



CLASS XI

ALL NCERT DIAGRAMS

CHAPTER-1

THE LIVING WORLD

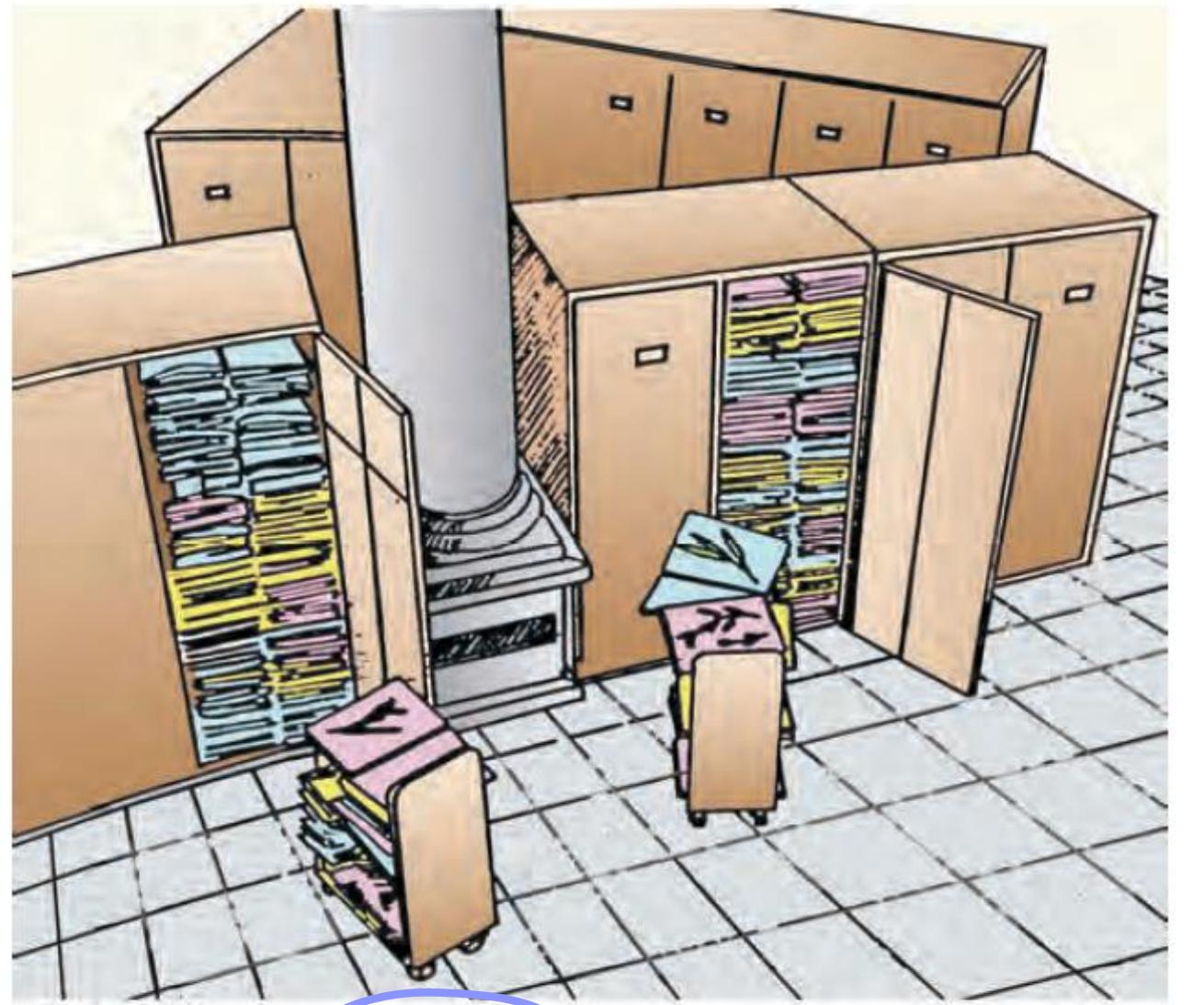
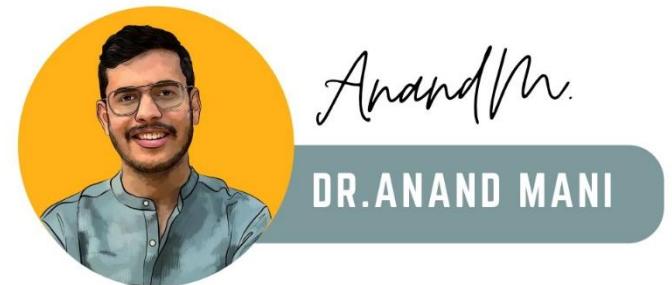


Figure 1.2 Herbarium showing stored specimens

X





X

C

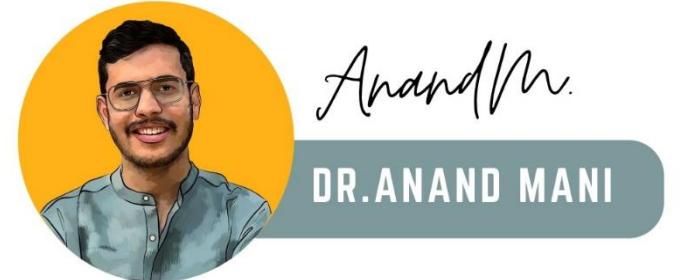
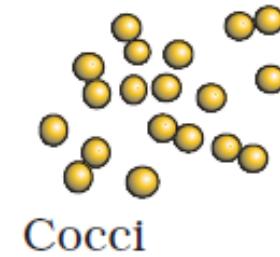


Figure 1.3 Pictures showing animals in different zoological parks of India

CHAPTER-2



BIOLOGICAL CLASSIFICATION



Spherical

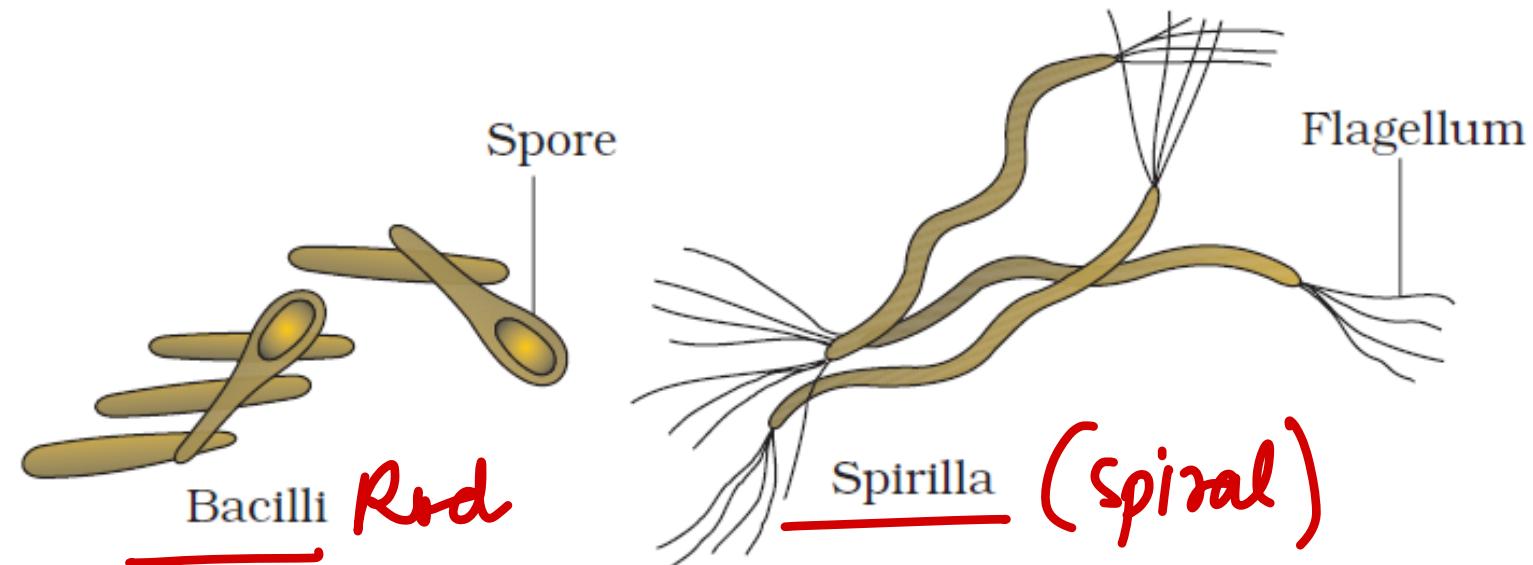


Figure 2.1 Bacteria of different shapes



Vibrio

(comma shaped)



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Identify

Streptococcus

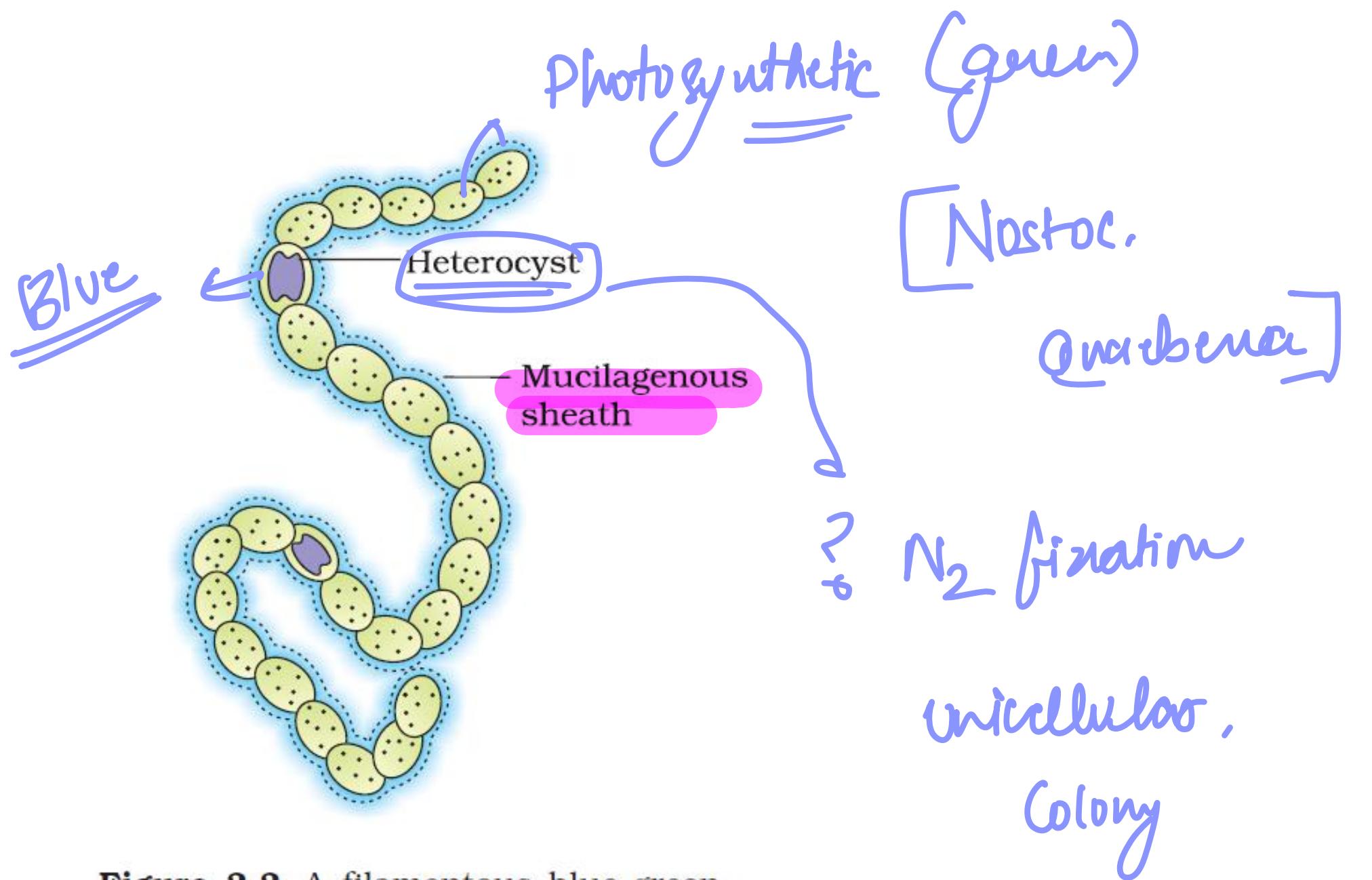
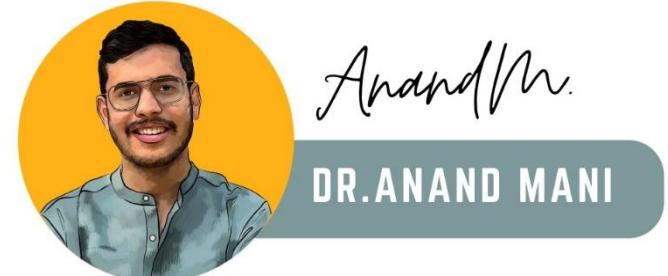


Figure 2.2 A filamentous blue-green algae – Nostoc



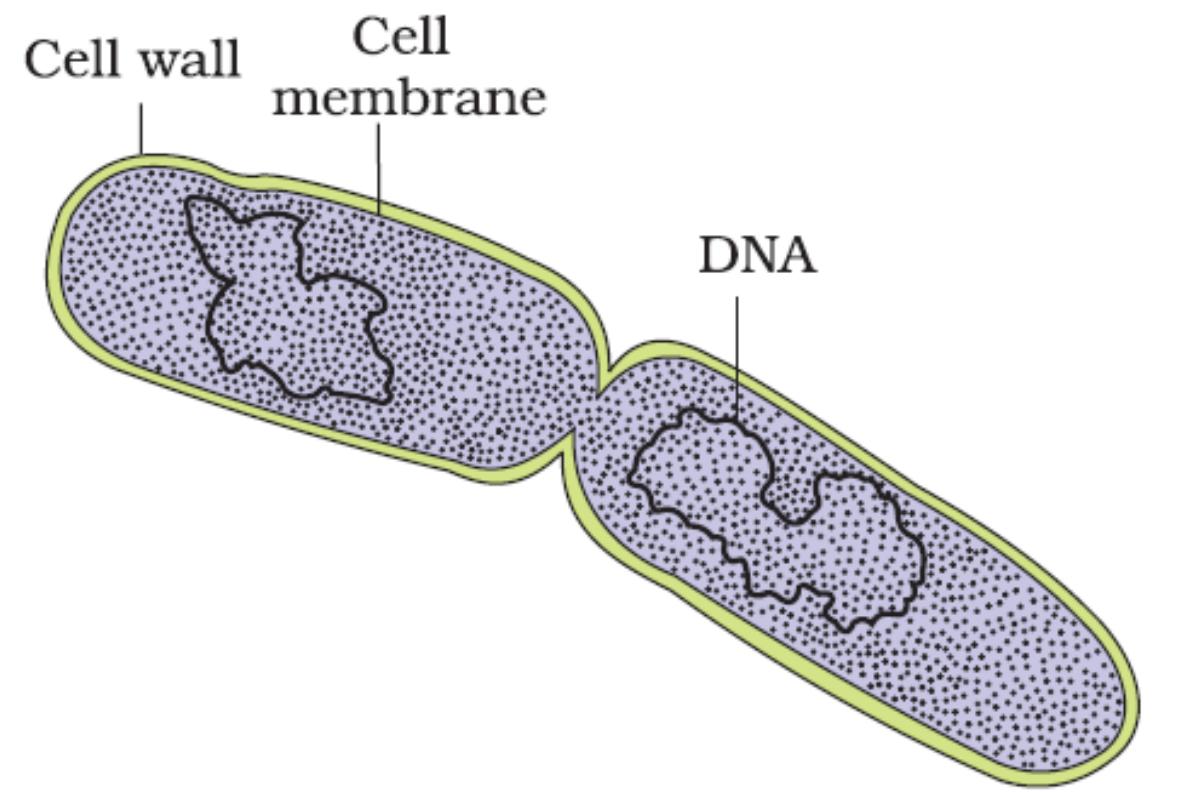


Figure 2.3 A dividing bacterium

① Binary fission

② Equal division

Nucleus
Cell divide



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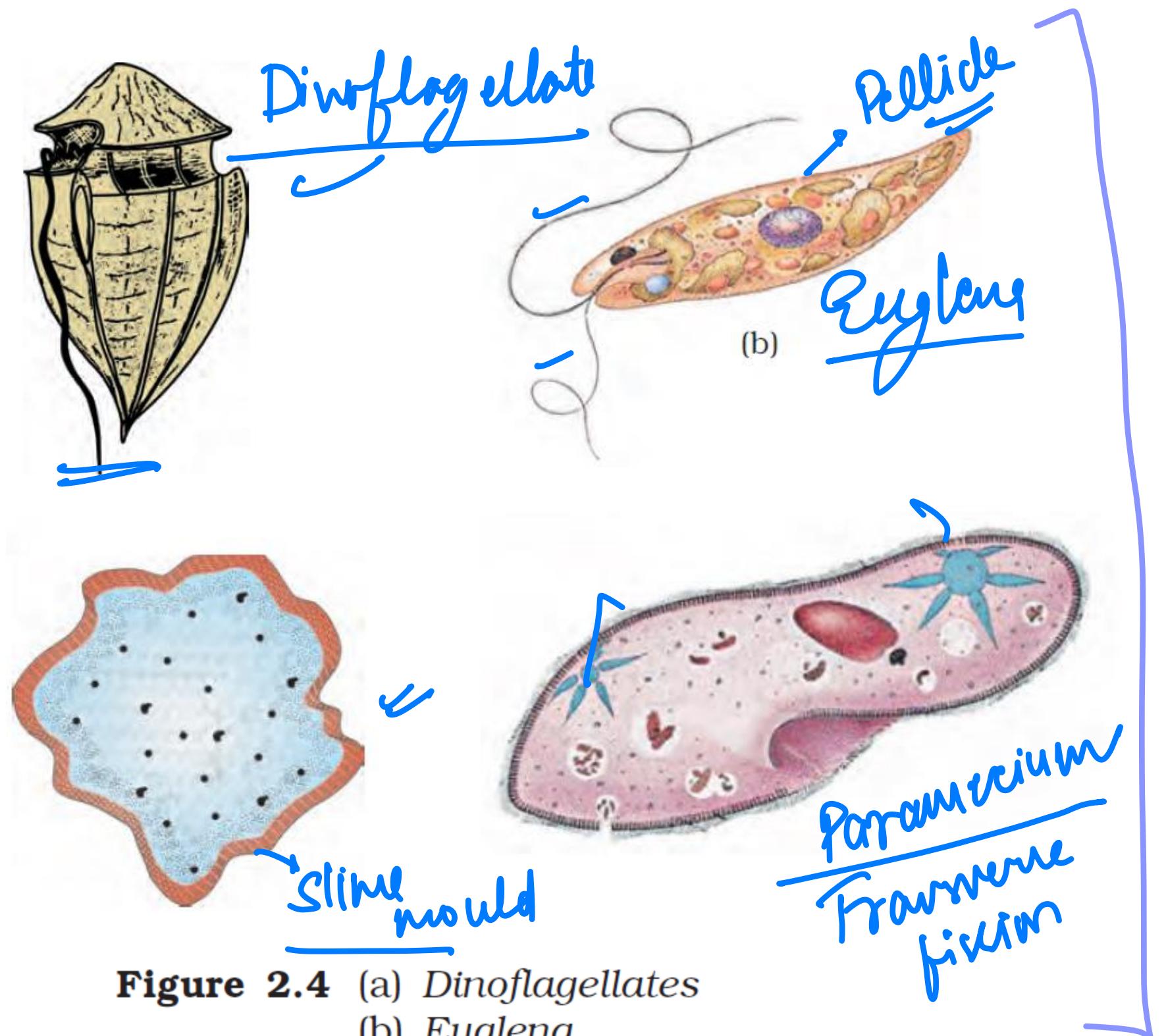


Figure 2.4 (a) *Dinoflagellates*
 (b) *Euglena*
 (c) *Slime mould*
 (d) *Paramecium*

Kingdom:
Protista

Identification



Mucor (Phycomycetes)



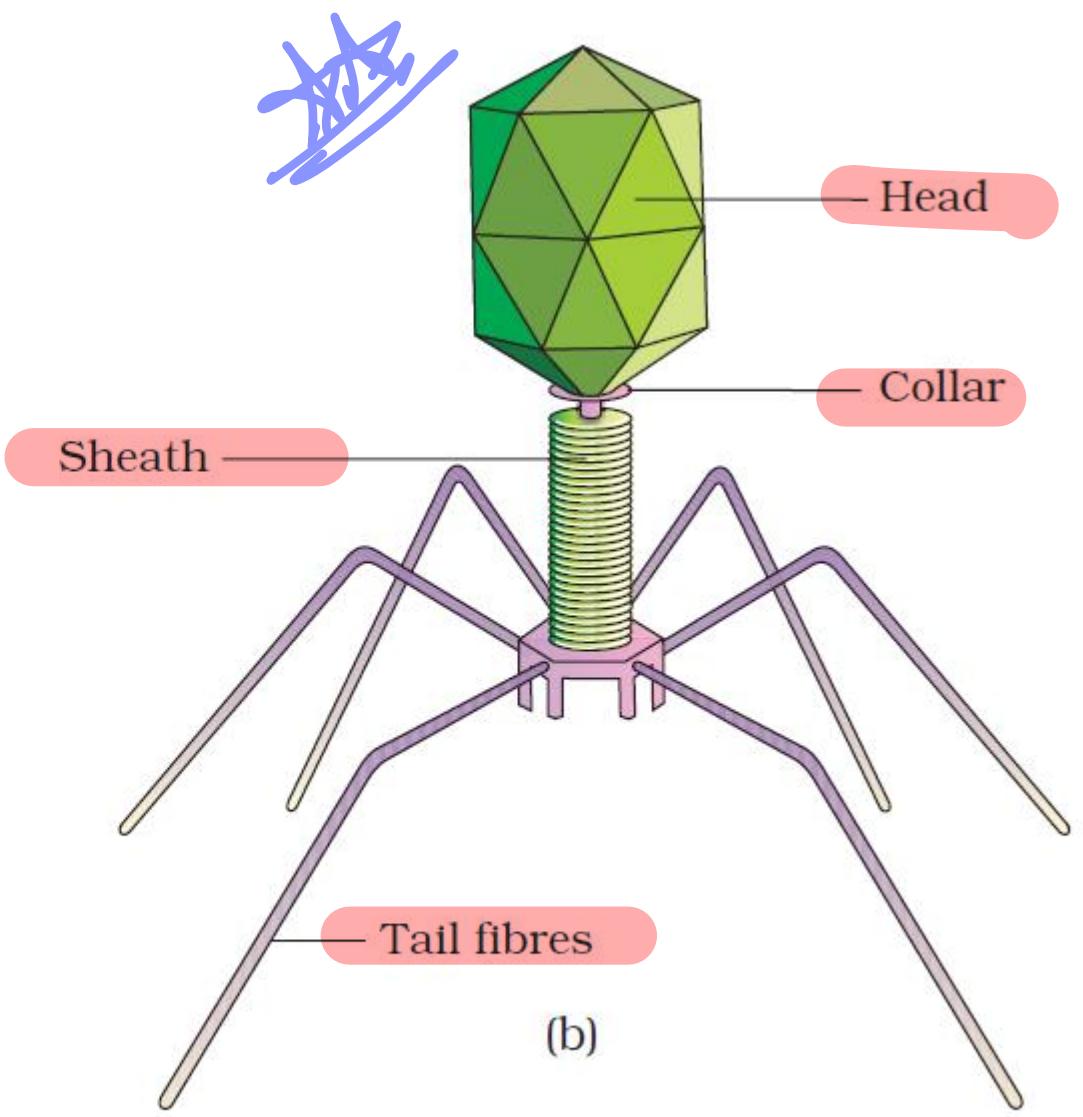
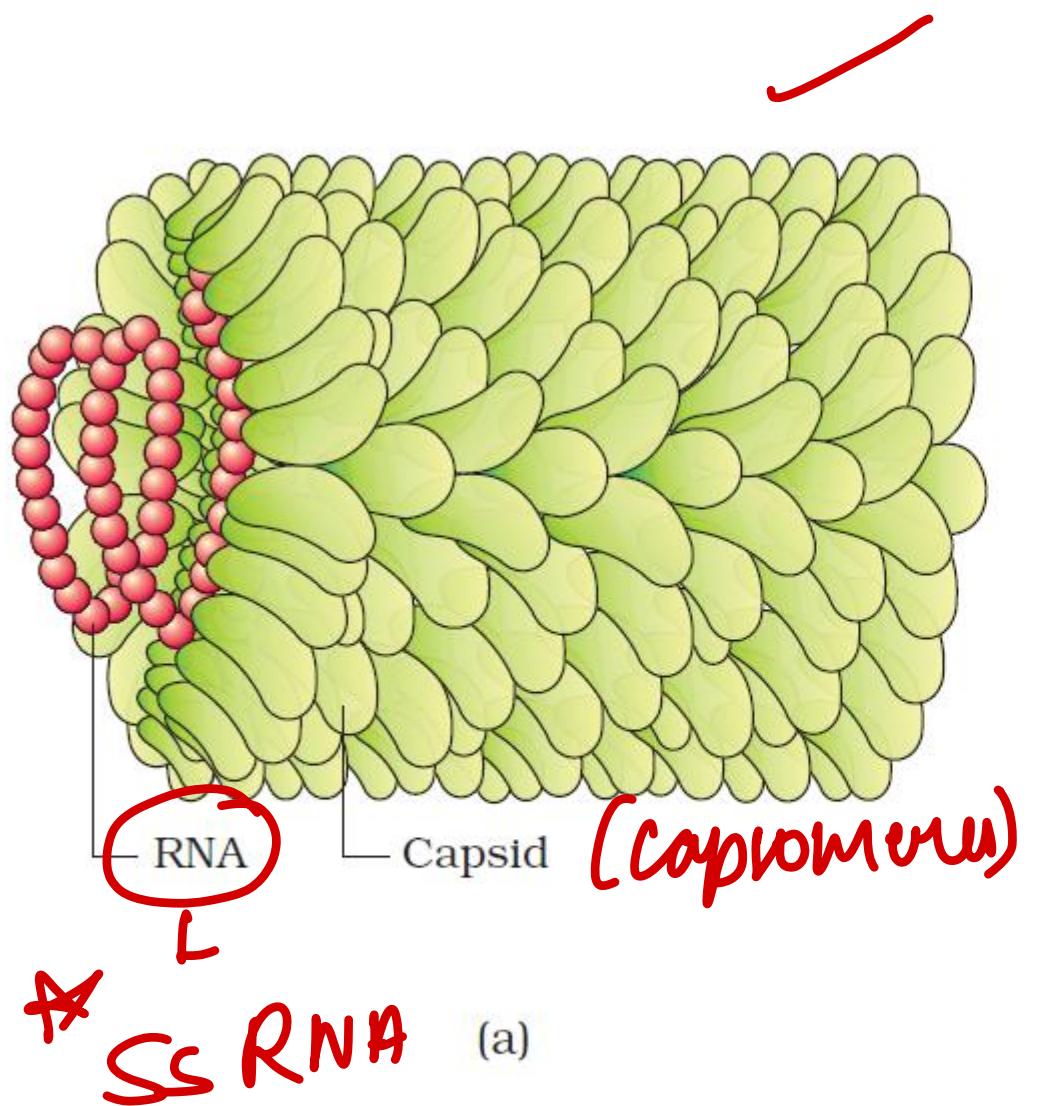
✓
Aspergillus
(Ascomycete)



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✓
Agaricus (Mushroom)
(Basidiomycete)

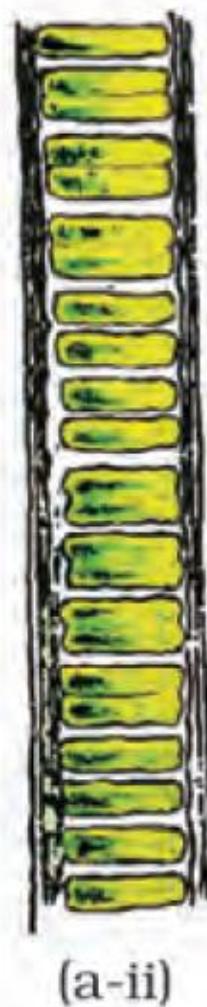
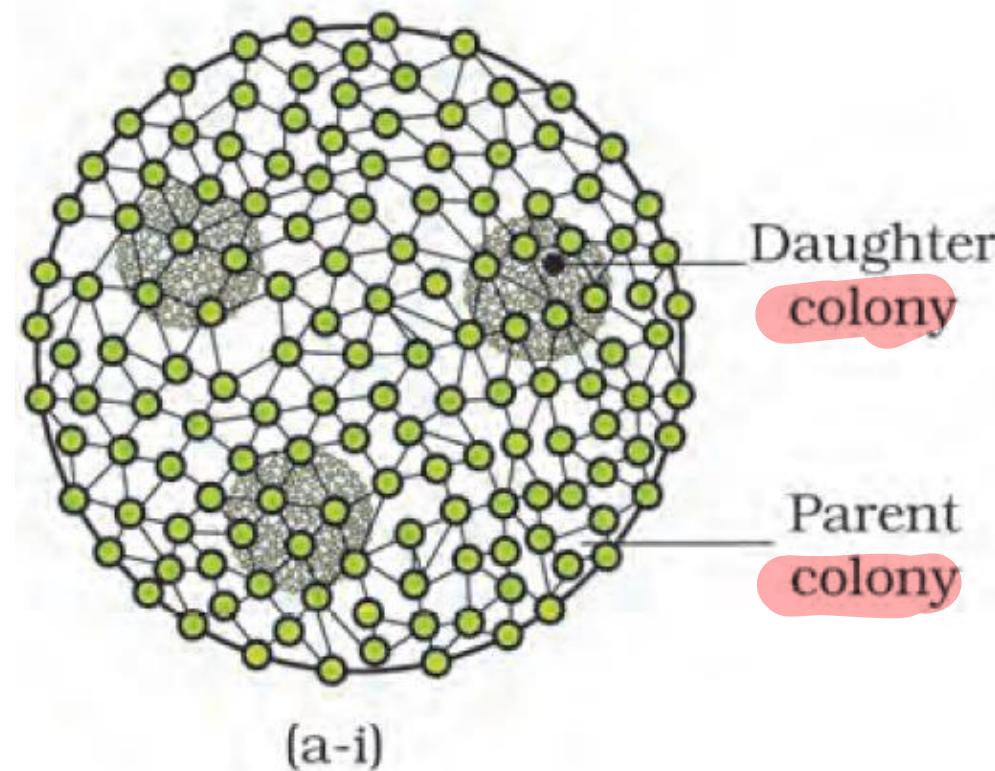


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Figure 2.6 (a) Tobacco Mosaic Virus (TMV) (b) Bacteriophage

CHAPTER-3

PLANT KINGDOM



Chlorophyceae

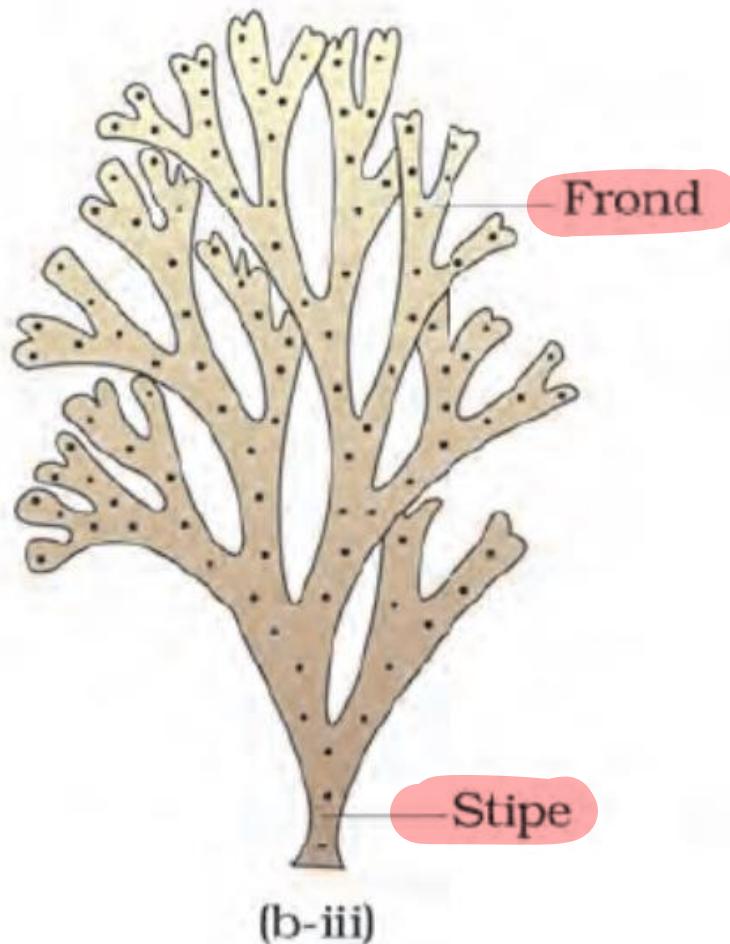
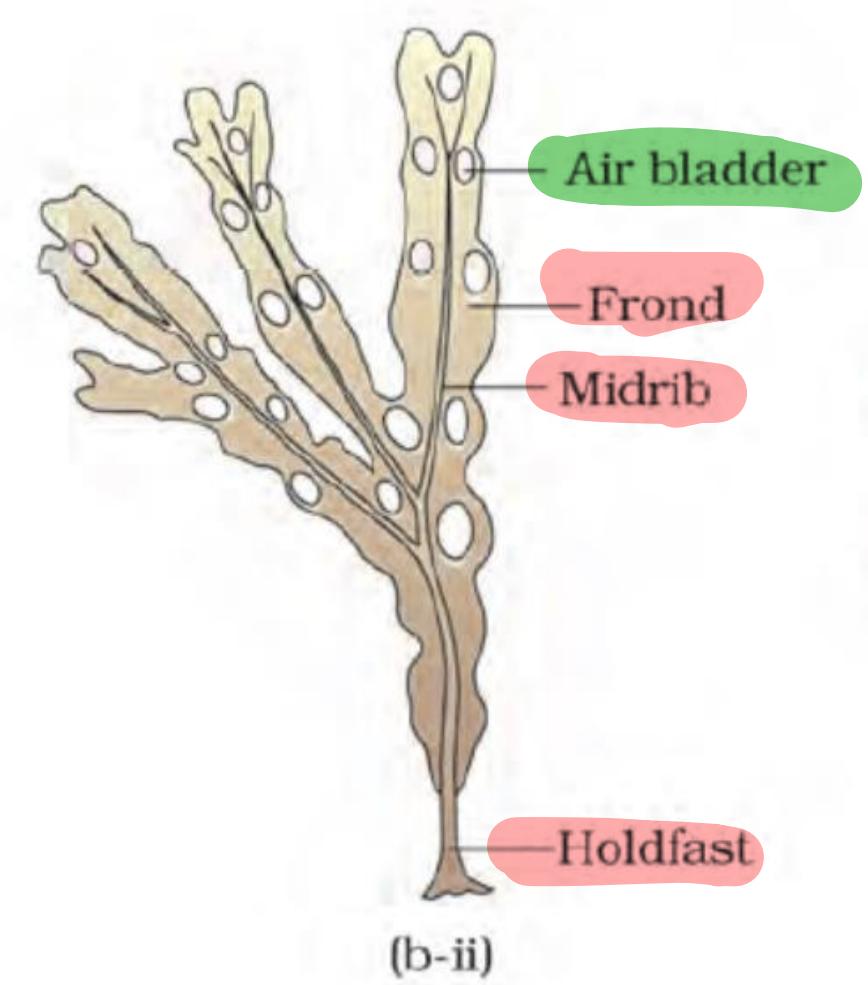
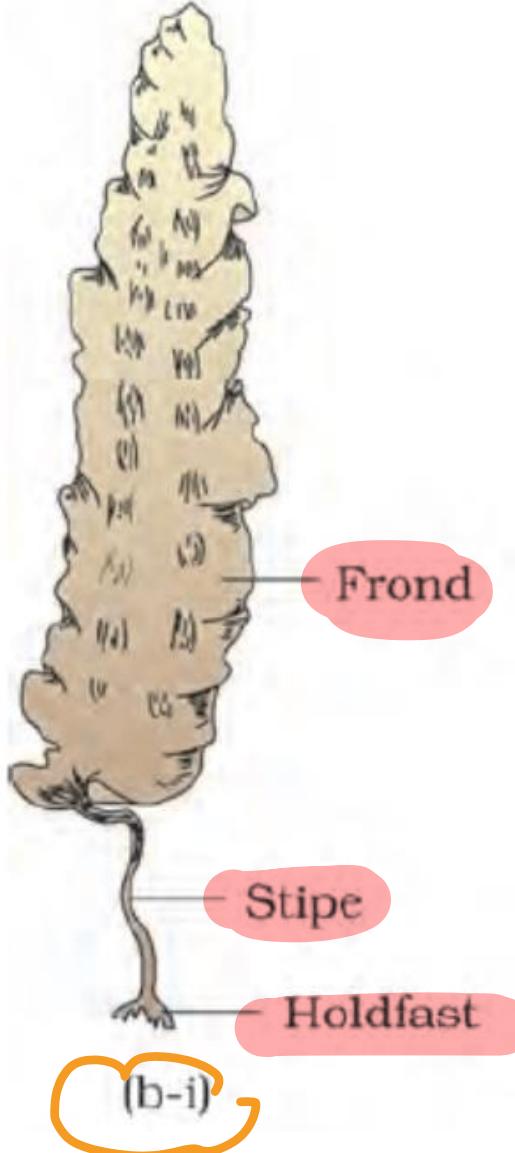
(a-i) valvox (colony)

(a-ii) Spirogyra
filamentous



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Rhaphophyceae

- (b-i) *laminaria*
- (b-ii) *Fucus* (air bladder)
- (b-iii) *Dictyota*

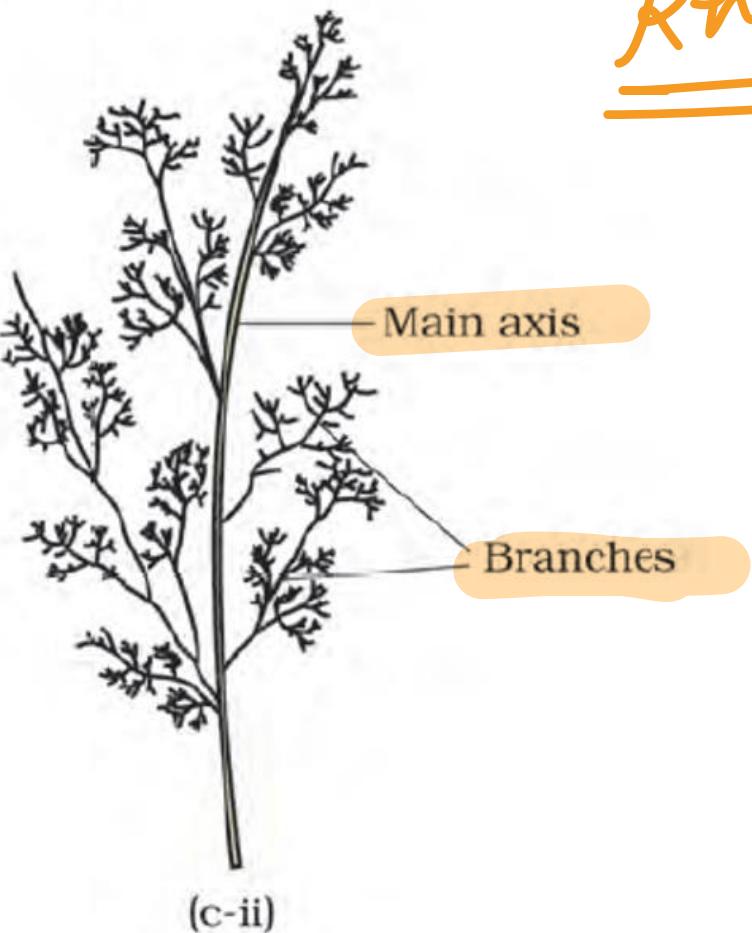
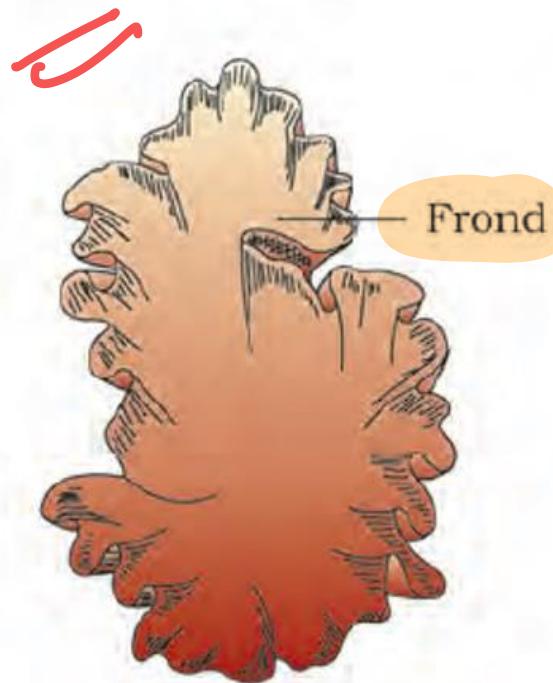
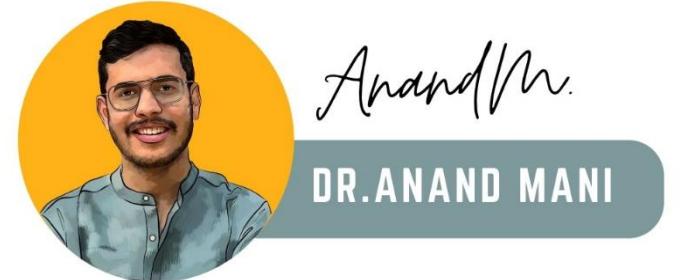


Figure 3.1 Algae : (a) Green algae (i) *Volvox*
 (b) Brown algae (i) *Laminaria*
 (c) Red algae (i) *Porphyra* (ii) *Ulothrix*
 (ii) *Fucus* (iii) *Dictyota*
 (ii) *Polysiphonia*

Identification ↗
 Labelling

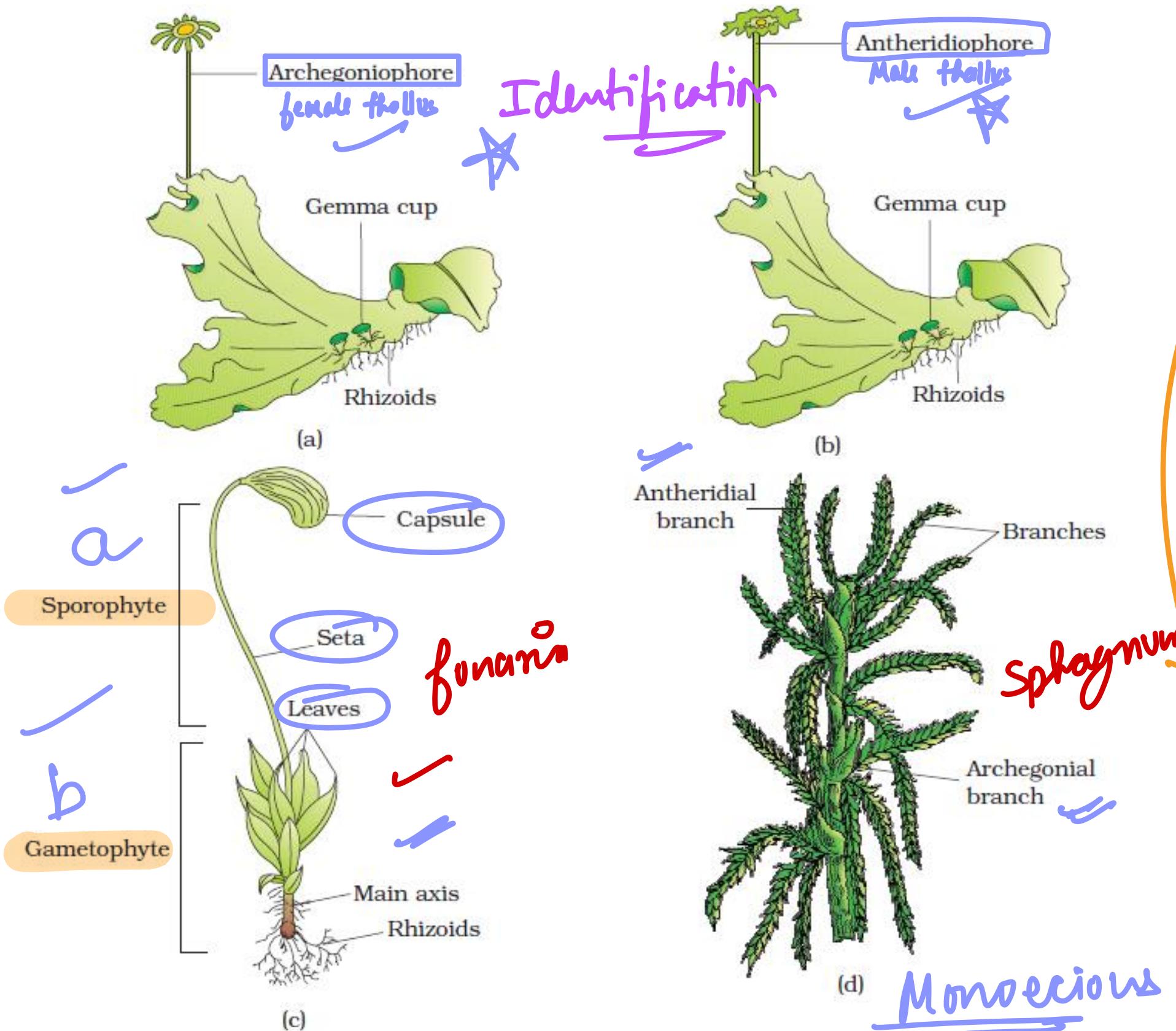
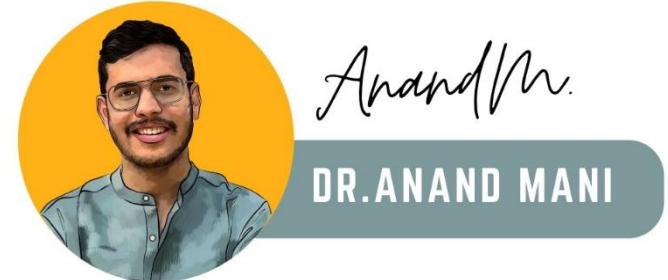
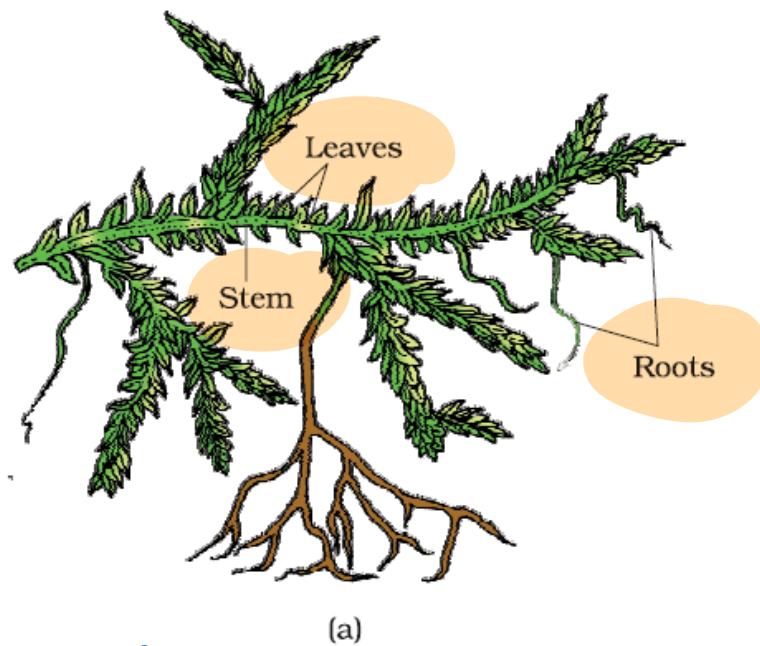


Figure 3.2 Bryophytes: A liverwort – *Marchantia* (a) Female thallus (b) Male thallus Mosses – (c) *Funaria*, gametophyte and sporophyte (d) *Sphagnum* gametophyte





Selaginella

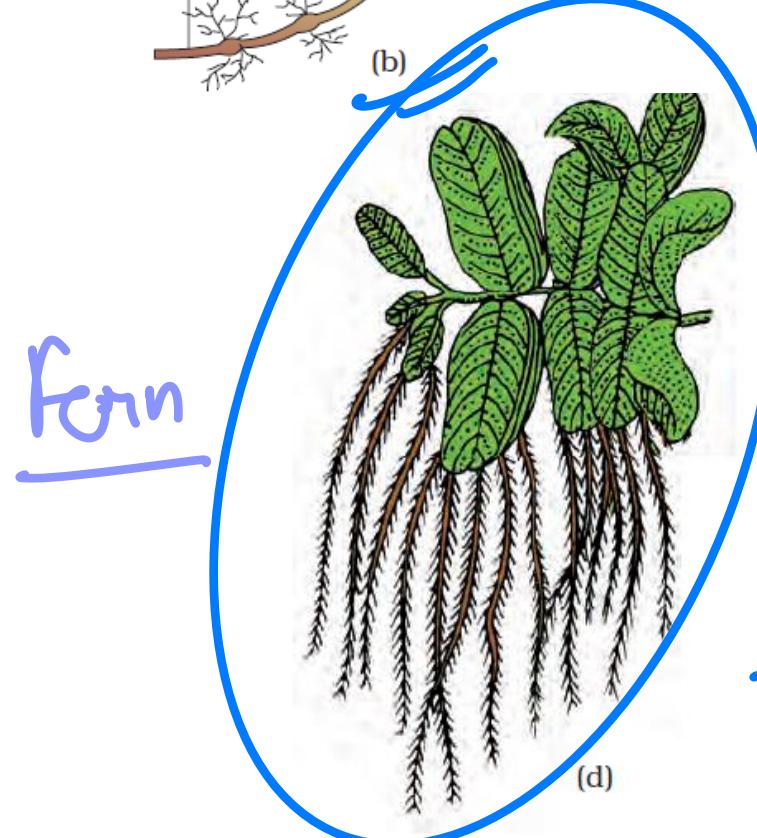
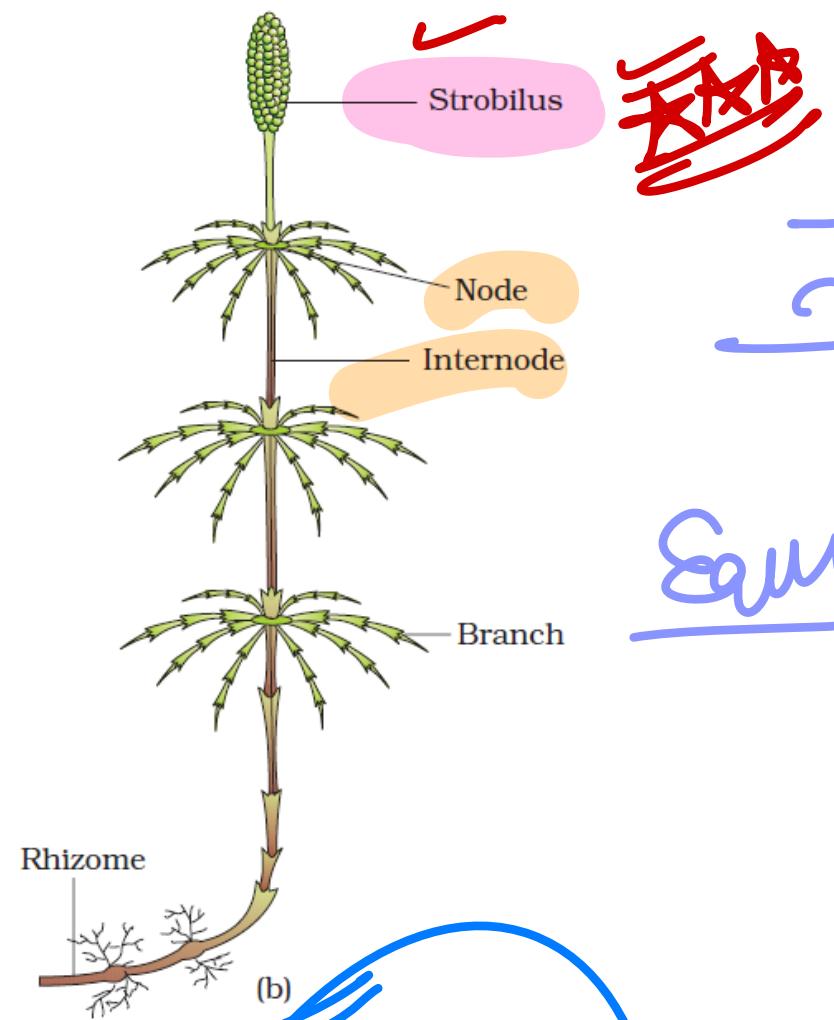
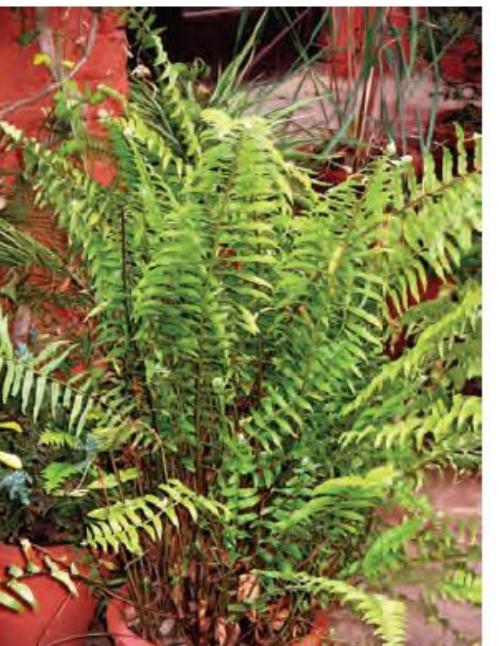


Figure 3.3 Pteridophytes : (a) Selaginella (b) Equisetum (c) Fern (d) Salvinia

Identification

Equisetum

Pteridophyte

Dip
L

Sporophytic

(2n)

Salvinia

~~Salvinia + Selaginella~~

Heterosporous

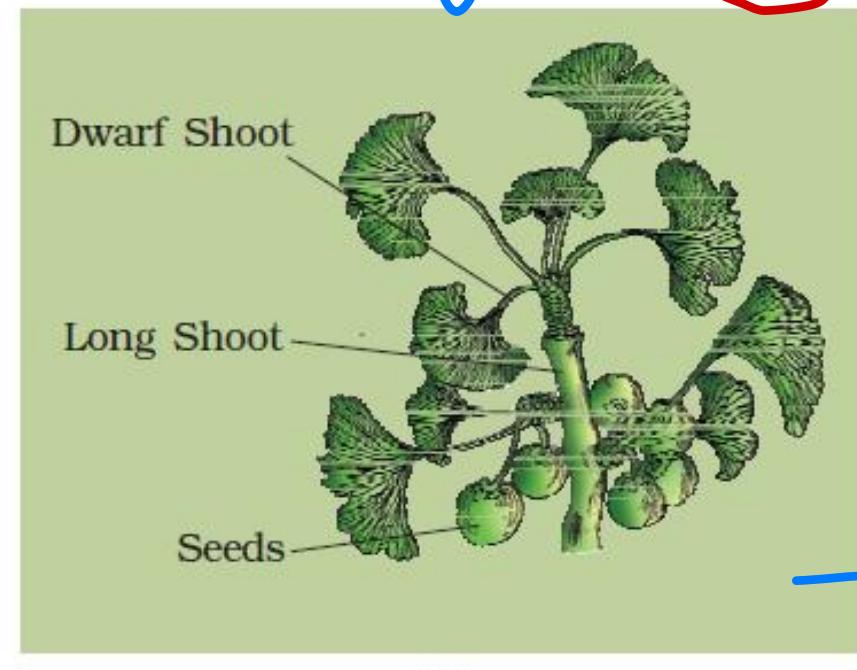
Microspore

Megasporangium



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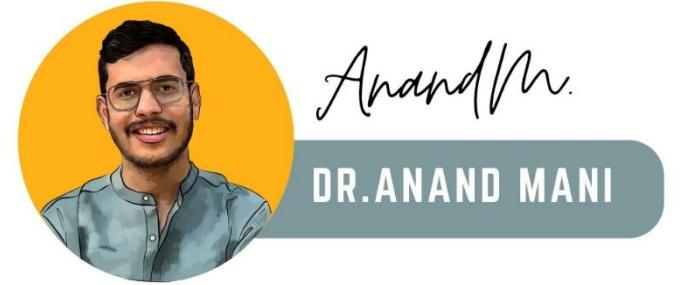
Pinus
—
Ginkgo

Figure 3.4 Gymnosperms: (a) *Cycas*
(b) *Pinus* (c) *Ginkgo*



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(a)



(b)

Figure 3.5 Angiosperms : (a) A dicotyledon (b) A monocotyledon

→ 2 Cotyledon → 1 Cotyledon
Leaves: → Reticulate → Parallel
 + Tetramerous / → trimersous
 + Pentamerous

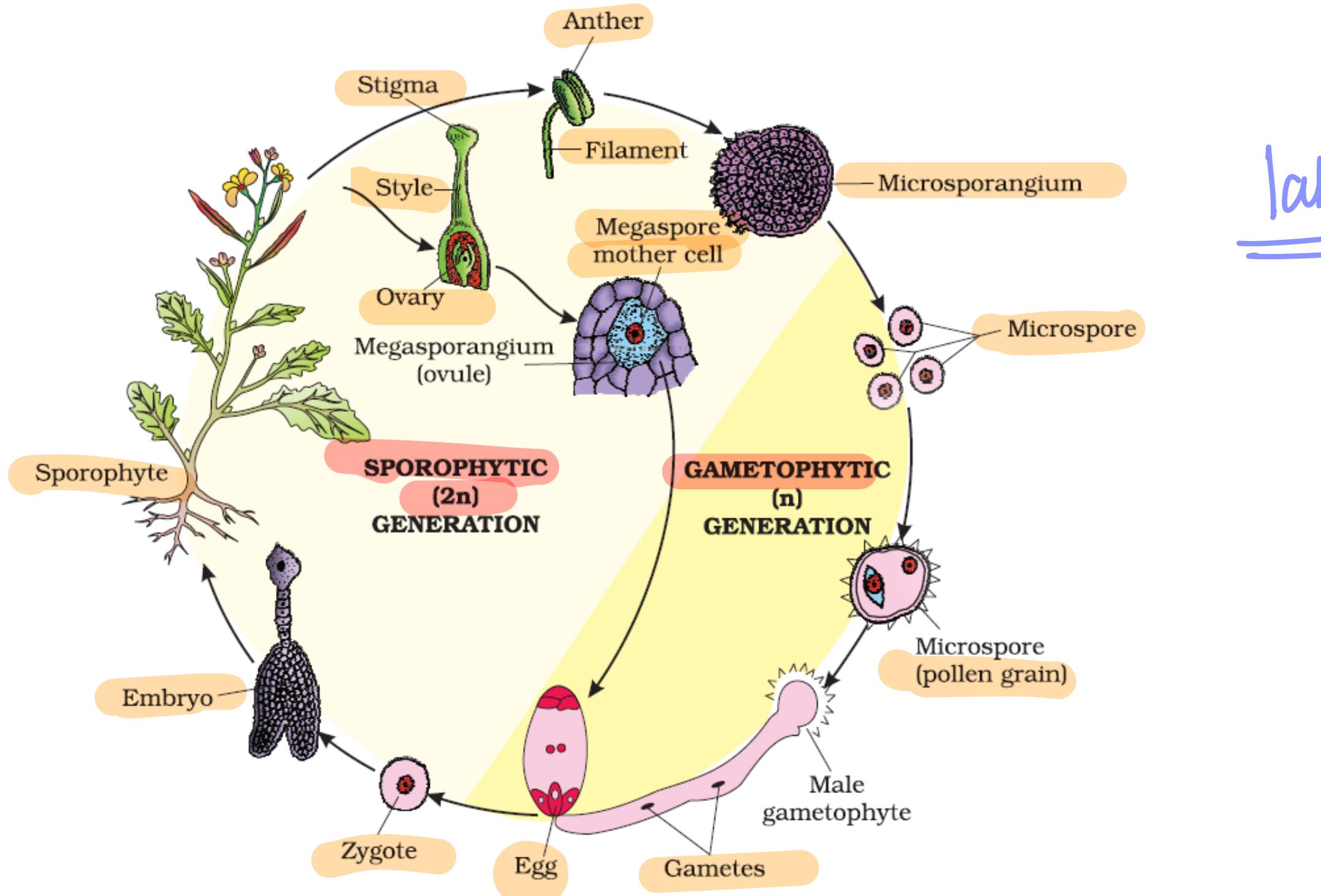
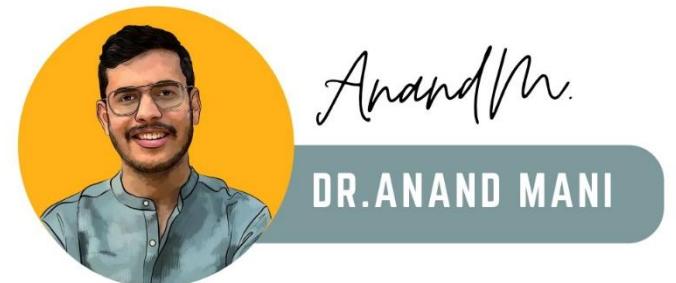


Figure 3.6 Life cycle of an angiosperm

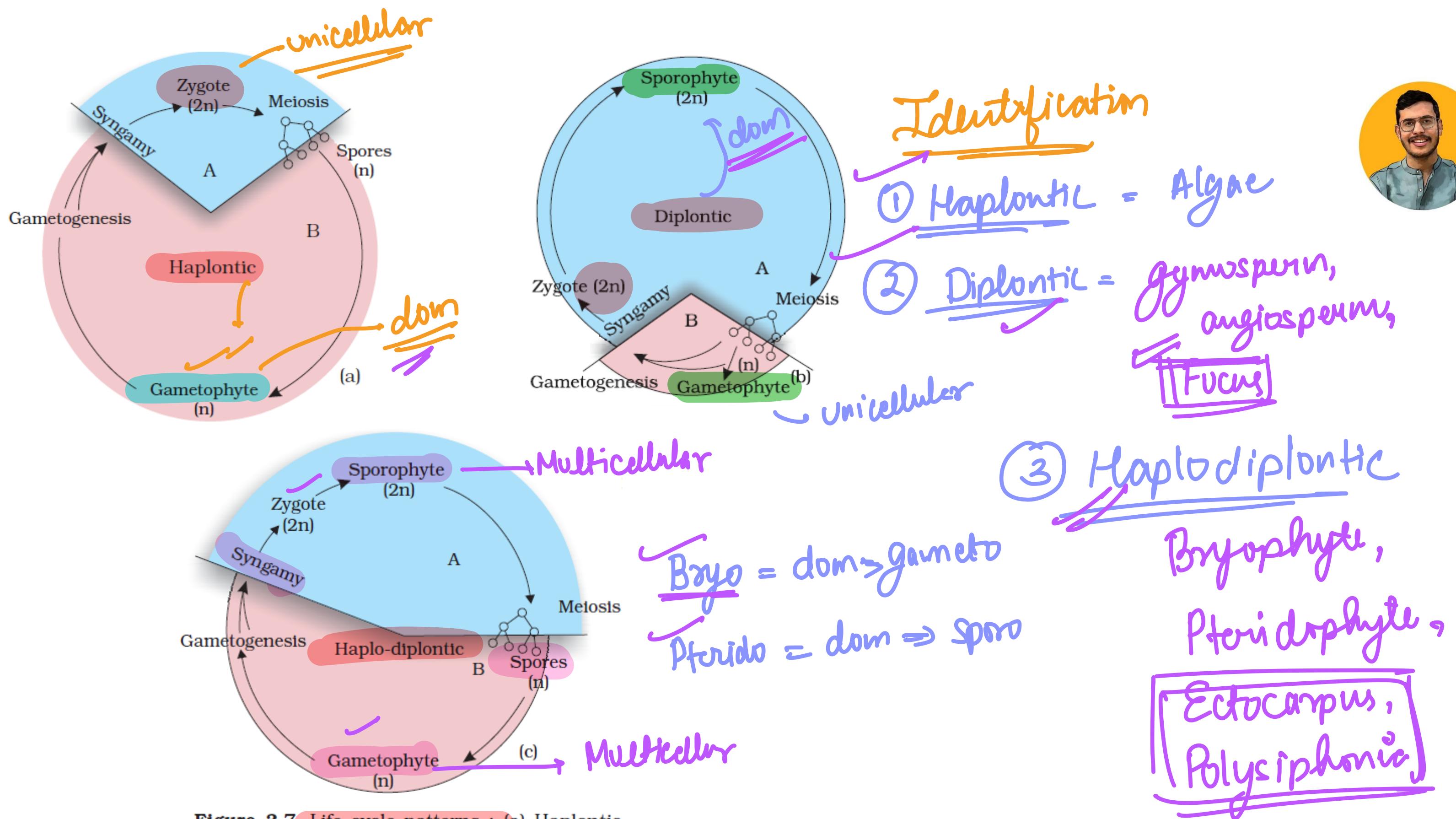
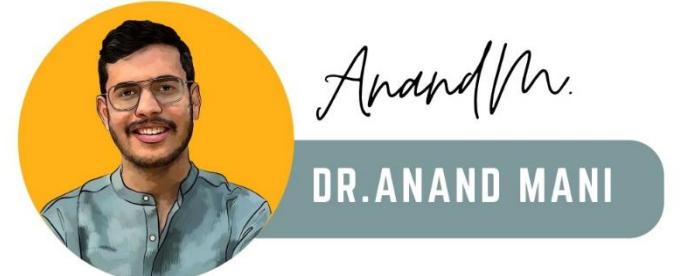


Figure 3.7 Life cycle patterns : (a) Haplontic
(b) Diplontic (c) Haplodiplontic

CHAPTER-4

ANIMAL KINGDOM

R10



Examples

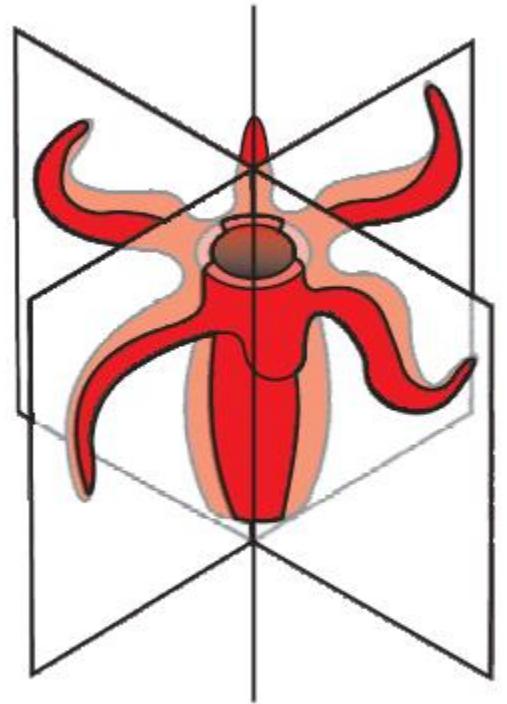


Figure 4.1 (a) Radial symmetry

any plane
→ Coelenterate
→ Ctenophora
→ ~~*~~ Adult echinodermata

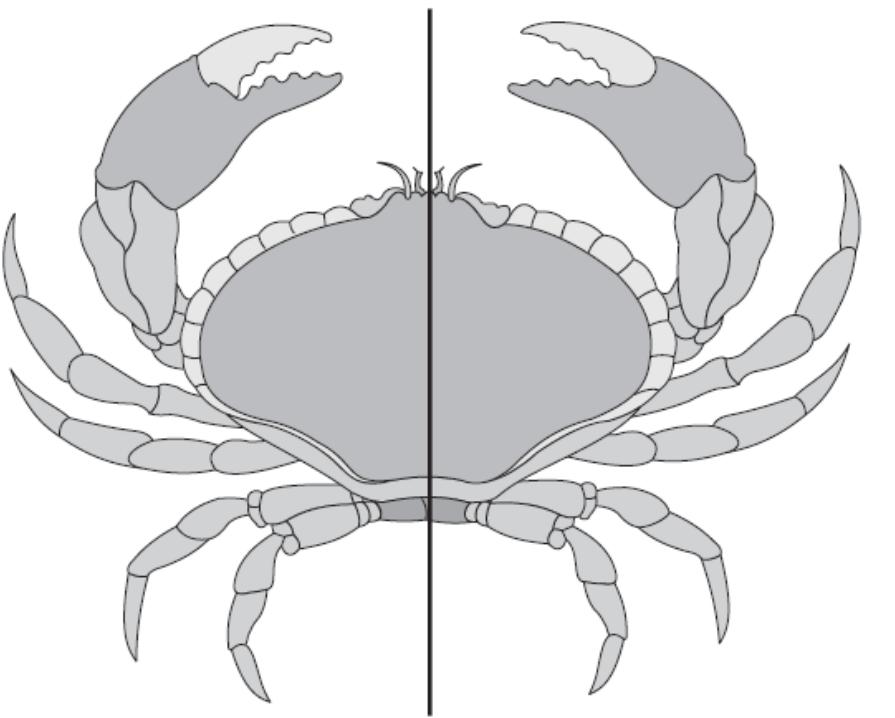


Figure 4.1 (b) Bilateral symmetry

Only in \neq Plane
→ (Platy → chordate)



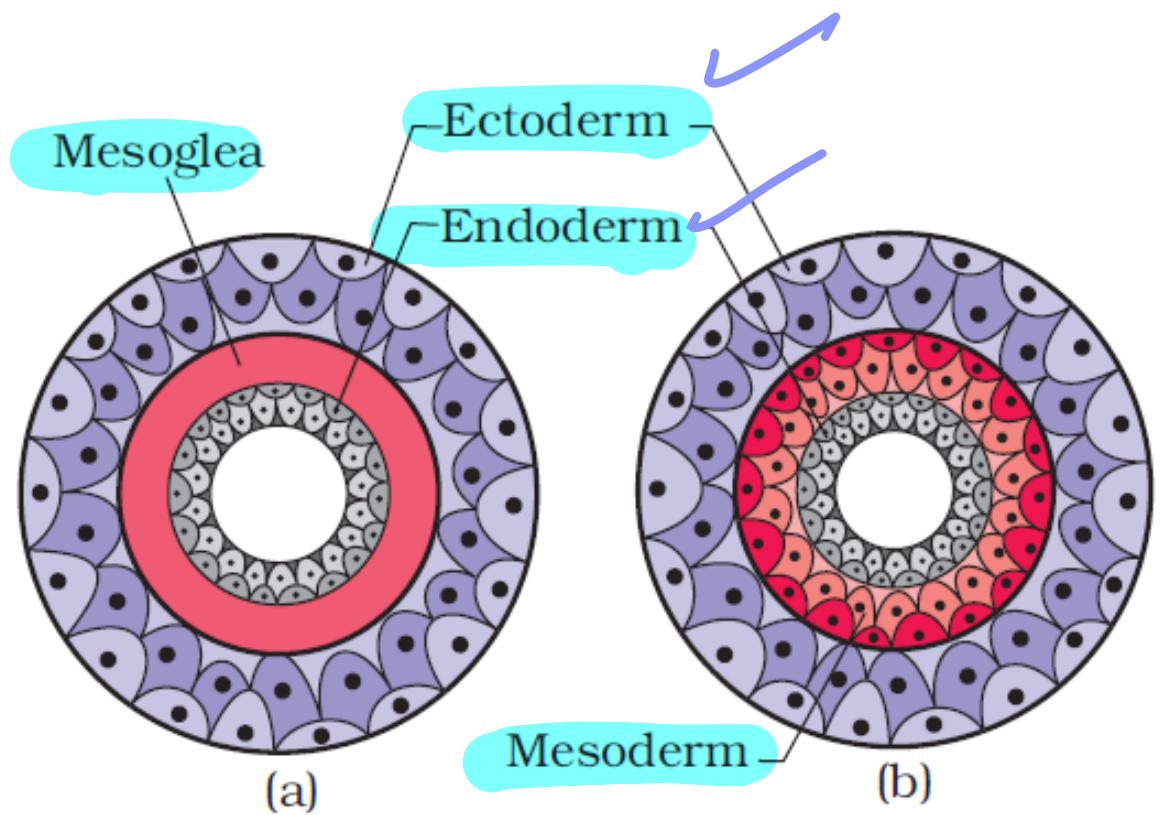
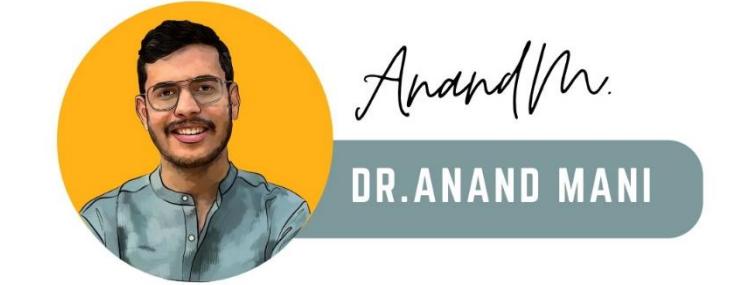


Figure 4.2 Showing germinal layers :
 (a) Diploblastic (b) Triploblastic



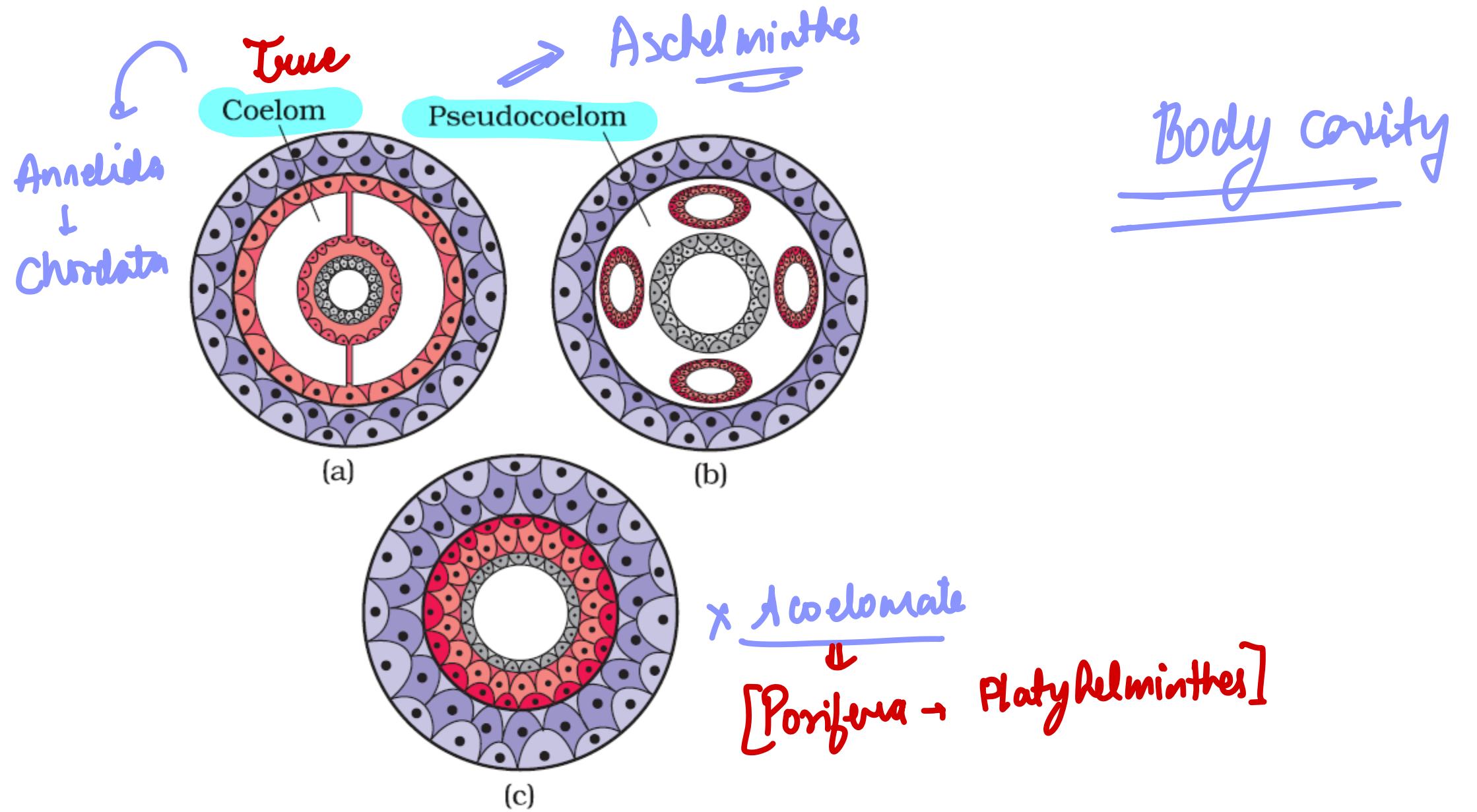
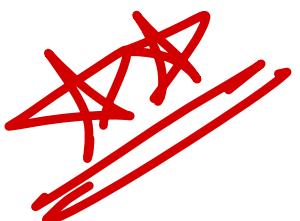
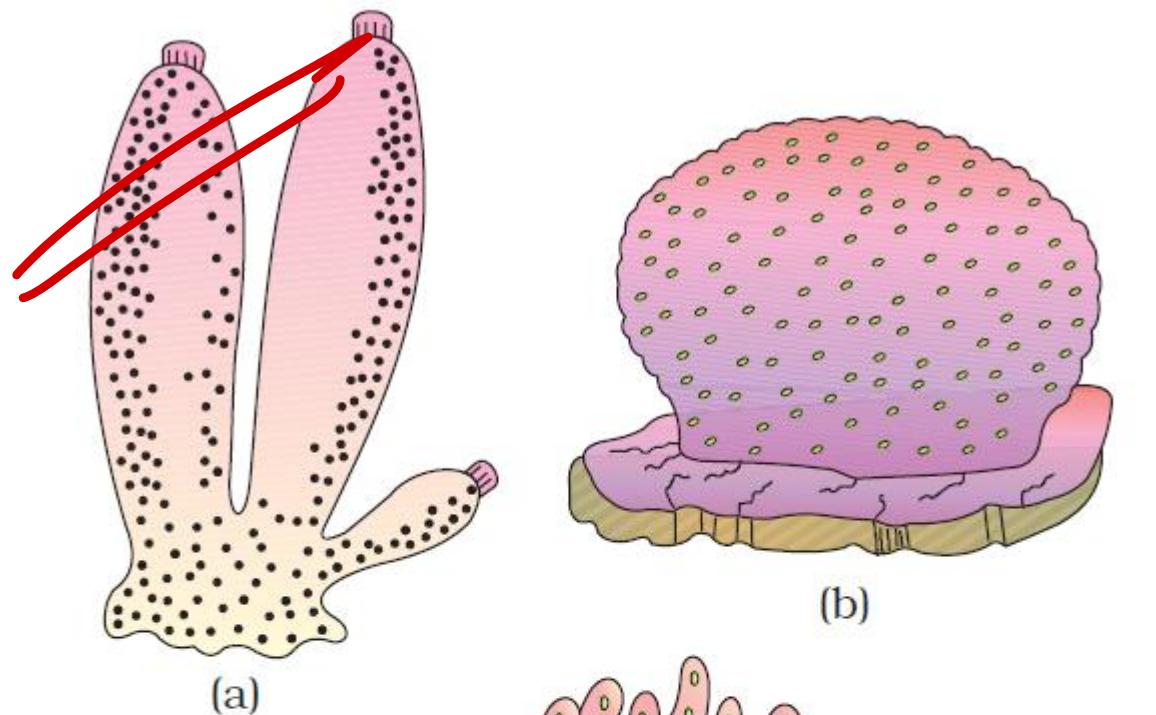


