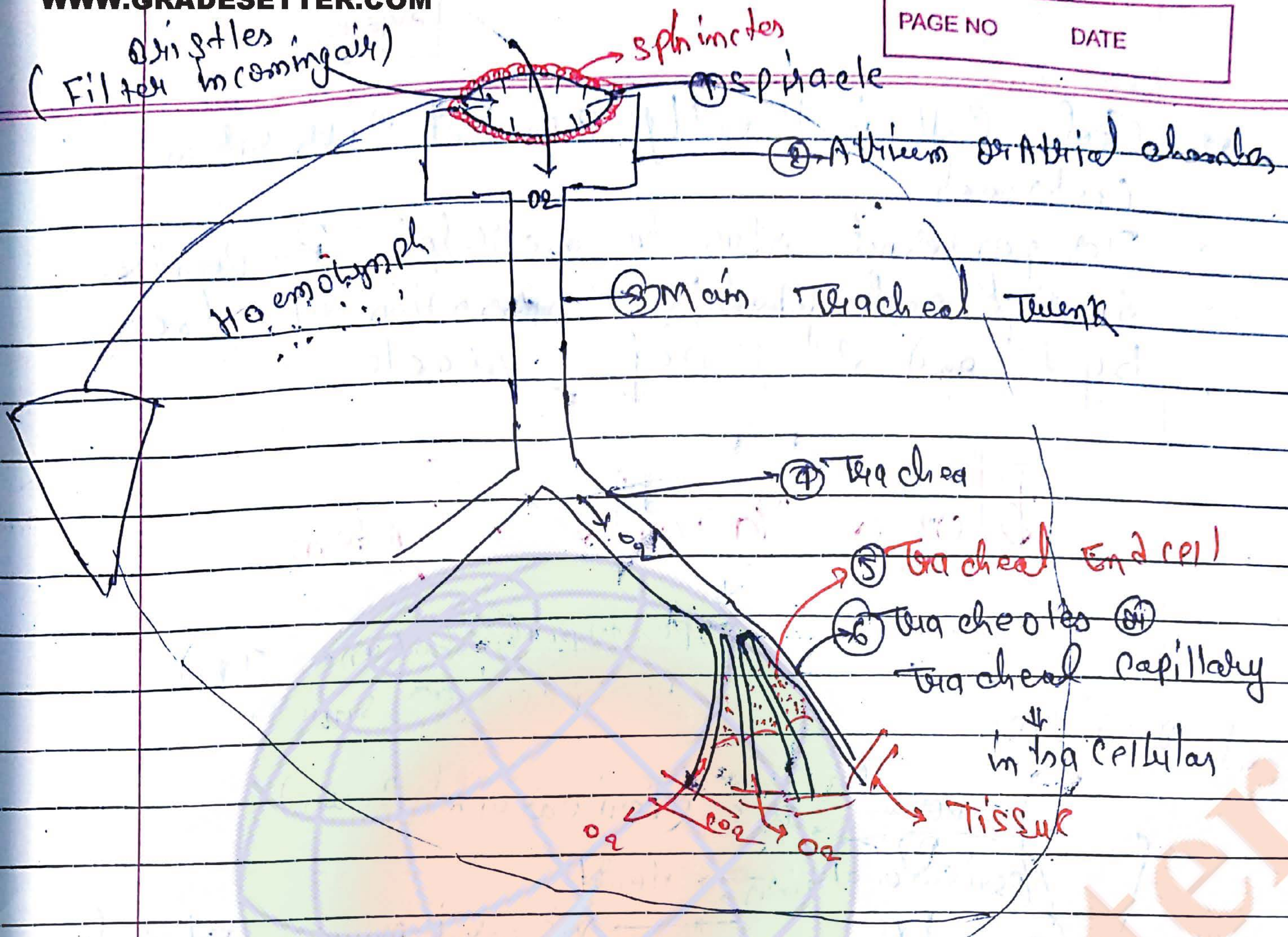
→ Malpighian tubules are the at the junction of Midgut and hindgut.
 → Rectal pepsin in Rectum help in the absorption of water from undigested food.

Respiratory System



Tergosternal Muscles
 → Help in Respiration.

(Filter for incoming air)

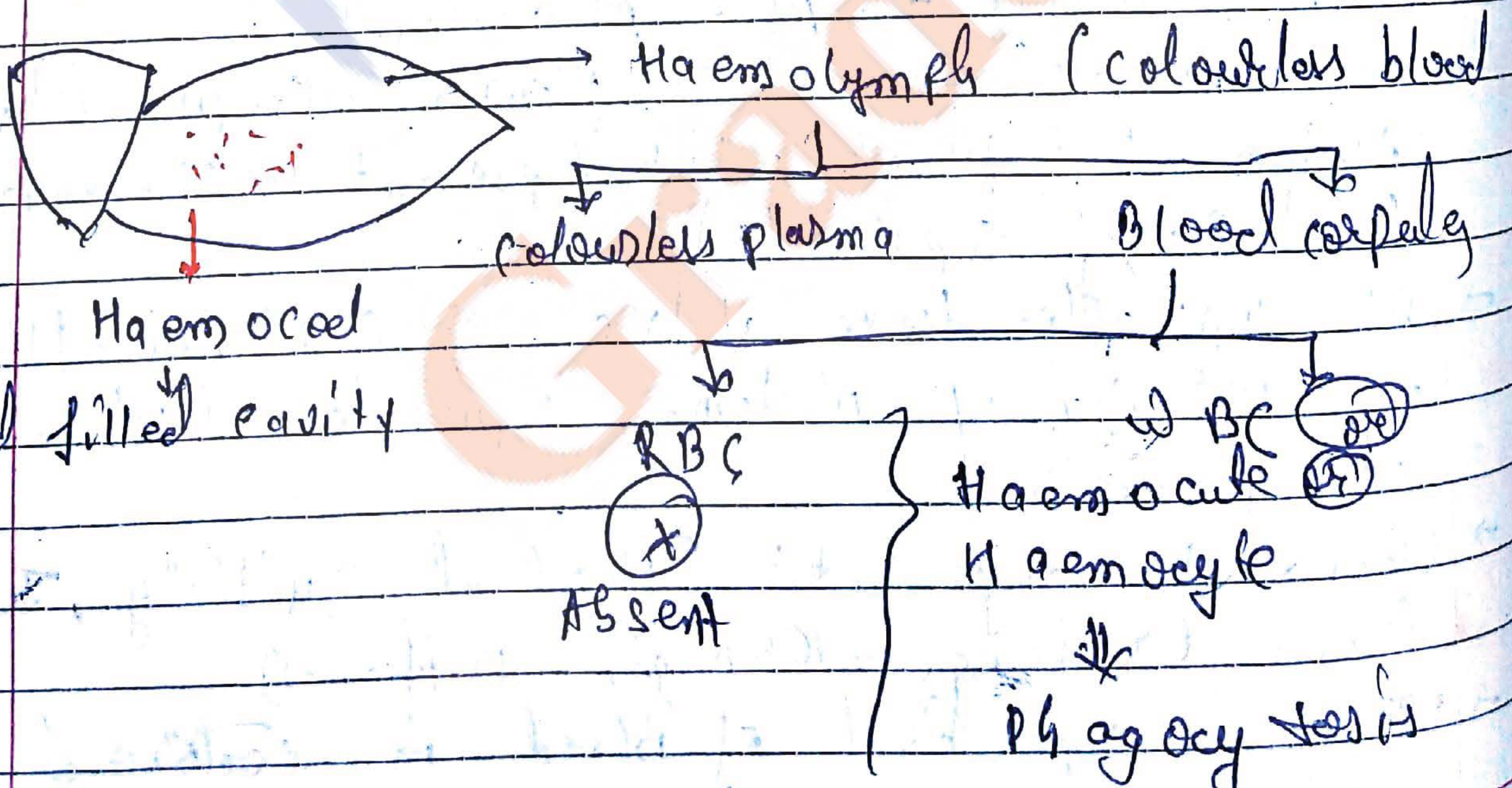
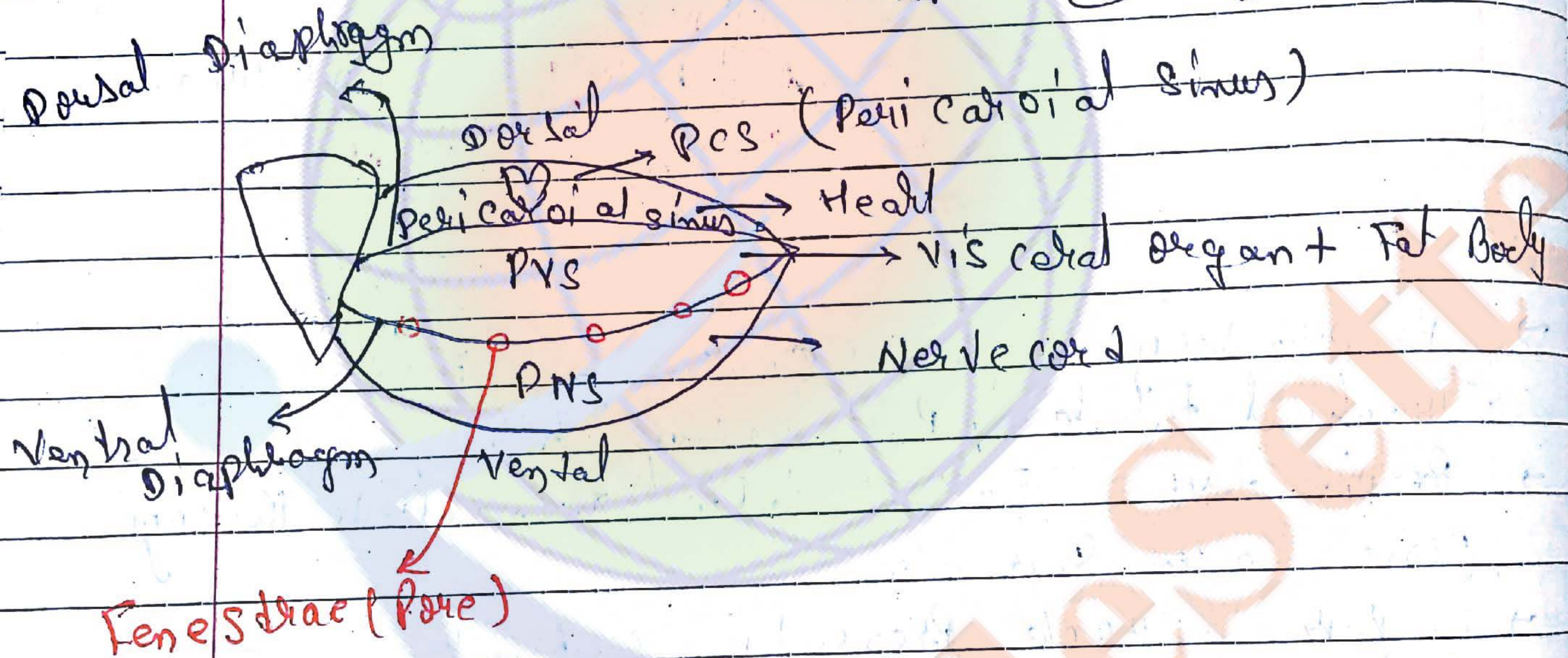


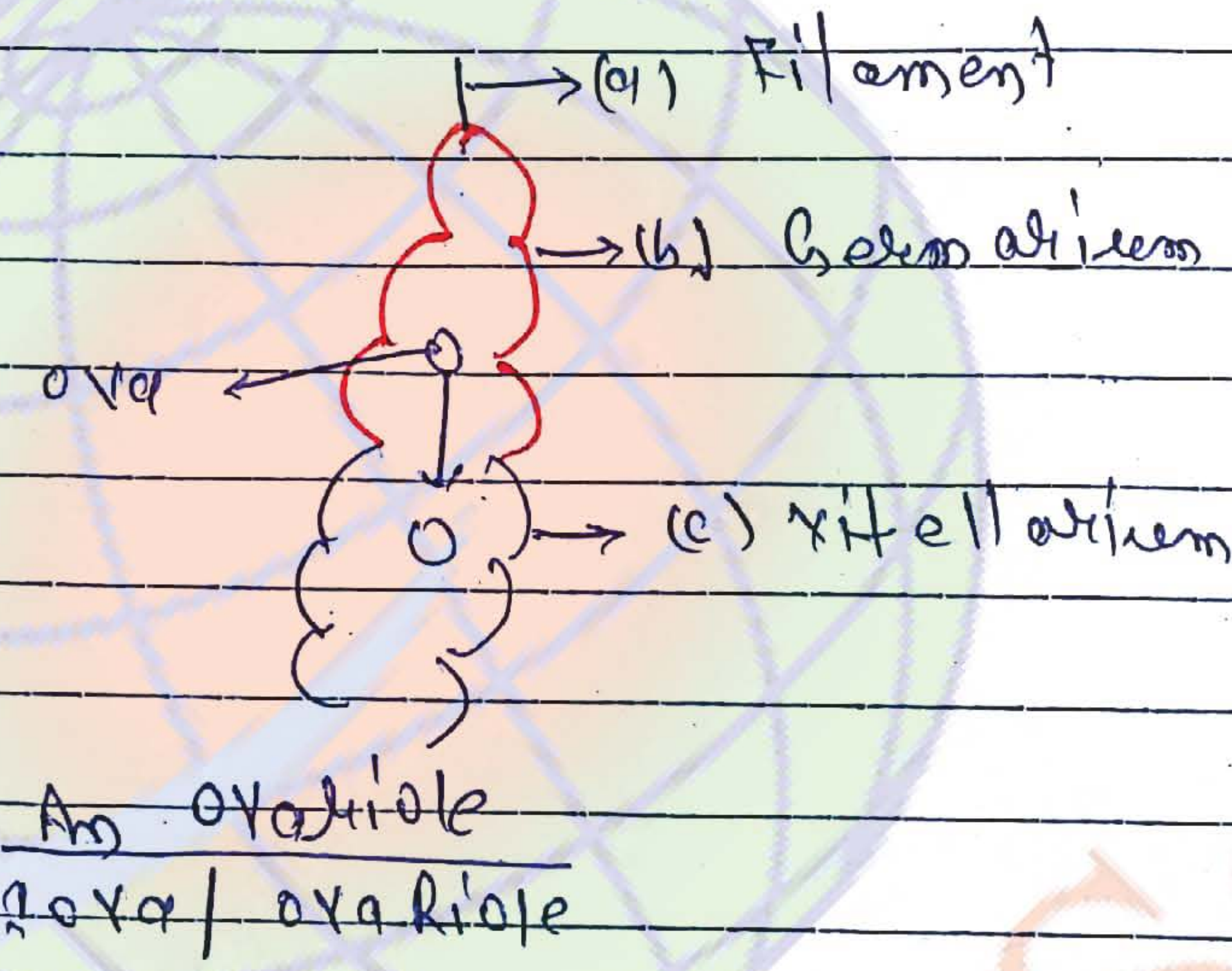
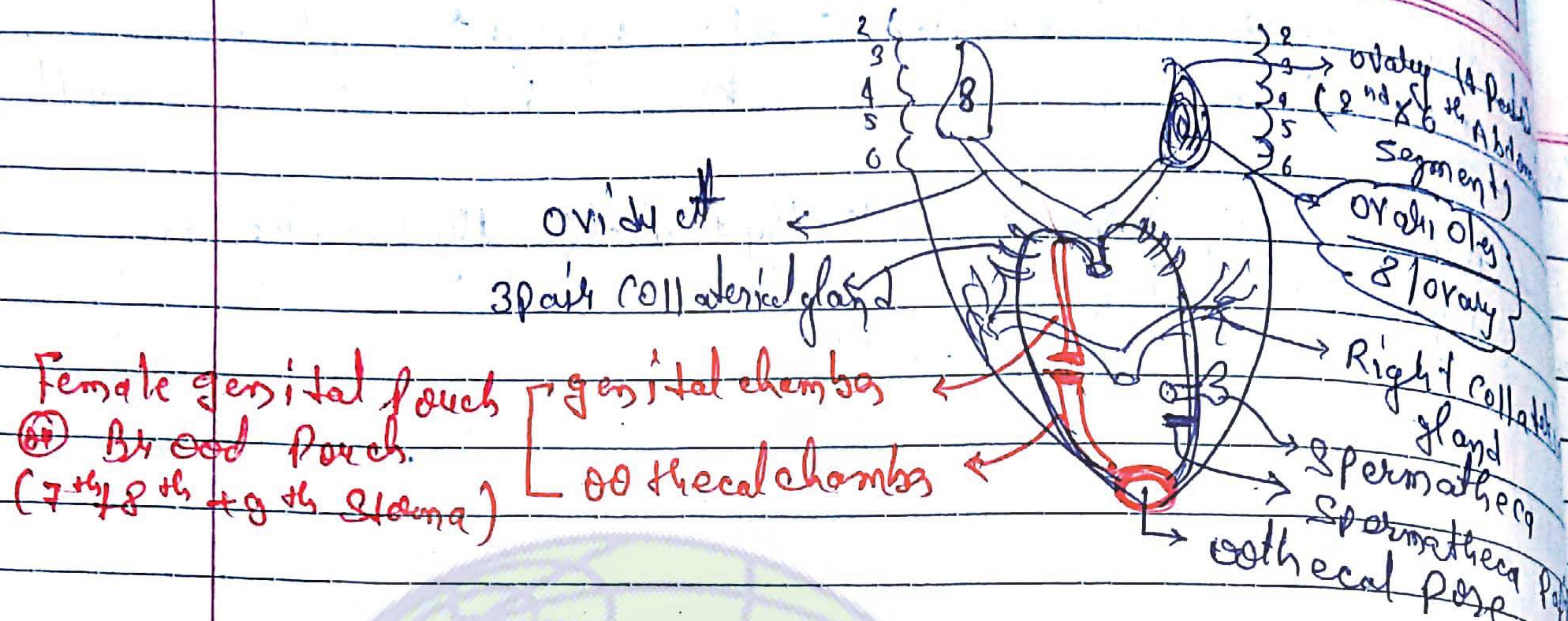
- Respiratory organ of Cockroach / Insects :-
Tracheal tubule / Respiratory tubules
- ~~Respiratory~~ Tracheal tube open outside through pores called spiracles
- 10 pair Spiracle present in cockroach (2 pair thorax + 8 pair Abdomen)
- All spiracles present on pleurae except 1st pair of Abdomen spiracle which is present on Tergum. (3rd pair of spiracle)
- All spiracles have valve except 1st pair of thorax and 1st pair of Abdomen spiracle (1st and 3rd pair of spiracles)
- Gases Exchange Site:- Tracheal capillary, Tracheoles
Gases Exchange through Diffusion.
- There is No Pool of Blood in cockroach in Respiration.

- Each cell is directly in contact with air in cockroach
- Terrestrial muscles are helping Respiration
- In cockroach mainly Respiration take place by 1st and 3rd pair of spiracle

Blood Vascular System

↓ open type (or) lacunar type
 ↳ space (or) sinuses





- In female cockroach 16 ova matured at a time.
- 8 long tube + ve per ovary known as ovarioles.
- An ovarioles so chain of developing ova
- Female genital pouches Blood pouch is form by 7th + 8th + 9th sterna
- 7th → Form Floor of pouch
- 8th + 9th → Form wall & Roof.
- In the genital chamber of the genital pouch 3 structure open, &
- (i) Female gonopore
- (ii) collateral gland

(iii) Spermatheca

→ Female external genitalia these are also known as Female gonapophyses.

→ Ovipositor are cylindrical flat, help to arrange ova in sequence

→ Collateral gland forms ~~ootheca~~ ootheca

→ No. of ootheca produce by a female cockroach in its life span 9-10

→ Size of ootheca → 8mm or 3/8 inch

→ Each ootheca contain 14-16 Fertilised egg.

→ Ootheca formation is a adaptation for water conservation

→ Development time in ootheca → 4-8 week

→ Type of Eggs insects or cockroach

i) ~~centroth~~ Centrolacithal (Yolk is concentrated in central)

ii) Megalacithal (am seen of yolk is more)

Type of Cleavage in insects or cockroach

i) Superficial (Peripheral)

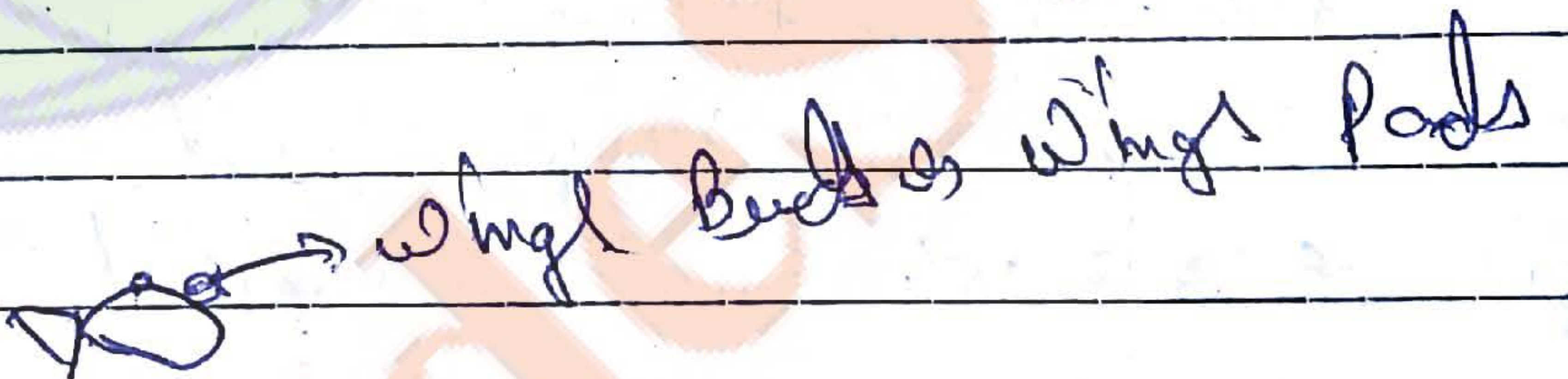
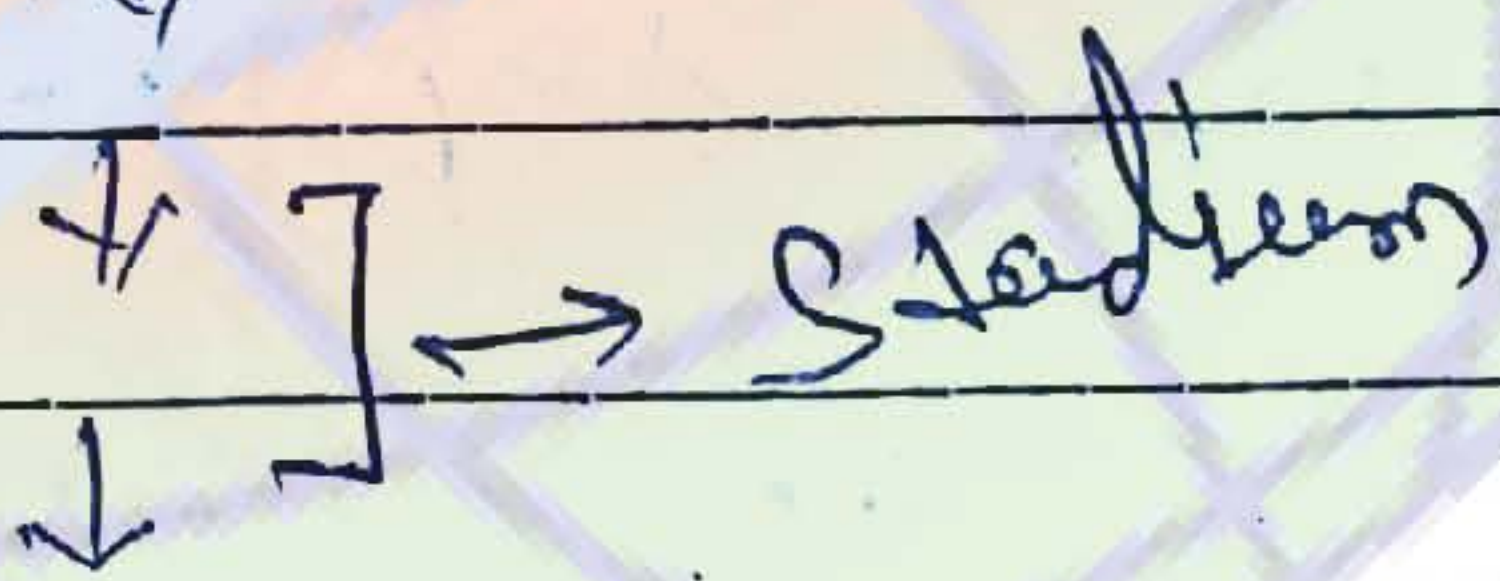
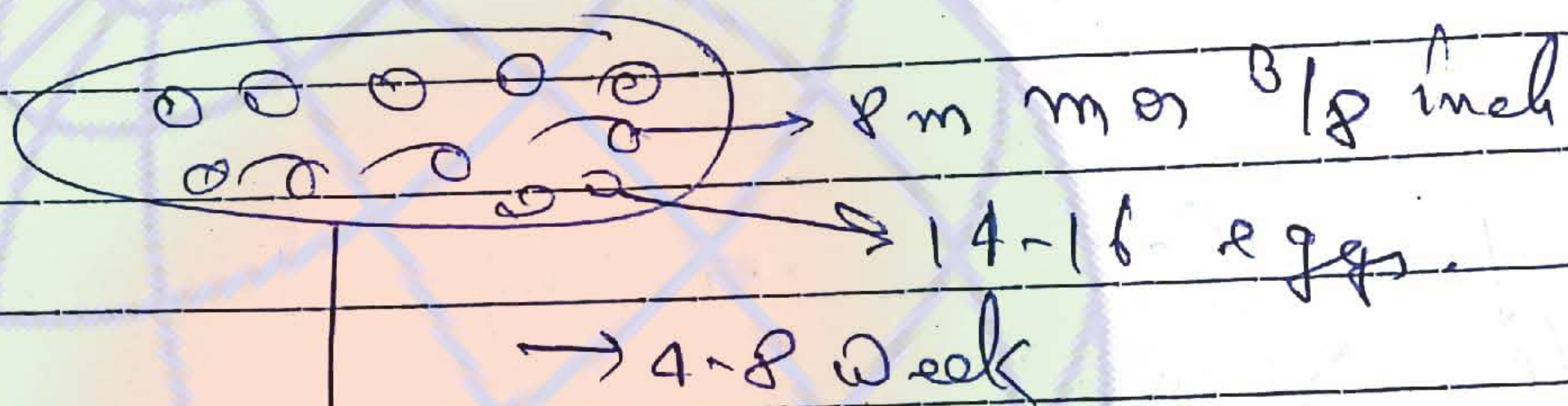
+
Mesoblastic (in complete cleavage)

