ARJUNA NEET BATCH

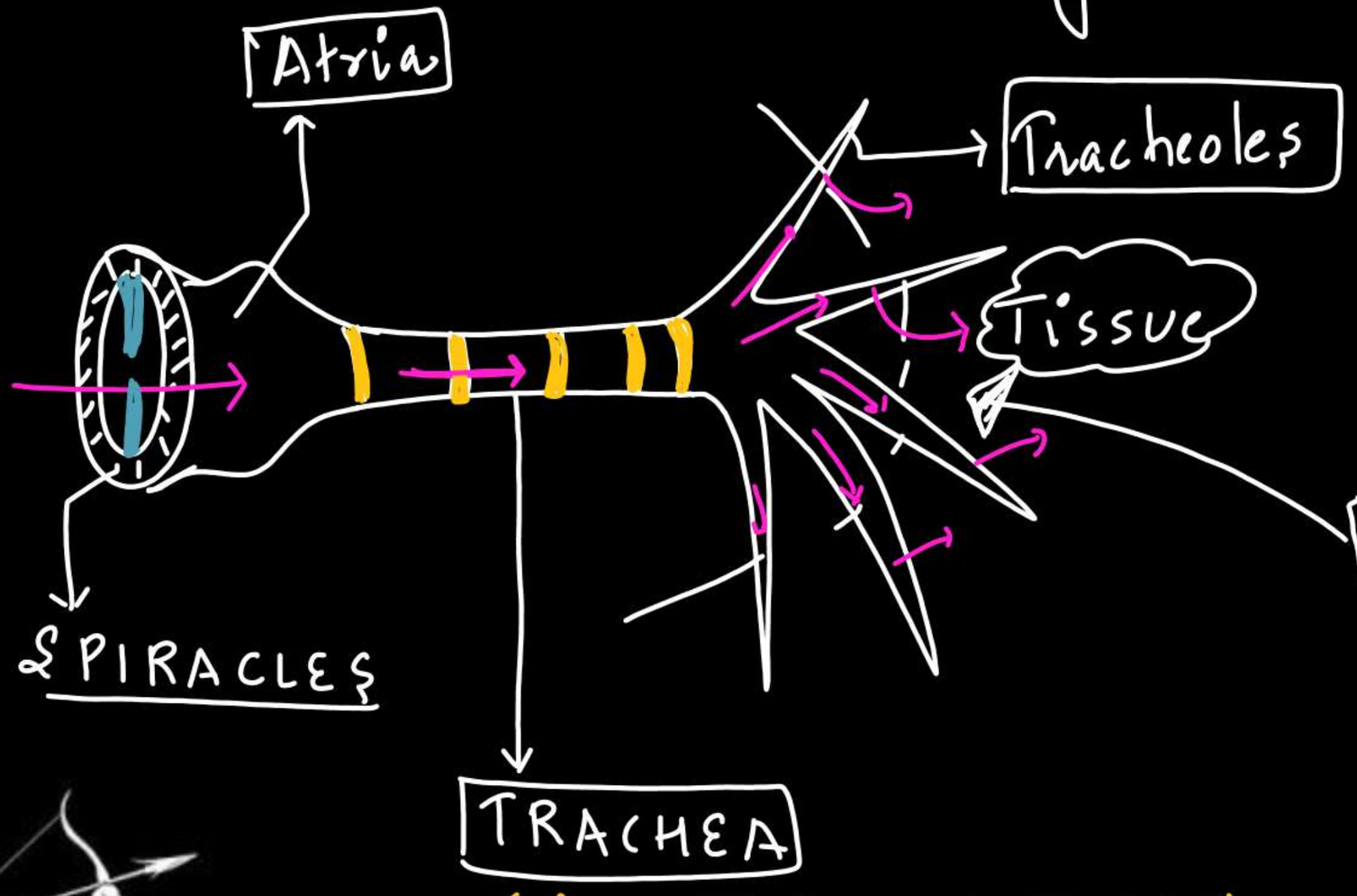
STRUCTURAL ORGANISATION IN ANIMALS- LECTURE -09