Figure 4.3 Diagrammatic sectional view of :

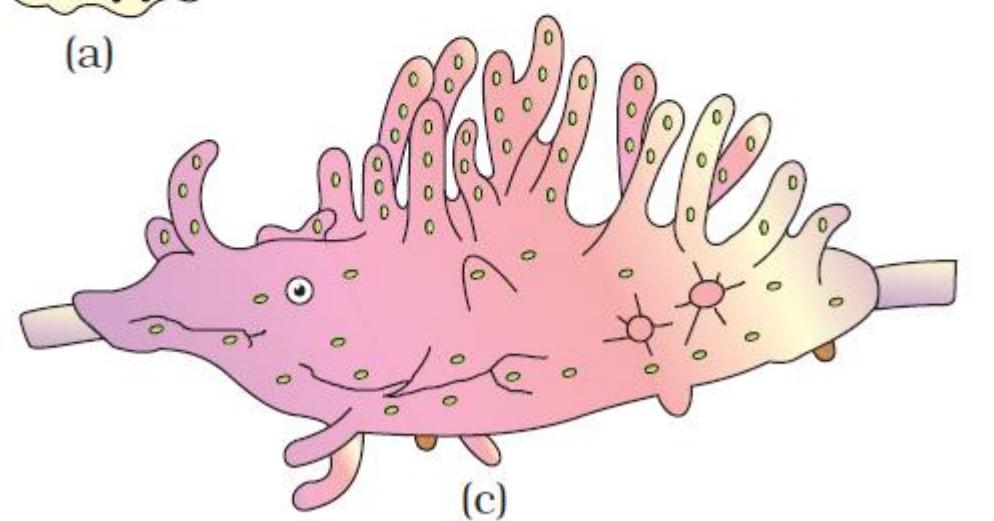
- (a) Coelomate
- (b) Pseudocoelomate
- (c) Acoelomate





(a)

(b)



(c)

Figure 4.5 Examples of Porifera : (a) *Sycon*
(b) *Euspongia* (c) *Spongilla*

Bath sponge

(Scypha)
fresh water sponge



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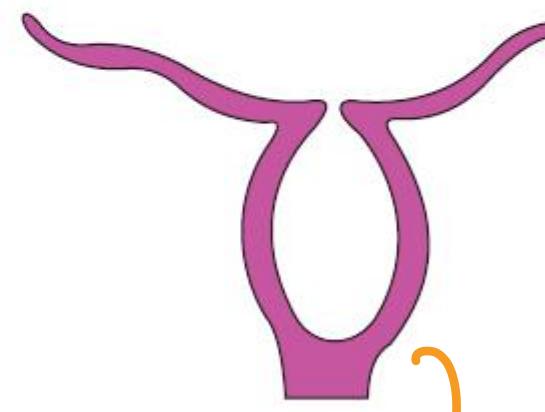
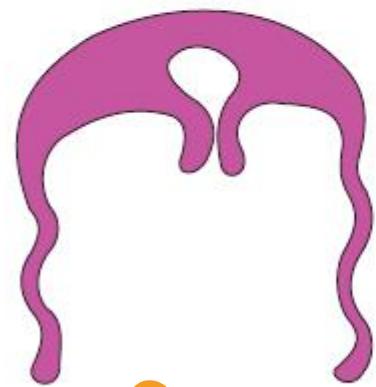


Figure 4.6 Examples of Coelenterata indicating outline of their body form :
a) *Aurelia* (Medusa) b) *Adamsia* (Polyp)

Nedus
→ Umbrella
→ Motile
A Sessile

Polyp
→ Cylindrical
→ Sessile
→ Asexual

Medus = *Aurelia*

alternation of gen
Polyp ⇌ Medus

obelia

Polyp = *Hydra*,
adamsia



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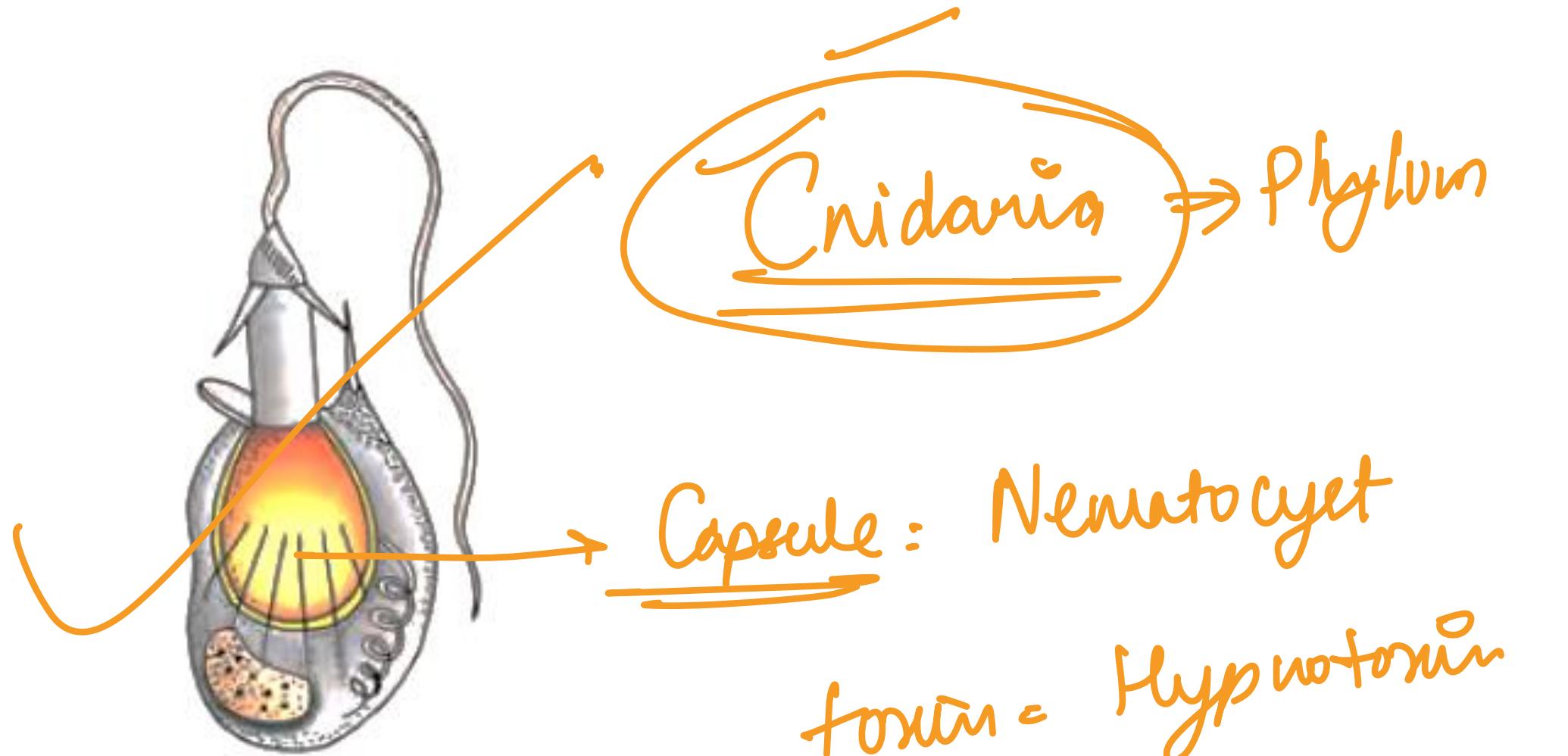
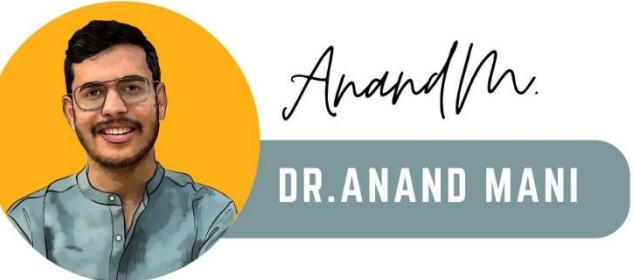


Figure 4.7
Diagrammatic view of
Cnidoblast



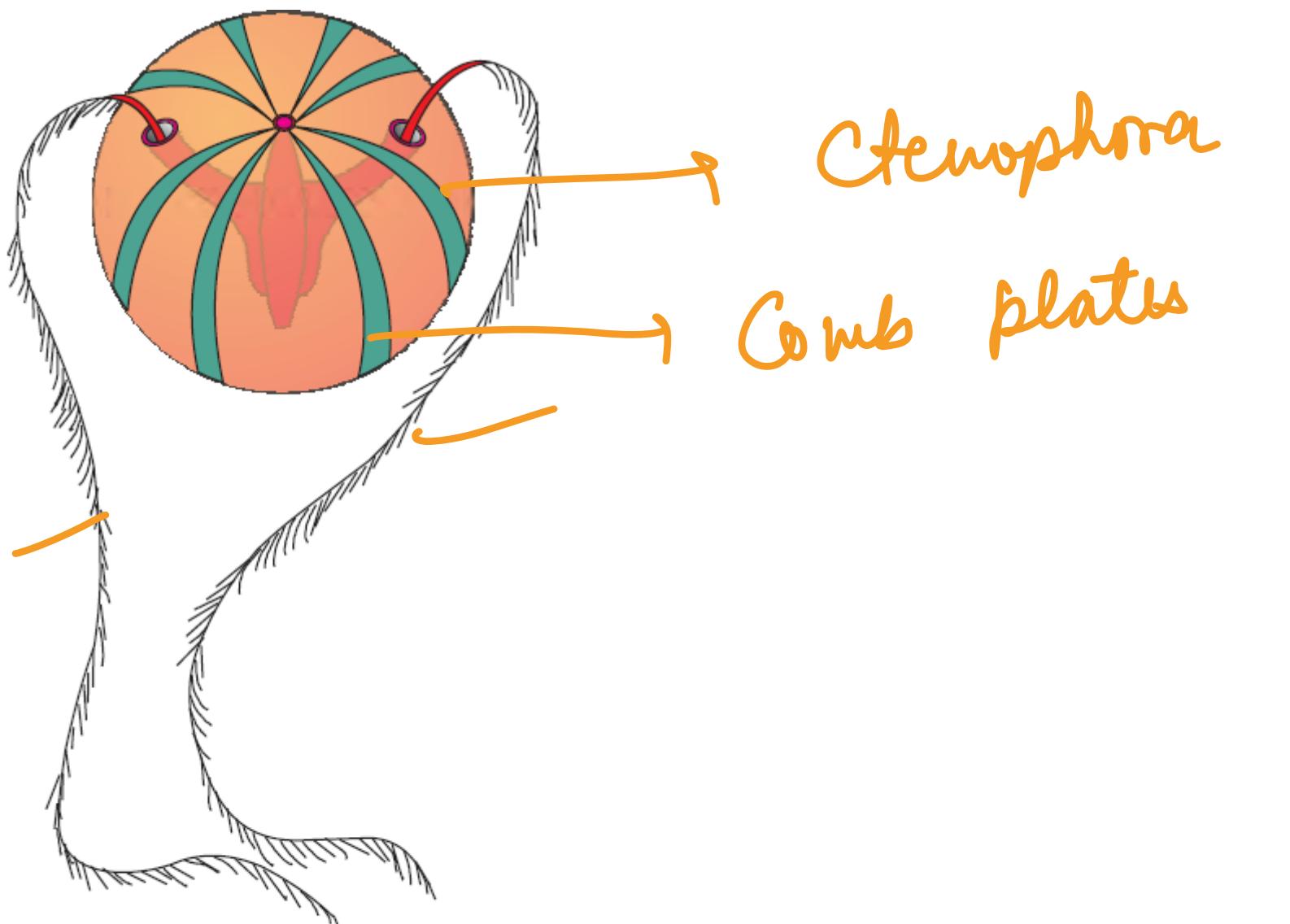
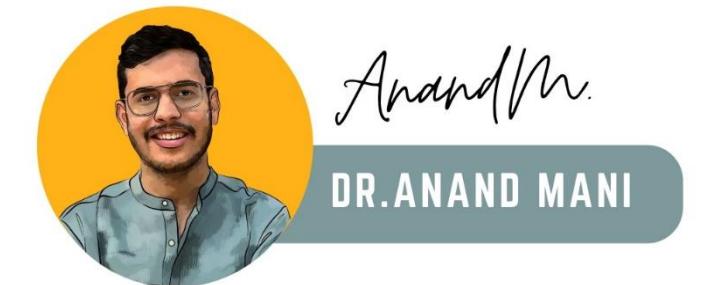
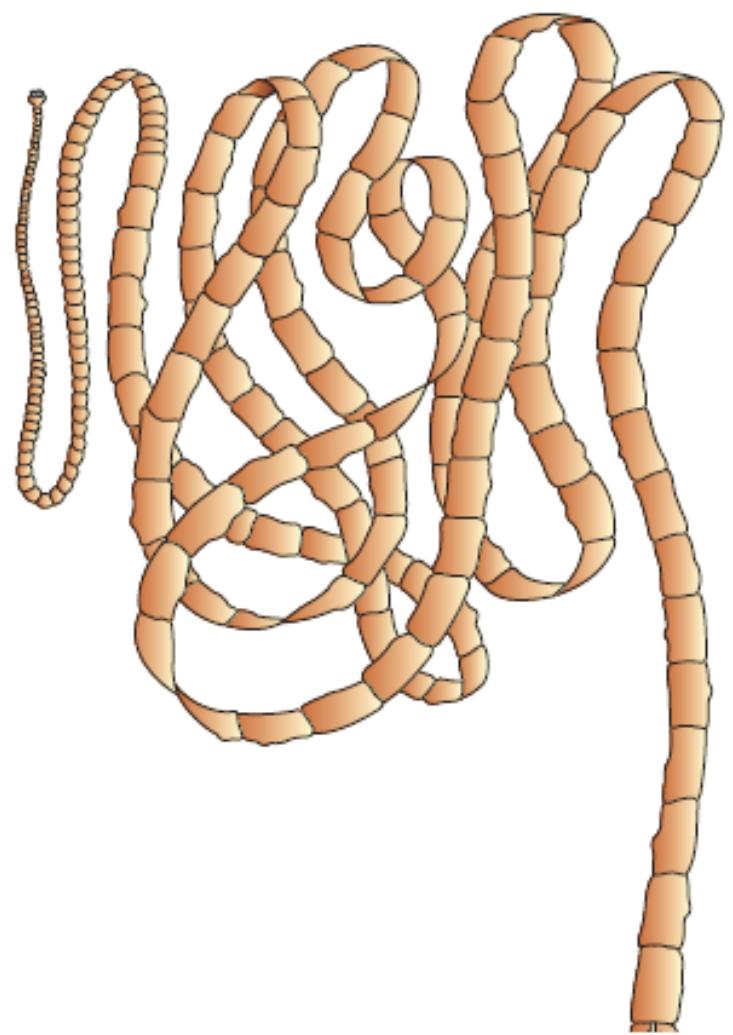
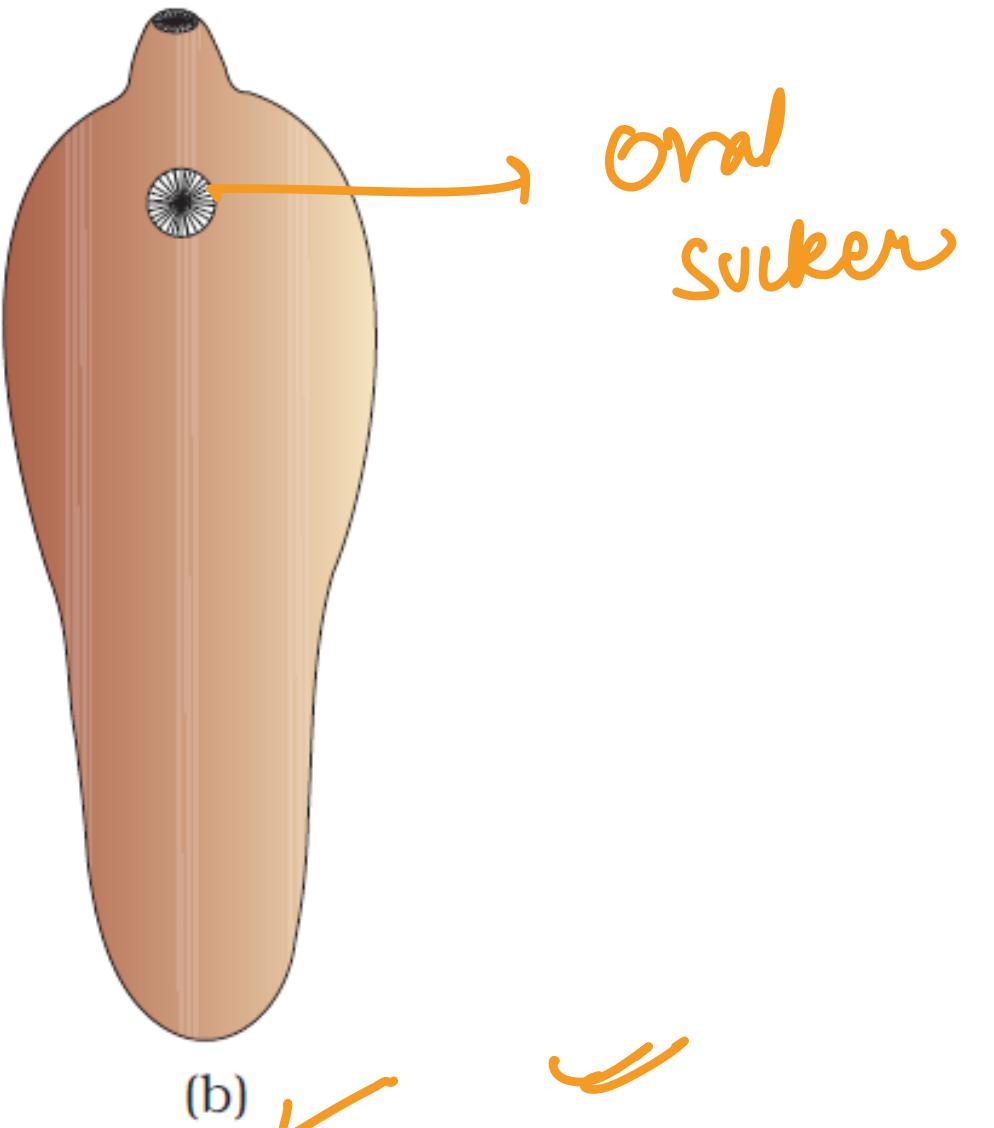


Figure 4.8 Example of
Ctenophora
(*Pleurobrachia*)





(a)



(b)

Figure 4.9 Examples of Platyhelminthes : (a) Tape worm (b) Liver fluke

Flat worm

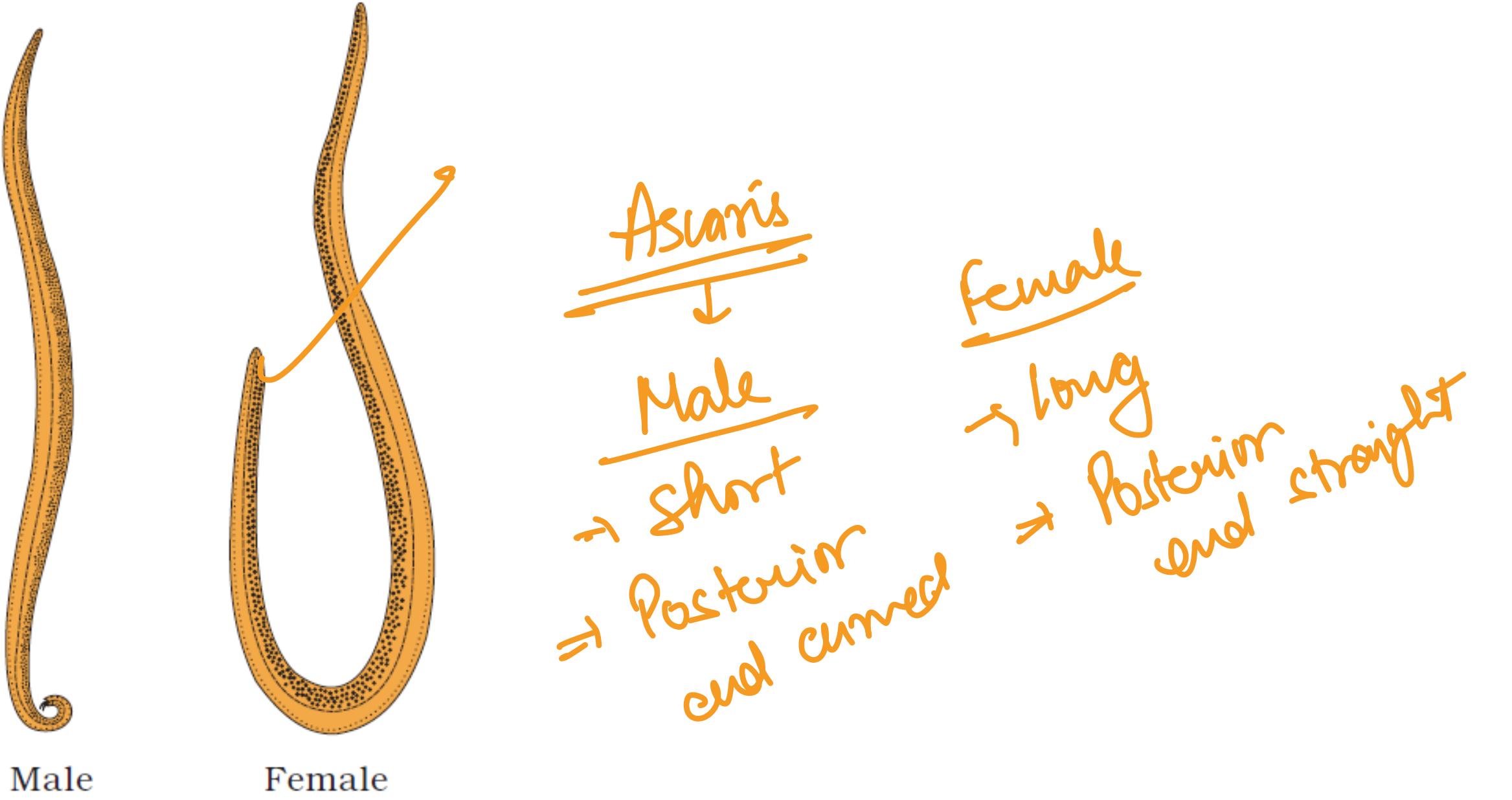
Taenia

Faeciola

Oral
sucker



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Male

Female

Figure 4.10 Example of
Aschelminthes:
Roundworm



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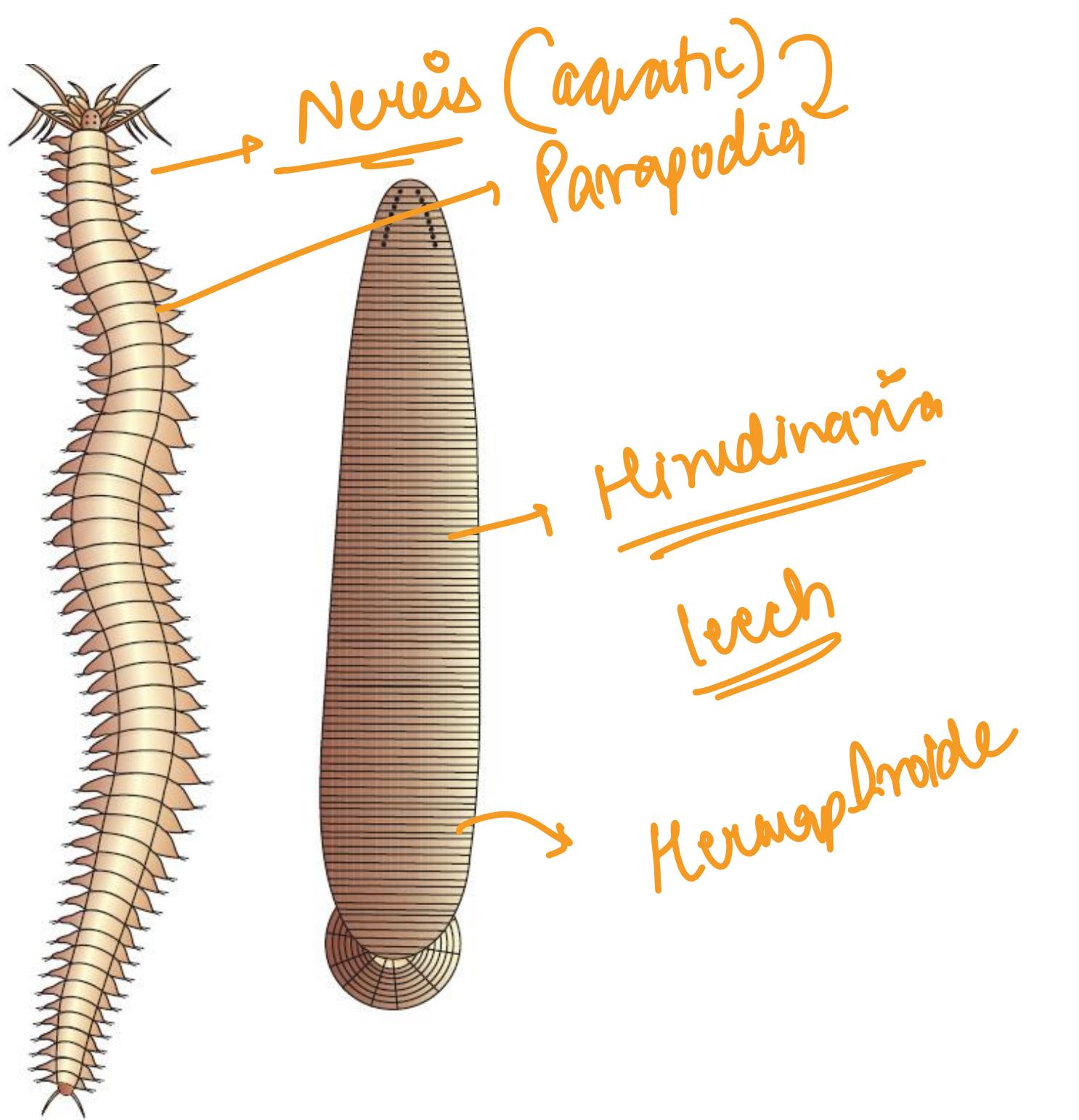


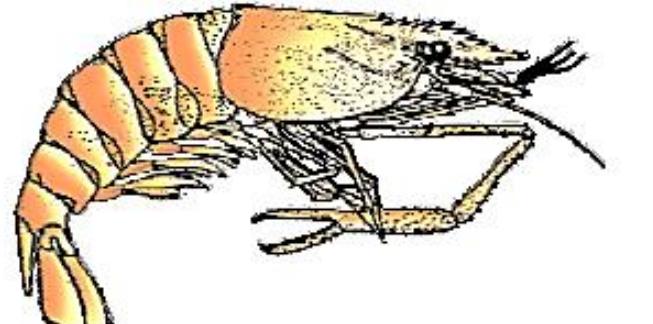
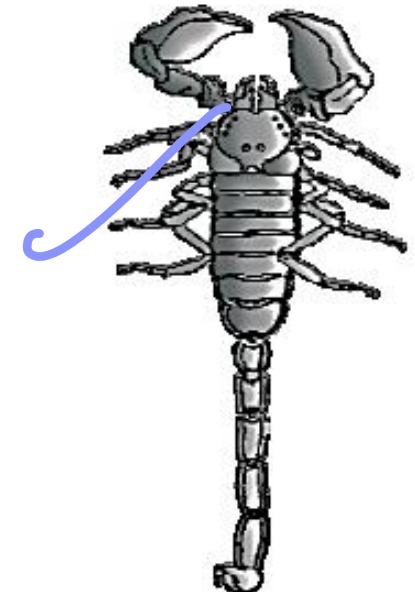
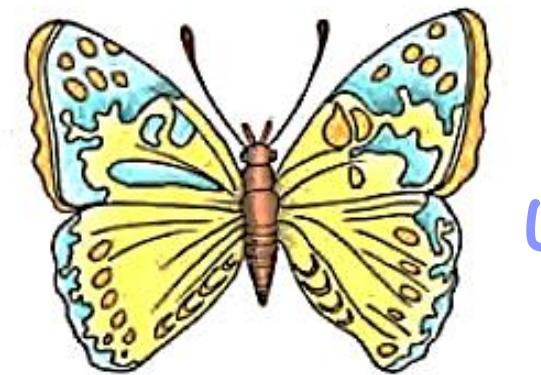
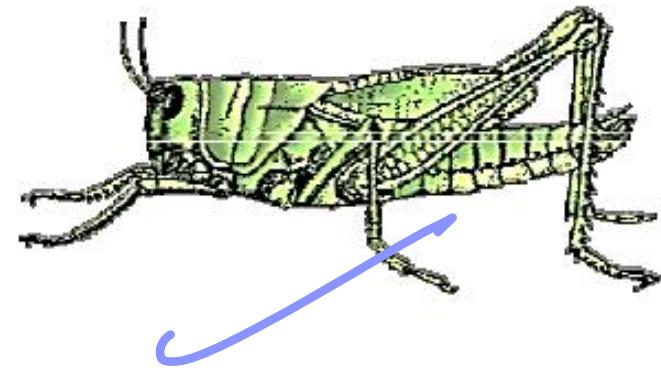
Figure 4.11 Examples of Annelida : (a) *Nereis*
(b) *Hirudinaria*



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True
Metamerism



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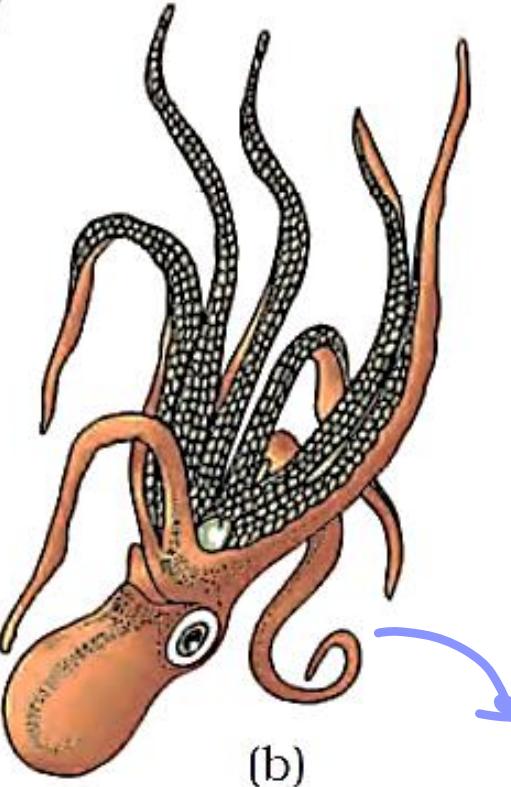
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Figure 4.12 Examples of Arthropoda :

- (a) Locust (b) Butterfly
- (c) Scorpion (d) Prawn



(a)



(b)

Pila (apple snail)



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Octopus (devil fish)

Cephalopod

closed circulatory
stem

Figure 4.13 Examples of Mollusca:
(a) *Pila* (b) *Octopus*

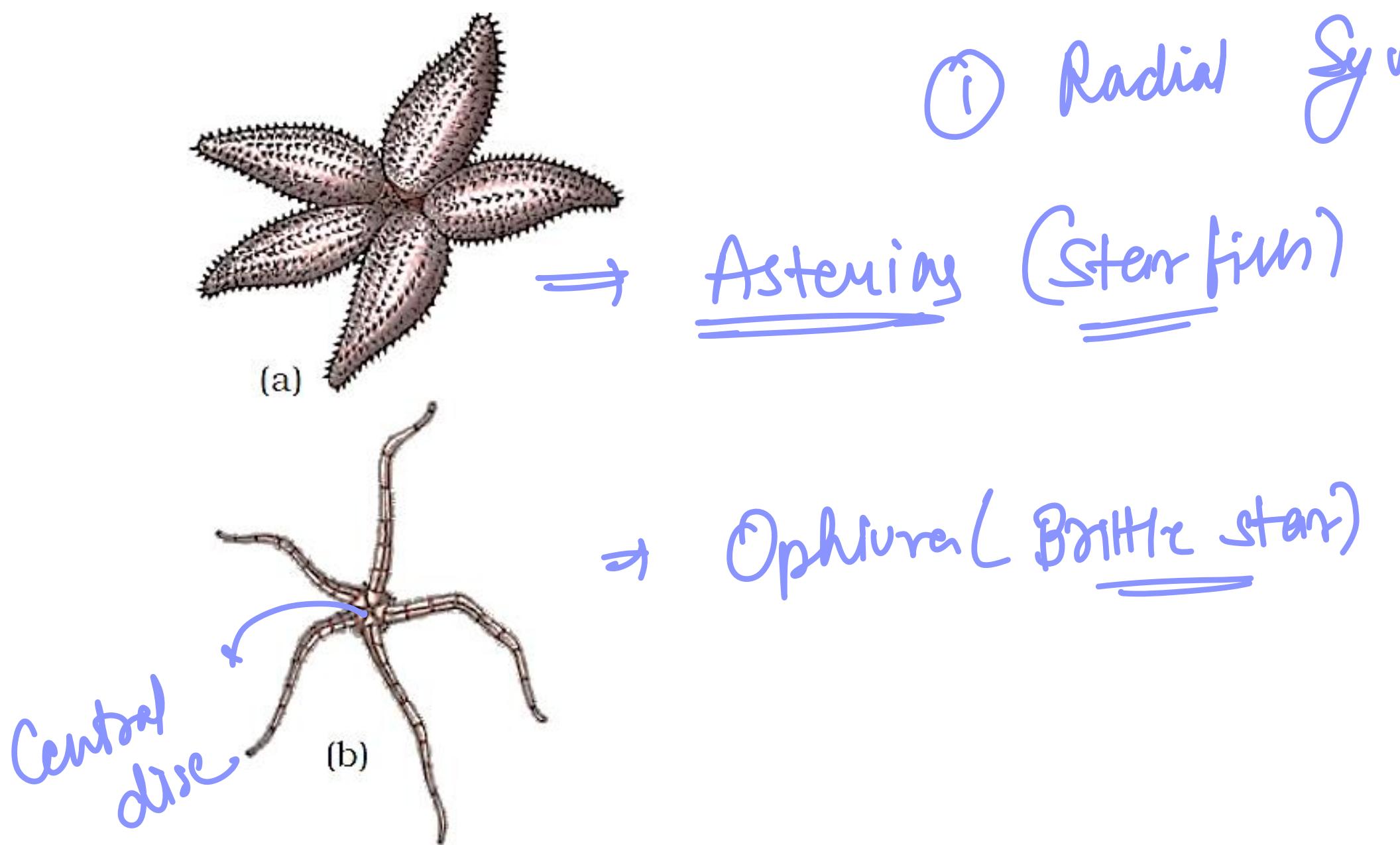
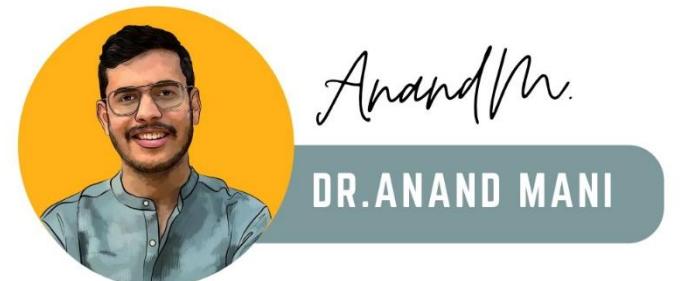


Figure 4.14 Examples of Echinodermata :
(a) *Asterias*
(b) *Ophiura*

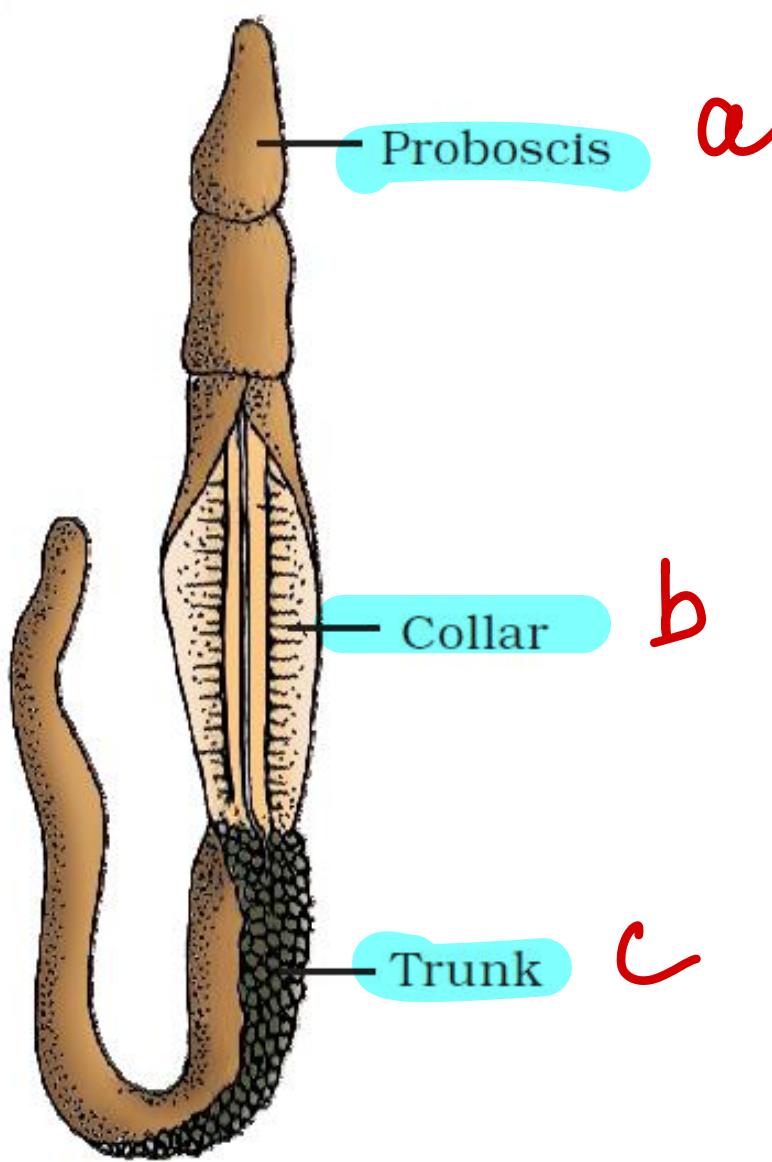


Figure 4.15 *Balanoglossus*

a
→ Hemichordata
→ labelling

b ←
stomochord

excretory =
organ Proboscis
 gland



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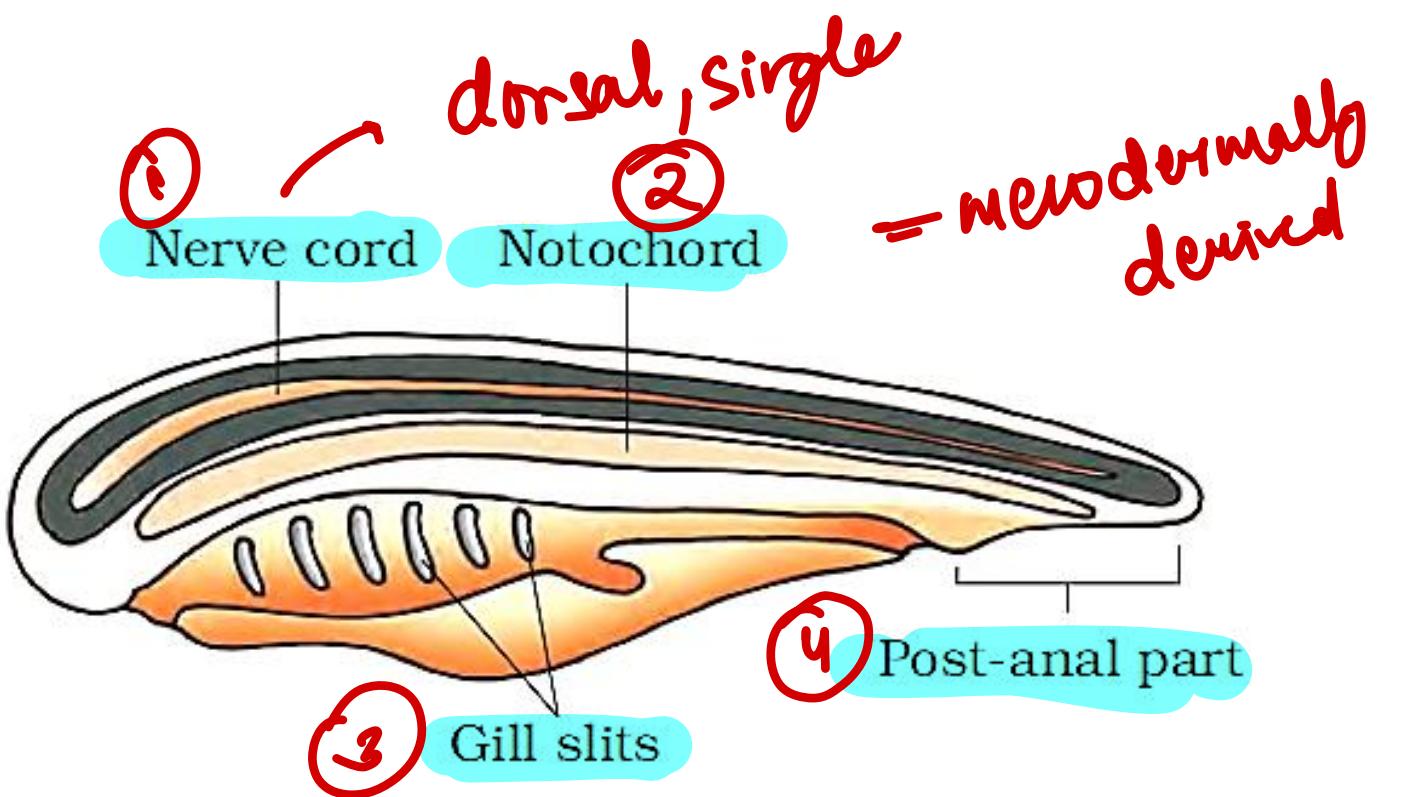
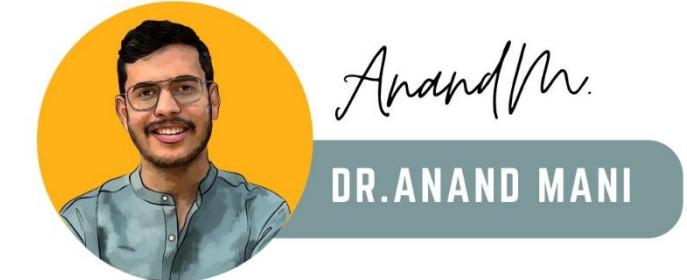
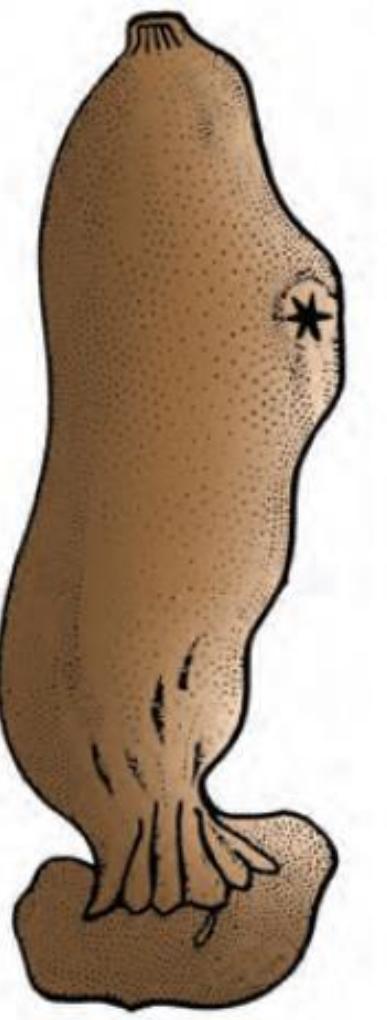


Figure 4.16 Chordata characteristics

⑤ Ventral heart





- Urochordata (sub phylum)
- ↓
- Notochord = tail
- ↓
- (Cervix)
- Exclusively marine
- Hermaphrodites

Figure 4.17 Ascidia

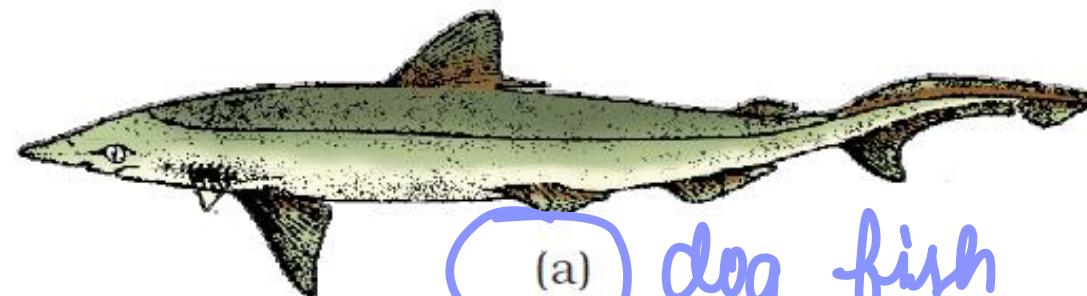


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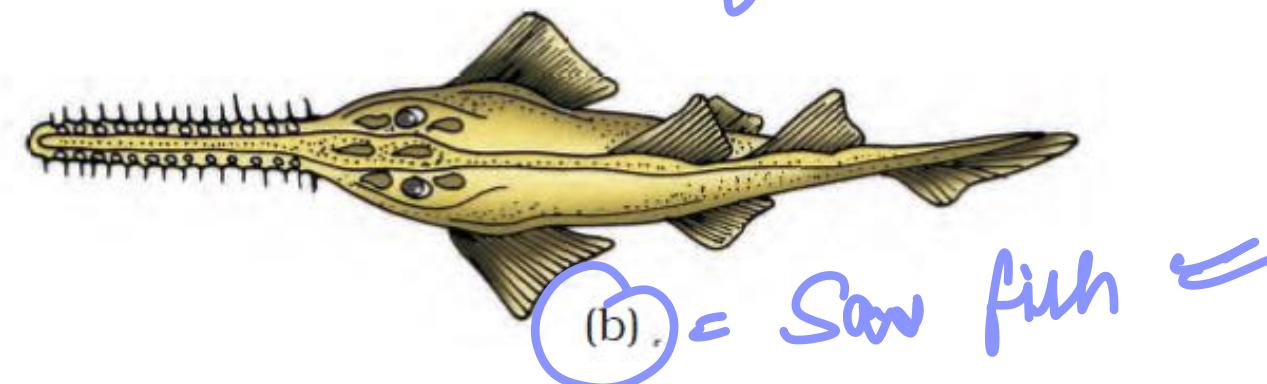
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Figure 4.18 A jawless vertebrate - *Petromyzon* (Lamprey)

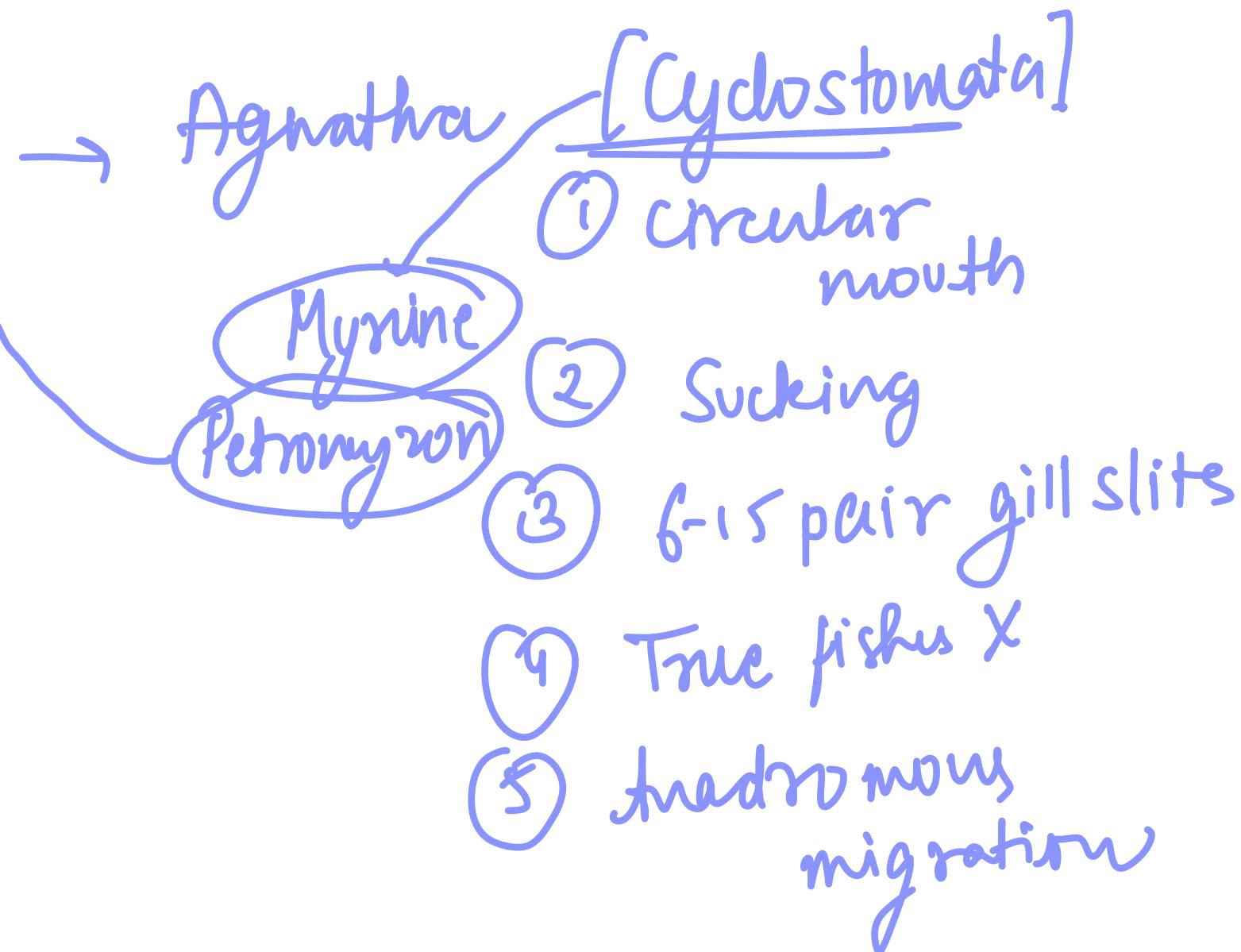


(a) dog fish



(b) Saw fish

Figure 4.19 Example of Cartilaginous fishes :
(a) Scoliodon (b) Pristis



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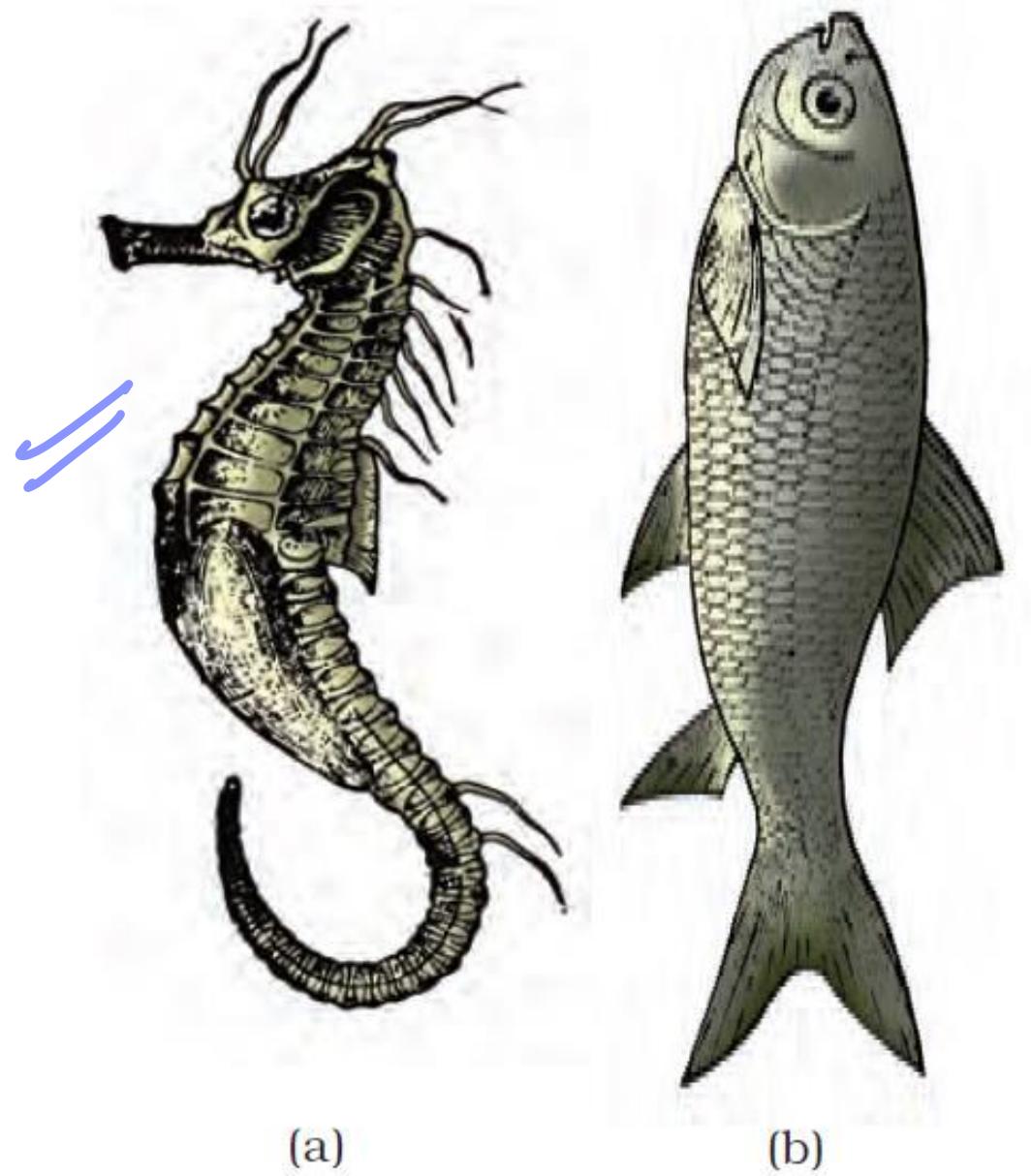
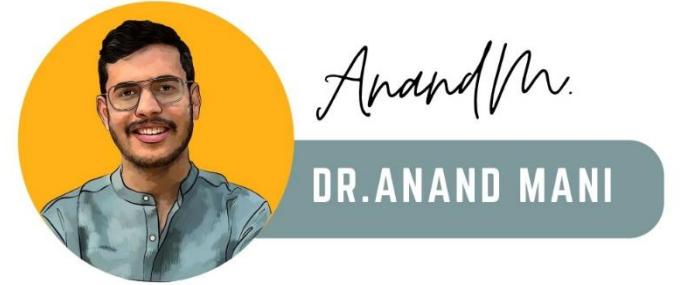
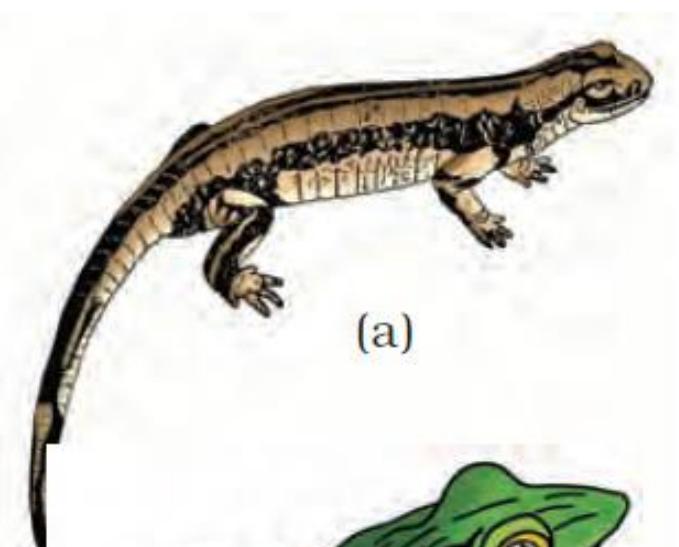
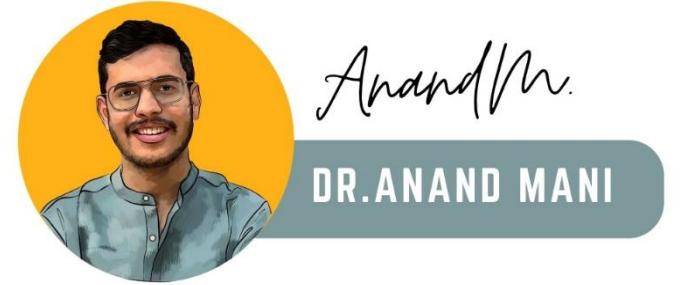


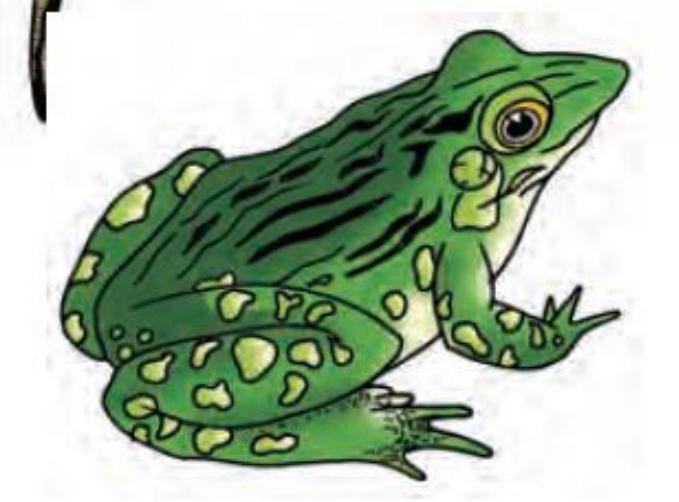
Figure 4.20 Examples of Bony fishes :

(a) *Hippocampus* (b) *Catla*

Sea horse Catla



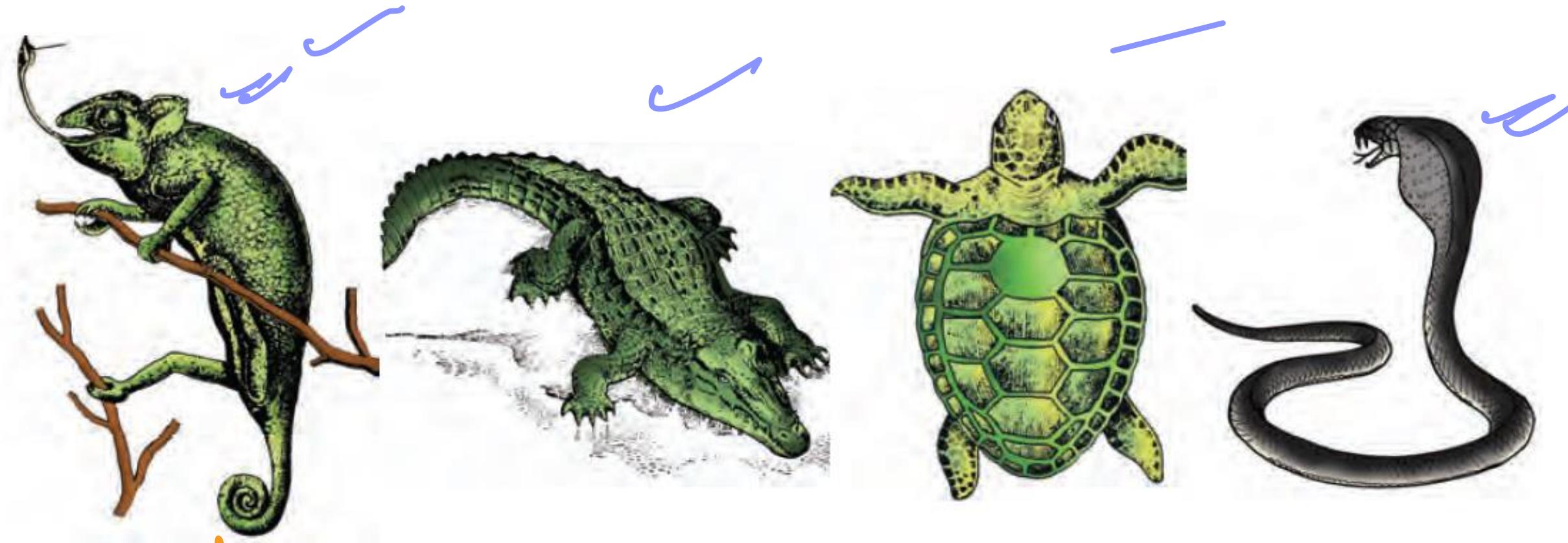
Salamander
→



frog
→

Figure 4.21 Examples of Amphibia :

- (a) *Salamandra*
- (b) *Rana*



(a) tree lizard

(b)

(c)

(d)

Figure 4.22 Reptiles: (a) *Chameleons* (b) *Crocodilus* (c) *Chelone* (d) *Naja*

turtle

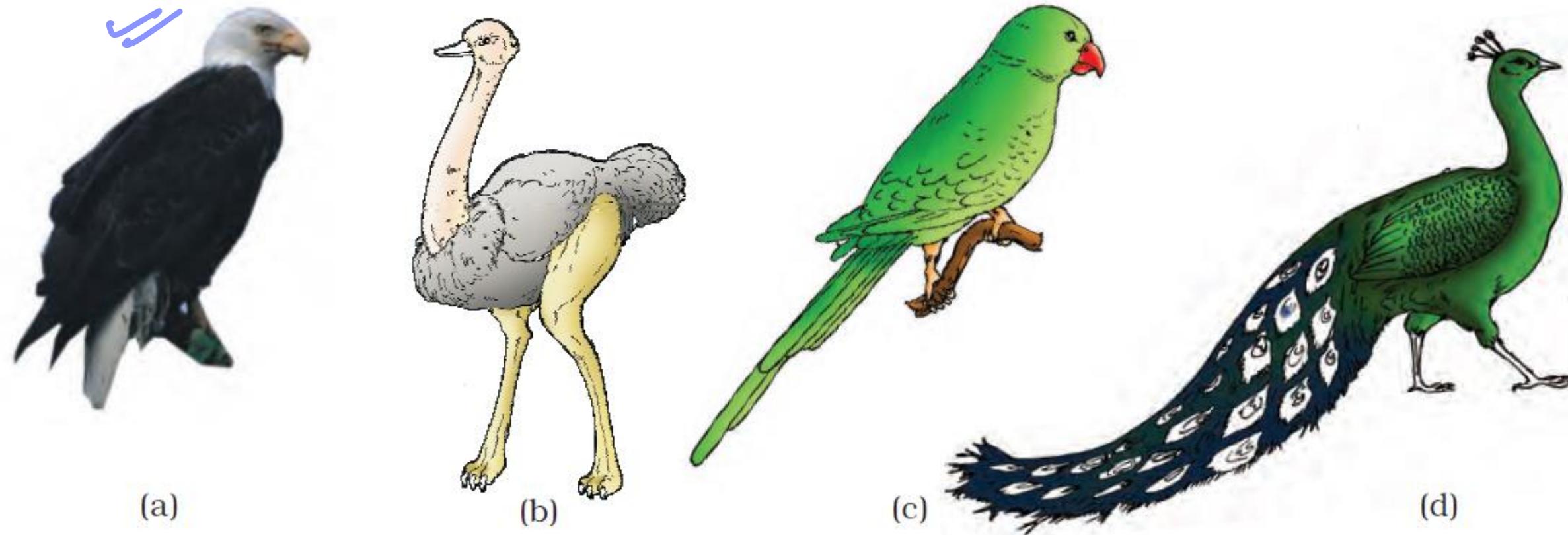
cobra

Poisonous
snake



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(a)

(b)

(c)

(d)

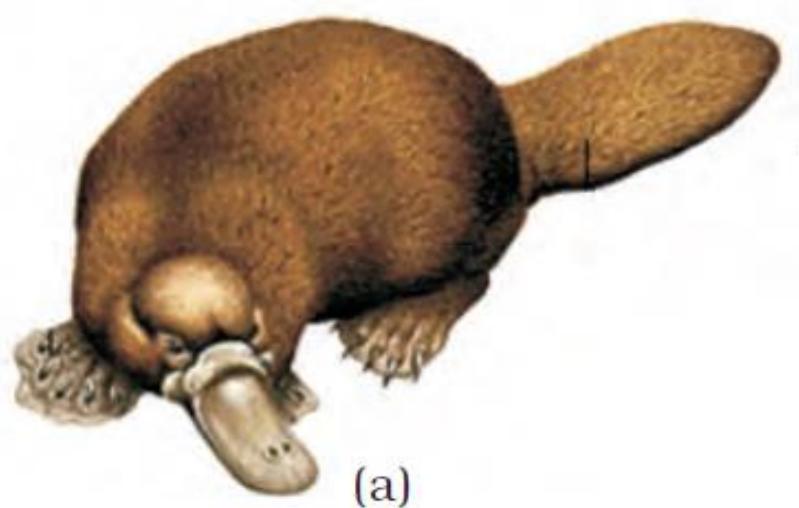
Figure 4.23 Some birds : (a) *Neophron* (b) *Struthio* (c) *Psittacula* (d) *Pavo*

Vulture Ostrich Parrot Peacock



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(a)

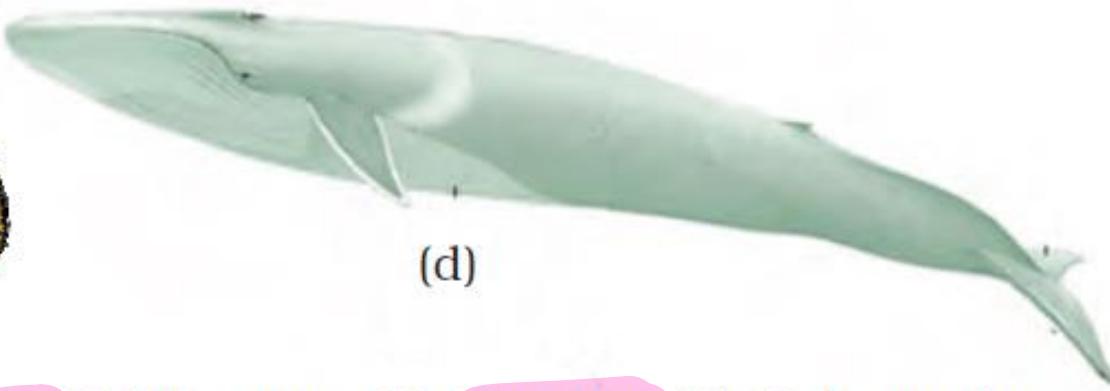
Oviparous



(b)



(c)



(d)

Figure 4.24 Some mammals : (a) *Ornithorhynchus* (b) *Macropus* (c) *Pteropus* (d) *Balaenoptera*

~~class~~

duck billed
Platypus

KangaroO

Bat

Blue
whale



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CHAPTER-5

MORPHOLOGY OF

FLOWERING PLANTS

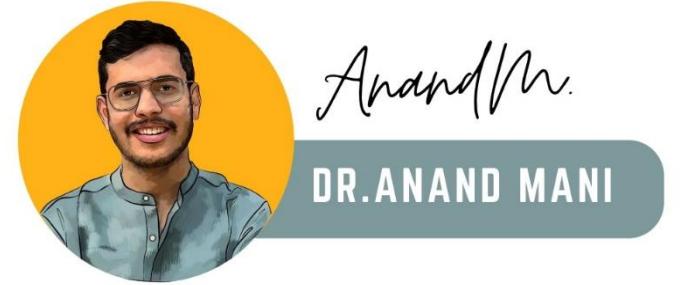
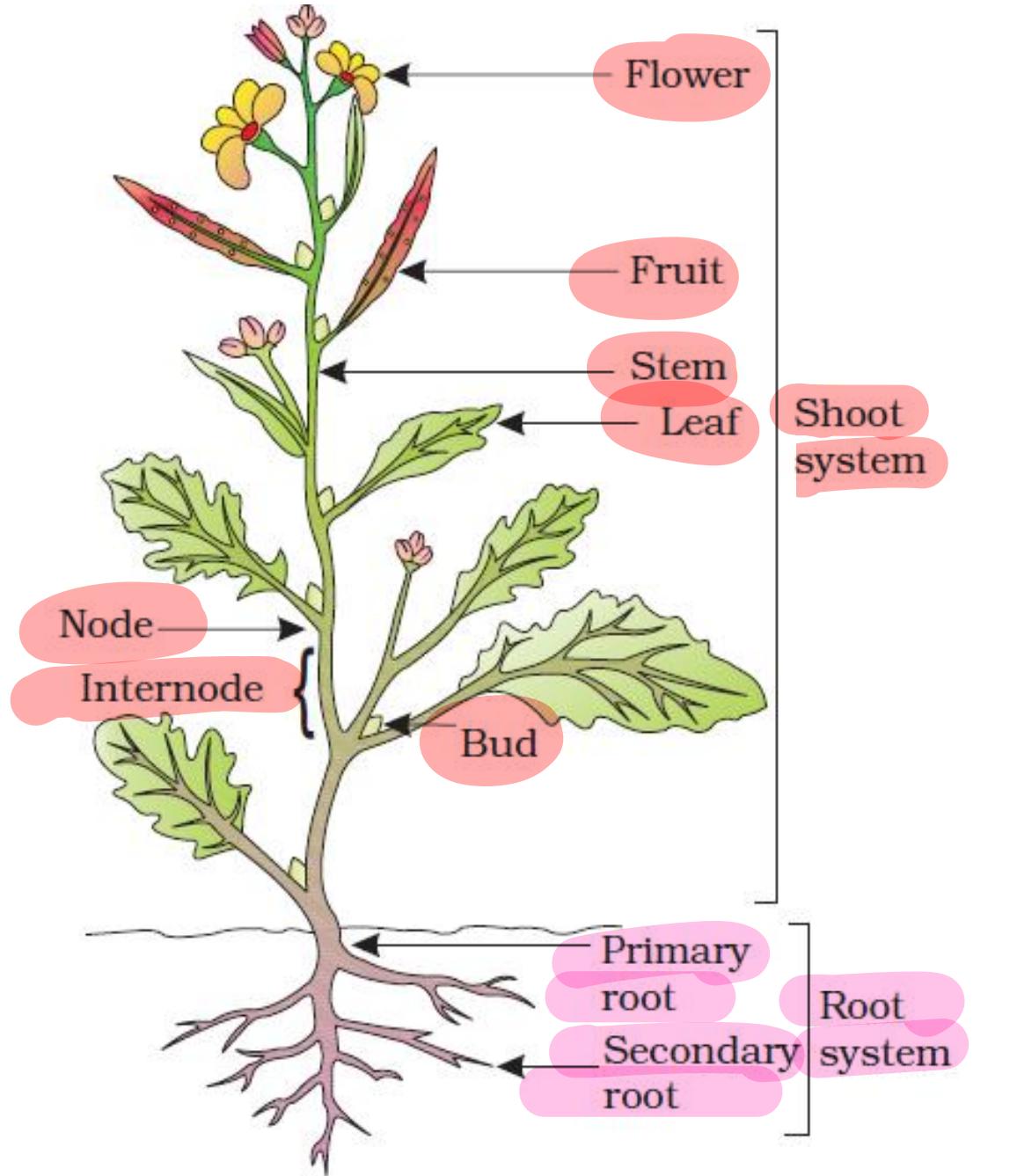
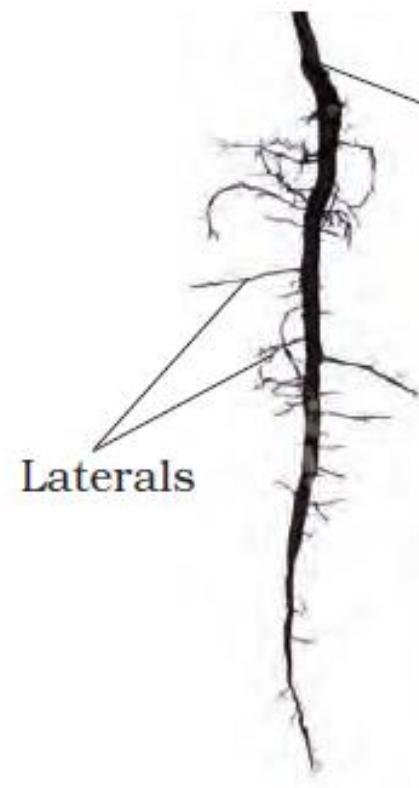


Figure 5.1 Parts of a flowering plant



(a)



(b)



(c)

Figure 5.2 Different types of roots : (a) Tap (b) Fibrous (c) Adventitious

Radicle base of
 stem

Nonstoma 'Banyan' tree



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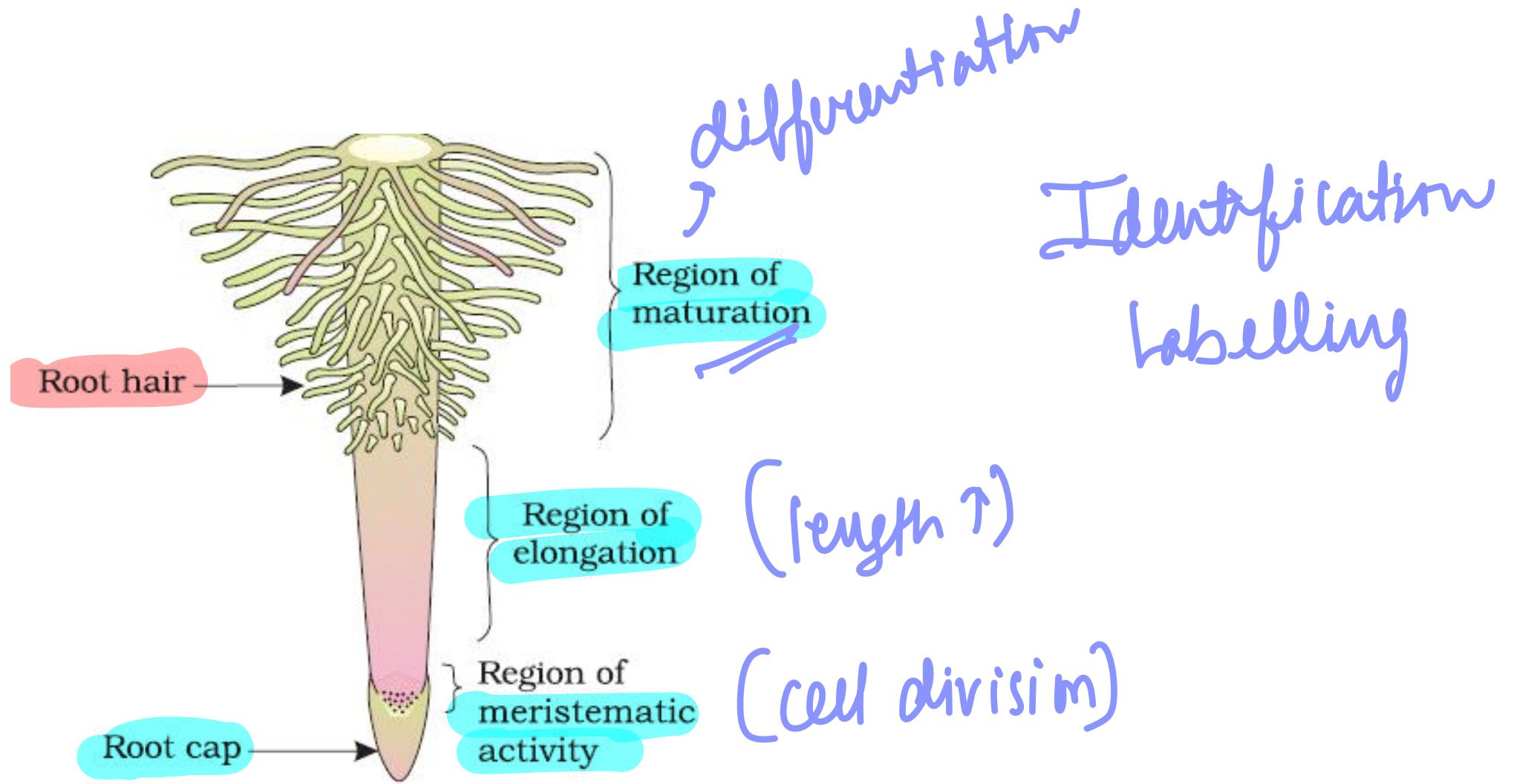