WA →

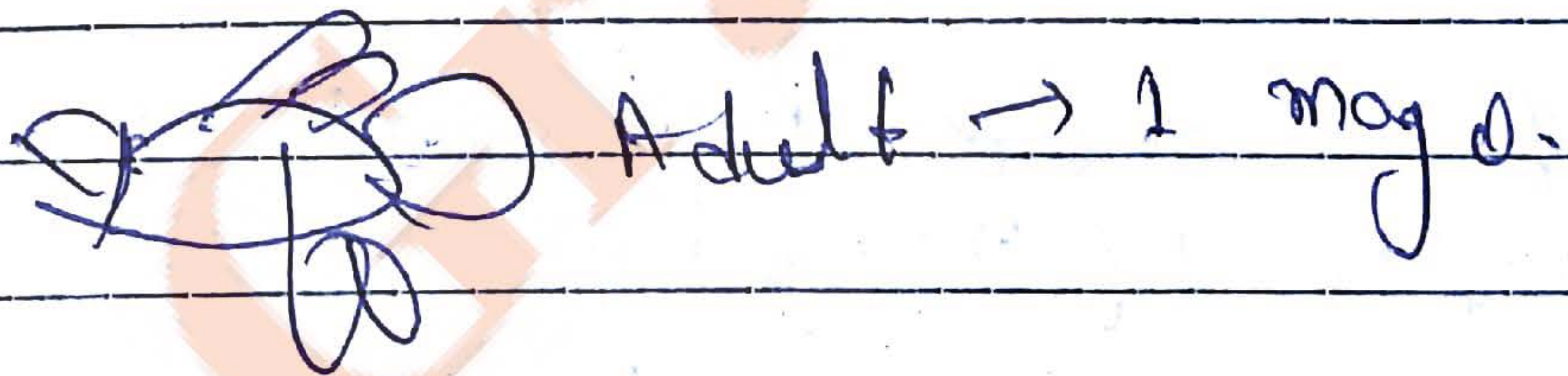
Type of Metamorphosis → Incomplete metamorphosis (larva absent)

→ nymphs look similar to adult (cock) each different size, wings.

→ In nymph - wings buds or wings pads during next to last nymphal stage



↓ 13



Phylum:- Annelida
 Class:- Oligochaeta
 Order:- Terricola
 Genus:- Pheretima
 Species:- Posthuma

Discover:- Dr. K.N. Bahl

Species:-

North Indian:- Pheretima & Eutyphelus

South Indian:- Draecida & Megalocolea (largest 13m)

American & European:- Lumbricus

Two common Earthworms found in India are Pheretima and Lumbricus

Habitat:- Nocturnal

Active Night Due to sensitive to light
 -ve photophobic

Fossorial - lives in burrow during (daytime)
 omnivorous

Maximum Earthworm found in garden soil^{upper layer} due to

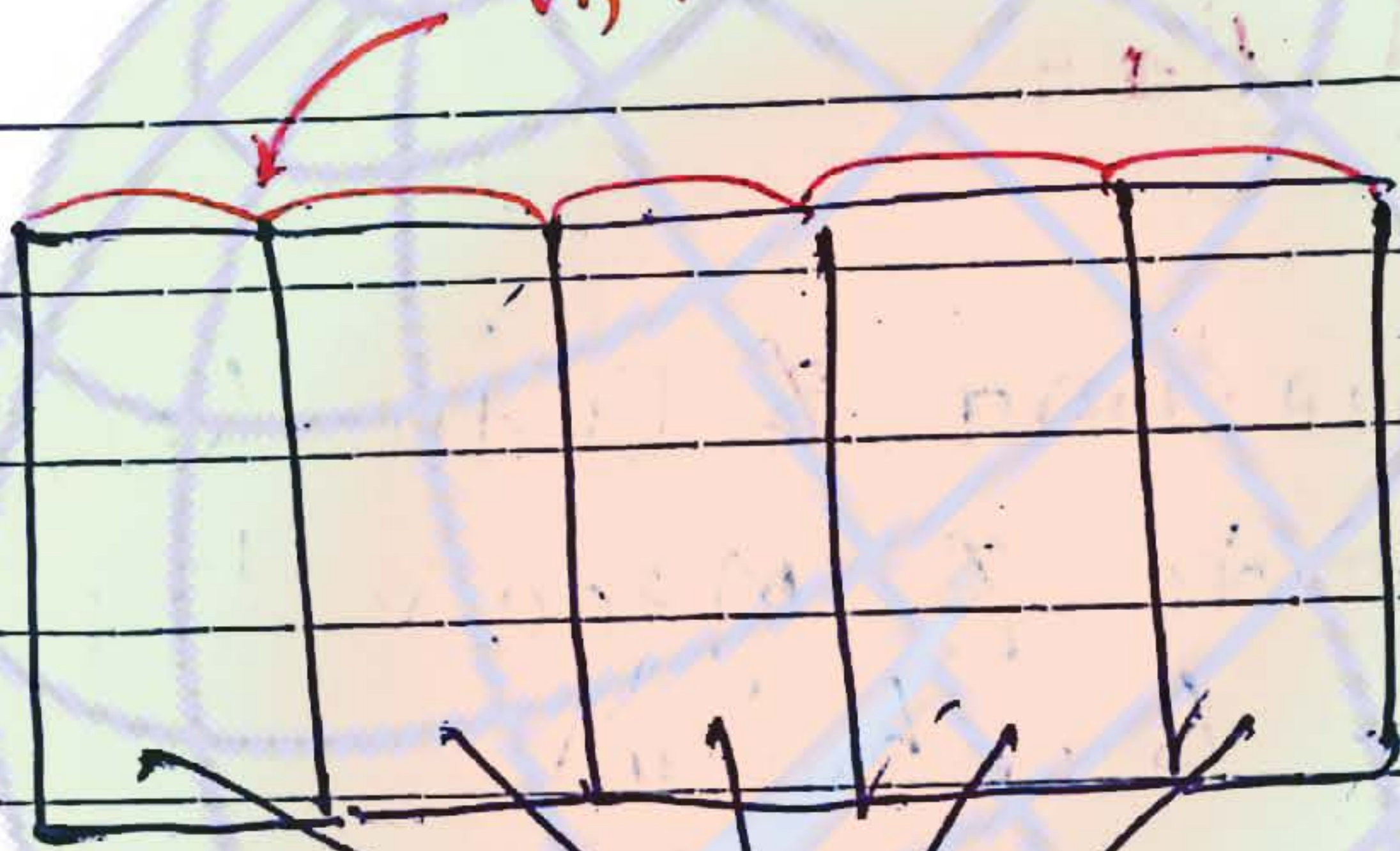
- i) its food - humus (Dead & Decaying matter mix with soil)
- ii) Cutaneous Respiration
- iii) If Earthworm will kept in Day soil, it will die due to Asphyxia

Morphology

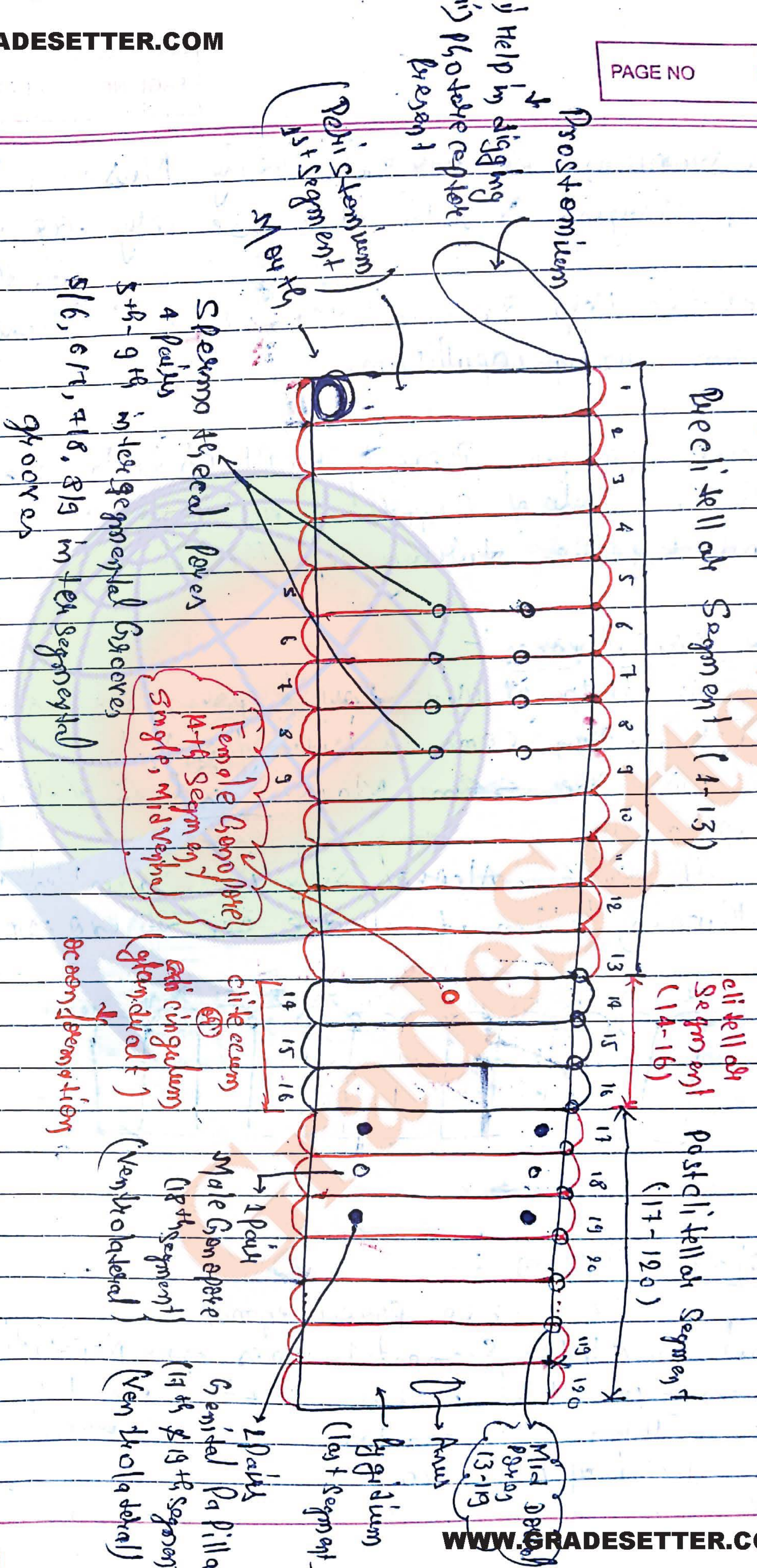
Dorsal side of Earthworms can be identified by the presence of a dark medium mid dorsal line which is its dorsal blood vessel.

Ventral side presence of genital apparatus.
 Anterior side " " clitellum

1m inter segmental groove



100-120 Metamer segments



- Prostomium is dorsal fleshy muscular lobe over hanging mouth it is sensory organ
- with the help spermathecal pores to transfer sperm during copulation
- Female gonopore present on 1st clitellar segment (14th)
- with the help of genital papilla to Earthworm bind together during copulation

Mid dorsal pores:-
 with the help of mid dorsal pores stemial fluid of Earthworm come outside from body surface and make the skin moist which help in Respiration.
 If salt, sugar, Alcohol solution sprinkled on Earthworm then it will die due to exosmosis.



Nephridi pores

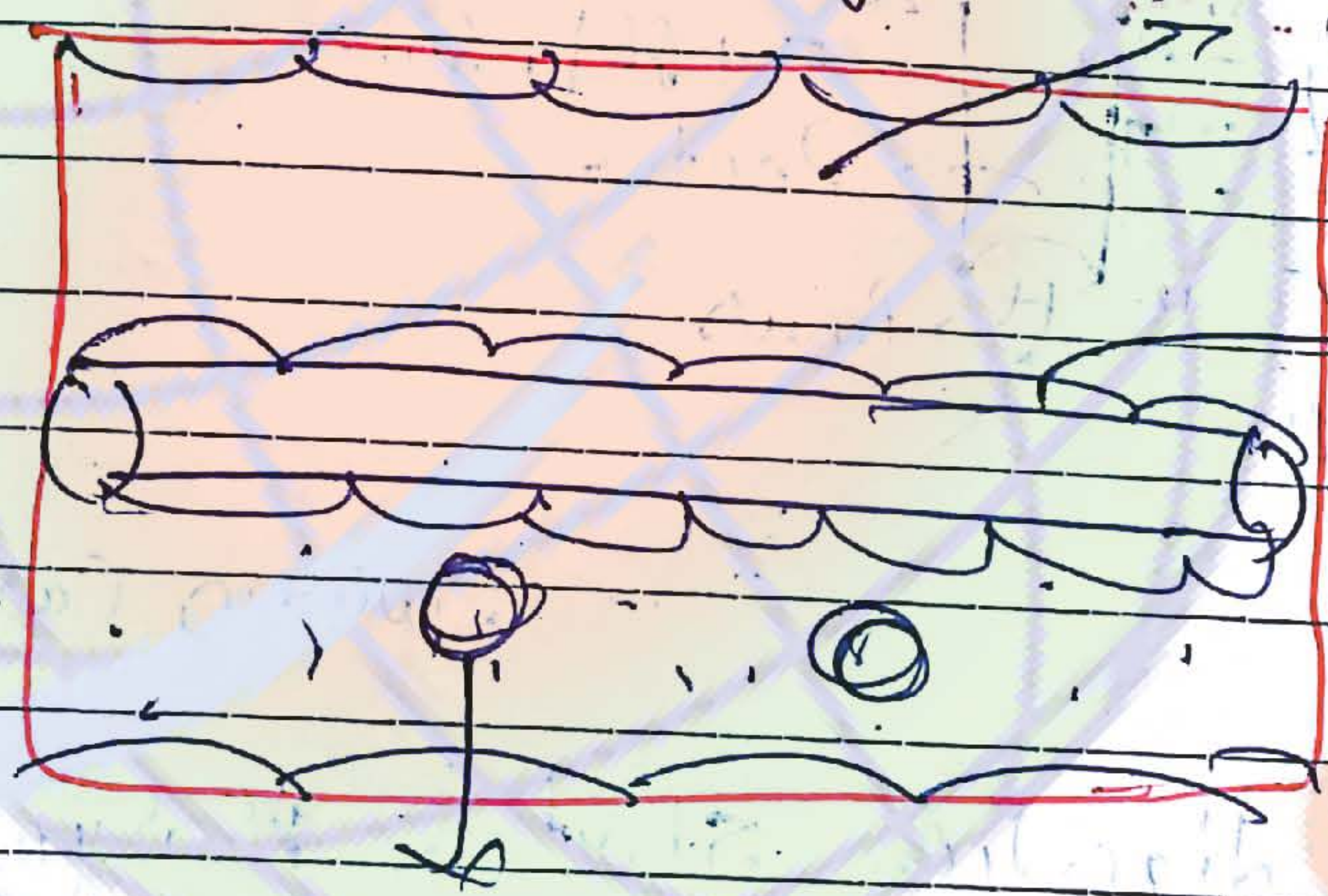
↳ 200 - 250 pores/segment

But on Clitellar segment 10 times more Nephridi pores are there that is 2000 - 2500 per Clitellar segment so, Clitellar segment is one known as forest of Nephridia

of coelomic fluid is milky and alkaline
 → In the ~~sea~~ coelomic fluid of earthworm yellow cell
 on chl or agogen cells are present which store
 the food and help in excretion. so it is
 an alogous to liver of vertebrate.

→ In Earthworm septa are present betⁿ two
 segments septa are also known as intersegmental
 septa are coelosepta.

→ In this pores septal pores help in the
 transfer of coelomic fluid betⁿ two segments.



Peristaltic peritoneum
 → visceral peritoneum

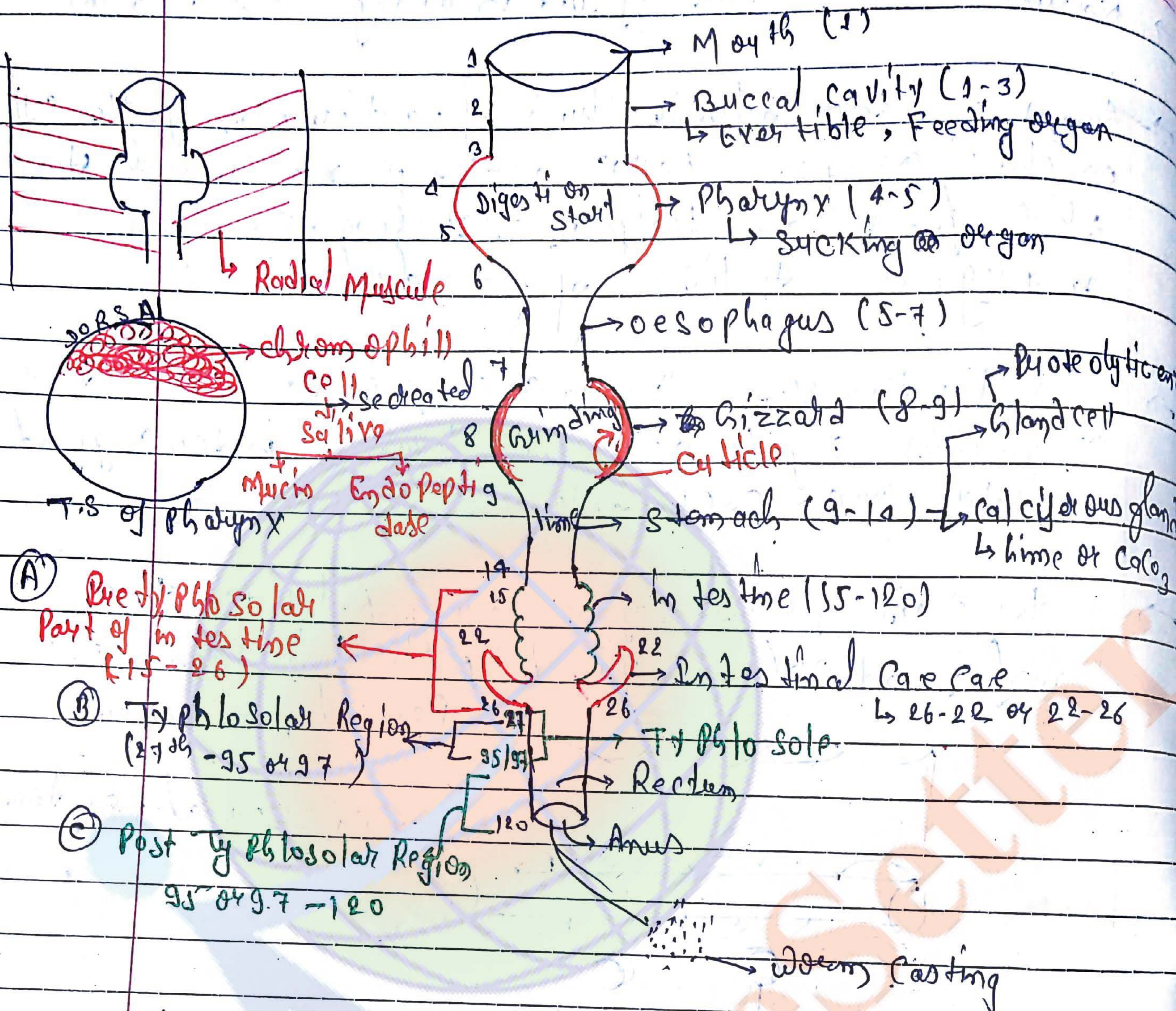
yellow cell or chlorogen cell

Locomotion

- ① Coelomic fluid: Work as hydrostatic skeleton
- ② Mucus: To move on smooth surface.
- ③ Setae
- ④ Muscle layer. CML: Thin + elongate
 LML: Thick + short.

→ In Earthworm during locomotion 1 segment
 contract at time

→ Contraction wave produces locomotion



(A) **Protyphlosolar**
Part of intestine (15-26)

(B) **Typhlosolar Region**
(27-28 - 95 or 97)

(C) **Post Typhlosolar Region**
95 or 97 - 120

- In Earth worm digestion start in pharynx
- only protein digestion occurs in pharynx
- cuticle is only present in gizzard of alimentary canal of earthworm
- calciferous gland of stomach secrete calcium carbonate or lime, which neutralise humic acid of food.
- Site for complete digestion and absorption of food = intestine
- Absorption of food take place by typhlosole & villi

→ ~~one pair~~ Pair Blind duct Present from 26th to 22nd Segment or 22nd to 26th Segment in the final caecae, which Release complete digestive juice.

→ ~~High~~

→ Typhlosole :- In the Intestine of Earthworm Mid Dorsal internal longitudinal fold Present which is the unique character of Earthworm.
Location :- Typhlosole present after 26th Segment or from 27th Segment to last Except 23 to 25 Segments

↳ It increase Surface area for food Absorption

↳ Typhlosole are similar to villi of human intestine
Fecakal Matter of Earthworm is called worming casting

Respiration

→ Respiration through Moist skin

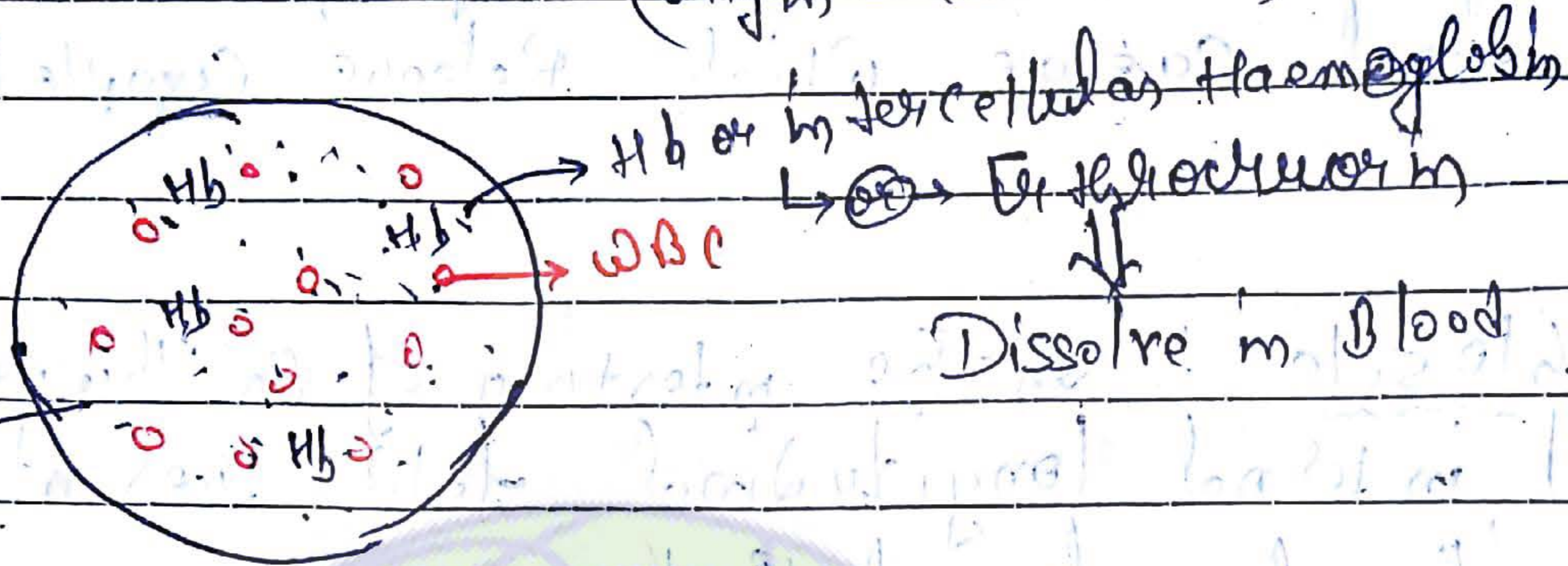
→ Atmospheric Oxygen dissolve in the moist skin and Diffuse in to the Blood

→ Generally aerobic Respiration but without oxygen Earthworm can live & survive 30 hours through anaerobic

Respiration

→ There is no Respiratory organ in Earthworm but it Respire.