Objective of today's class

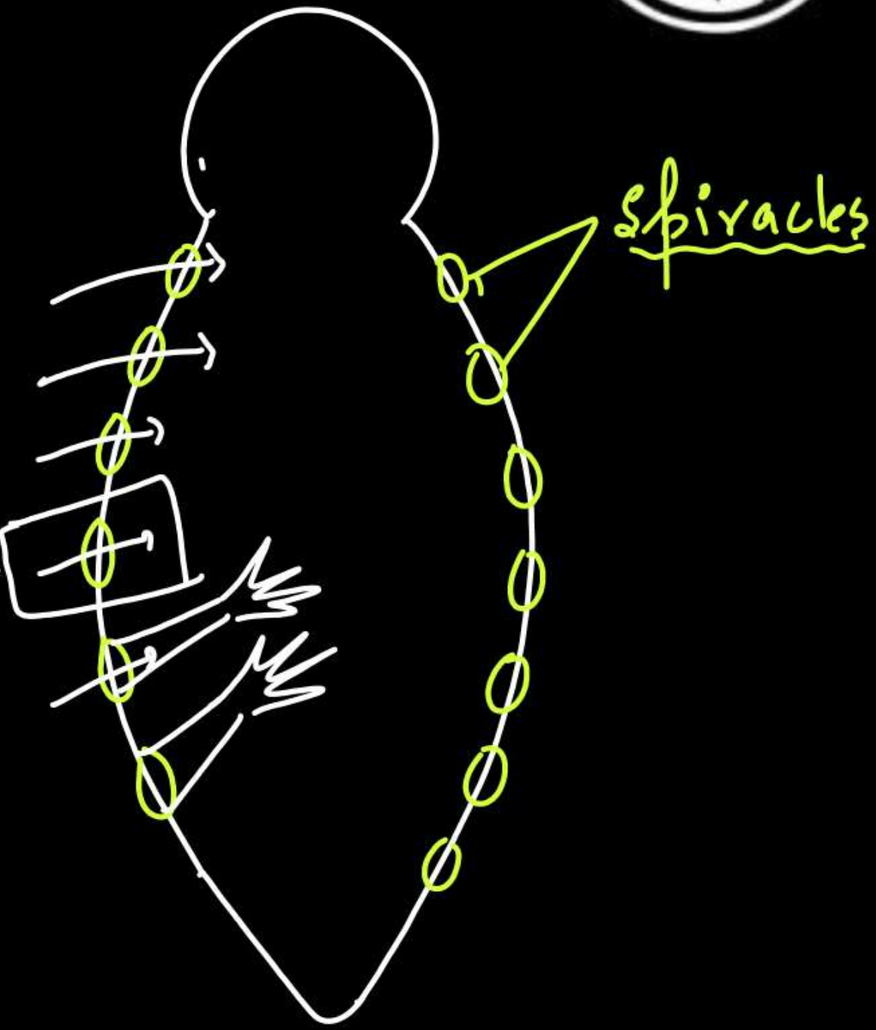
COCKROACH –PART 2

Respiratory system

→ Tracheal system



(has CHITINOUS RINGS)



Spiracles → Lateral openings → 10 pair → 2 thoracic
→ 8 Abdominal

→ Guarded by SPHINCTERS
↳ regulate opening of spiracle

Air

↓

Atria

↓

Trachea

↓

Tracheoles

↓

Simple diffusion occurs → Air → Tissue

Note: Cockroach Blood/haemolymph has NO RESPIRATORY PIGMENT (haemoglobin) hence it plays NO ROLE in RESPIRATION.

Circulatory system

→ OPEN-TYPE → There is NO CLOSED NETWORK of Blood vessel, instead Blood moves in open Space of a SINUSES

Heart

13 Chambers

Sinuses → also Known as "Haemocoel"