Figure 5.3 The regions of the root-tip



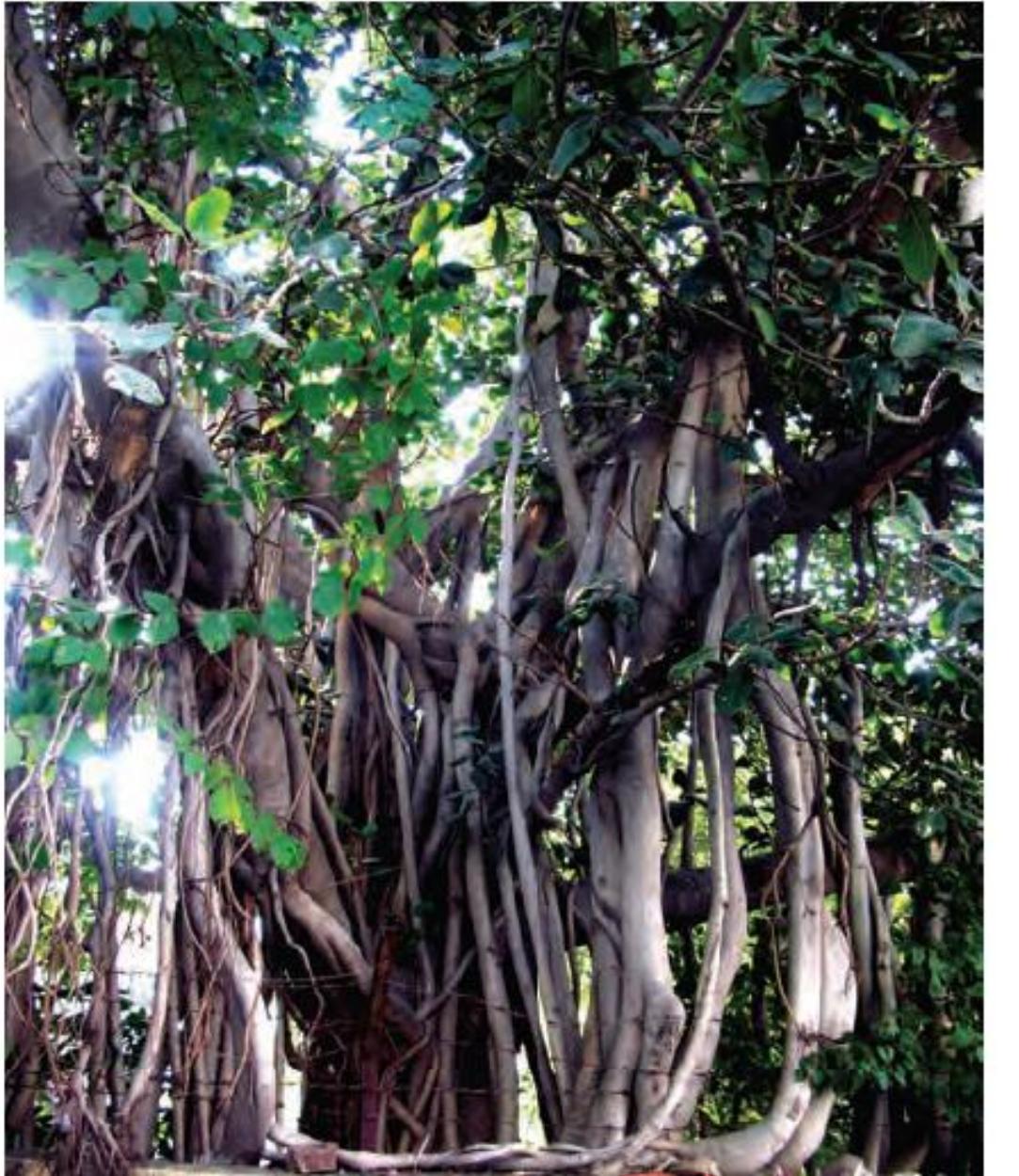


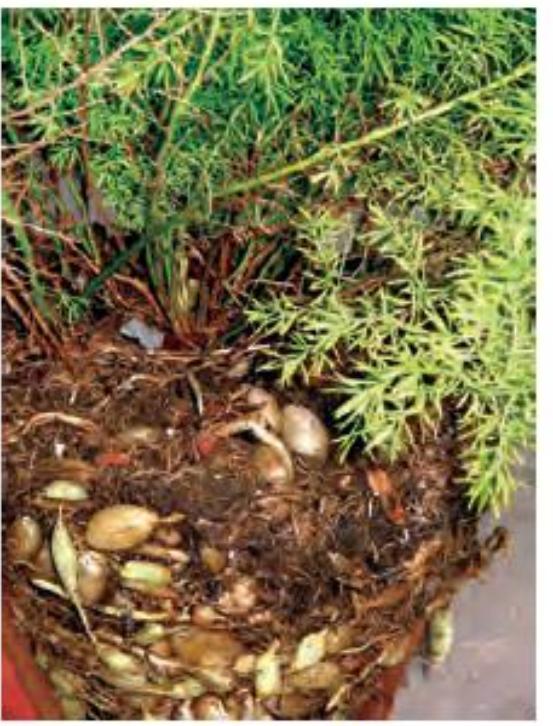
Figure 5.4 Modification of root for support:
Banyan tree

Hanging roots
(Prop roots)

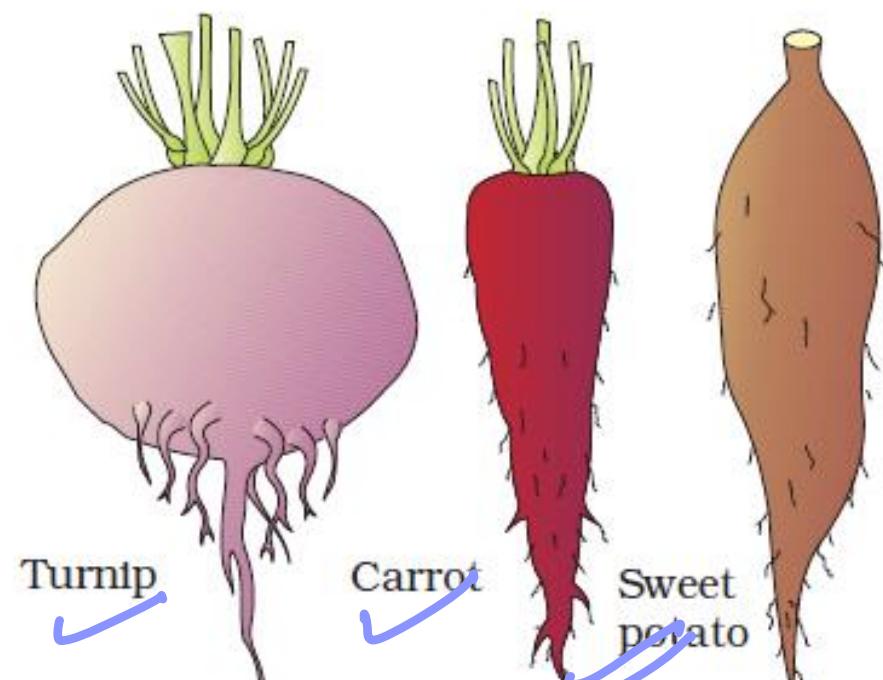


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Asparagus



(a)



(b)

Figure 5.5 Modification of root for: (a) storage (b) respiration: pneumatophore in *Rhizophora*

Swampy area

vertically upward



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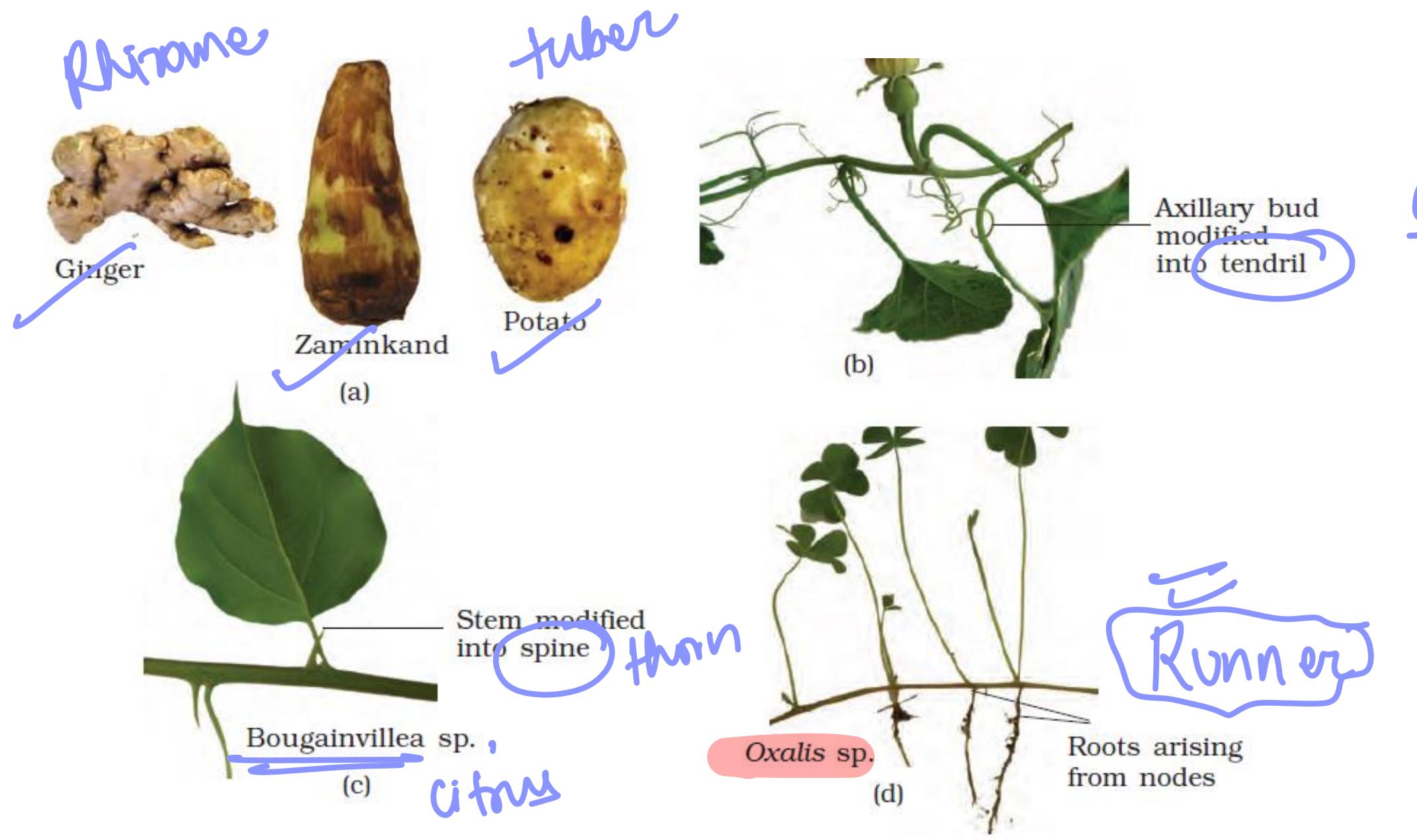
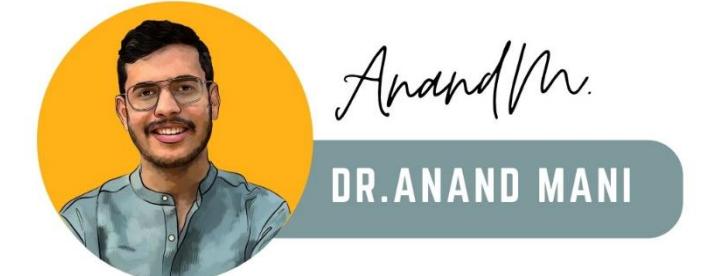
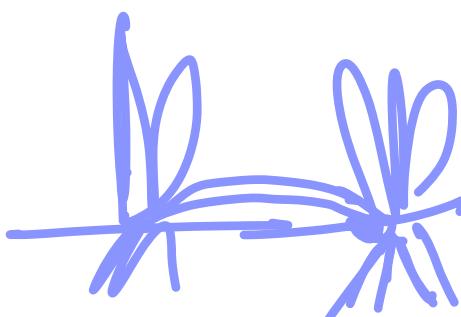


Figure 5.6 Modifications of stem for: (a) storage (b) support (c) protection (d) spread and vegetative propagation

climbing
gourds
 (Cucumber,
 watermelon)



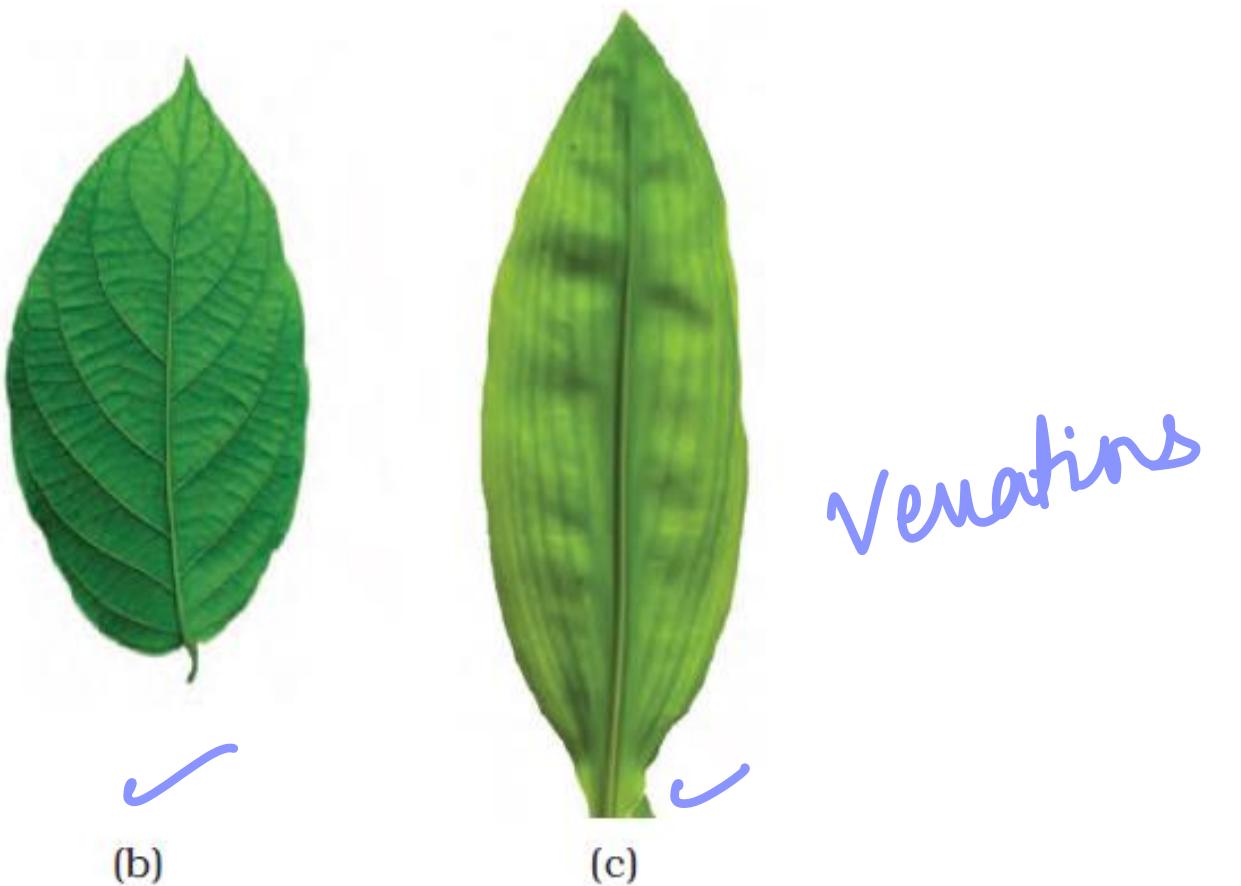
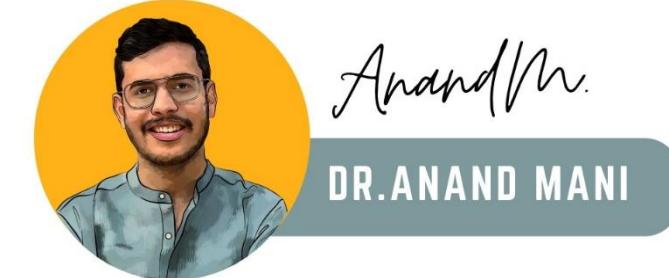
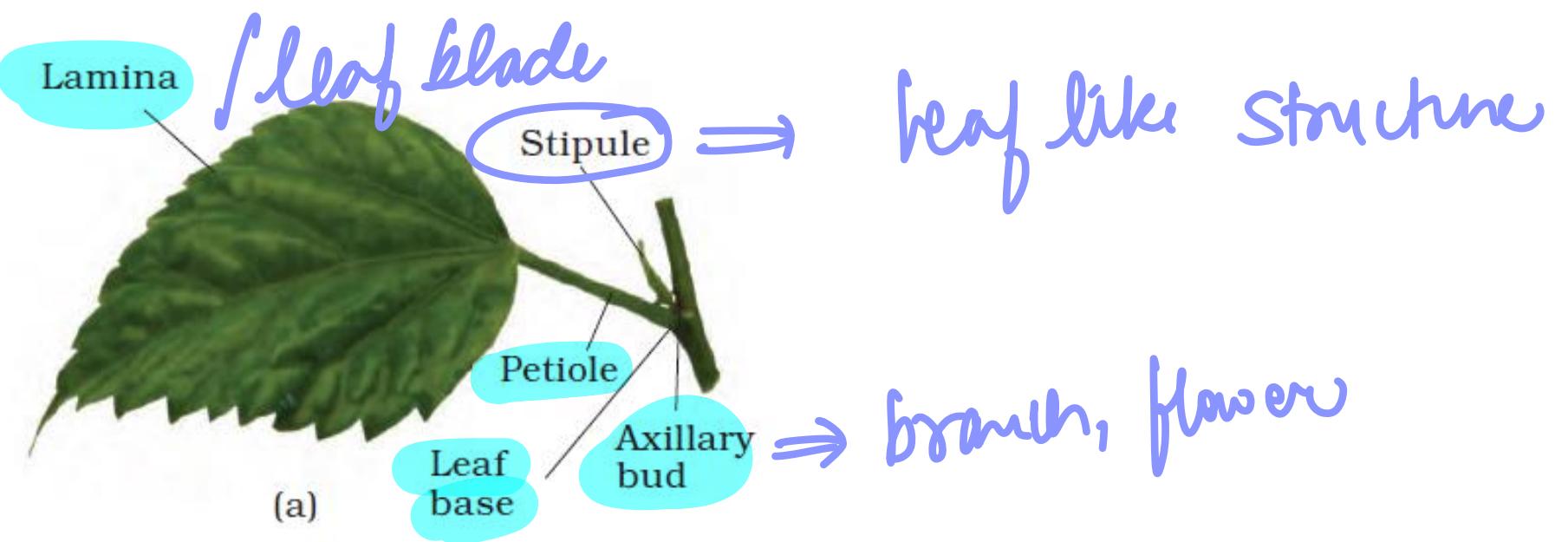


Figure 5.7 Structure of a leaf :

- (a) Parts of a leaf ↗
- (b) Reticulate venation ↗ network (dιυτ)
- (c) Parallel venation ↗ Parallel (Νονοστ)

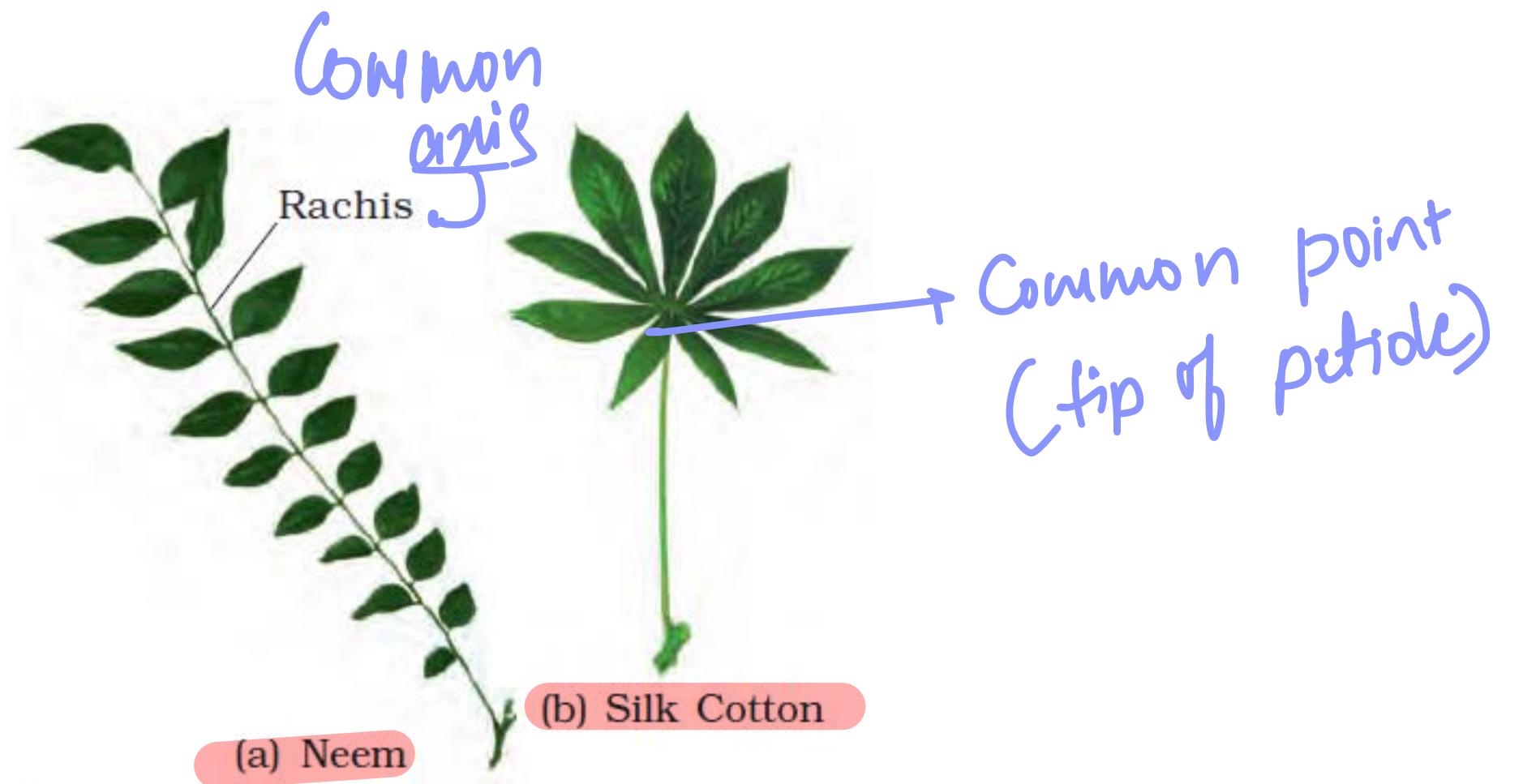
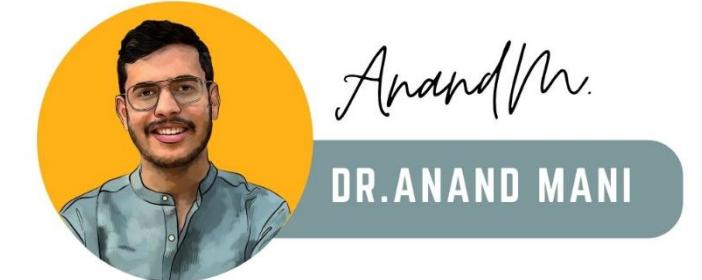
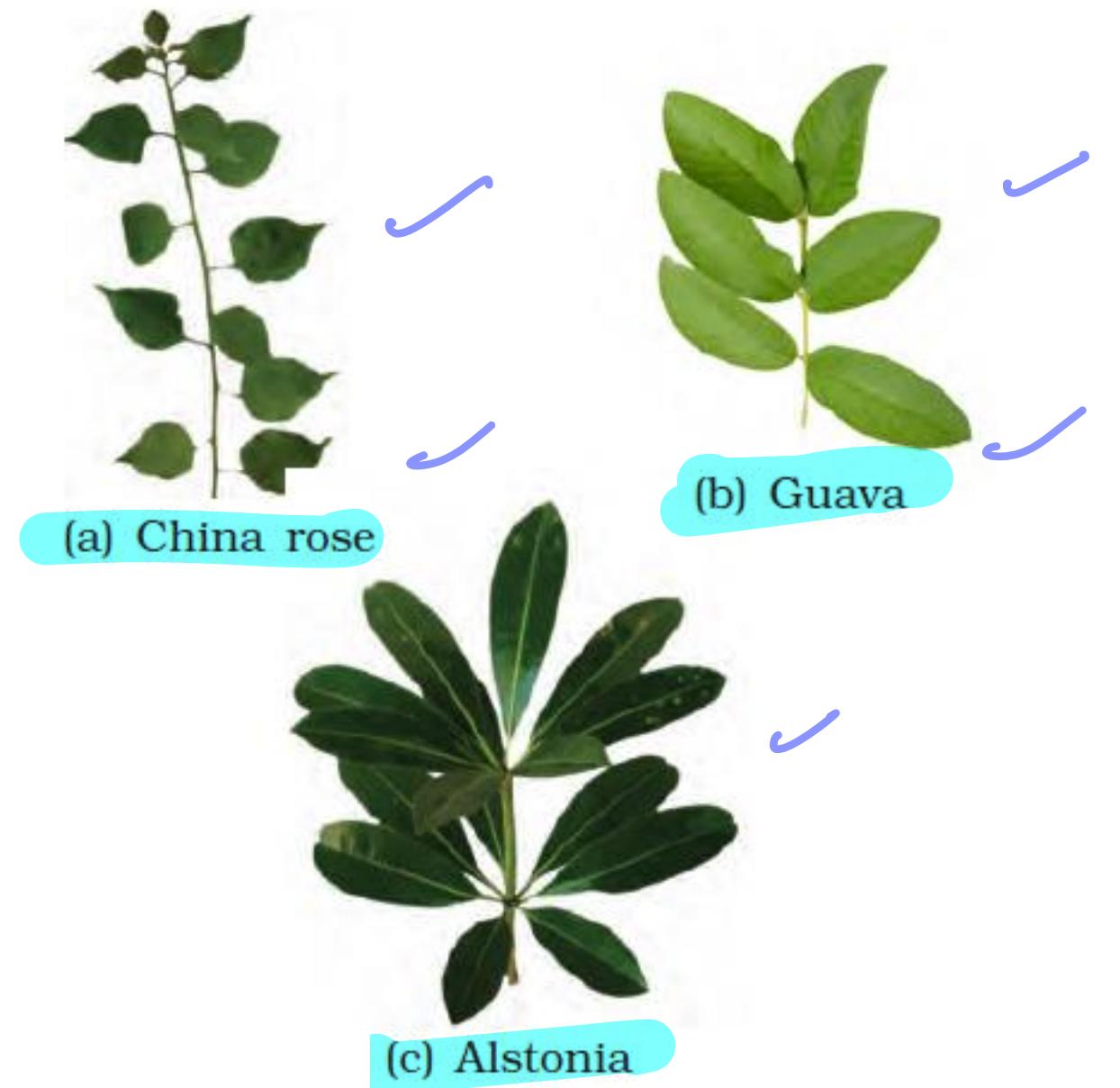
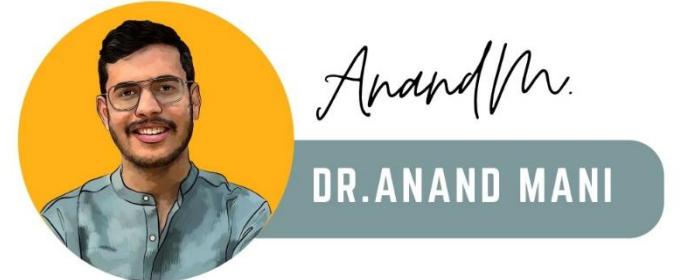


Figure 5.8 Compound leaves :

- (a) pinnately compound leaf
- (b) palmately compound leaf





Identification
example

Figure 5.9 Different types of phyllotaxy :

- (a) Alternate
- (b) Opposite
- (c) Whorled

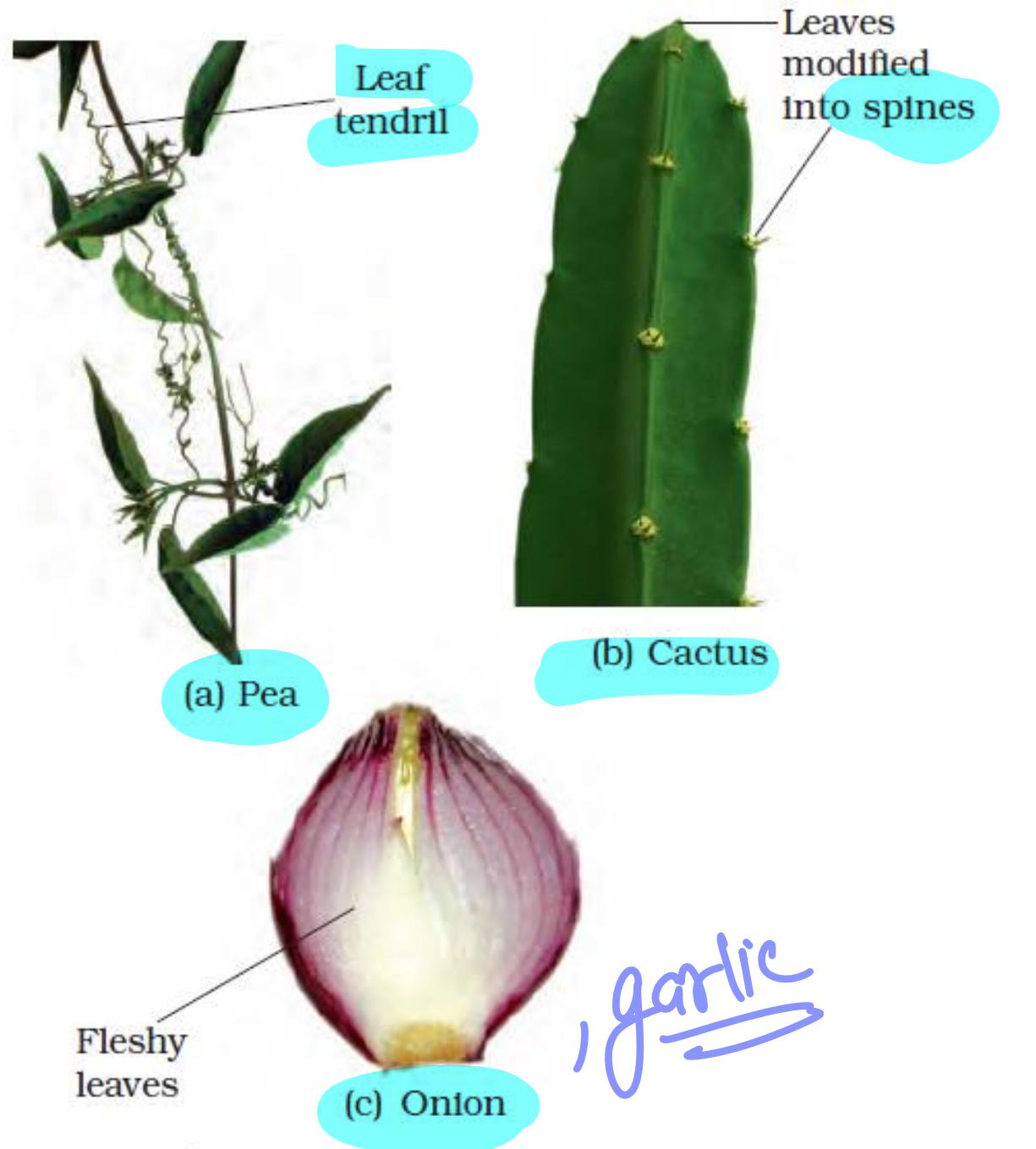


Figure 5.10 Modifications of leaf for :

- (a) support: tendril
- (b) protection: spines
- (c) storage: fleshy leaves

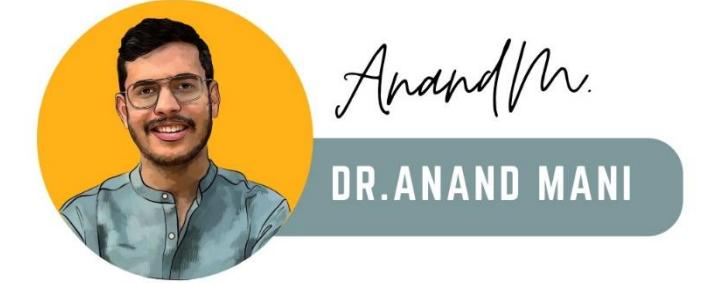


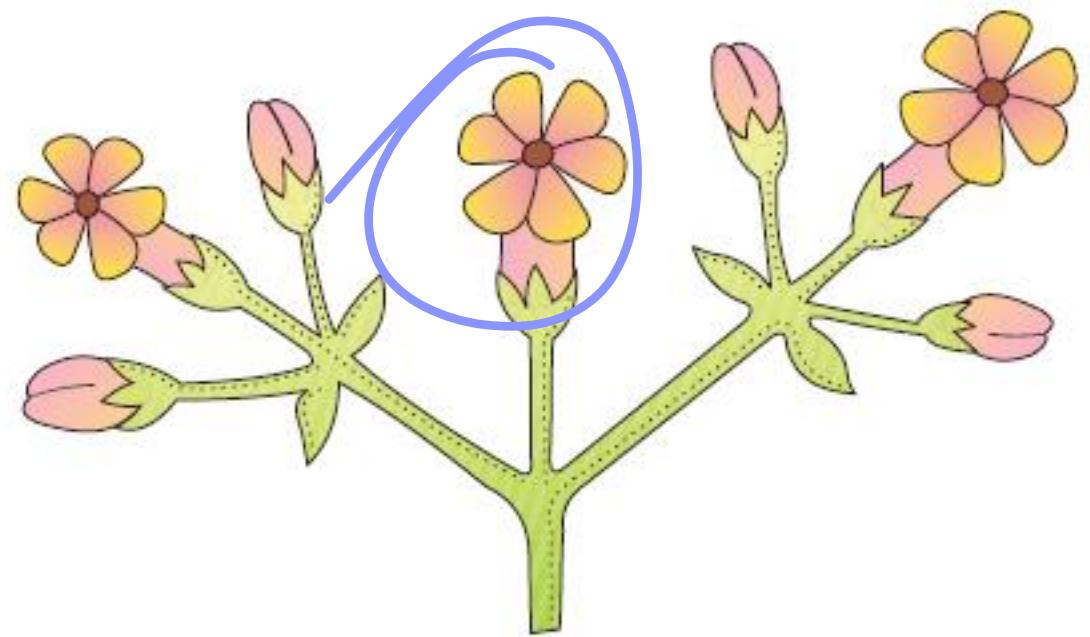
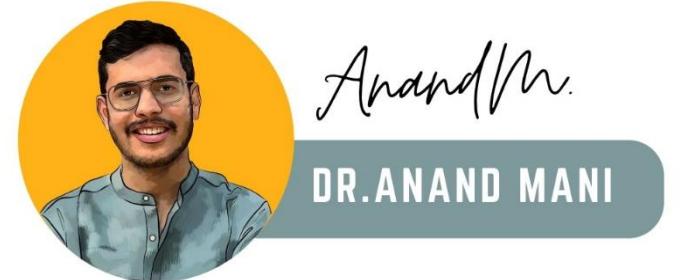


Figure 5.11 Racemose inflorescence

- Main axis continues to grow ↴
- Acropetal
- * Flowers present laterally



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→ Main axis ends in flower
⇒ Baumpetal

Figure 5.12 Cymose inflorescence

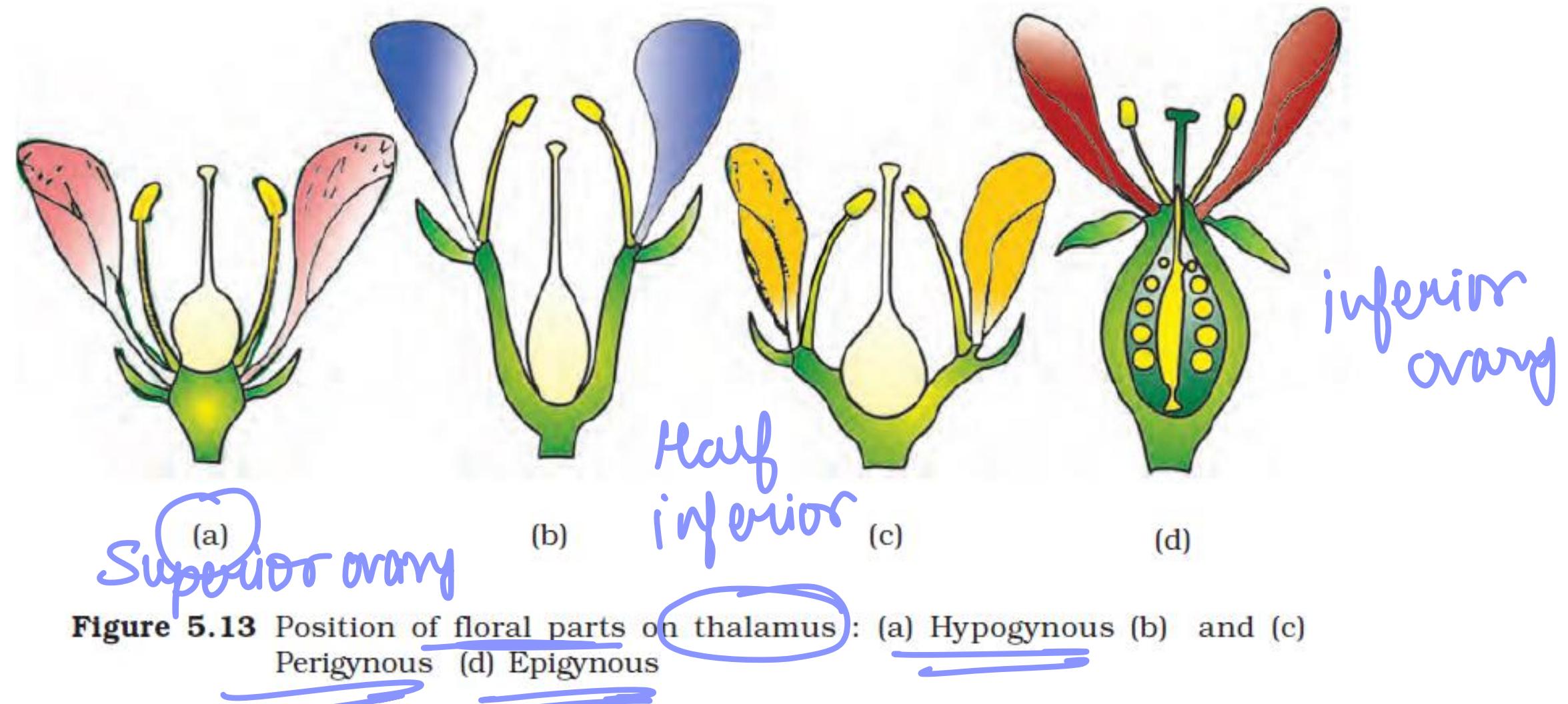
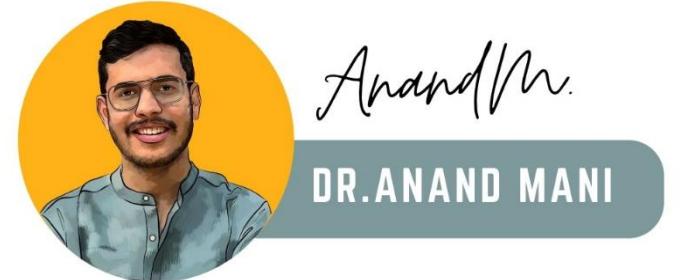


Figure 5.13 Position of floral parts on thalamus: (a) Hypogynous (b) and (c) Perigynous (d) Epigynous



Hypogynous : mustard, china rose, brinjal

Perigynous : Rose, plum, peach

Epigynous : guava, cucumber

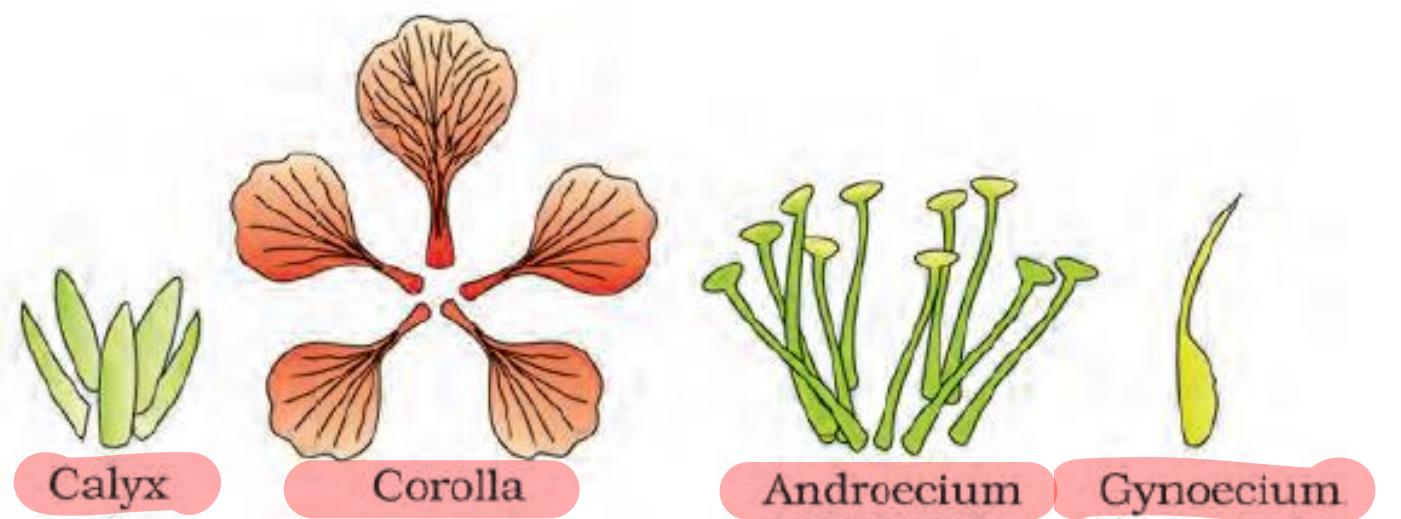
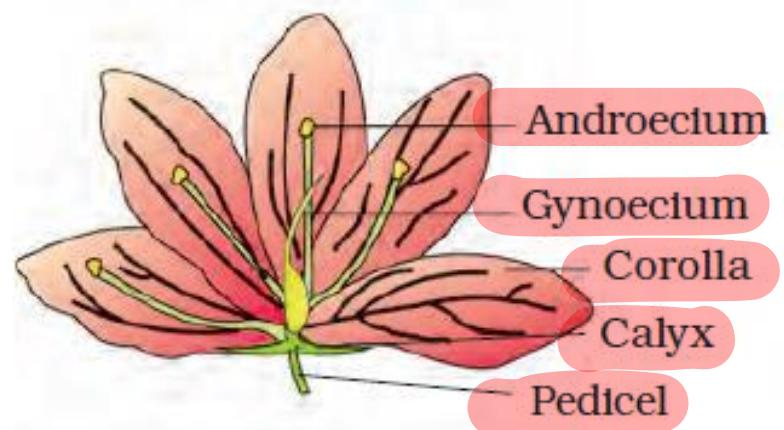
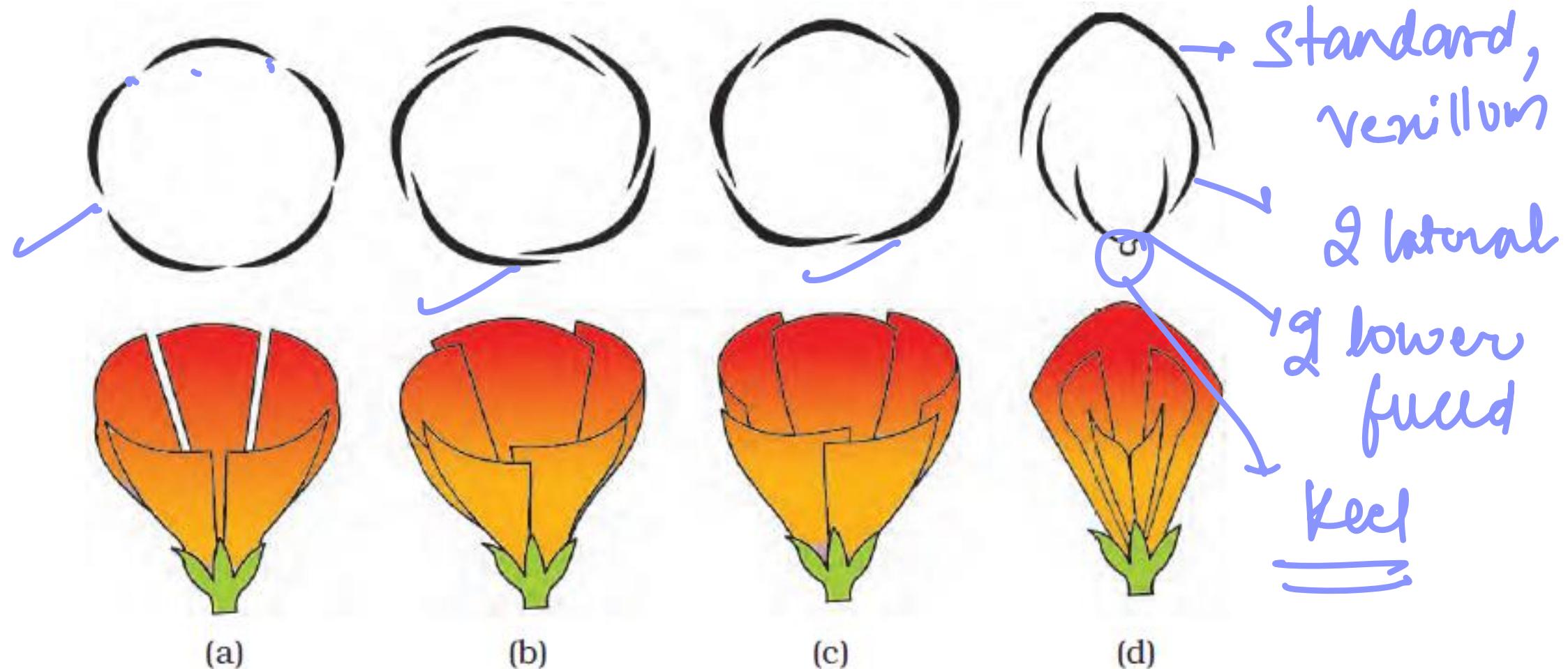


Figure 5.14 Parts of a flower



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Figure 5.15 Types of aestivation in corolla : (a) Valvate (b) Twisted (c) Imbricate (d) Vexillary

Calotropis
 China rose
 Lady finger
 Cauci
 gulmohar
 Papilionaceous

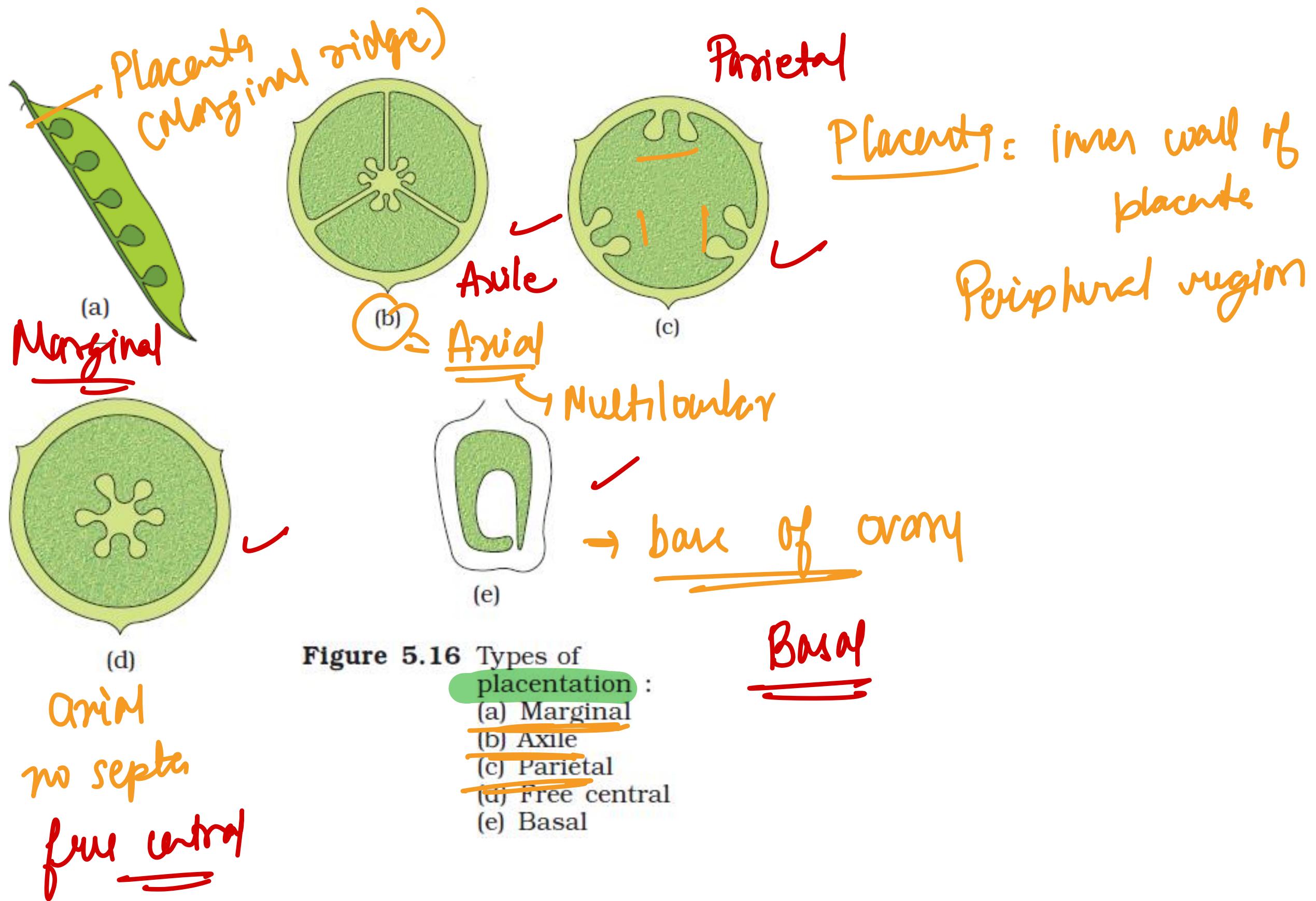


Figure 5.16 Types of placentation :

- (a) Marginal
- (b) Axile
- (c) Parietal
- (d) Free central
- (e) Basal



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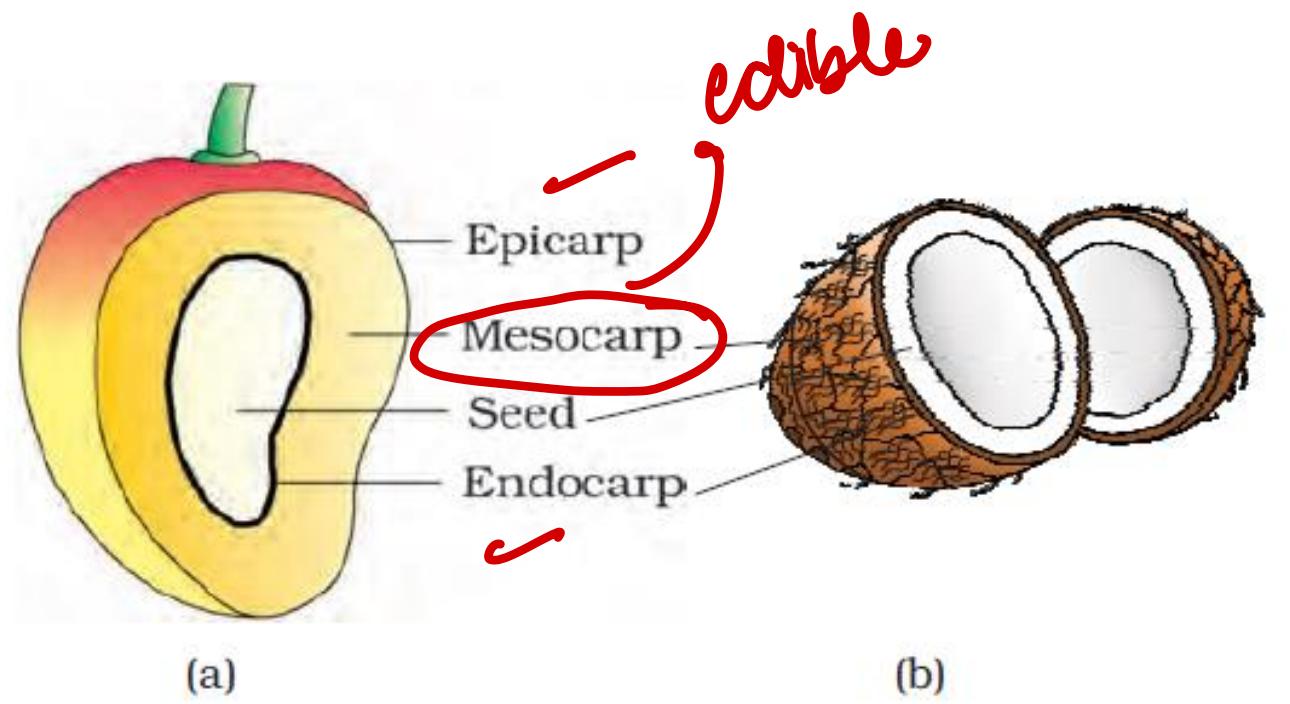
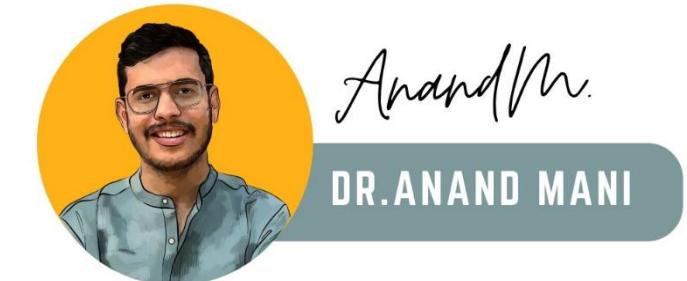


Figure 5.17 Parts of a fruit : (a) Mango (b) Coconut

drupe fruit

Mesocarp = fibrous
endocarp = hard



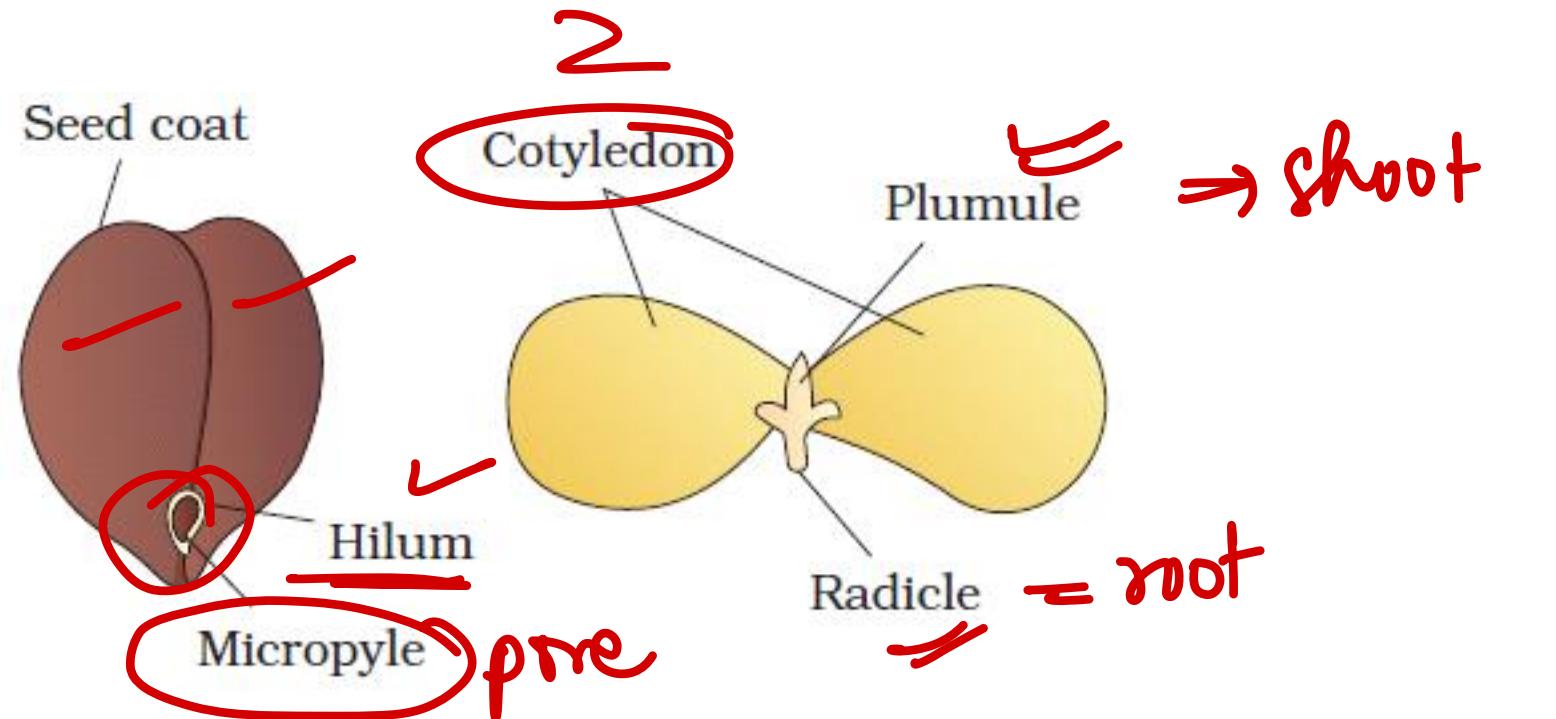
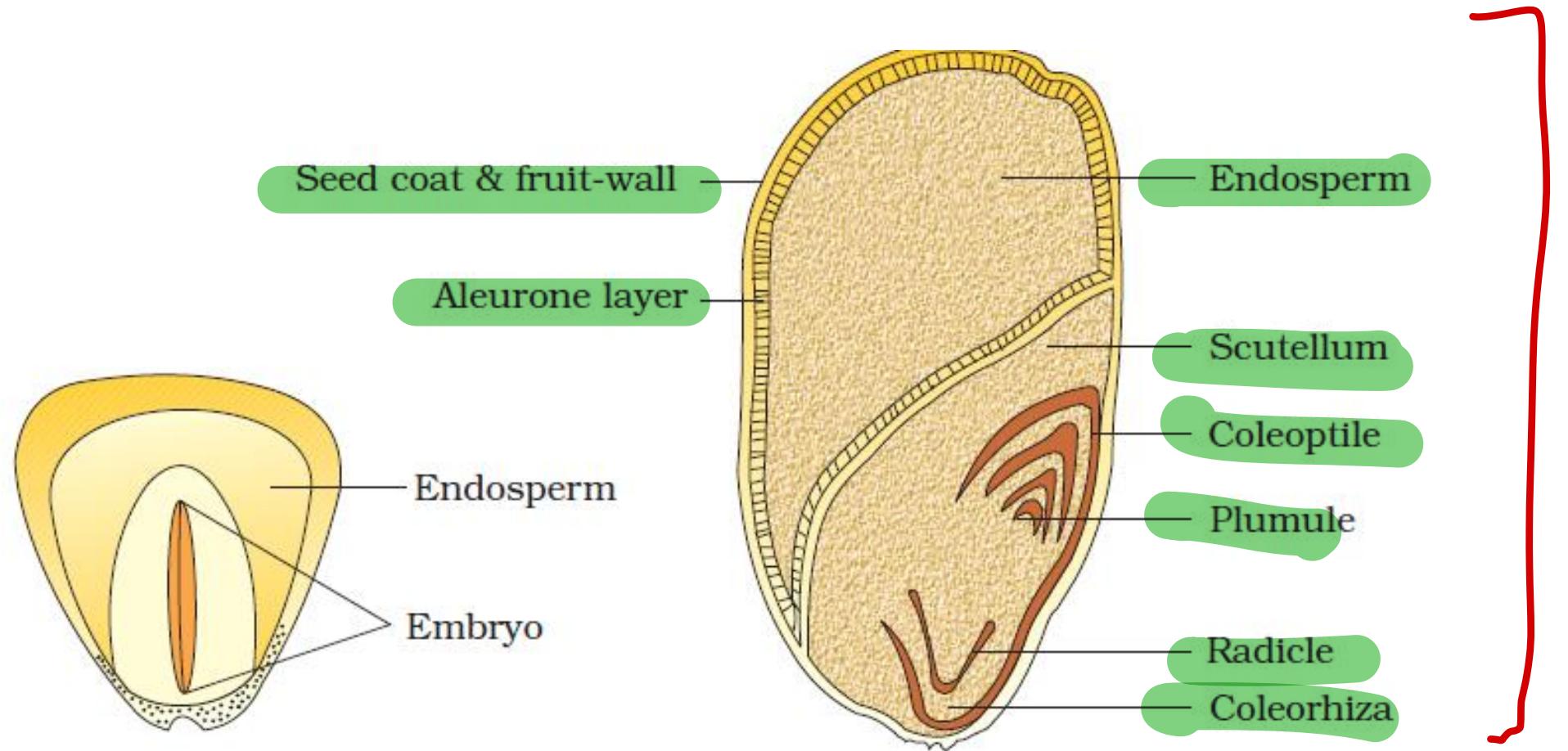


Figure 5.18 Structure of dicotyledonous seed



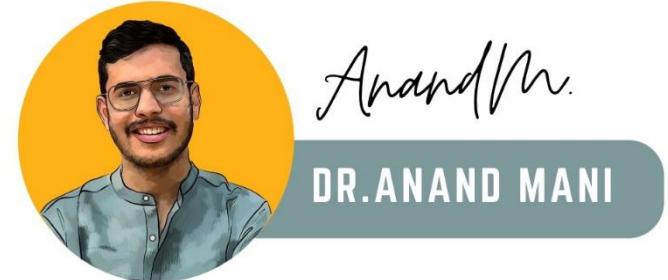
Anand/M.

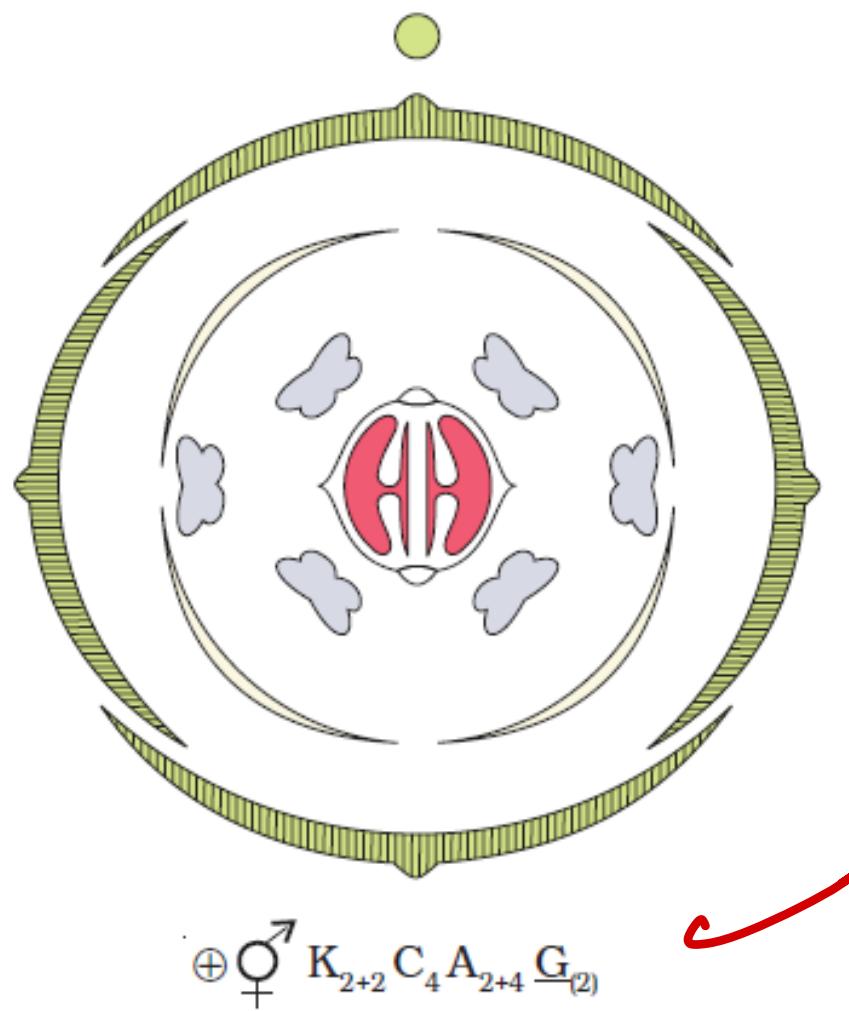
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Labelling

Figure 5.19 Structure of a monocotyledonous seed





Brassicaceae = Mustard

$\oplus \text{♂} \text{♀} \rightarrow K_{2+2} C_4 A_{2+4} G_{(2)}$

Figure 5.20 Floral diagram with floral formula

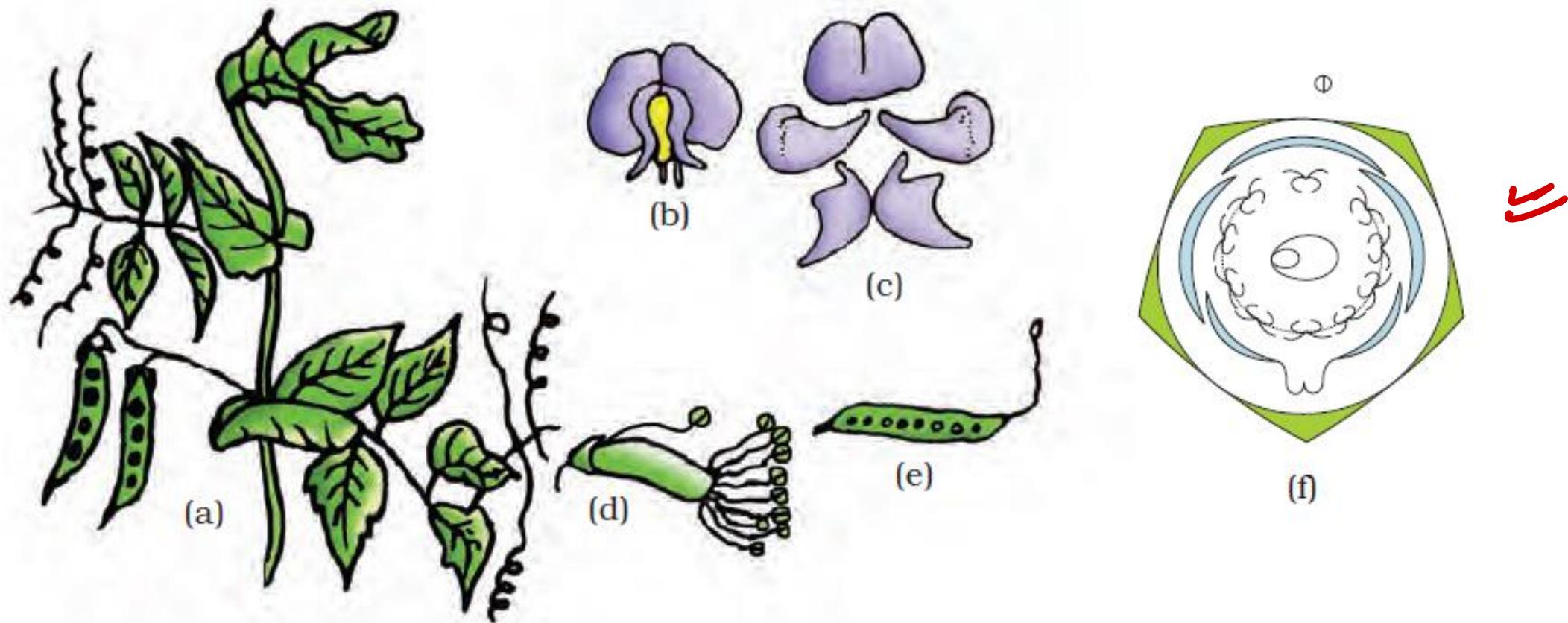
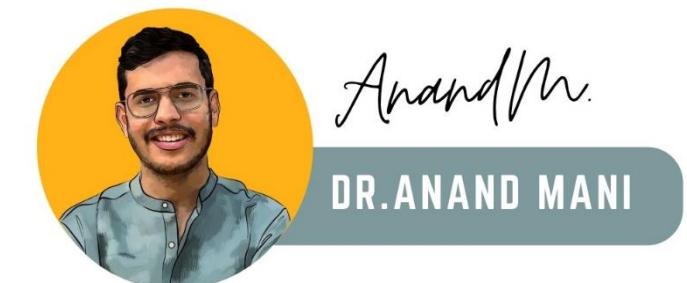


Figure 5.21 *Pisum sativum* (pea) plant : (a) Flowering twig (b) Flower (c) Petals
 (d) Reproductive parts (e) L.S.carpel (f) Floral diagram

Fabaceae

% \vec{Q} K(5) C₁₊₂₊₍₂₎ A₍₉₎₊₁ G₁



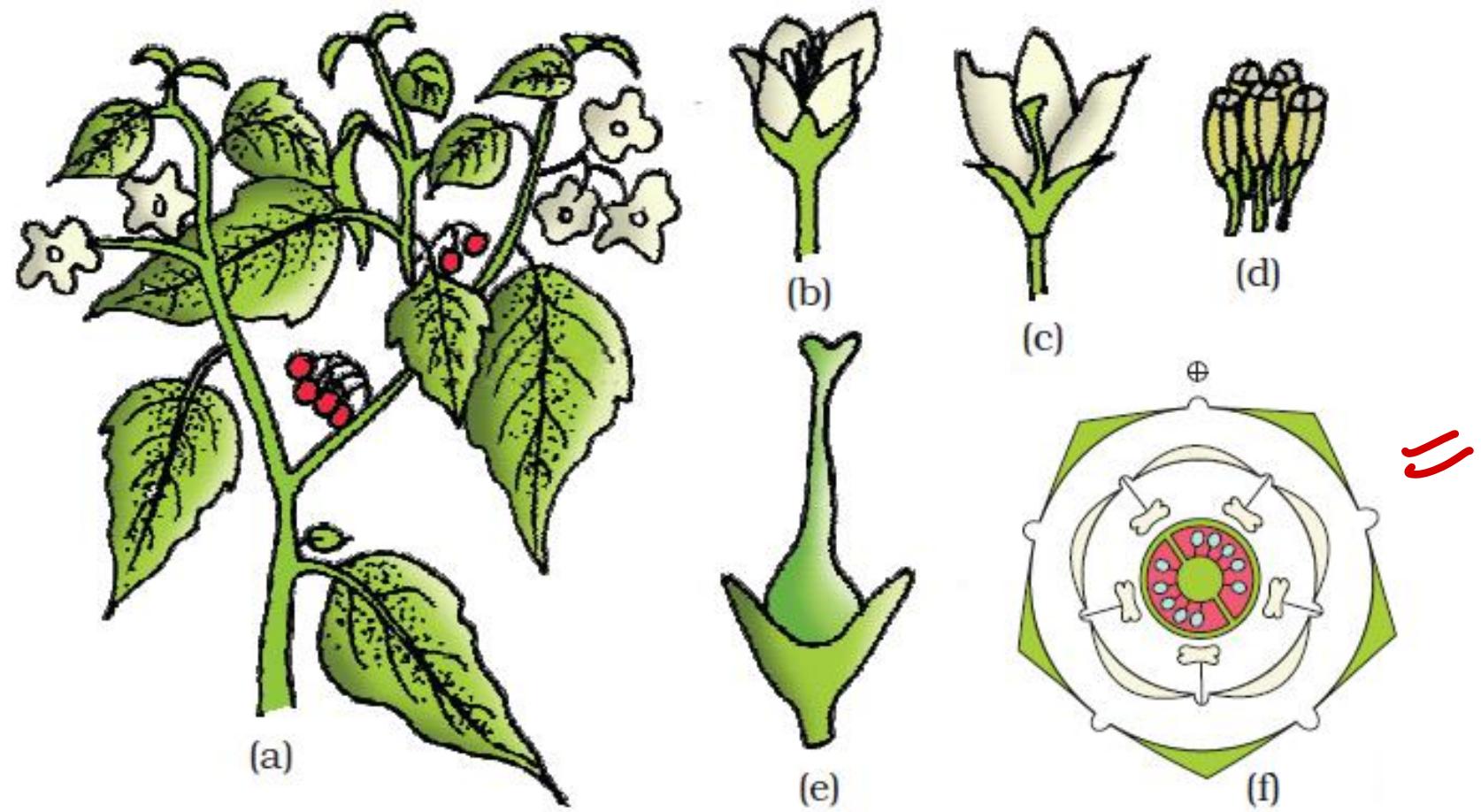


Figure 5.22 Solanum nigrum (makoi) plant : (a) Flowering twig (b) Flower
(c) L.S. of flower (d) Stamens (e) Carpel (f) Floral diagram

$\oplus \overset{\circ}{\underset{+}{\times}} K(5) (5) A_5 L(2)$



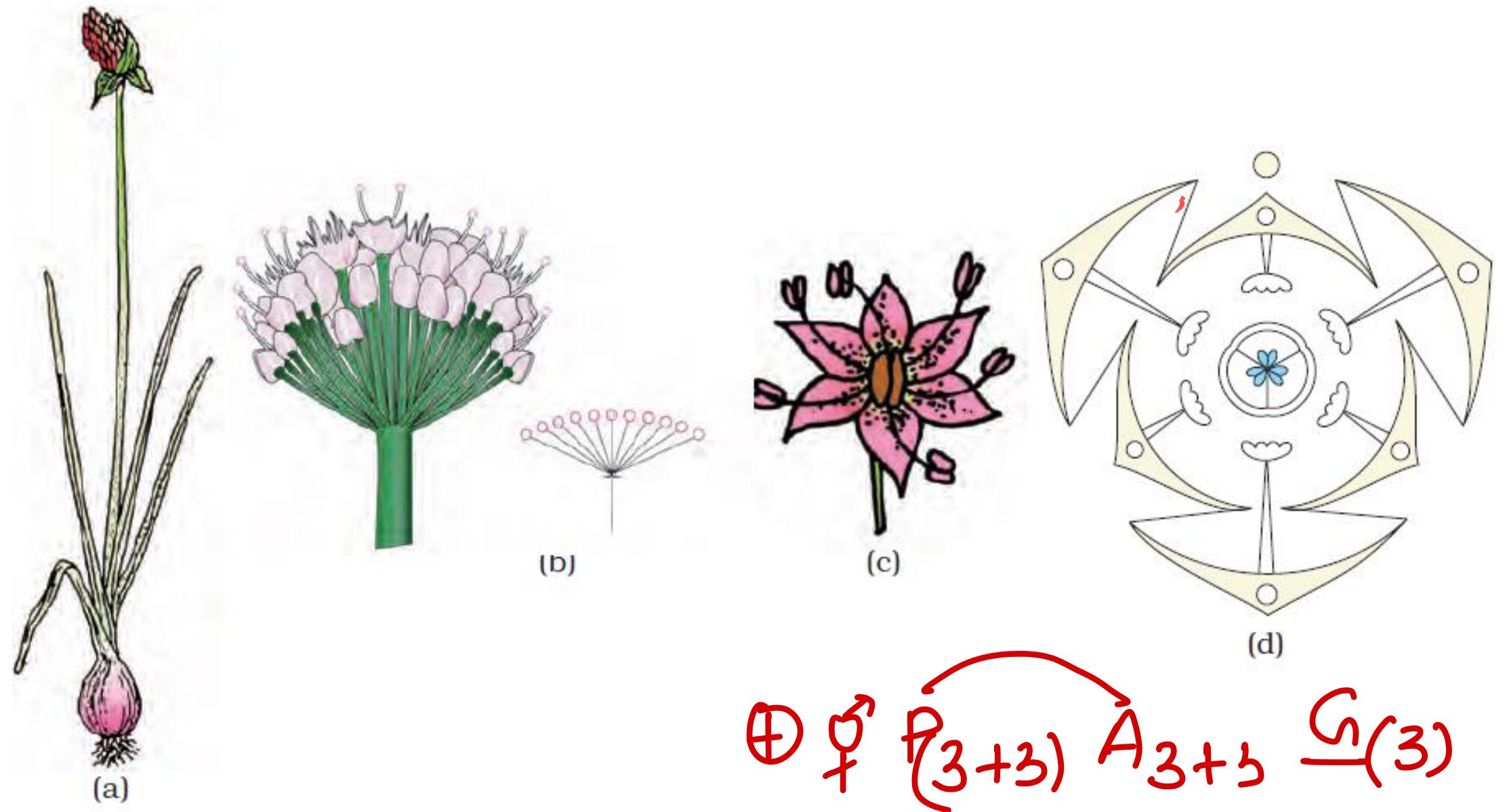


Figure 5.23 *Allium cepa* (onion) plant : (a) Plant (b) Inflorescence (c) Flower
(d) Floral diagram