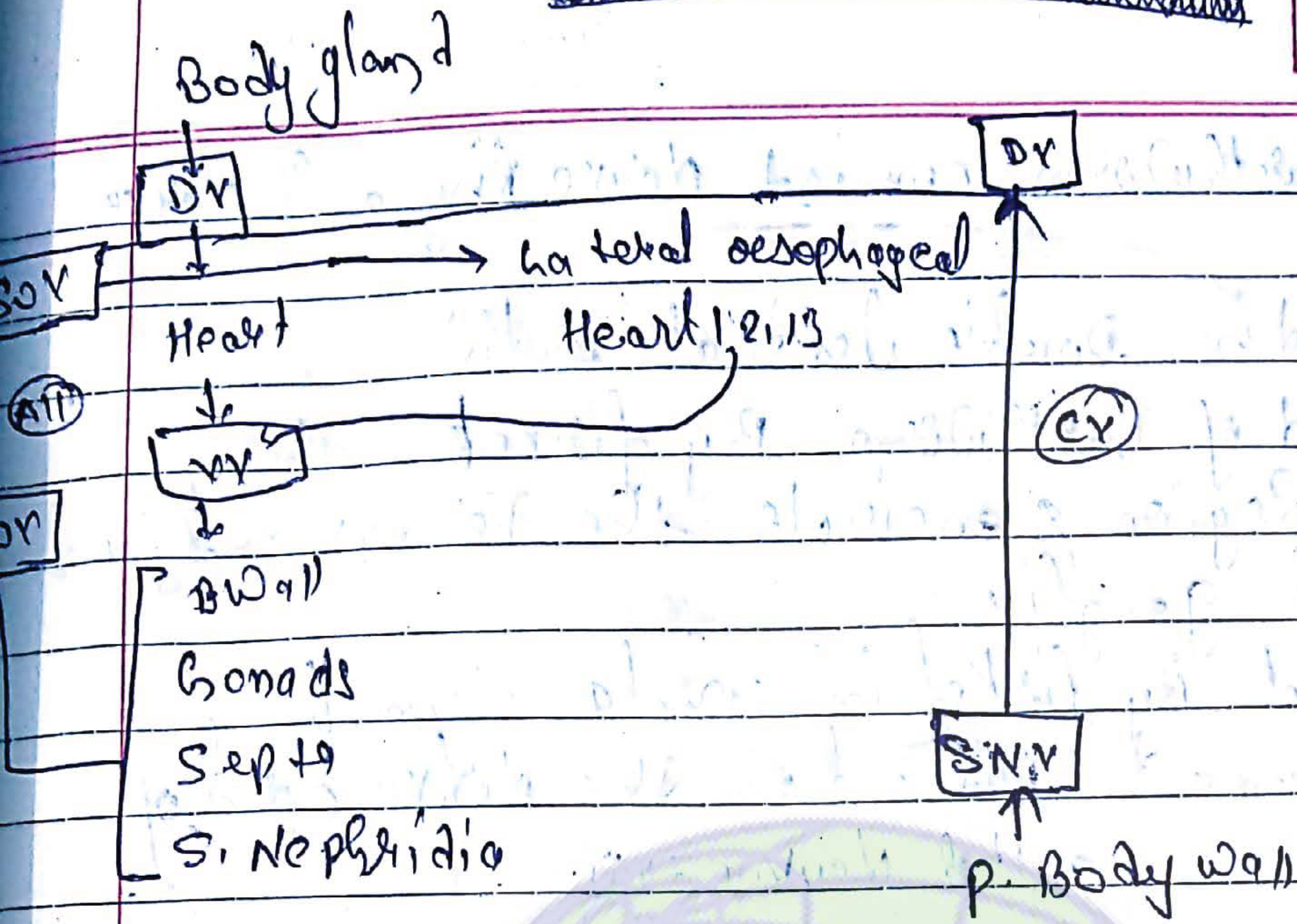
→ close type → True Blood vessel present
(origin Mesodermal)



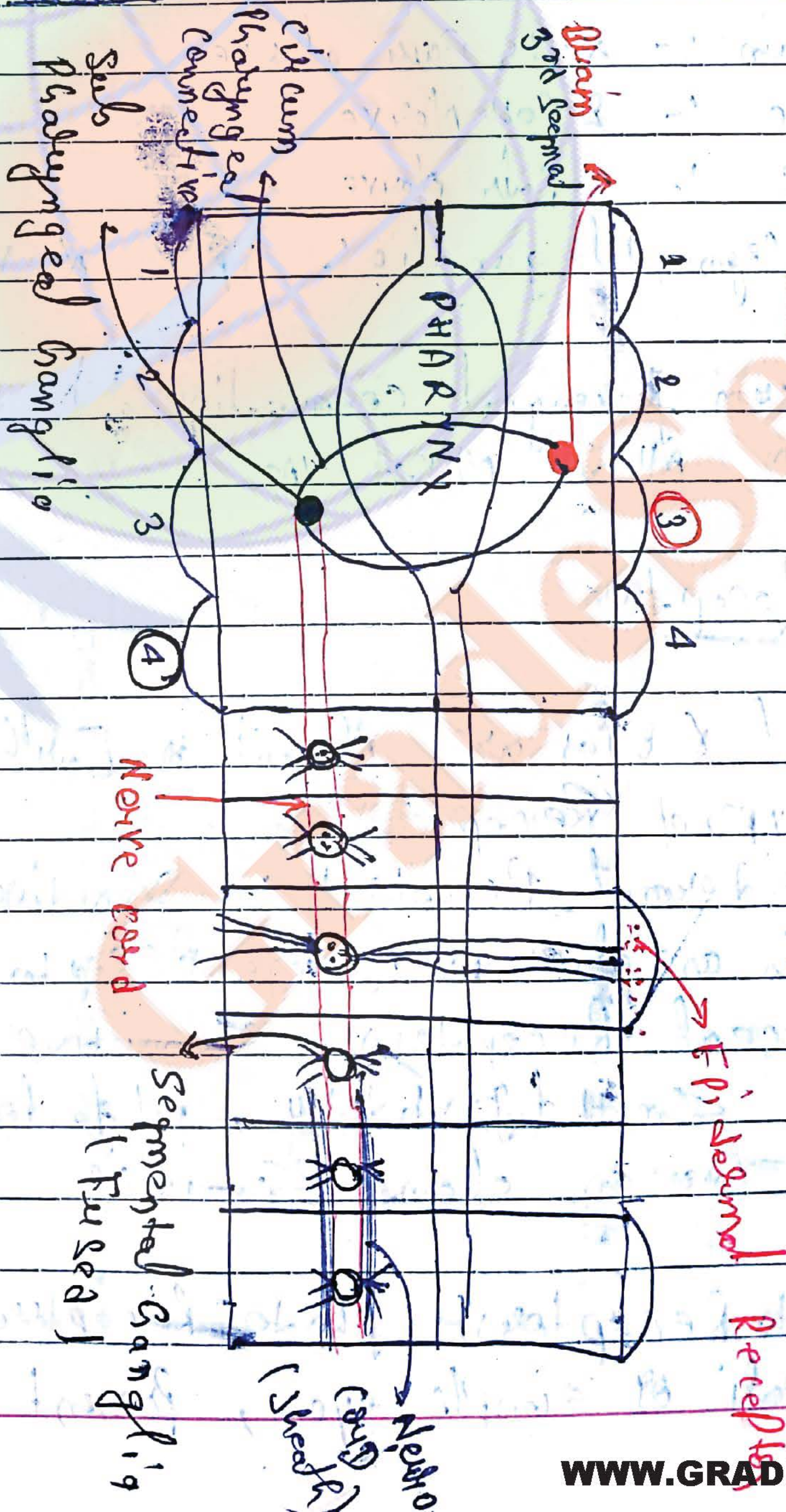
Dissolve in Blood Plasma

B.C Absent (chordate)

- circulation is close type in Earth worm because Blood vessel, heart, Blood capillary are present
- Blood is confined to Blood vessel in Earth worm
- RBC are Absent but Haemoglobin present and Haemoglobin are dissolve in Blood plasma



NERVOUS SYSTEM



Brain (3) Central Ganglia (4) Sub-oesophageal ganglia

- CNS of Earthworm consist Nerve Ring and Nerve cord
- Nerve cord is Double dorsal solid
- Nerve cord of Earthworms By fixated in the in teridial Region & encircle the Ferings and joined to several ganglia
- Nerve cord By fixated in 30-40 segment
- ~~Earth~~ integument present on the Nerve cord of Earth worm called Neurocord

→ PNS

Brain :- 8-10 pair Nerve

CPC :- 2 pair Nerve

SPG :- 3 pair Nerve

Each segmental ganglia :- 3 pair Nerve

Circumferential connective and subpharyngeal ganglia All are mixed type

Receptor:

→ Head & Eyes are absent in Earthworm

→ 3 Types of Receptors :-

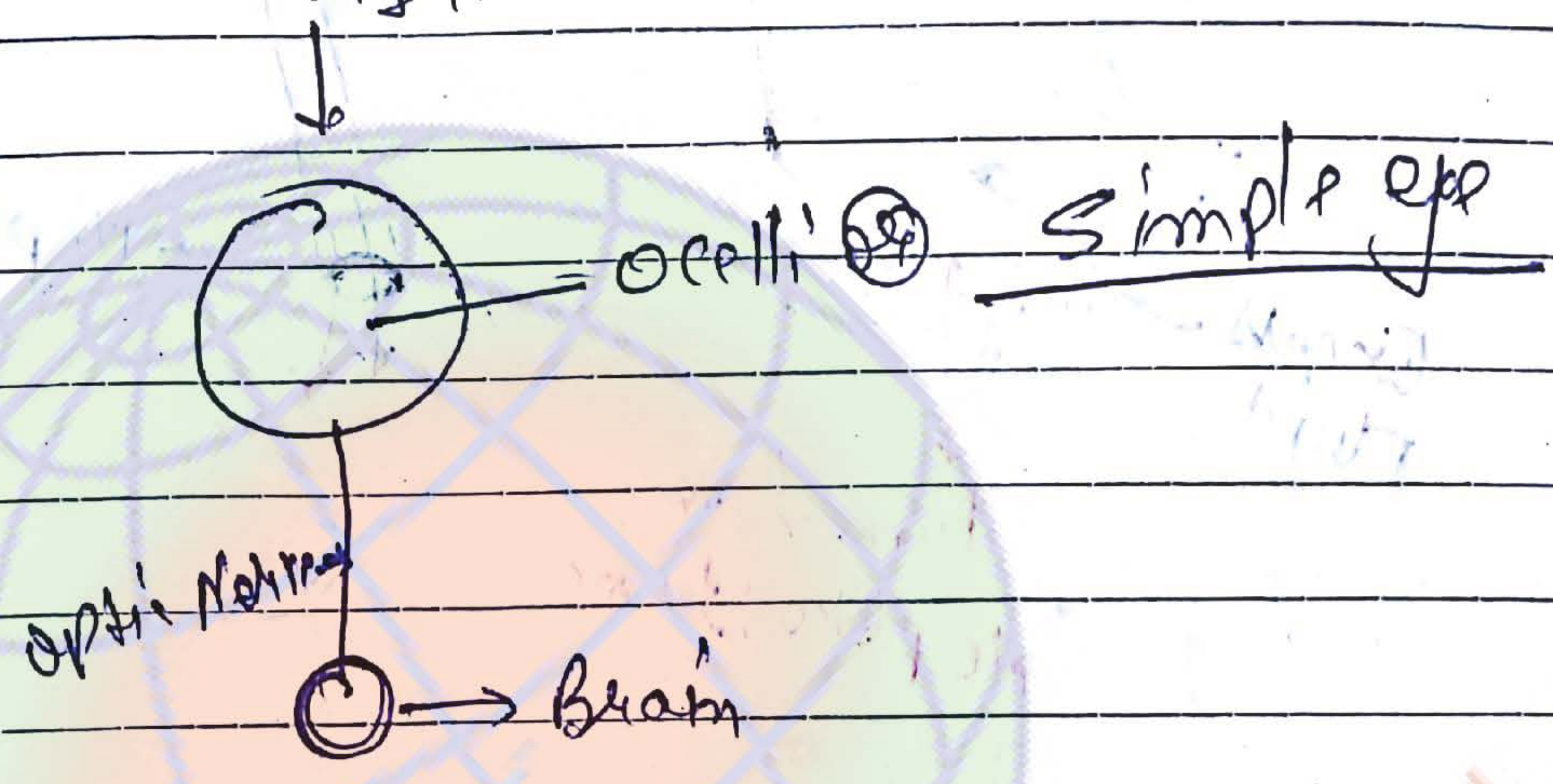
i) Epidermal Receptors :- Sensitive for touch this are also as Tingo Receptor

ii) Buccal Receptors Sensitive for taste and smell (gustatory, olfactory.) these receptors are known as chemo sensitive

iii) Photo Receptors photo receptors are also known as coli or simple eye, present on dorsal side

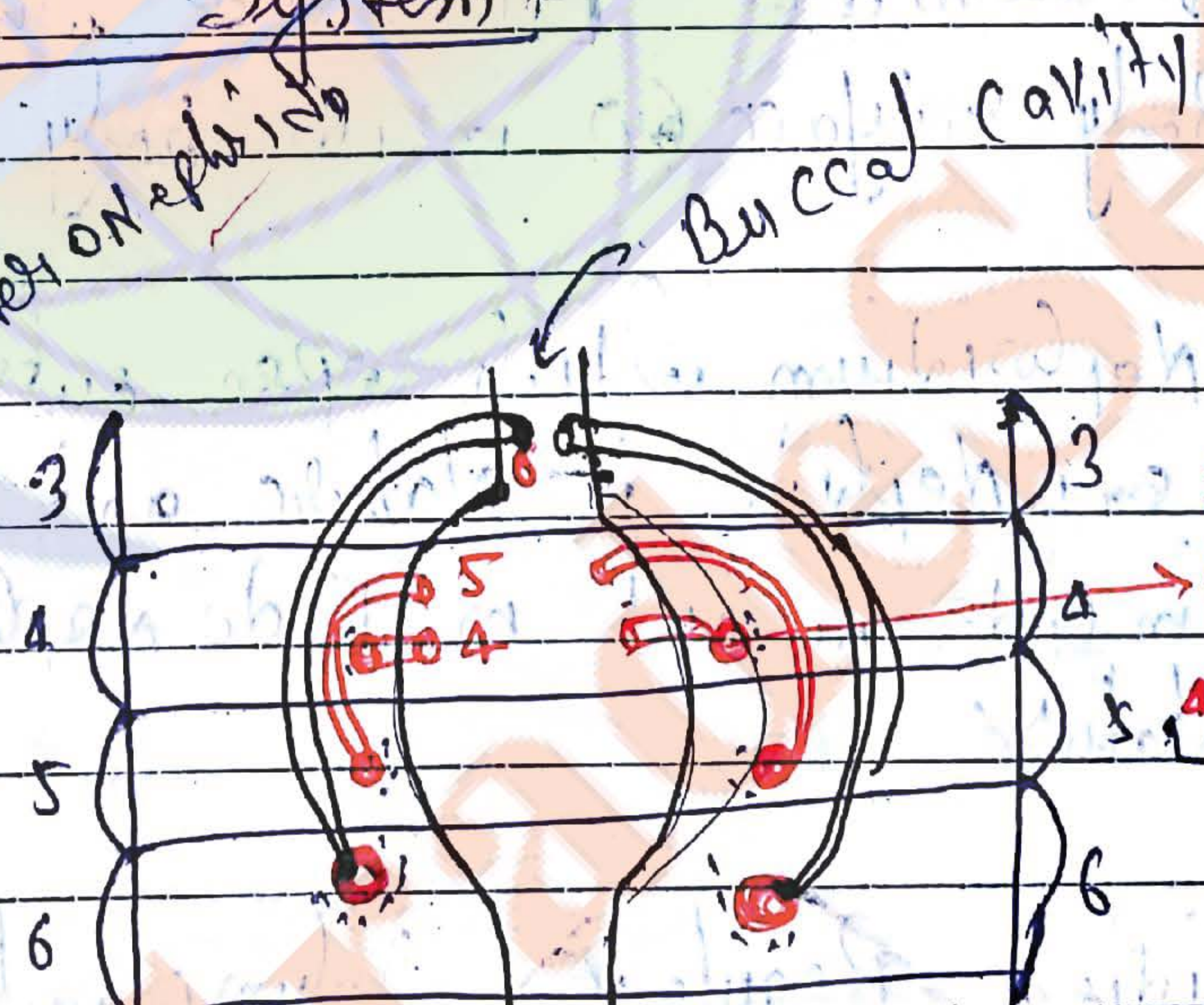
of Body.
 sensitive for light intensity
 Maximum Photo Receptor present on pro stomach and
 peristomium.

photo Receptor send the information of light intensity
 to Brain through optic Nerve



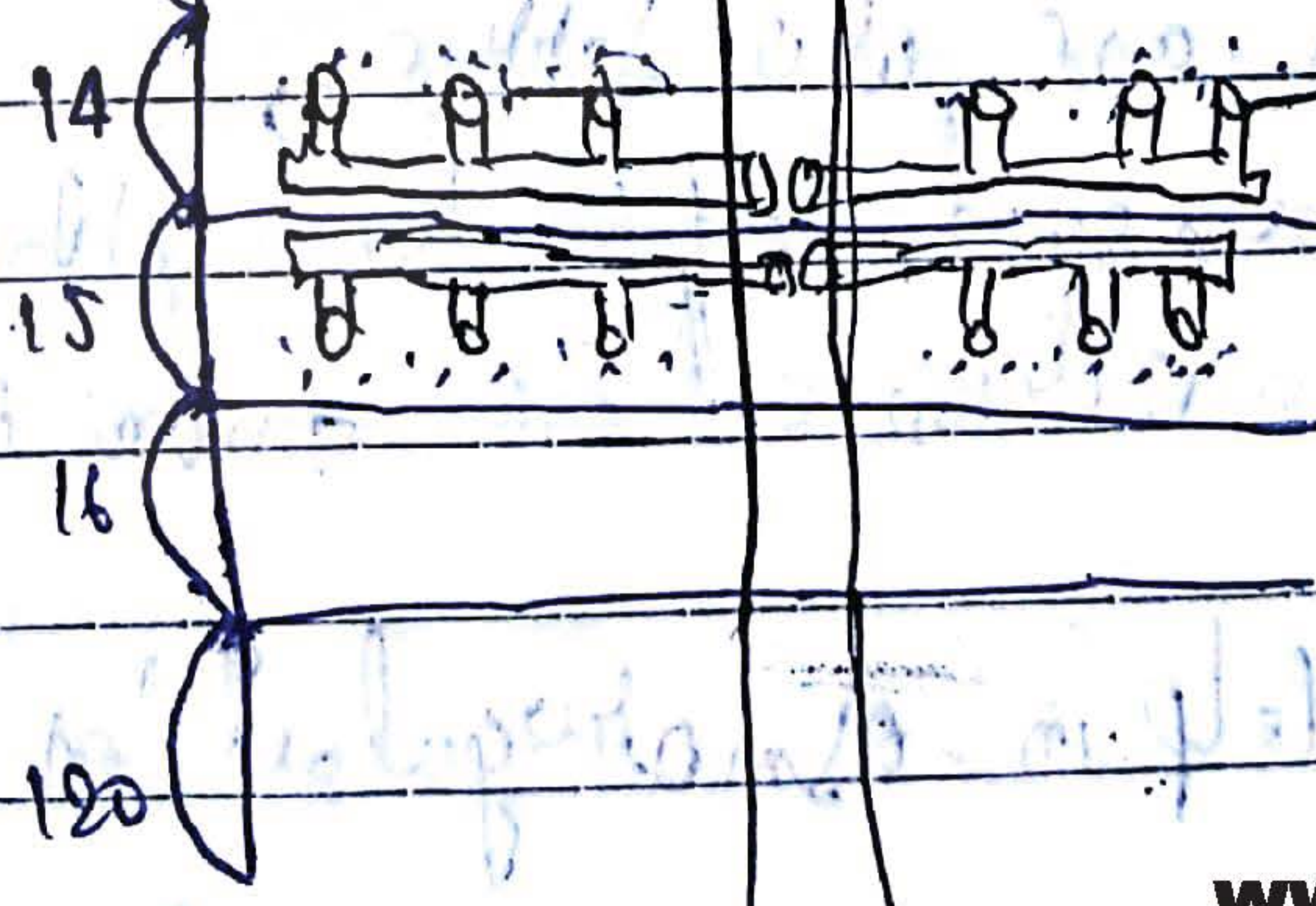
Excretory System

Sepetal Nephridia
 Pharyngeal Nephridia
 Endo Nephridia
 Nature



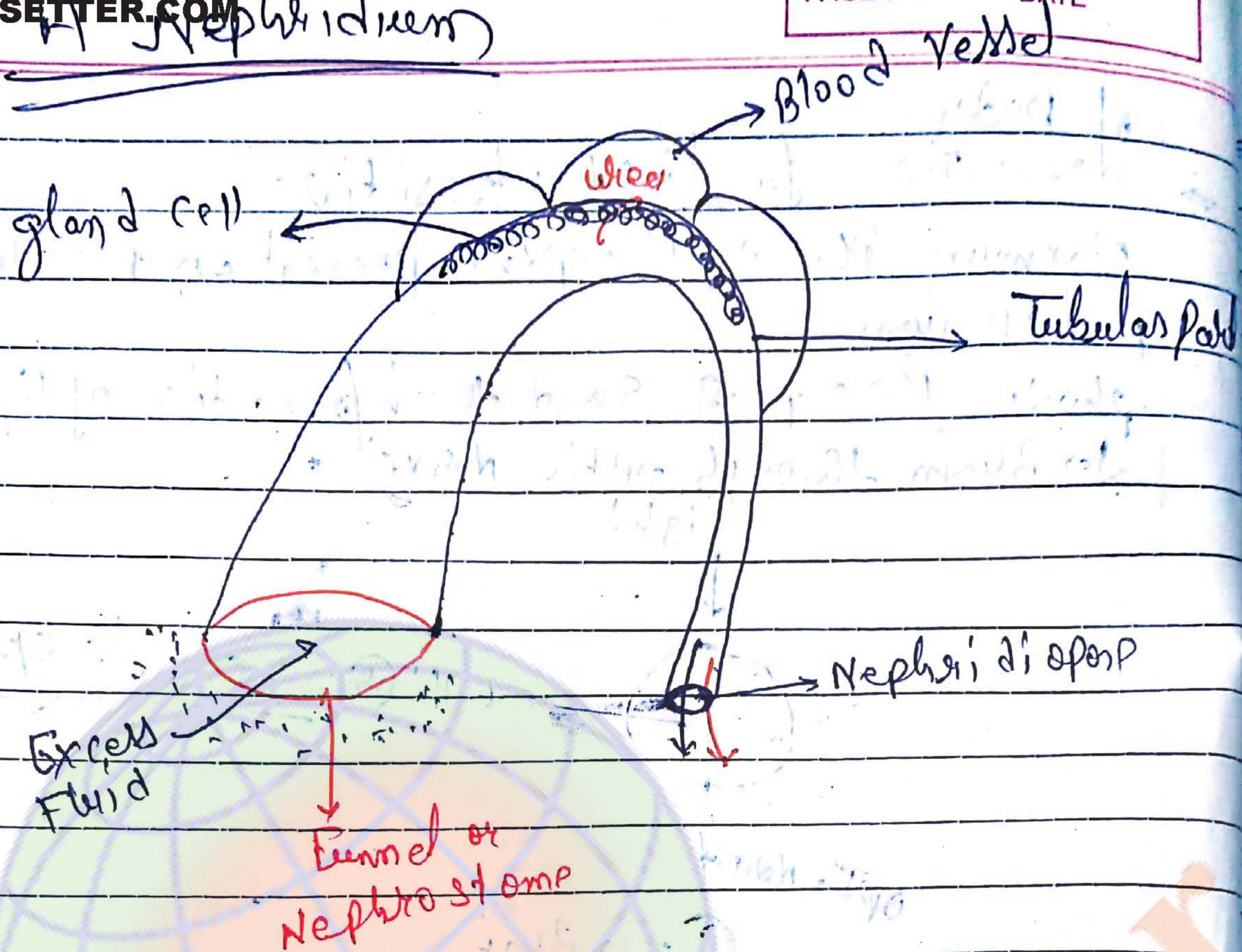
Indo germ on tary
 Nephridia
 (3-120)