present

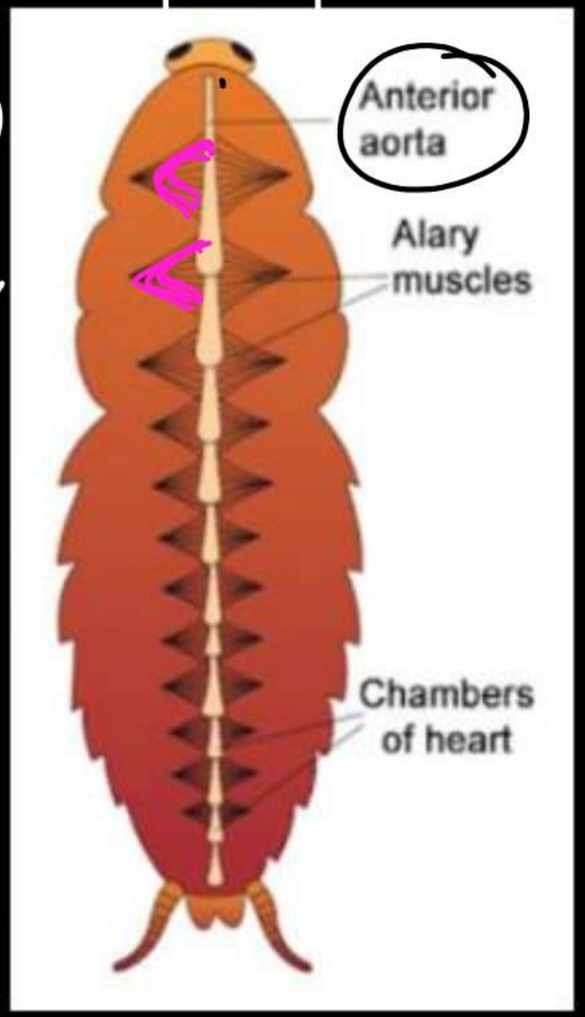
Haemolymph

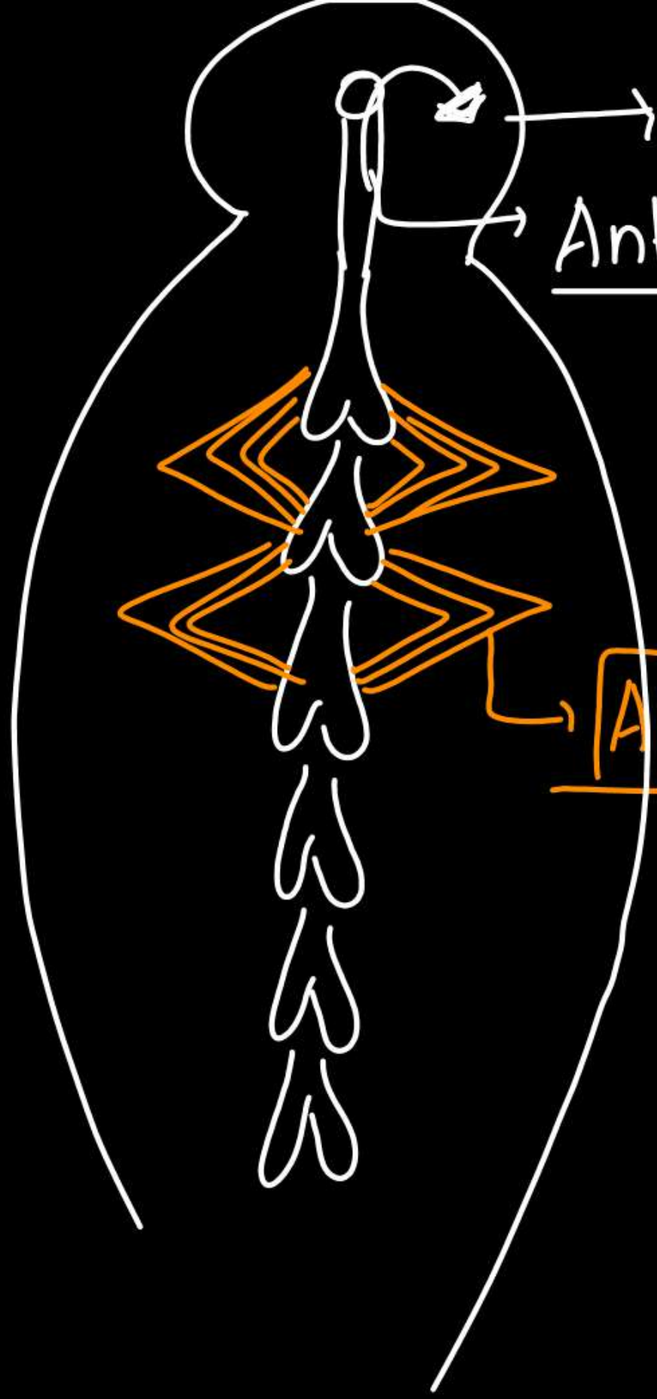
Anterior Aorta → connected to 1st chamber & dumps the Blood into cephalic sinus

→ Blood → Colorless → No Haemoglobin

→ OSTIA

Openings present Laterally through which Blood enters into Heart





Cephalic sinus

Ant. aorta

1 pair between 2 chamber

Alary Muscles

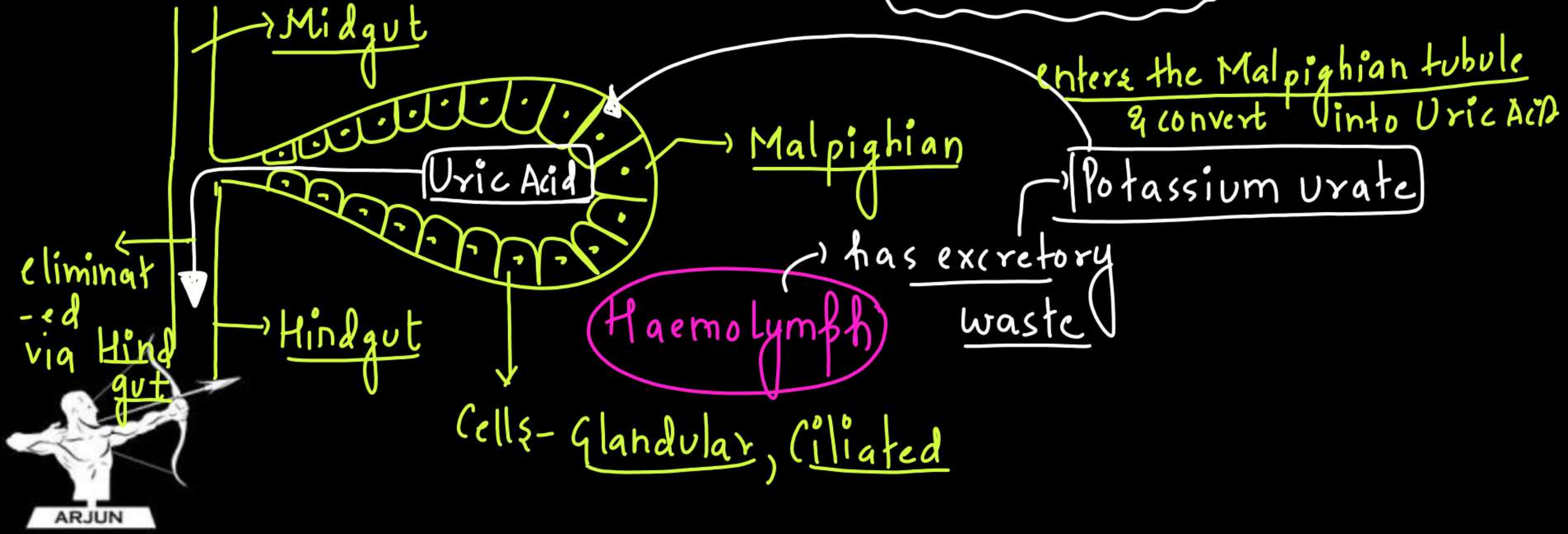
12 pair fan shaped Muscle which regulates the opening of Ostia.