$\oplus \text{♀ } P_{(3+3)} A_{3+3} G_{(3)}$

Alliaceae



CHAPTER-6

ANATOMY OF

FLOWERING PLANTS

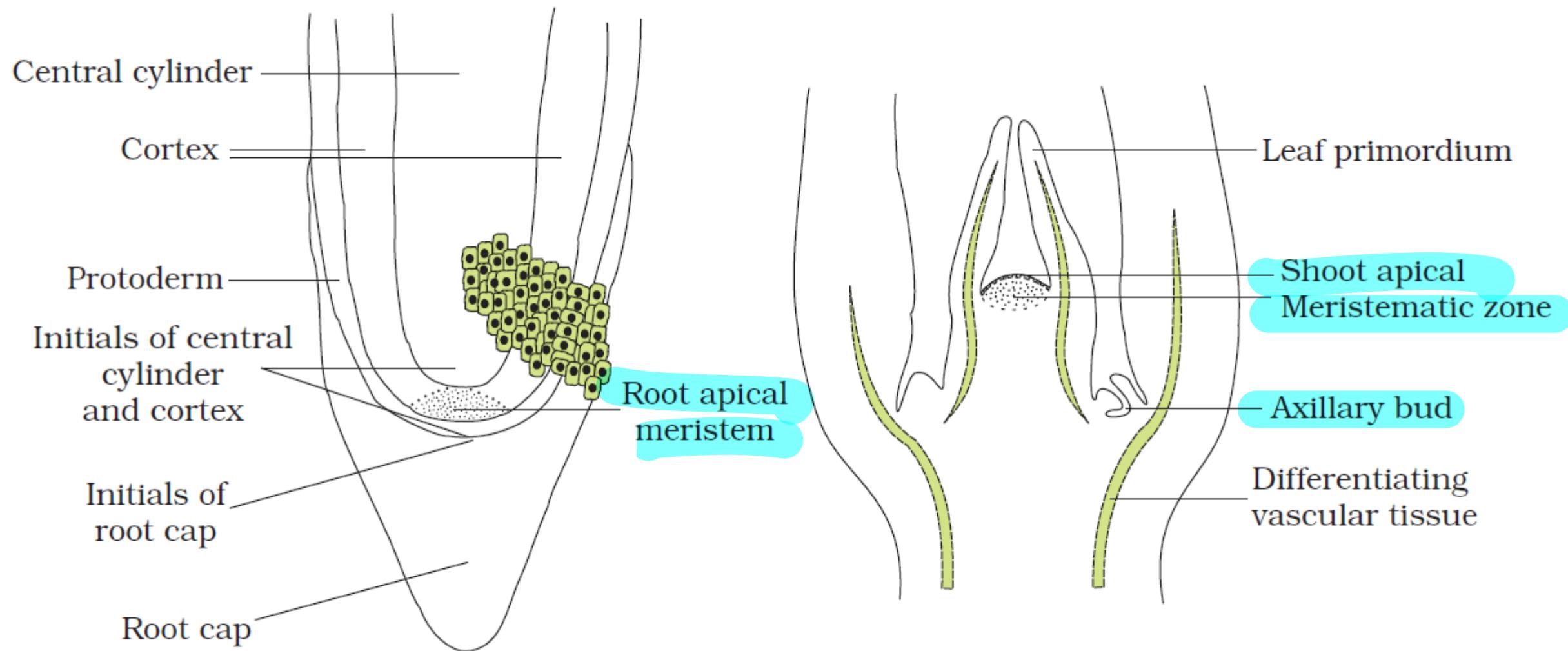
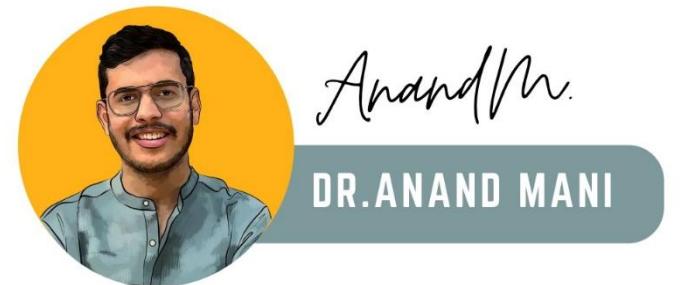
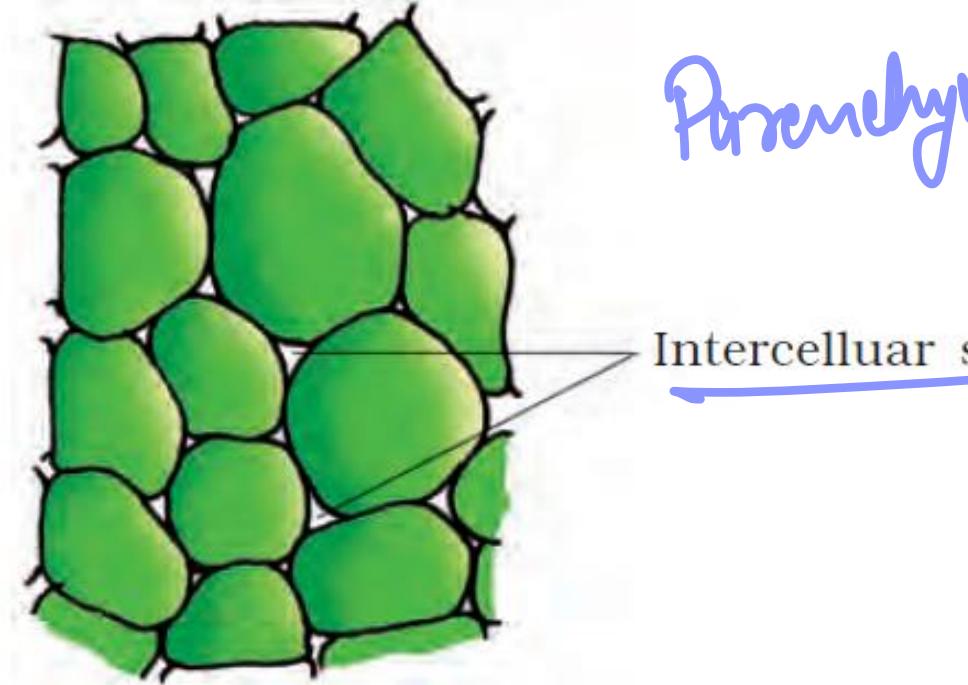
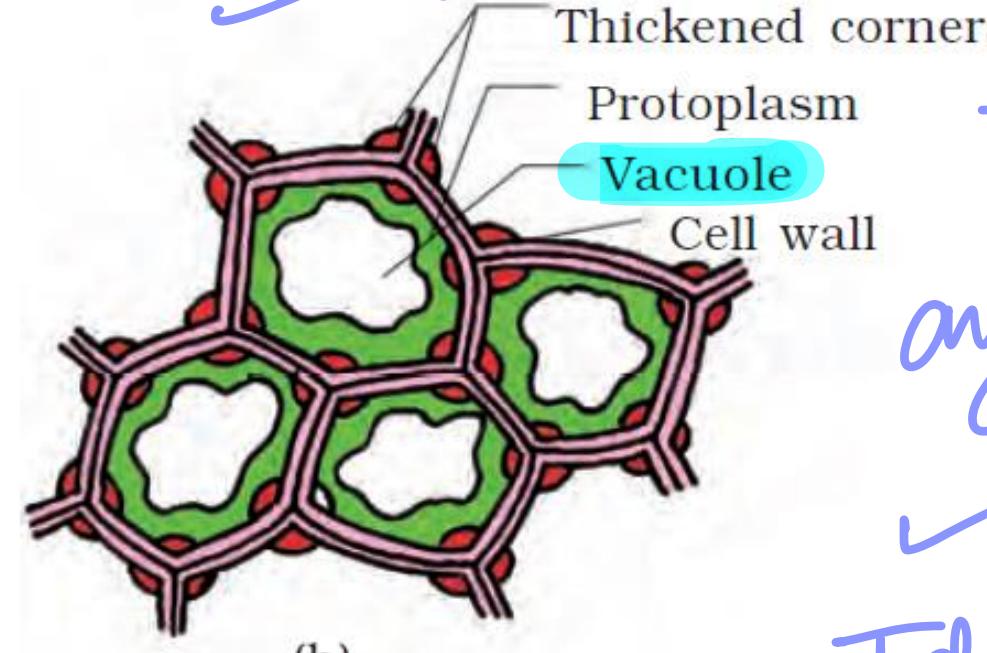


Figure 6.1 Apical meristem: (a) Root (b) Shoot



(a)

Parenchyma



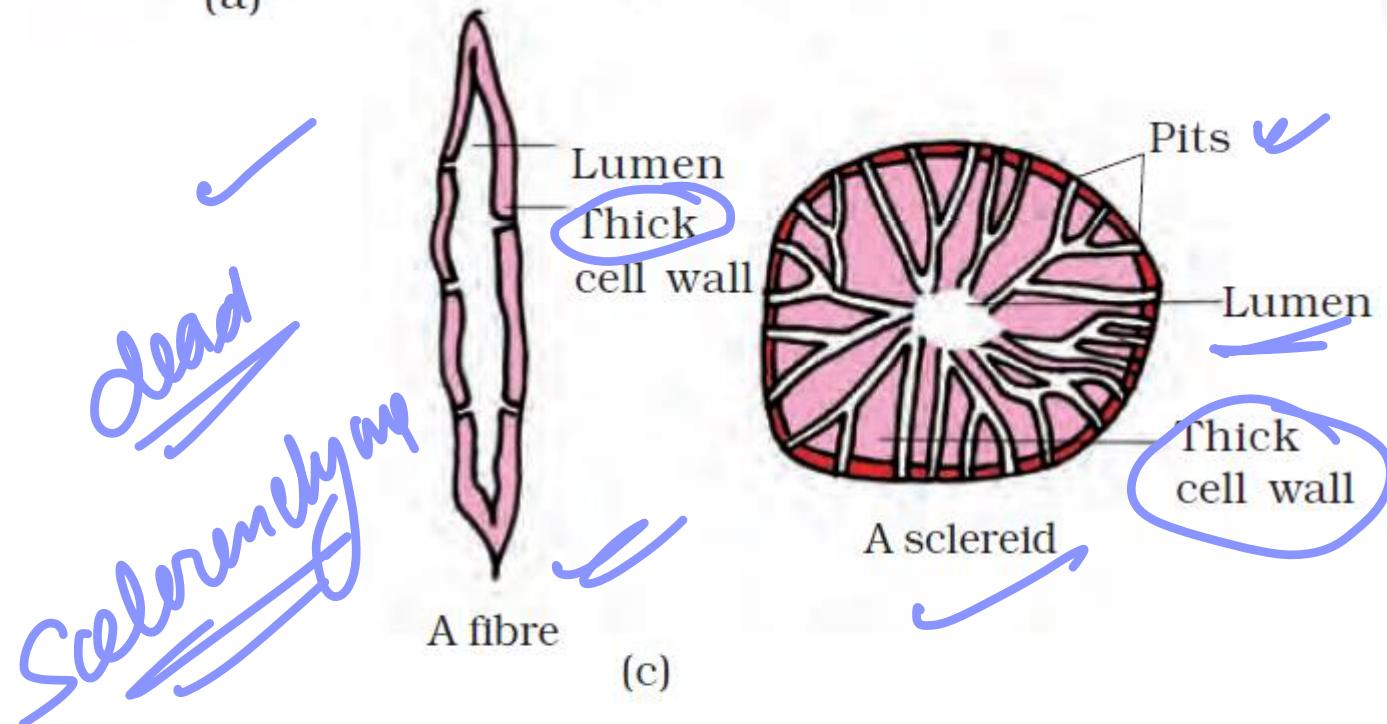
(b)

Collenchyma
Noncol X
Root X
living
Mechanical
angular thickening



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(c)

Figure 6.2 Simple tissues :

- (a) Parenchyma
- (b) Collenchyma
- (c) Sclerenchyma

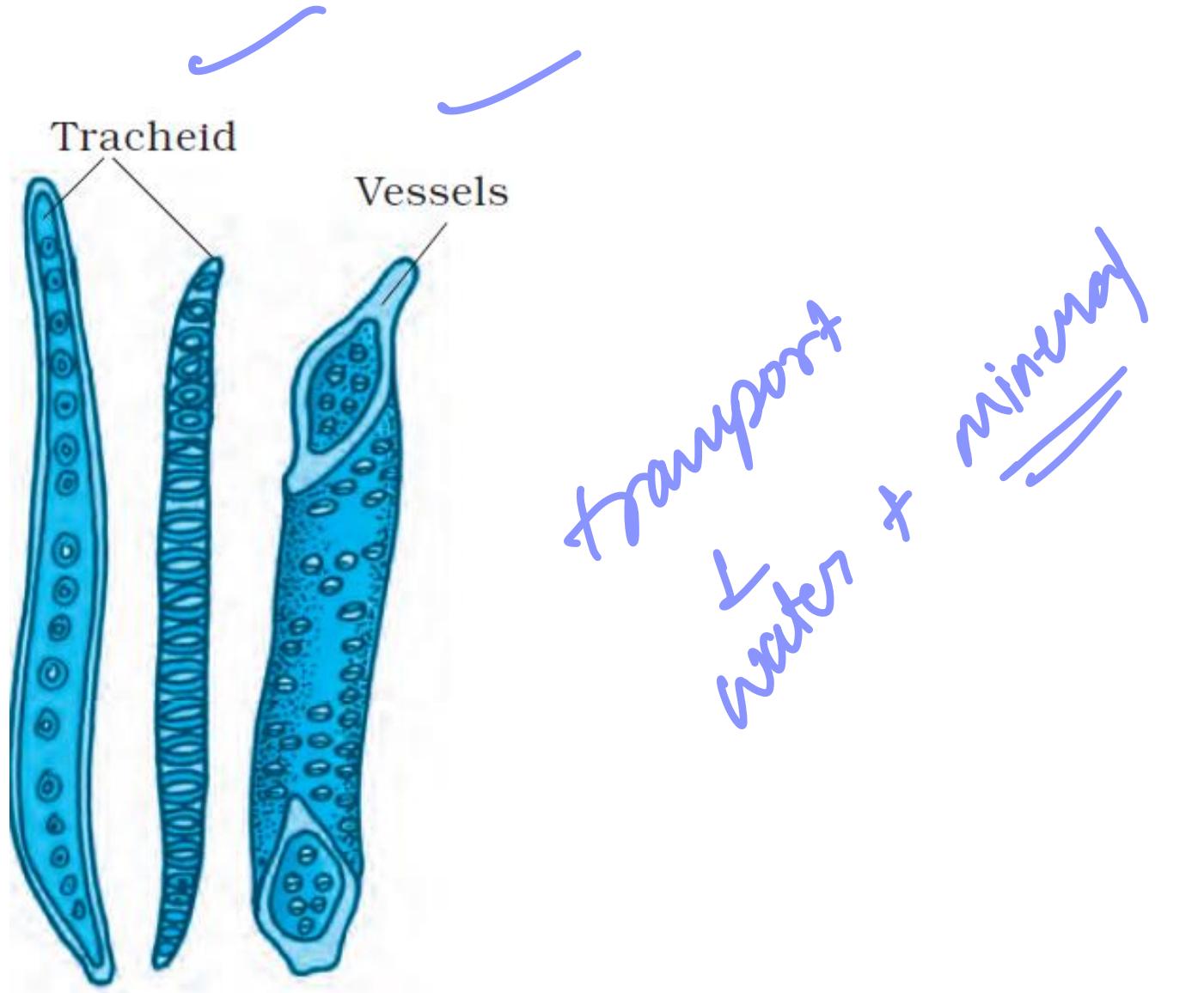
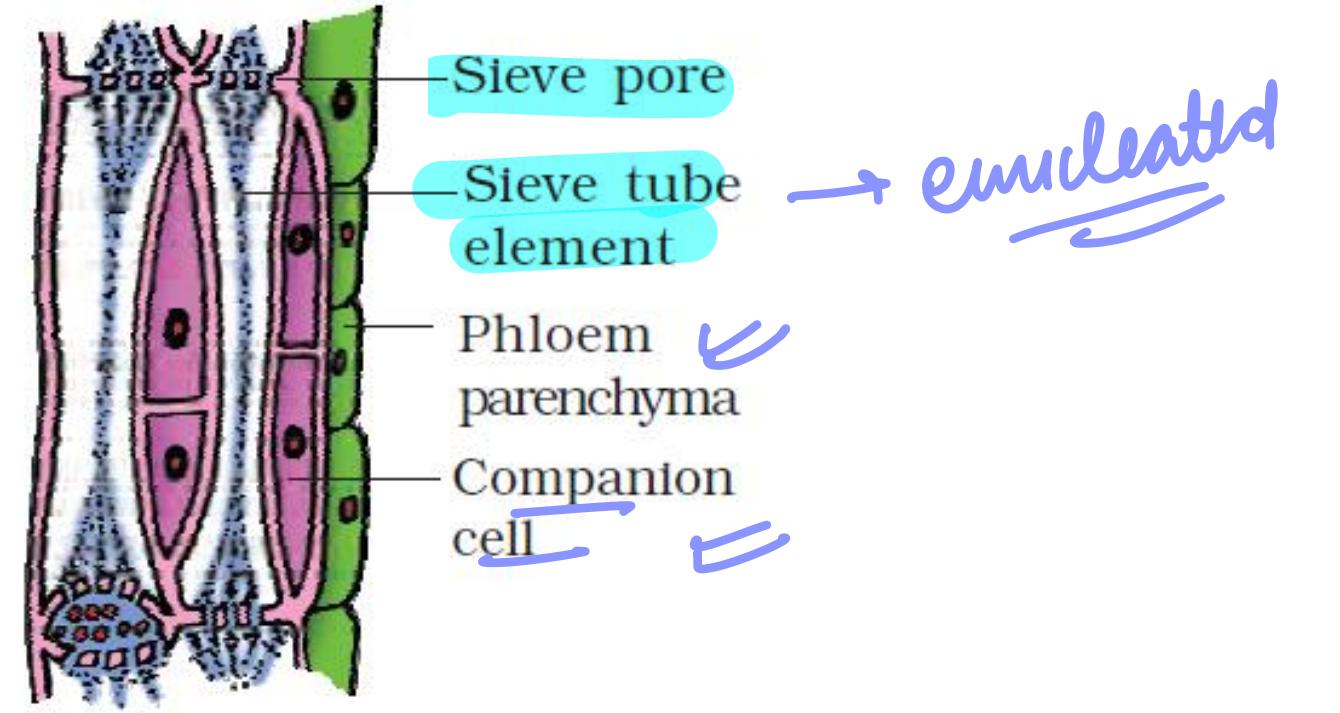


Figure 6.3 (a) Xylem



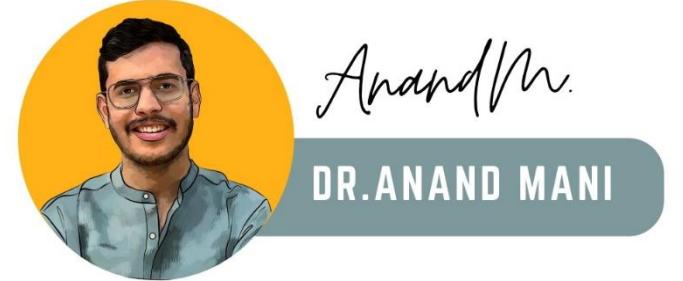
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(b)

Figure 6.3 (a) Xylem
(b) Phloem



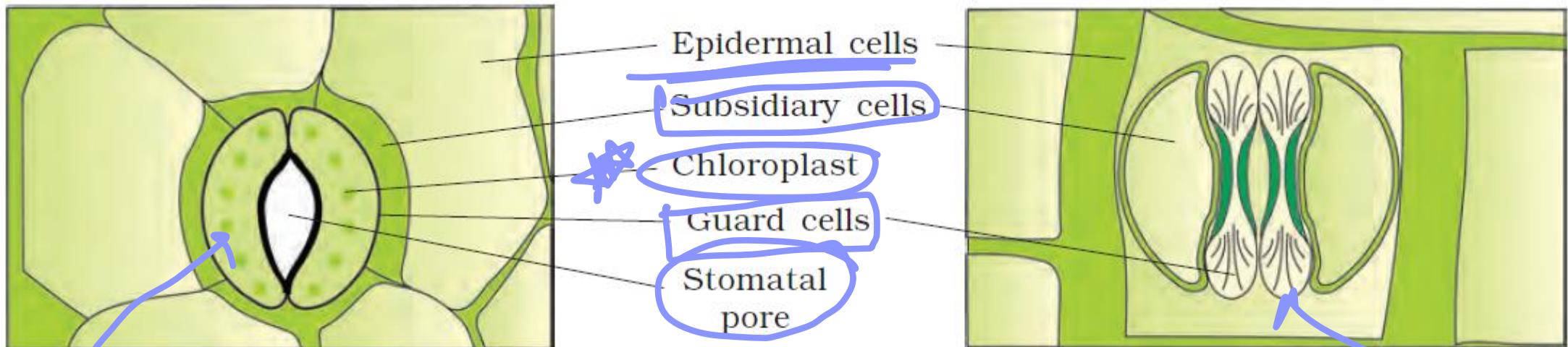
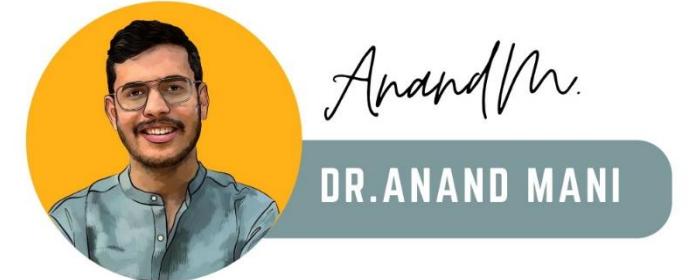


Figure 6.4 Diagrammatic representation: (a) stomata with bean-shaped guard cells
 (b) stomata with dumb-bell shaped guard cell

Monolet
diot

Pyle



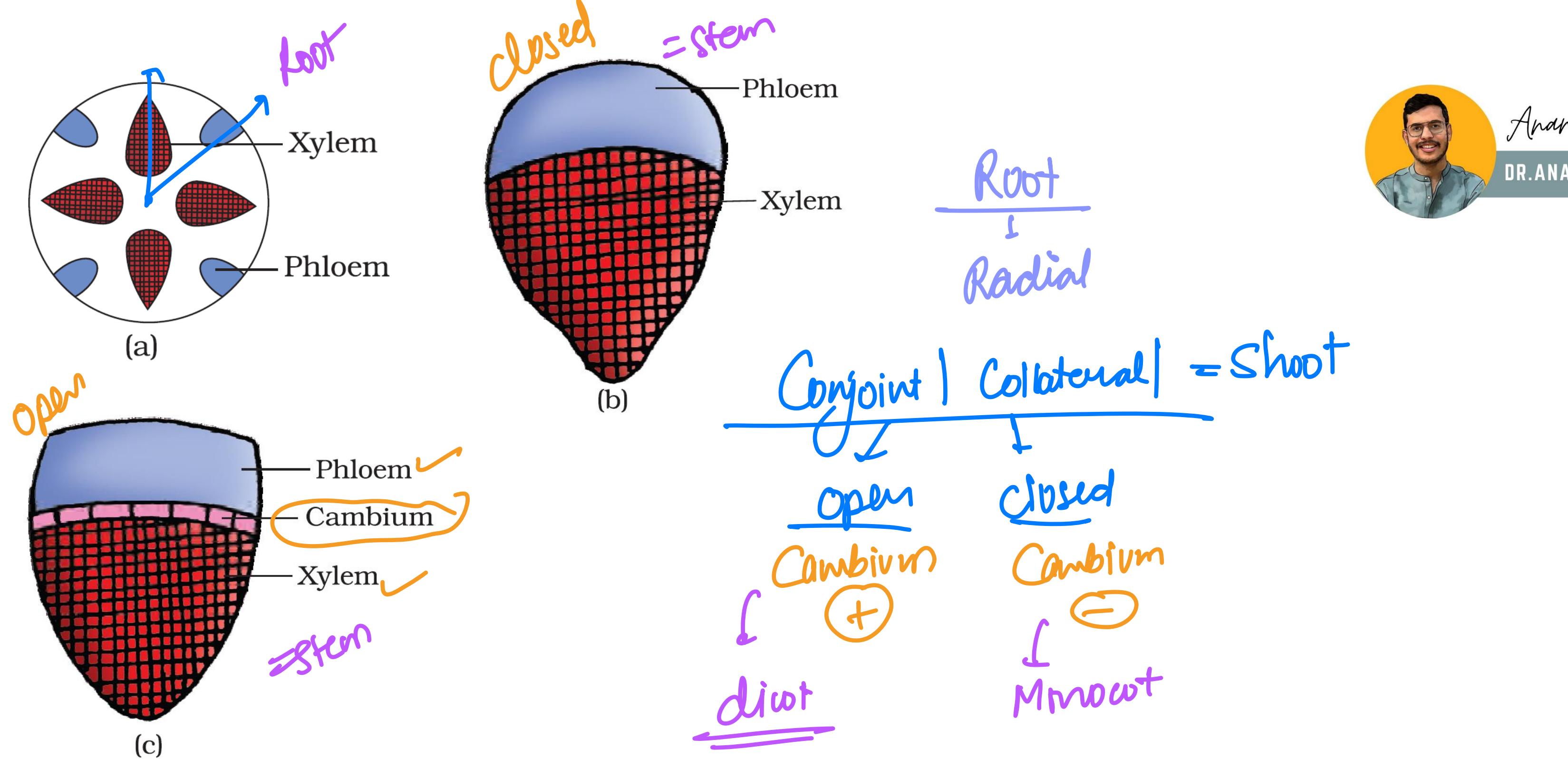
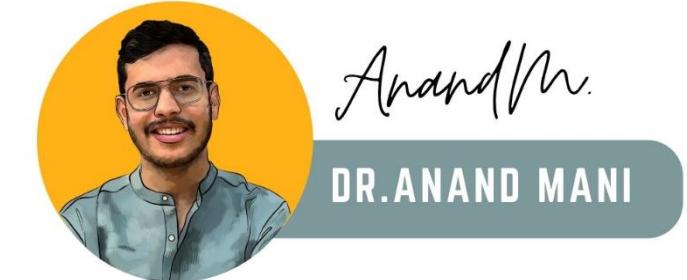
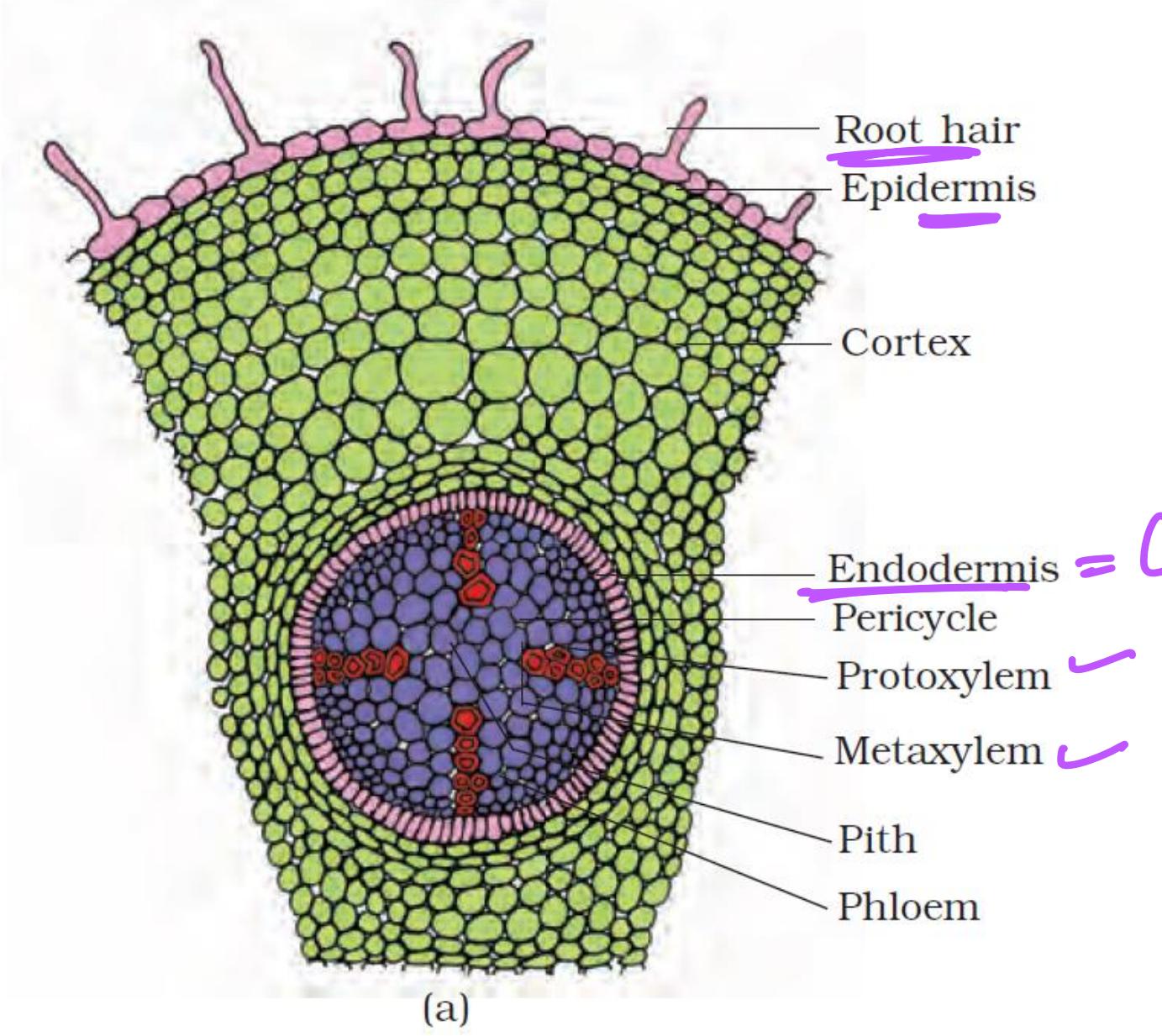


Figure 6.5 Various types of vascular bundles :
 (a) radial (b) conjoint closed
 (c) conjoint open





dicot

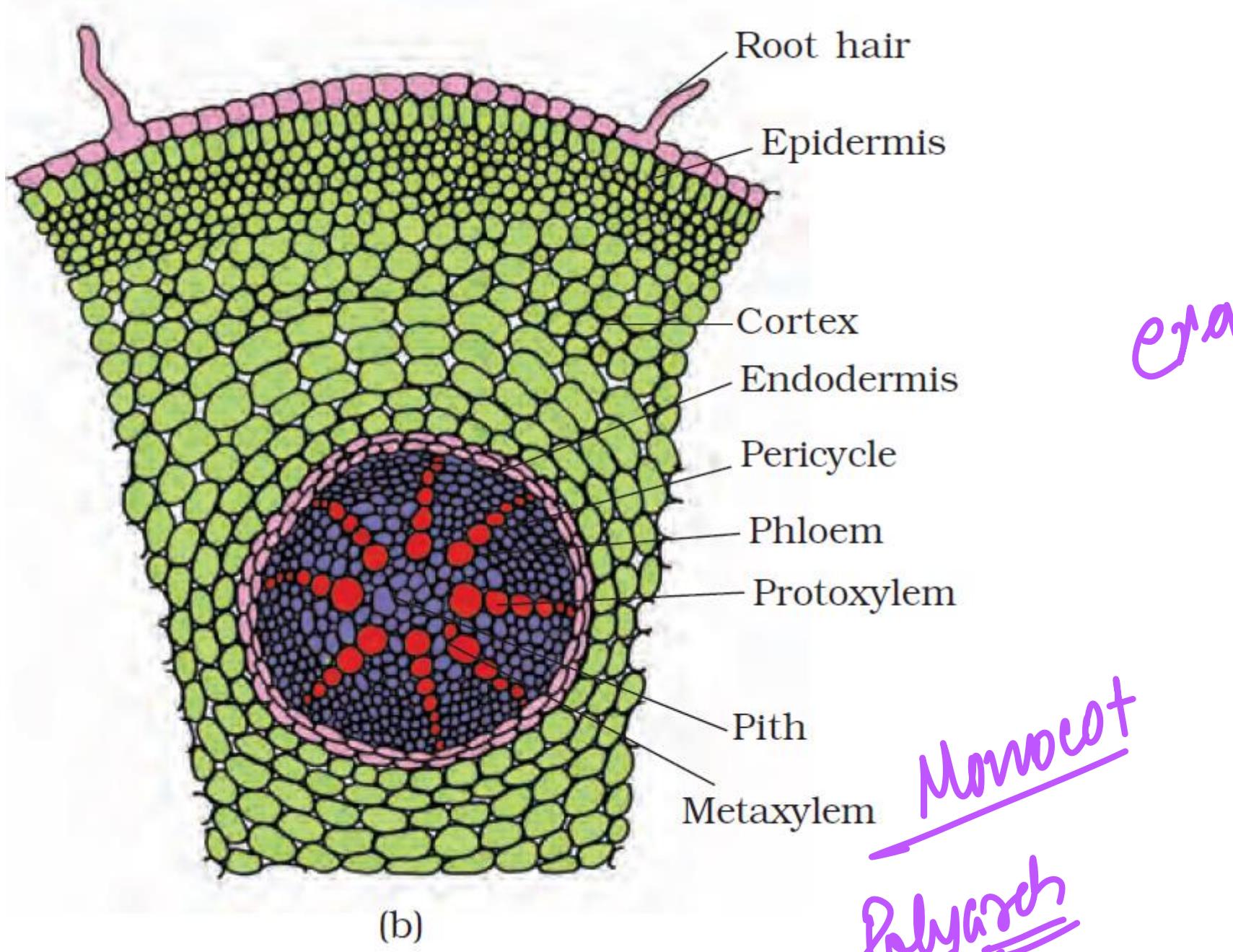
Root = emars

= *Carponian strip*



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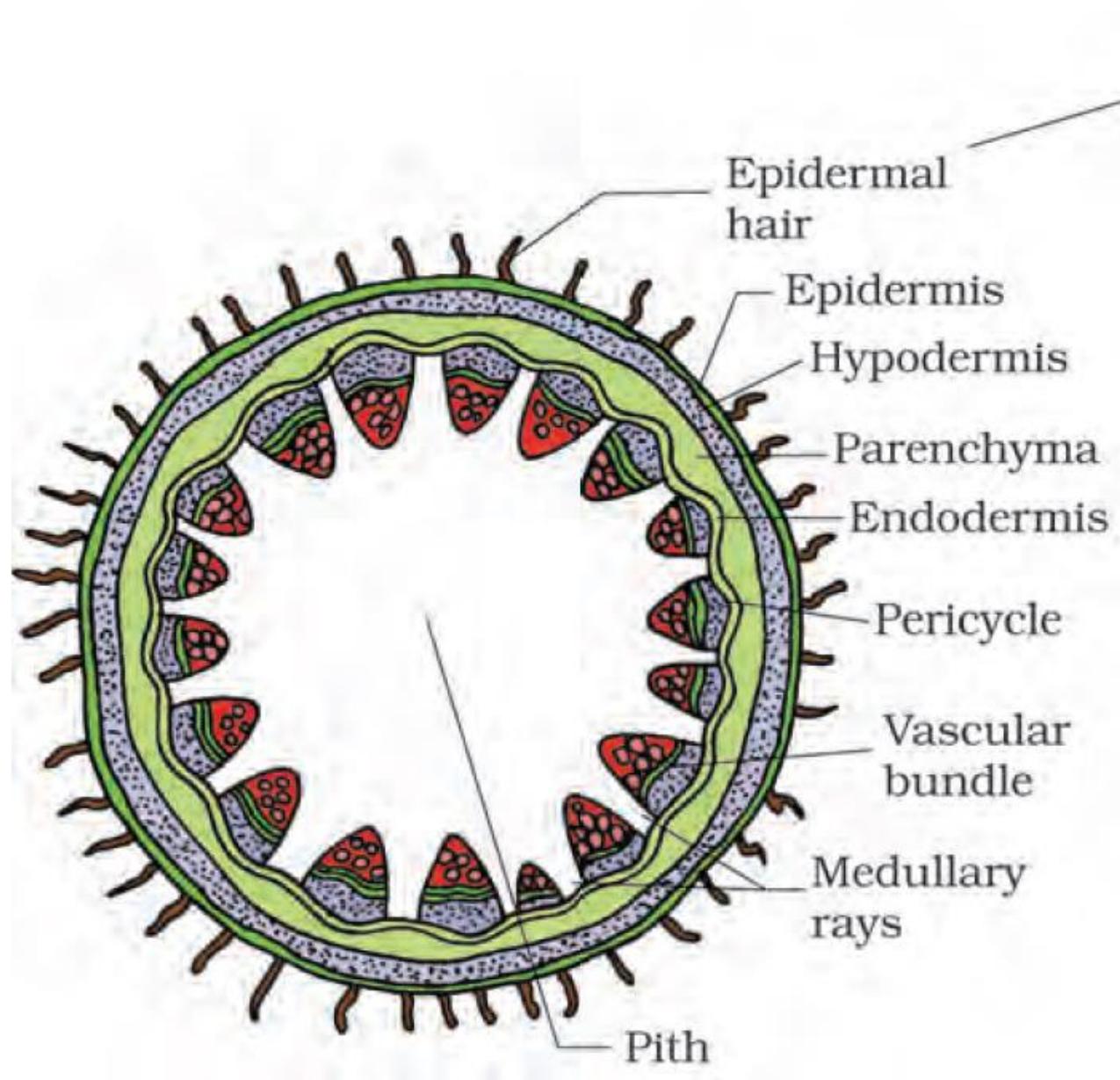
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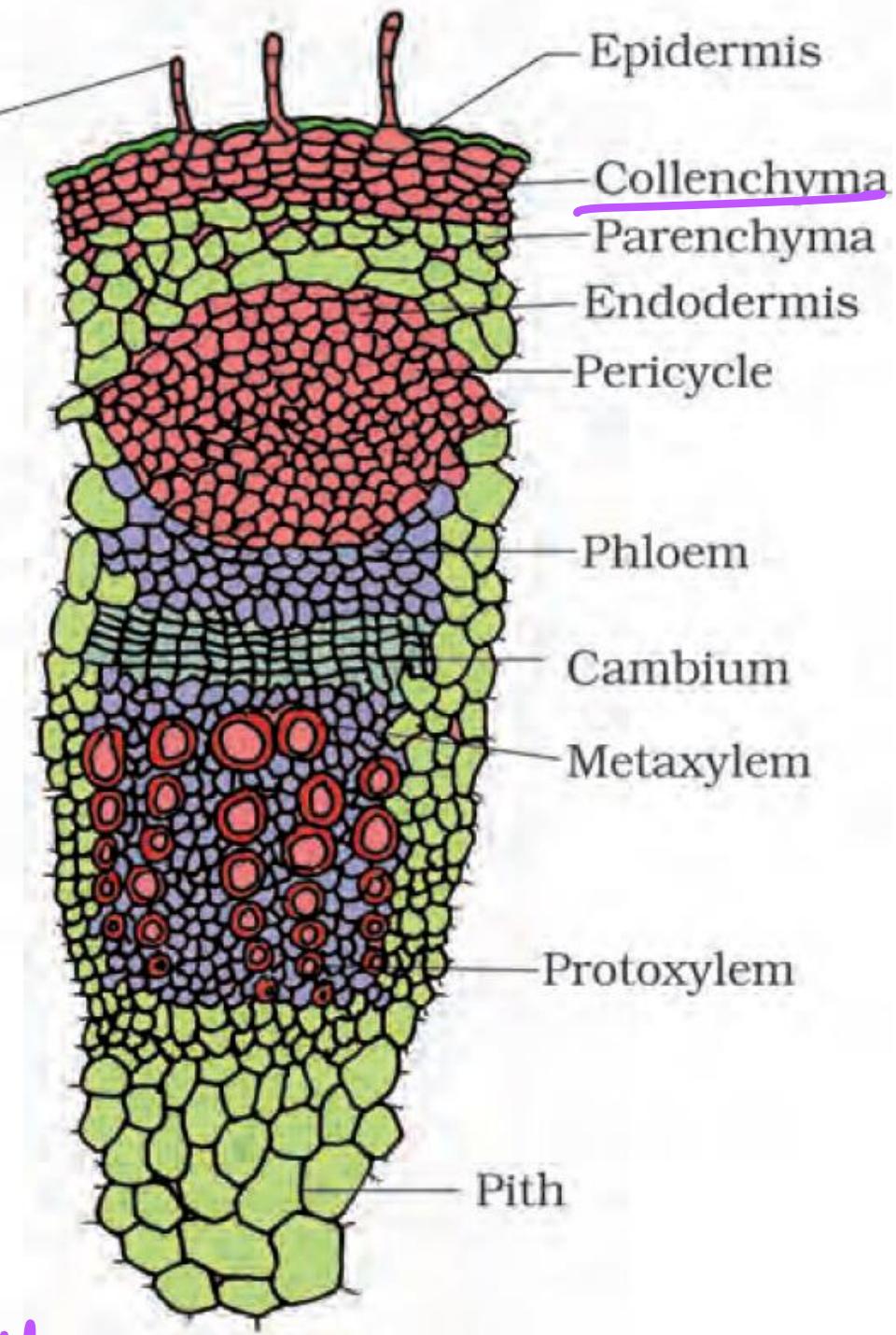
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Figure 6.6 T.S. : (a) Dicot root (Primary)
(b) Monocot root



(a)

Vascular bundle
ring arranged



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eudawn
II
Stem

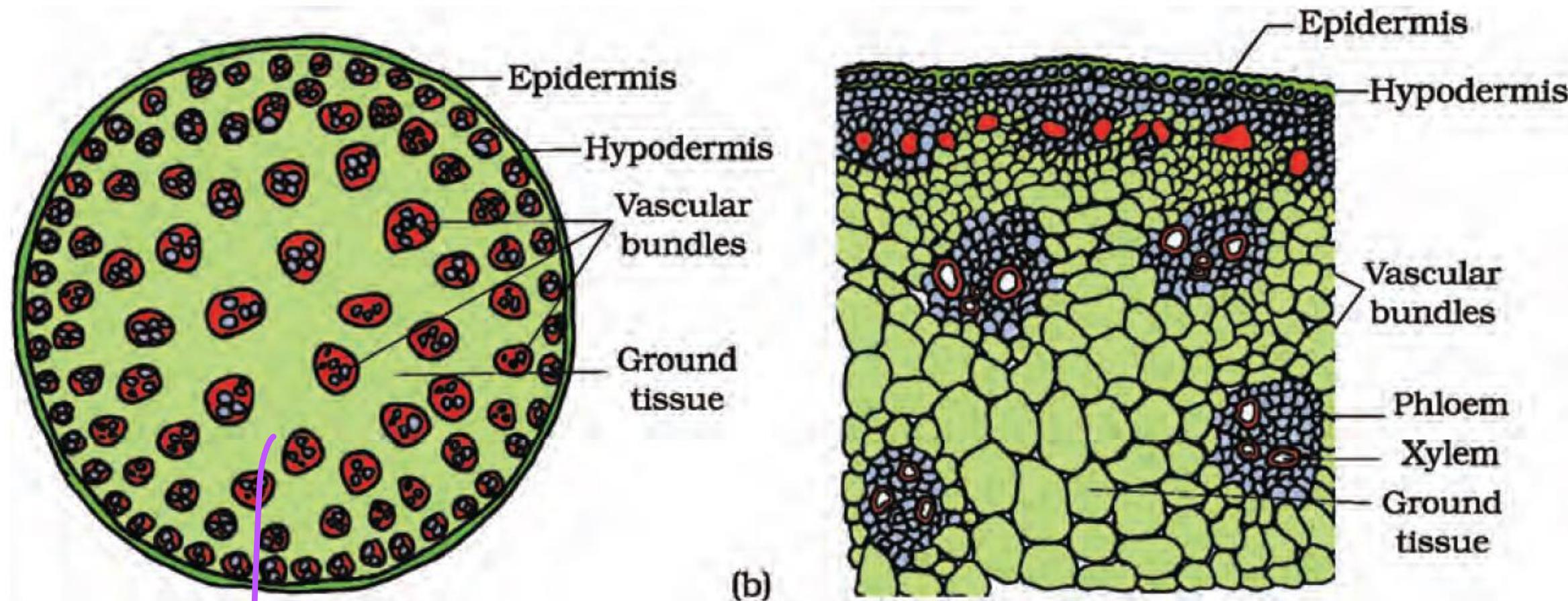
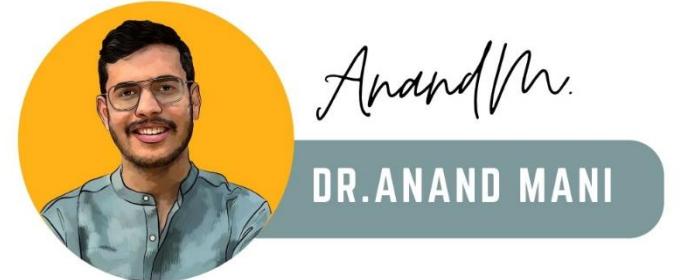
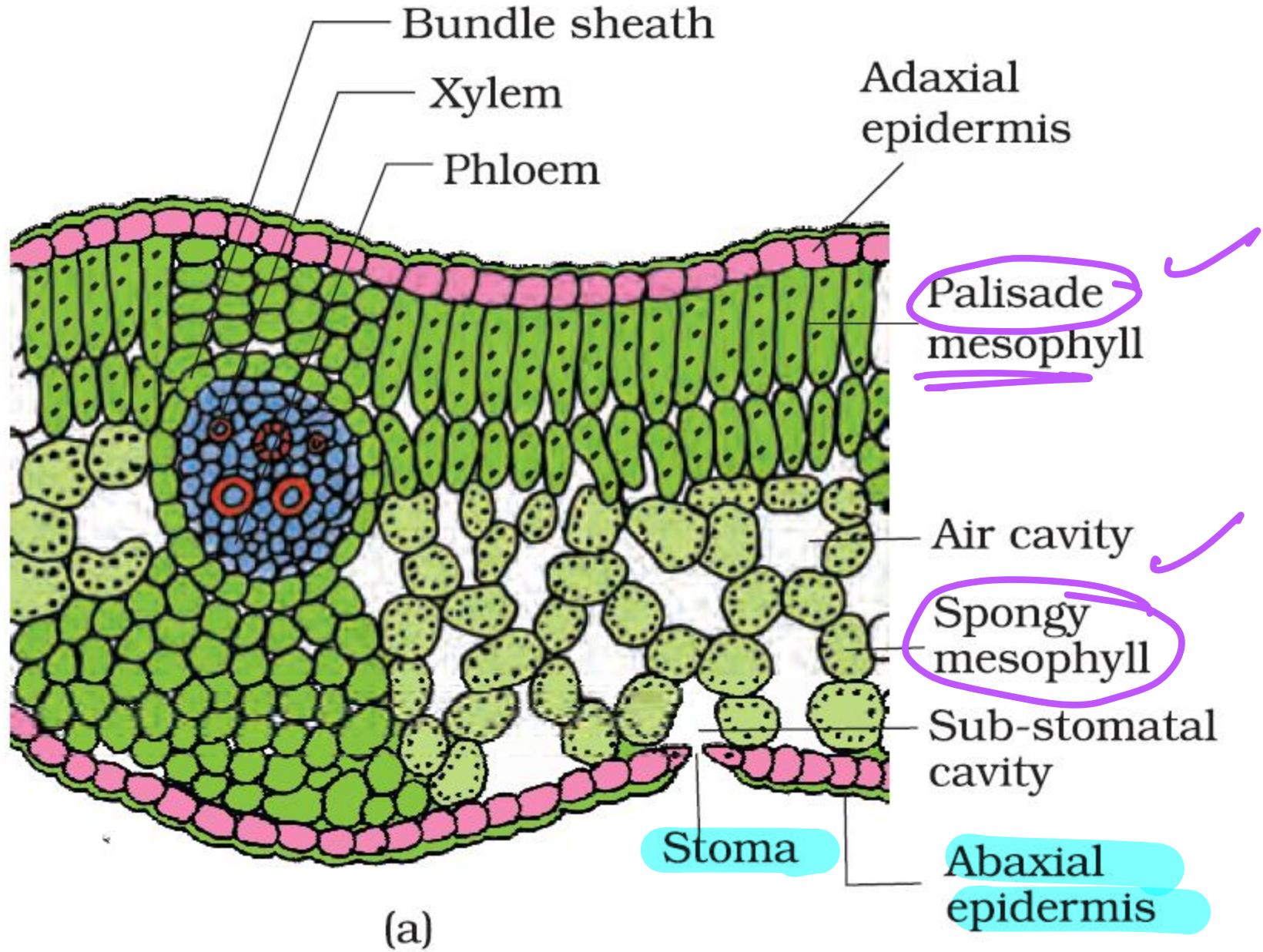


Figure 6.7 T.S. of stem : (a) Dicot (b) Monocot

Monocot
stem \Rightarrow Vascular bundle
Scattered



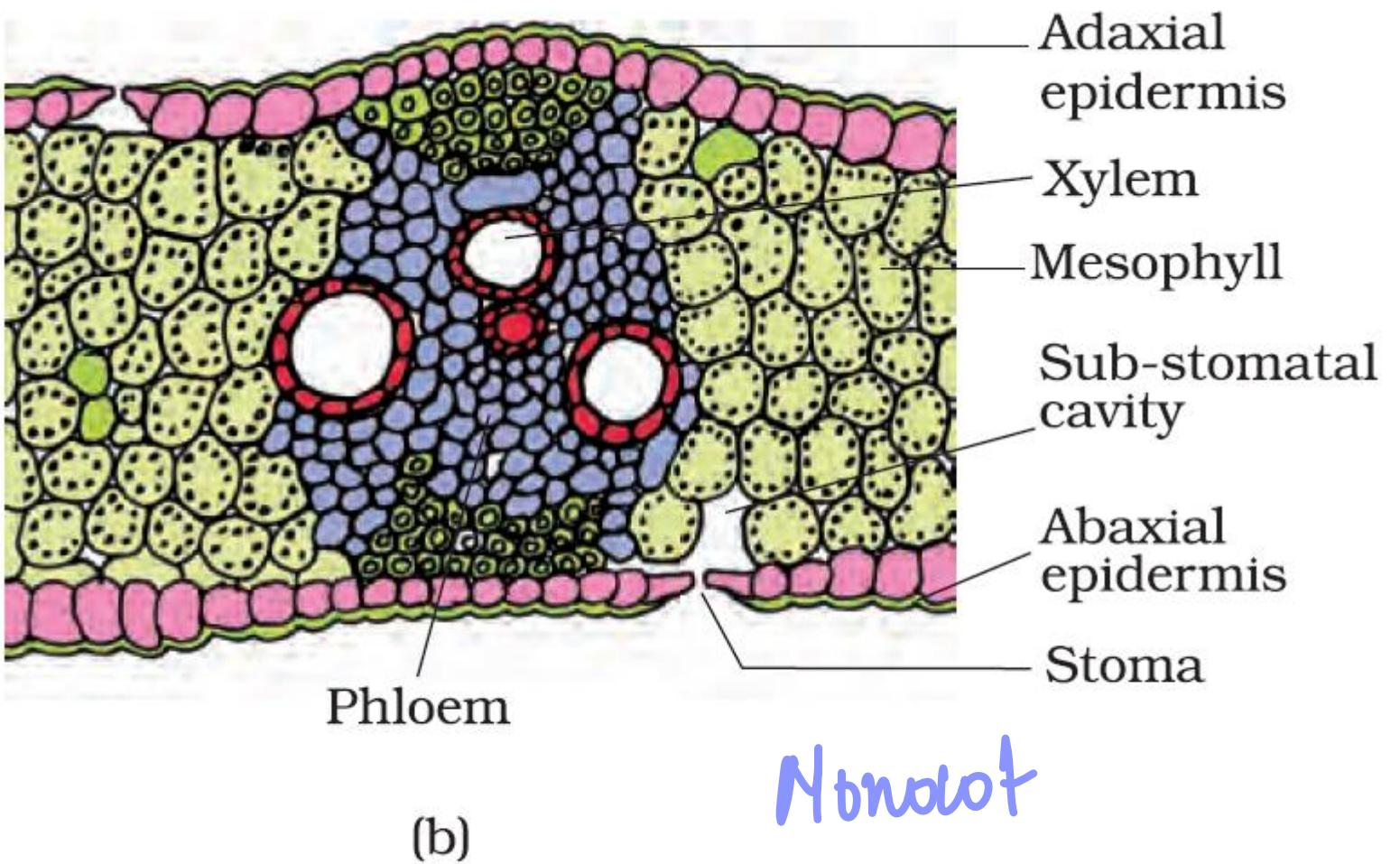
Dorsiventral
Hypostomatu



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dicot leaf



Identification



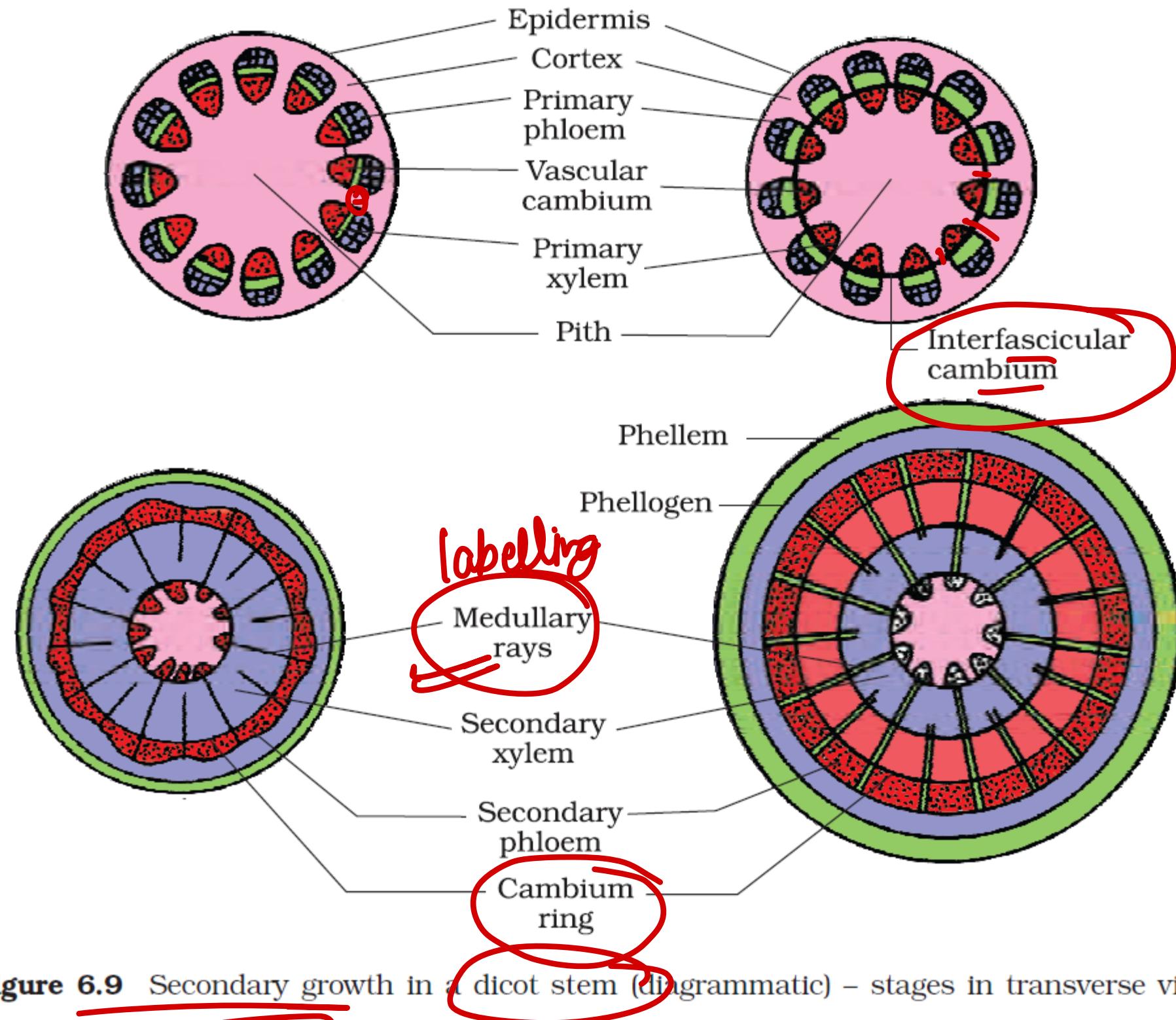
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Isobilateral leaf

Amphistomatic leaf

Figure 6.8 T.S. of leaf : (a) Dicot (b) Monocot



Cambial ring → Inter

1° origin ←

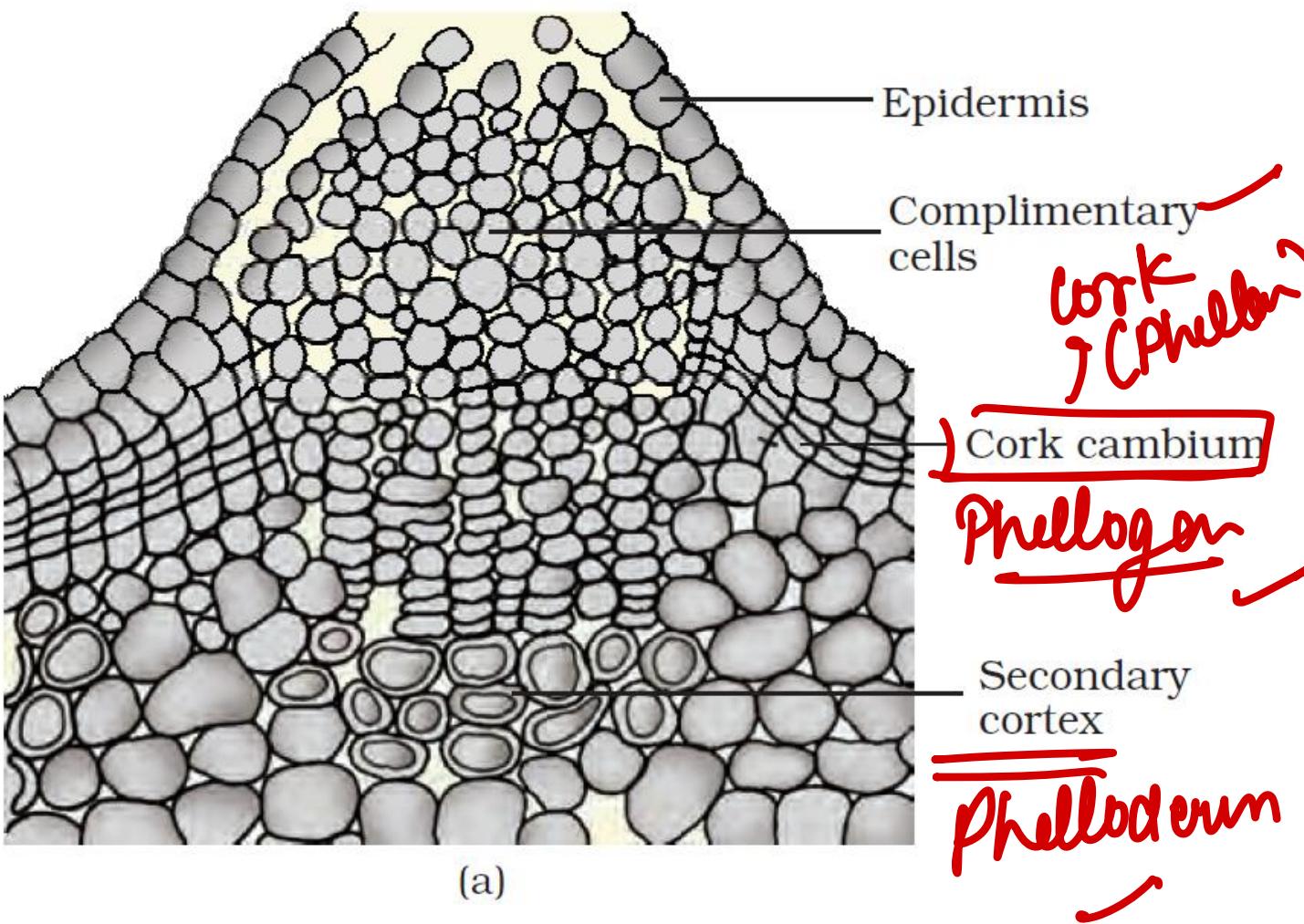
2° origin ←

Inter



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Figure 6.9 Secondary growth in a dicot stem (diagrammatic) – stages in transverse views



(a)



(b)

lens shaped
lenticels

Figure 6.10 (a) Lenticel and (b) Bark

everything
outside vascular
Cambium



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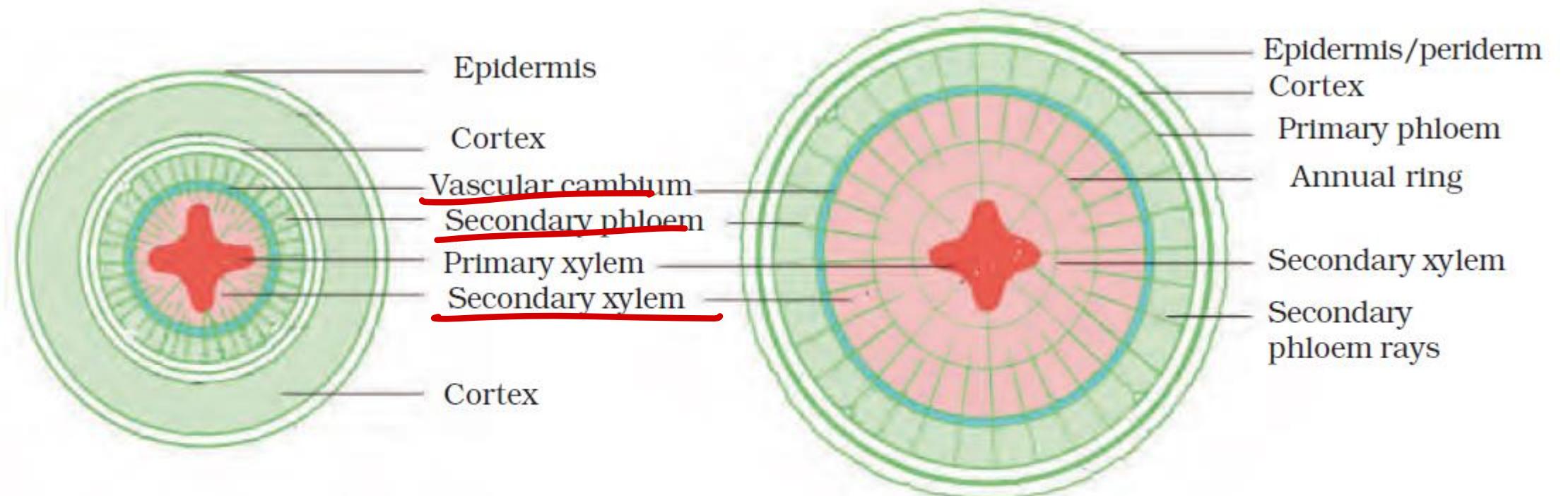
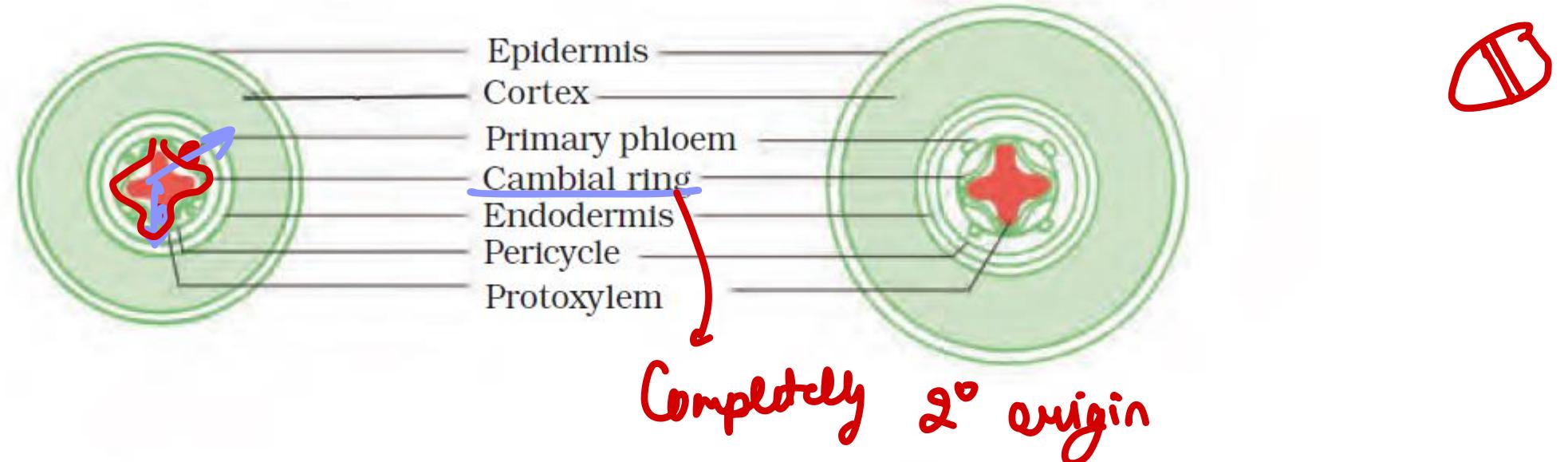
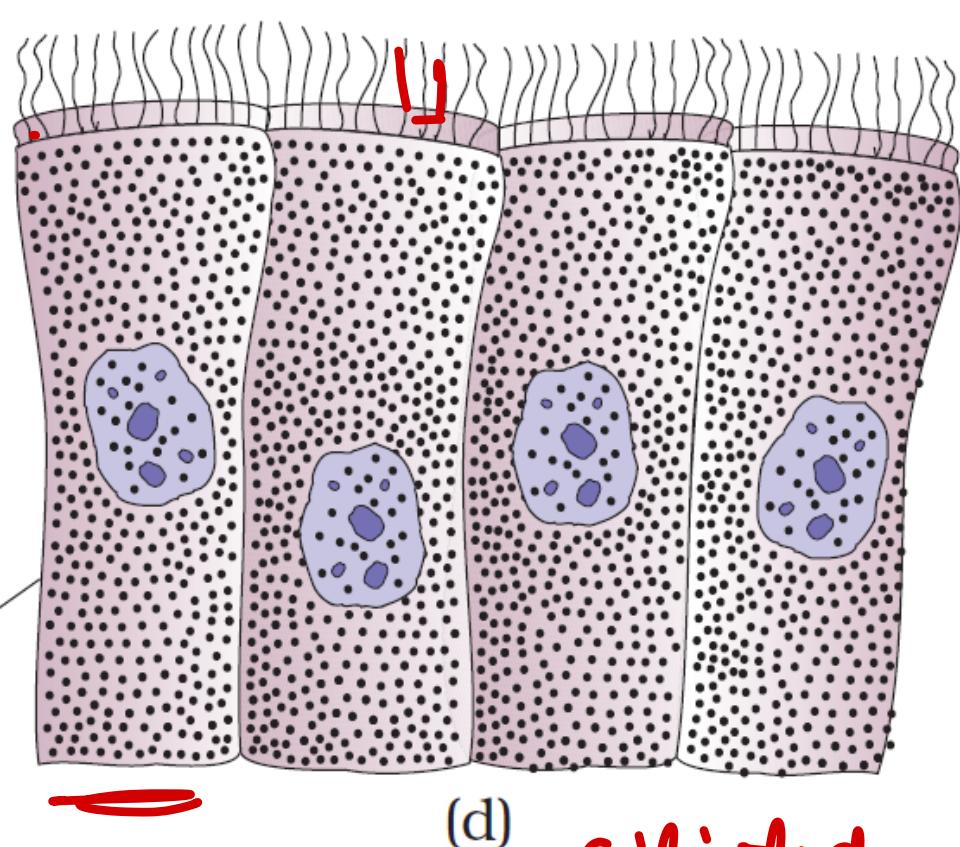
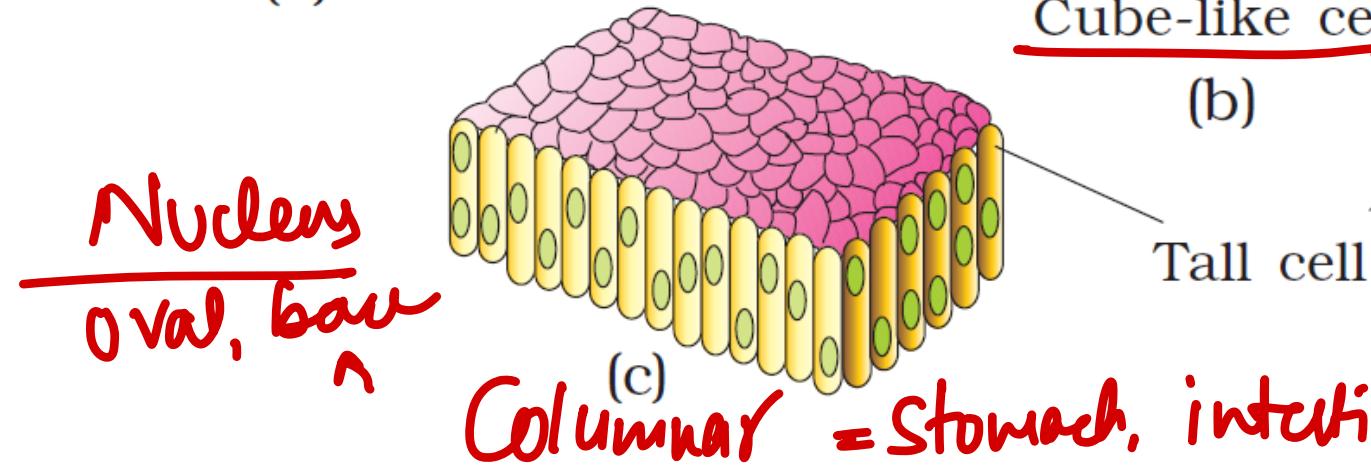
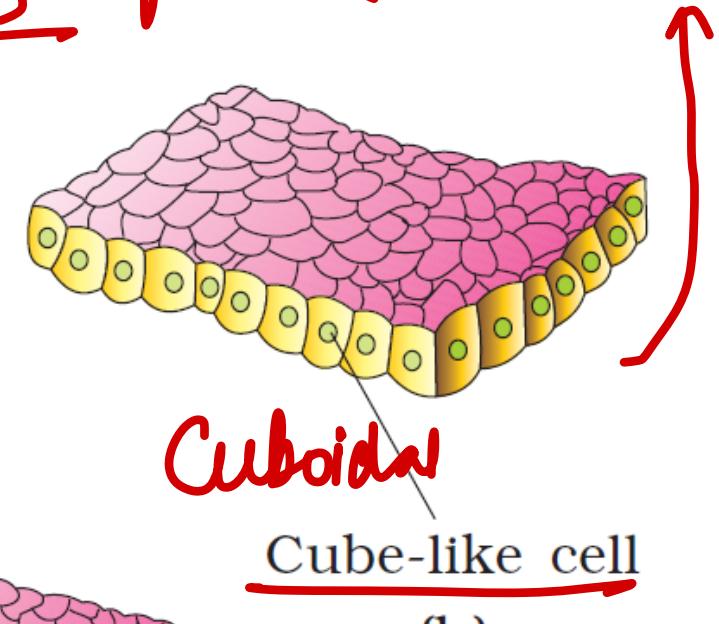
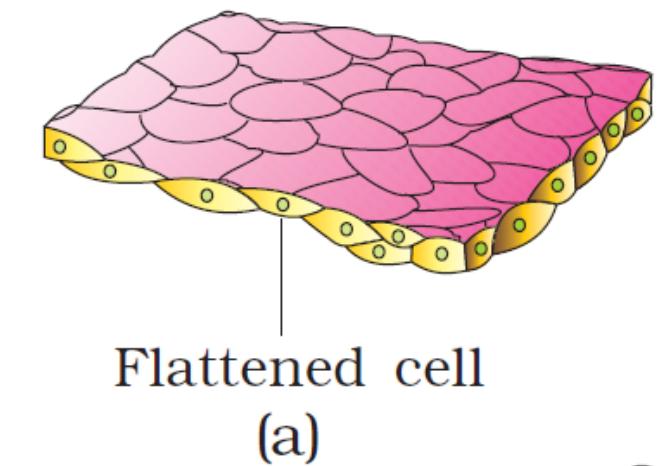


Figure 6.11 Different stages of the secondary growth in a typical dicot root

CHAPTER-7

STRUCTURAL ORGANISATION IN ANIMALS

Squamous → flat (nucleus ~round, centre)

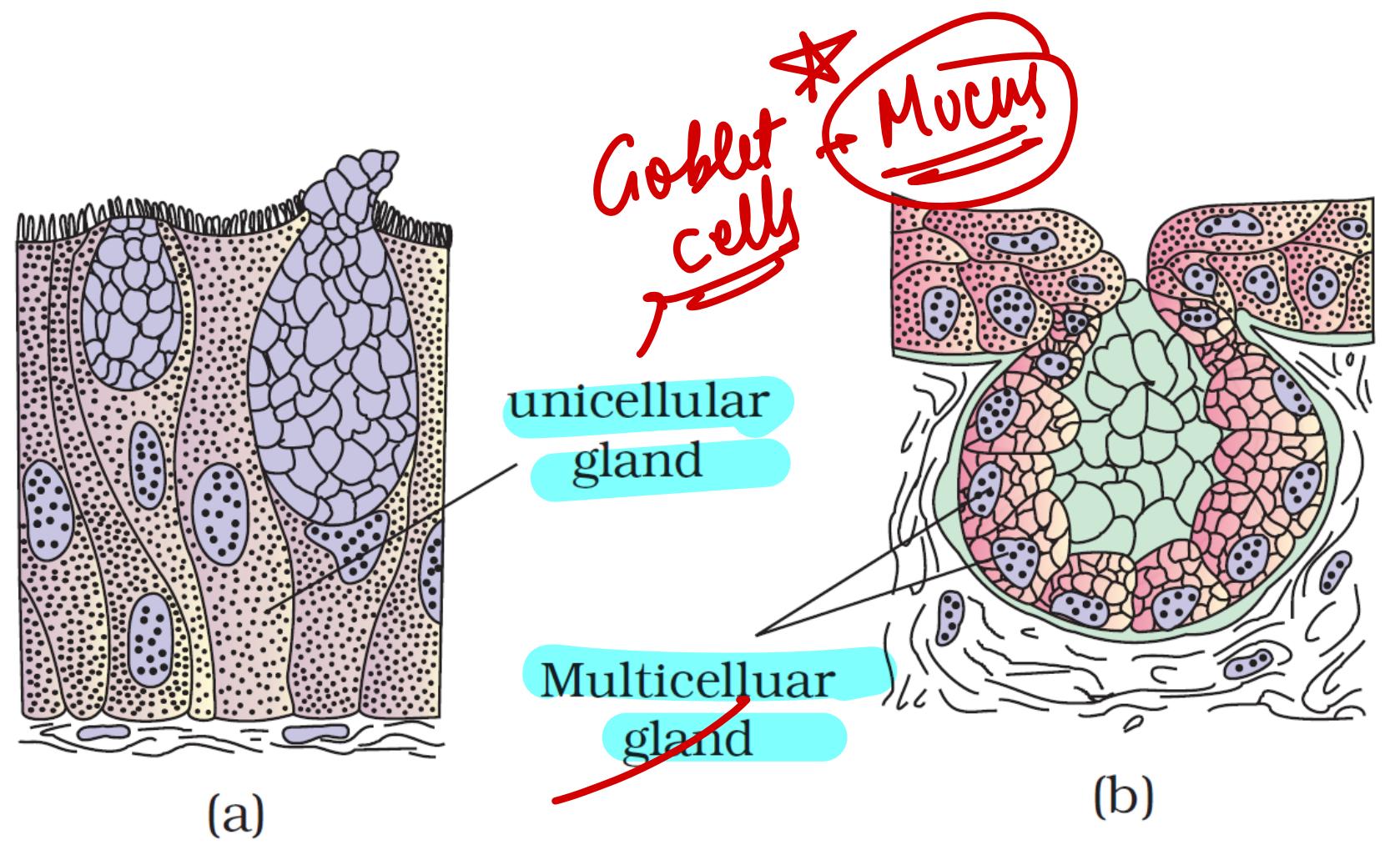


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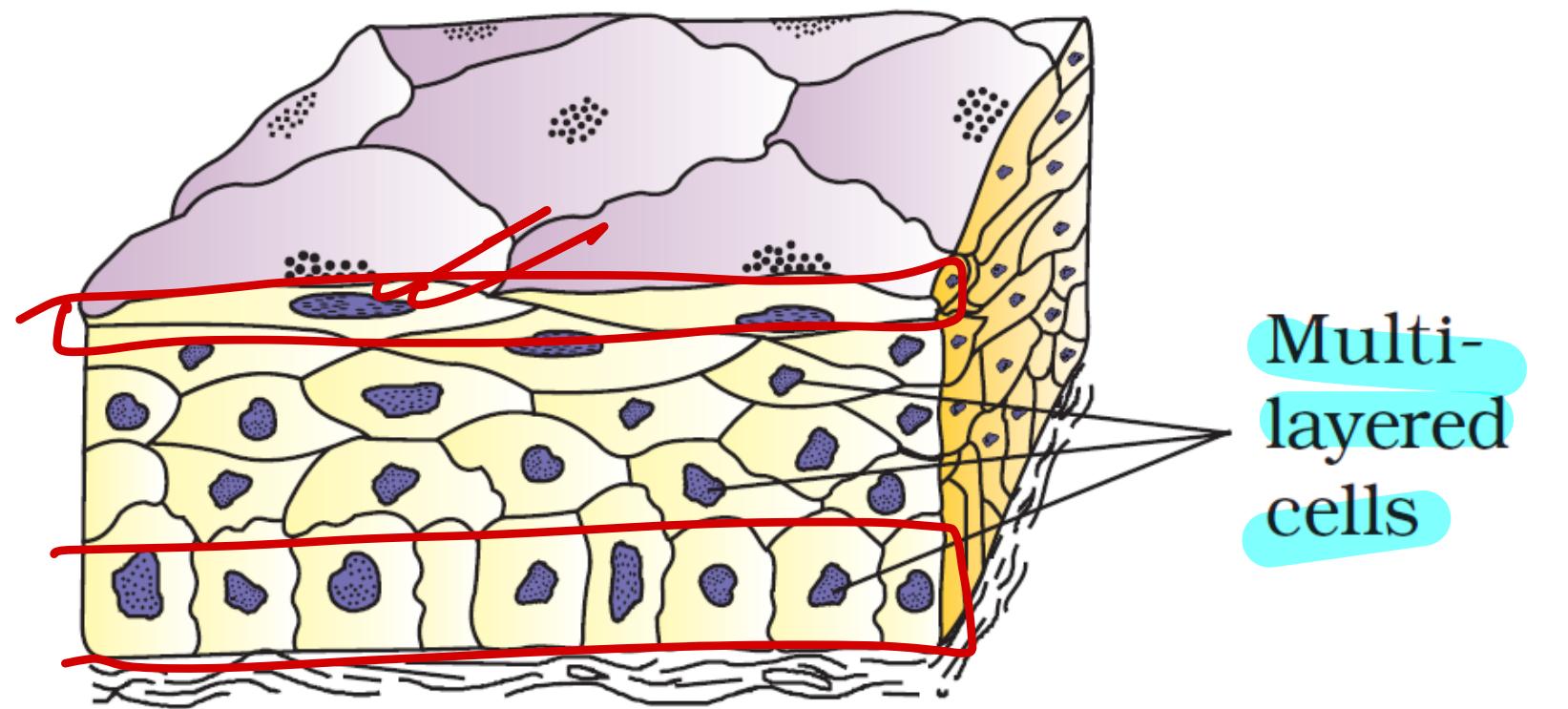
Figure 7.1 Simple epithelium: (a) Squamous (b) Cuboidal (c) Columnar
(d) Columnar cells bearing cilia