Exo Nephritic Nature



Sepetal Nephridia
 (15-120) on Both side
 in ter Segmen ter Sep
 open in in Testine

A Nephridium



Nephridium are coiled tube which open either side on Body surface or inside body in gut

The Nephridium which open outside on body surface are exonephric in nature and Nephridia which open inside in gut in Endonephric or enteronephric in nature

→ Nephridium Regulate Volume and composition of somatic fluid

→ Nephridium remove ~~out~~ excess coelomic fluid

→ Earth worm are also Jettic

When more amount of water Available in Environment then, the environment are animal is Jettic

Nephridium help in osmoregulation

Nephridium collect urea from blood and remove it outside

lar part

Male Reproductive organ

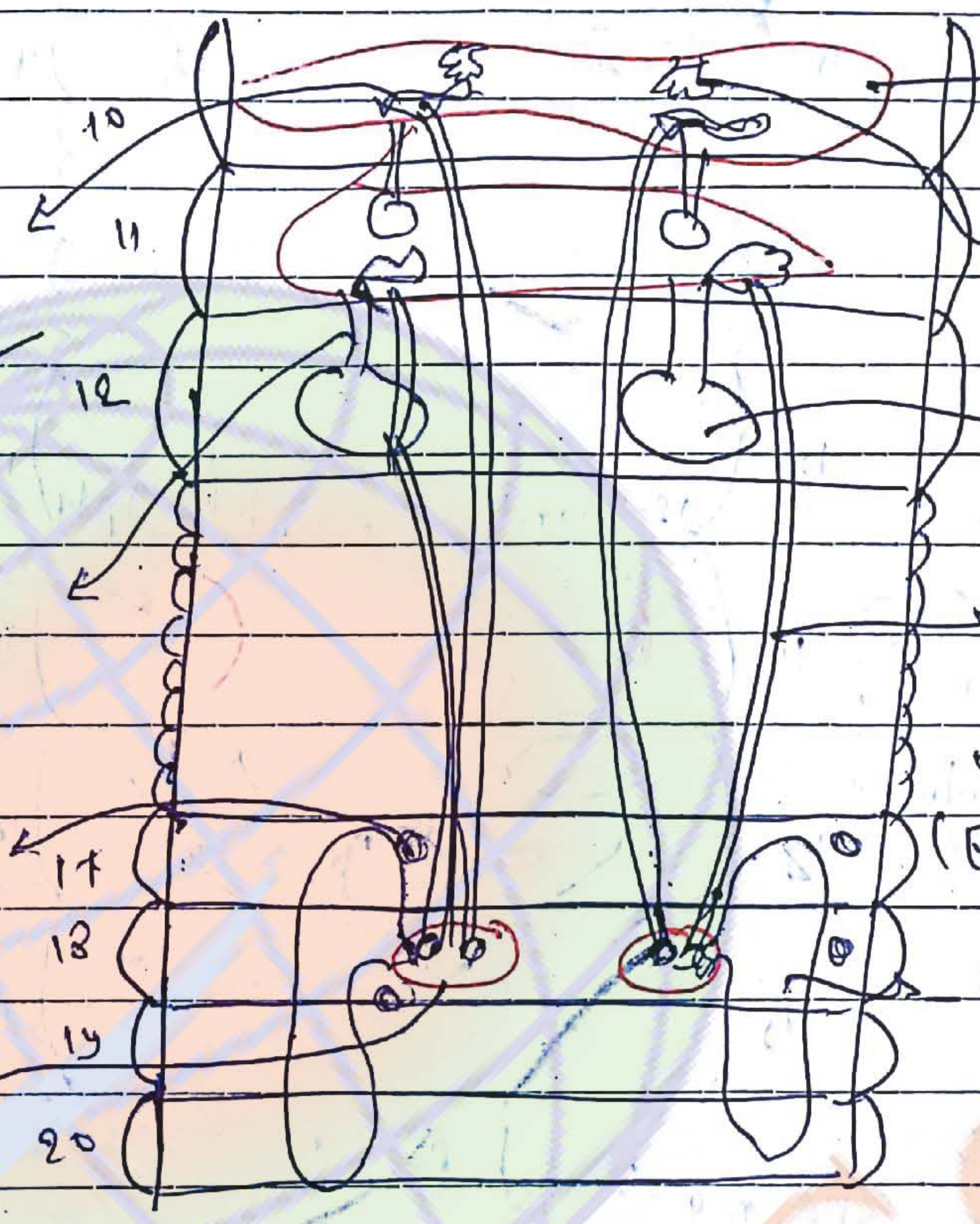
→ Spermatogenesis
↓ spermatogenesis
→ sperm

Spermidial funnel (2 pair) 10, 11 segments

Tubules (2 pair)

Accessory gland (2 pair) 17, 19 seg

male gonopore (2 pair) 18 seg



Testes sac (1 pair)

Testes (2 pair) 10, 11 seg

Seminal vesicle (2 pair)

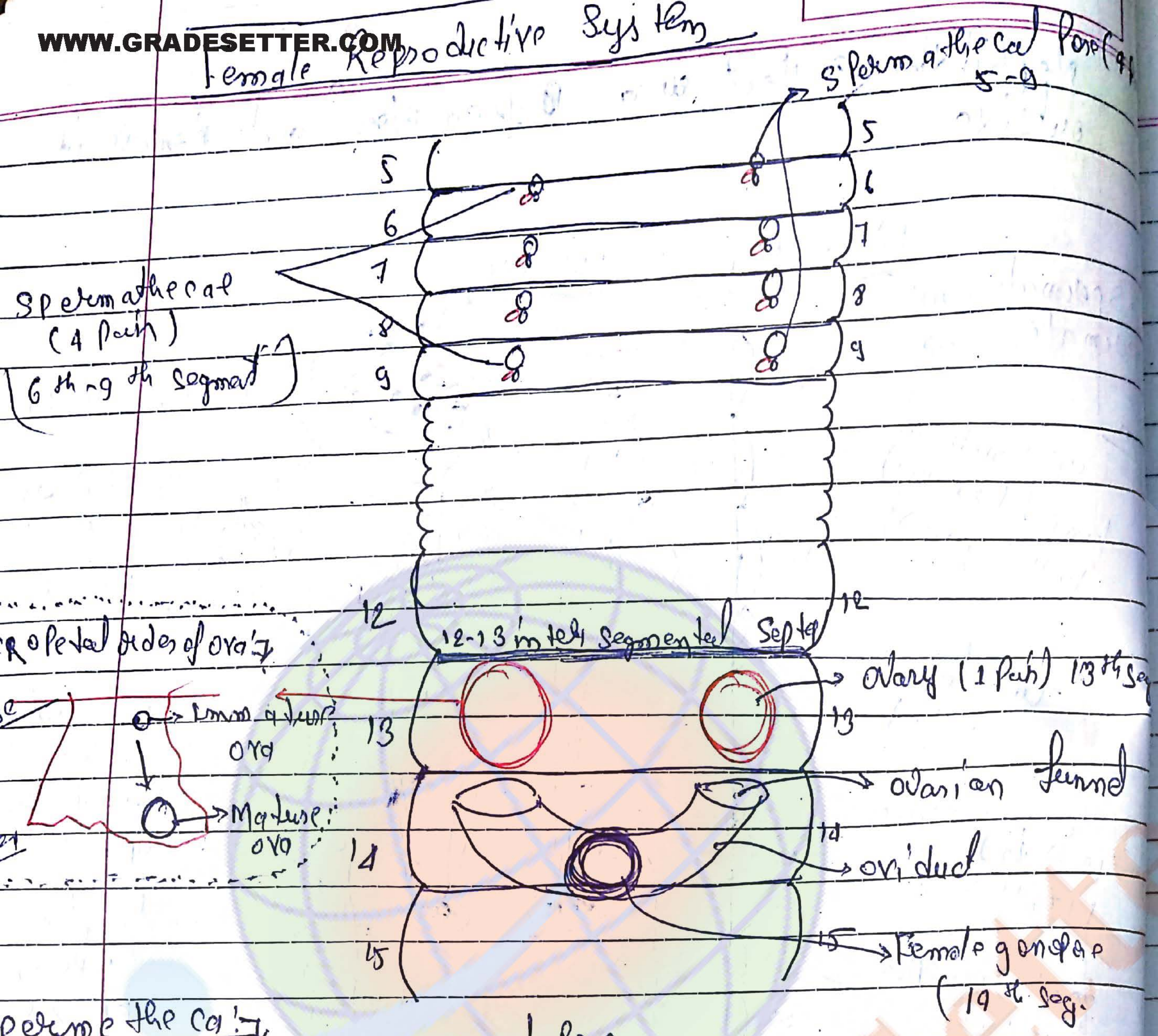
Vas deferens (2 pair) 11, 12 segment

Spermatic duct (Extend up to 18th segment)

Prostate gland (2 pair) 17-18 seg

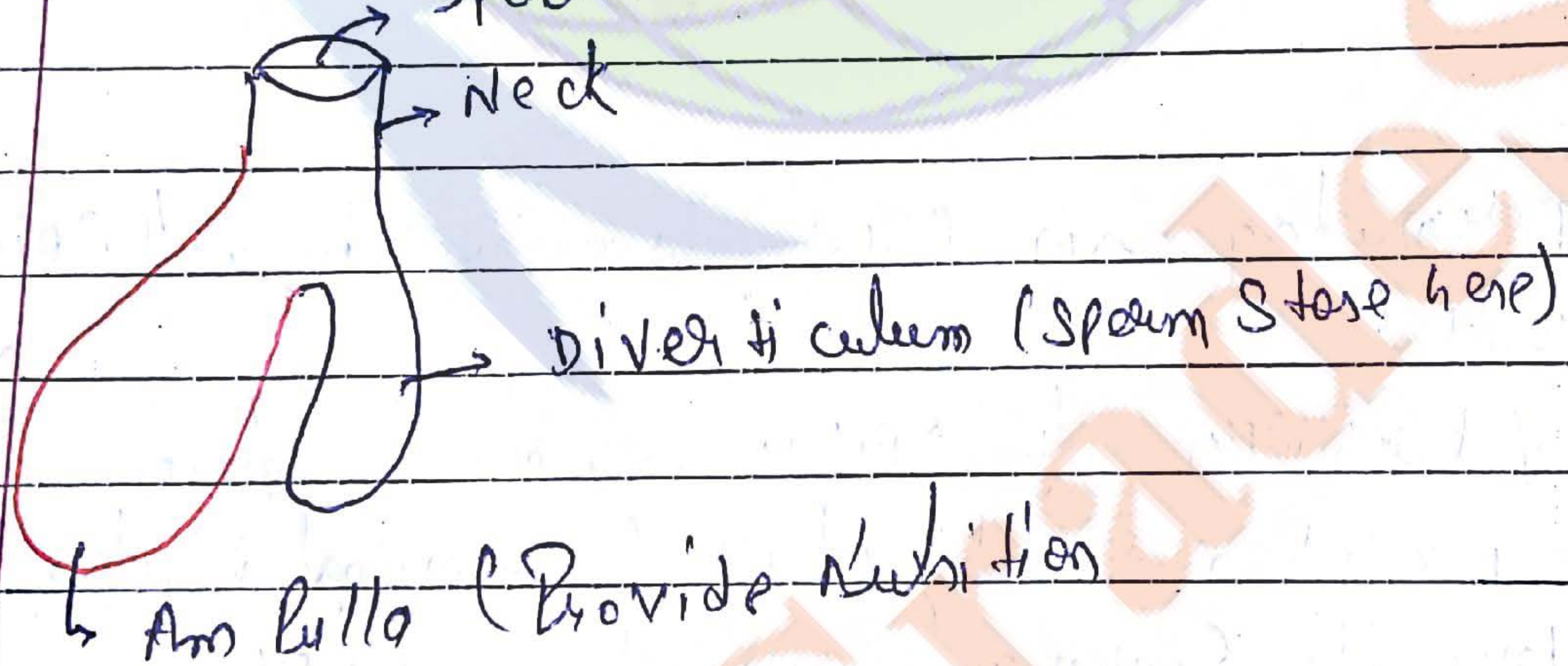
- site of spermatogenesis (sperm formation) in earthworm → Seminal vesical
- 9+ Testes of Earthworm only Spermatogenesis are found
- A protozoan parasite monoxystis infect the seminal vesicles of earthworm and destroy its sperm and cause male sterility
- after spermatogenesis sperm enters into sperm ductal funnel and rich to male gonopore through male sperm duct.
- prostatic secretion increase motility of sperm.
- Each male gonopore has opening of 3 duct = (i) → vas deference + one prostatic duct.

Female Reproductive System

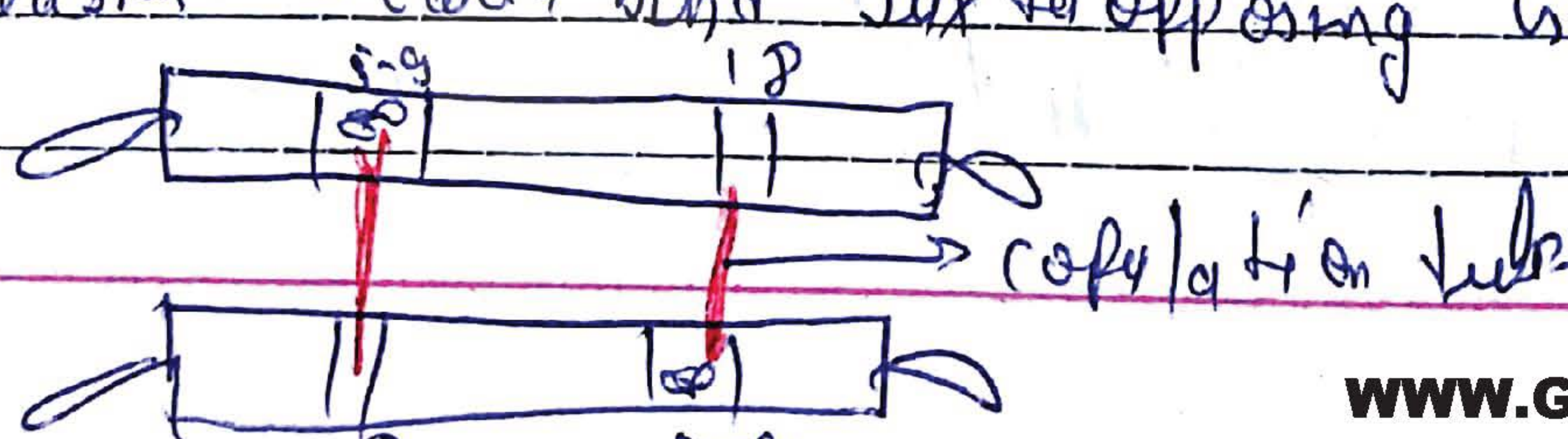


Perme the ca:

Spermathecae pore.

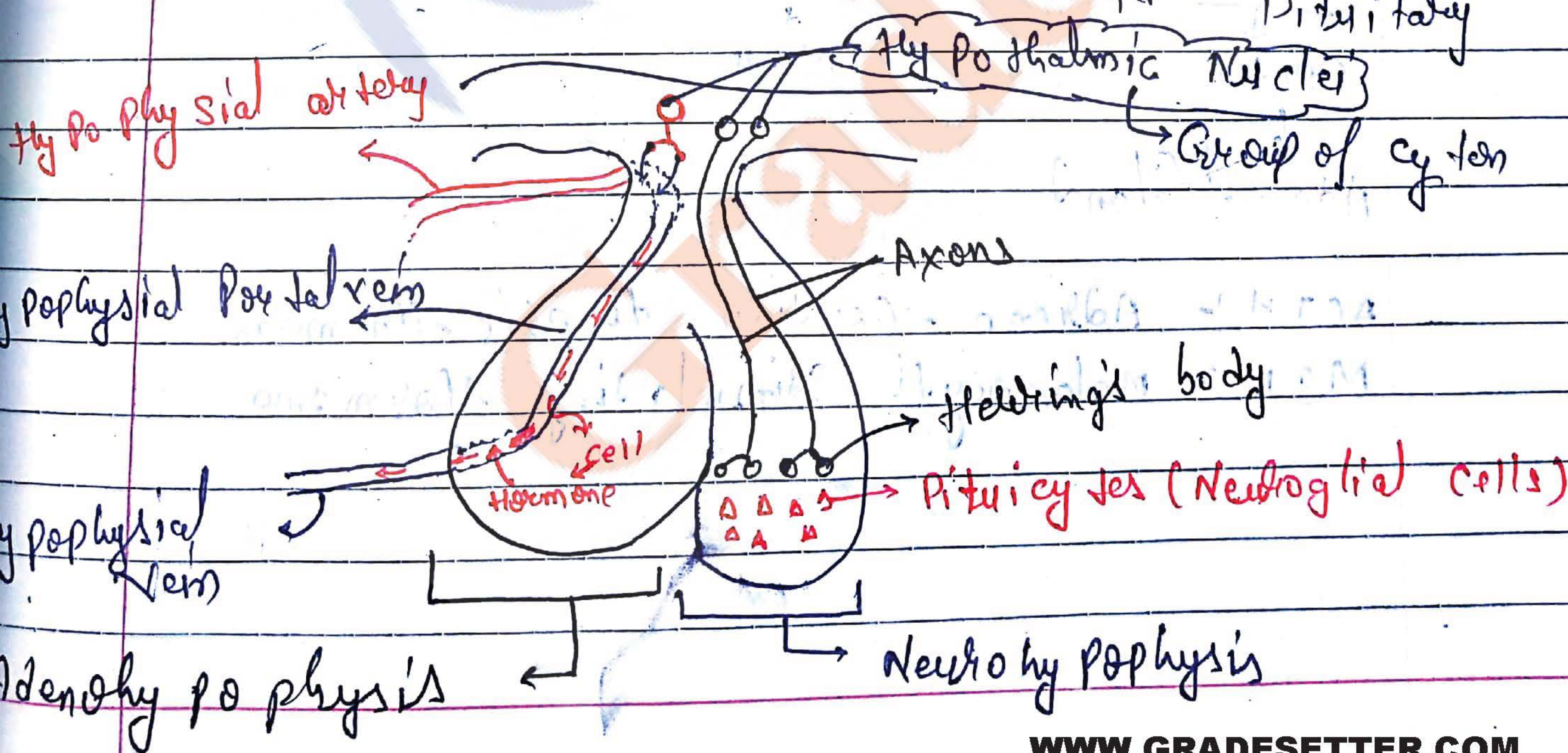
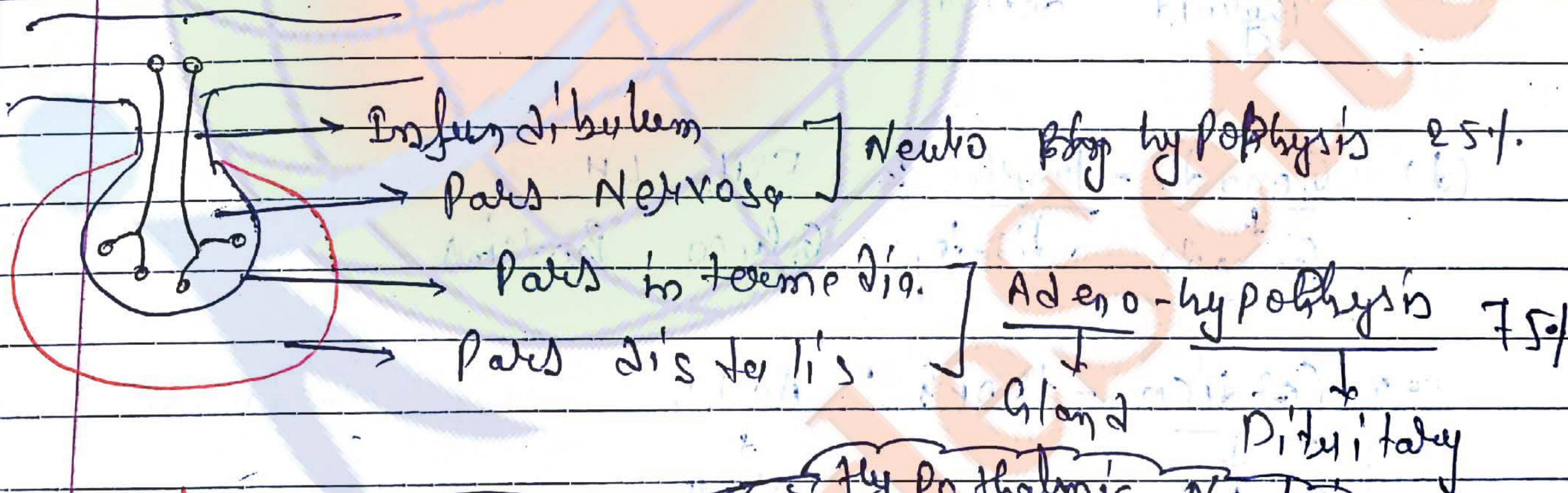
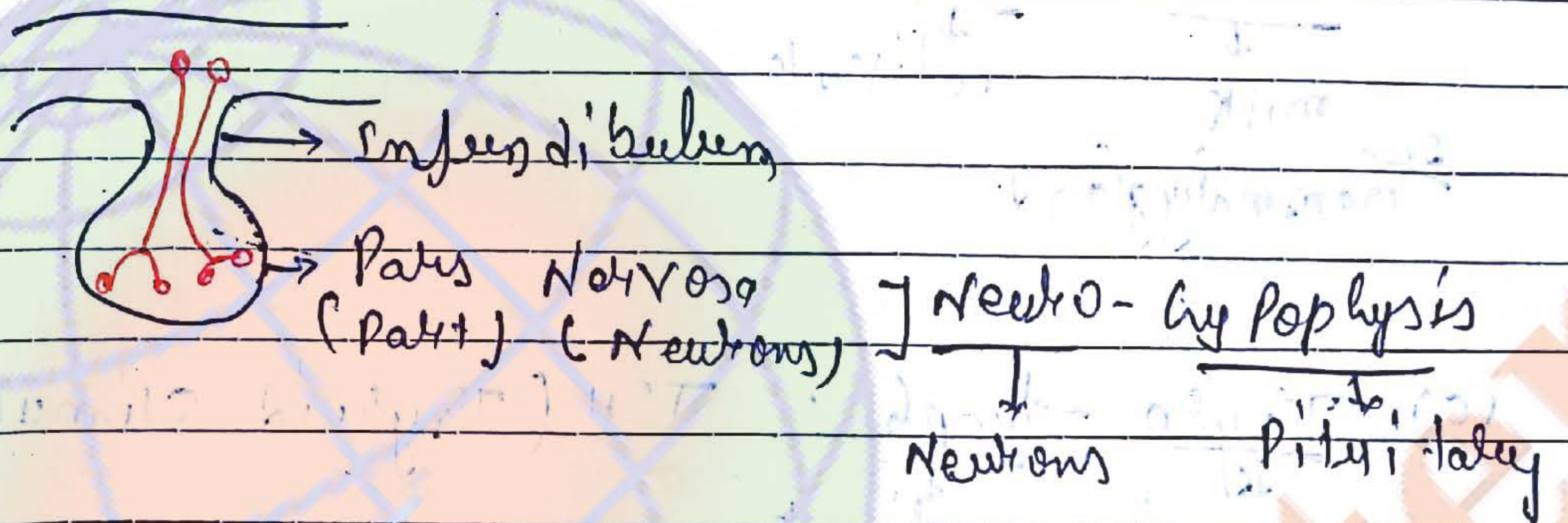
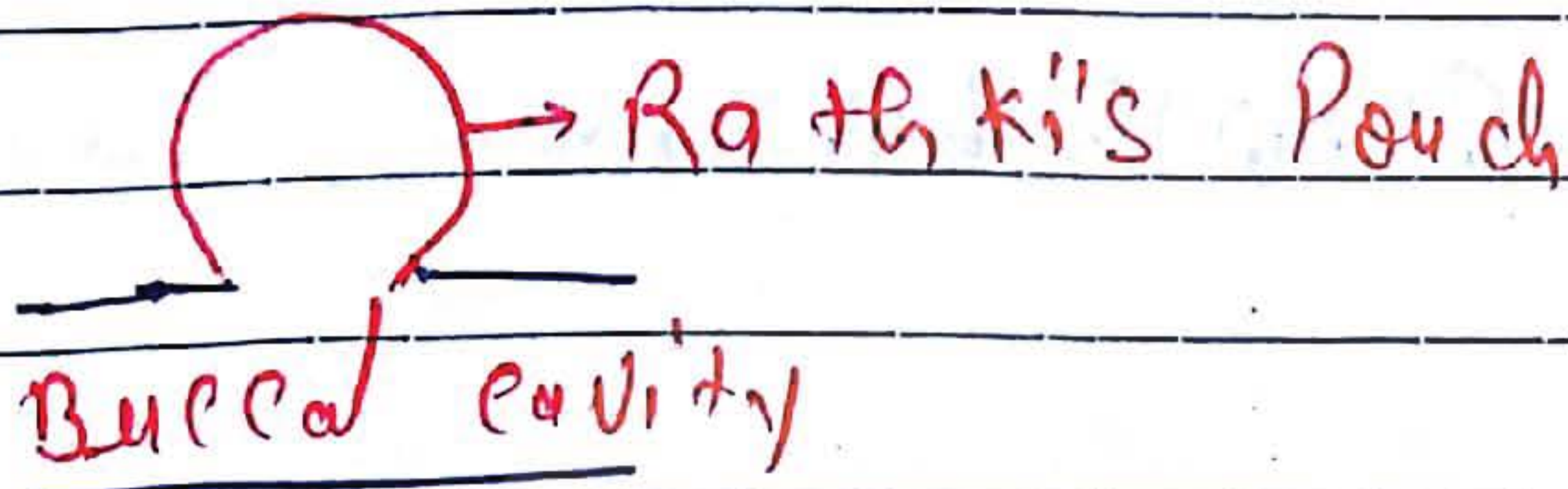