Excretory system

→ Malpighian tubules → 100 - 150

↳ between Midgut & Hindgut

Excretory product → URIC-ACID → URICOTELIC

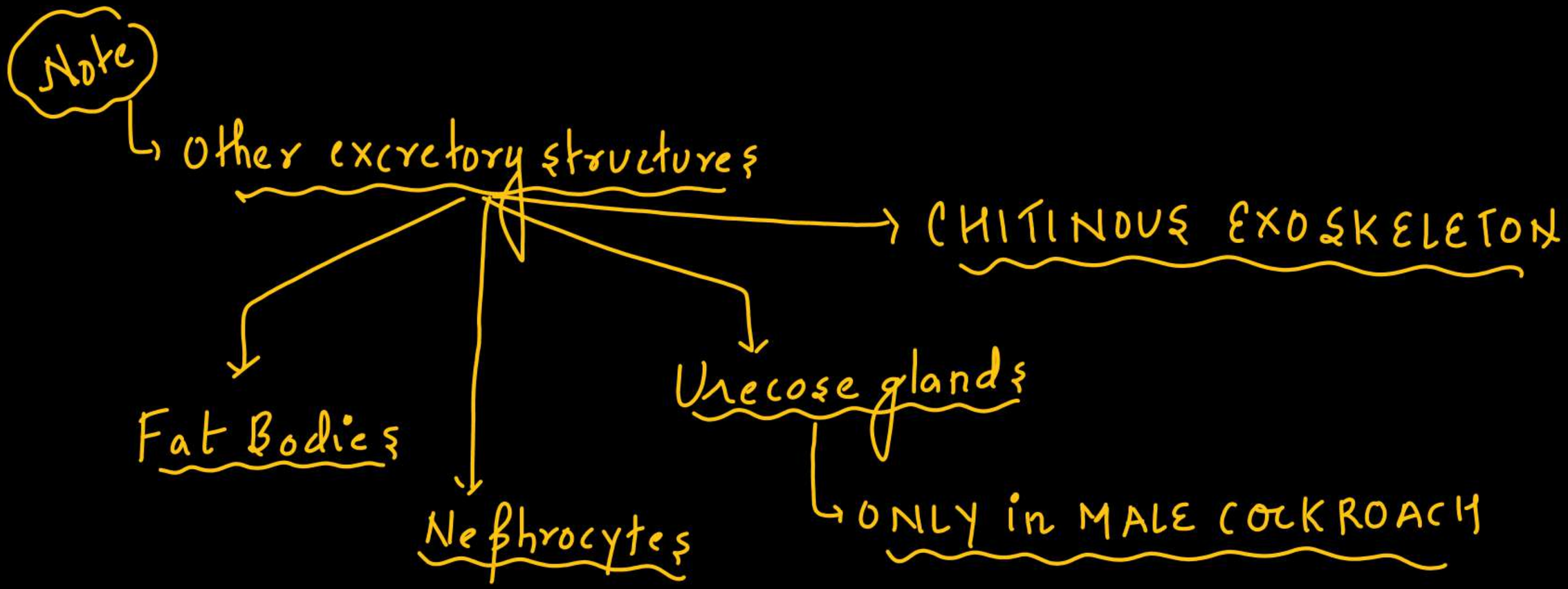


enters the Malpighian tubule & convert into Uric Acid

→ Potassium urate

→ has excretory waste

eliminat -ed via Hind gut


Note
Other excretory structures
CHITINOUS EXOSKELETON
Fat Bodies
Nephrocytes
Urecose glands
ONLY in MALE COCKROACH

Nervous system

The nervous system of cockroach consists of a series of fused, segmentally arranged ganglia joined by paired longitudinal connectives on the ventral side. Three ganglia lie in the thorax, and six in the abdomen.