Ciliated epithelium
↳
Bronchi,
fallopian
tube



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Protection



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Figure 7.3 Compound epithelium

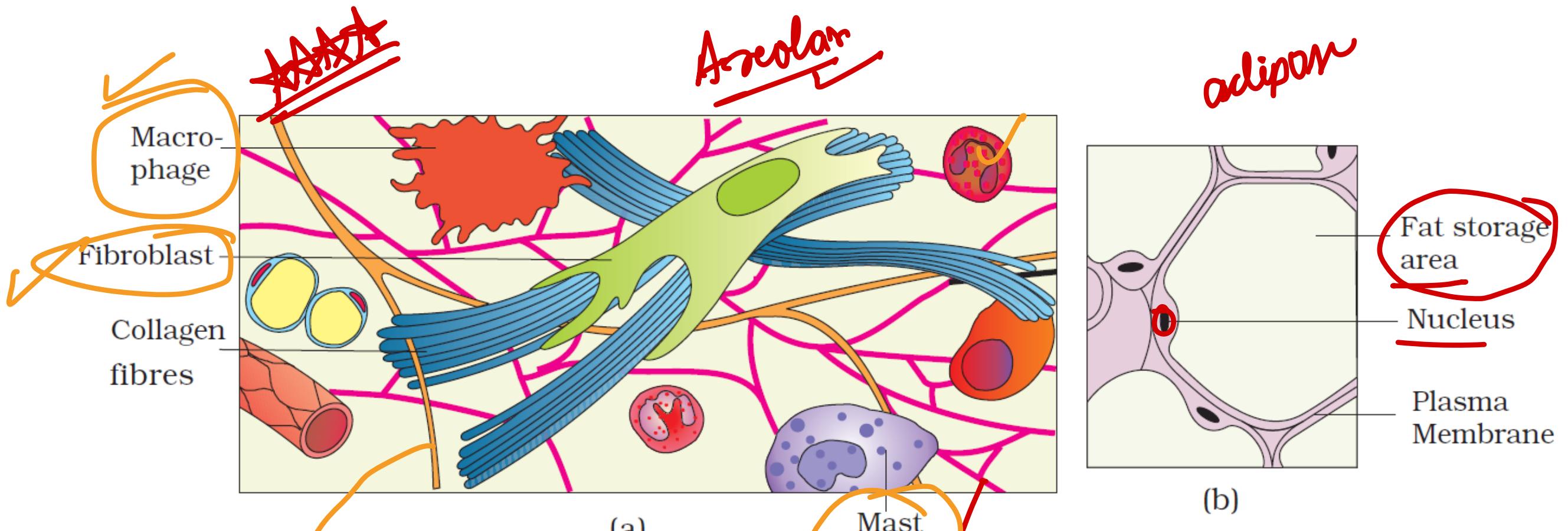


Figure 7.4 Loose connective tissue : (a) Areolar tissue (b) Adipose tissue

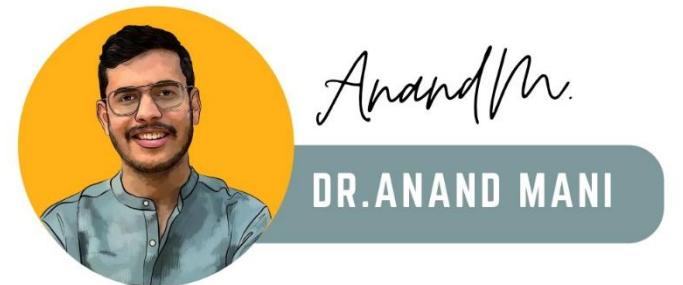
Reticulate
fibers

Labelling

Mast
cell

fat storage

Blood
Capillaries



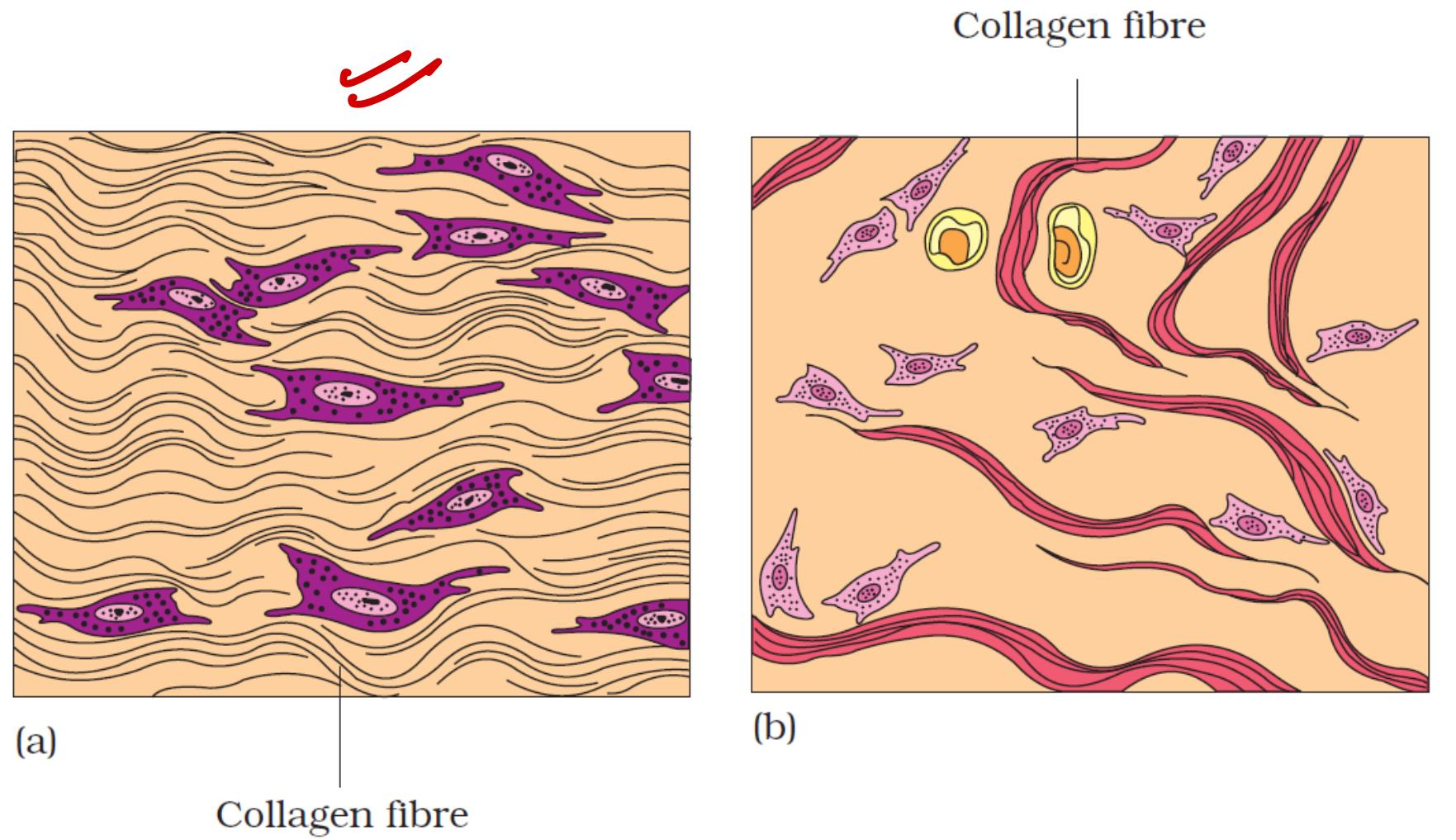
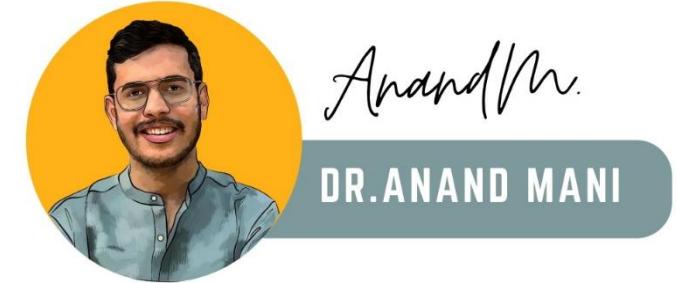
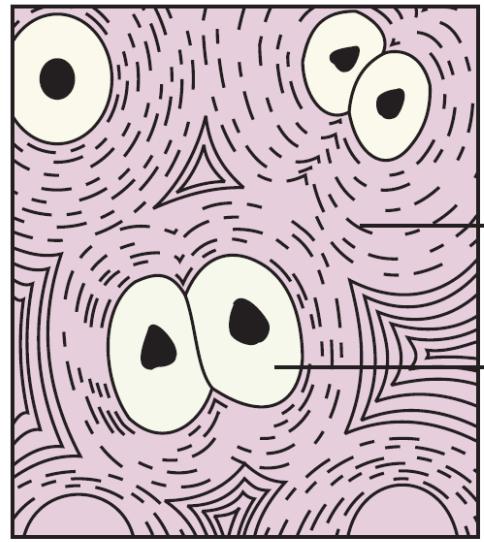


Figure 7.5 Dense connective tissue:
 (a) Dense regular
 (b) Dense irregular

\uparrow **Tendon**
 \uparrow **Ligament**
 \uparrow **Skin**
 $=$



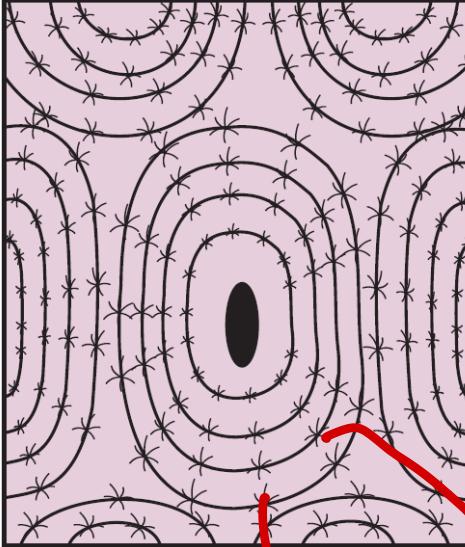


(a)

Collagen fibers

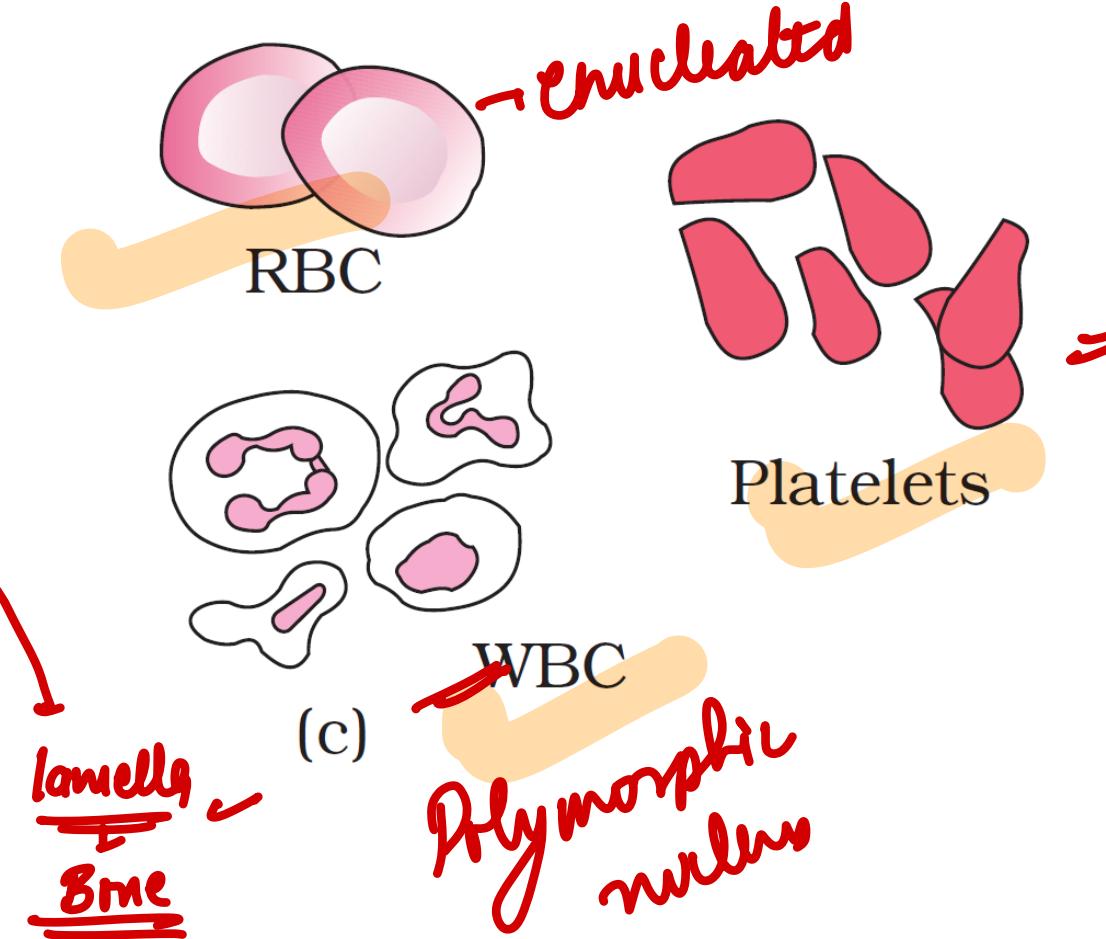
Cartilage cell
(chondrocyte)

(lacuna - many
chondrocytes)



(b)

(Lacuna = Osteocyte)



(c)

-enucleated

RBC

Platelets

WBC

laculla
Bme

Poly morphic
nucleus

Figure 7.6 Specialised connective tissues : (a) Cartilage
(b) Bone (c) Blood



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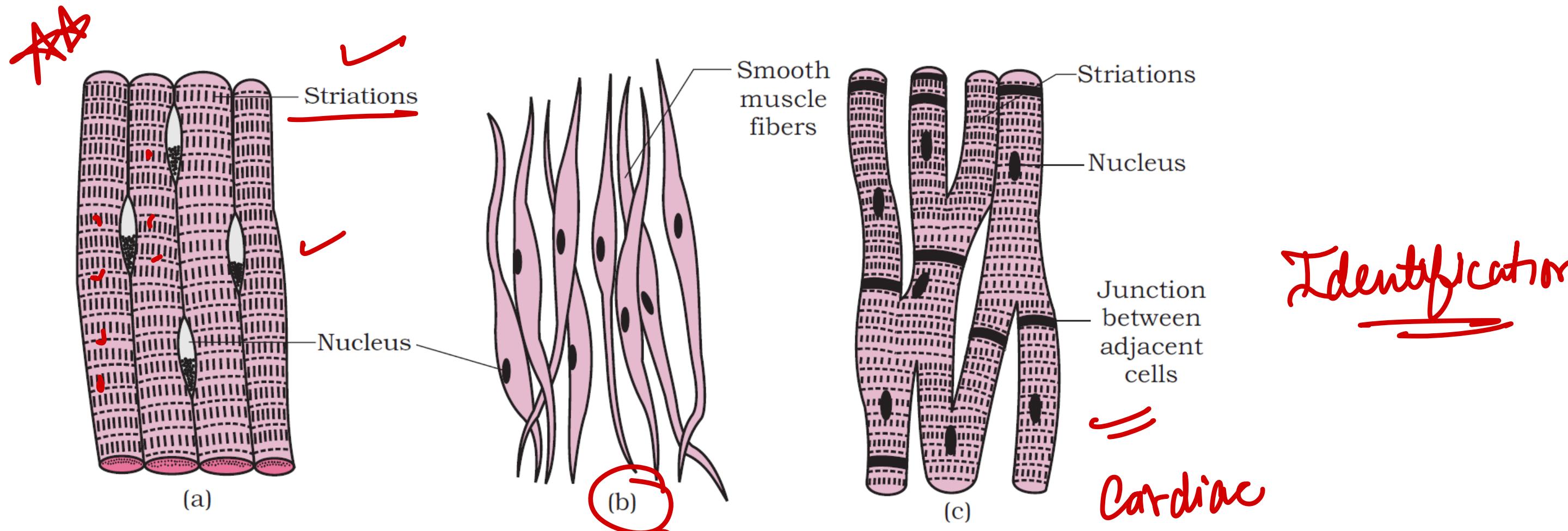


Figure 7.7 Muscle tissue : (a) Skeletal (striated) muscle tissue (b) Smooth muscle tissue
(c) Cardiac muscle tissue

Identification

Skeletal

⇒ Striations ✓

⇒ Branching X

⇒ Multinucleate

⇒ Cylindrical

Involuntary

⇒ Striation X

⇒ Tapering

⇒ Uninucleate

⇒ Striation

⇒ Branching X

⇒ Uninucleate

⇒ Cylindrical



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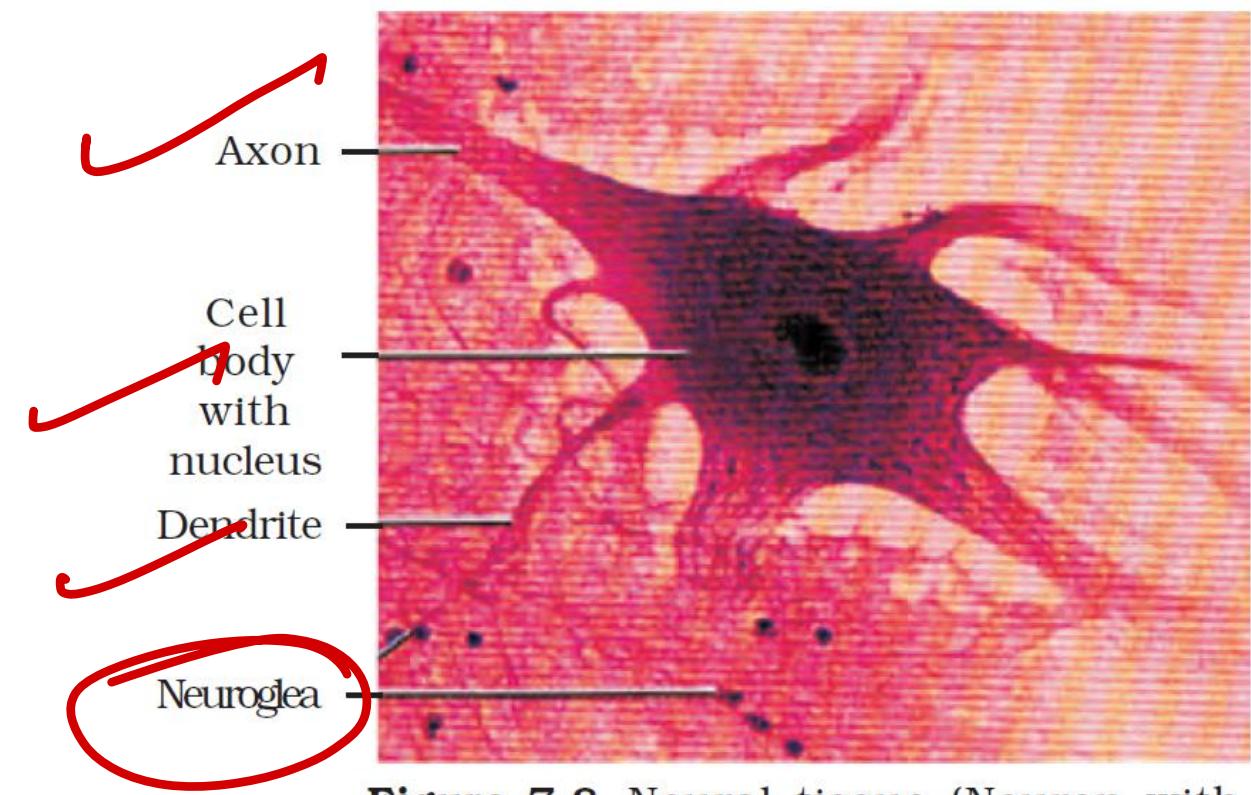
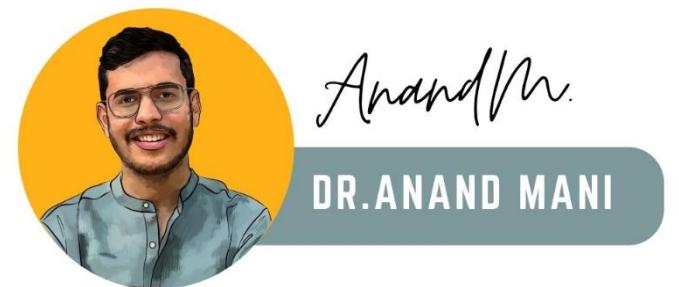
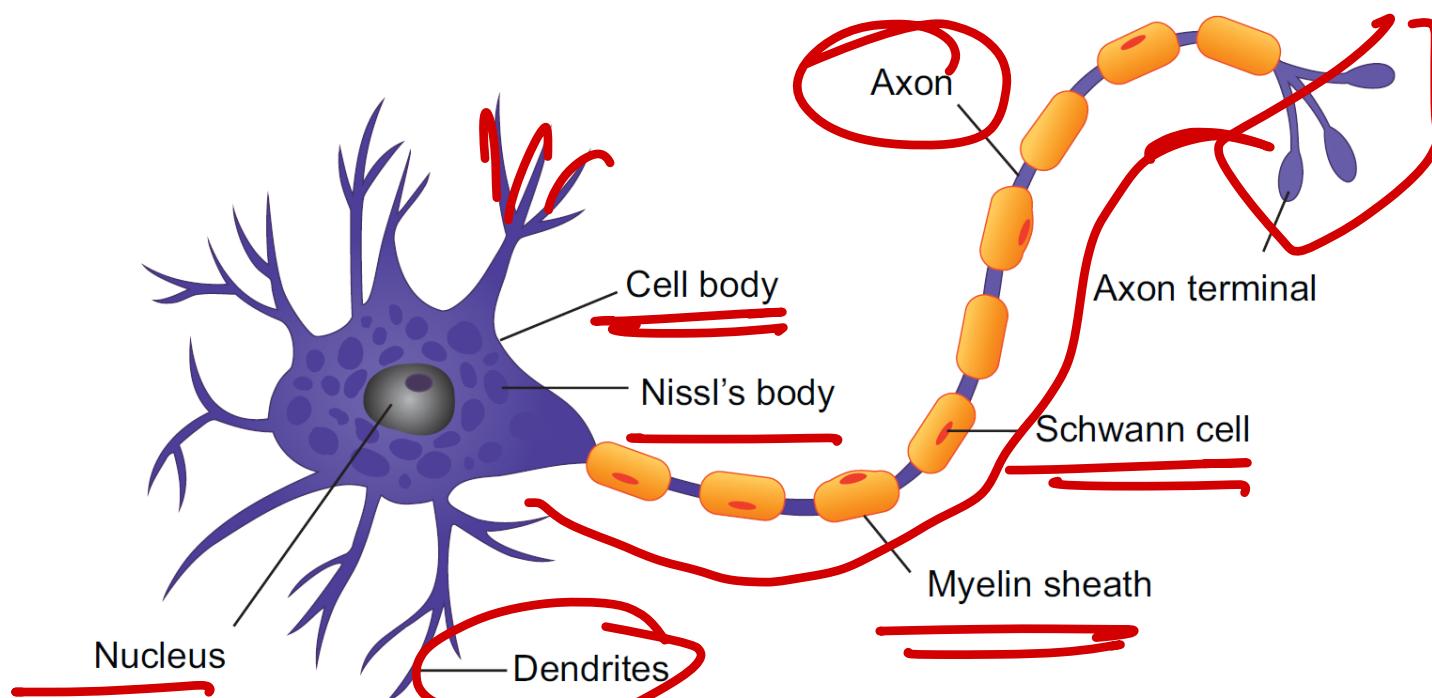
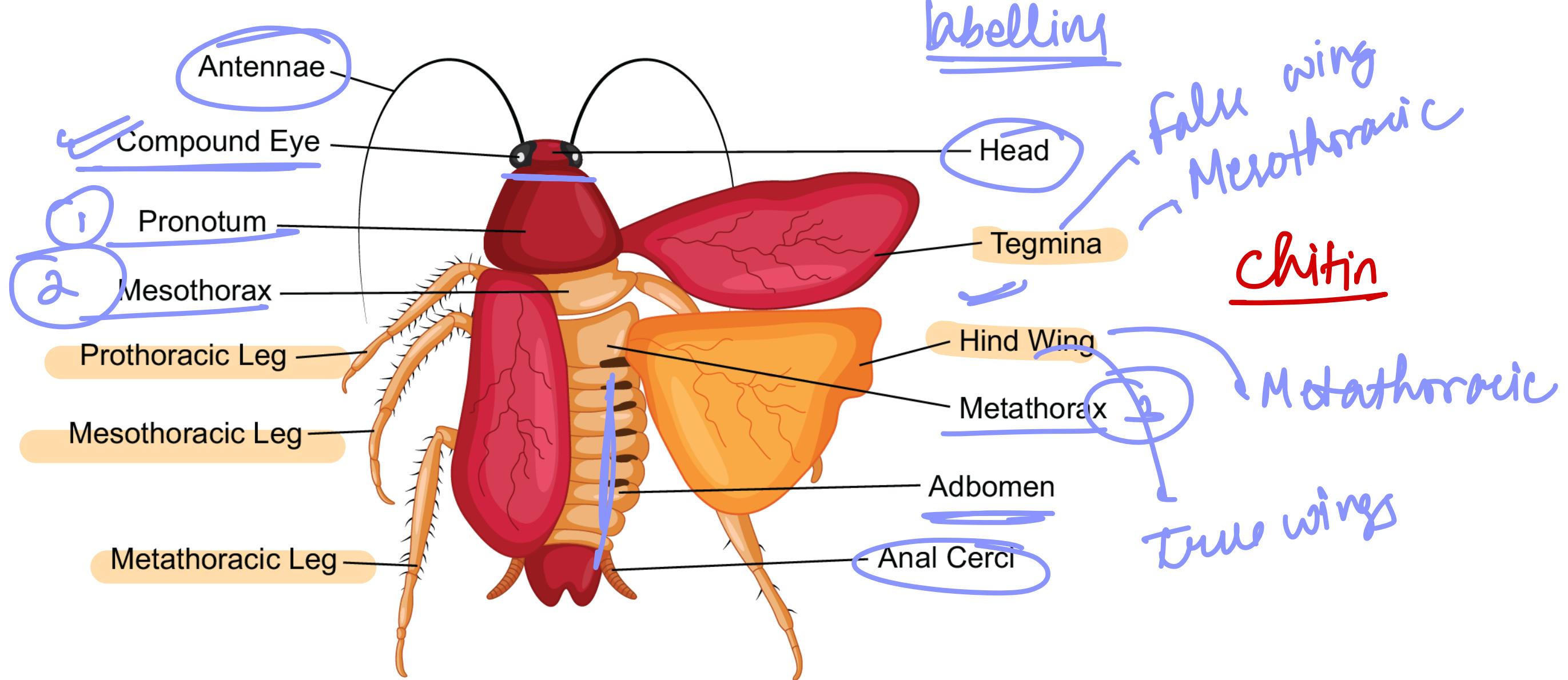


Figure 7.8 Neural tissue (Neuron with neuroglia)





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Figure 7.14 External features of cockroach

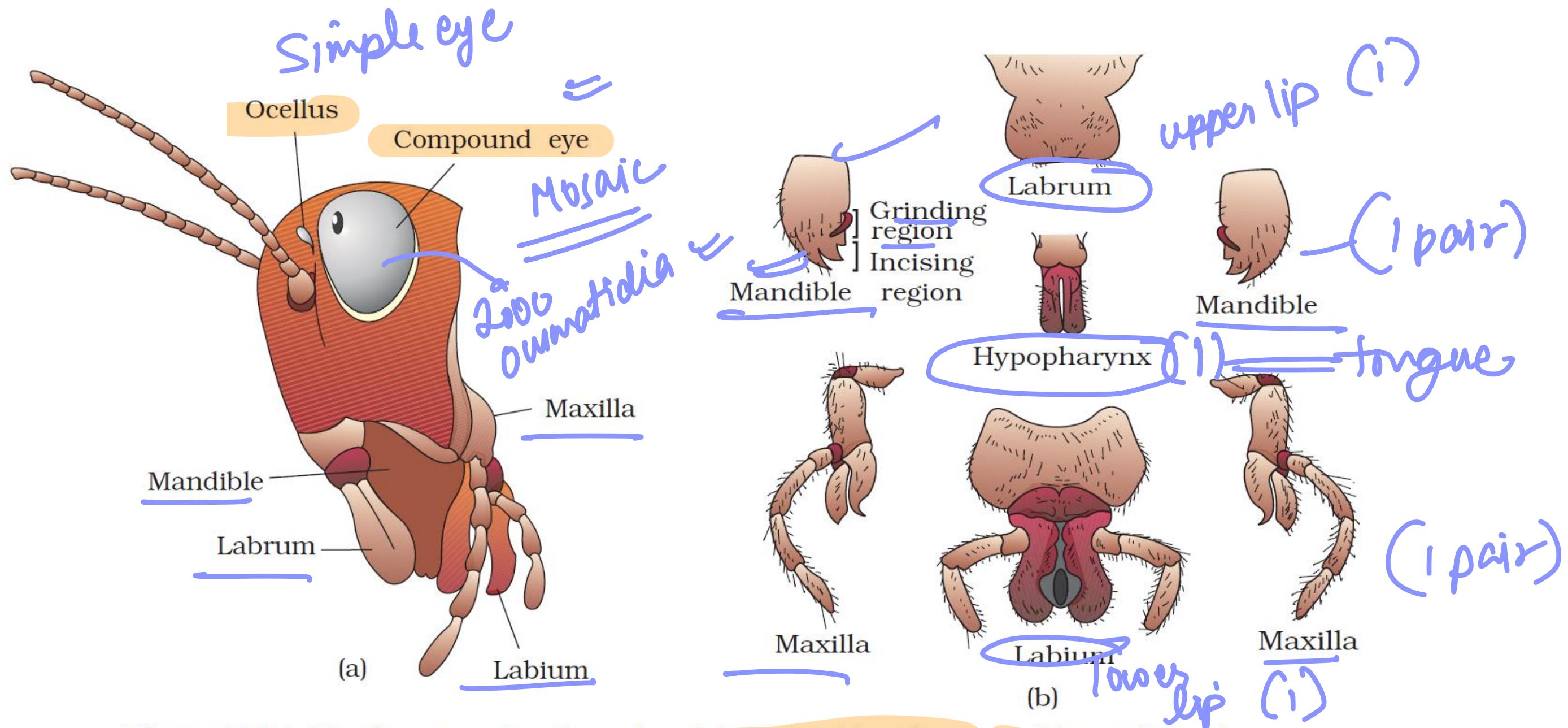
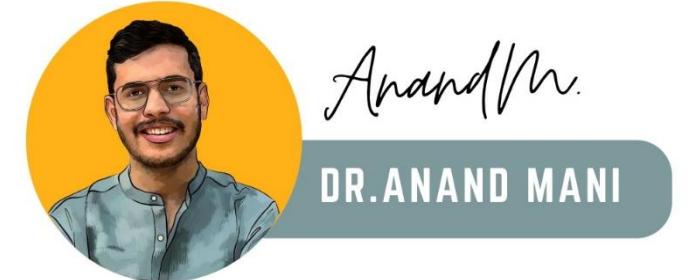


Figure 7.15 Head region of cockroach : (a) parts of head region (b) mouth parts



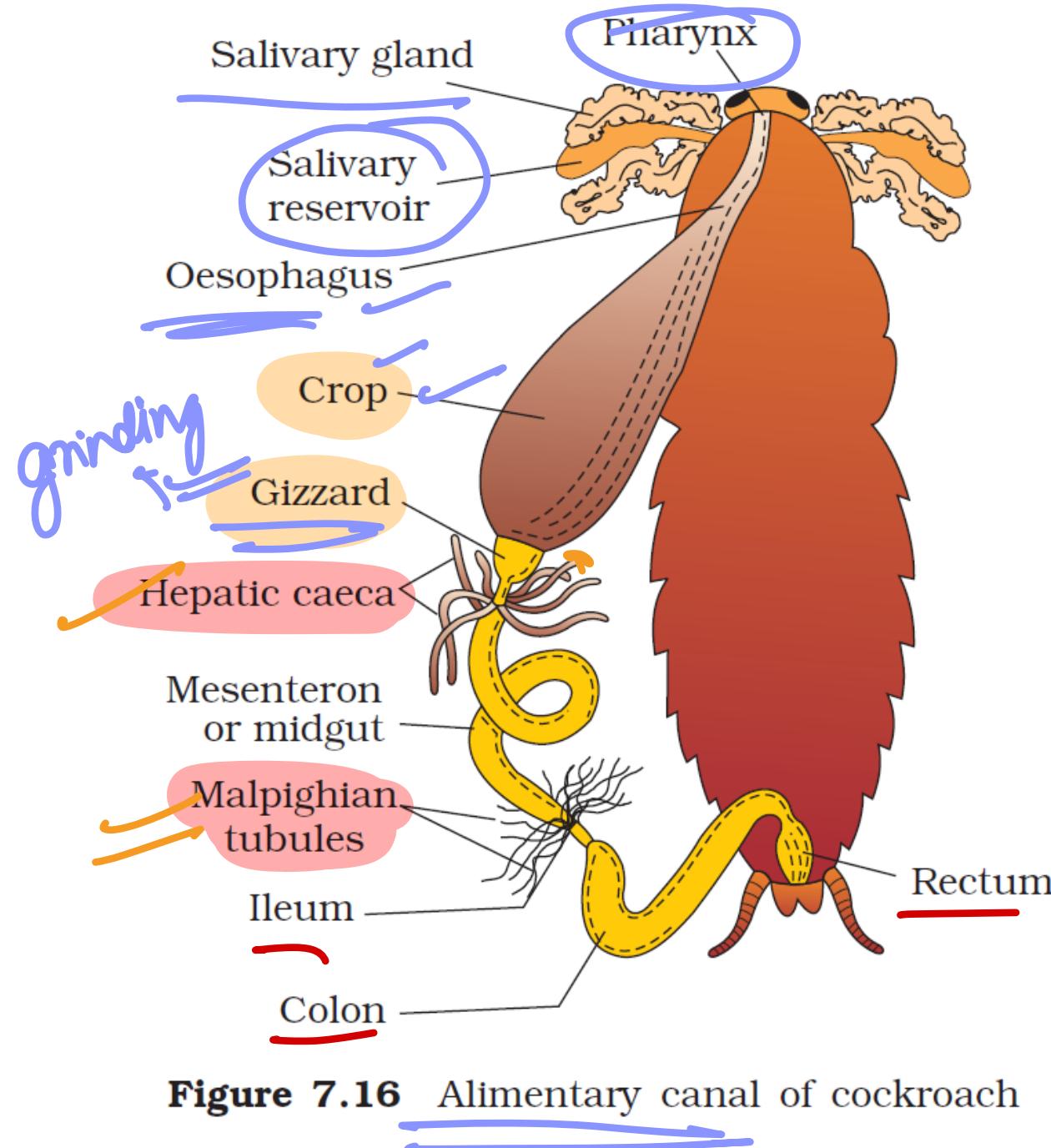


Figure 7.16 Alimentary canal of cockroach

Labelling

Foregut

Mouth
↓
Gizzard

⇒ Hepatic

Caeca

(6-8)

(blind tubuli)

digestive juice

→ Junction of foregut & mid gut

Midgut

Mesenteron

Hindgut

Ileum, color, vacua

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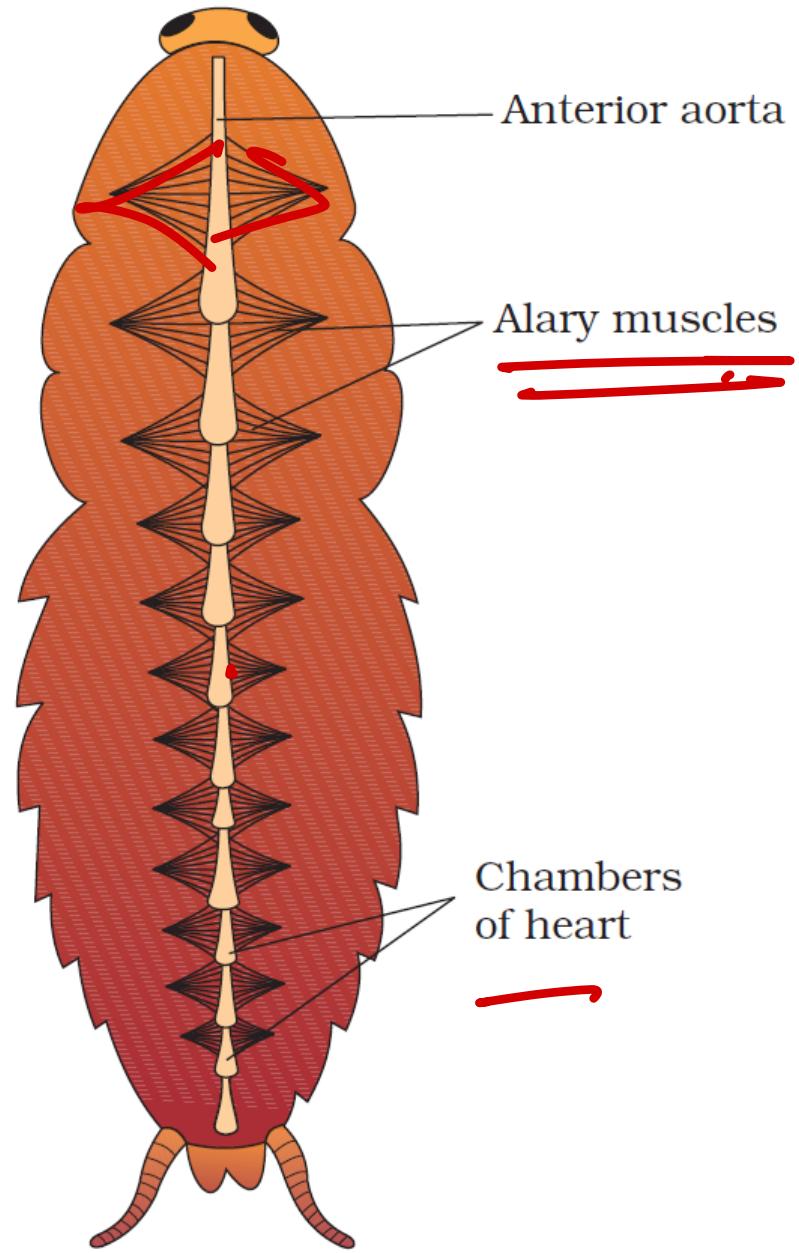


Figure 7.17 Open circulatory system of cockroach

⇒ 13 chambered (flask)
⇒ alary muscles = 12 pair



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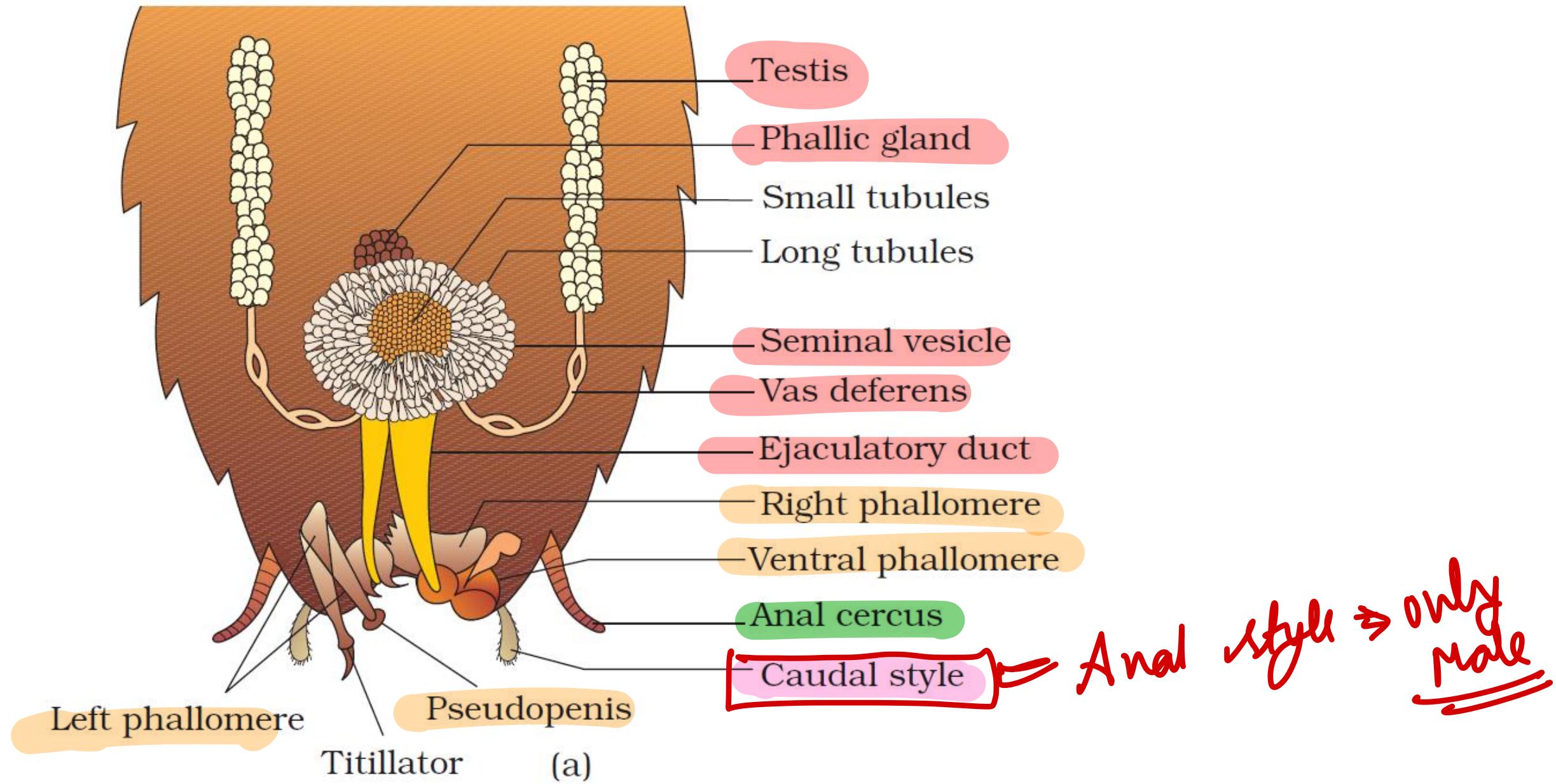
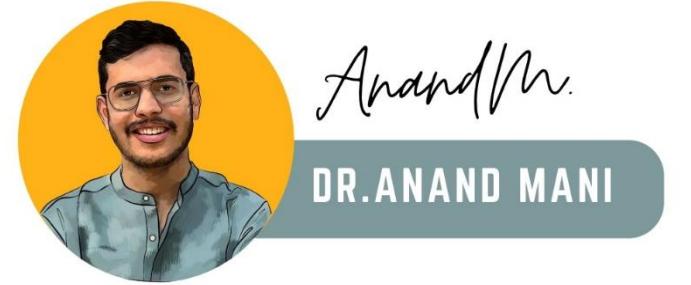


Figure 7.18 Reproductive system of cockroach : (a) male

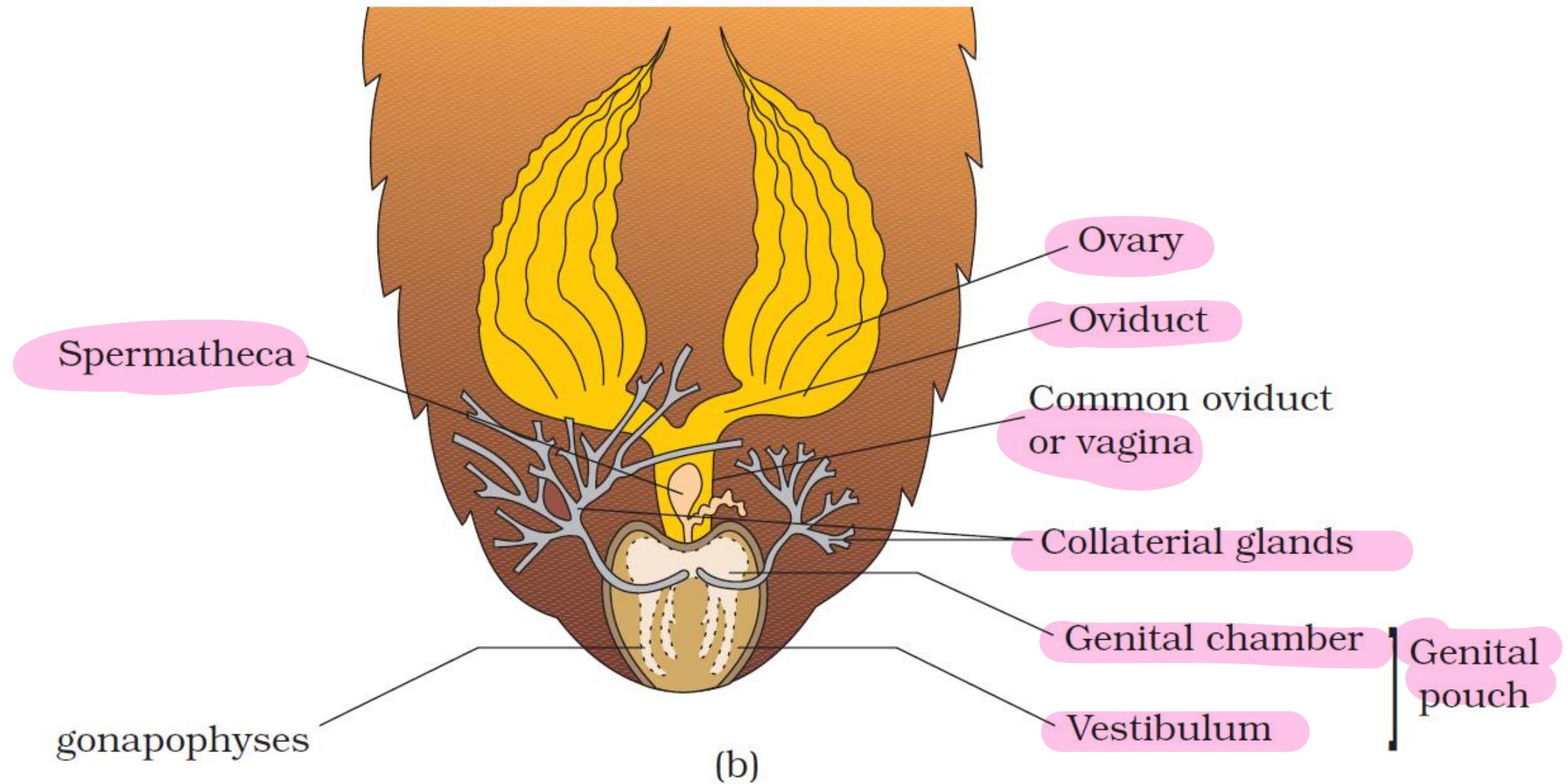
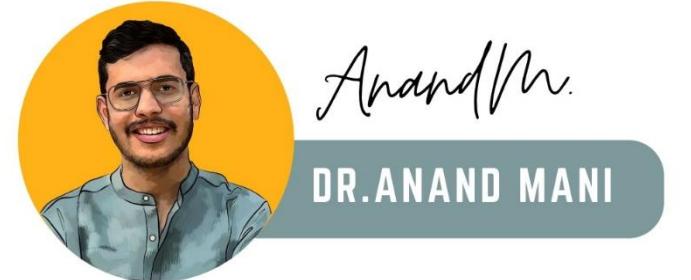


Figure 7.18 Reproductive system of cockroach : (b) female

CHAPTER-8

CELL: THE UNIT OF LIFE





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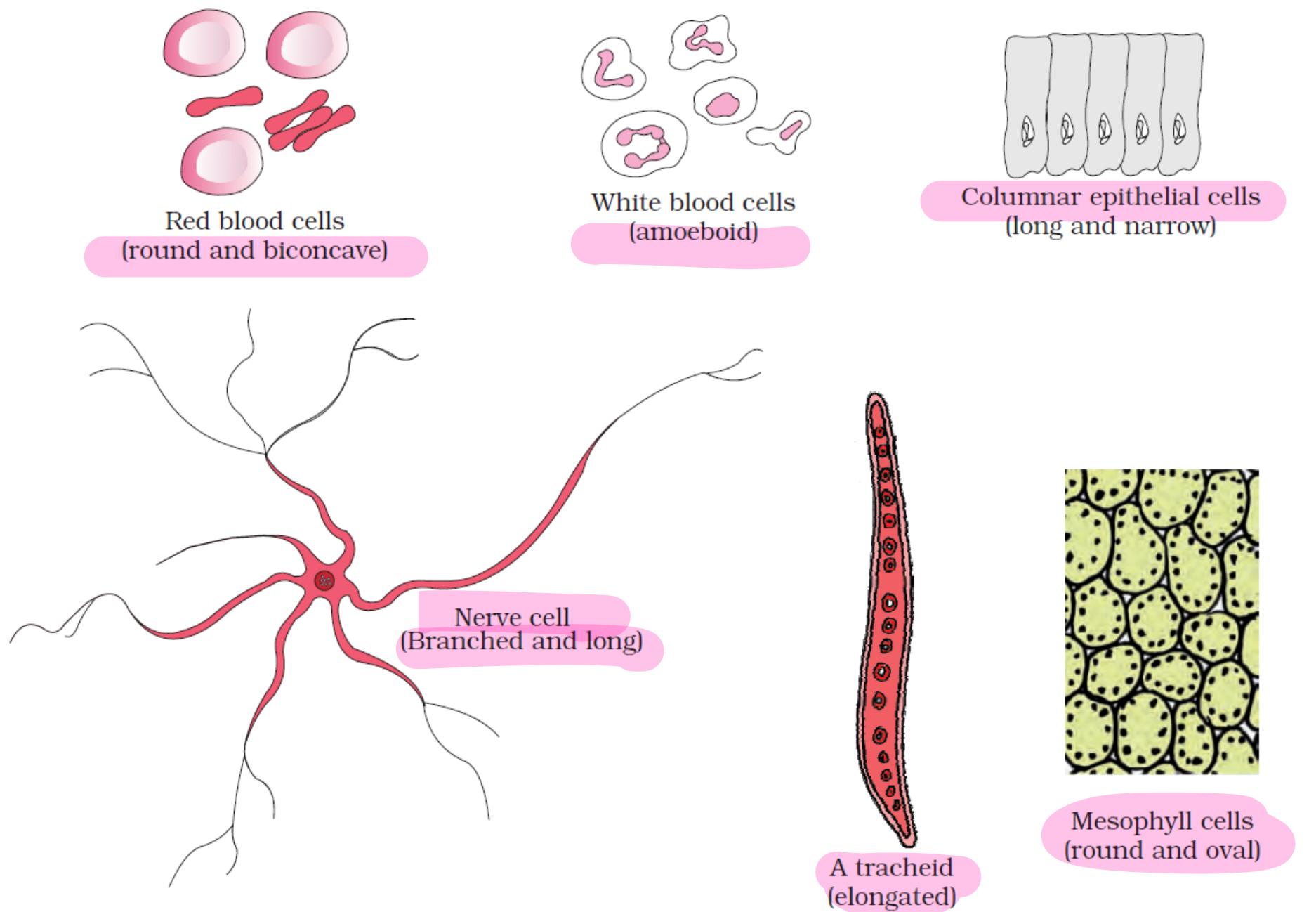


Figure 8.1 Diagram showing different shapes of the cells

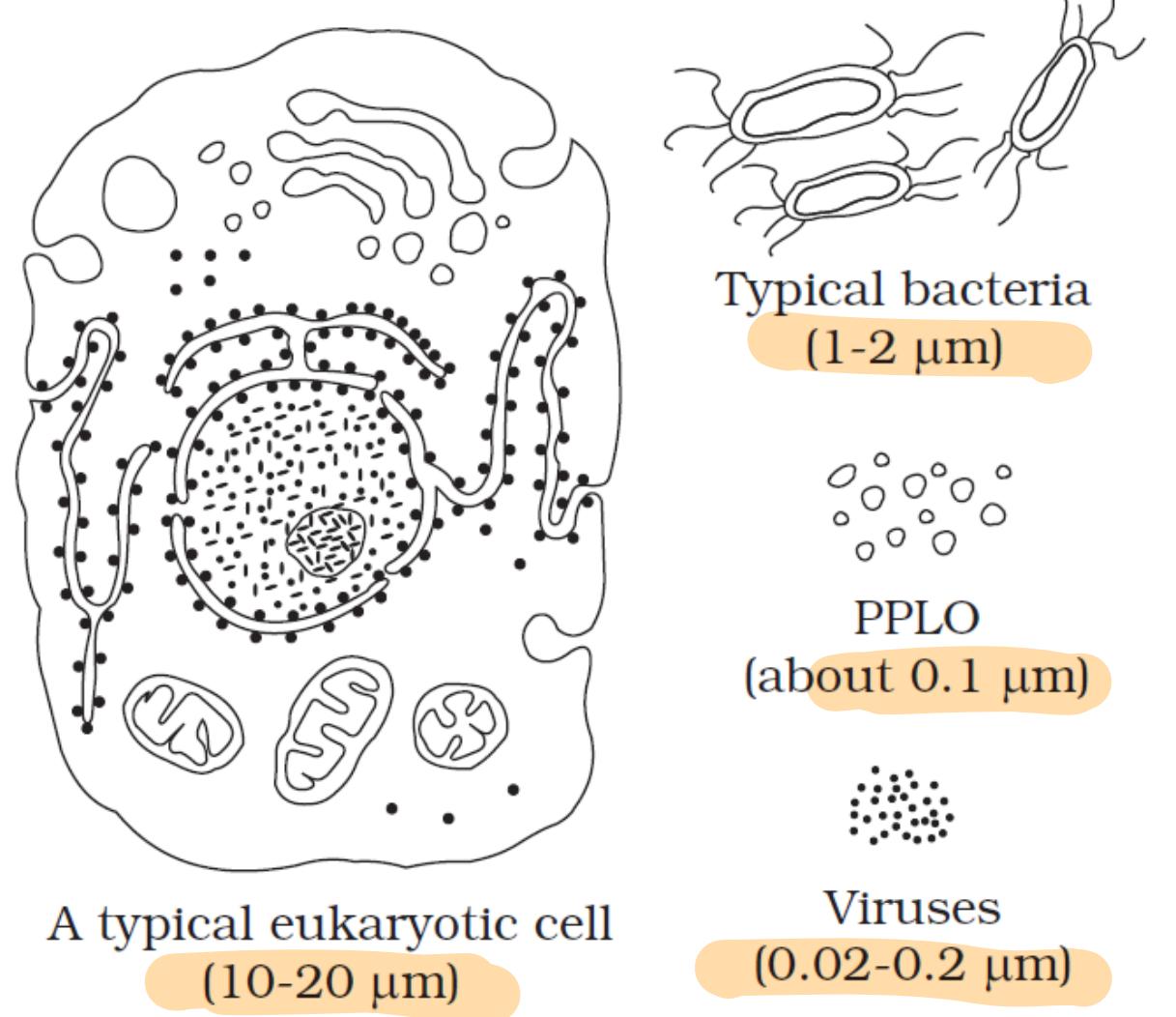
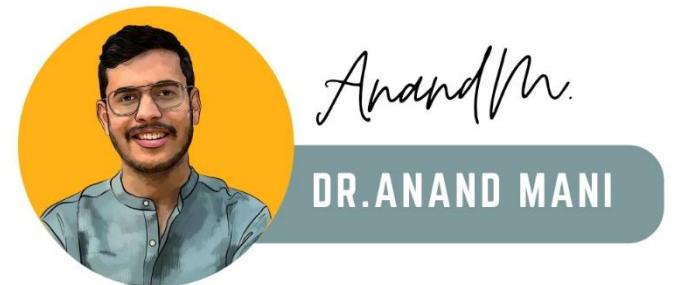


Figure 8.2 Diagram showing comparison of eukaryotic cell with other organisms

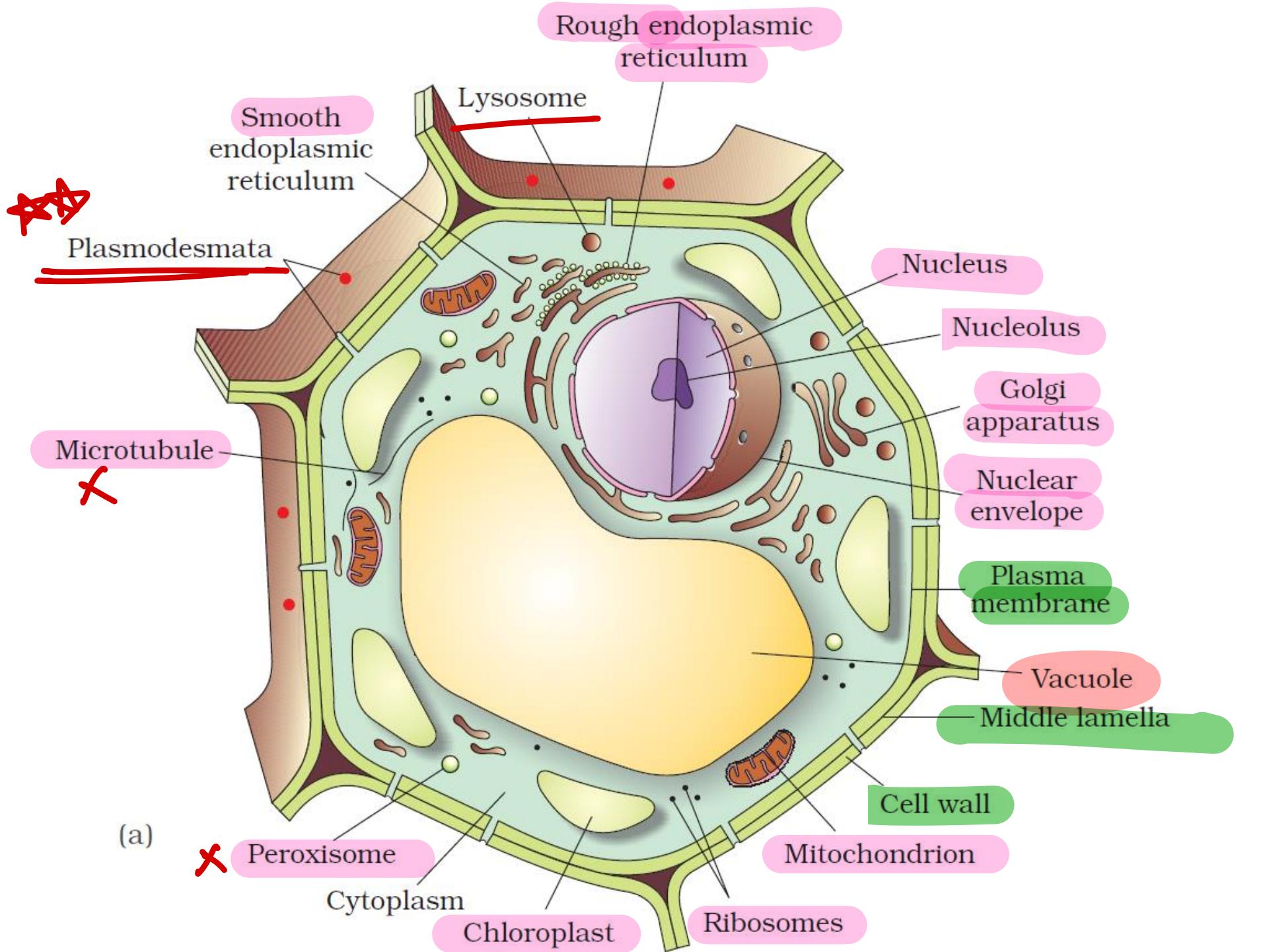
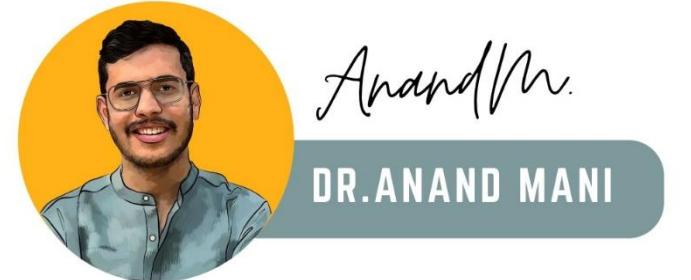


Figure 8.3 Diagram showing : (a) Plant cell

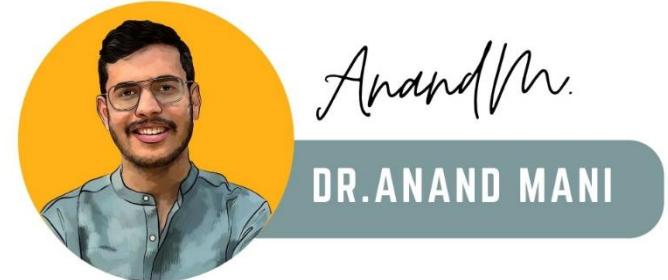
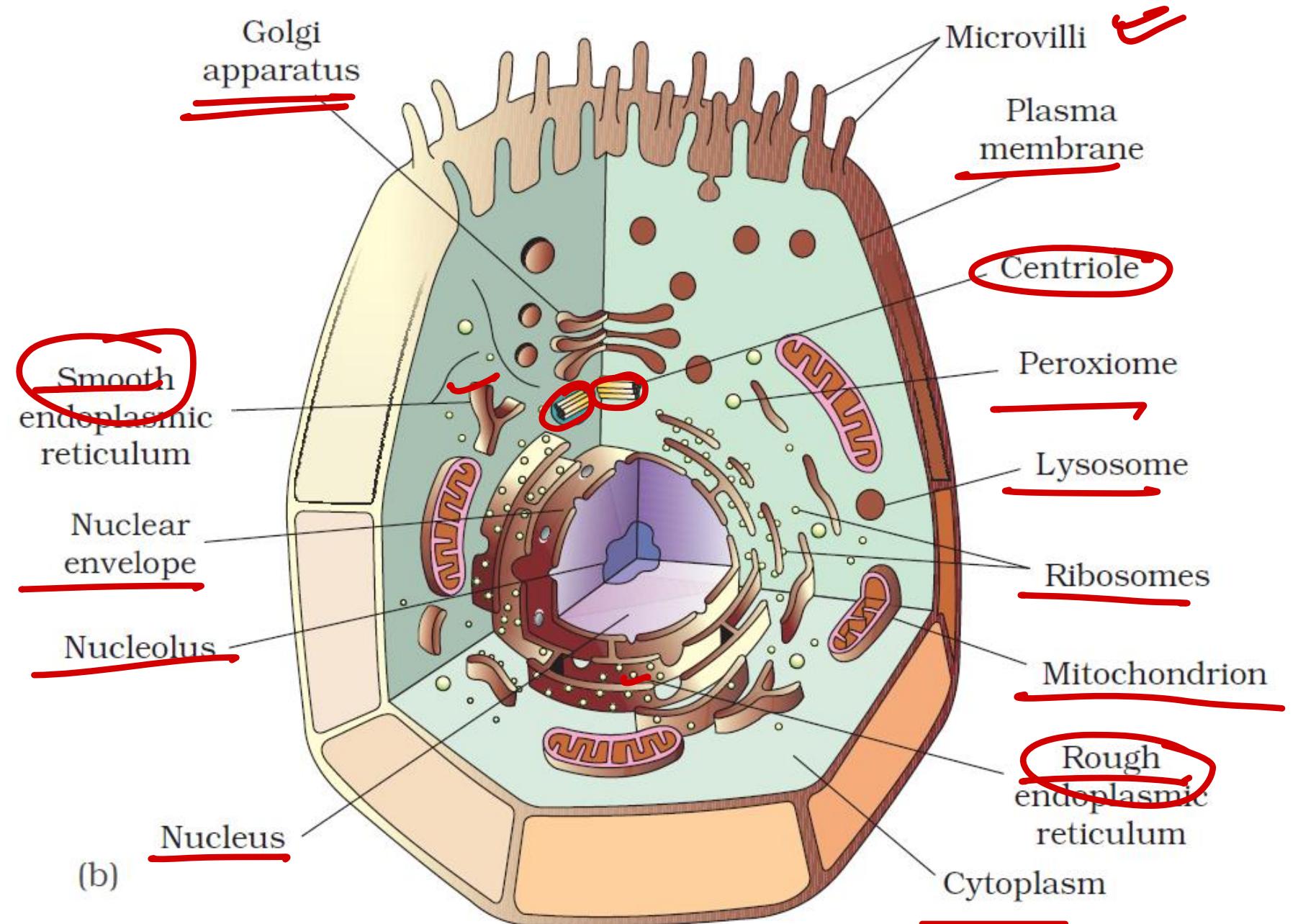


Figure 8.3 Diagram showing : (b) Animal cell

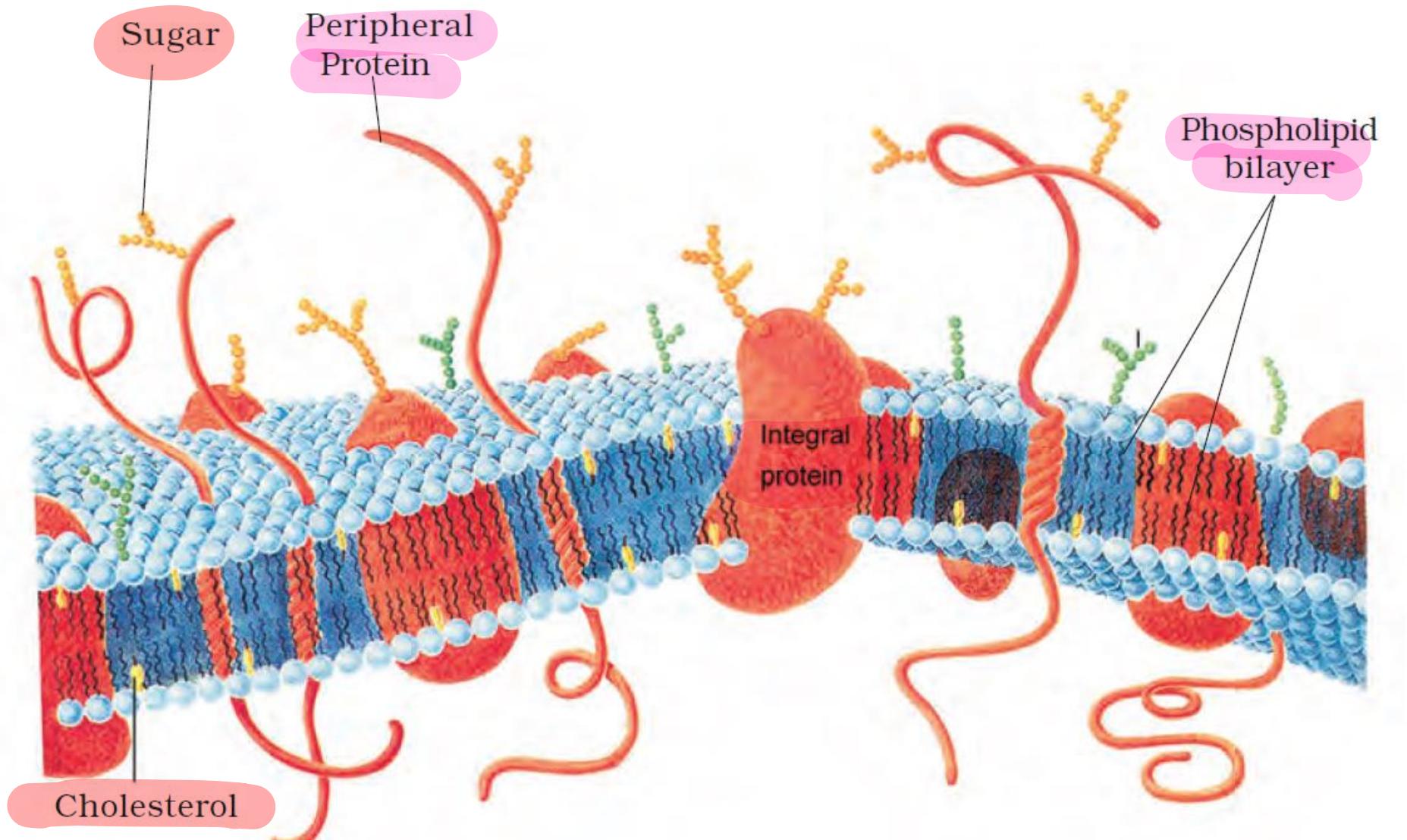
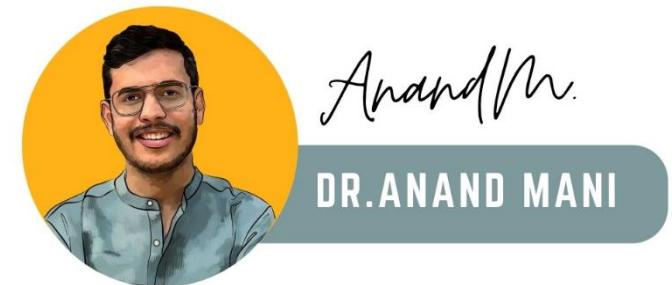


Figure 8.4 Fluid mosaic model of plasma membrane

① Singer & Nicolson

② 1972



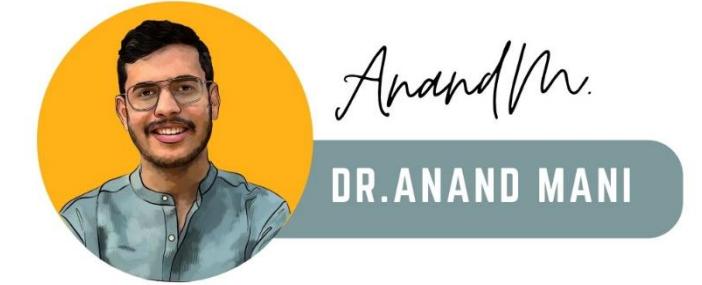
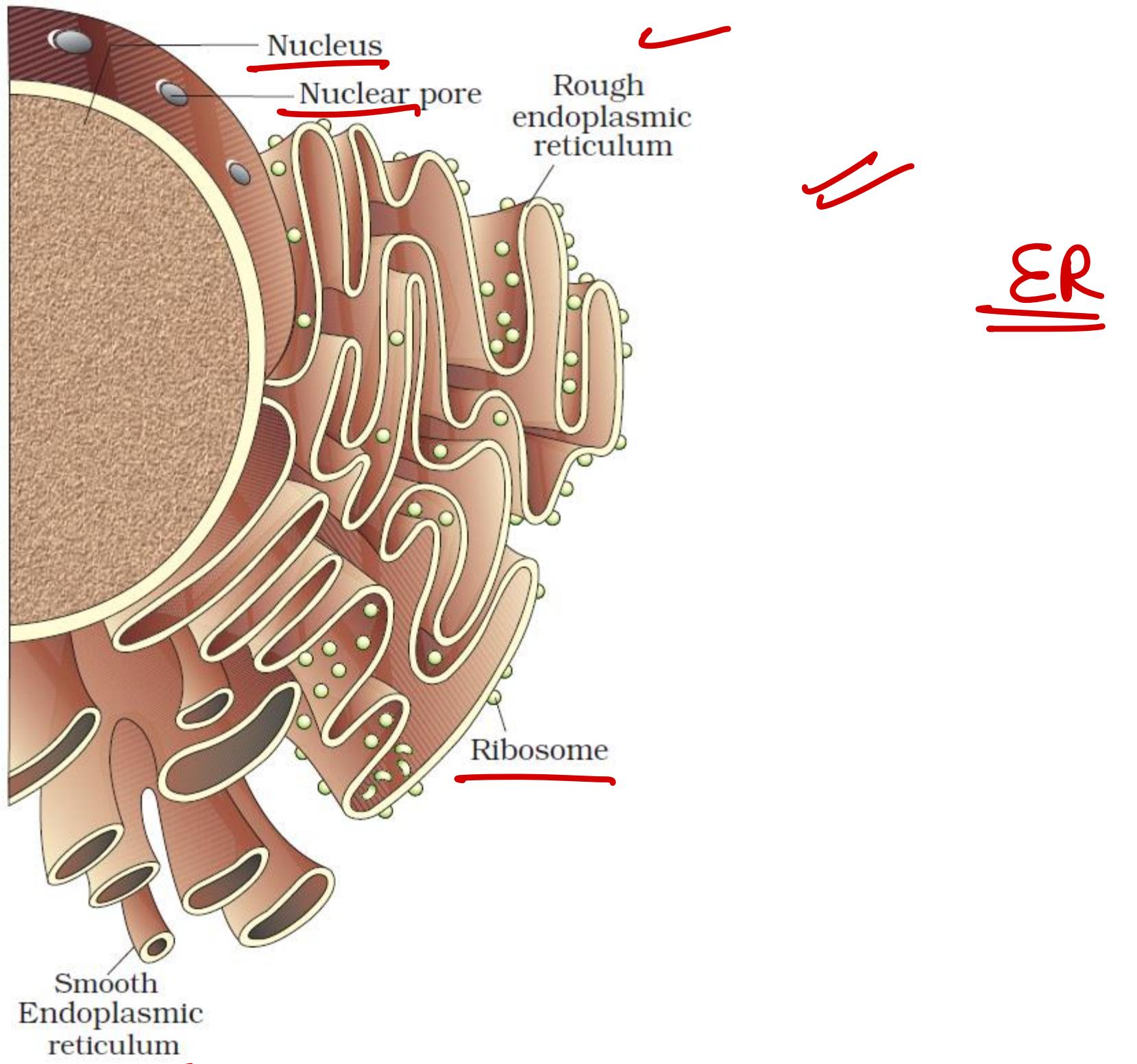


Figure 8.5 Endoplasmic reticulum

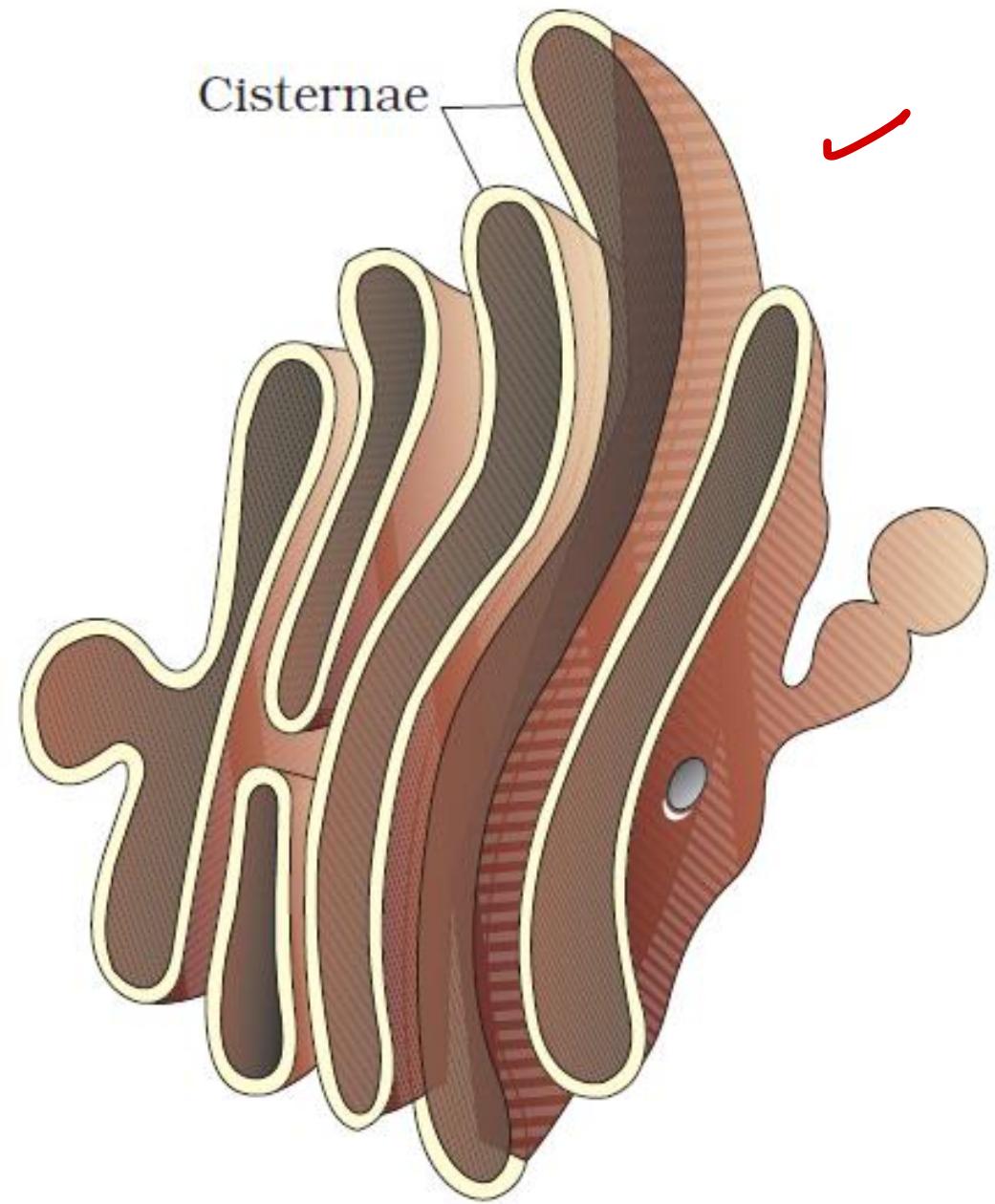
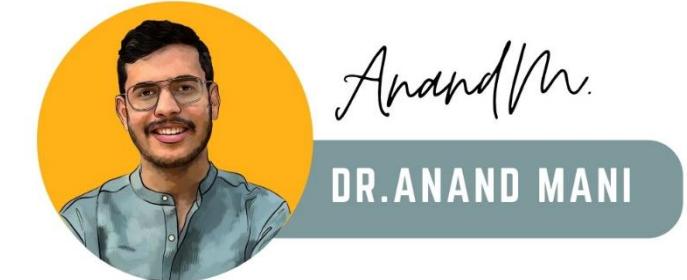