- Earth worm is Monocid
- Earth worm is protandrous Means sperm form first then ova
- Fertilisation is cross, External (outside body) & inside cocoon
- during copulation 2 earth bind Jux to opposing Gonadal open



Pituitary Glands

origin → Projection from hypothalamus (Ectoderm)
 " " " Buccal cavity (Ectoderm)



(i) Adeno-hypophys
 → In direct control
 → Portal circulation +ⁿ⁺
 → Cells

(a) Somato-troph :- Growth hormone
 ↓ ↓
 Body activate

(b) Lacto-troph :- Prolactin
 ↓ ↓
 milk activate
 or mammary gland

(c) Thyro-troph :- TSH (Thyroid Stimulating hormone)
 ↓ ↓
 Thyroid activate

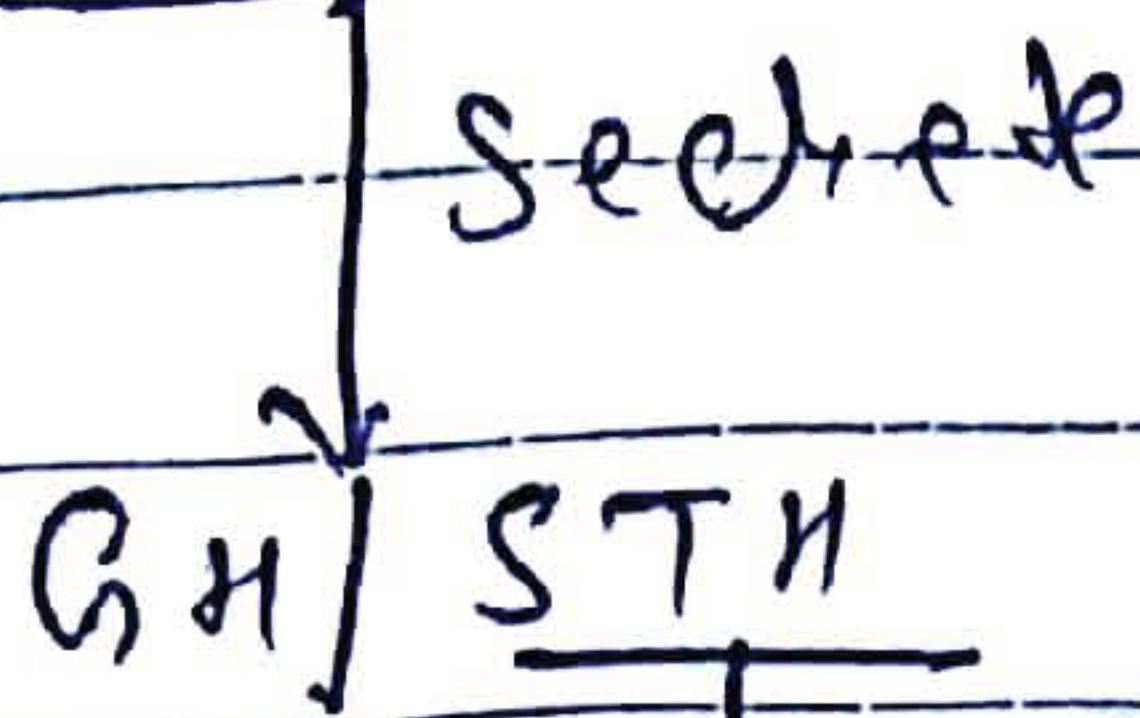
(d) Gonado-troph :- FSH, LH
 ↓ ↓
 GONADS activate → Glyco-proteins

(e) Cortico-troph :- ACTH
 ↓ ↓
 Cortex MSH
 ↓
 Adrenal Gland

ACTH :- Adreno-cortico trophic hormone

MSH :- Melanocyte Stimulating hormone

Somato-troph

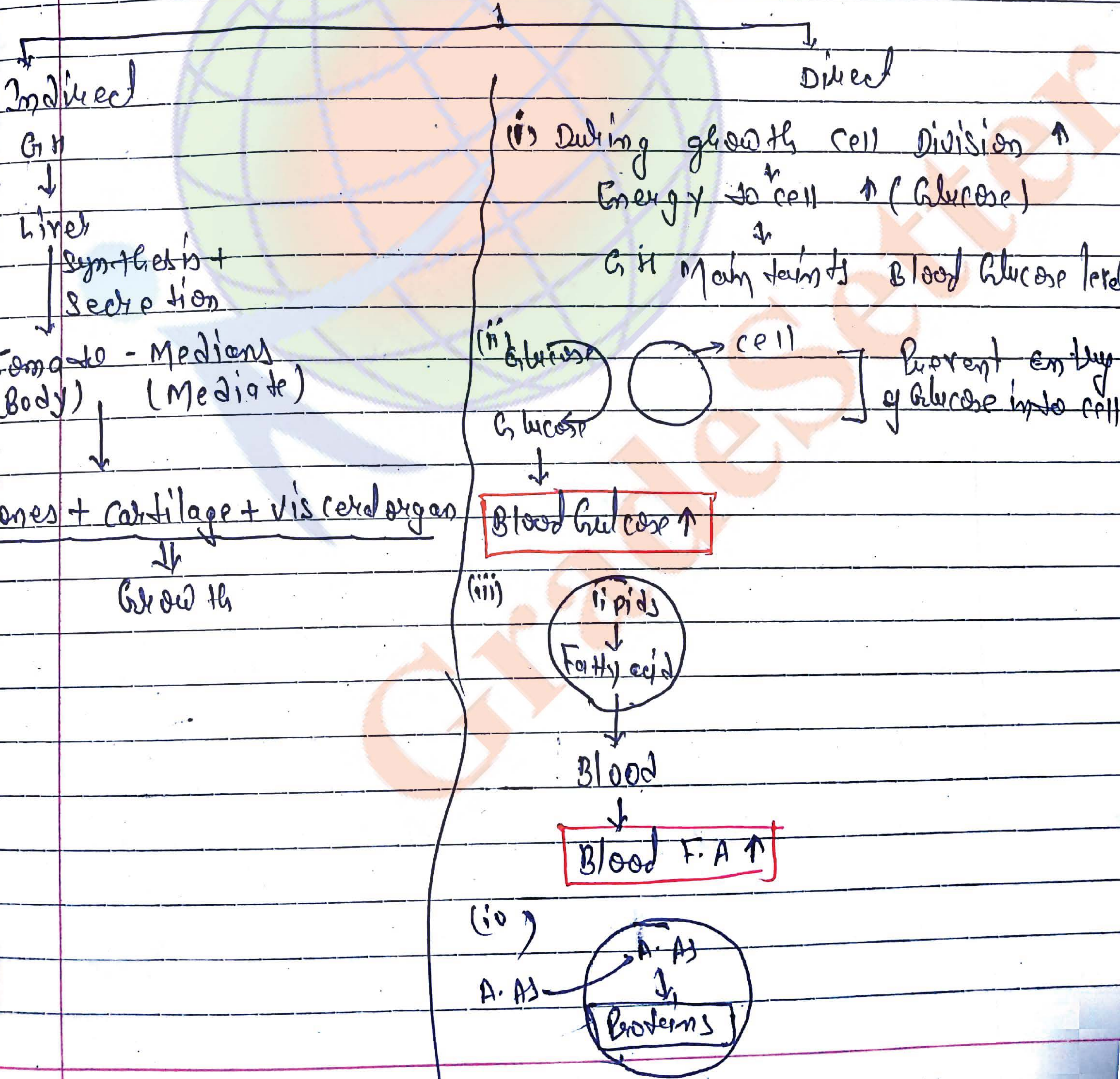


Somato trophic hormone

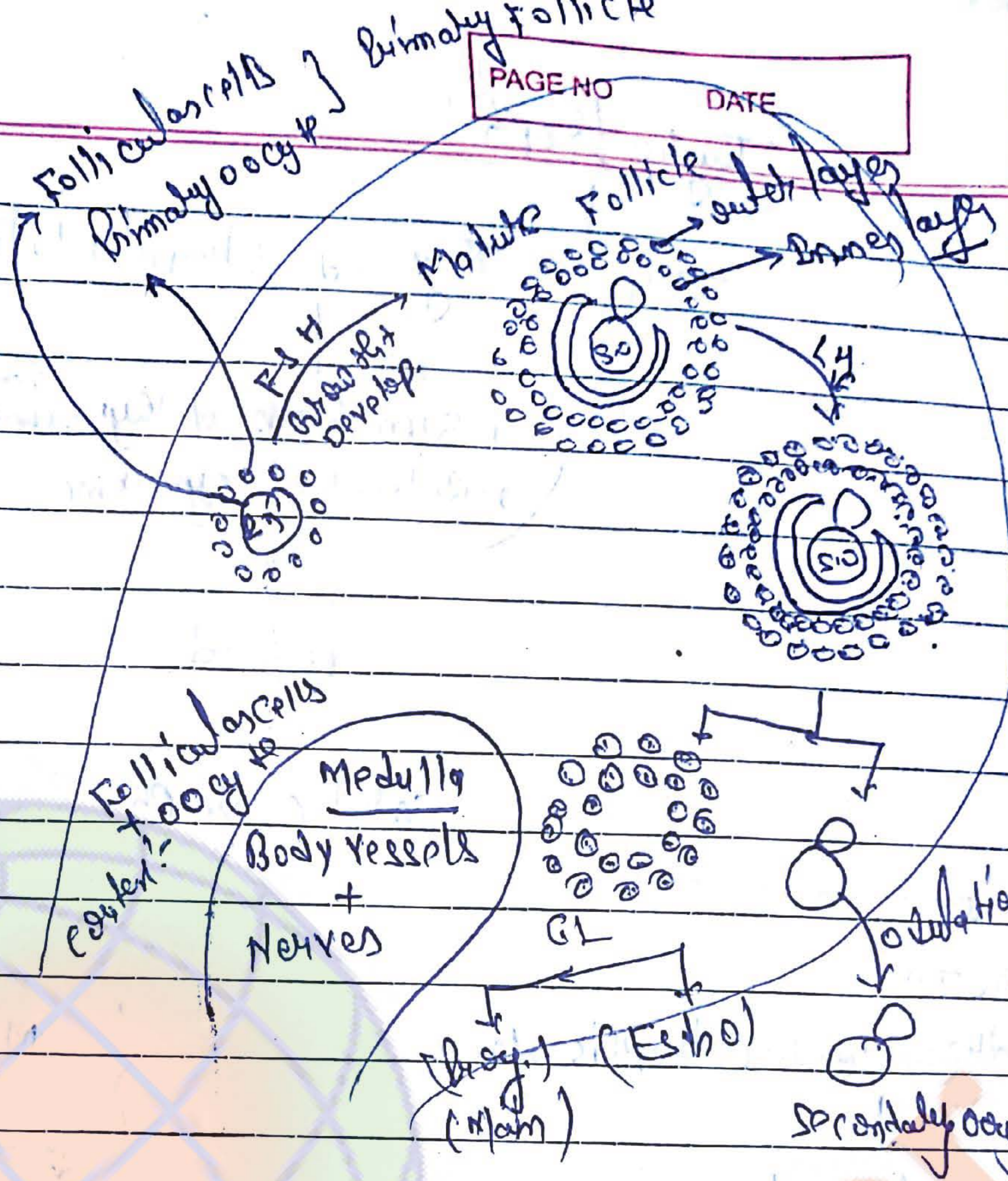
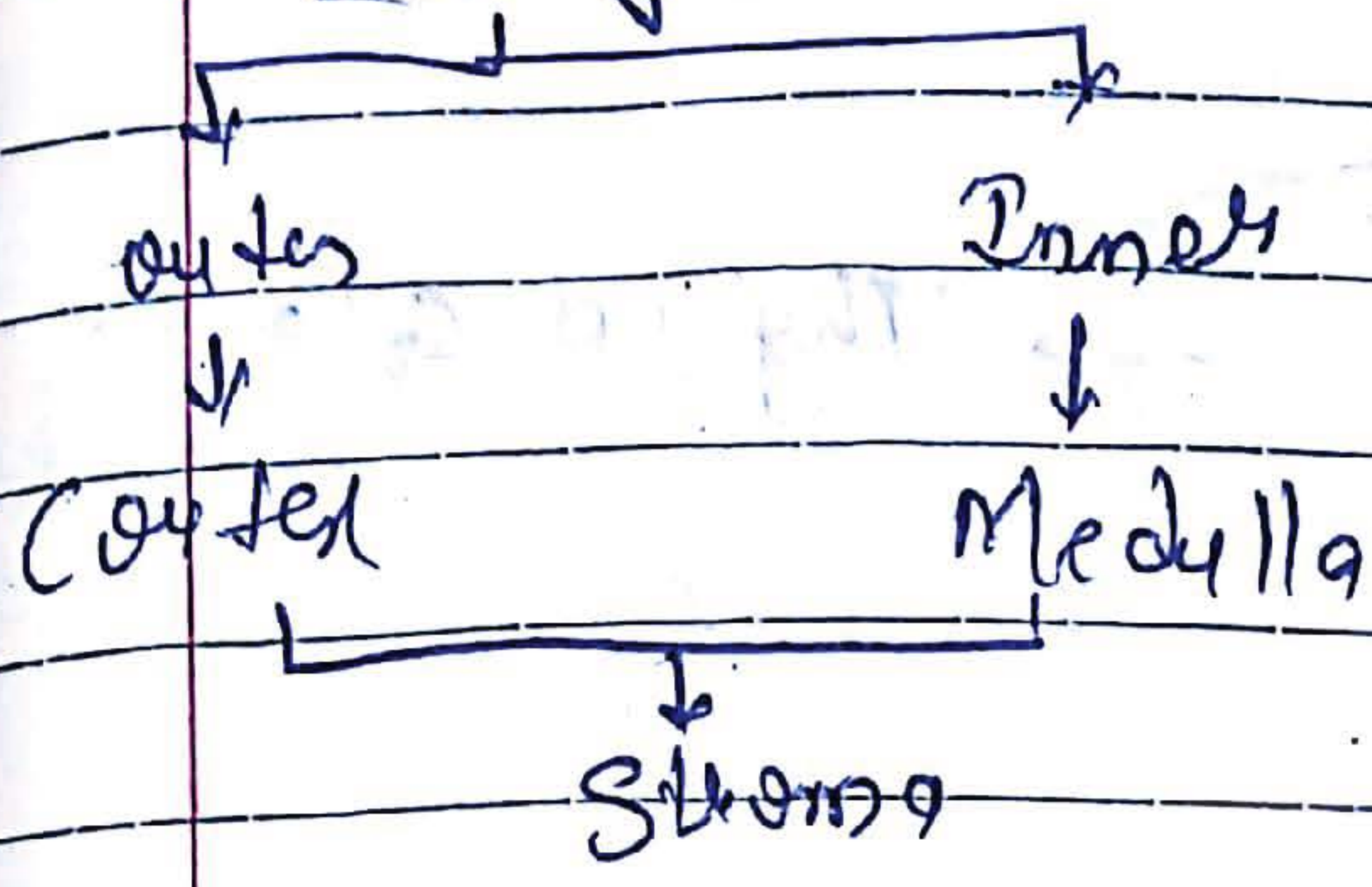
Function:

- i) ↑ Blood Glucose level
- ii) ↑ lipolysis
- iii) ↑ protein synthesis

Growth hormone



Female (-)
(Ovary)



C.L = Corpus luteum
Body luteum
Ruptured follicle

LH: - Luteinizing hor.

Function of LH:

- (i) Maturation of follicle
- (ii) Deposition of luteal pigment in follicular cells
 - ↓ Progesterone
 - ↓ Estrogen
- (iii) Rupturing of follicle / ovulation
- (iv) Maintain corpus luteum

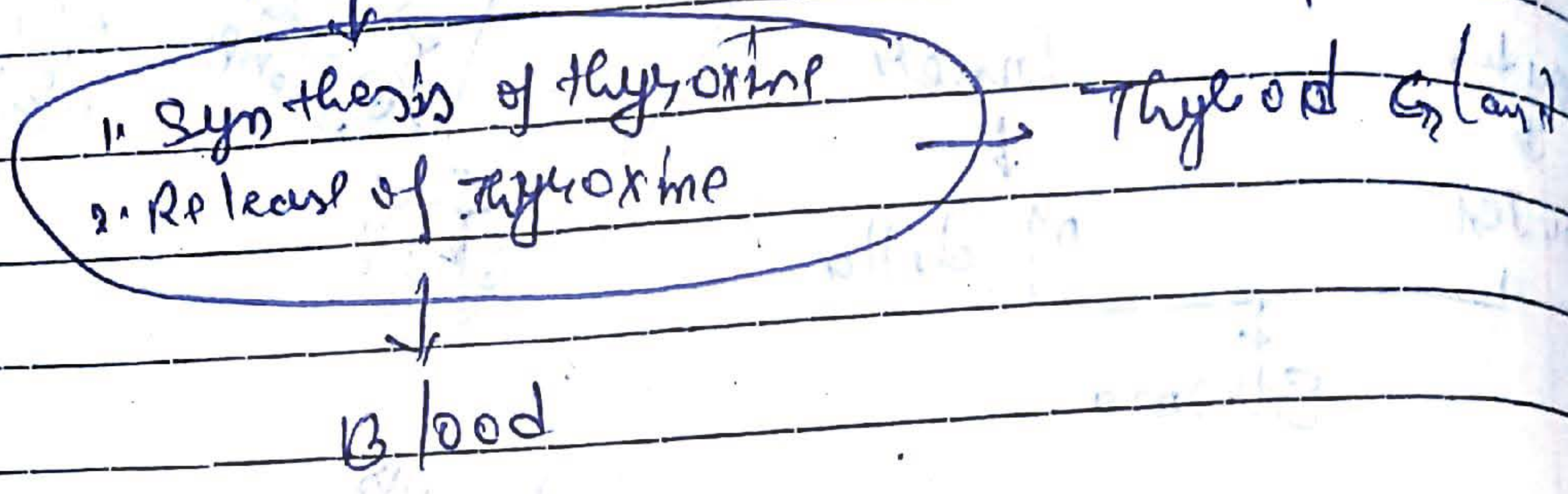
⇒ outer layer / Theca externa - outer layer

⇒ Inner layer / Theca interna → Estrogen → initiate Release of L.H.

⇒ Sequence: FSH → Estrogen → LH → Prog.

Thyroid Tropics

TSH :- Thyroid Stimulating Hormone



Corticotroph

ACTH

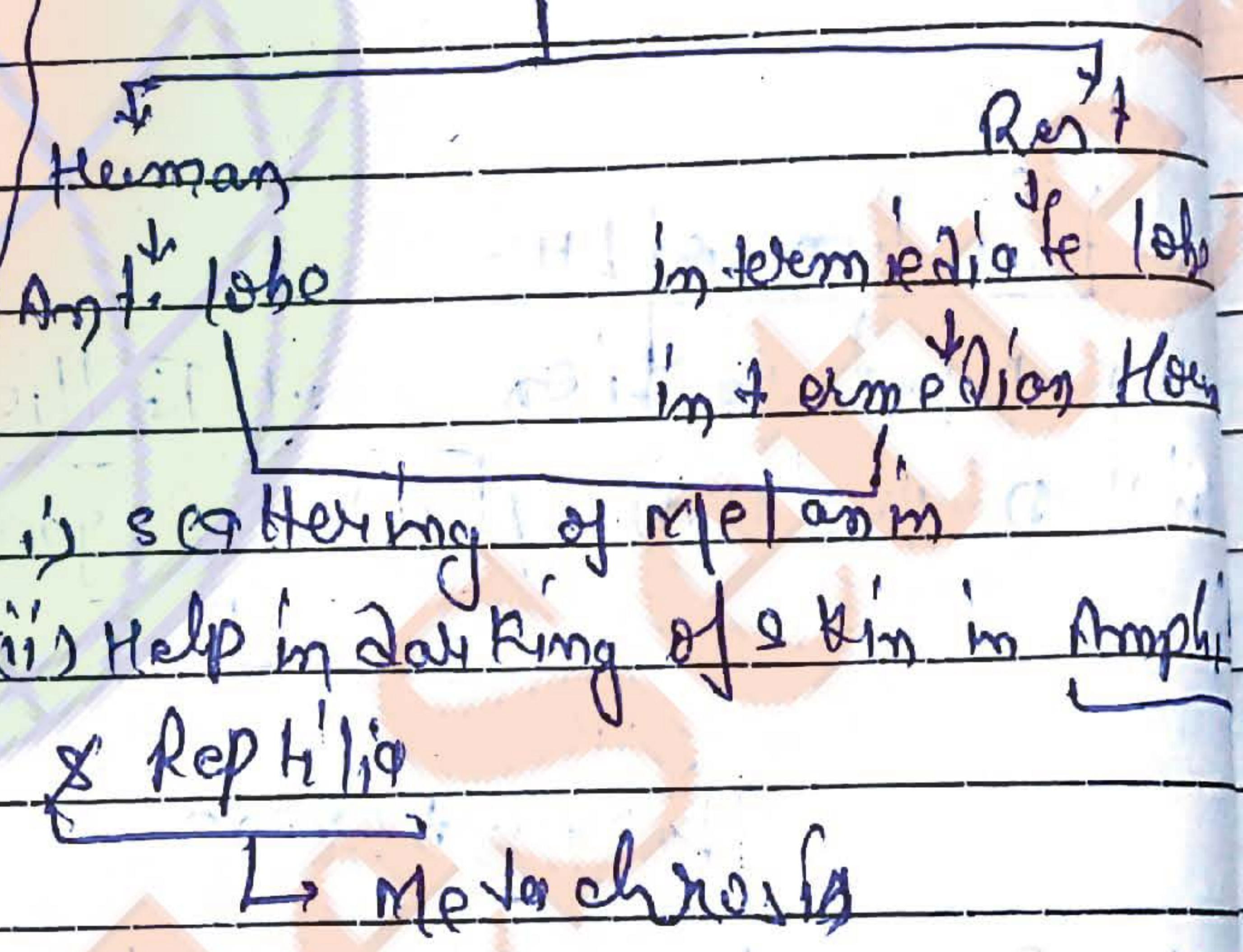
Adreno cortico trophic hor.

Adrenal cortex

- i) Mineralocorticoids (controlled by Renin)
 - ii) Gluco-corticoids
 - iii) Sex-corticoids
- by ACTH

MSH

Melanocyte stimulating Hormone



②

Neuro-hypophysis

Synthesis of hormone :- Hypothalamus

Transport :- Axonal transport

stored and released

↳ Pars nervosa / Post pituitary

Hypothalamus

contains

hypothalamic nuclei

Para-ventricular

Synthesis

oxytocin

pit. osin

↳ Market name

Supra-optic

Synthesis

Vaso-pressin

ADH

Pit. pressin

↳ Market name

oxytocin

contraction in smooth muscles

uterus

Facilitate child birth

or help in parturition

or Birth Hormone

Mammary gland

contraction

Ejection of milk

or Milk ejection hormone

or Milk letdown factor

→ oxytocin is called love hormone & Bond hormone

→ H_2O :- (Temperature Buffer)

→ water itself participates in different types of chemical reactions

i) hydrolysis / hydrolytic breakdown :-



Substrate

Any chemical reaction in which water is used to break the bond of the substrate with the help of water is hydrolysis.