Nervous System ★★★

Brain

Represented By

SUPRA-OESOPHAGEAL GANGLION

controls Head

Nerve cord

on top it has ganglions

9

3 thoracic

6 Abdominal

DOUBLE, VENTRAL SOLID

Ganglion
↳ fusion of Cell Body

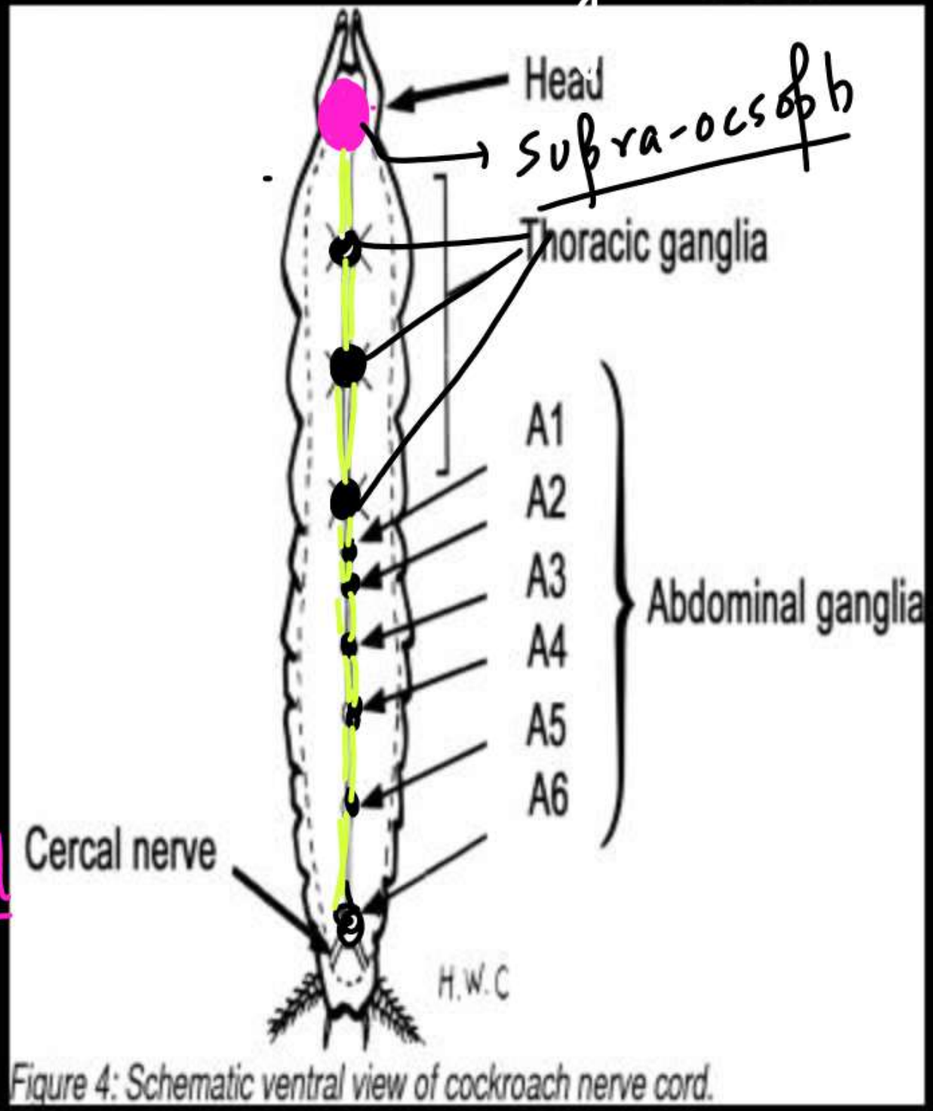


Figure 4: Schematic ventral view of cockroach nerve cord.

Sensory structures

→ Antennae, Maxillary palps, Ocelli
, Compound eyes — Labial palps

Ocelli → Non-functional Simple-eye.