Figure 8.6 Golgi apparatus

Camillo Golgi ↪
(0.1 - 0.5 μm)
⇒ Cis | forming | convex
⇒ trans | maturing | concave



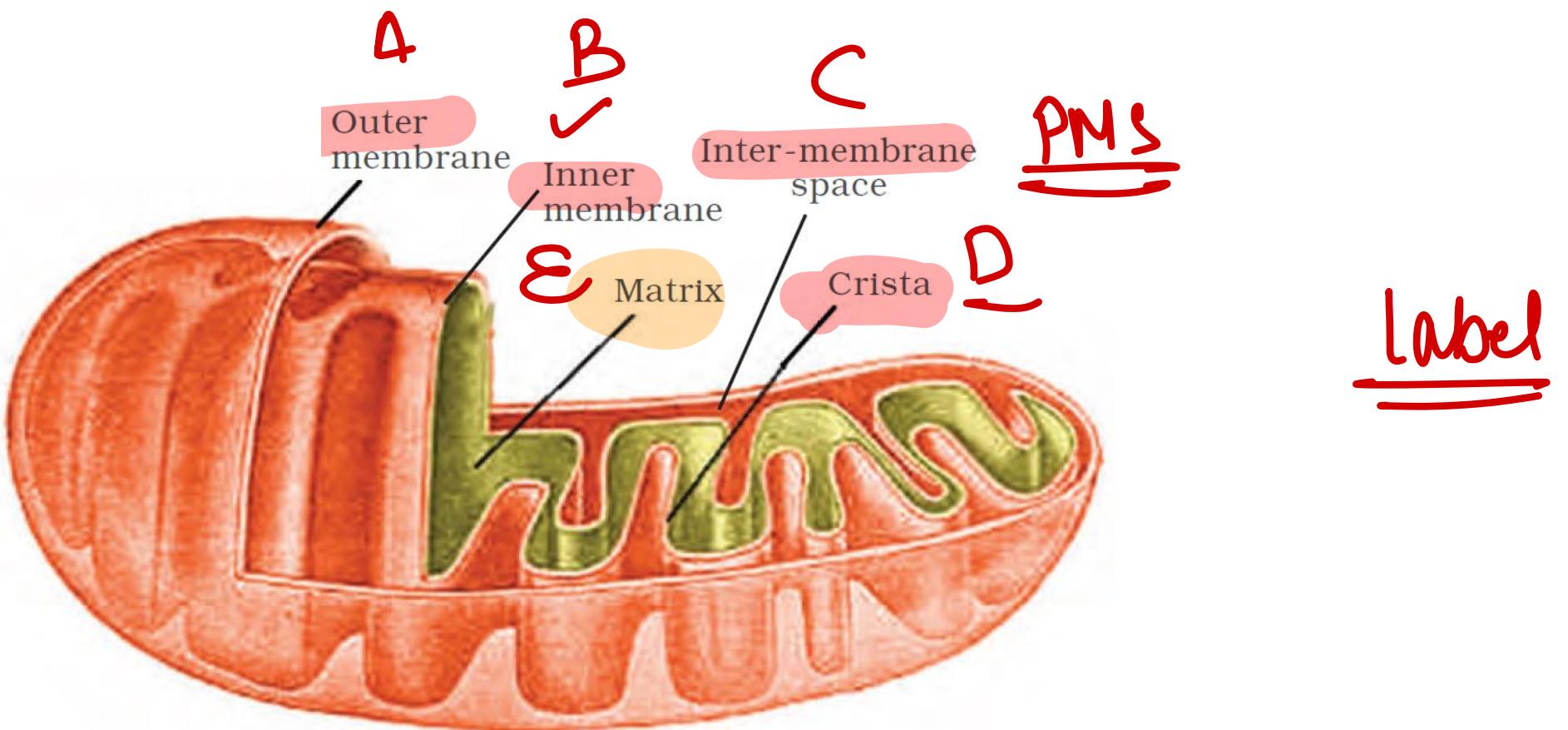
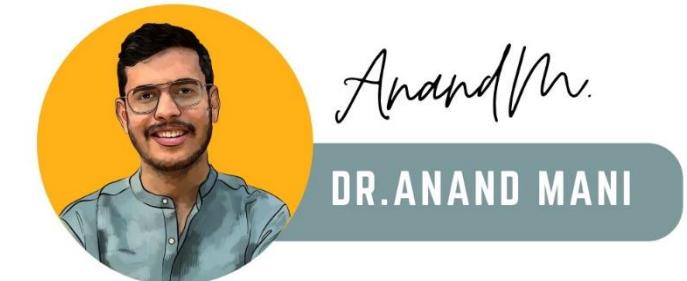


Figure 8.7 Structure of mitochondrion (Longitudinal section)

Label



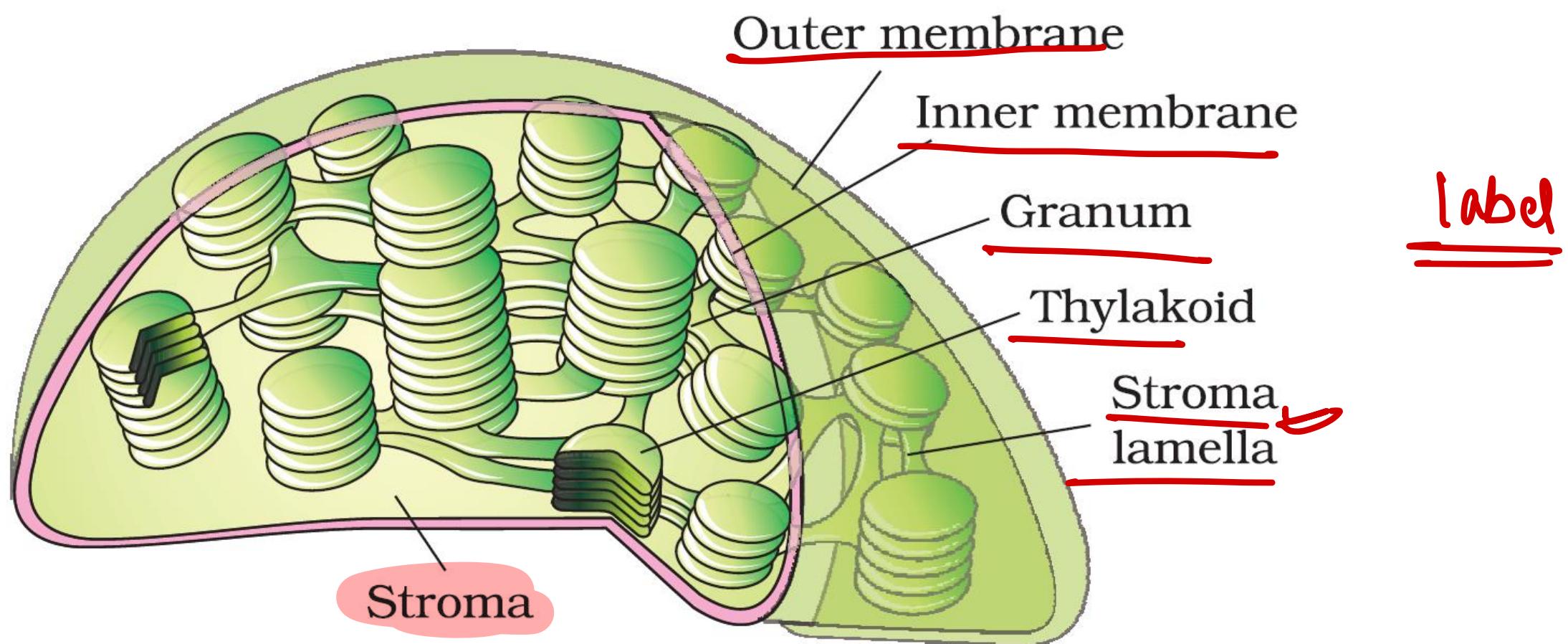
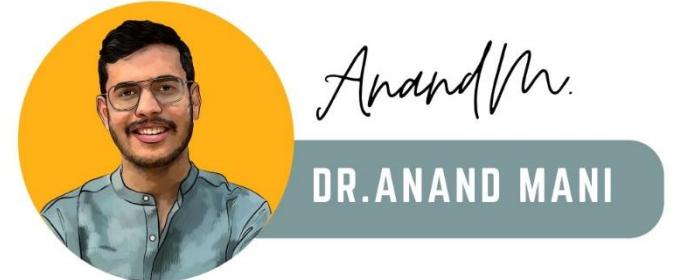


Figure 8.8 Sectional view of chloroplast

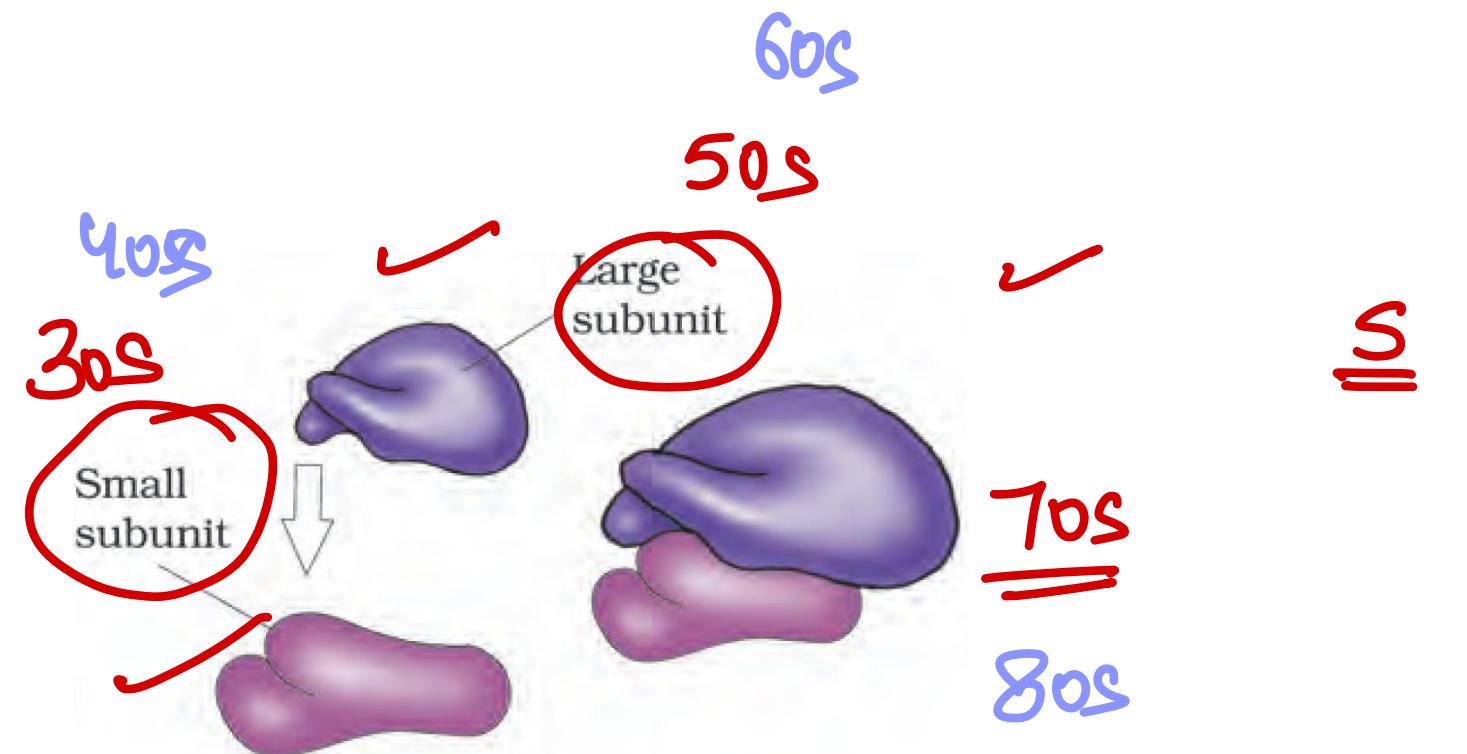
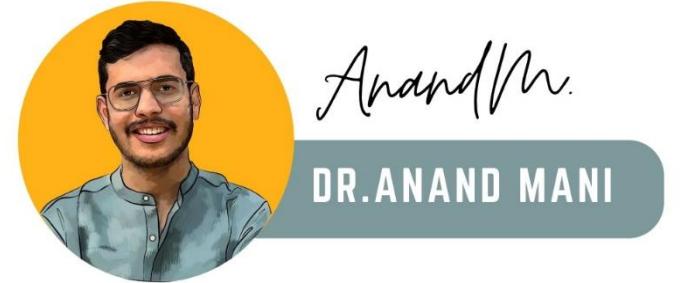
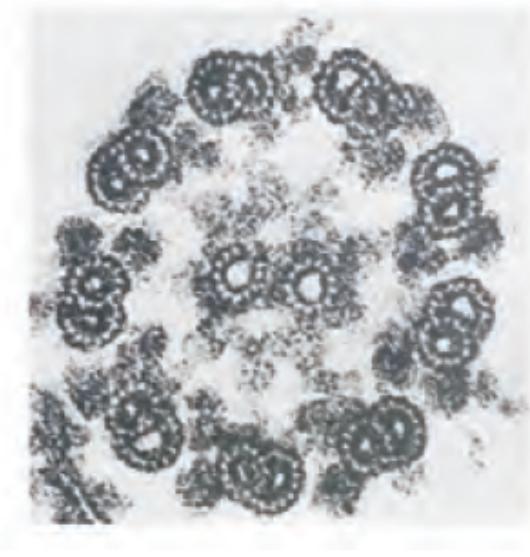


Figure 8.9 Ribosome



(a)

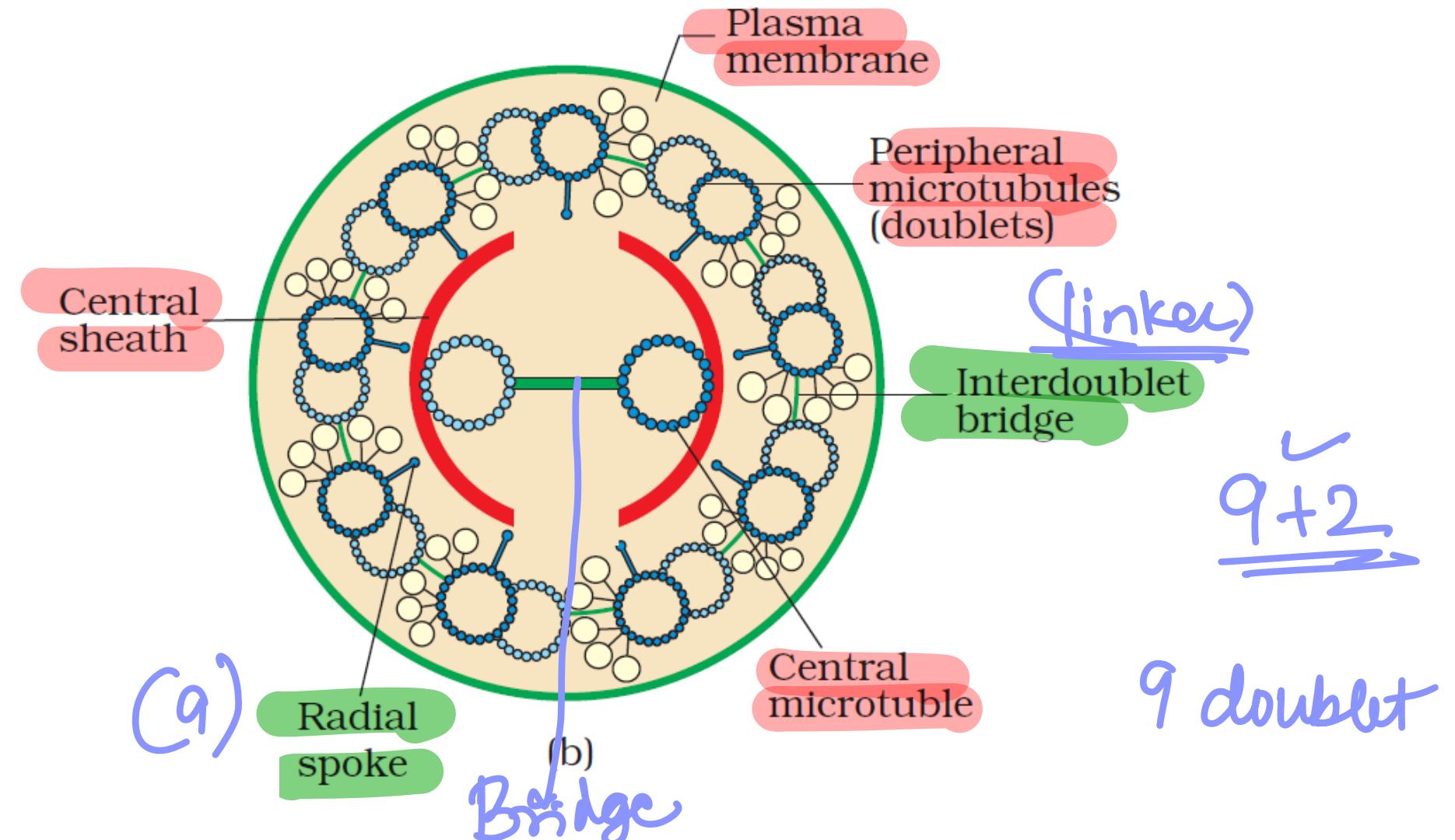
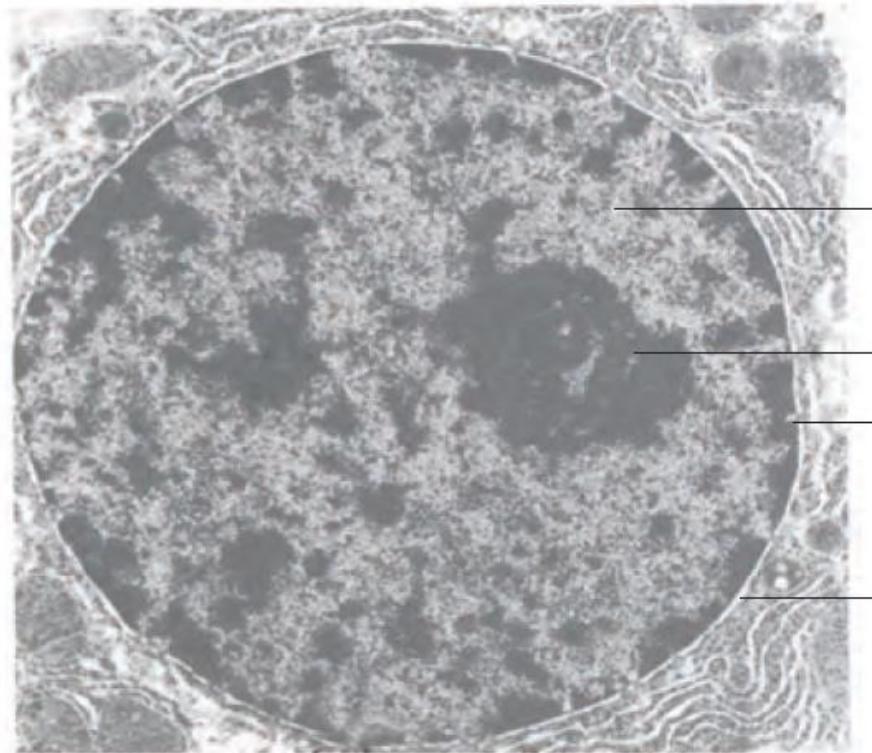


Figure 8.10 Section of cilia/flagella showing different parts : (a) Electron micrograph
(b) Diagrammatic representation of internal structure



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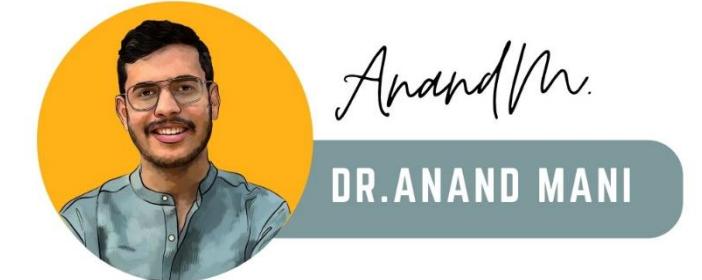
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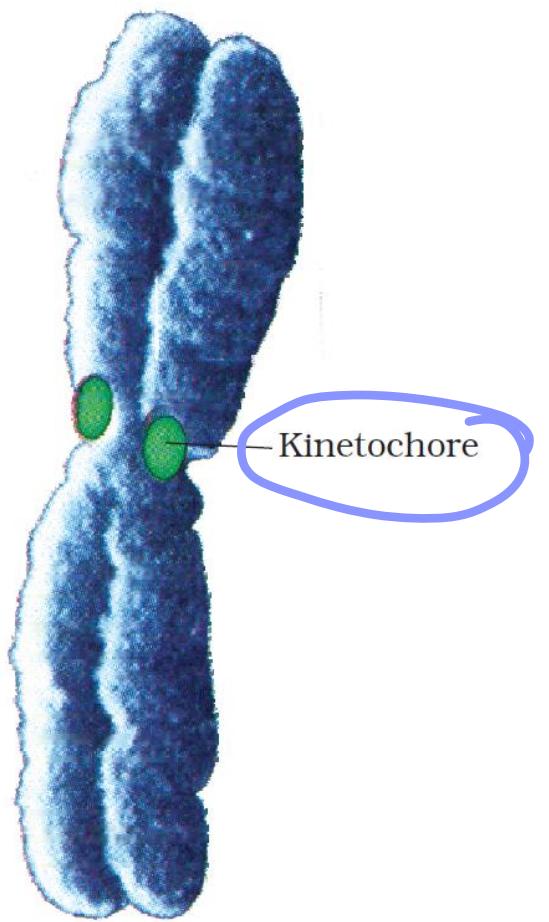
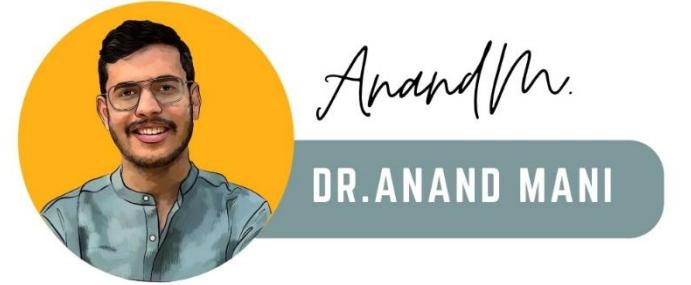


Nucleoplasm
Nucleolus = γ RNA (Ribosome factory)
Nuclear pore
Nuclear membrane

Figure 8.11 Structure of nucleus

Carmine





A

dis
Spindle fiber

Figure 8.12 Chromosome with kinetochore

CHAPTER-9

BIOMOLECULES

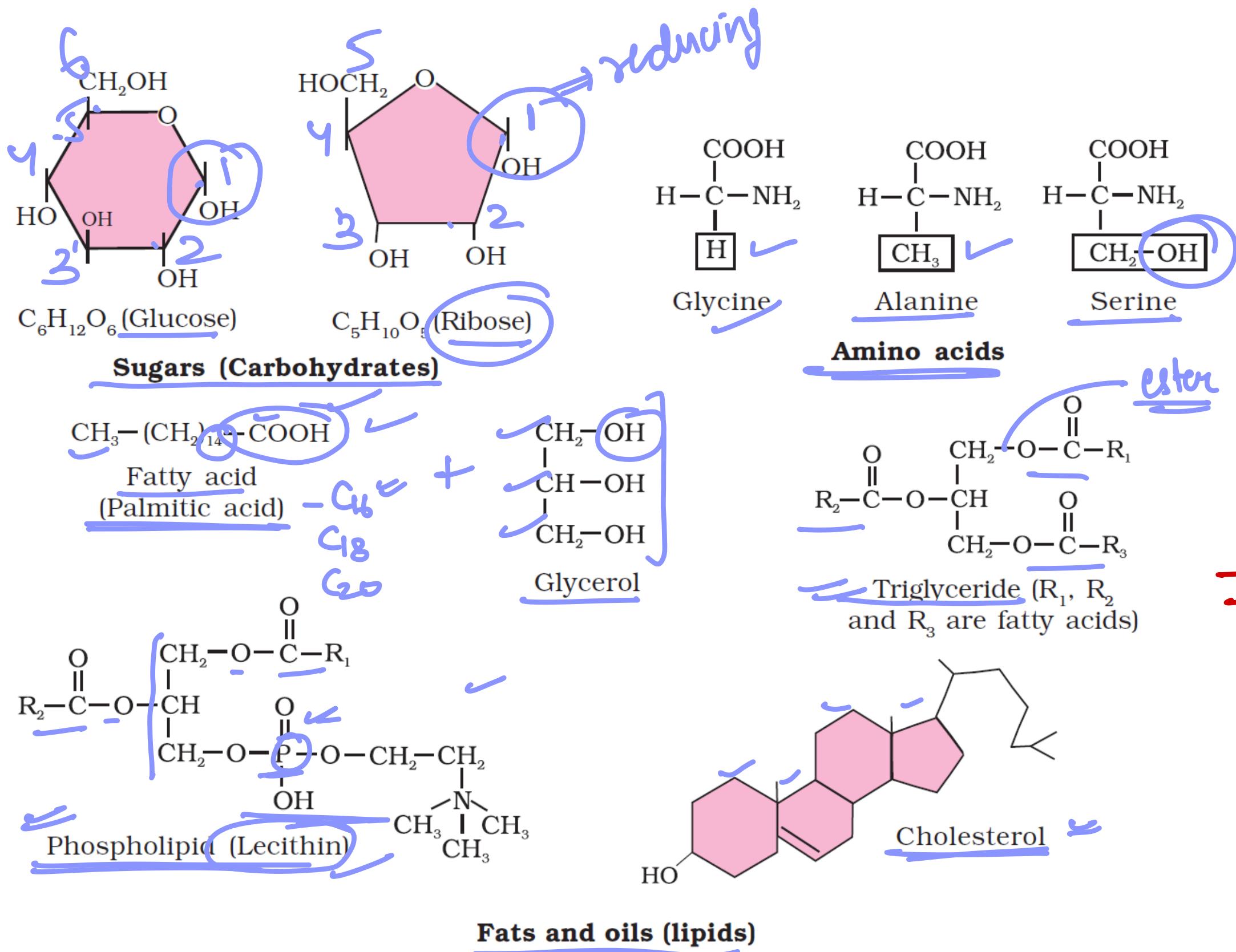


Figure 9.1 Diagrammatic representation of small molecular weight organic compounds in living tissues

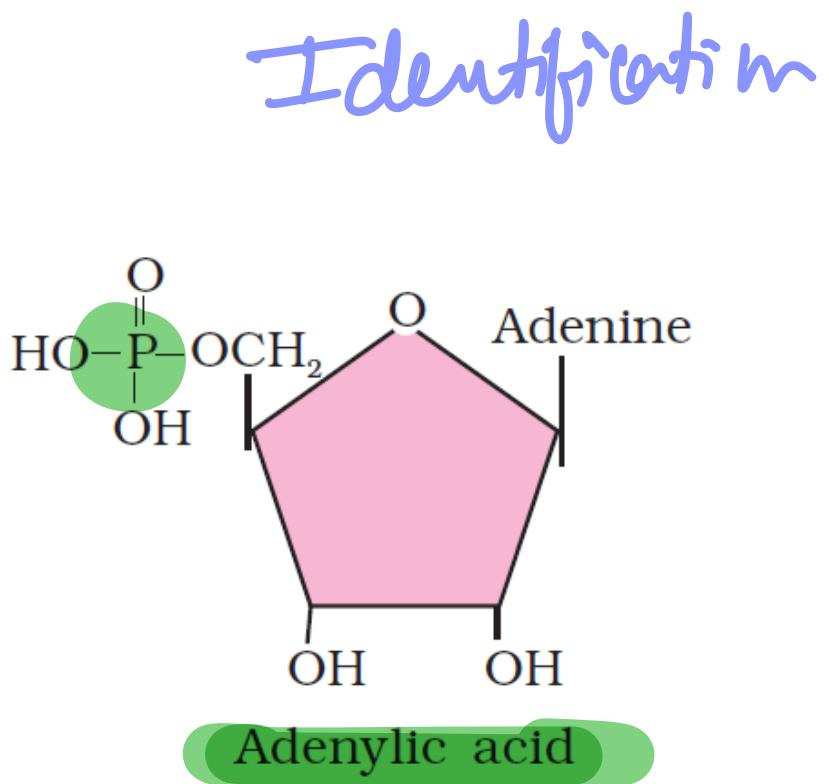
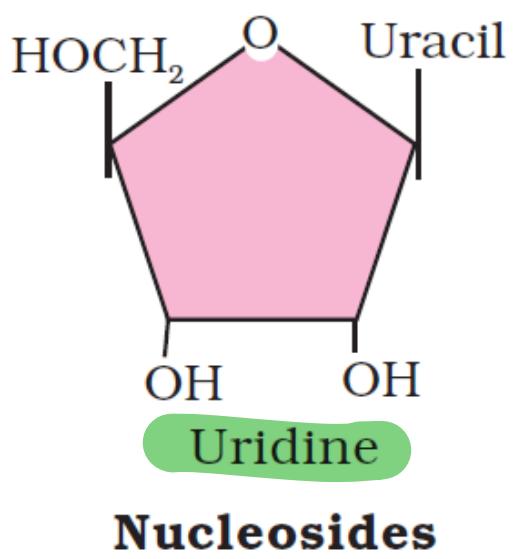
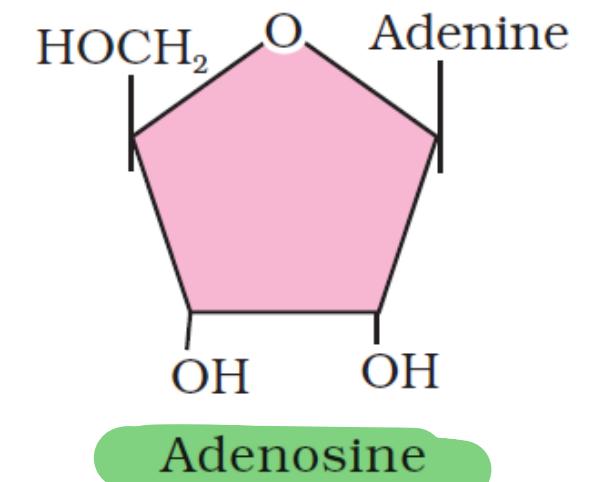
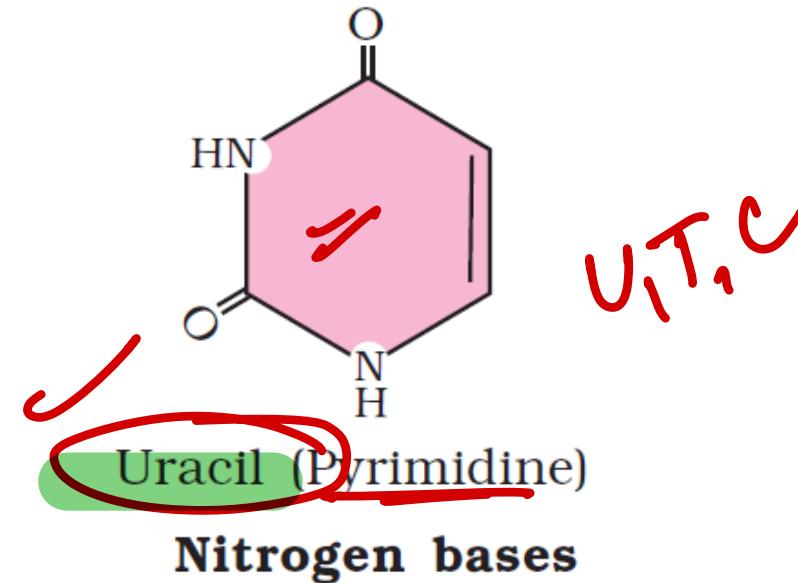
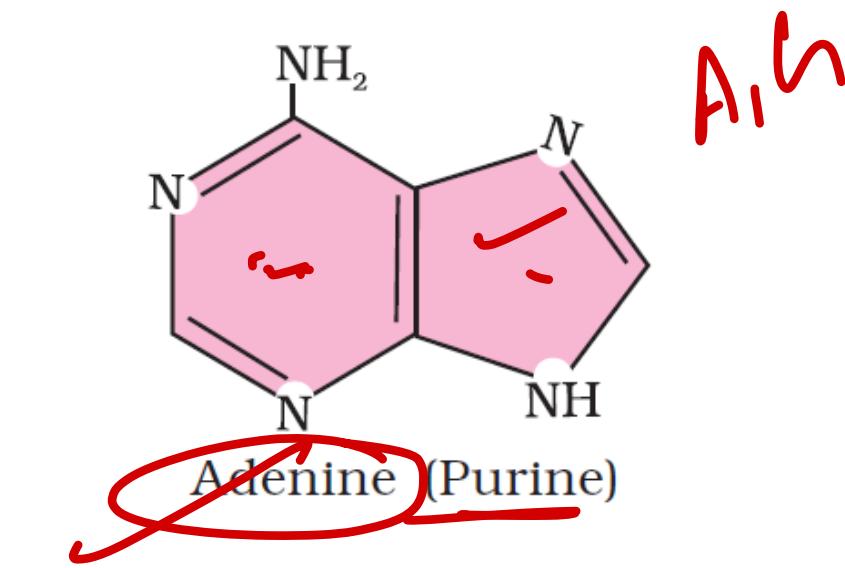


Figure 9.1 Diagrammatic representation of small molecular weight organic compounds in living tissues

★ ★ *PYQ*
 Sugar + N₂base = Nucleoside
 +
 Nucleotide

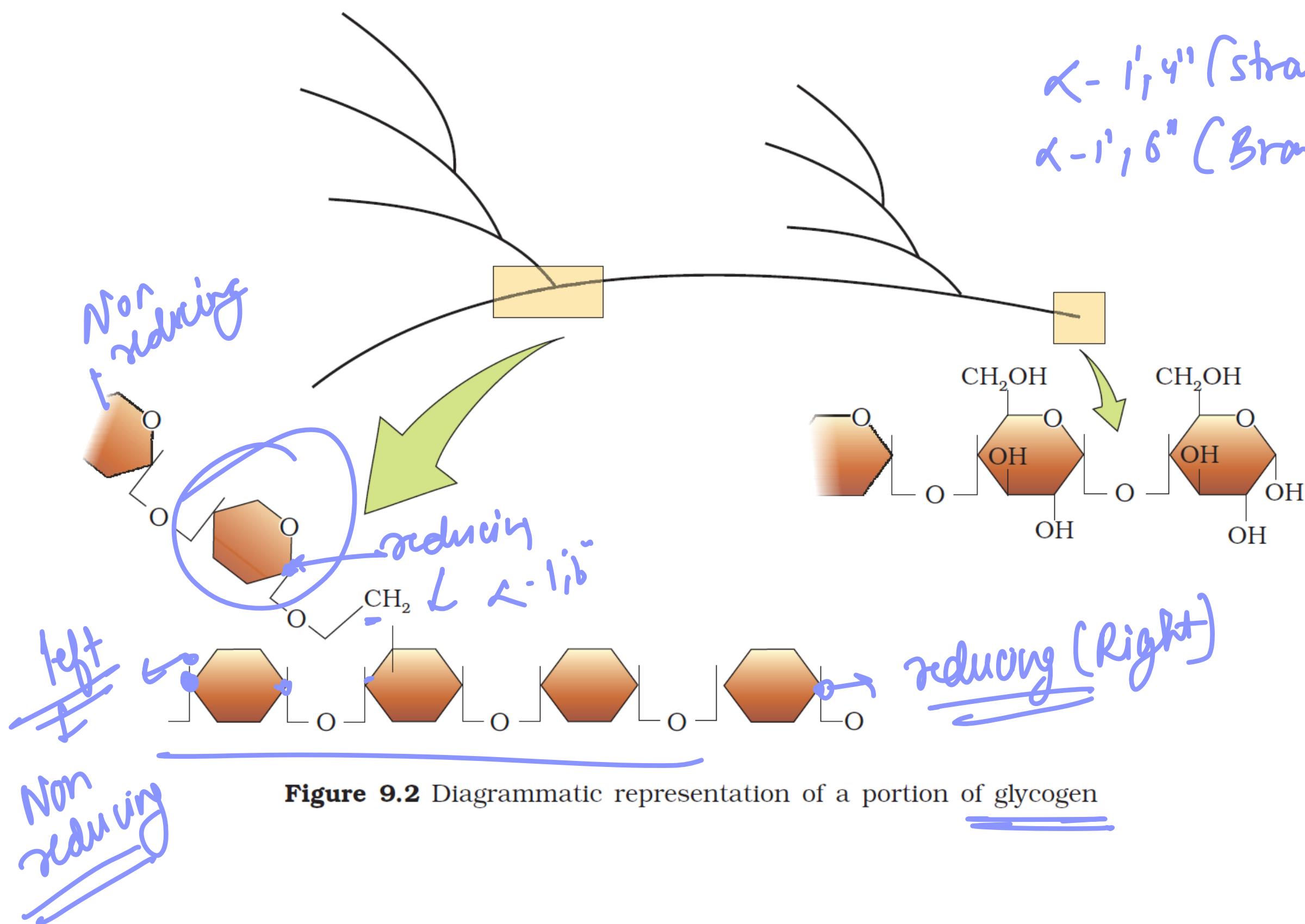
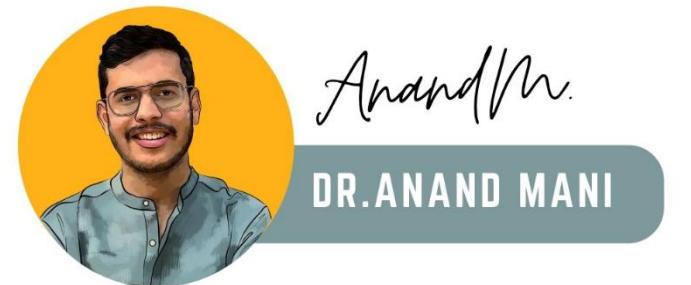


Figure 9.2 Diagrammatic representation of a portion of glycogen

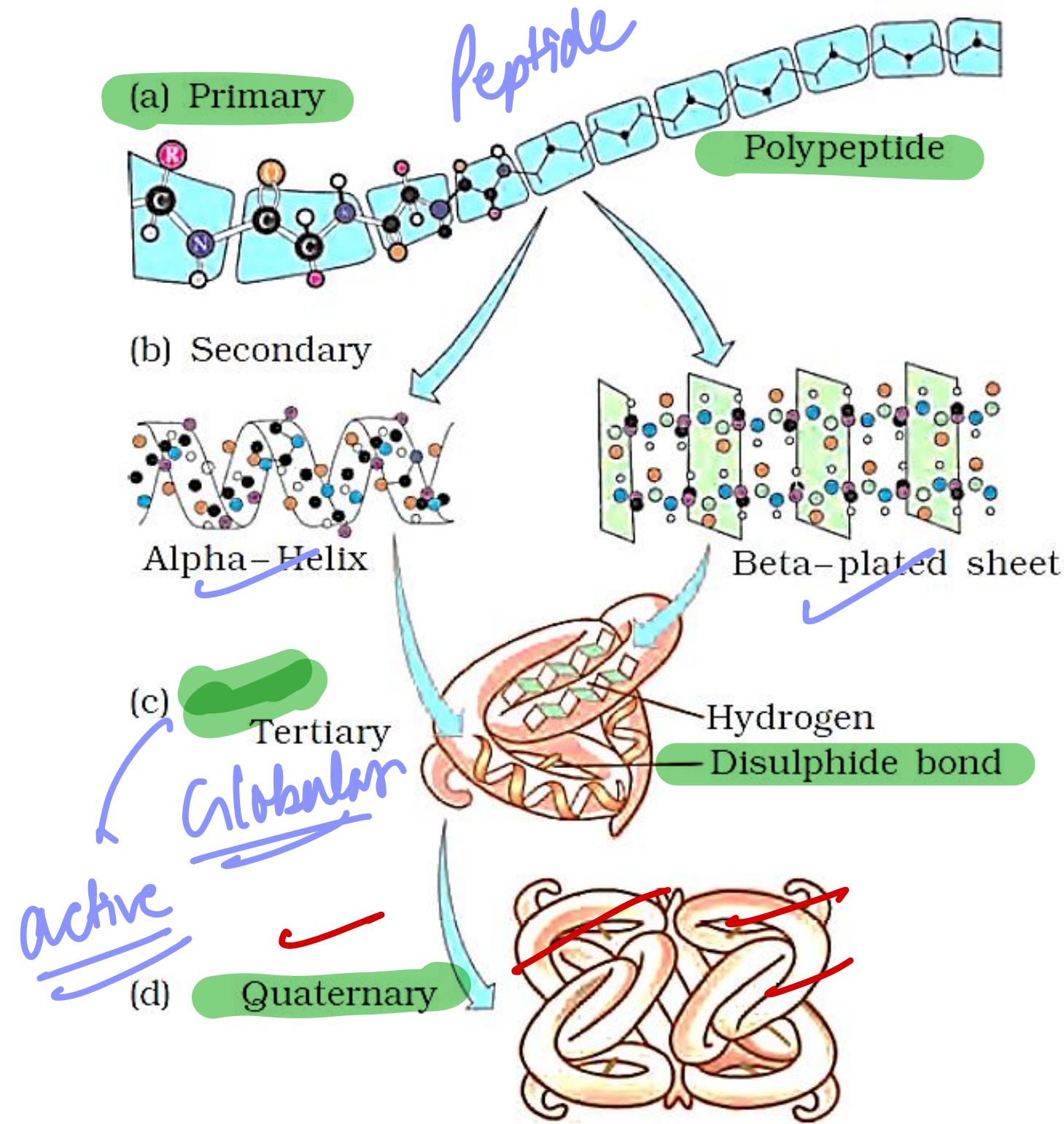
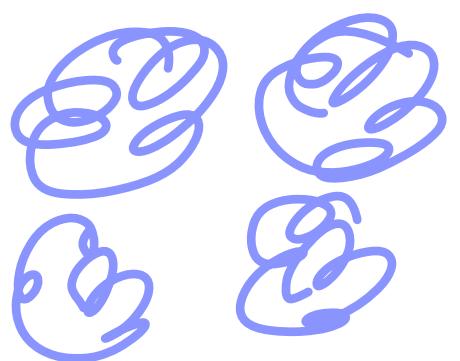
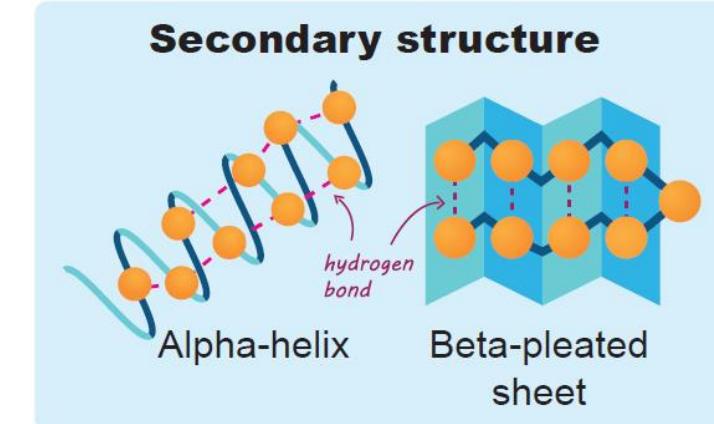
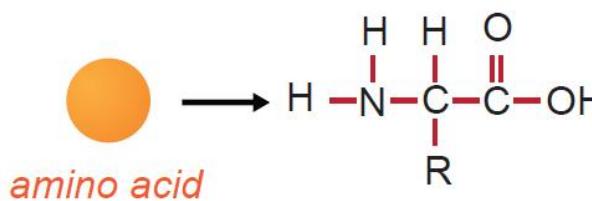


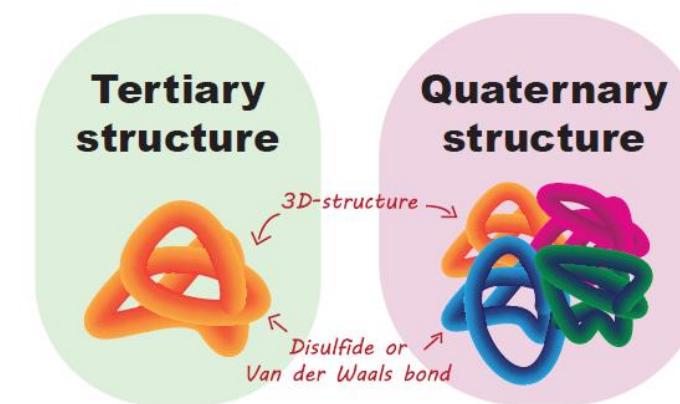
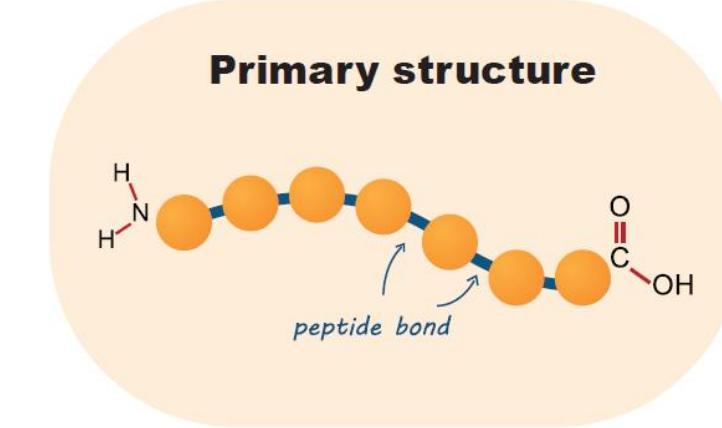
Figure 9.3 Various levels of Protein Structure



Identification



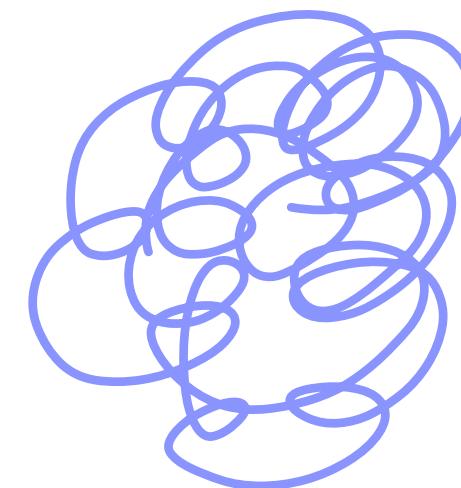
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Protein

α helix

β sheet



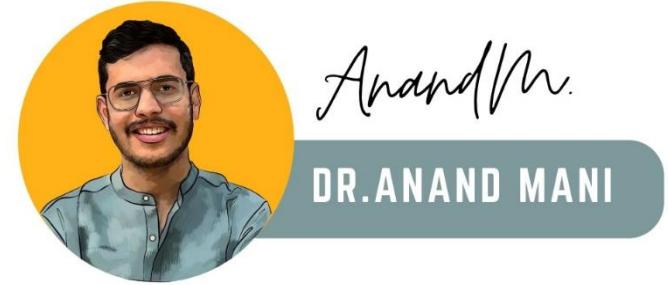
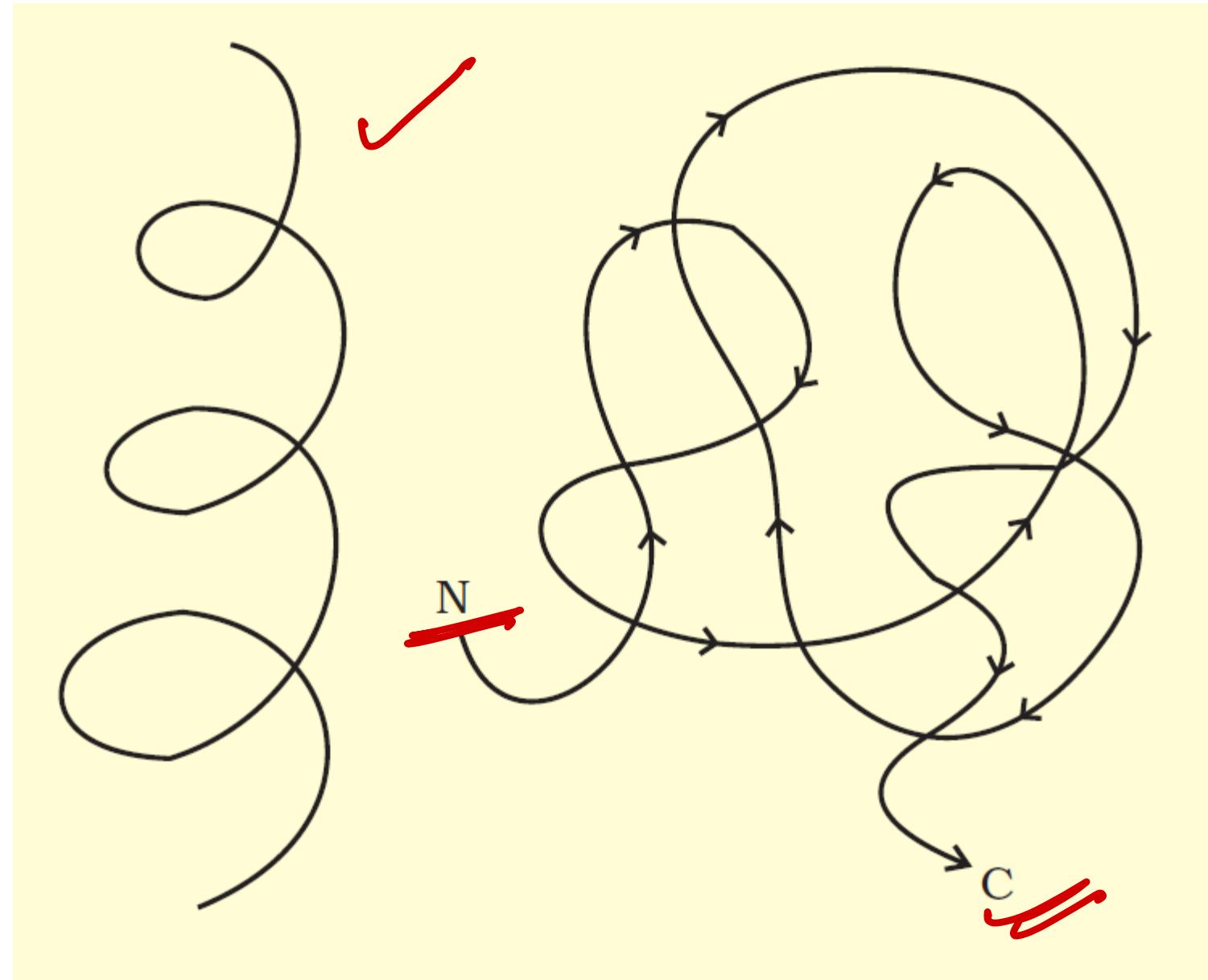


Figure 9.4 Cartoon showing : (a) A secondary structure and (b) A tertiary structure of proteins

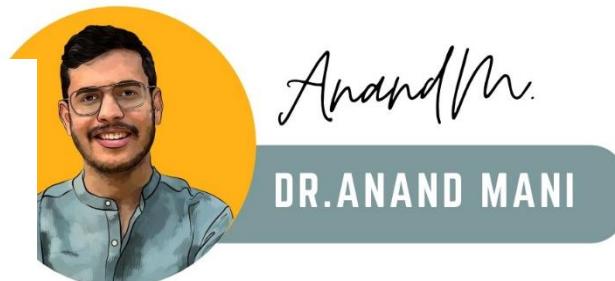
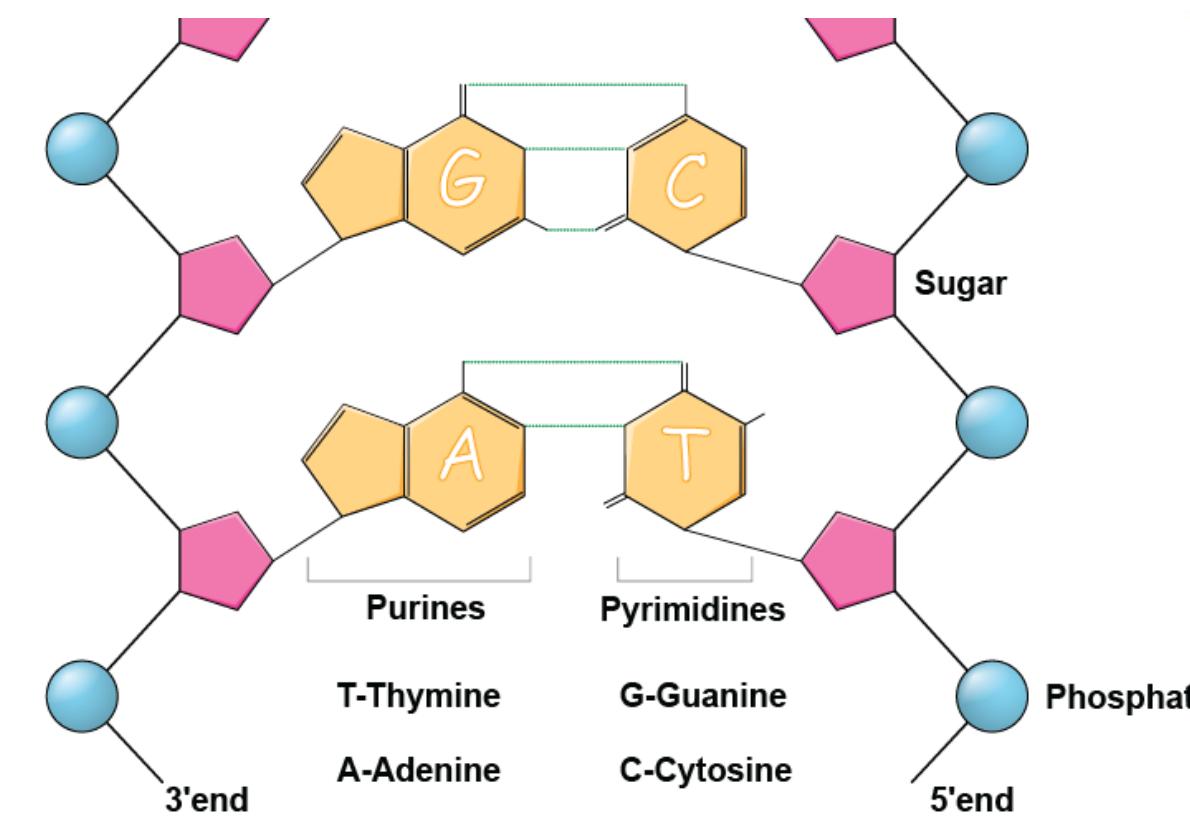
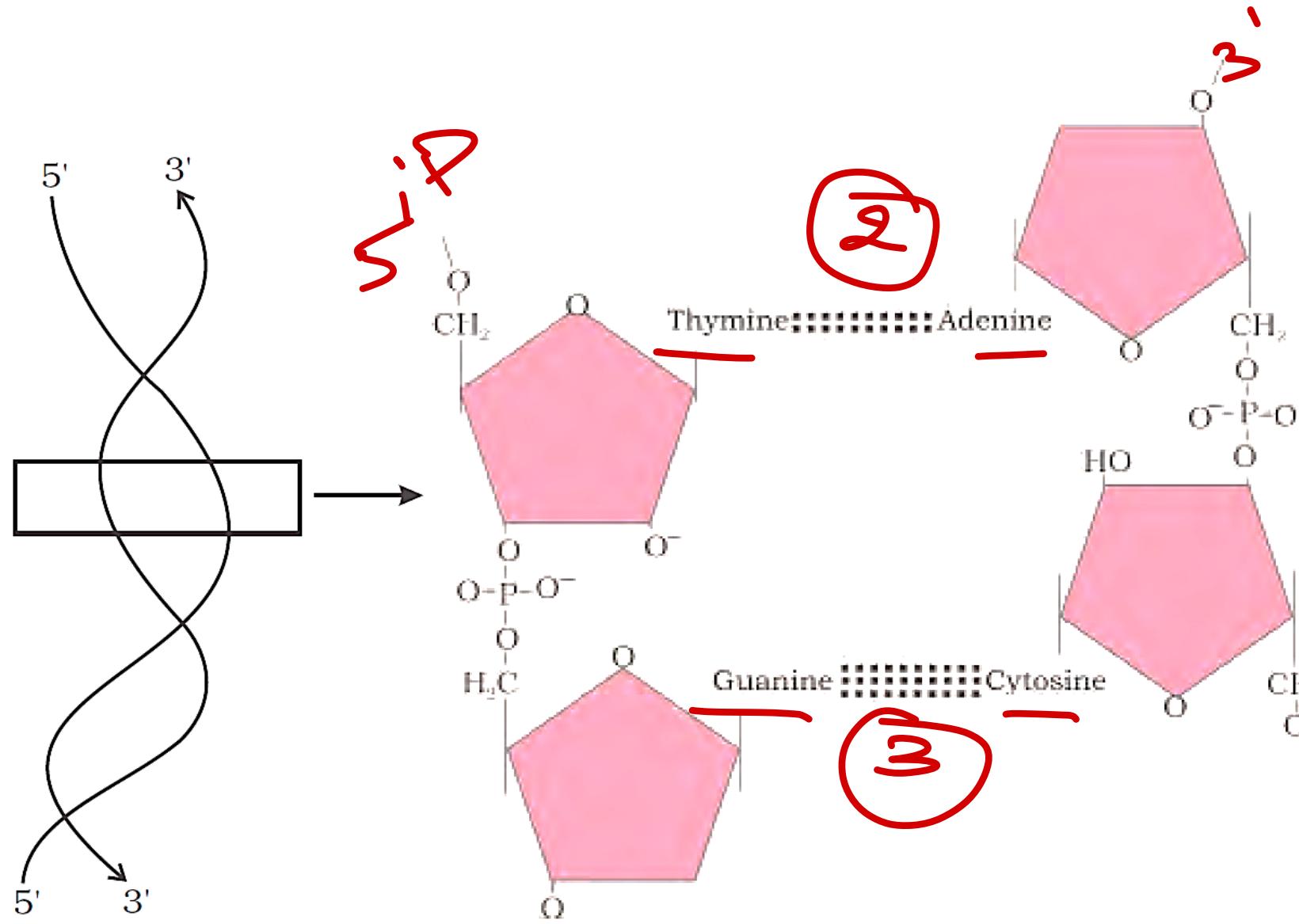


Figure 9.5 Diagram indicating secondary structure of DNA

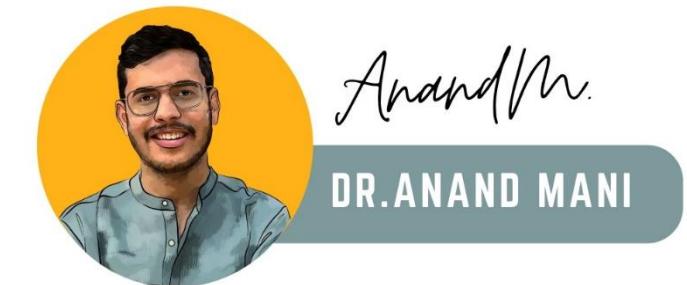
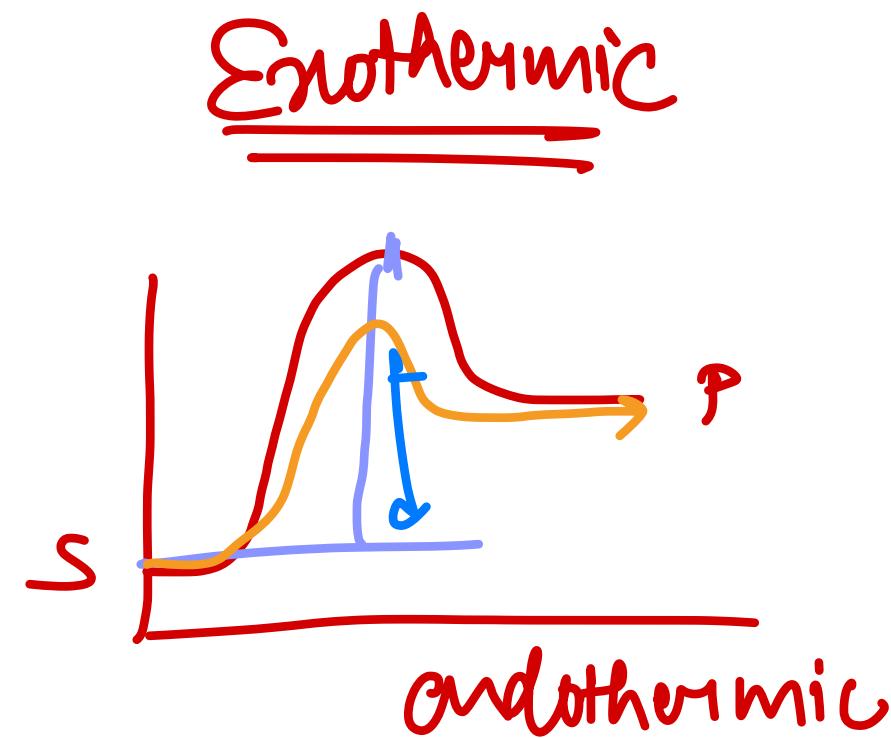
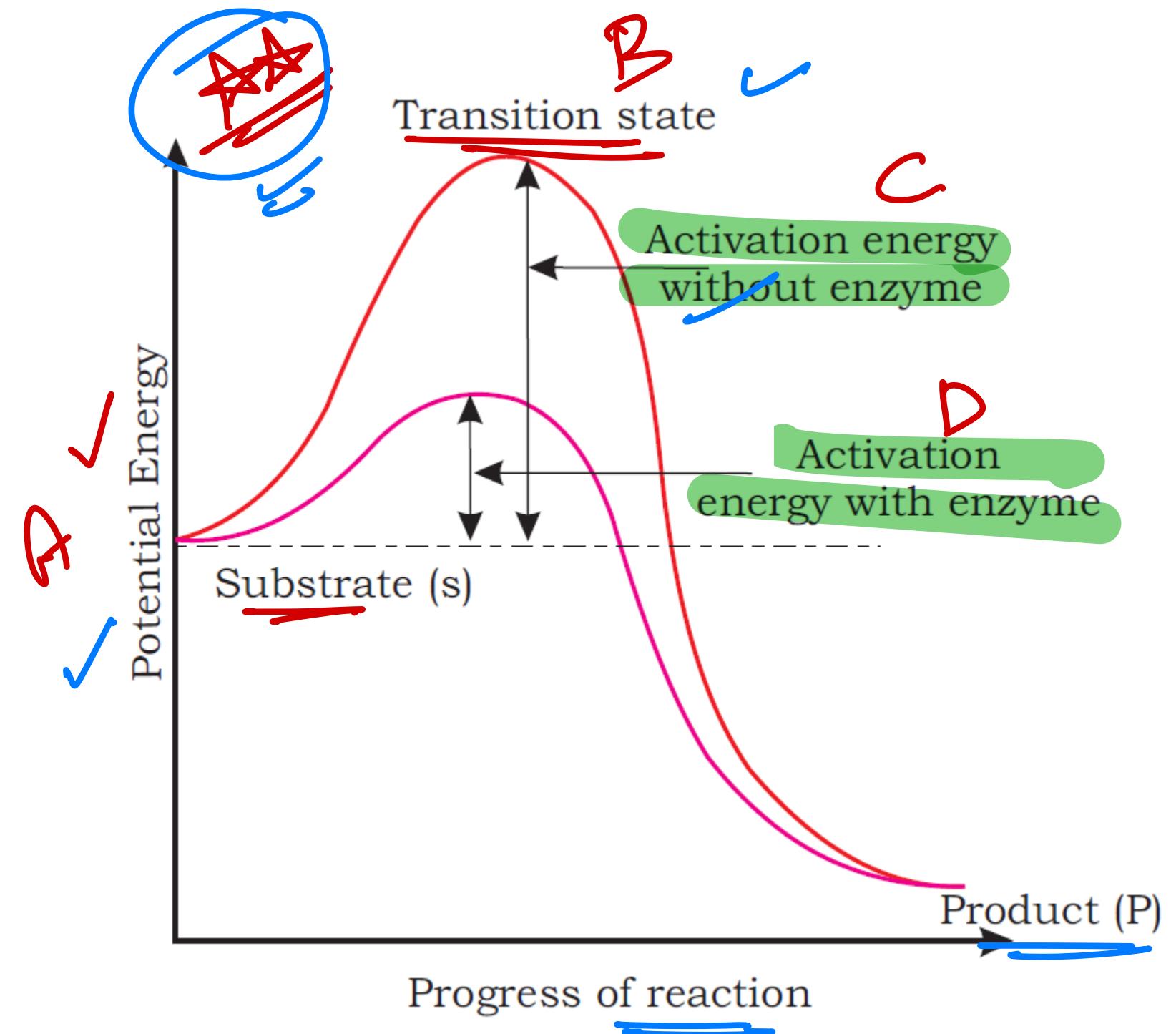


Figure 9.6 Concept of activation energy

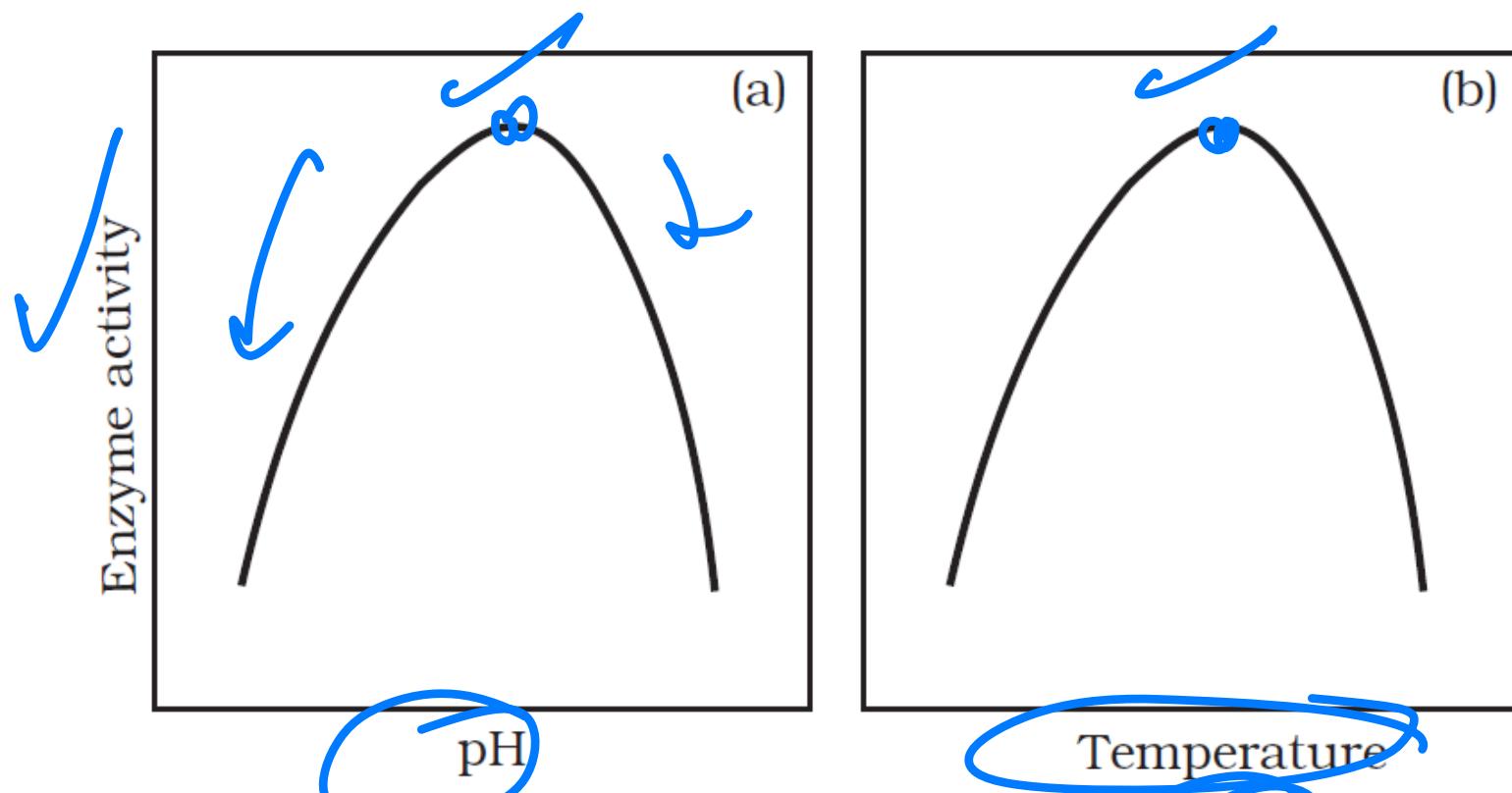
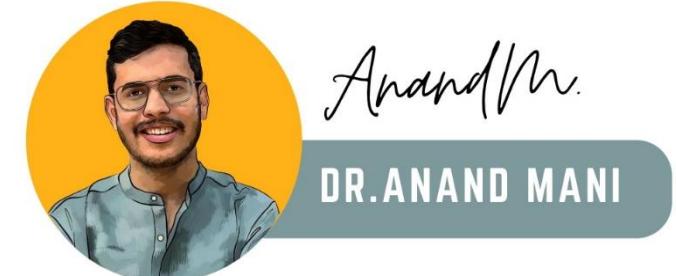
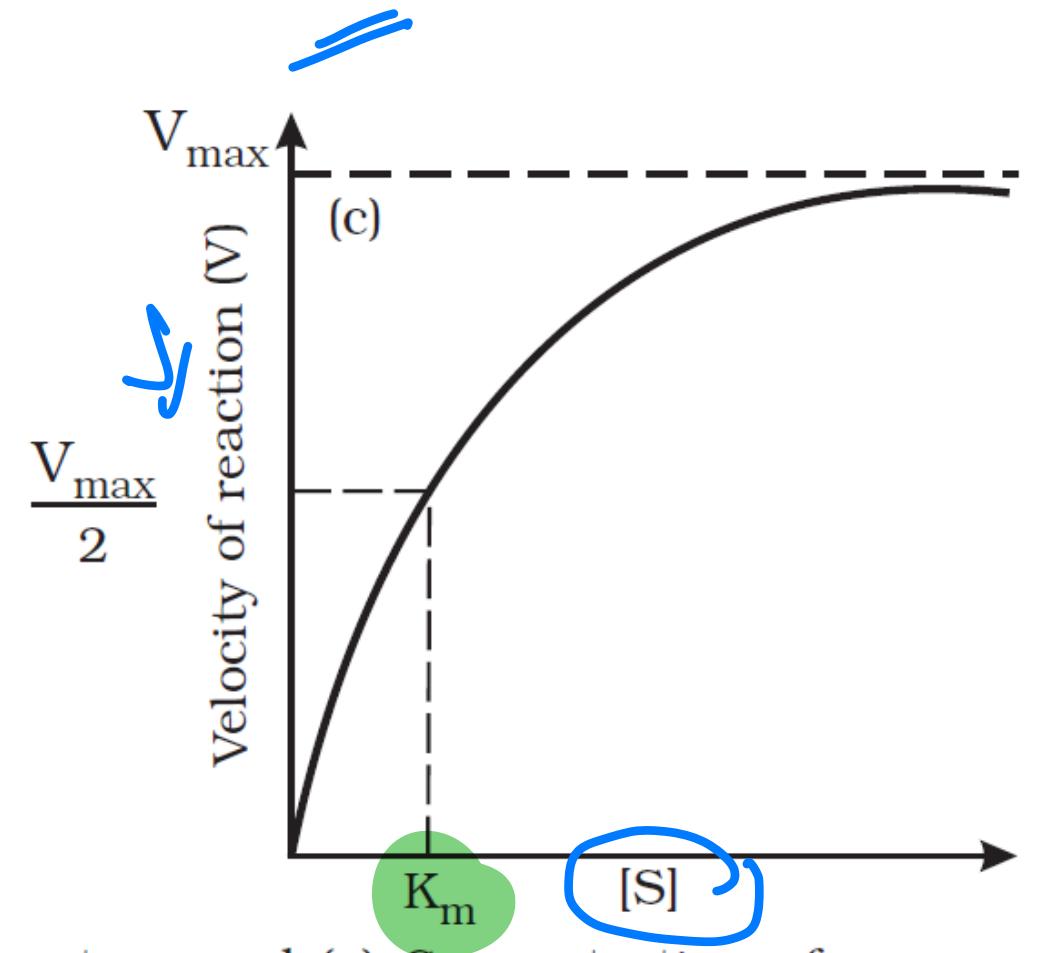


Figure 9.7 Effect of change in : (a) pH (b) Temperature and (c) Concentration of substrate on enzyme activity

Optimum



CHAPTER-10

CELL CYCLE AND

CELL DIVISION



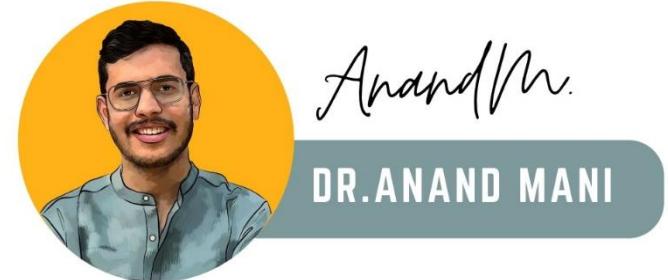
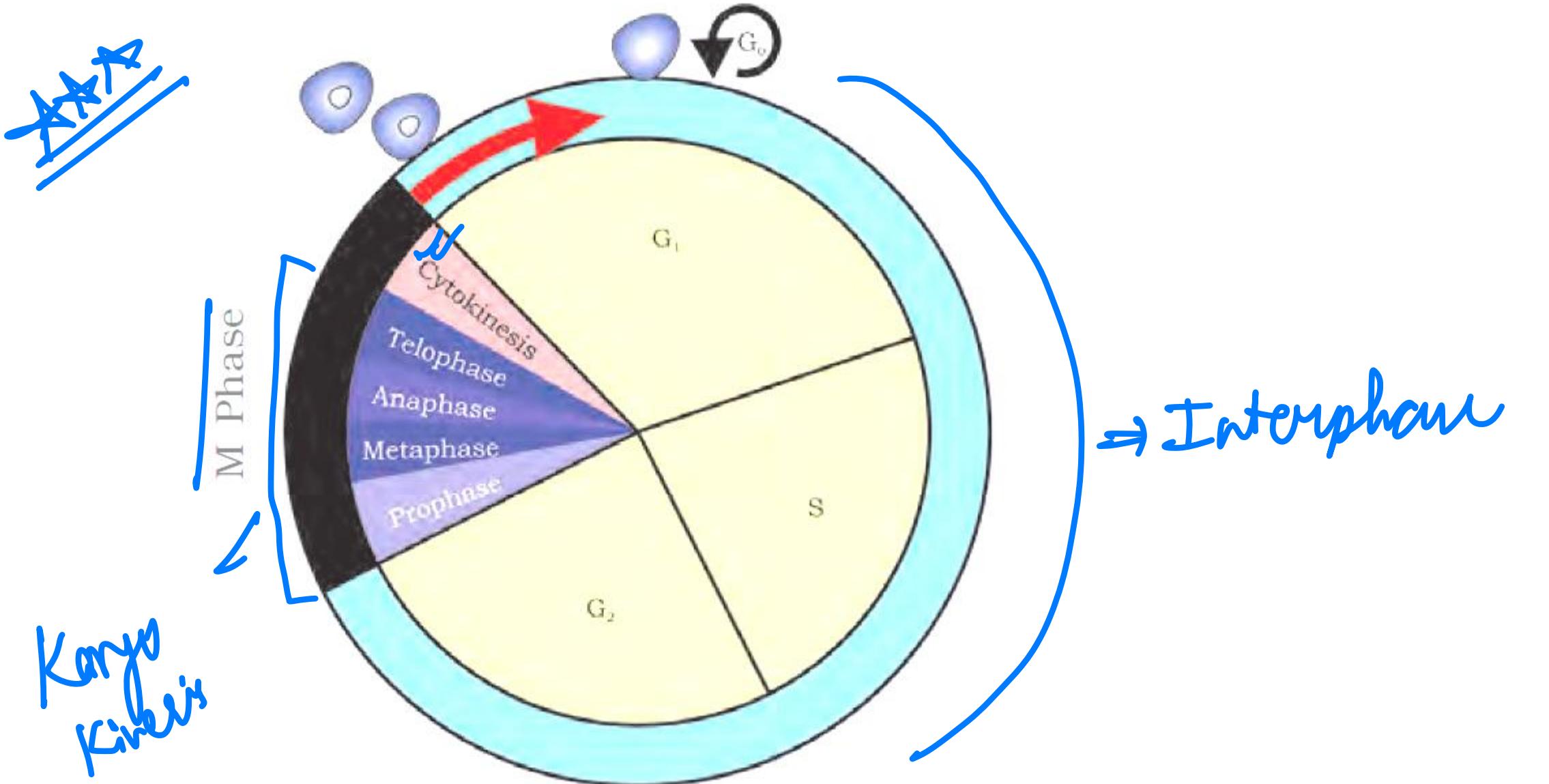
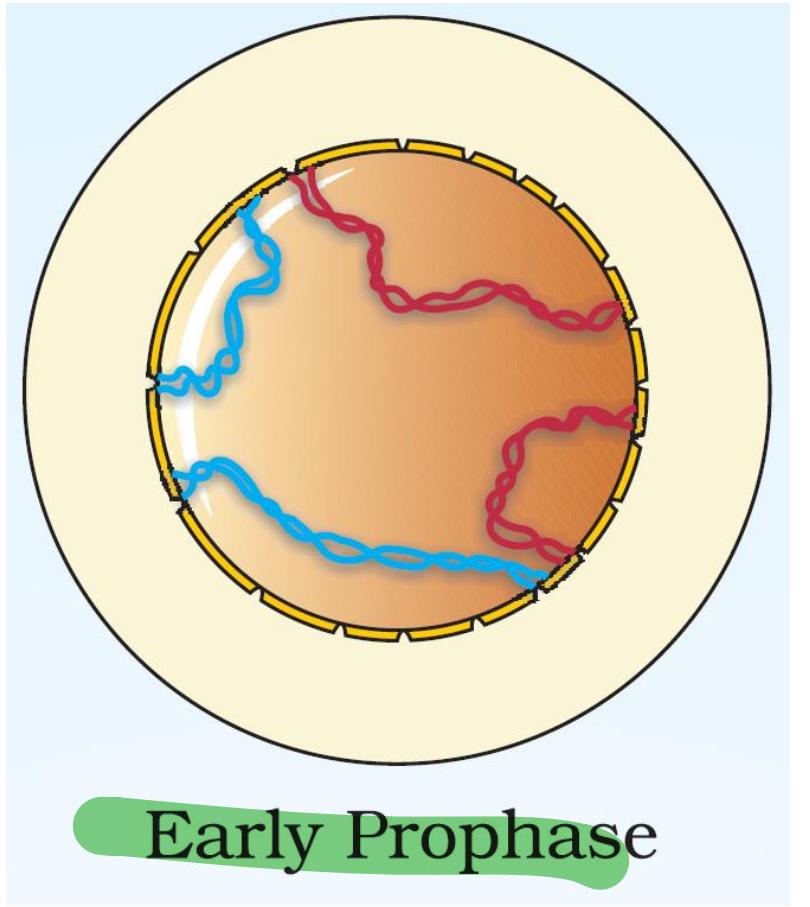
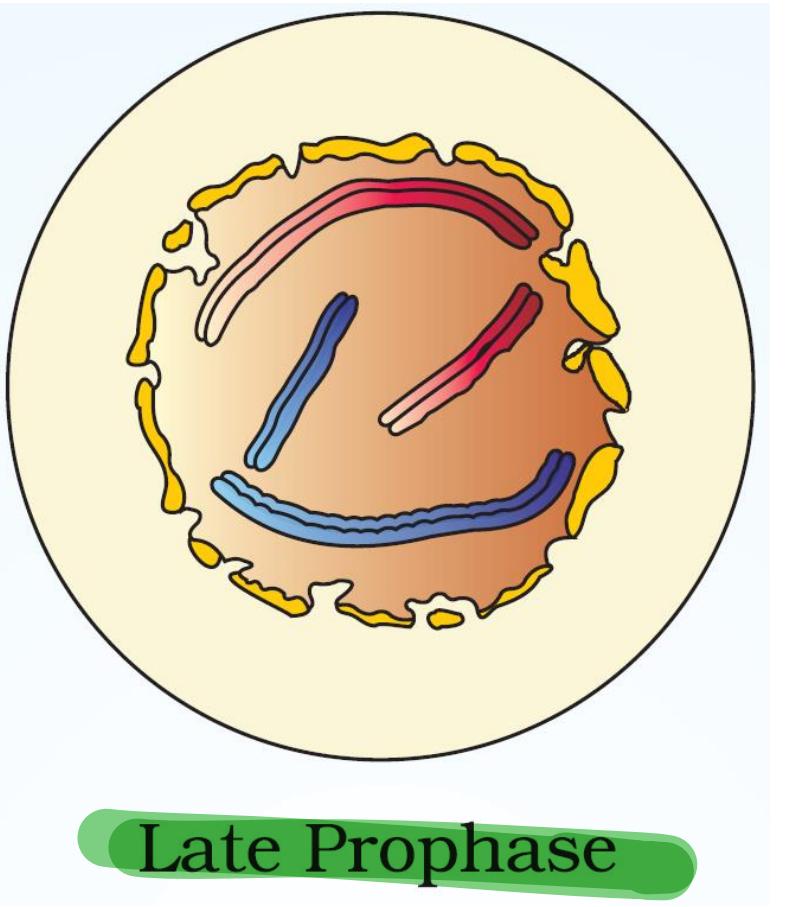