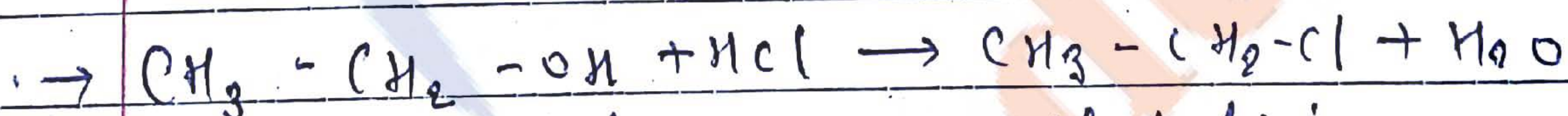
eg:- Maximum Reactions of Digestive enzyme

Dehydration Reaction:-



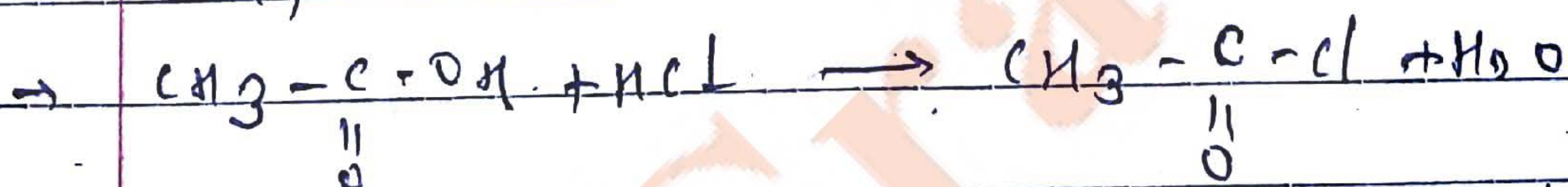
By Product:

Any Reaction in which water is produced as byproduct is known as Dehydration Reaction.



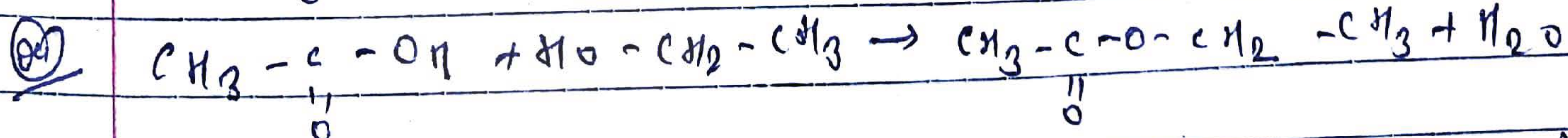
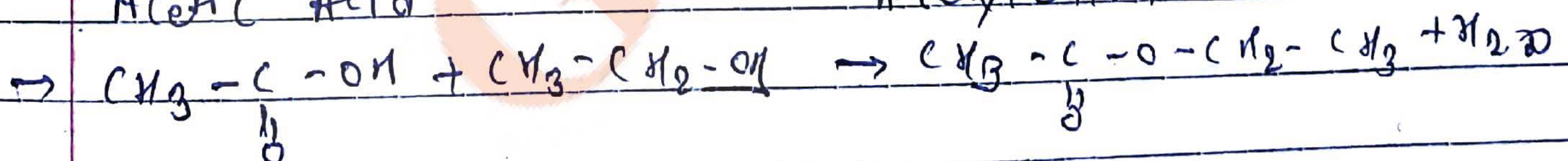
Ethyl Alcohol

Ethyl chloride



Acetic Acid

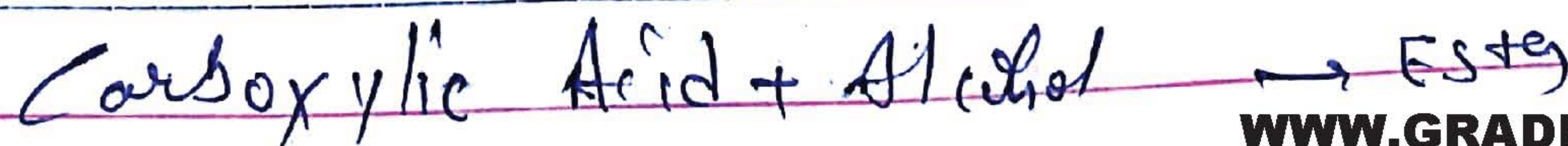
Acetyl chloride



Acetic Acid

Ethanol

Ethyl Ethanoate (Ester)



Salt:

Salts in protoplasm are present in the form of ions.

- Cofactor :- Some enzymes Required metallic ions for their reactivity on substrate known as

Cofactors

Cofactors

Cu^{++}

Zn^{++}

Mg^{++}

Enzyme

Tyrosinase

Carbonic Anhydrase

Kinase

Salt linkage :- The bond which is formed with the help of salt known as salt linkage.

eg (i) Salt linkage betⁿ larger subunit and smaller subunit of Rhizome takes place with the help of Mg^{++} .

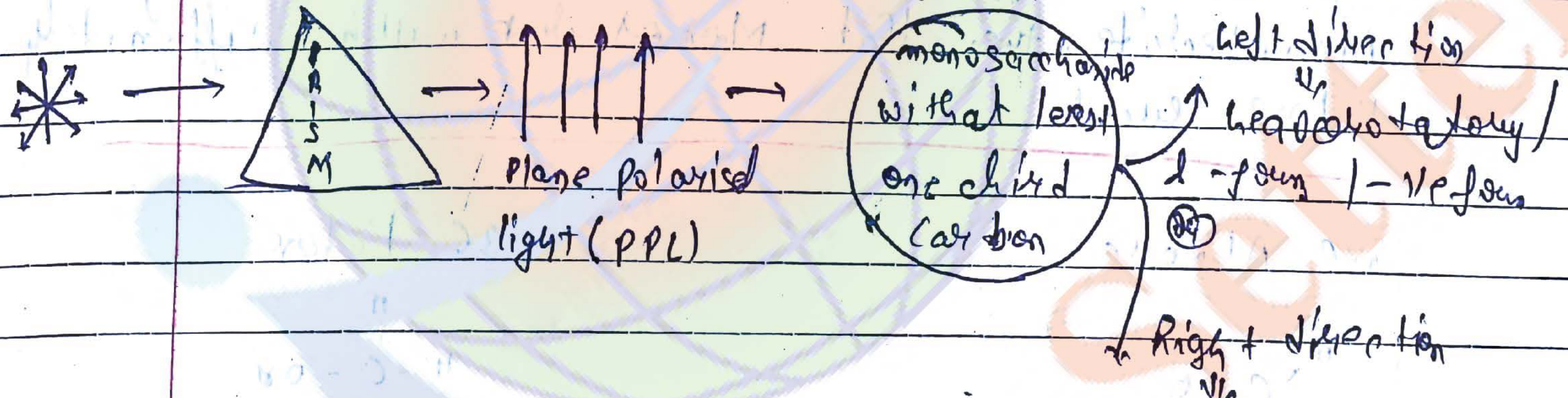
(ii) In eukaryotes salt linkage betⁿ DNA and some proteins also takes place with the help of Mg^{++} .

Carbohydrates are source of instant energy
 → priority order of using these energy substrates by a cell in oxidation for energy requirements
 → Carbohydrate > Lipid > Protein → Chlorophyll

where $x \neq y$; May be any number but always greater than 3.

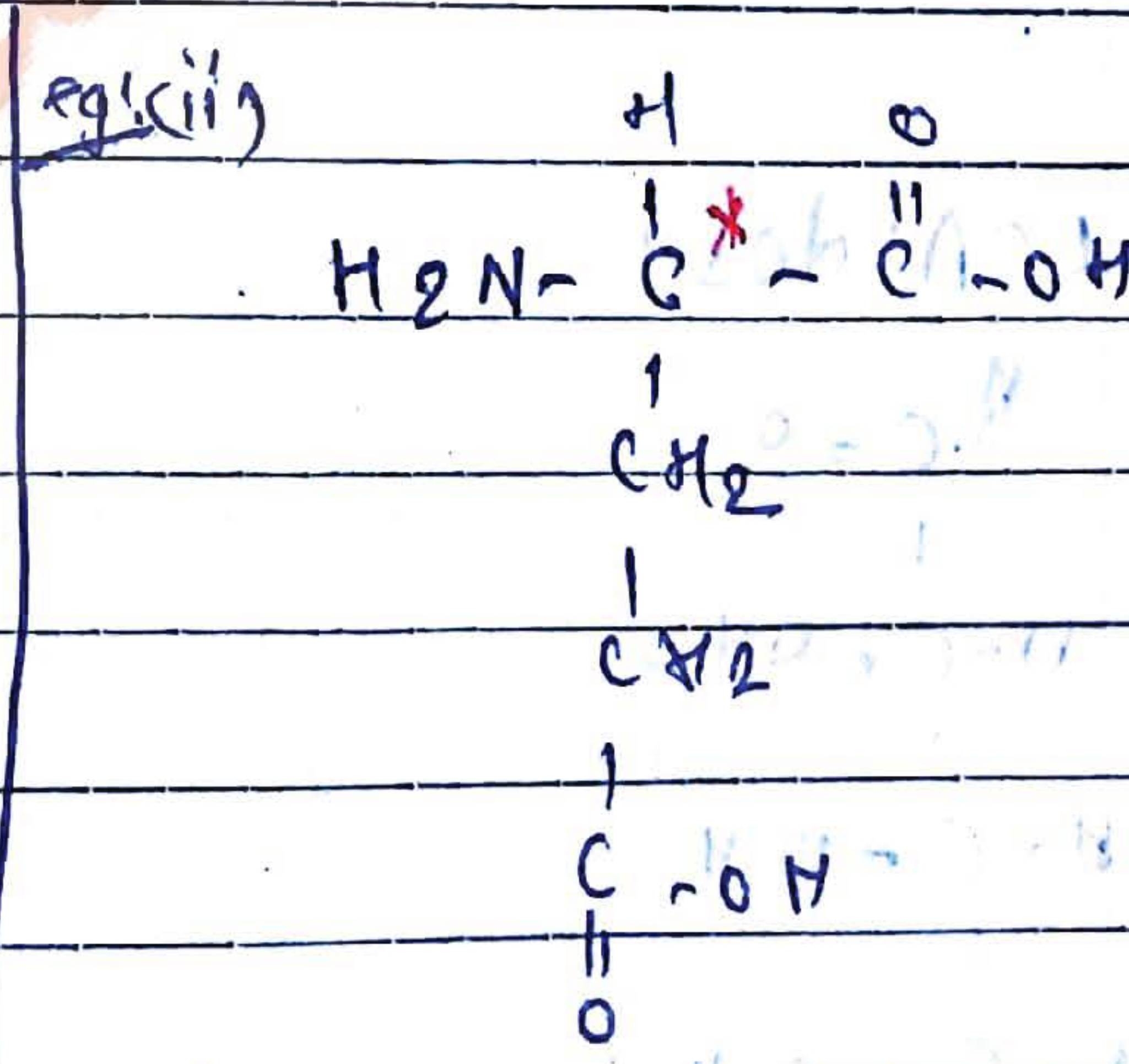
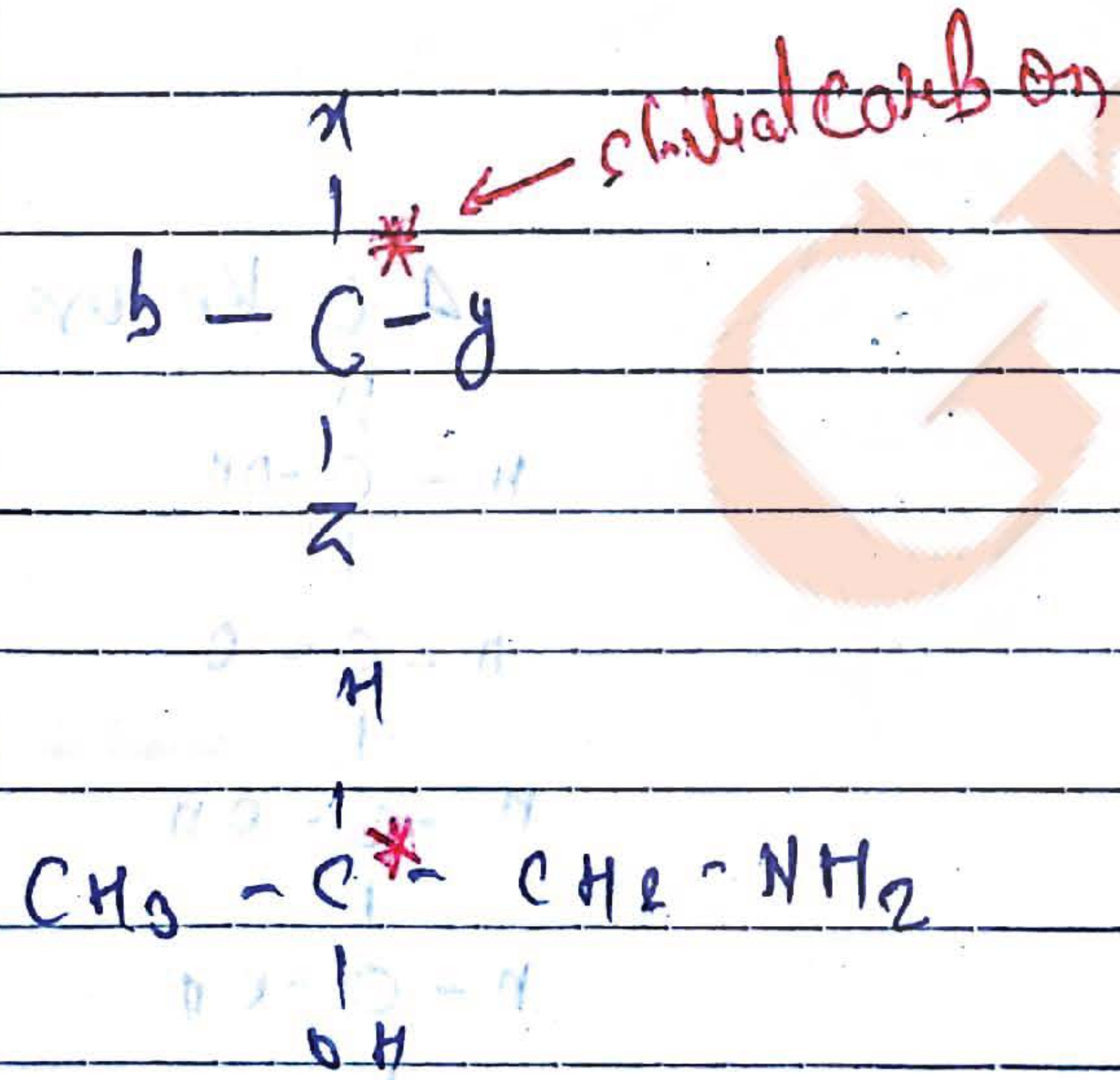
Mono saccharide:

Simplest carbohydrate so no hydrolysis so no hydrolysis
 no digestion only oxidation for energy requirements
 All Mono saccharides are present in α & β form or D -form or L -form except Dihydroxy and Acetone and



Dextrorotatory / levorotatory

Chiral Carbon



→ All Monosaccharide are polyhydroxy. Aldehyde or ketone
 It means in the structure of Monosaccharide more than one
 hydroxyl groups are present while only one either
 Aldehyde group or only one ketone group will be present

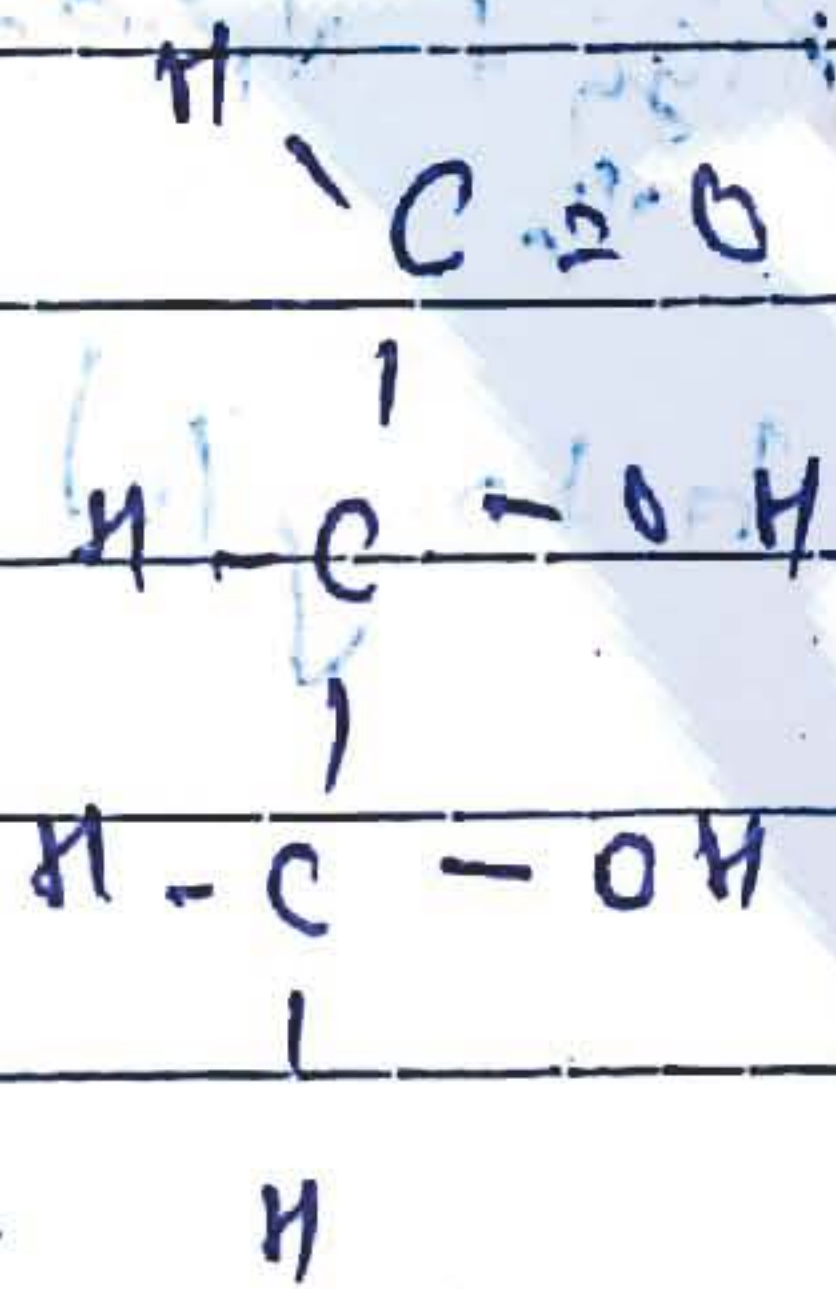
Aldose
 Glyceraldehyde
 Dxylose
 Ribose
 Glucose

Ketose
 Dihydroxy Acetone
 Erythrulose
 Ribulose

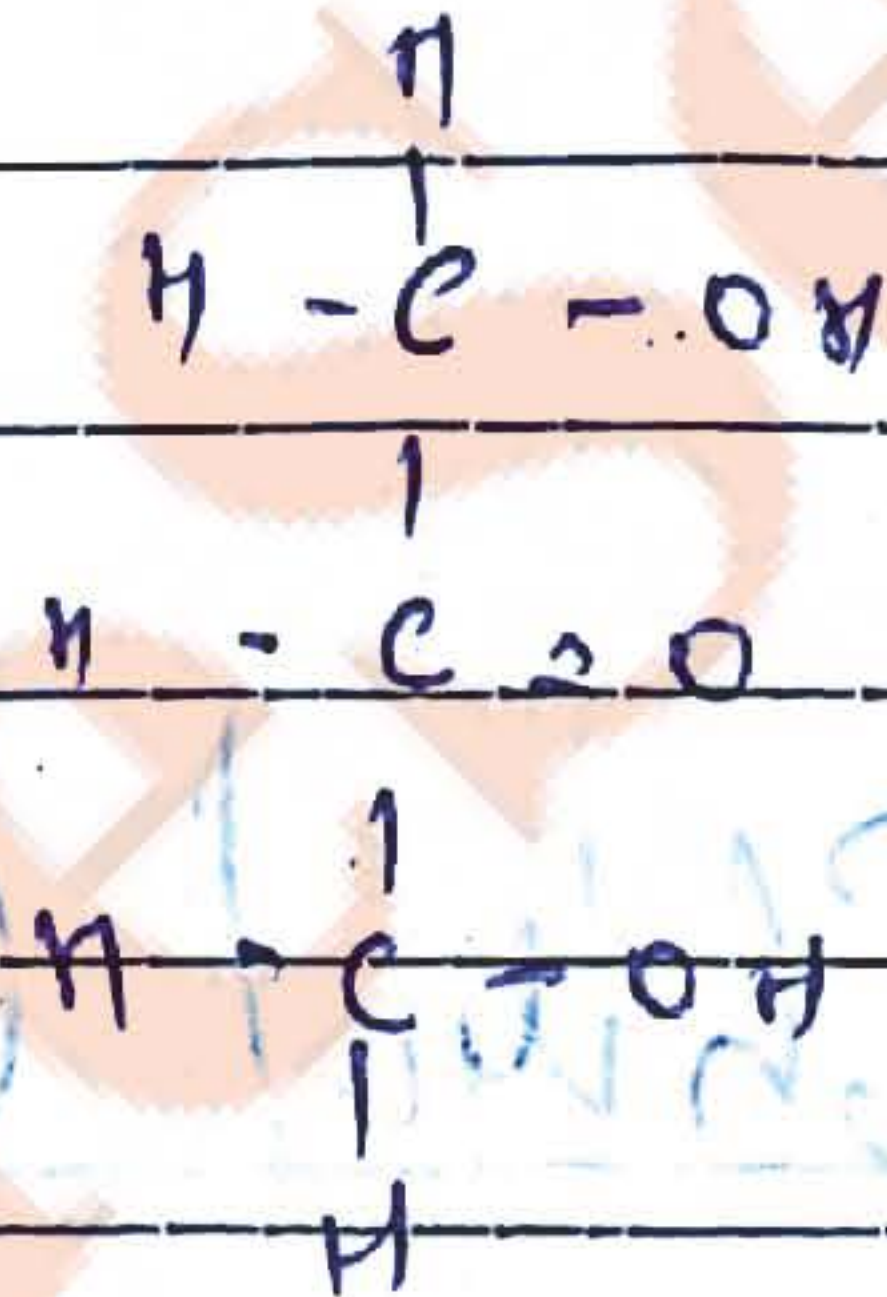
Fructose *

→ If "ose" suffix is present in the name of any
 Monosaccharide, then that Monosaccharide will be, definitely
 Ketose sugar