Vision → MOSAIC VISION → Image in Bits & Pieces

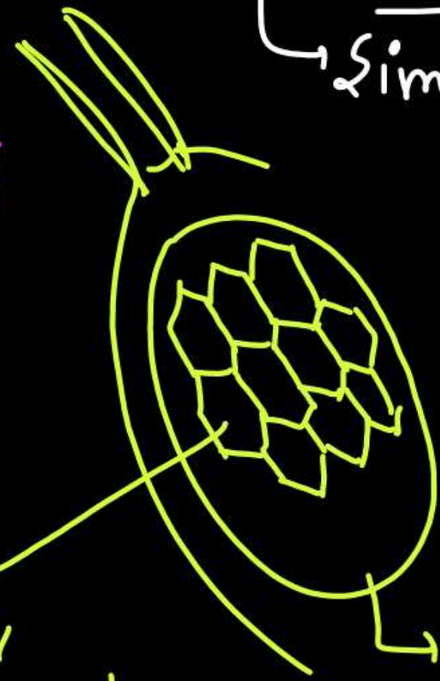
Sensitivity ↑↑↑↑, Resolution Poor

functional unit

OMMATIDIUM

Each eye has 2000

hexagonal structure



Compound eye

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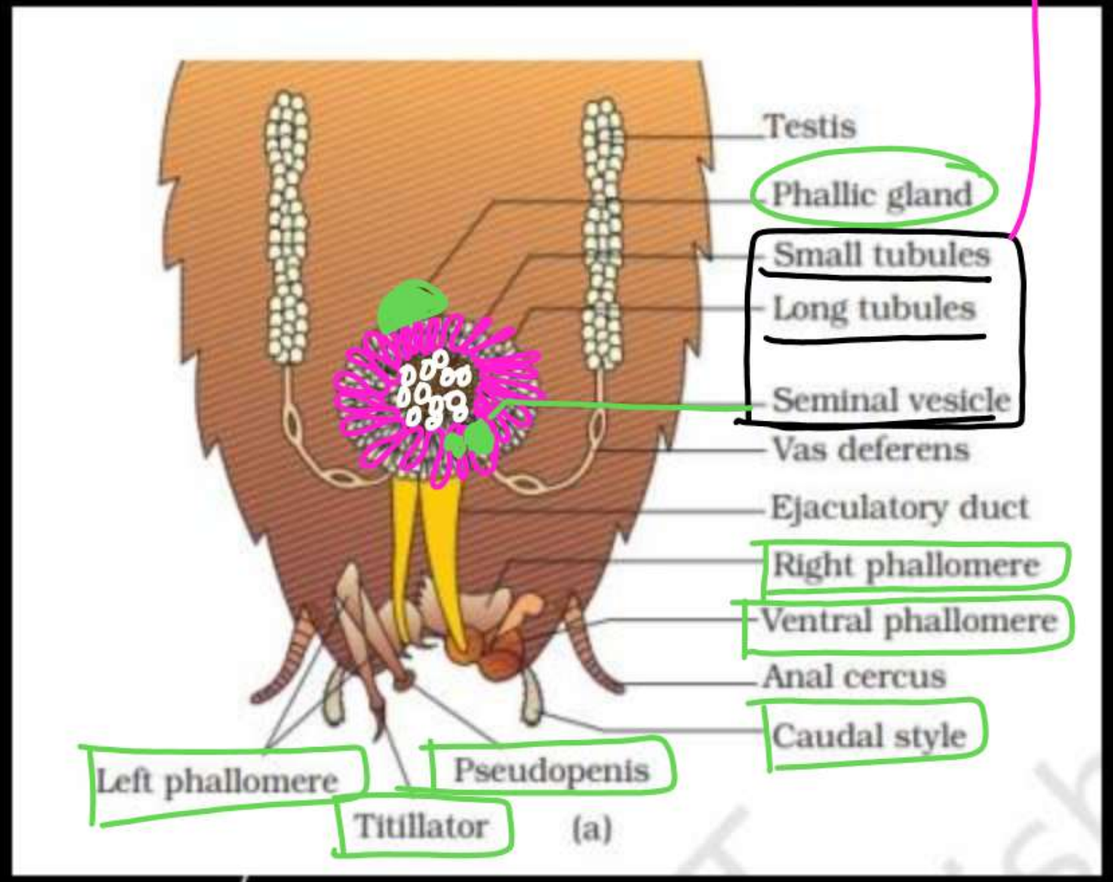
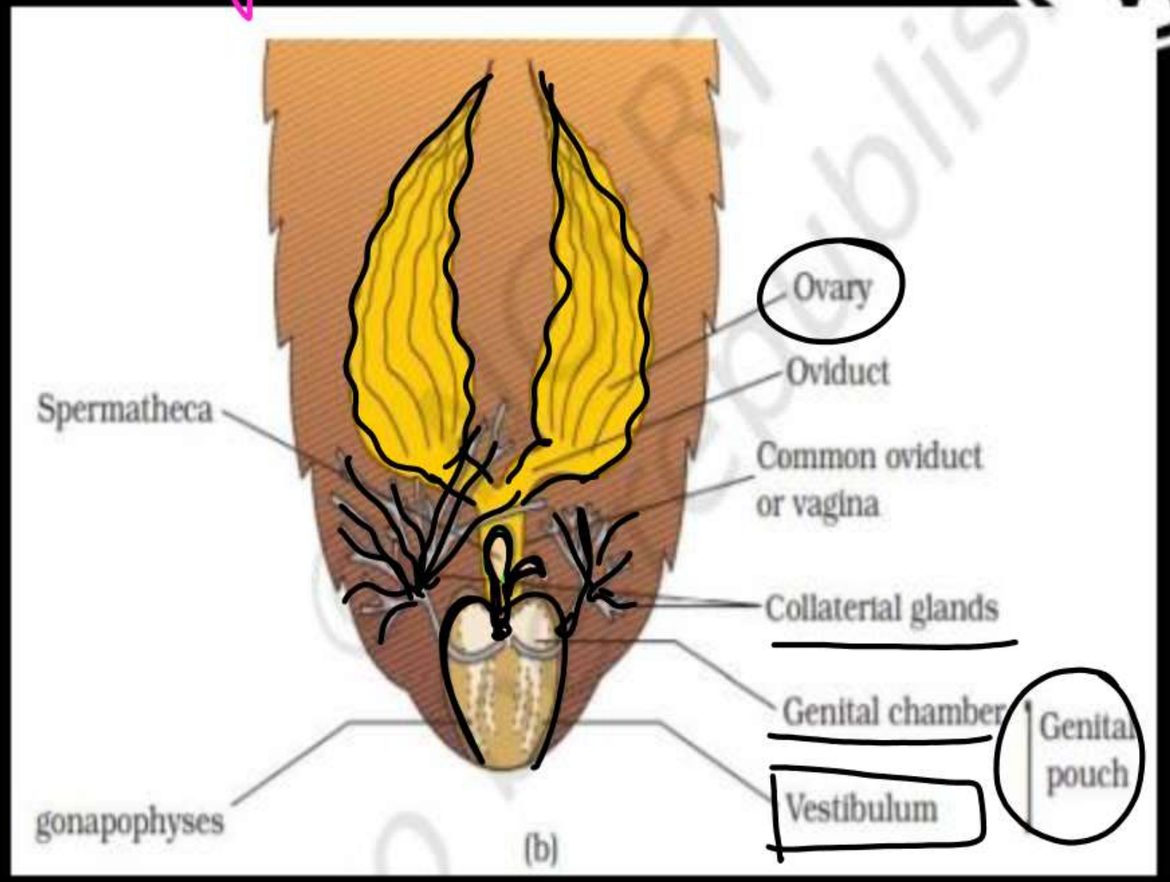
Reproductive system