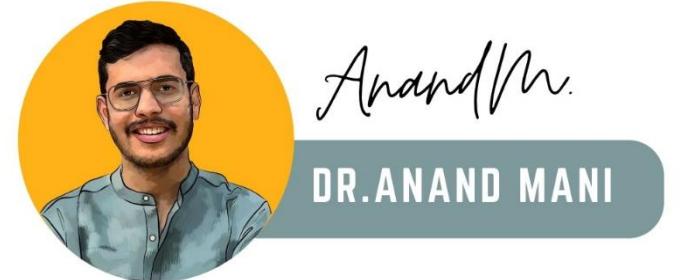
Figure 10.1 A diagrammatic view of cell cycle indicating formation of two cells from one cell



Early Prophase

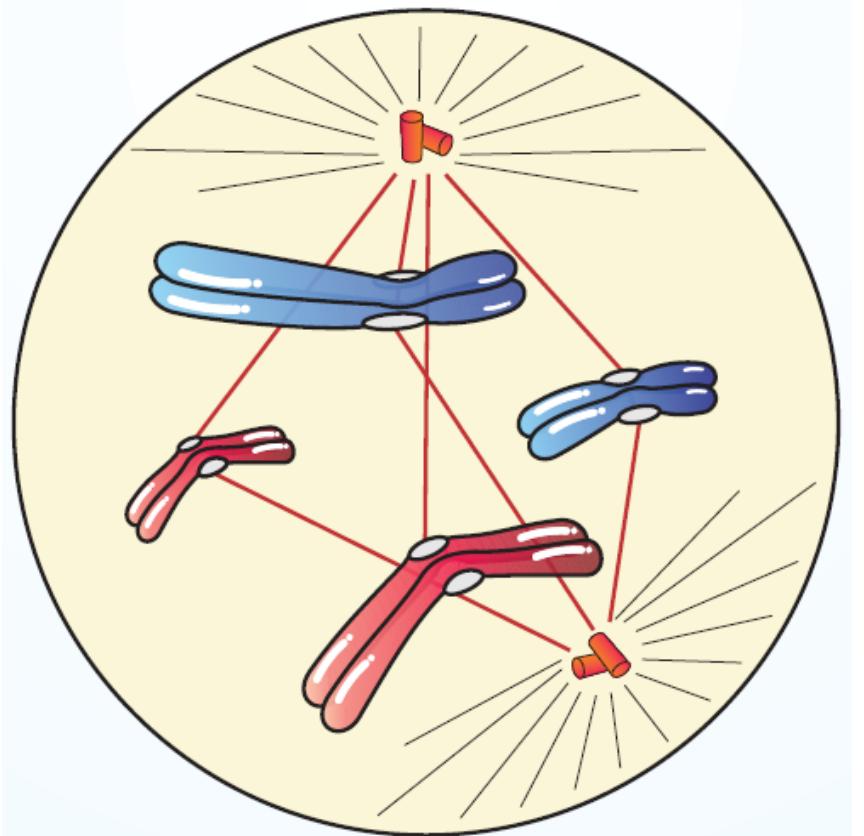


Late Prophase

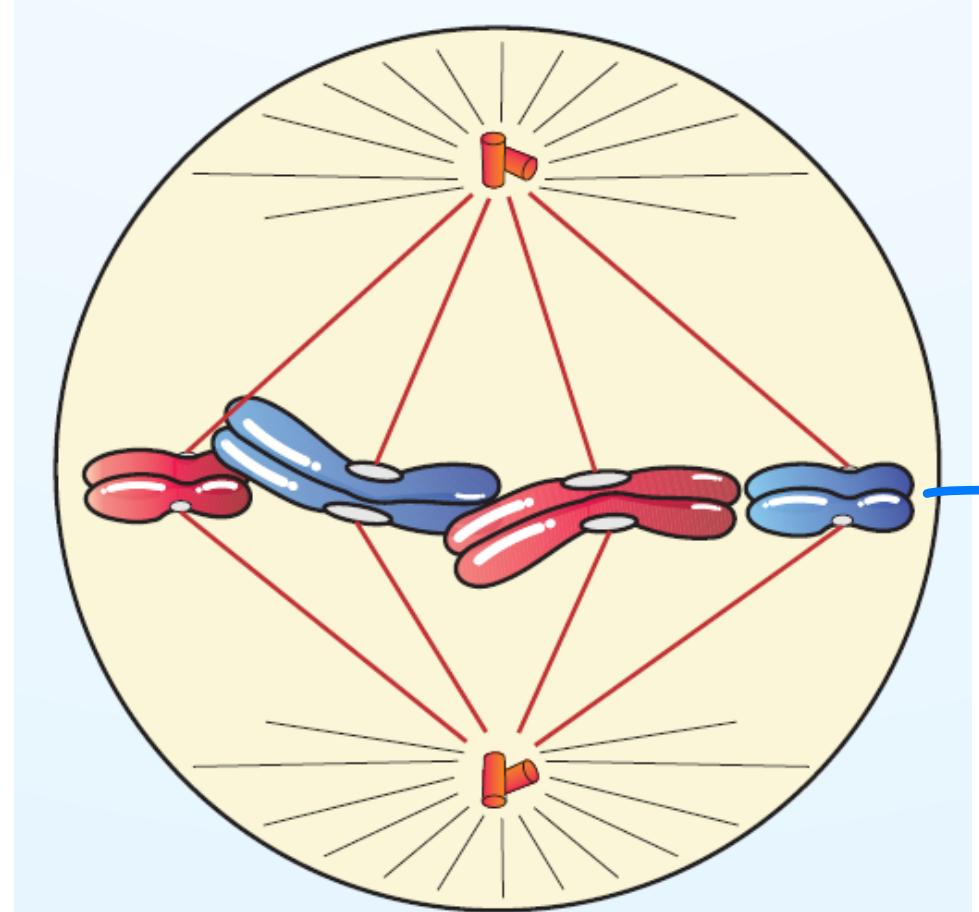


(a)

Figure 10.2 a and b : A diagrammatic view of stages in mitosis



Transition to
Metaphase



Metaphase

equatorial
plate

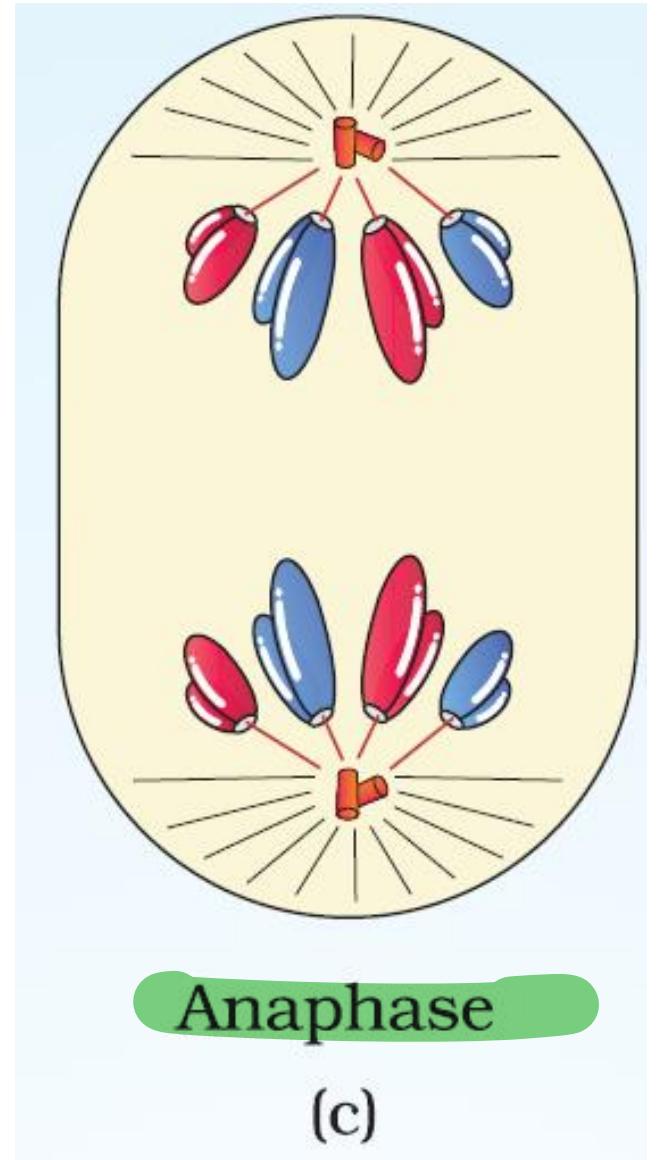
(b)

Figure 10.2 a and b : A diagrammatic view of stages in mitosis



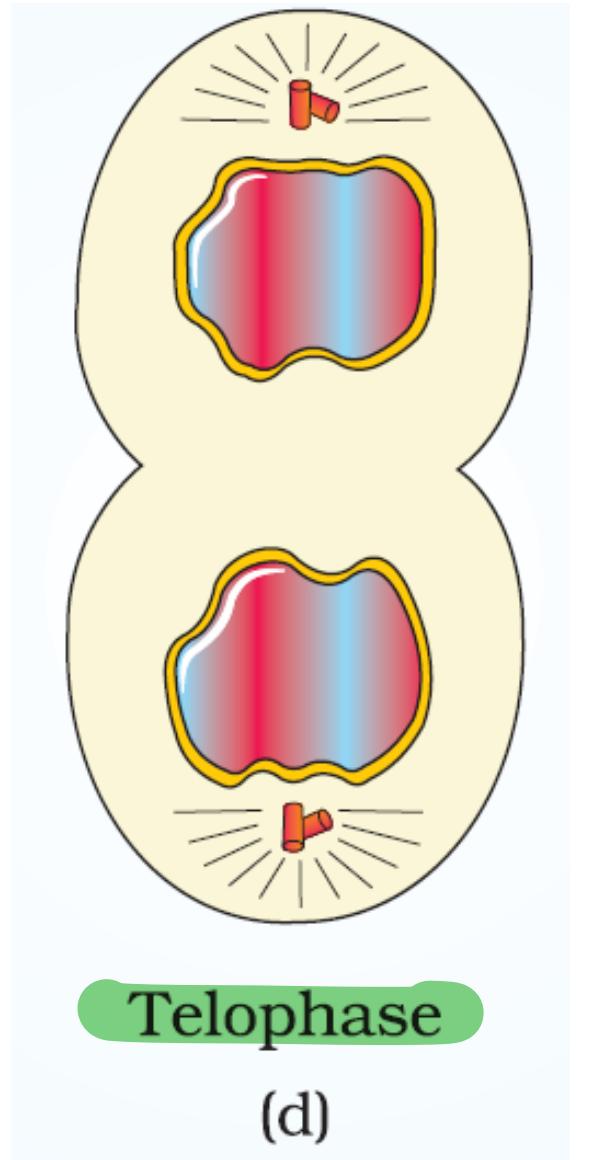
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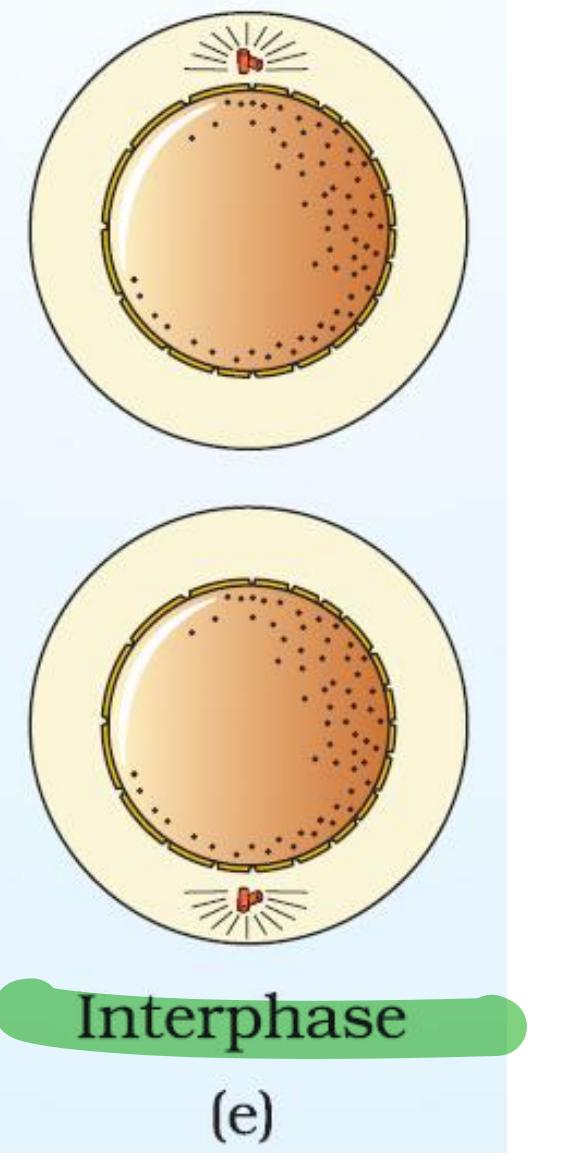
Anaphase

(c)



Telophase

(d)



Interphase

(e)



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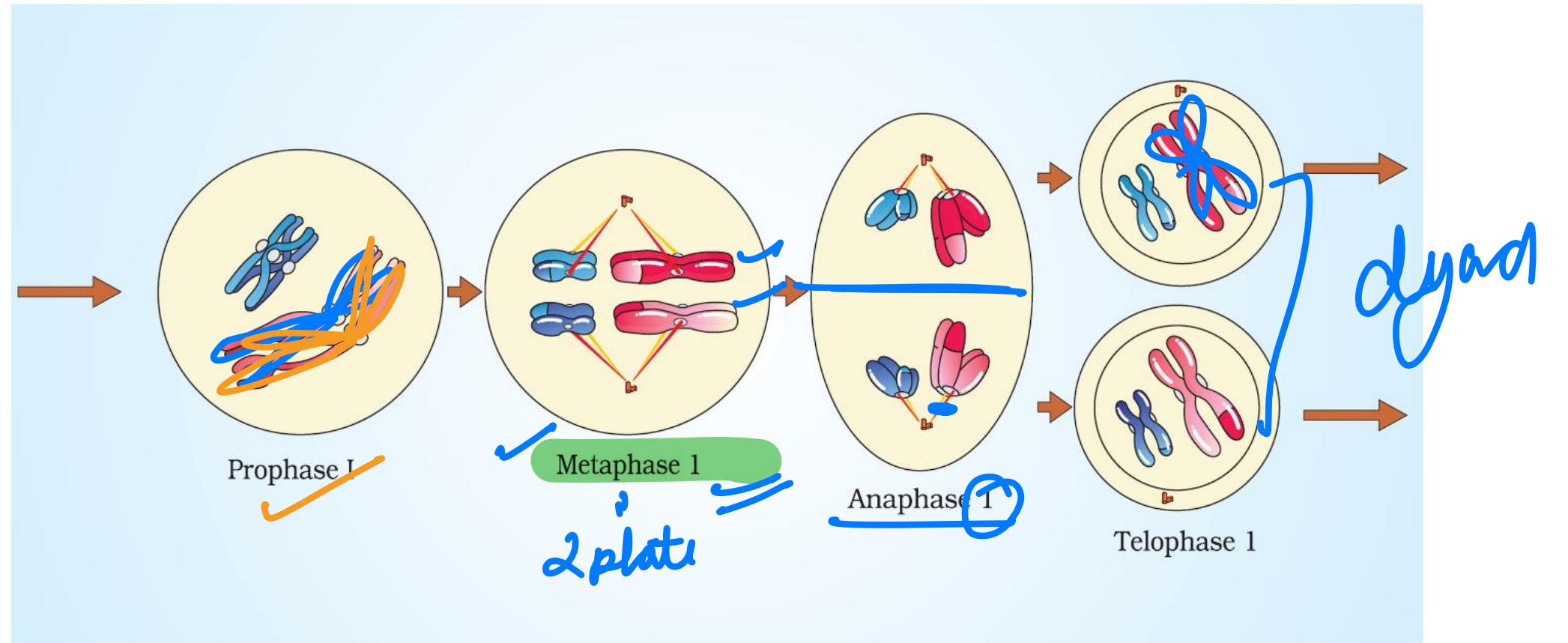
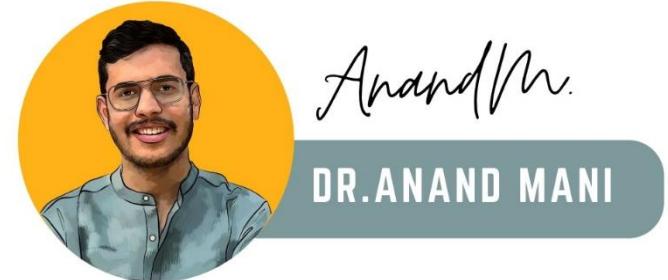


Figure 10.3 Stages of Meiosis I



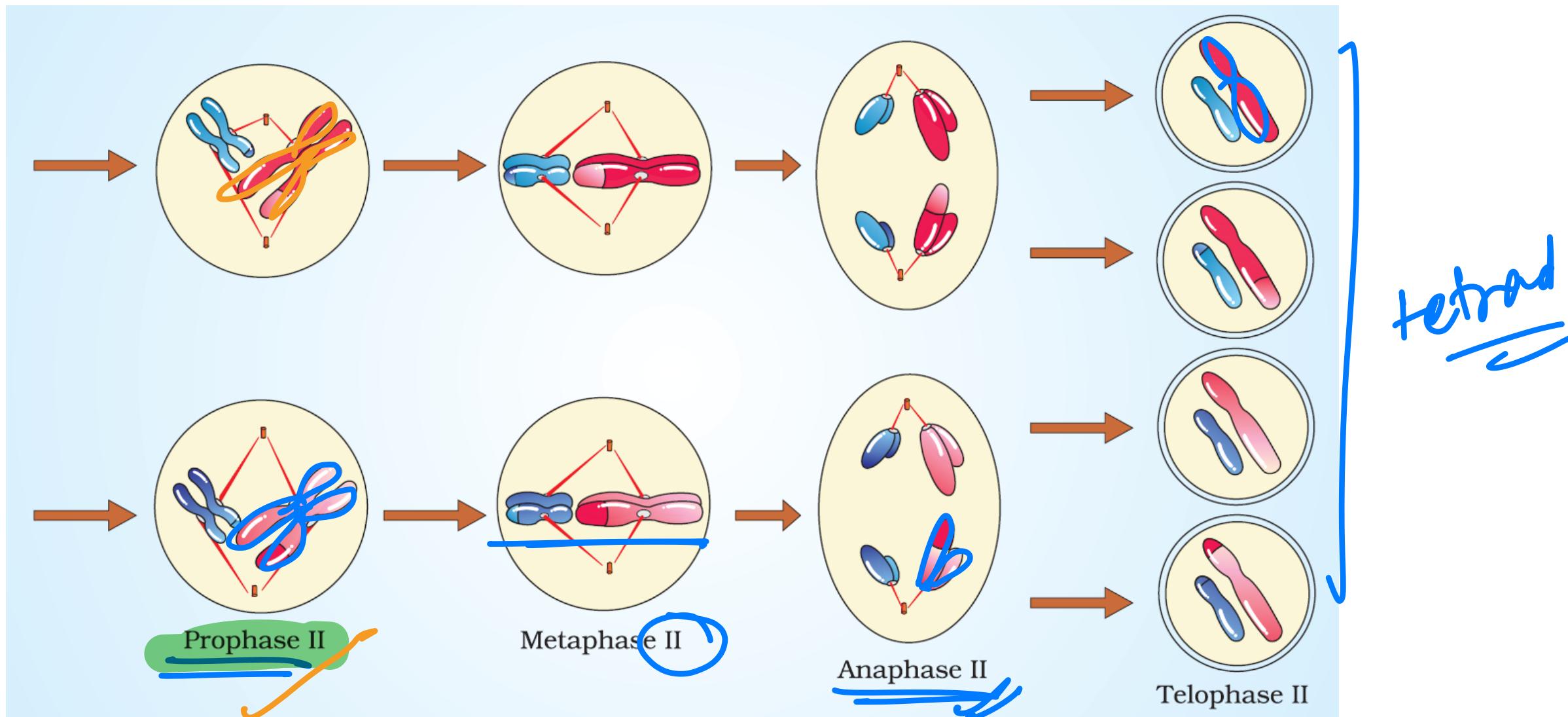


Figure 10.4 Stages of Meiosis II



CHAPTER-11

TRANSPORT IN PLANTS

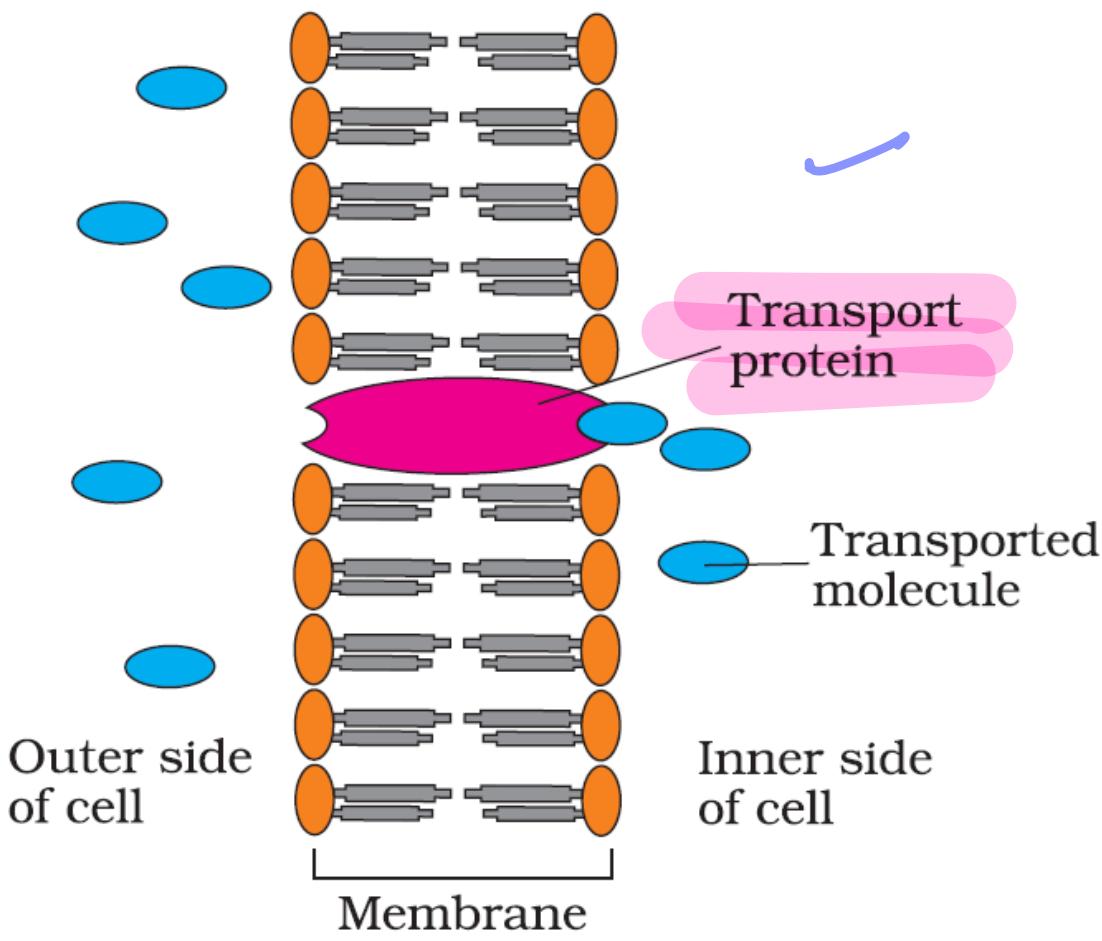
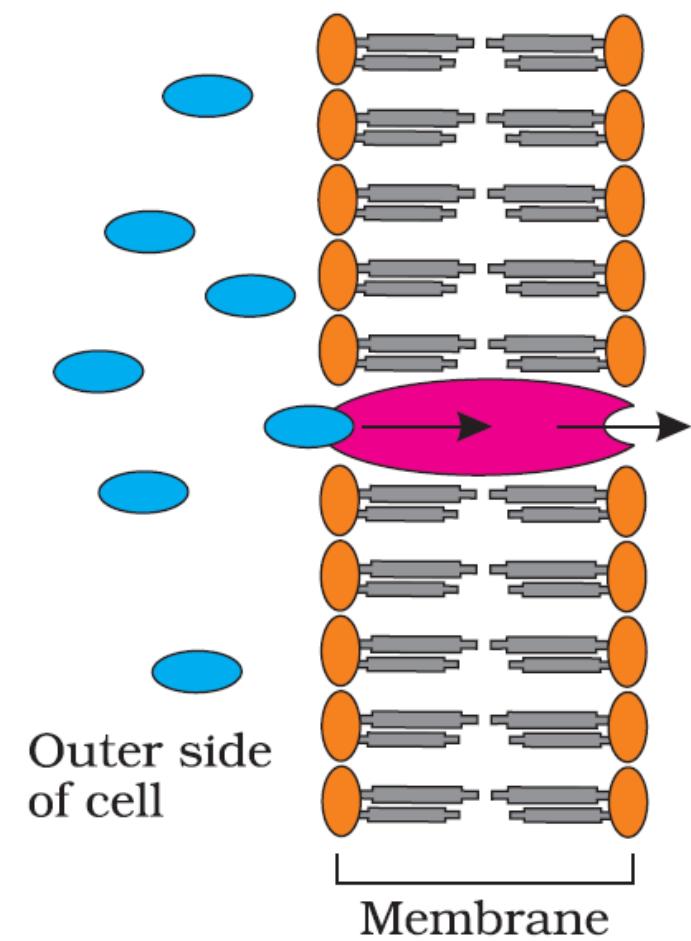


Figure 11.1 Facilitated diffusion

channel /
carrier

~~Passively~~



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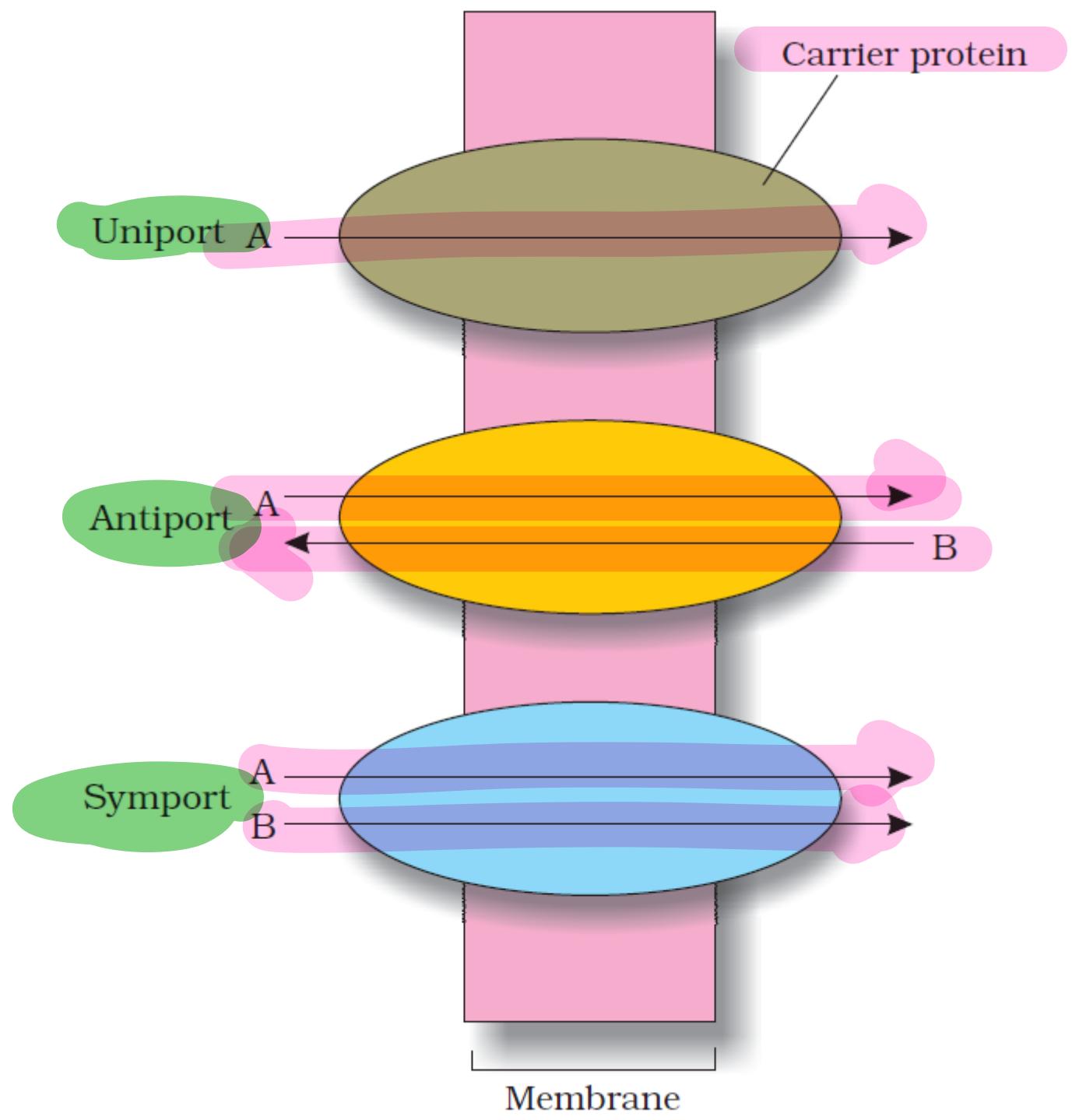
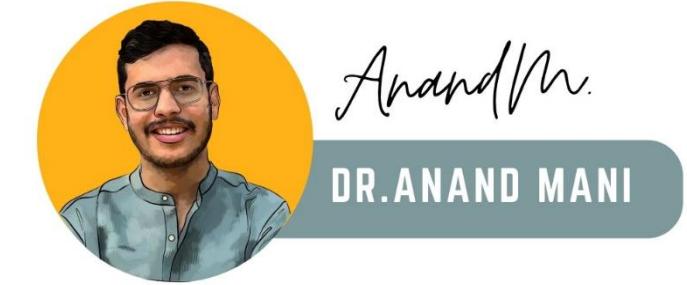


Figure 11.2 Facilitated diffusion



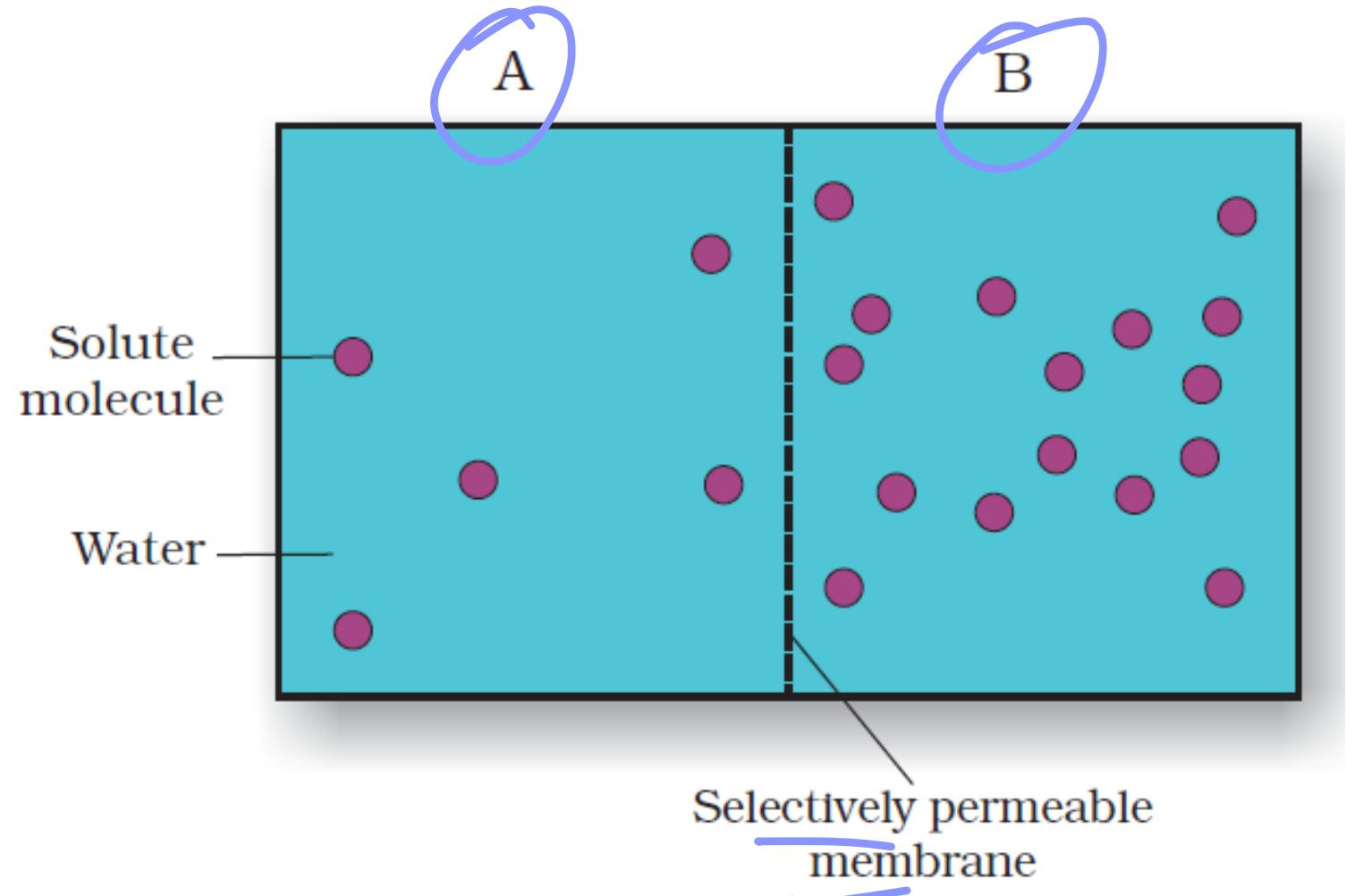


Figure 11.3

$$\psi_w A > \psi_w B$$

$$\psi_s A > \psi_s B$$



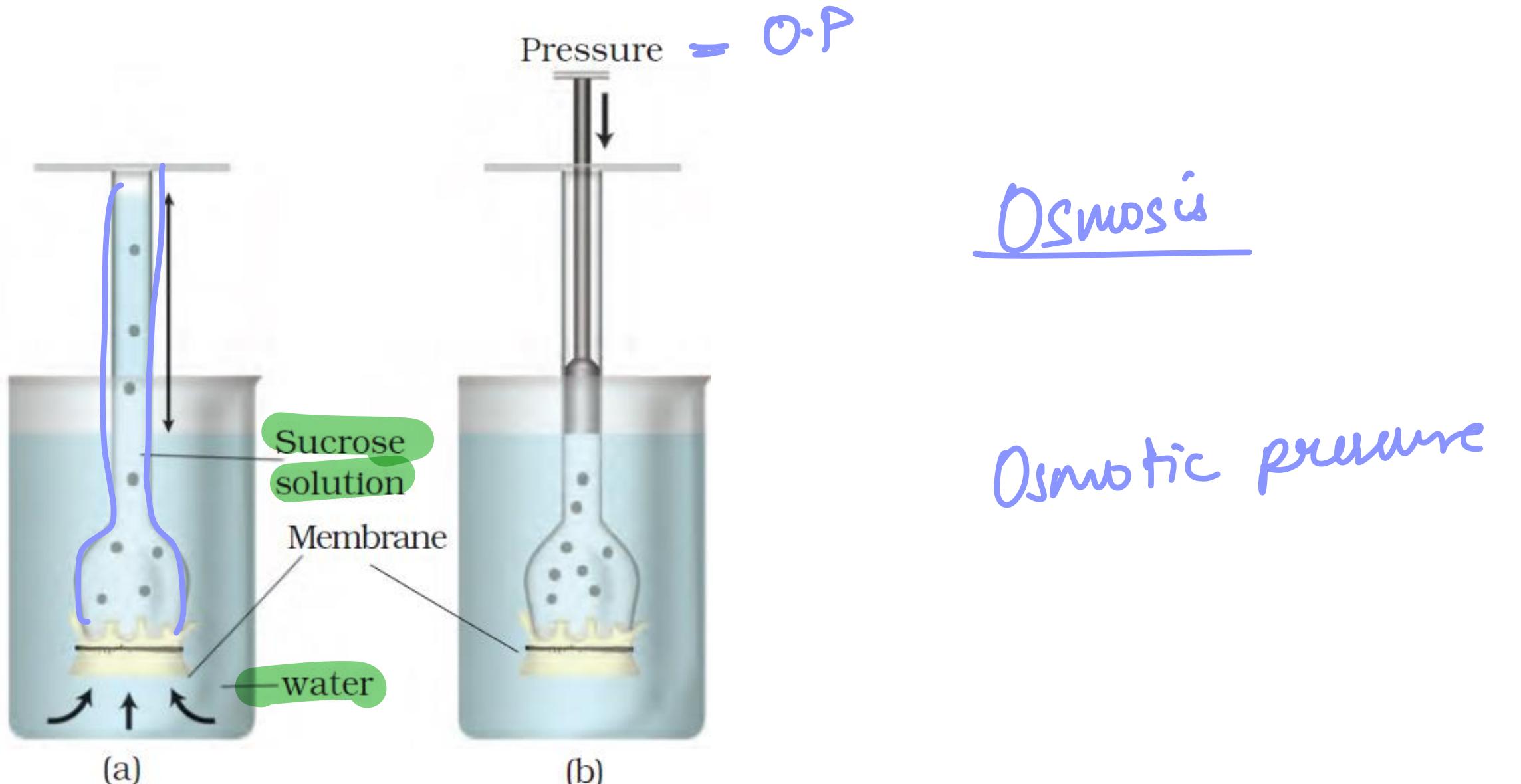
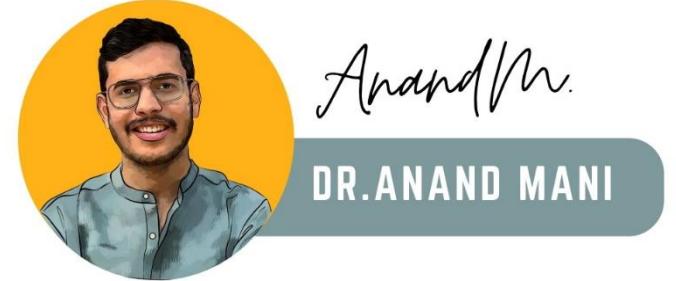


Figure 11.4 A demonstration of osmosis. A thistle funnel is filled with sucrose solution and kept inverted in a beaker containing water.
 (a) Water will diffuse across the membrane (as shown by arrows) to raise the level of the solution in the funnel (b) Pressure can be applied as shown to stop the water movement into the funnel

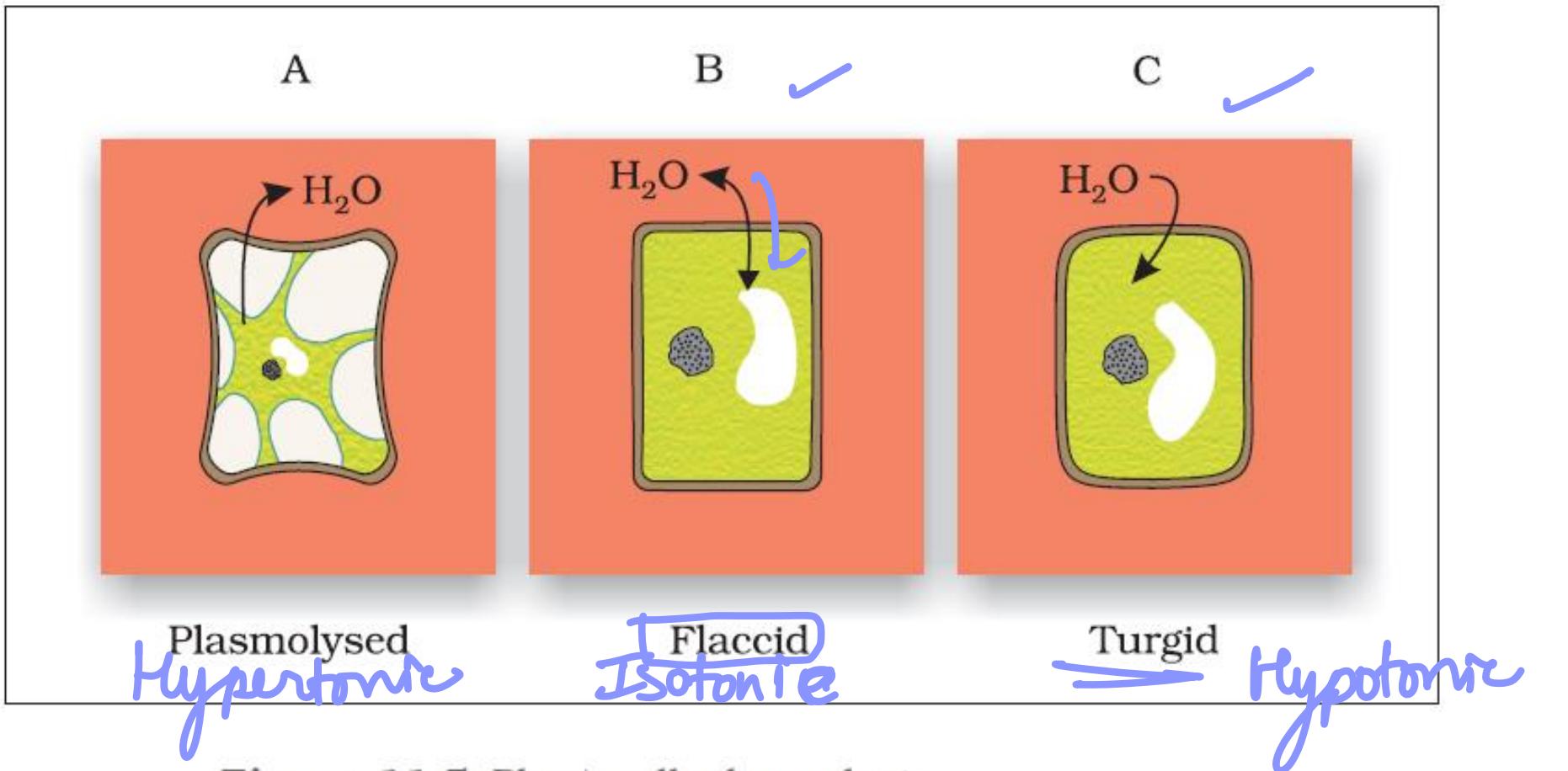
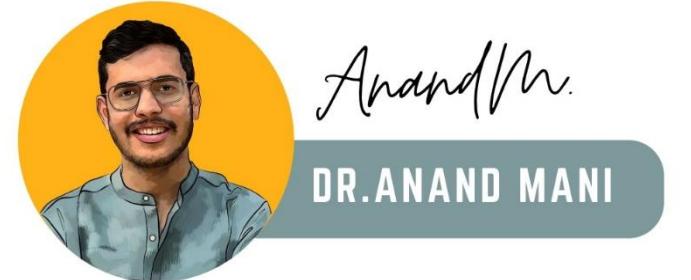


Figure 11.5 Plant cell plasmolysis

$$\Psi_P = -ve$$

$$\Psi_P = 0$$

$$\Psi_P = +ve$$

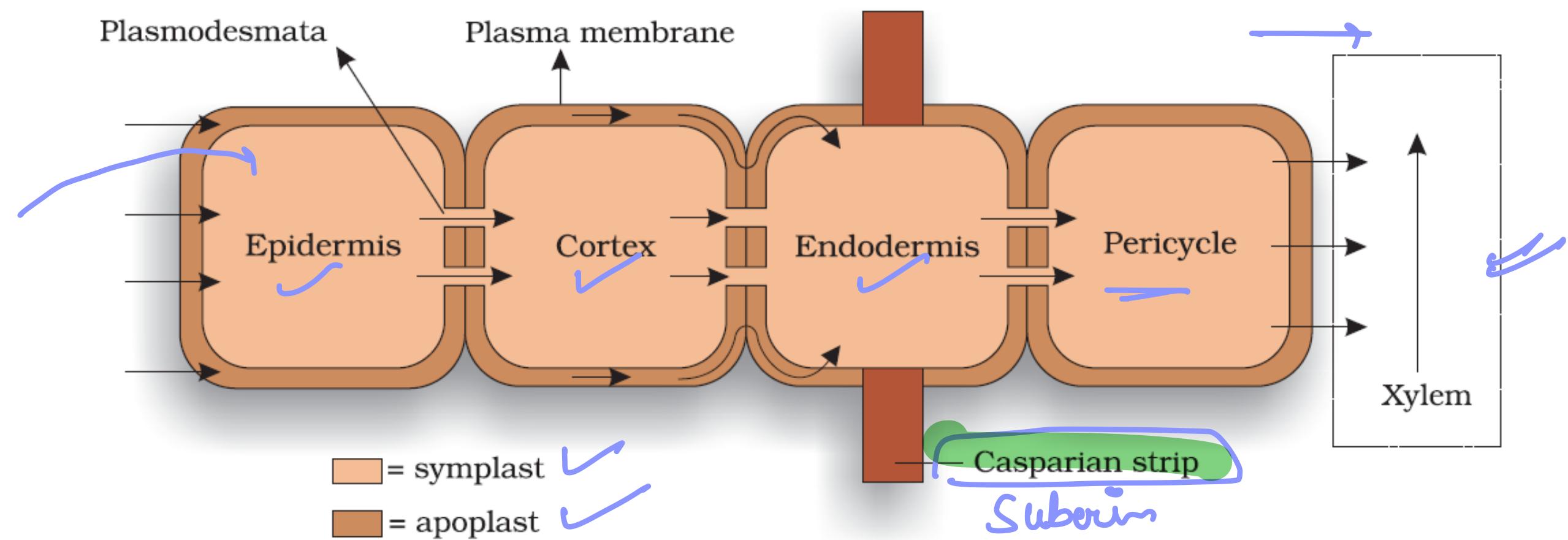
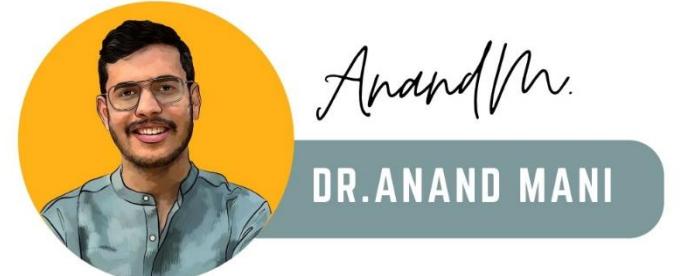


Figure 11.6 Pathway of water movement in the root

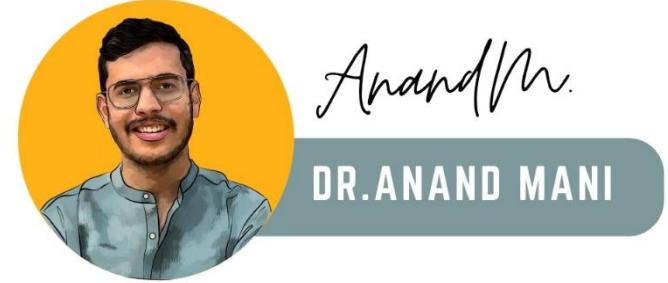
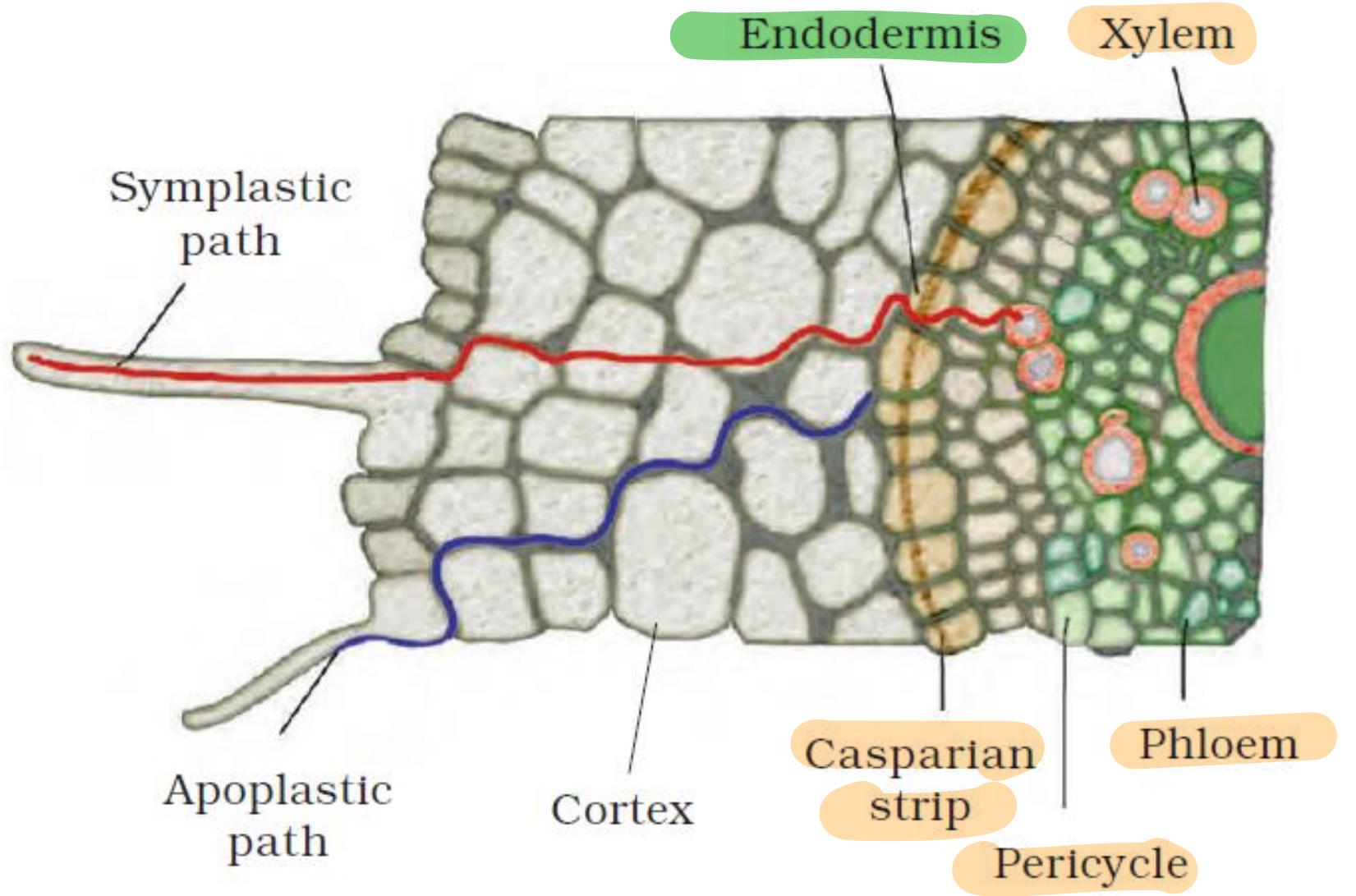


Figure 11.7 Symplastic and apoplastic pathways of water and ion absorption and movement in roots

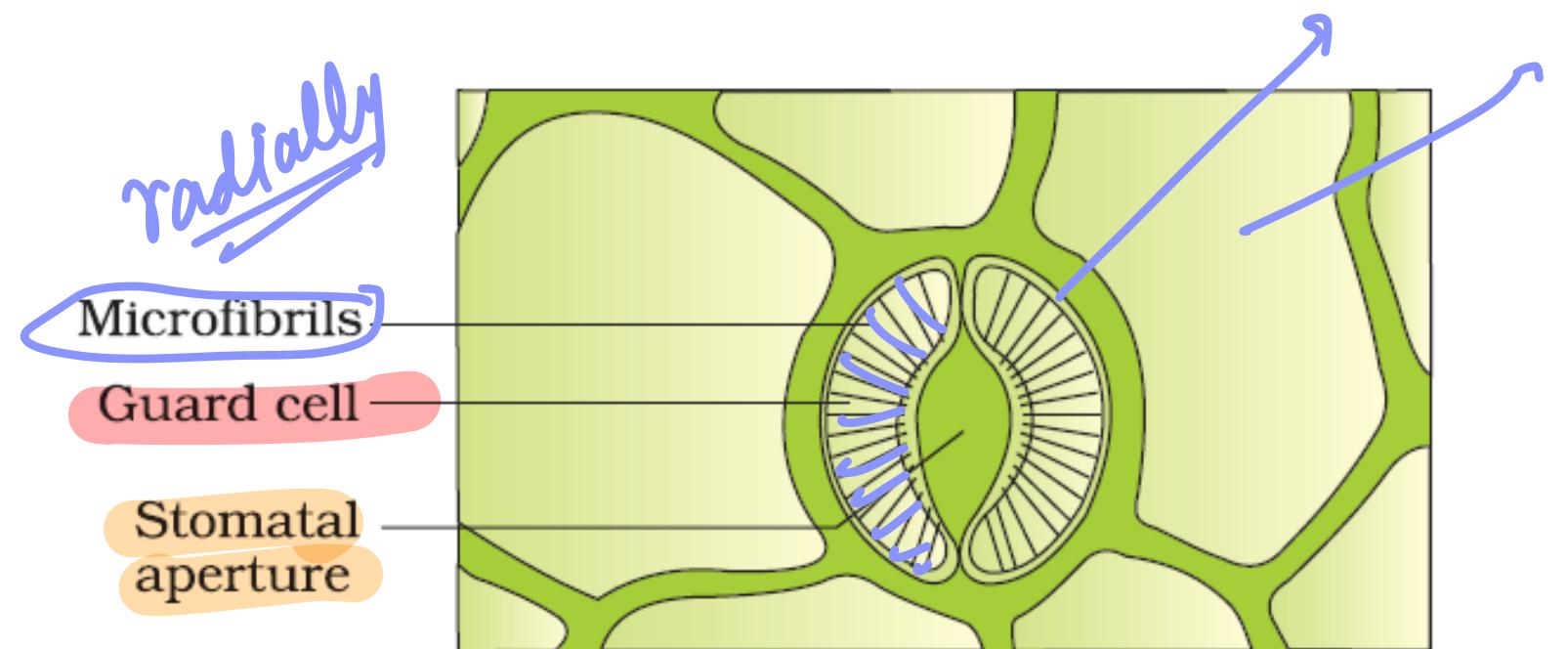


Figure 11.8 A stomatal aperture with guard cells

dicot = bean shaped
monocot = dumbbell shaped



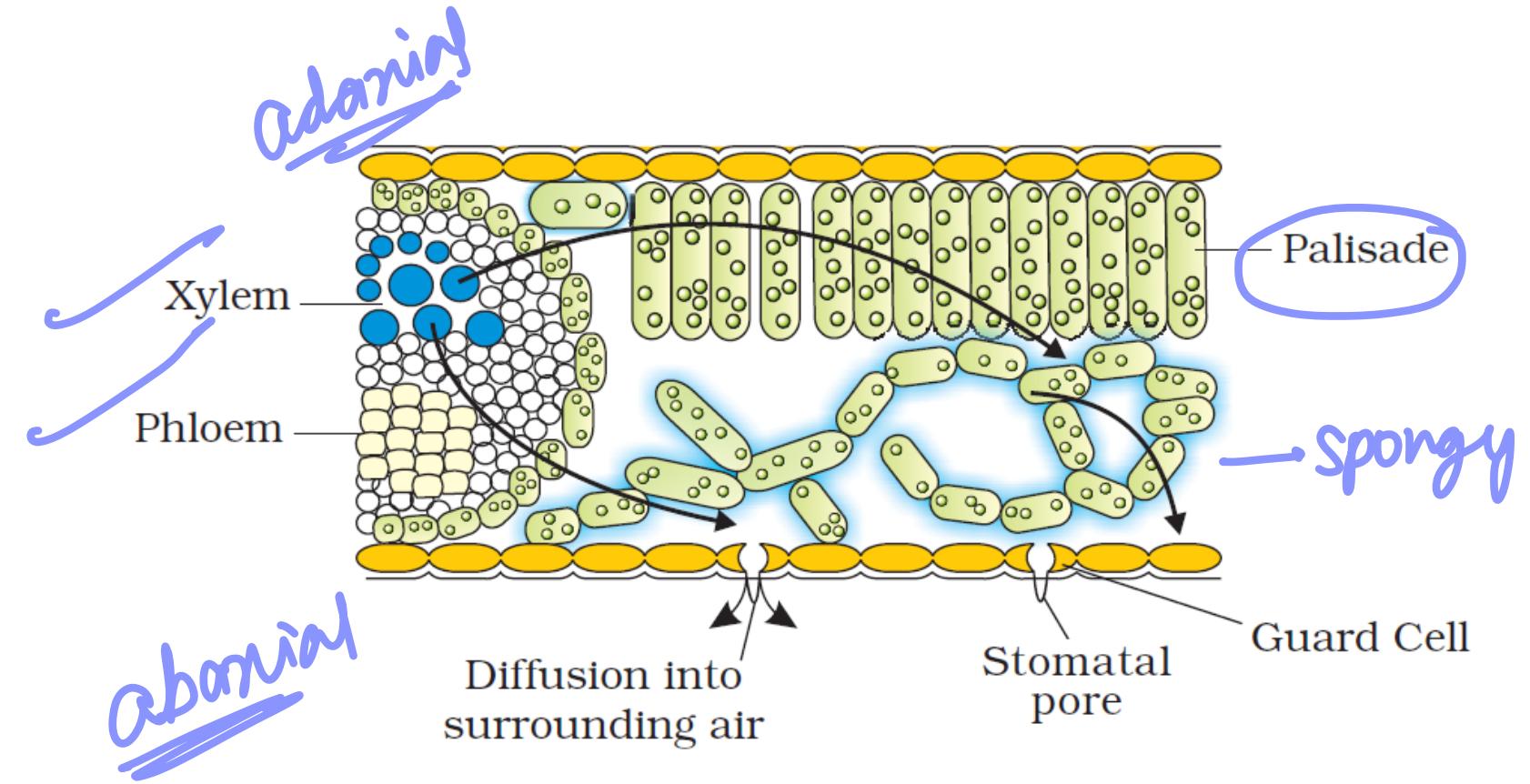
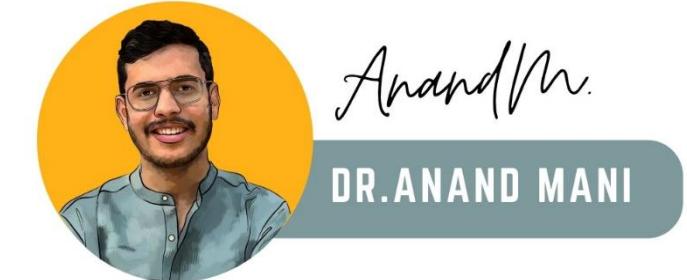


Figure 11.9 Water movement in the leaf. Evaporation from the leaf sets up a pressure gradient between the outside air and the air spaces of the leaf. The gradient is transmitted into the photosynthetic cells and on the water-filled xylem in the leaf vein.



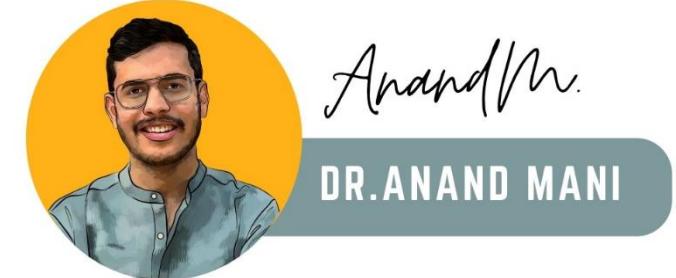
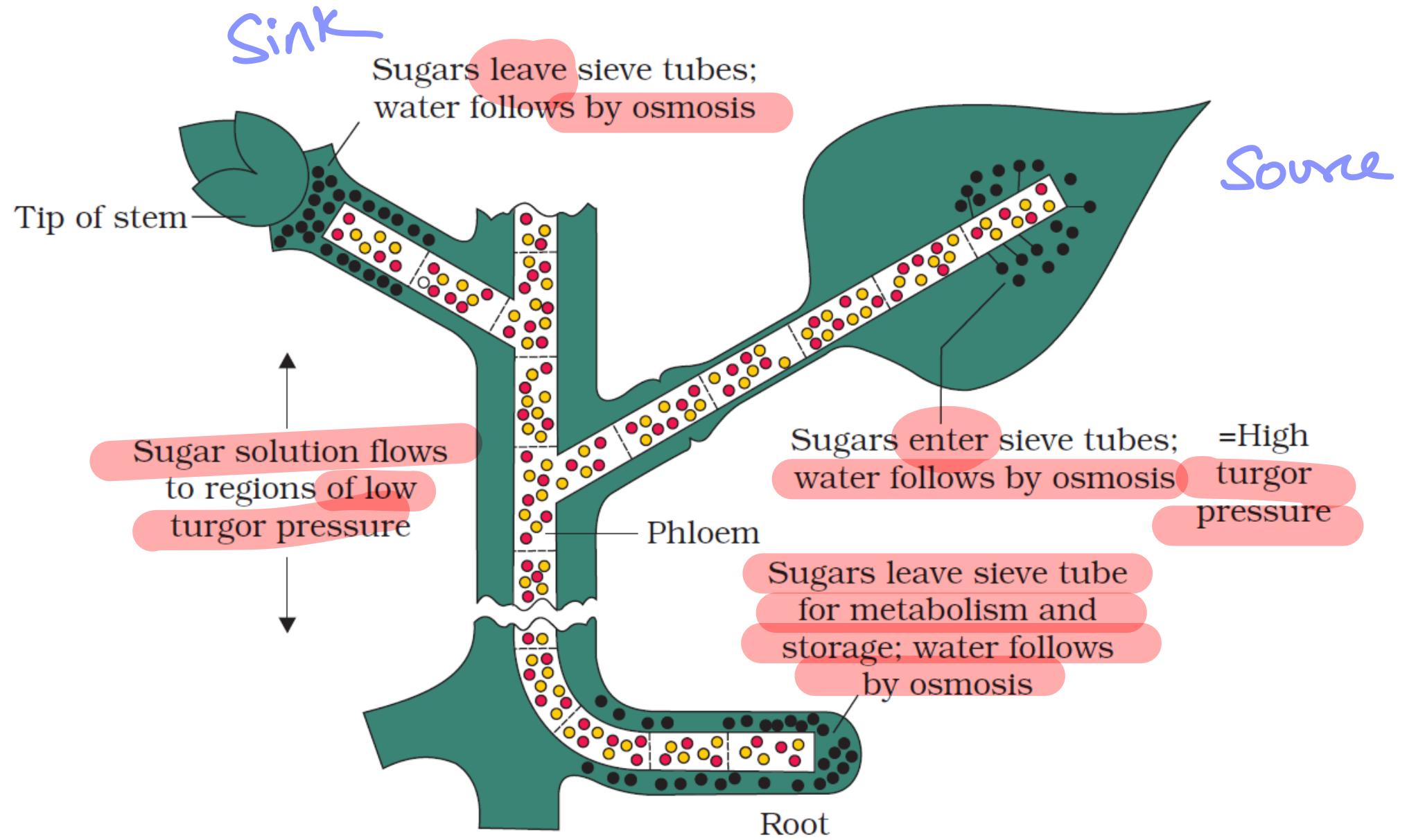
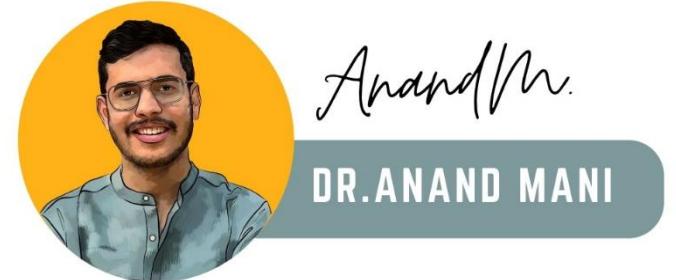


Figure 11.10 Diagrammatic presentation of mechanism of translocation

CHAPTER-12

MINERAL NUTRITION



J. V. Sachs

Hydroponics

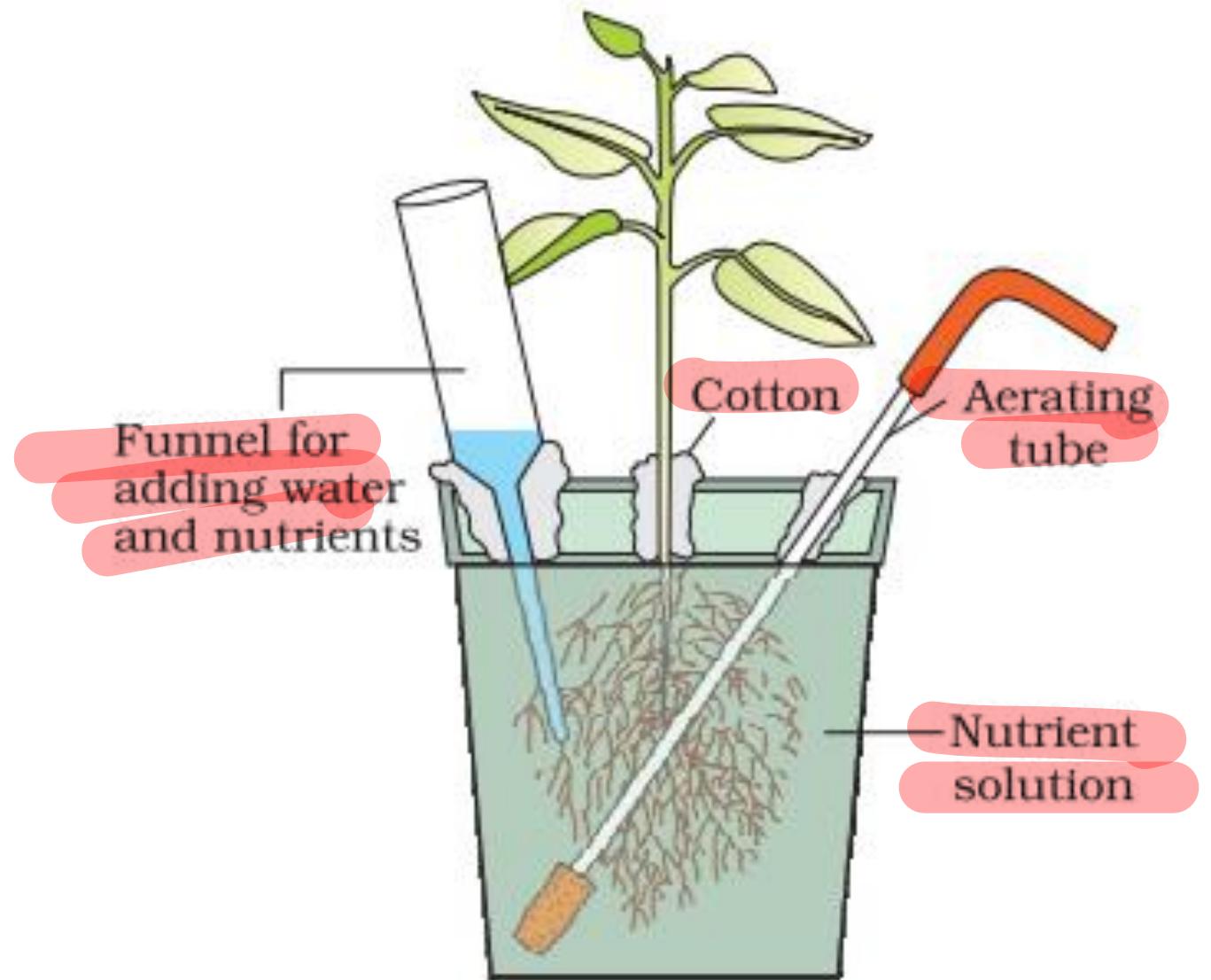


Figure 12.1 Diagram of a typical set-up for nutrient solution culture

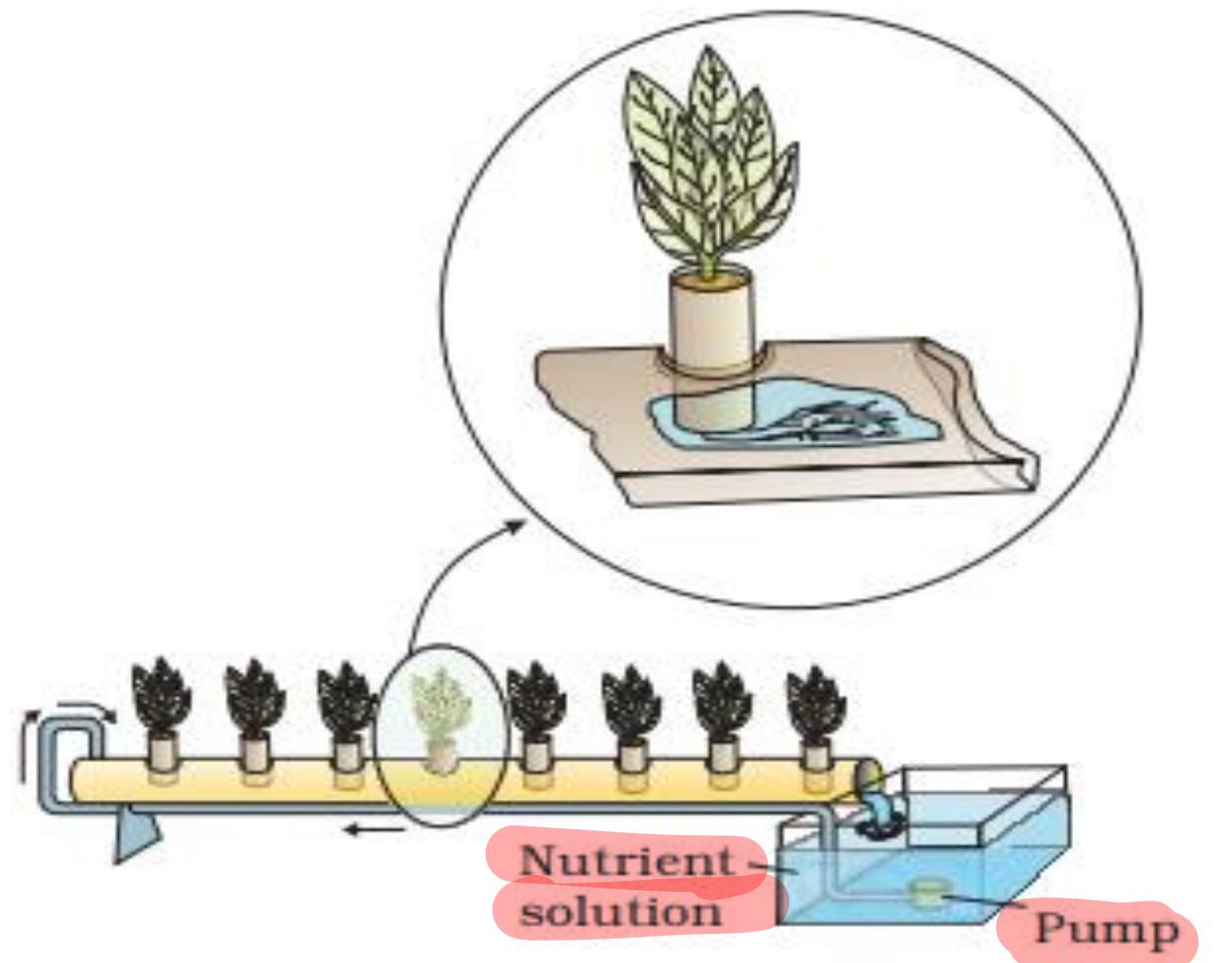
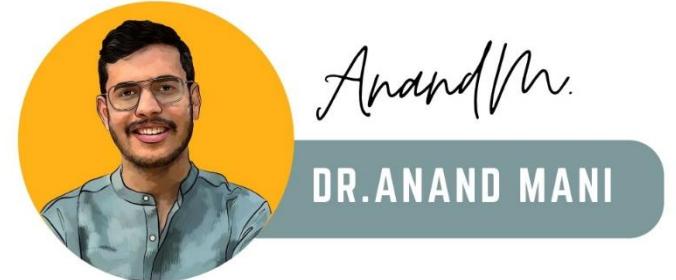


Figure 12.2 Hydroponic plant production. Plants are grown in a tube or trough placed on a slight incline. A pump circulates a nutrient solution from a reservoir to the elevated end of the tube. The solution flows down the tube and returns to the reservoir due to gravity. Inset shows a plant whose roots are continuously bathed in aerated nutrient solution. The arrows indicates the direction of the flow.