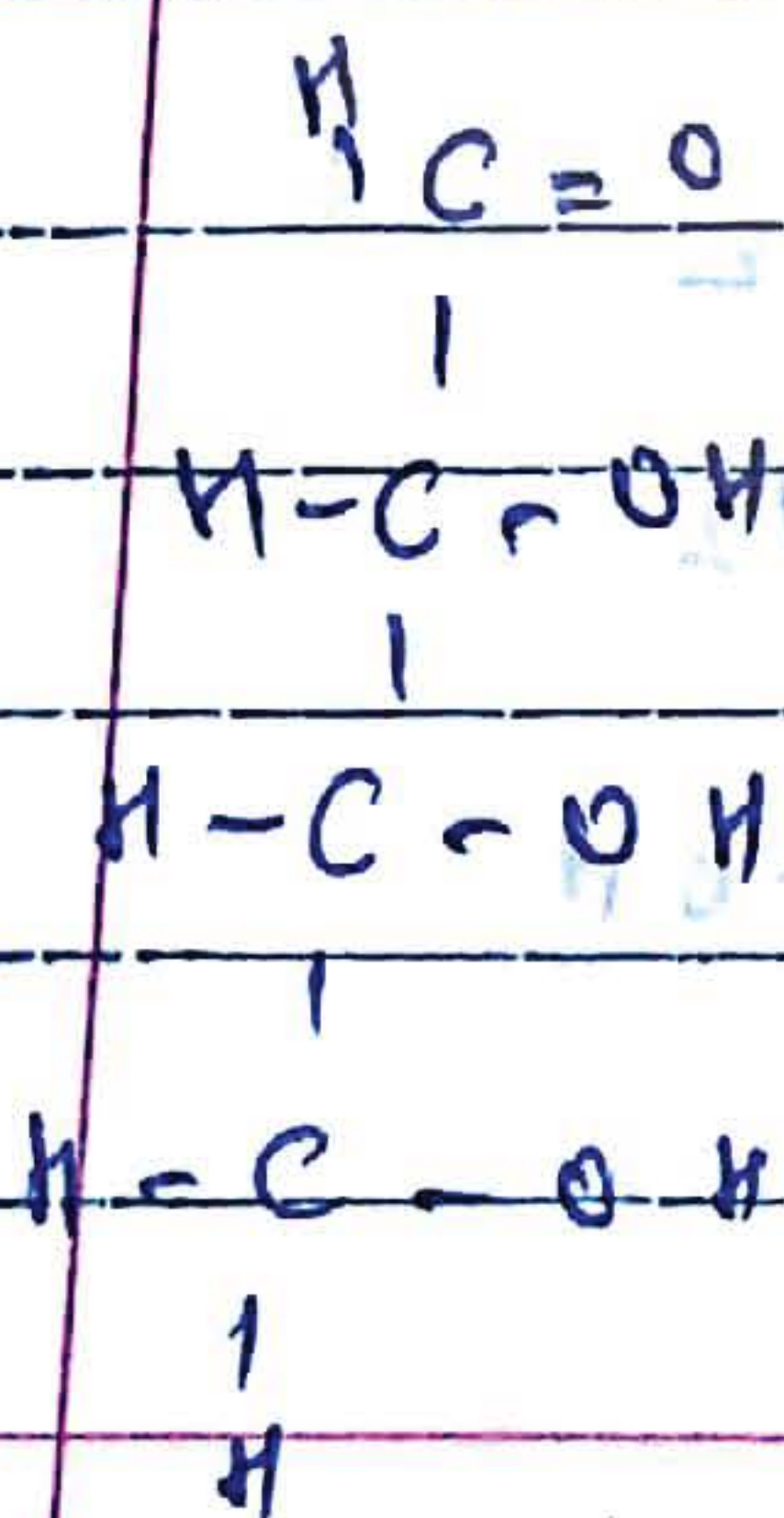
3-C Aldose



3-C Ketose

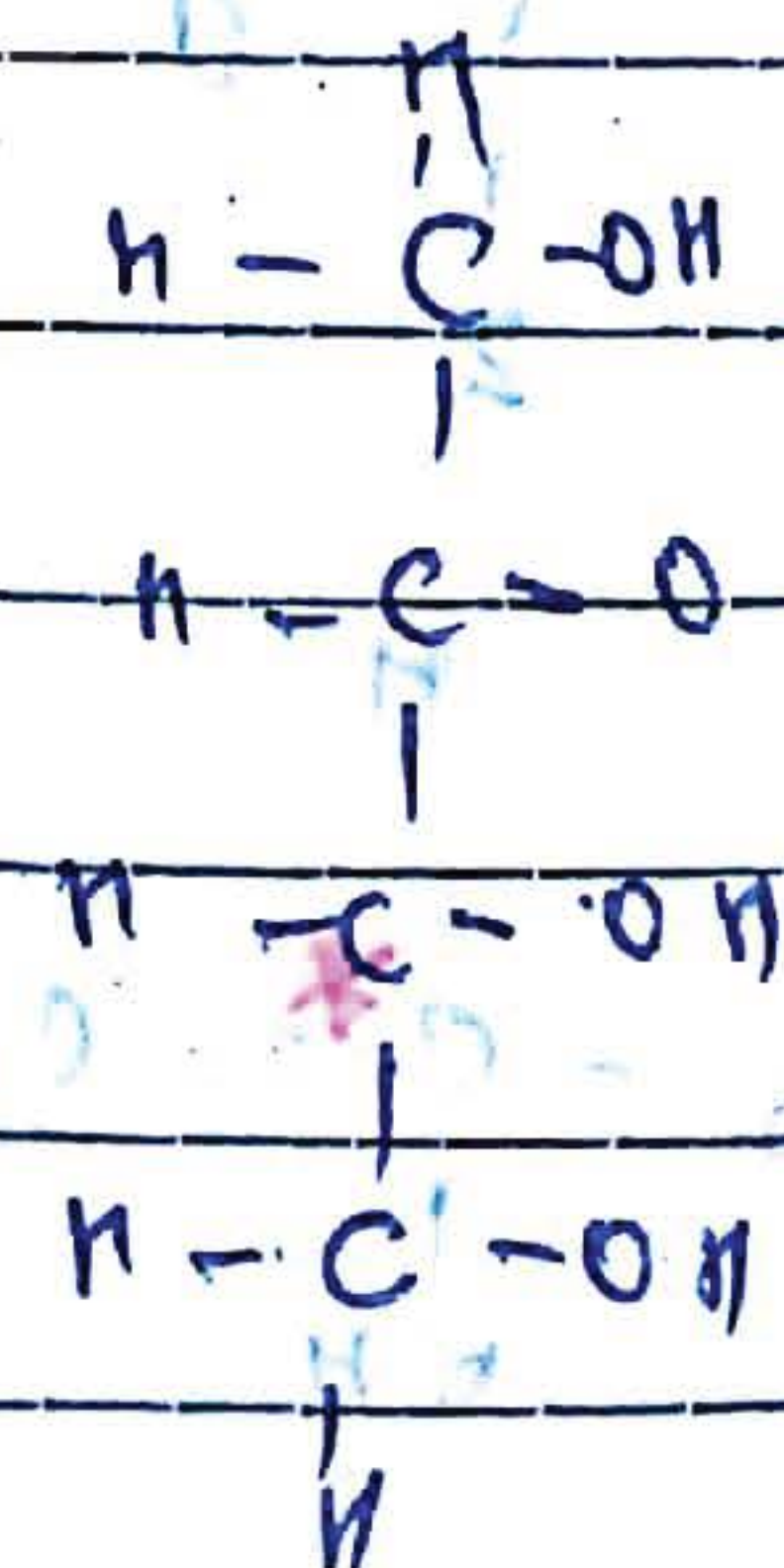


4-C Aldose

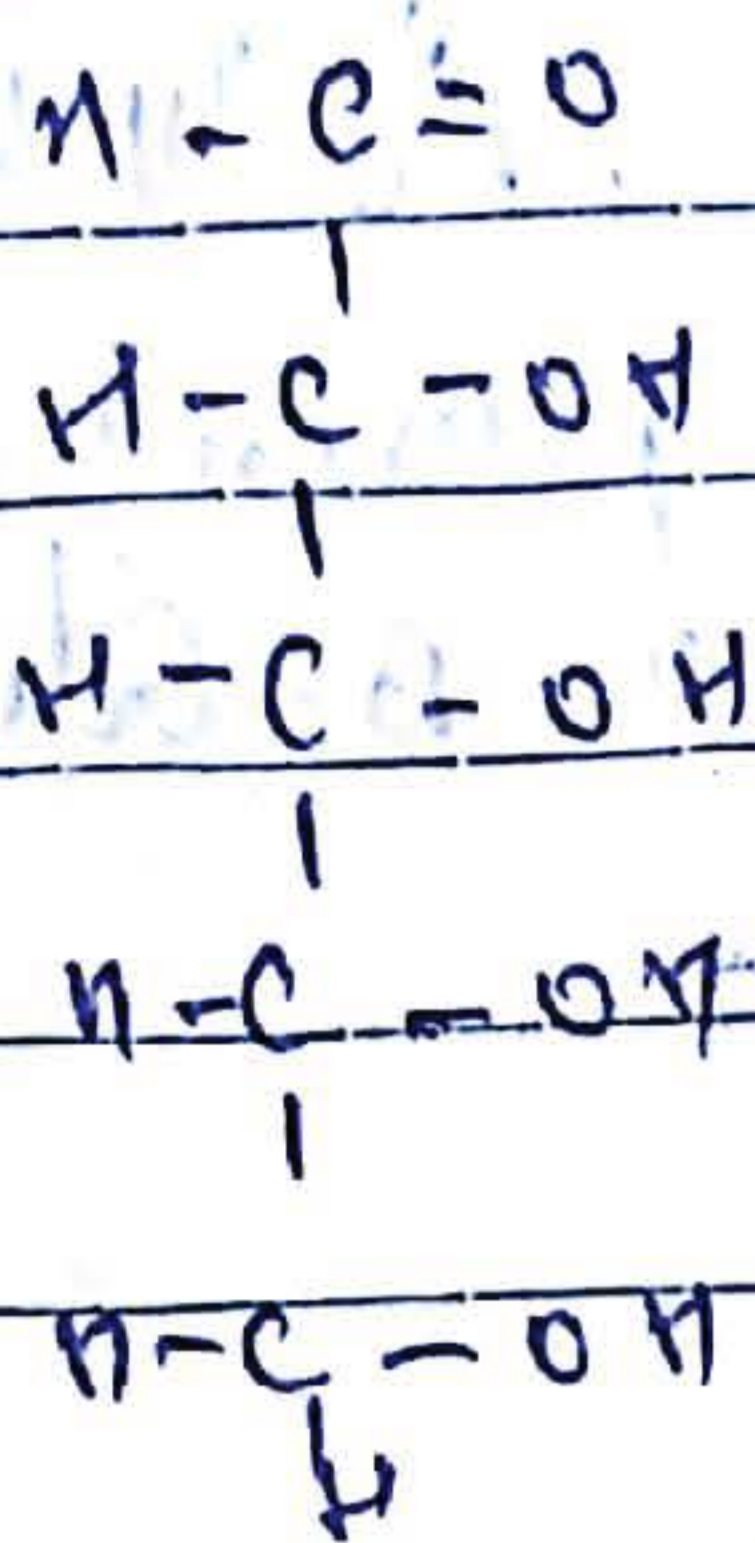


Erythrulose

4-C Ketose

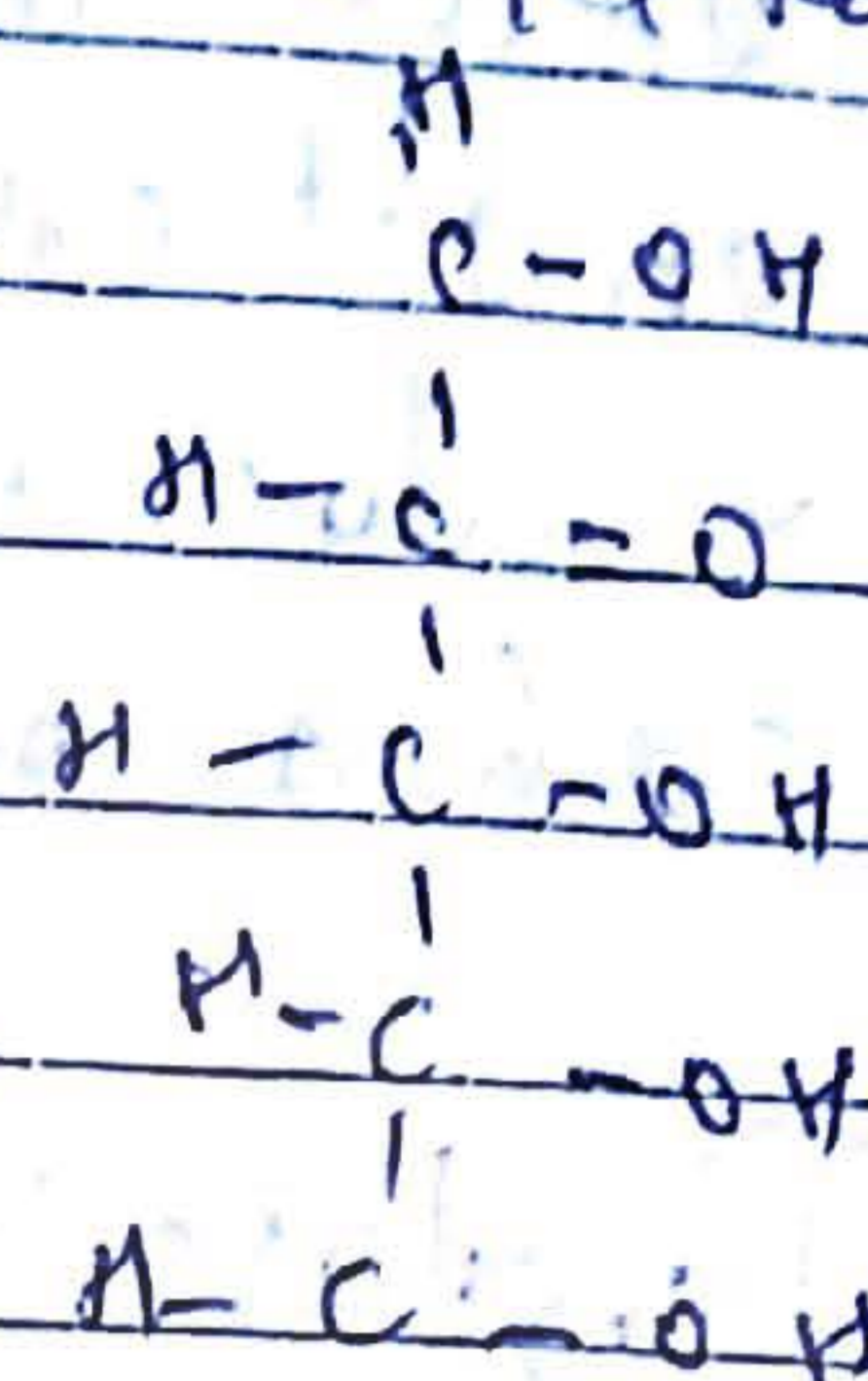


5 C Aldosp



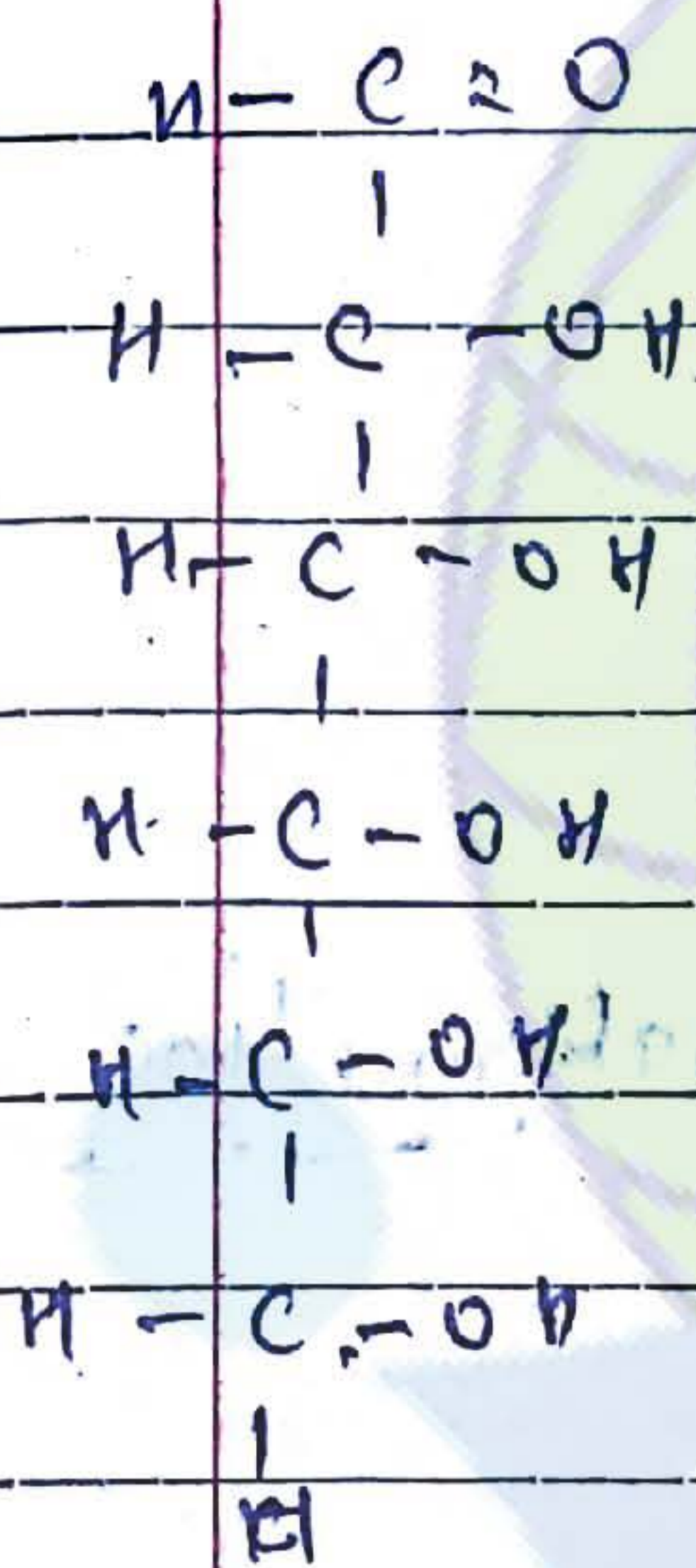
"Ribosp"

5 C Ketosp



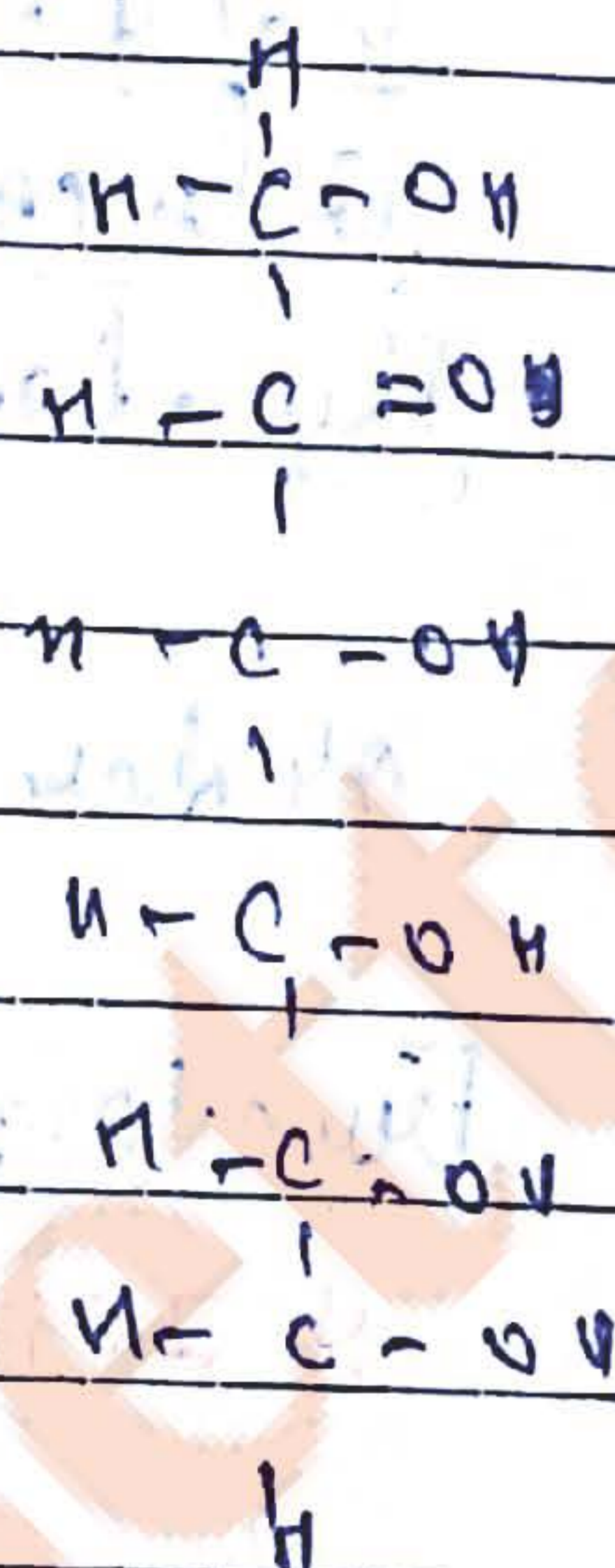
"Ribulosp"

6-C Aldosp



"Allose" (Isomer of Glucose)

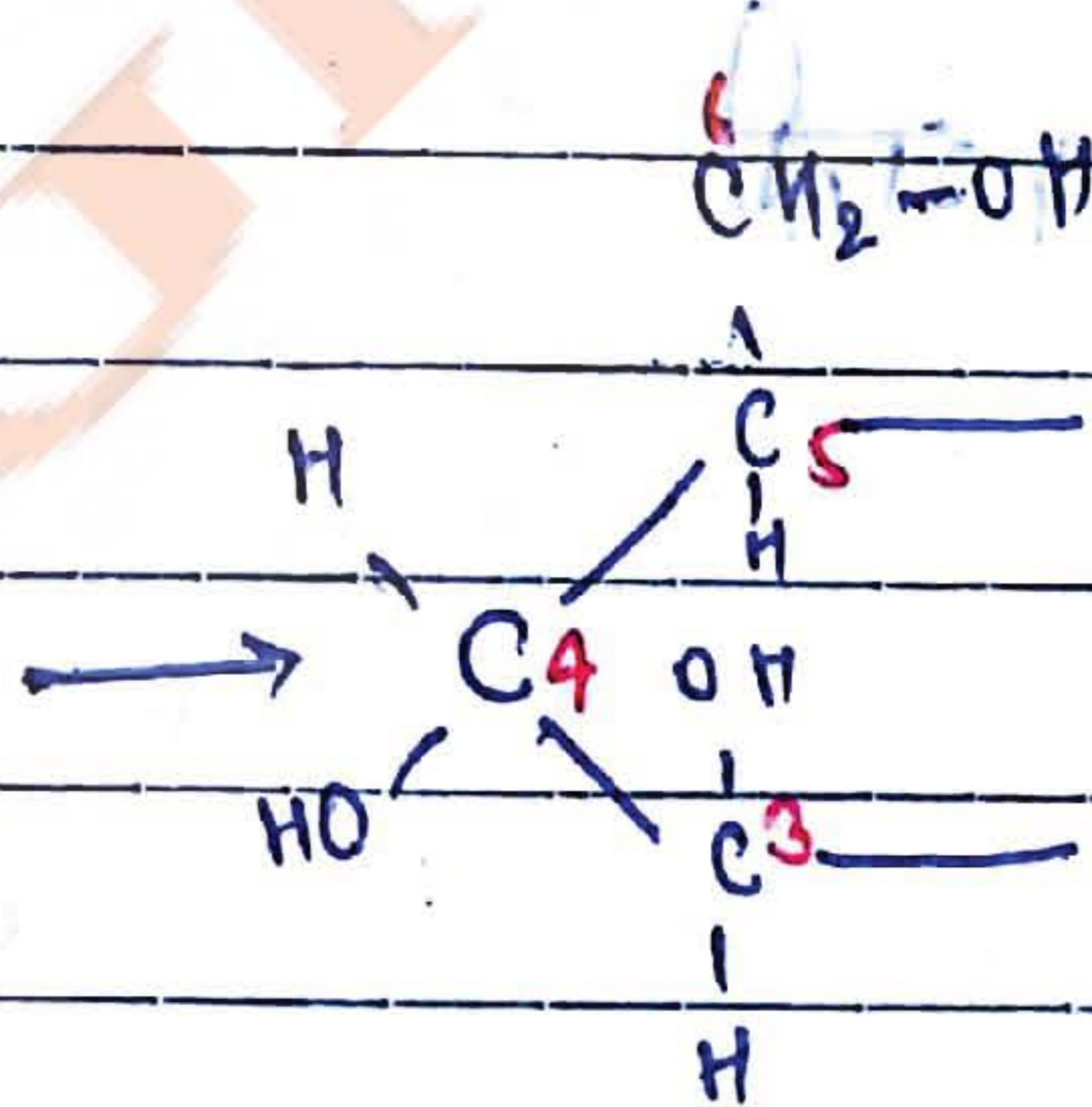
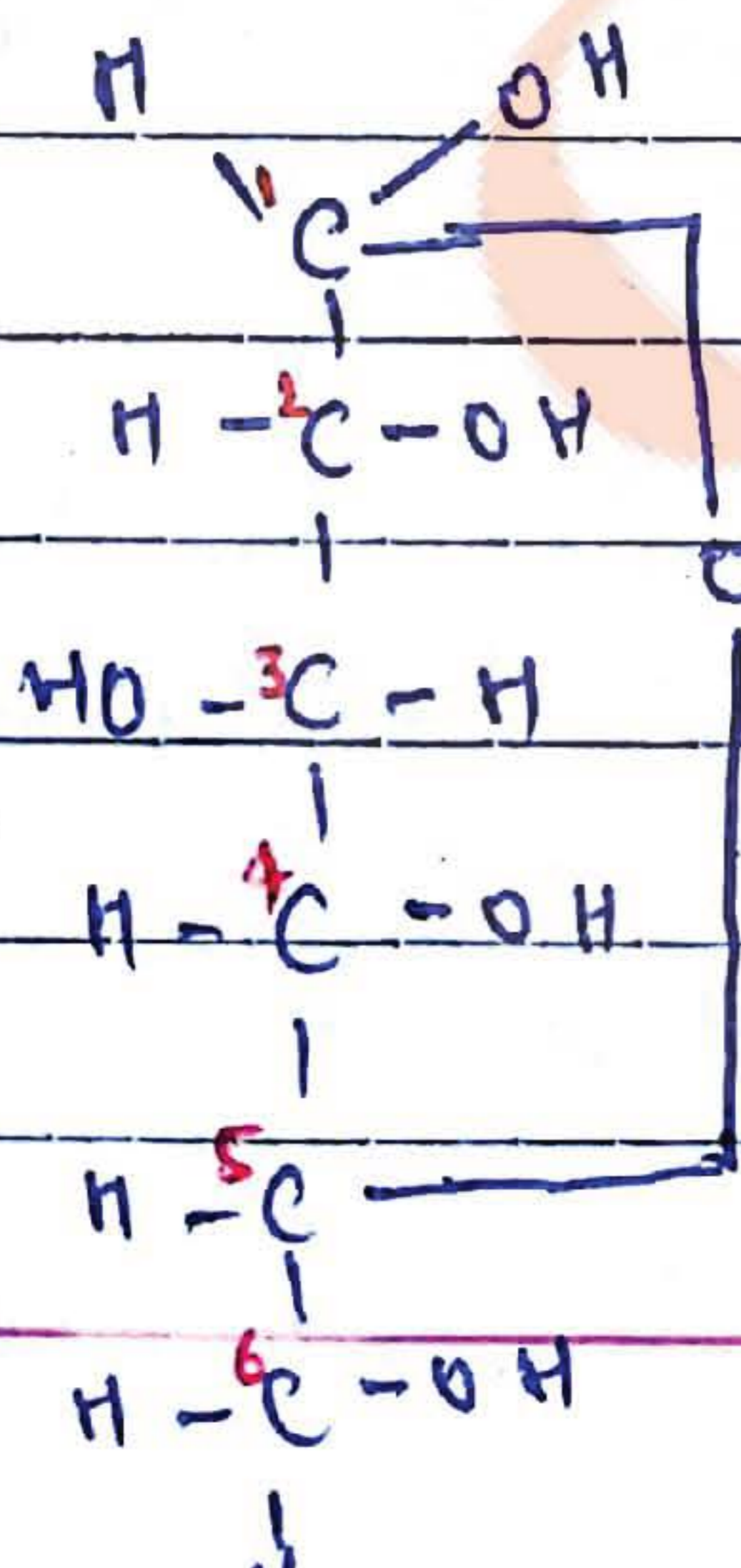
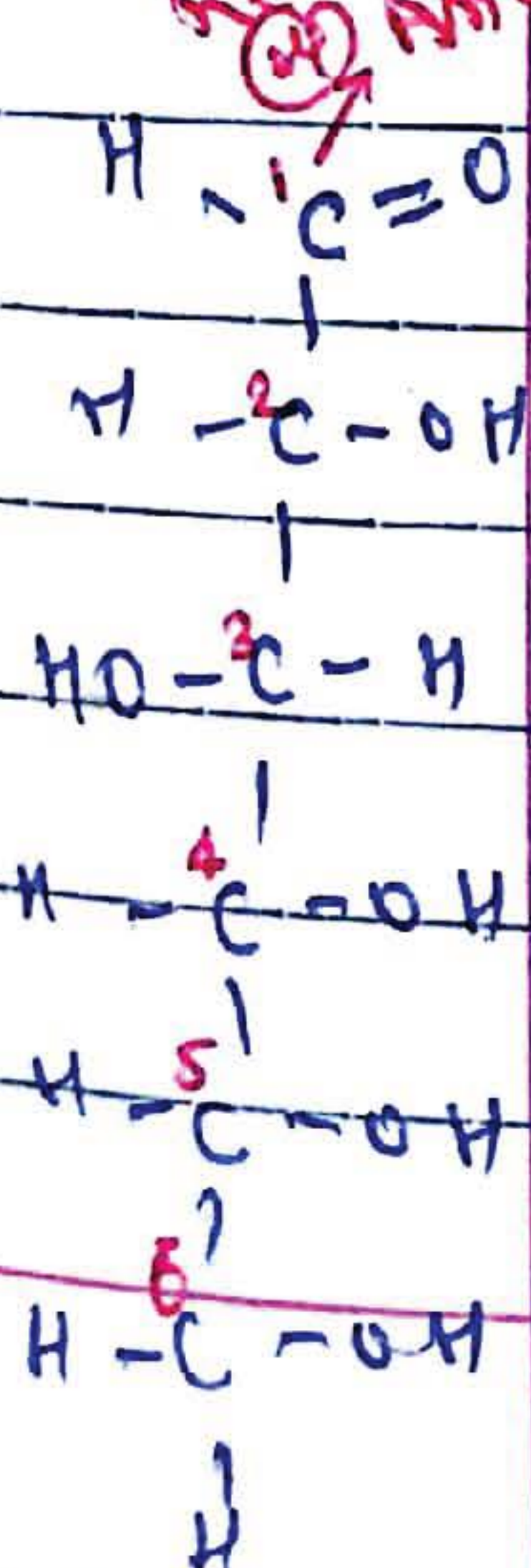
6 C Ketosp