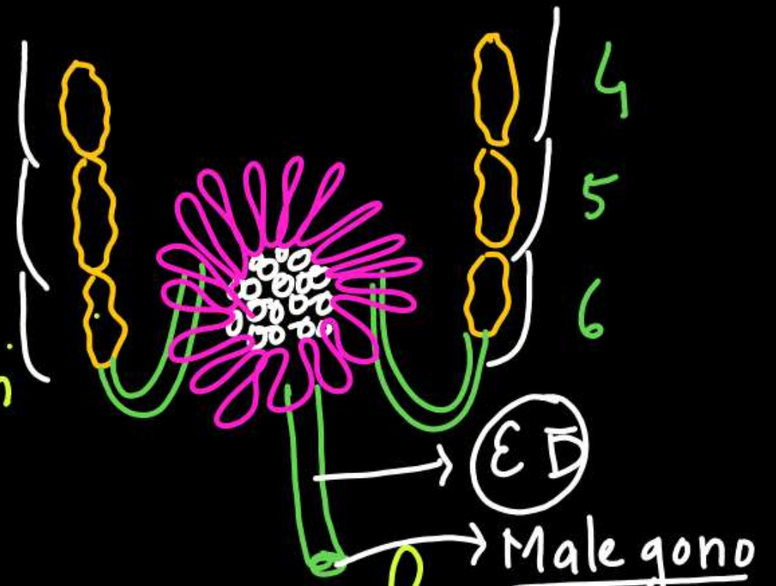
→ Mushroom gland





Male Reproductive System

① TESTES: 1 pair → Each testis is TRILOBED
- → Formation of SPERMS → spermatogenesis
- → Location → 4th, 5th, 6th abdominal Segments



② VAS DEFERENS: 1 pair, from Each testis, arises 1 Vas deferens to carry sperms

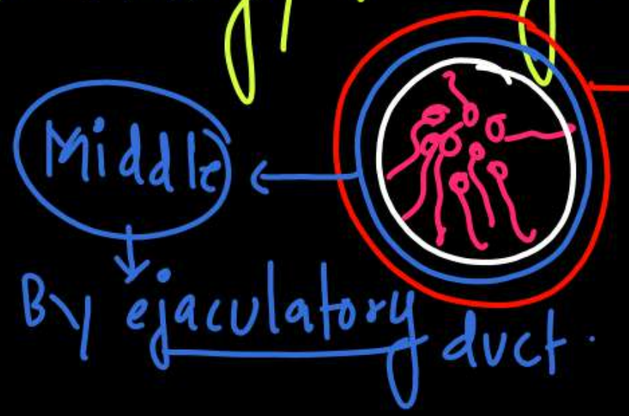
③ EJACULATORY DUCT: It is formed by fusion of Both Vas deferens, its opening is called MALE GONOPORE / MALE GENITAL PORE

(4) Mushroom gland: Located 6-7th abdominal segment
→ UTRICULAR GLAND

→ Small tubules → also K/a Utricular Breviore
↳ provides Nourishment to Sperms

→ Long tubules → also K/a Utricular Majore
↳ forms the innermost Layer of "SPERMATOPHORE"

→ Seminal Vesicle
↳ Its secretion helps in sticking / gluing the Sperms together to form SPERMATOPHORE
↳ Storage of Spermatophore



⑥ Phallic gland : It is also K/a CONGLOBATE GLAND
↳ Secretion of outer Layer of Spermatophore.

Note Spermatophore is a 3 Layer structure.

⑦ Male genital pouch : formed by 9th, 10th tergum along 9th sternum.

⑧ External genetalia / Phallomeres
↳ are hard Chitinous structure also K/a GONAPHYSIS helping in COPULATION

Female Reproductive System:

(1) OVARY: 1 pair, Located - 2-6th abdominal segment

↳ egg/ova formation - OOGENESIS

1 ovary → 8 ovarioles, 1 ovariole → 1 egg

∴ 16 ovariole → 16 egg

(2) OVIDUCT: from each ovary, arises 1 oviduct to carry eggs

(3) COMMON OVIDUCT: Both oviduct fused to form common Oviduct/VAGINA whose opening called FEMALE GONOPORE

④ Collateral gland → 1 pair

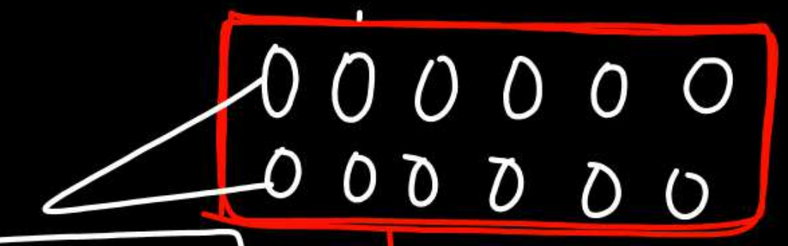
↳ Secretion → helps in formation of OOTHECA → Egg Case

⑤ SPERMATHECA

↳ 1 pair

↳ 6th Abdominal

↳ Receive & stores the spermatophore during copulation



fertilised egg

In 2 Rows

ootheca → 8mm long

dark-Reddish Brownish covering

6. Genital pouch → How it is formed ??

- anterior → Genital chamber
- posterior → Vestibulum

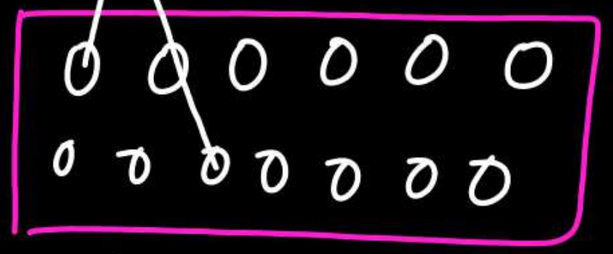
7. → Gonapophyses / Phallomeres → External Genetalia → hard Chitinous structures

FERTILISATION AND DEVELOPMENT

Fertilisation → Internal

Egg + Sperm → Zygote → ootheca is secreted immediately

14-16



8 mm long ootheca

gmf → At one time "9-10" ootheca is released

Each ootheca is having 14-16 eggs

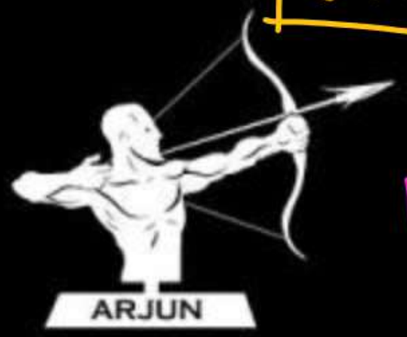
gmf:

PAUROMETABOLUS INSECTS

Nymph & Adult has same Mode of Life But different structure

Eggs → NYMPH → ADULT

13 times MOULTING



Nymph → No wing

Adult → has wing

PYQ's

1. Cuboidal epithelium with brush border of microvilli is found in: (2020)
   a. Ducts of salivary glands
   b. Proximal convoluted tubule of nephron
   c. Eustachian tube
   d. Lining of intestine

2. If the head of cockroach is removed, it may live for few days because: (2020)
   a. The cockroach does not have nervous system.
   b. The head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.
   c. The head holds a 1/3rd of a nervous system while the rest is situated along the dorsal part of its body.
   d. The supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.

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3. Goblet cells of alimentary canal are modified from: (2020)

a. Columnar epithelial cells b. Chondrocytes

c. Compound epithelial cells d. Squamous epithelial cells

4. In cockroach, identify the parts of the foregut in correct sequence: (2020 Covid Re-NEET)

a. Mouth → Crop → Pharynx → Oesophagus → Gizzard

b. Mouth → Gizzard → Crop → Pharynx → Oesophagus

c. Mouth → Pharynx → Oesophagus → Crop → Gizzard

d. Mouth → Oesophagus → Pharynx → Crop → Gizzard

5. Match the following columns with reference to cockroach and select the correct option: (2020 Covid Re-NEET)

	Column-I		Column-II
1.	Grinding of the food particles	(i)	Hepatic caecal
2.	Secrete gastric juice	(ii)	10^{th} segment
3.	10 pairs	(iii)	Proventriculus
4.	Anal cerci	(iv)	Spiracles
		(v)	Alary muscles

(GIZZARD)

	(1)	(2)	(3)	(4)
a.	(iv)	(iii)	(v)	(ii)
b.	(i)	(iv)	(iii)	(ii)
c.	(ii)	(iii)	(i)	(iv)
d	(iii)	(i)	(iv)	(ii)

6. Select the **incorrectly** matched pair from following:
(2020 Covid Re-NEET)

a. Neurons - Nerve cells
b. Fibroblast - Areolar tissue
c. Osteocytes - Bone cells
d. Chondrocytes - Smooth muscle cells

7. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in (2019)

a. Bile duct and bronchioles

b. Fallopian tubes and pancreatic duct

c. Eustachian tube and salivary duct

d. Bronchioles and fallopian tubes

Ciliated Columnar

8. Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth (2019)

a. Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum

b. Pharynx → Oesophagus → Gizzard → Crop → Ileum → Colon → Rectum

c. Pharynx → Oesophagus → Gizzard → Ileum → Crop → Colon → Rectum

d. Pharynx → Oesophagus → Ileum → Crop → Gizzard → Colon → Rectum

9. Which of the following features is used to identify a male cockroach from a female cockroach? (2018)

a. Presence of a boat shaped sternum on the 9th abdominal segment

b. Presence of caudal styles

c. Forewings with darker tegmina

d. Presence of anal cerci

13. Smooth muscles are: (2016 - II)

a. Involuntary, cylindrical, striated

b. Voluntary, spindle–shaped, uninucleate

c. Involuntary, fusiform, non-striated

d. Voluntary, multinucleate, cylindrical

14. In male cockroaches, sperms are stored in which part of the reproductive system? (2016 - II)

a. Testes

b. Vas deferens

c. Seminal vesicles

d. Mushroom glands

16. Which type of tissue correctly matches with its location? (2016 - I)

	Tissue	Location
a.	Smooth muscle	Wall of intestine
b.	Areolar tissue	Tendons
c.	Transitional epithelium	Tip of nose
d.	Cuboidal epithelium	Lining of stomach

17. The terga, sterna and pleura of cockroach body are joined by: (2015)

a. Arthrodial membrane
b. Cartilage
c. Cementing glue
d. Muscular tissue

20. The function of the gap junction is to: (2015 Re)

a. Facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules

b. Separate two cells from each other

c. Stop substance from leaking across a tissue

d. Performing cementing to keep neighboring cells together.

21. Choose the correctly matched pair: (2014)

a. Cartilage - Loose connective tissue

b. Tendon - Specialised connective tissue

c. Adipose tissue - Dense connective tissue

d. Areolar tissue - Loose connective tissue

Thank You