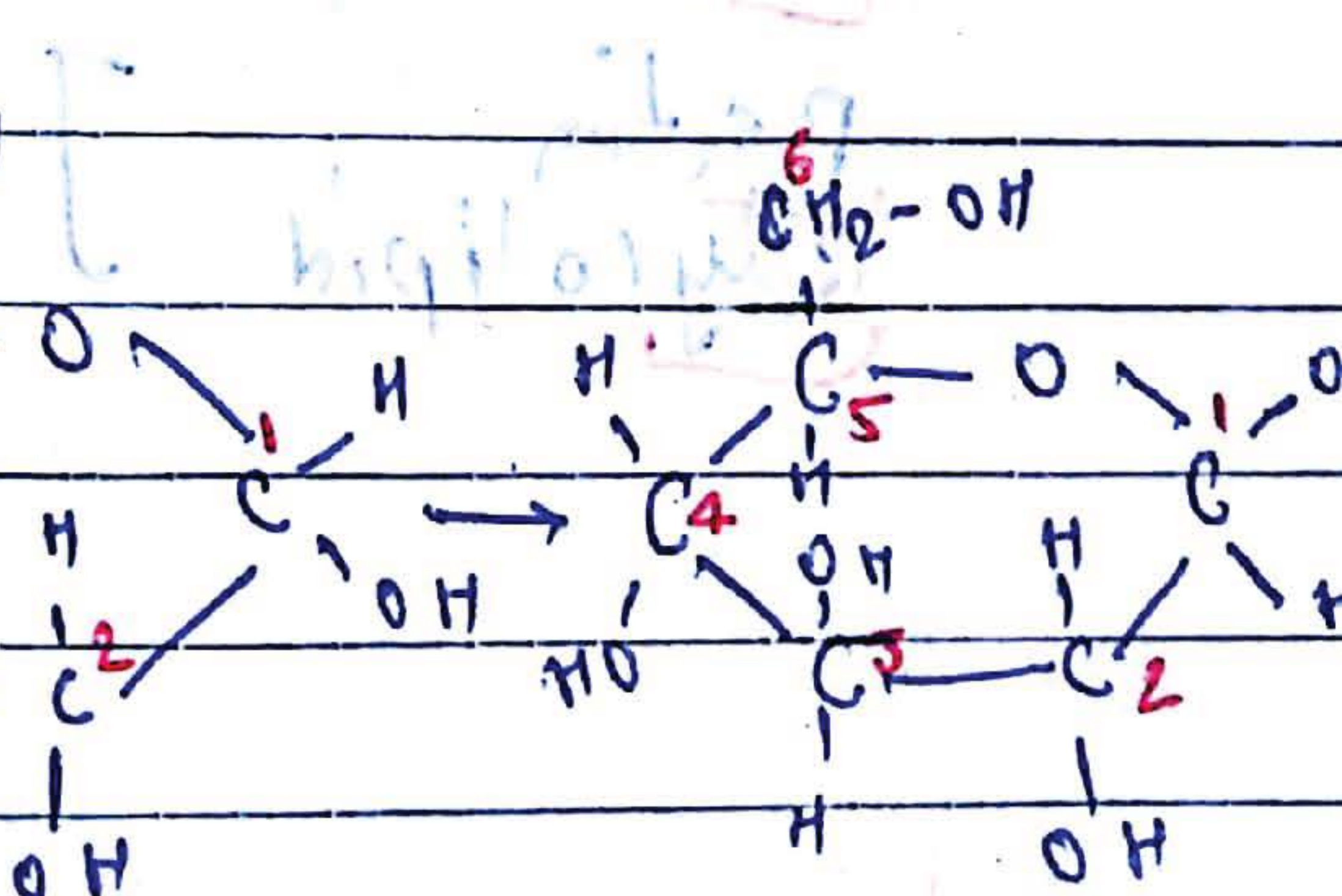
"Psicose" (Isomer of Fructose)

Straight chain structure & Ring structure of Glucose

Reducing carbons
① ② ③ ④ ⑤ ⑥
Amphoteric carbon




α -D Glucose



β -D Glucose

In the Ring structure of Glucose if hydroxyl group present on 1st carbon on downward position then it will be α -Glucose but if that hydroxyl group present on 1st carbon on upward position, then it will be β -Glucose

Pentose :-  \rightarrow XYDARR
Hexose

Rhamnose रमि चि

Mannose

Galactose गिअ

Glucose ग्लुकोस

Fruuctose फ्रुक्टोस

☆ Order of Sweetness

Fruuctose < Saccharine < Monellin < Thalimathin
 फ्रुक्टोस < सक्चरिन < मनेलिन < थलिमाथिन

- Artificial Sweetner
- ~~Protein~~ Protein derivatives
- Carcinogenic (Cancer Causing)

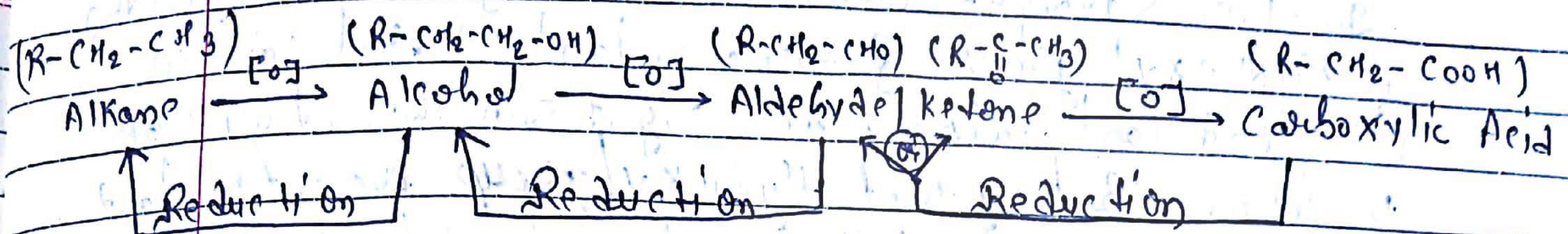
Galactose

Hem Cellulose] रमि चि

Lactose

Pectin] ग्लुकोस

Glycolipid

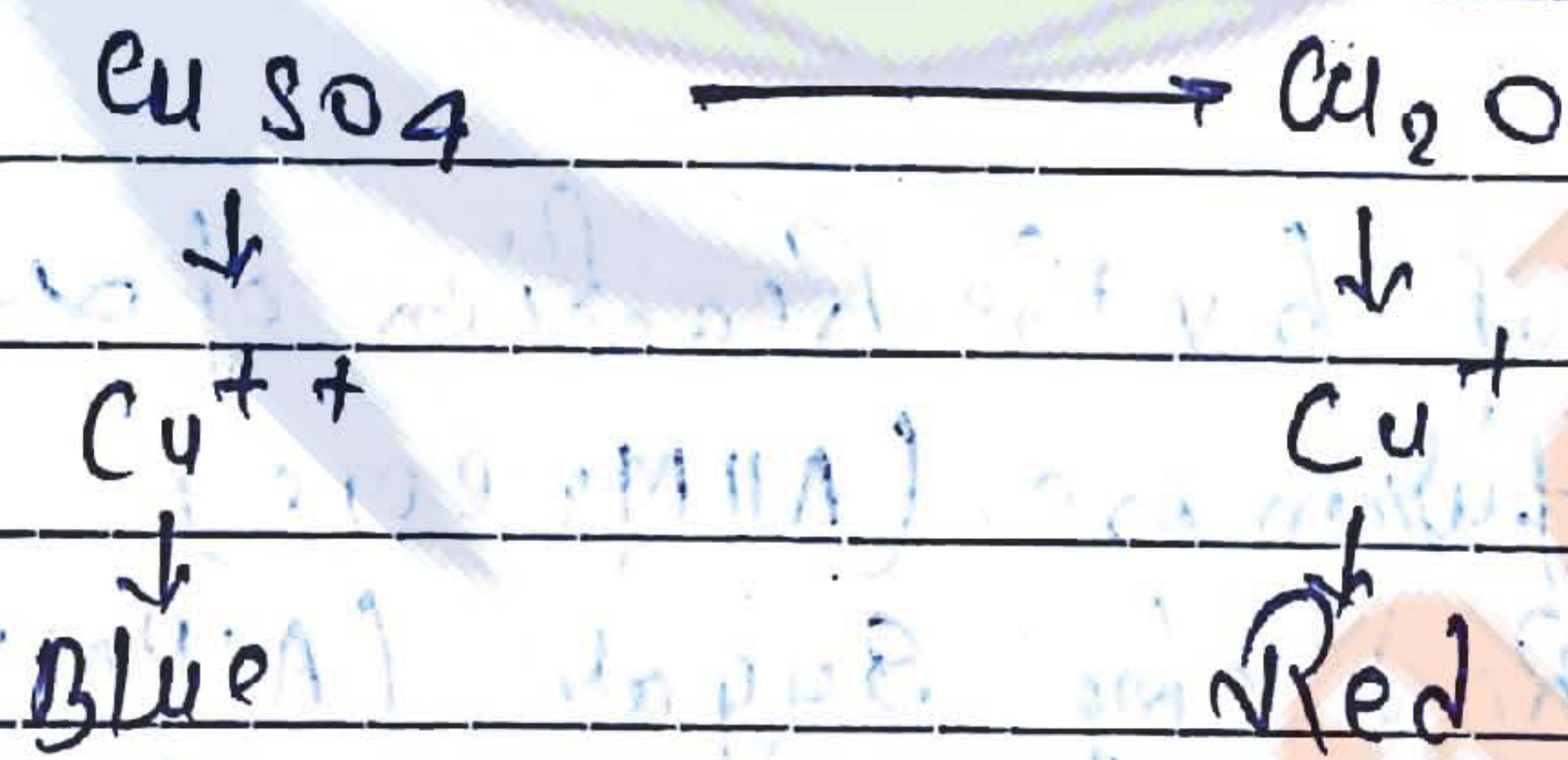


Chemically Modified Sugar / Derivatives of Monosaccharide

Tests of Monosaccharides

Due to presence of Aldehyde or ketone group all monosaccharides have reducing nature, so all monosaccharides so Benedict's Test and Fehling Test.

In Benedict's Test, Benedict's solution is used in which $CuSO_4$ is present and in $CuSO_4$ copper is present in Cu^{++} state and its colour is blue, but Aldehyde or ketone group of monosaccharides reduce $CuSO_4$ into Cu_2O and in Cu_2O copper is present in Cu^+ state and its colour red.

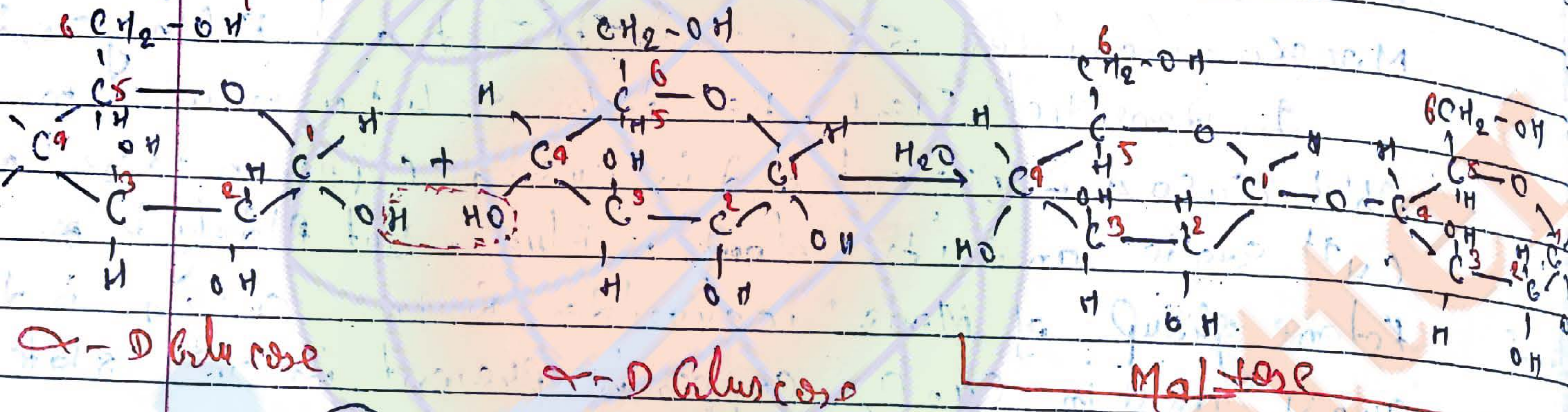


- Benedict's Test is also used to determine the presence of Glucose in urine
- Normally Glucose is Absent in urine but in Diabetes it is present and it can be checked by this test
- Result: 1st Carbon is Reducing center in the case of Aldose sugar while 2nd Carbon is Reducing center in the case of Ketose sugar.

In the straight chain structure of monosaccharides if hydroxyl group present on last chiral carbon (second last carbon) on Right side then it will be "D-form" But if that hydroxyl group present on last chiral carbon on left side then it will be "L-form" (Mirror image of each other)

① Ligo Saccharides

Maltose :-



Sucrose

- Sucrose is Made up by the Reaction of α -D Glucopyranose and β -D Fructofuranose (AIIMS 2015)
- Sucrose is Non-Reducing Sugar (AIPMT 2014, 2015) because Reducing centers of Both Glucose (1st carbon) and Fructose (2nd carbon) are conjugated in glycosidic bonding.
- But hydrolysed solution of Sucrose is Reducing because Reducing centers of both Glucose and Fructose become free. Due to hydrolysis
- Sucrose is Dextrorotatory but hydrolysed solution of Sucrose is laevorotatory, so

Poly Saccharides

$(\text{Mono Saccharide})_n \longrightarrow \text{poly saccharide}$

$(\text{monomers})_n \longrightarrow \text{Polymers / Macromolecule}$

Poly saccharides are of Polymers / Macromolecule of
Mono Saccharides (Monomers)

unit, monomers and Building Block are Synonyms

cellulose, starch & Glycogen are common poly-
Saccharides made up of glucose so, they are
commonly known as Glycoses

In Glycogen 1-6 linkage is more with Amylopectin Part
of starch

Q. A diglyceride. Made up of Palmitic Acid ($C_{15}H_{31}COOH$) and glycerol. If the Molecular Weight of the palmitic Acid is "P" and the Molecular Weight of glycerol is 92, then what will be Molecular Weight of that diglyceride

$$3P + 92 = \text{Mw diglyceride} + 3(18)$$

Compound Lipid:

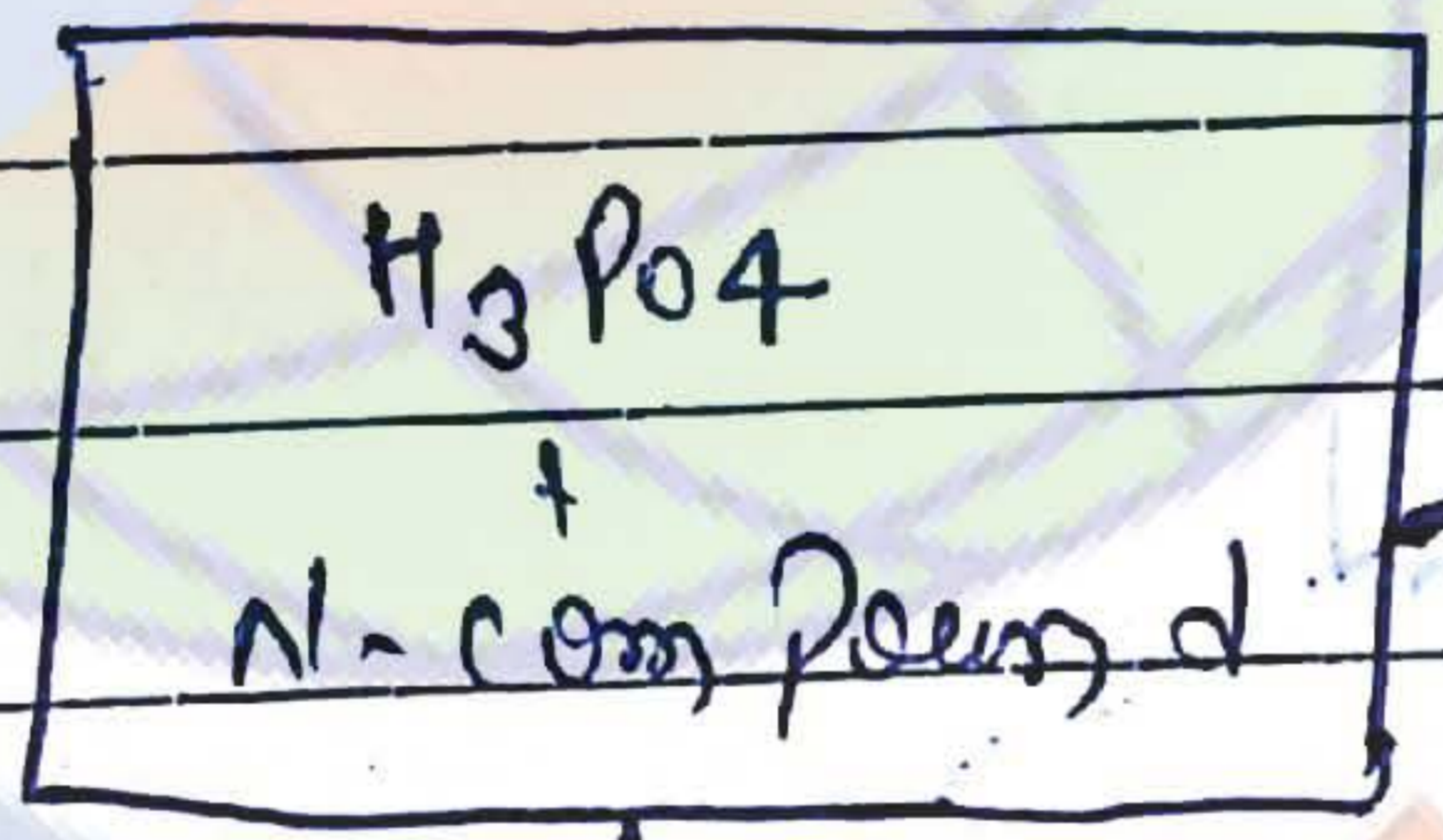
phospholipid
 @ phosphoglyceride

Glycolipid

phospholipid = 2 Fatty Acids + 1 Glycerol + H_3PO_4 + N-Compound

Hydrophobic
 @ Non-Polar

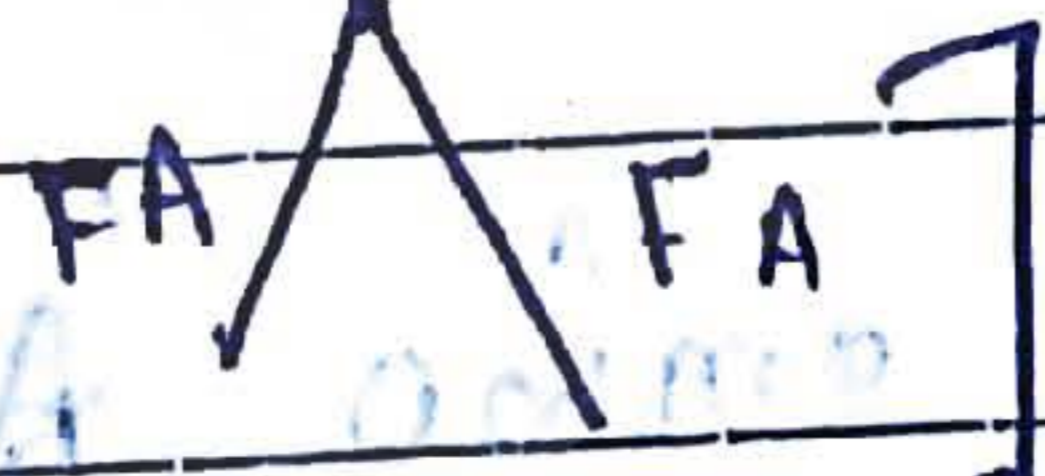
Hydrophilic @ Po



Head → Hydrophilic

G
L
Y

C
E
R
O



Tail = Hydrophobic