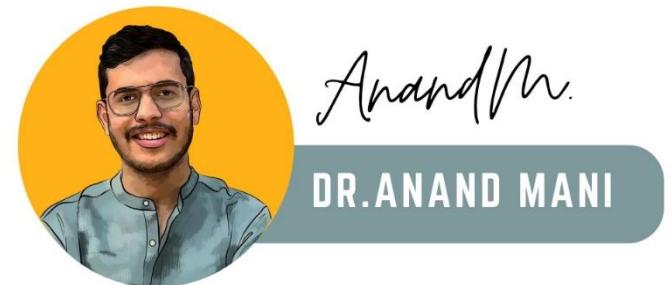
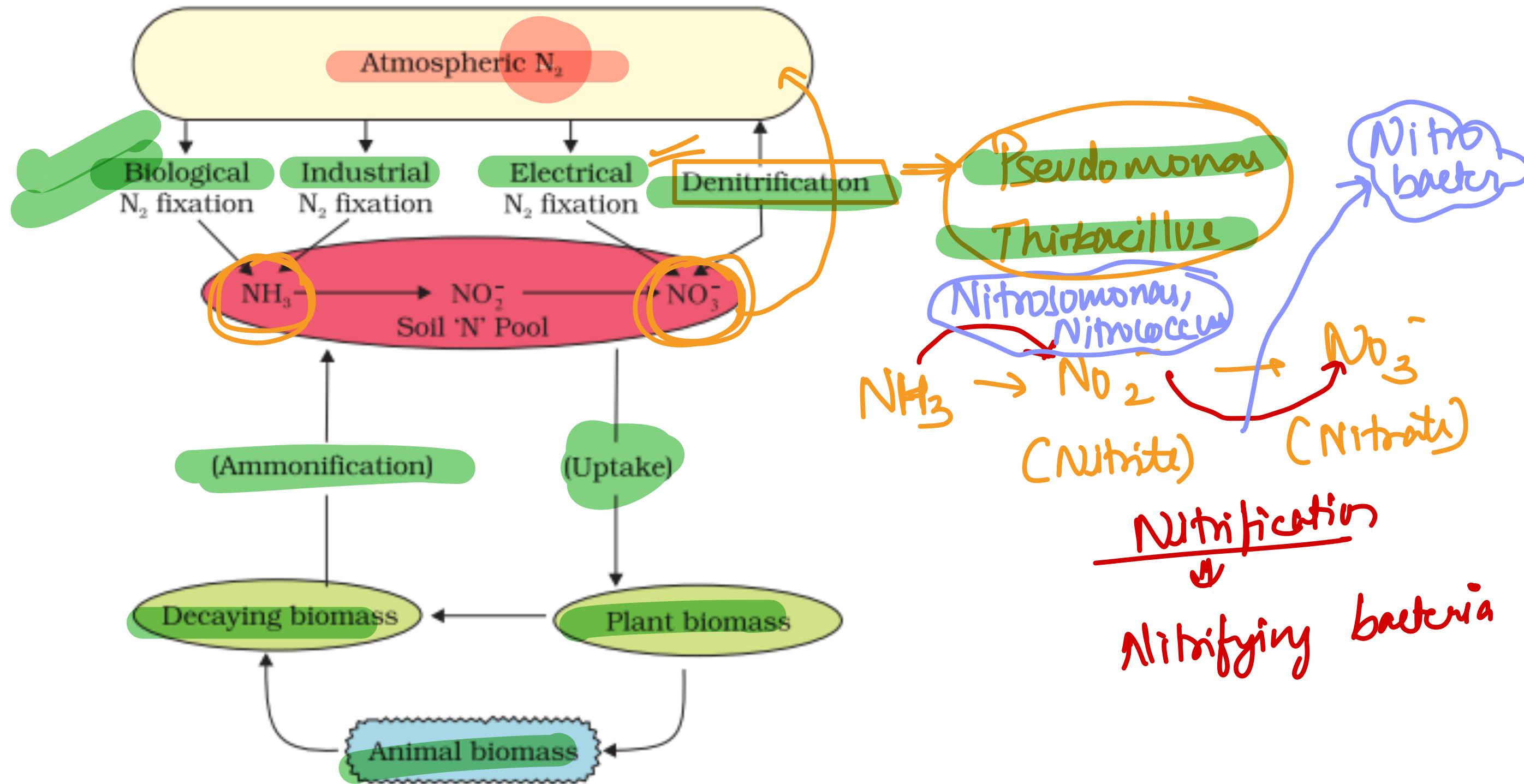
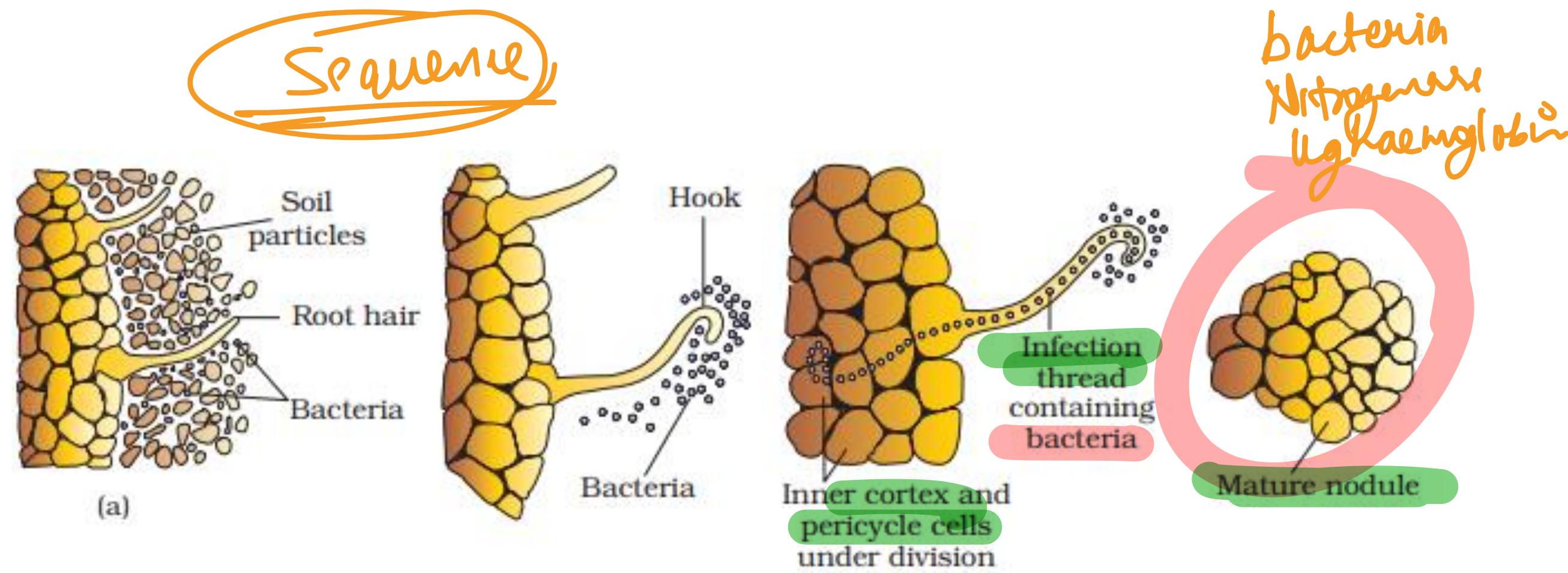


Figure 12.3 The nitrogen cycle showing relationship between the three main nitrogen pools – atmospheric soil, and biomass



Sequence

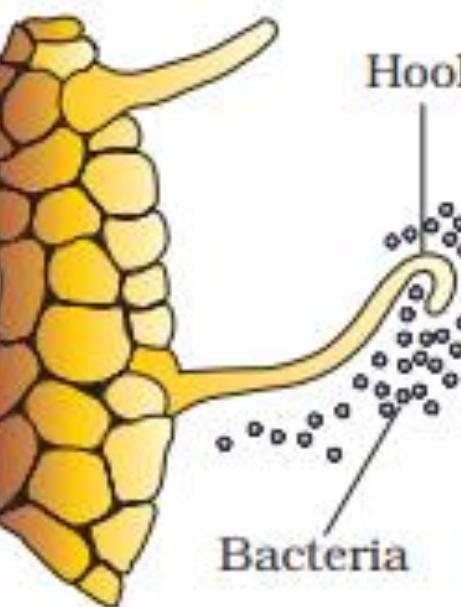
bacteria
Nitrogen
UG haemoglobin



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(a)



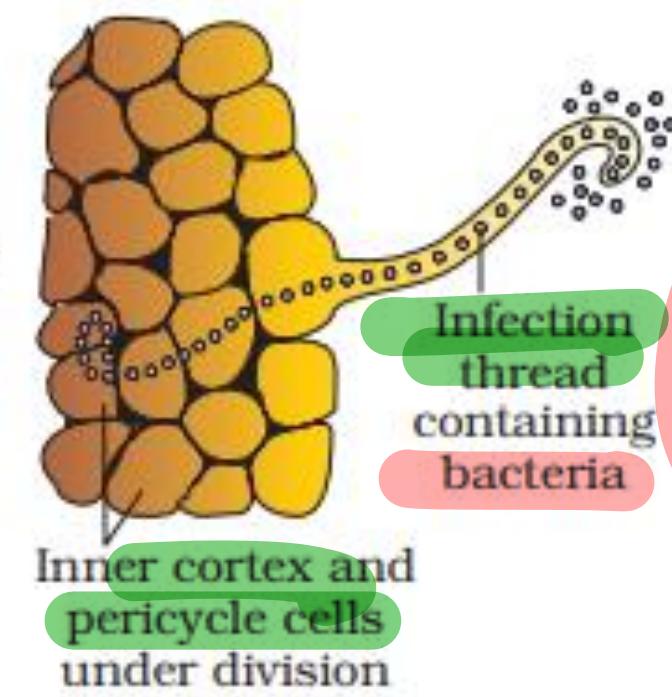
Soil particles

Root hair

Bacteria

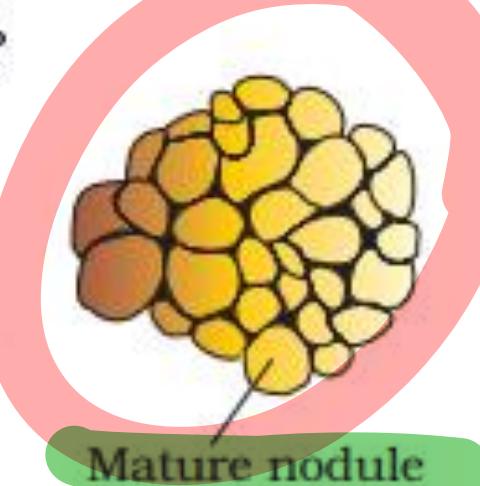
Hook

Bacteria



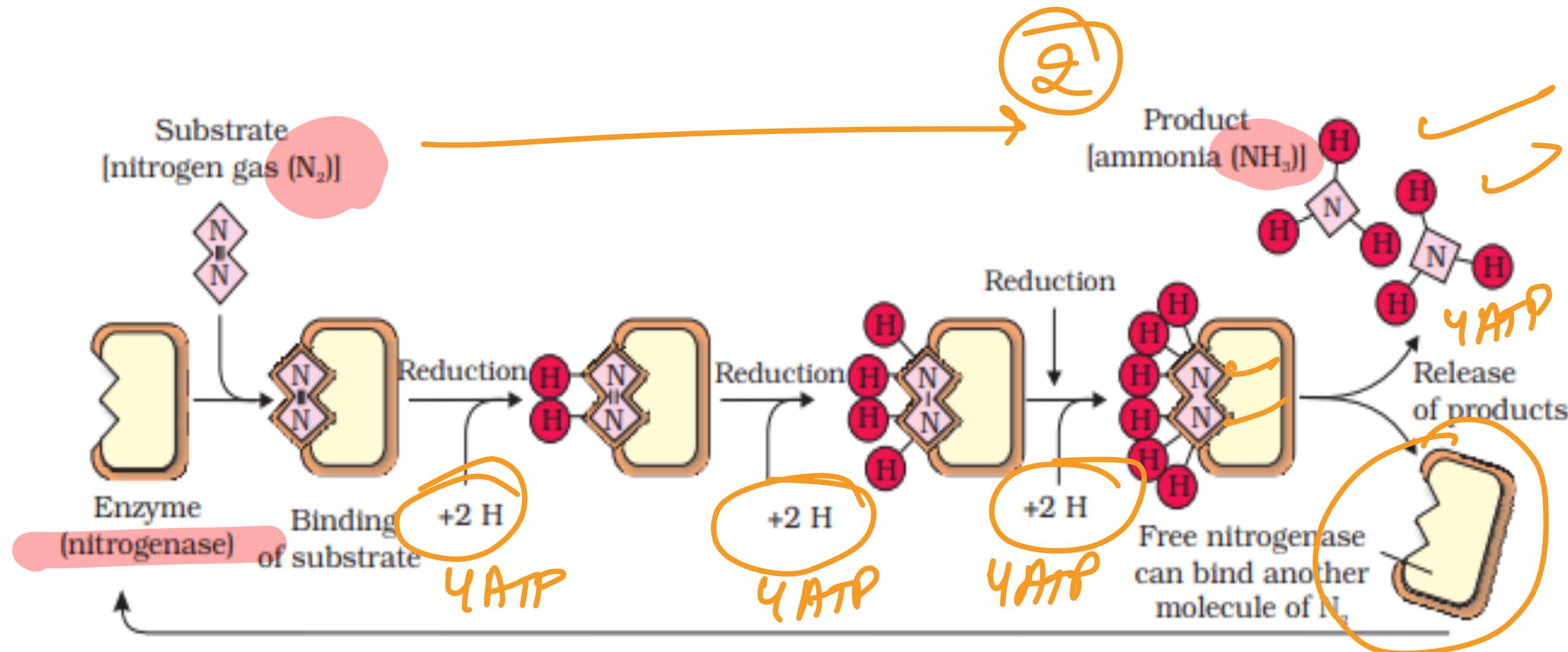
Inner cortex and pericycle cells under division

Infection thread containing bacteria



Mature nodule

Figure 12.4 Development of root nodules in soyabean : (a) *Rhizobium* bacteria contact a susceptible root hair, divide near it, (b) Successful infection of the root hair causes it to curl, (c) Infected thread carries the bacteria to the inner cortex. The bacteria get modified into rod-shaped bacteroids and cause inner cortical and pericycle cells to divide. Division and growth of cortical and pericycle cells lead to nodule formation, (d) A mature nodule is complete with vascular tissues continuous with those of the root



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Figure 12.5 Steps of conversion of atmospheric nitrogen to ammonia by nitrogenase enzyme complex found in nitrogen-fixing bacteria

CHAPTER-13

PHOTOSYNTHESIS IN

HIGHER PLANTS

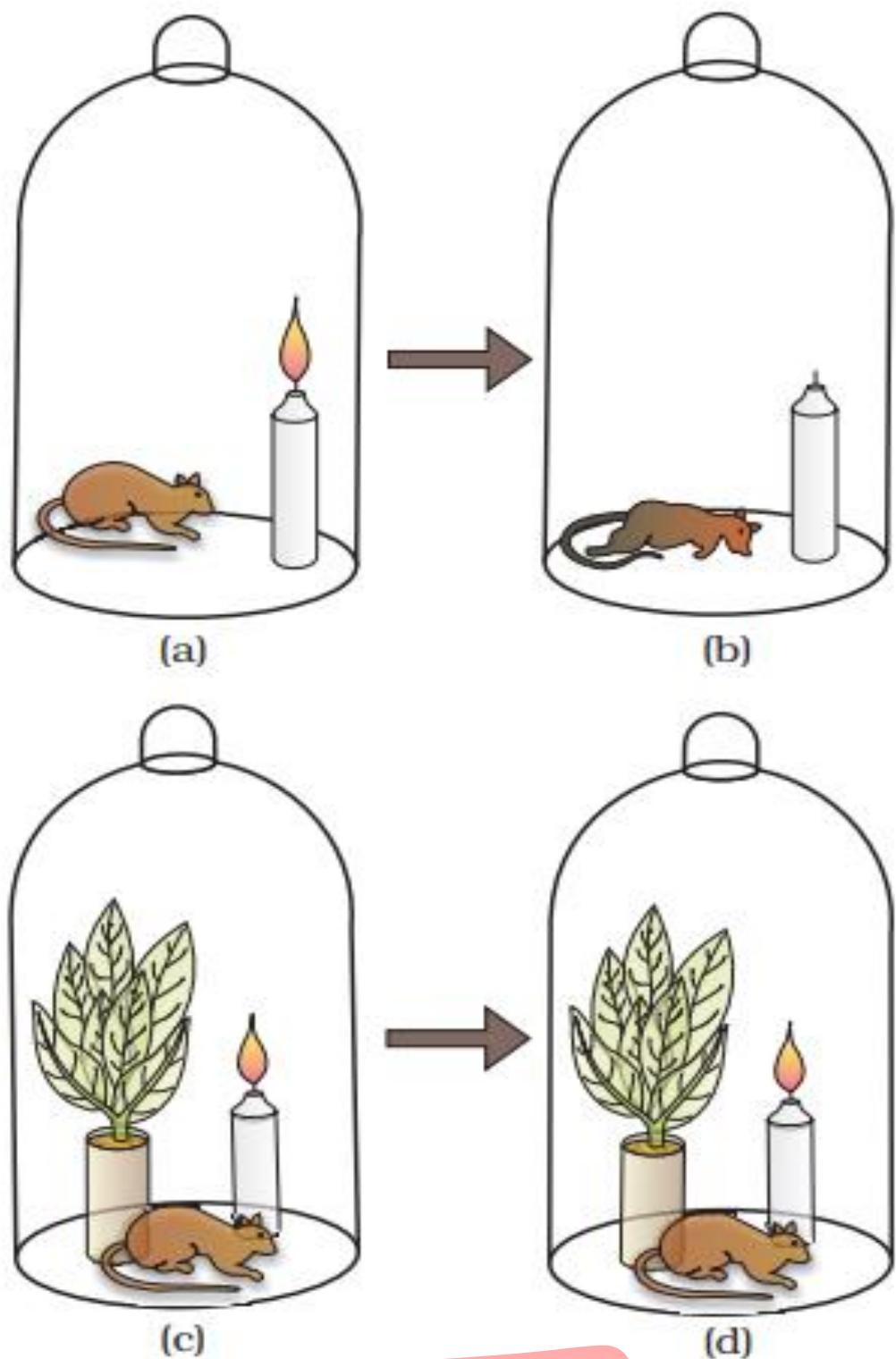
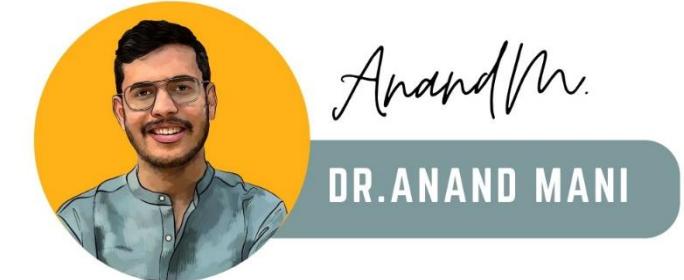
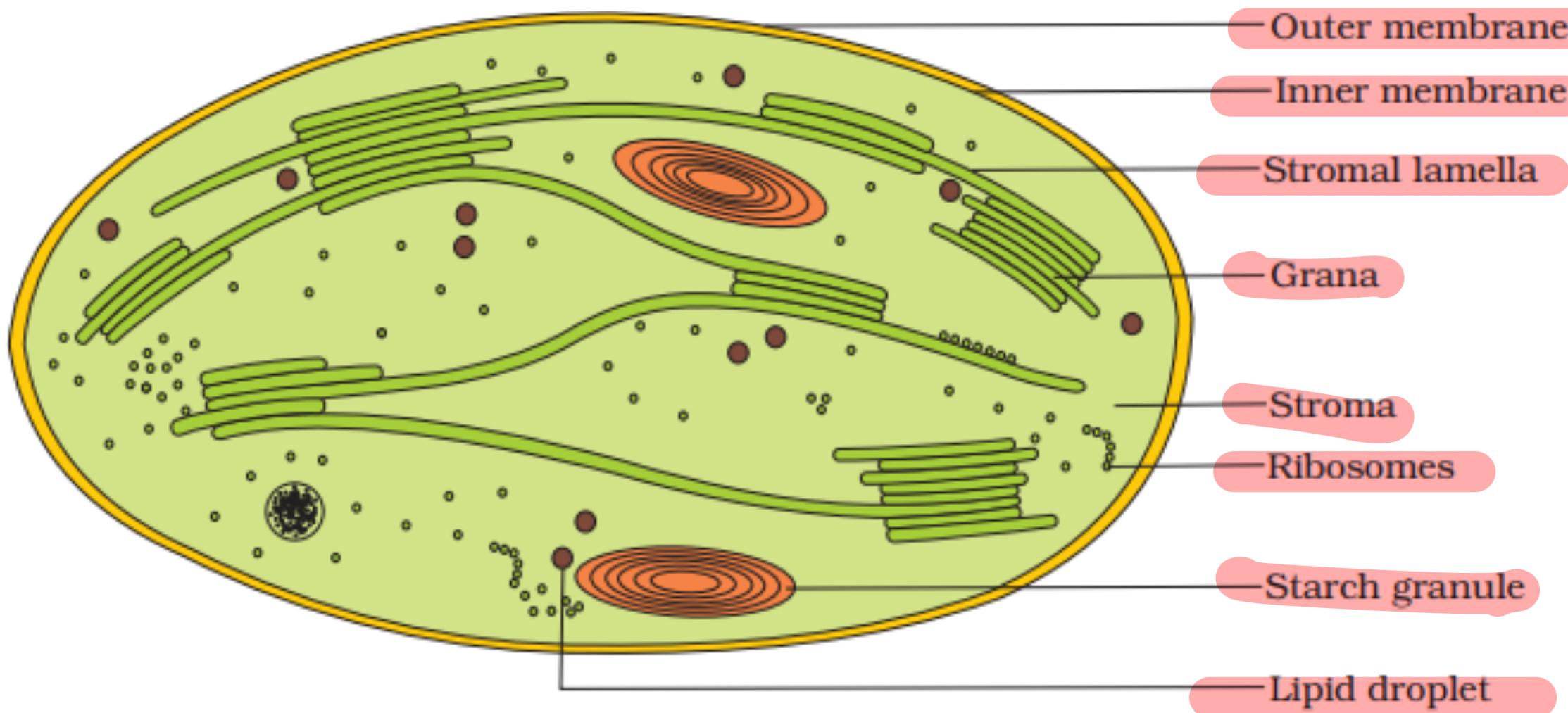


Figure 13.1 Priestley's experiment

Bell jar = (1770)

My = Oxygen
discovery

Labelling



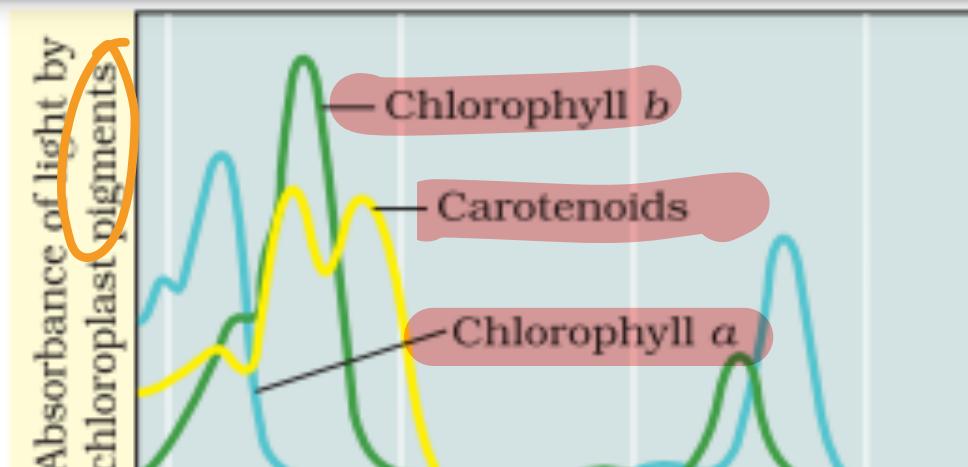
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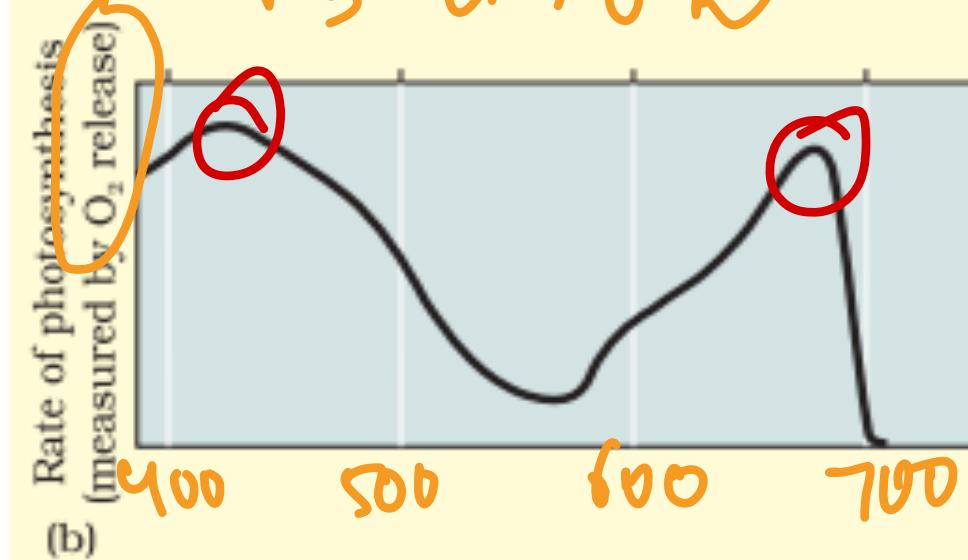
Figure 13.2 Diagrammatic representation of an electron micrograph of a section of chloroplast

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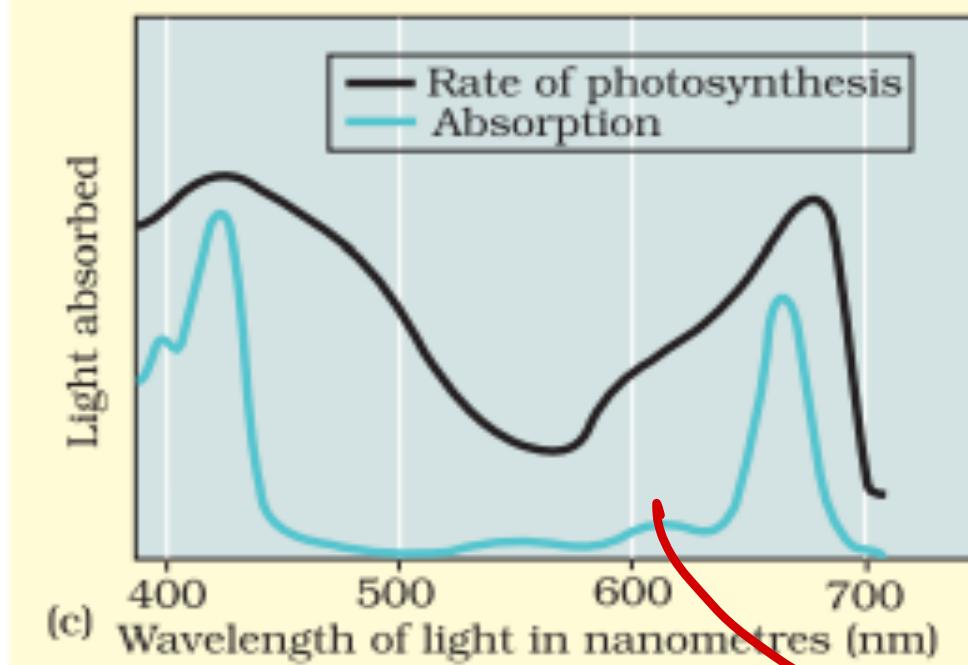
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(a) 400 450 500 550 600 700



(b) 400 500 600 700



(c) 400 500 600 700

Action → Absorption spectrum

→ Action spectrum
Blue = Max rate of photosynthesis
Red = Most efficient photosynthesis
PSI, PSII

Figure 13.3a Graph showing the absorption spectrum of chlorophyll a, b and the carotenoids

Figure 13.3b Graph showing action spectrum of photosynthesis

Figure 13.3c Graph showing action spectrum of photosynthesis superimposed on absorption spectrum of chlorophyll a

Main P_r
Chl A (R_m centre)

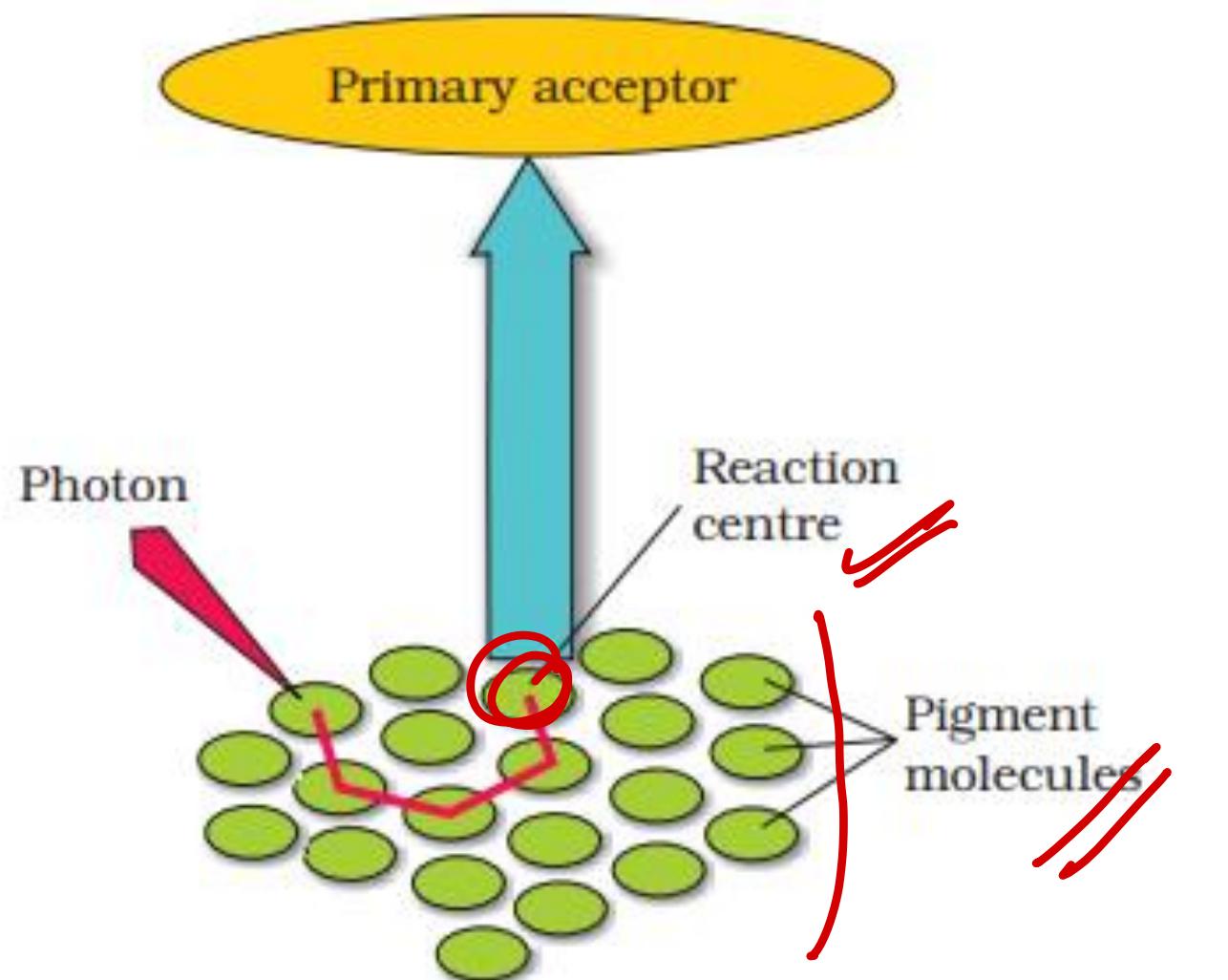
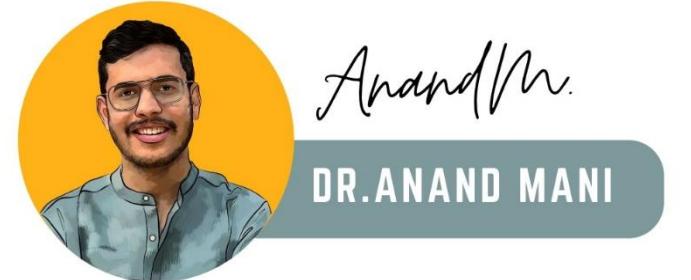


Figure 13.4 The light harvesting complex

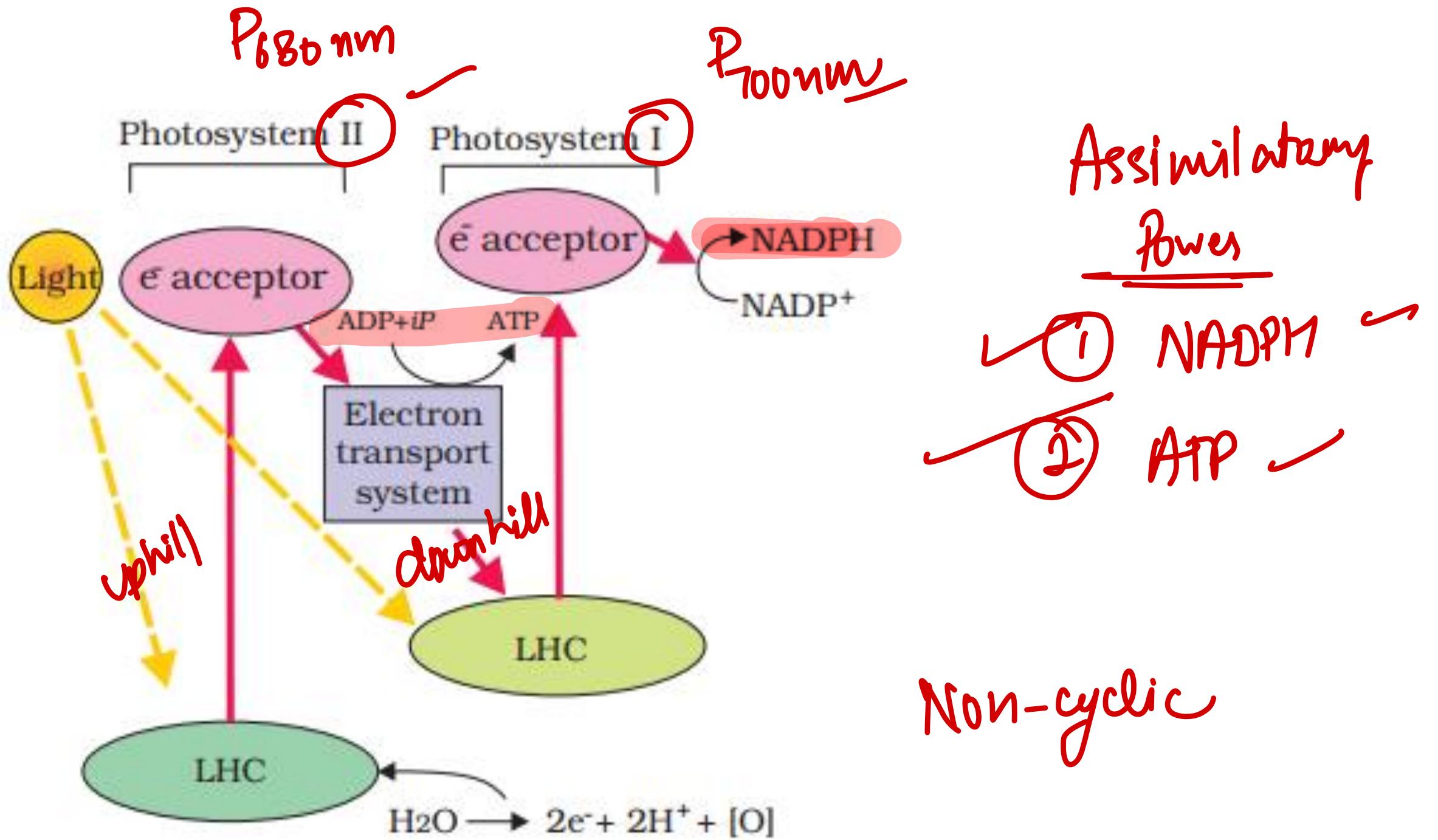
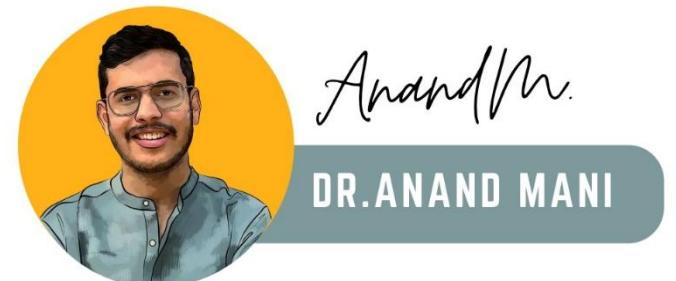


Figure 13.5 Z scheme of light reaction

Non-cyclic

= Appressed region

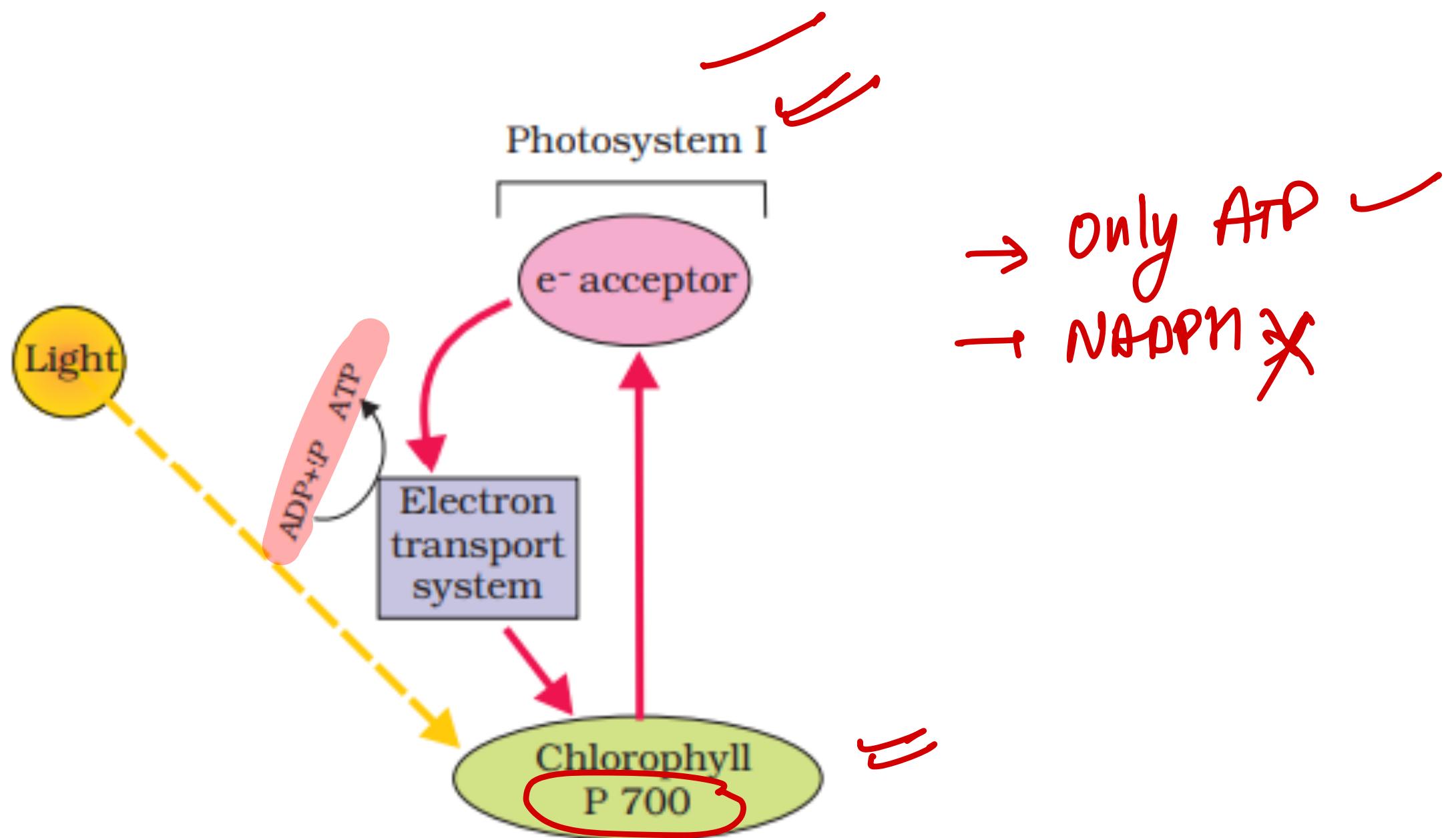
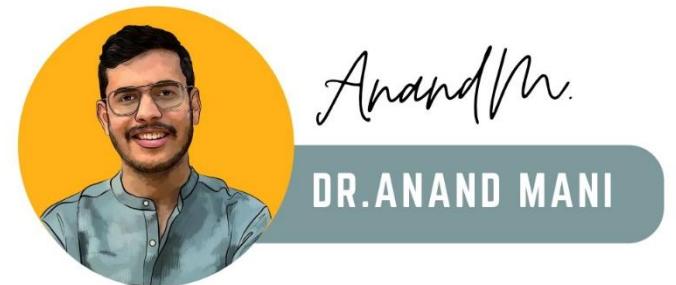


Figure 13.6 Cyclic photophosphorylation

Non oxygenated region

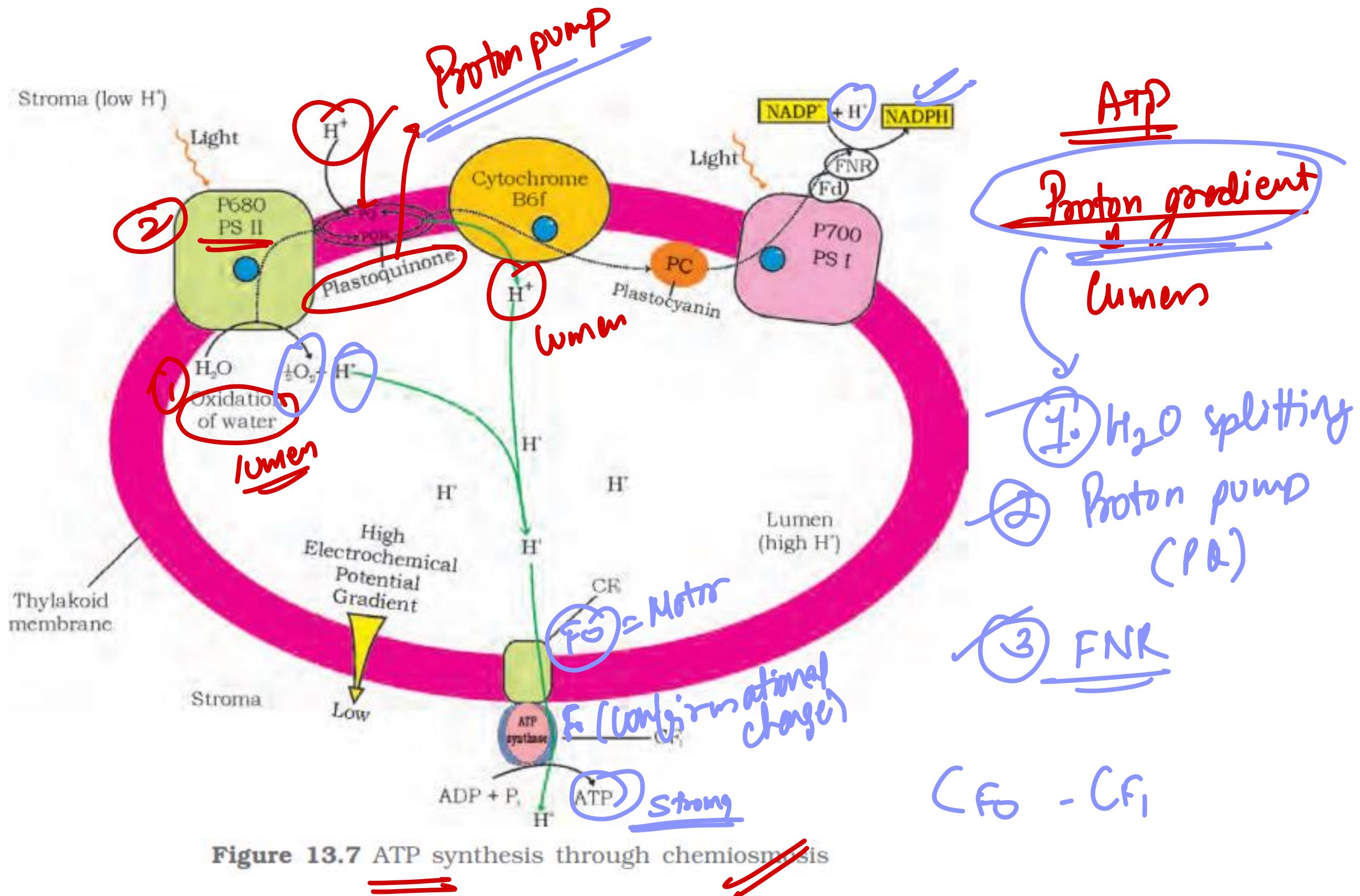


Figure 13.7 ATP synthesis through chemiosmosis

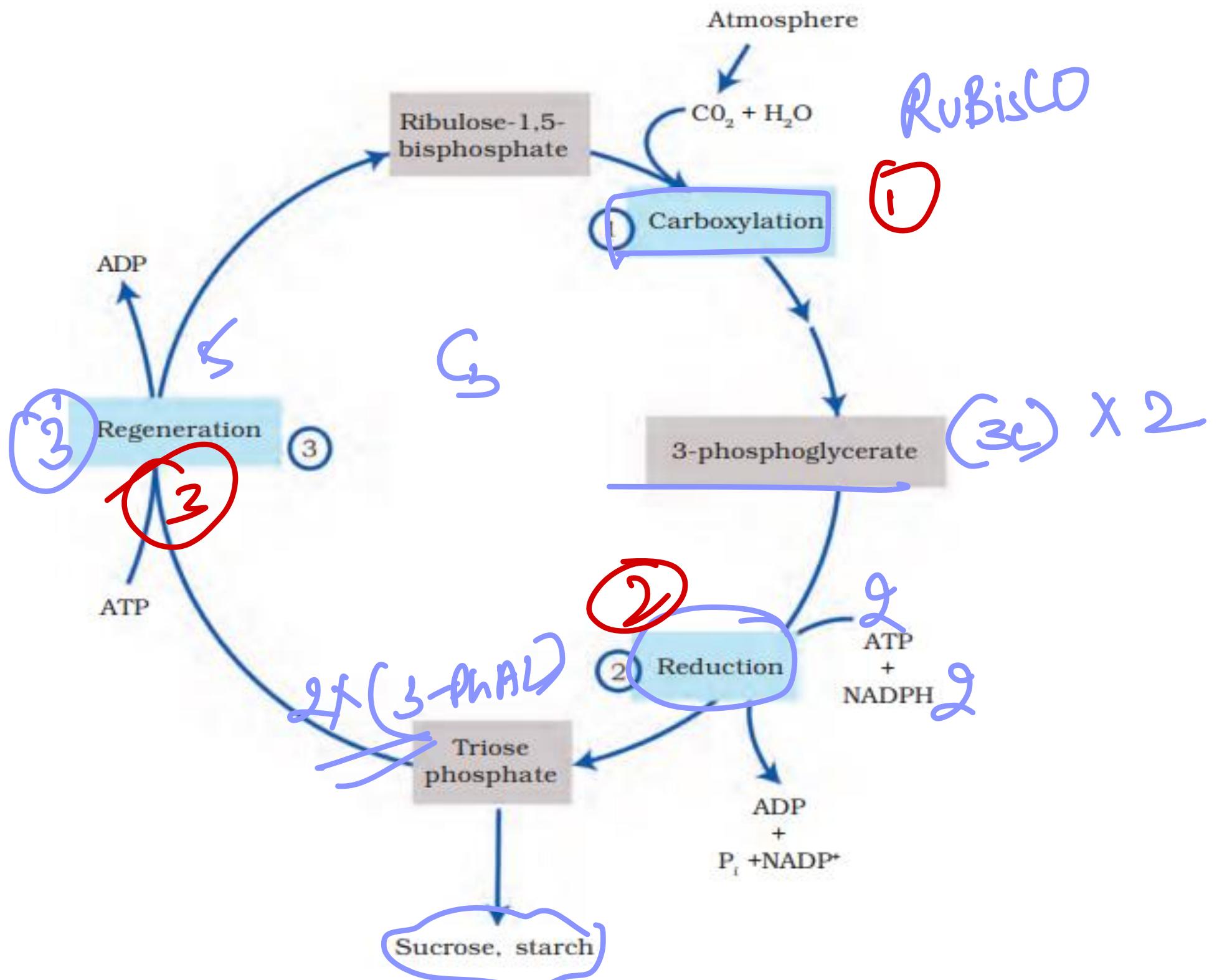
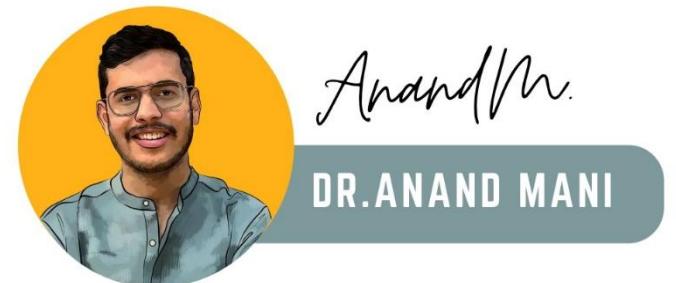


Figure 13.8 The Calvin cycle proceeds in three stages : (1) carboxylation, during which CO_2 combines with ribulose-1,5-bisphosphate; (2) reduction, during which carbohydrate is formed at the expense of the photochemically made ATP and NADPH; and (3) regeneration during which the CO_2 acceptor ribulose-1,5-bisphosphate is formed again so that the cycle continues

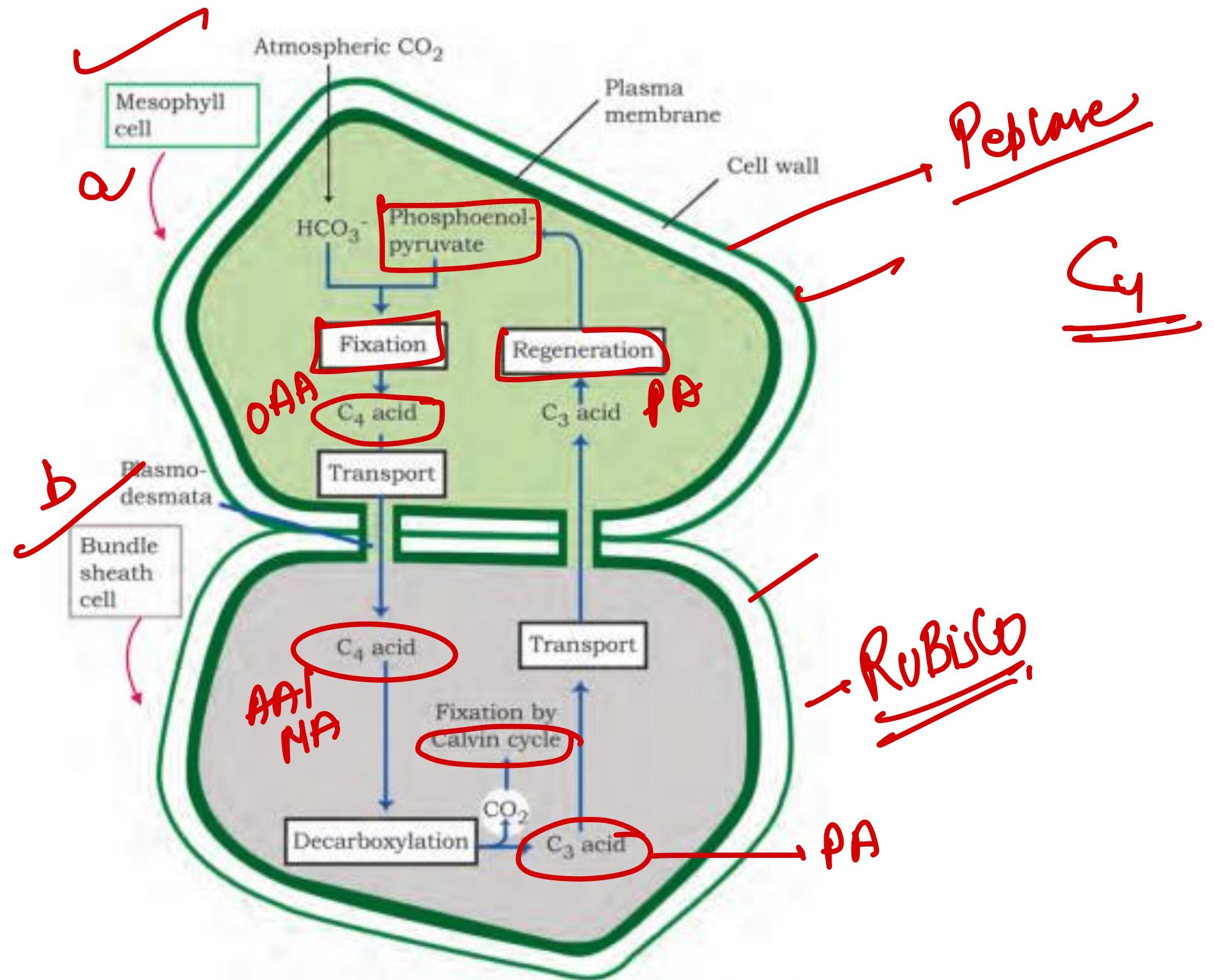
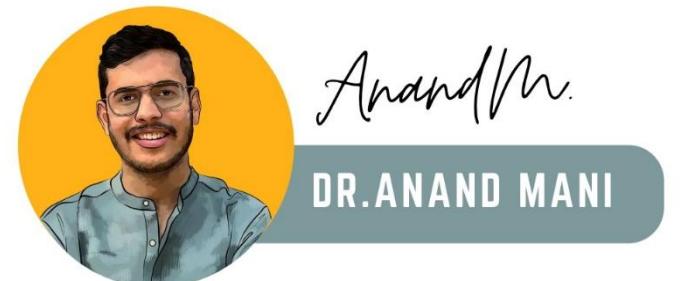


Figure 13.9 Diagrammatic representation of the Hatch and Slack Pathway

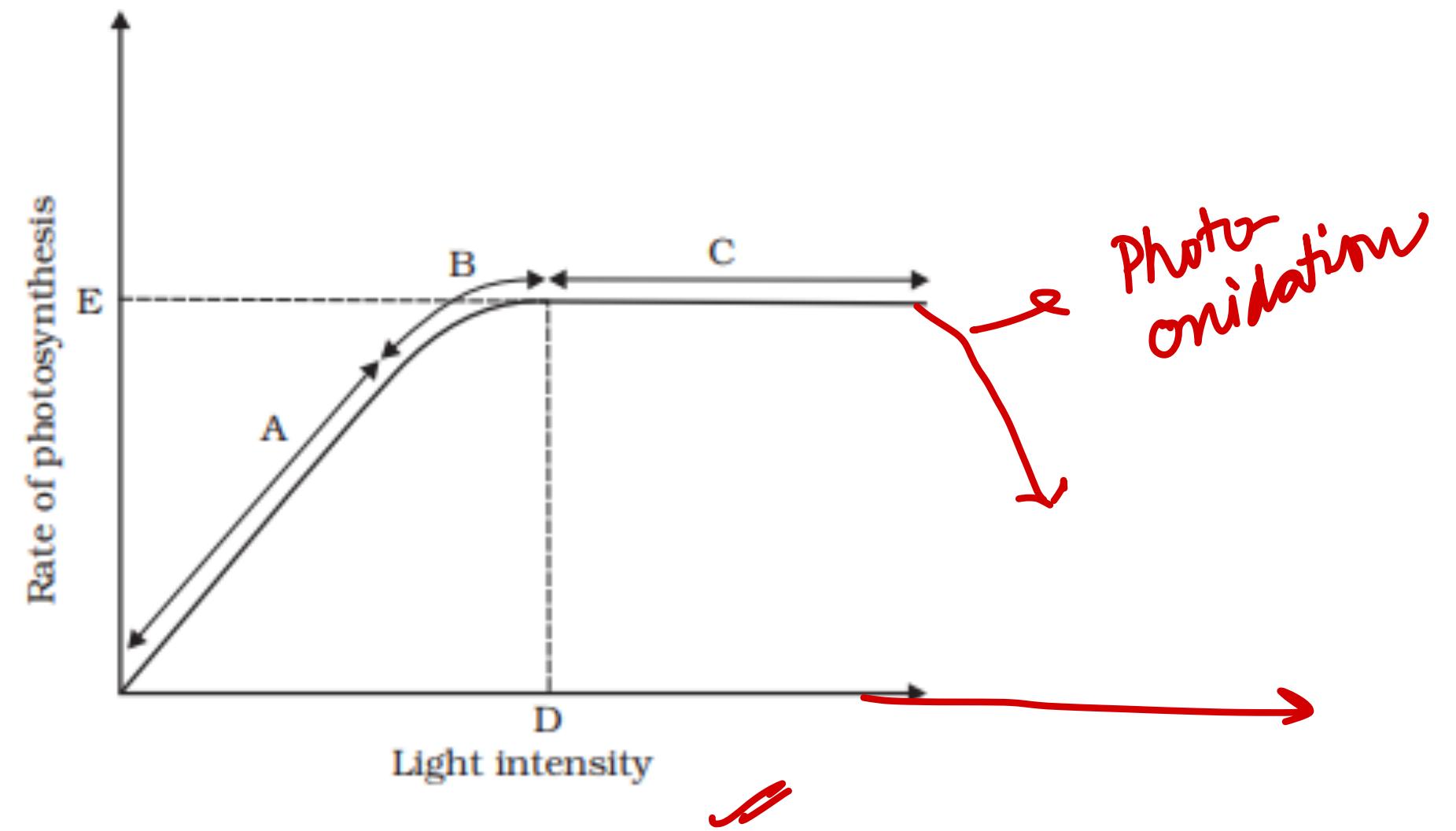
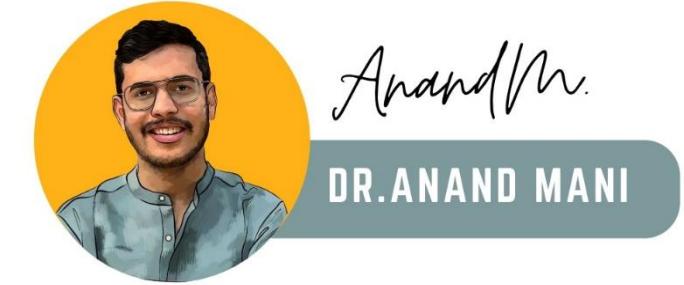
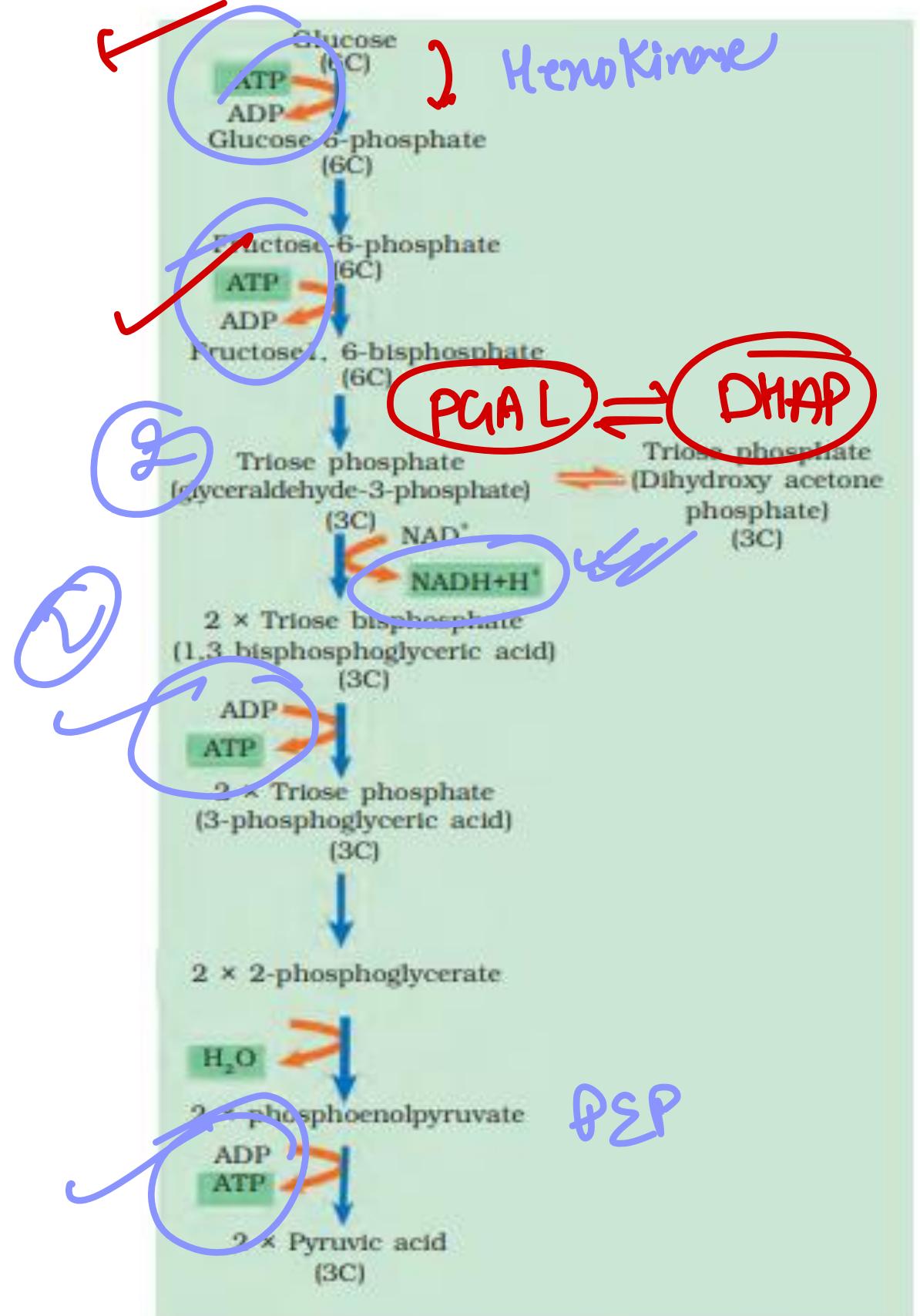


Figure 13.10 Graph of light intensity on the rate of photosynthesis

CHAPTER-14

RESPIRATION IN

PLANTS

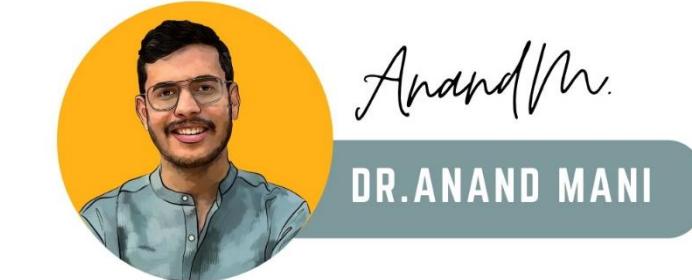


3 NADH \rightarrow 2

Total ATP = 4
form

uu = 2

Net gain ? 2



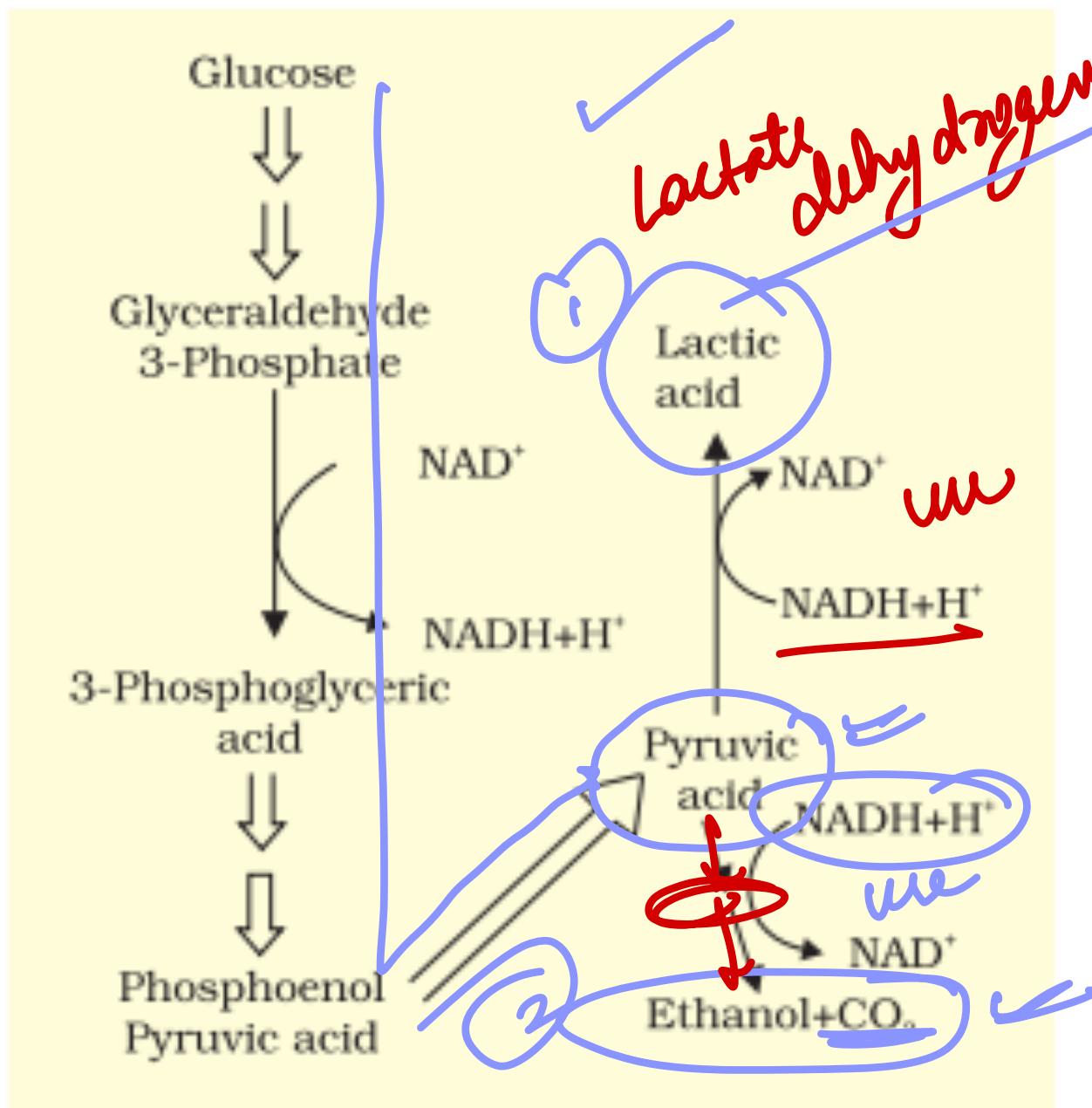
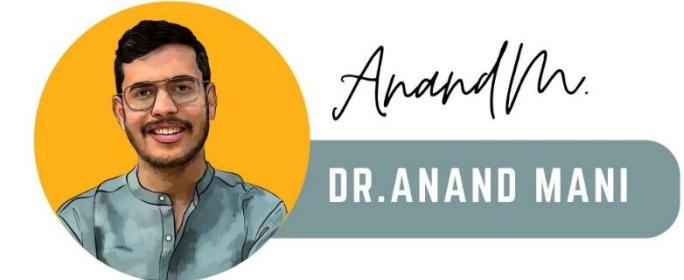
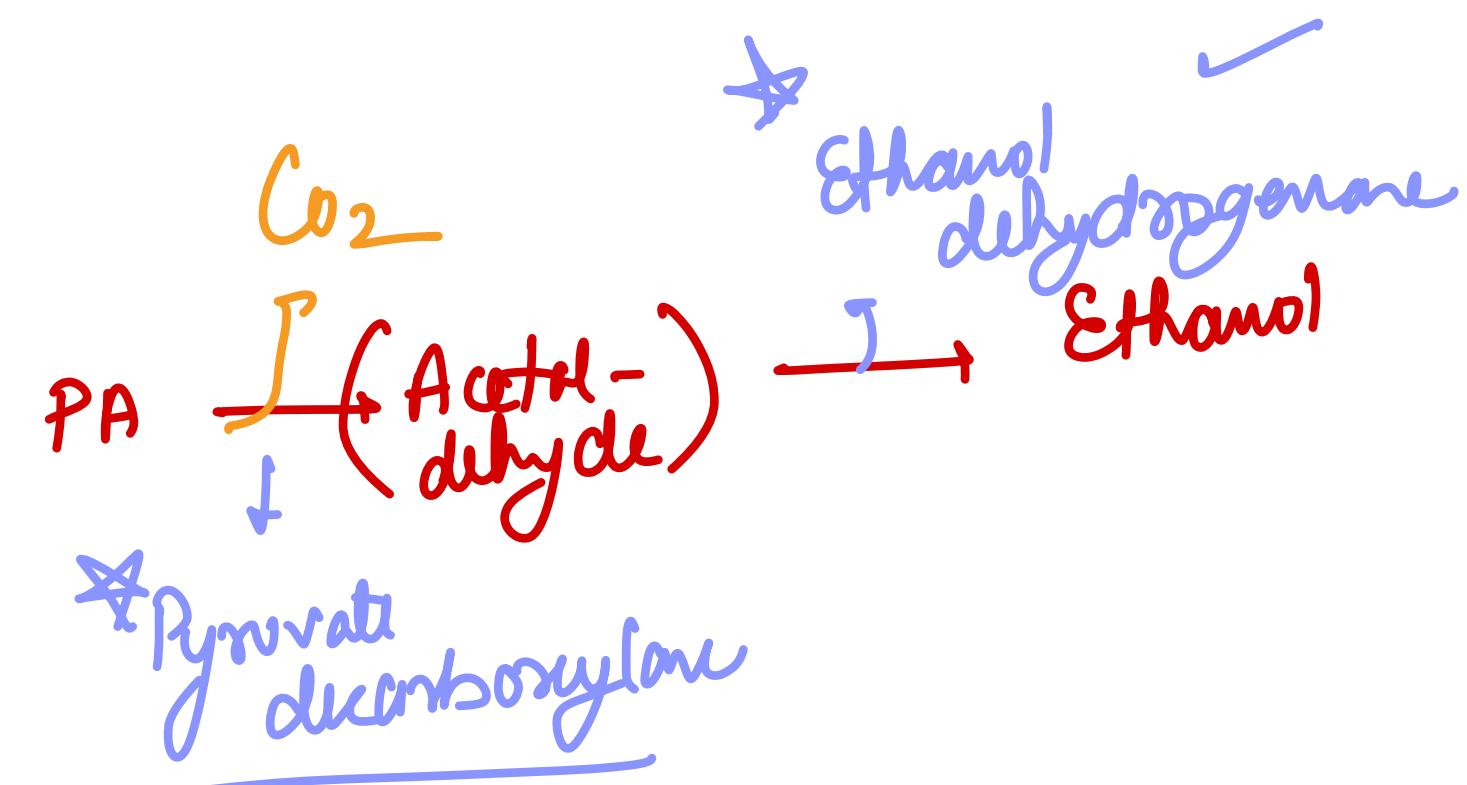
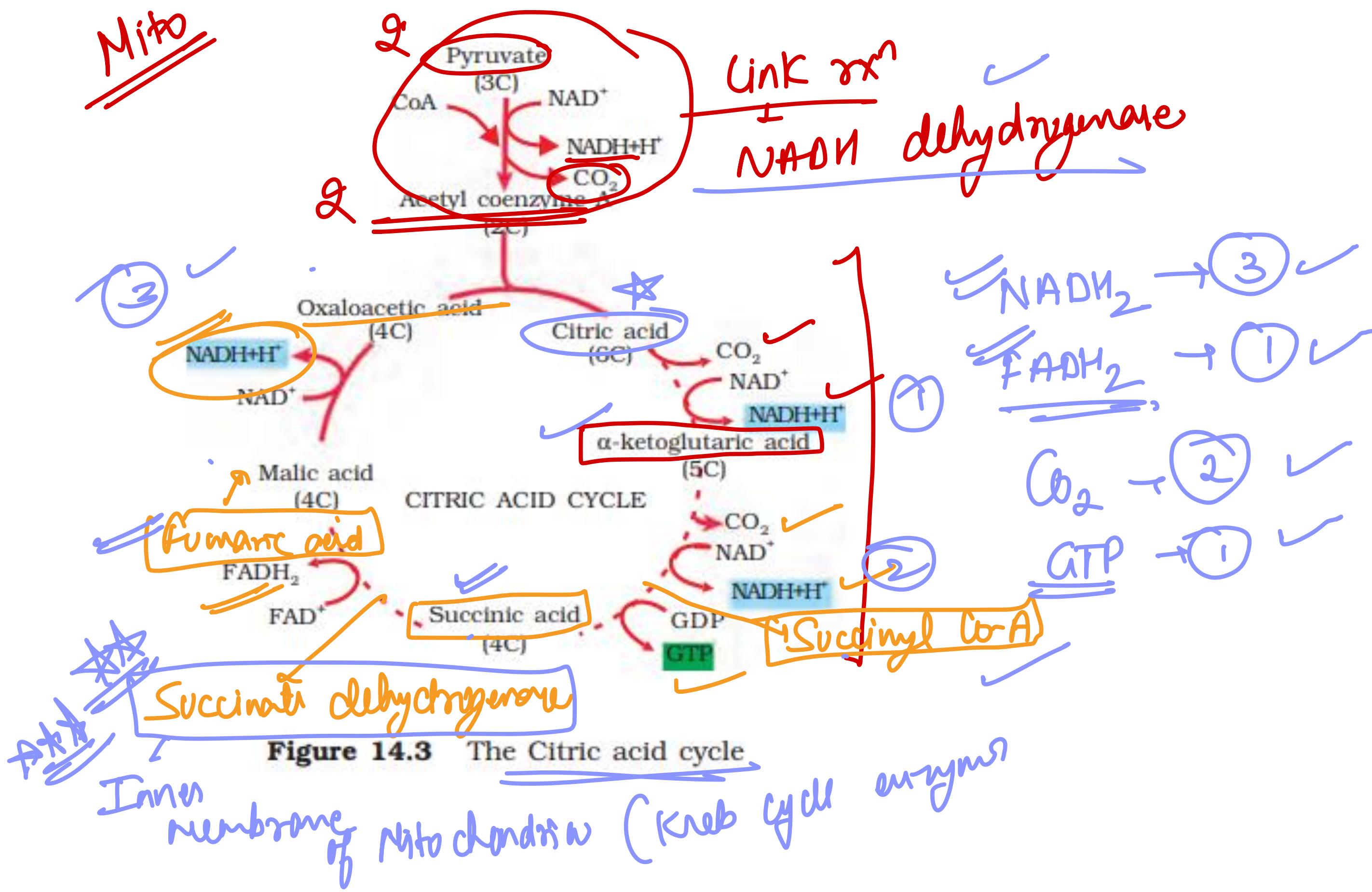
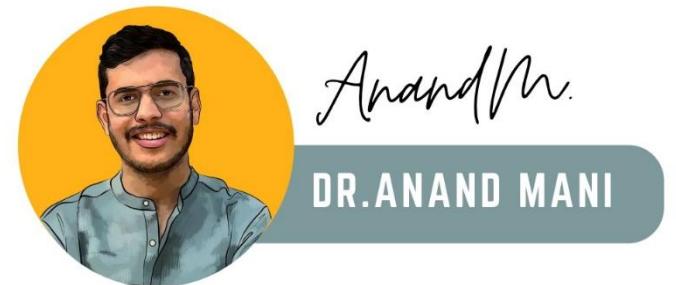
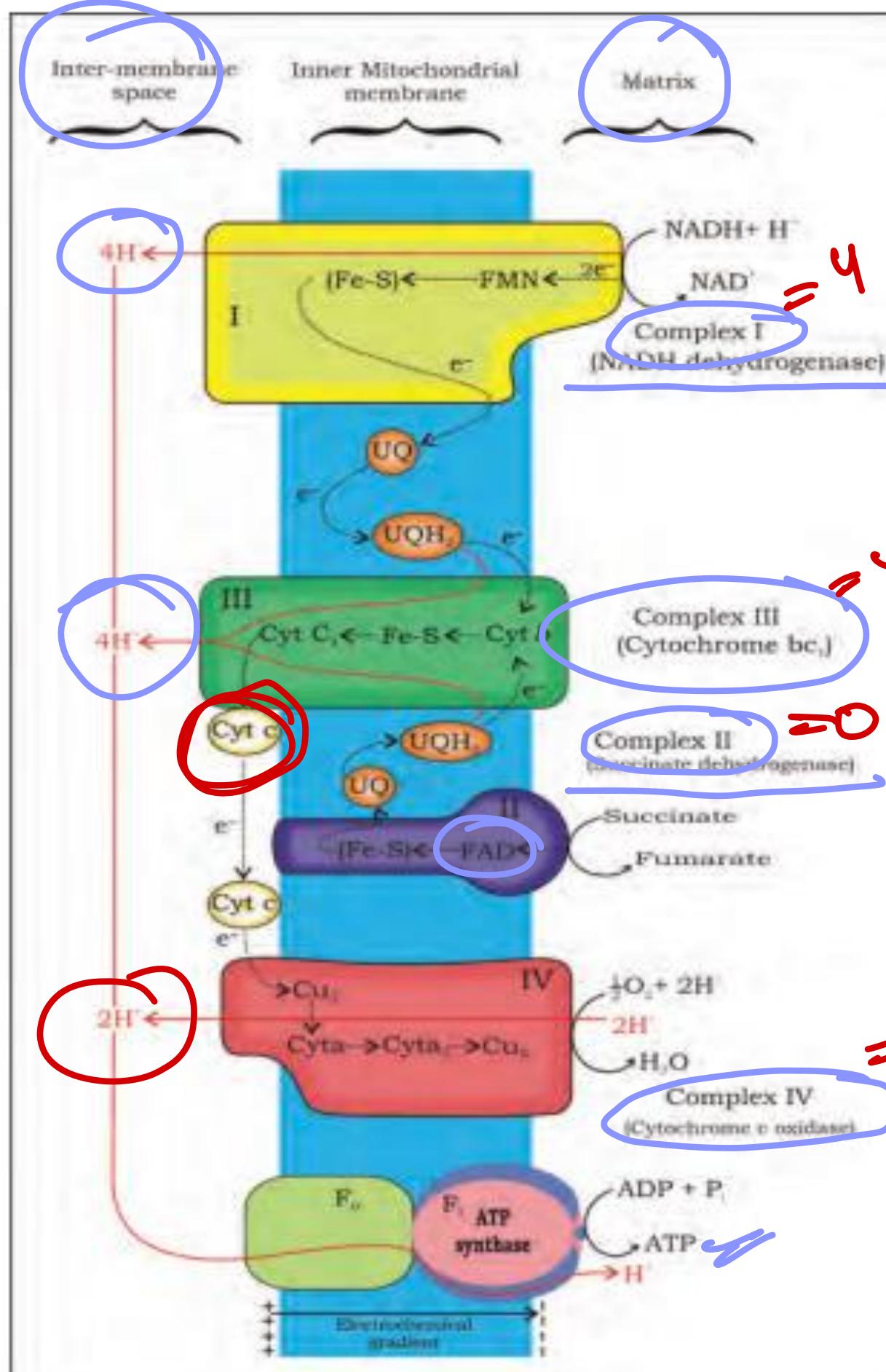


Figure 14.2 Major pathways of anaerobic respiration

Fermentation







① Location = Inner membrane



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② Complex? = 4 involved

③ $\text{NADH} \rightarrow \text{Complex I}$

④ $\text{FADH}_2 \rightarrow \text{Complex II}$

⑤ Proton pump no. 3

$$\begin{cases} \text{I} = 4\text{H}^+ \\ \text{II} = 0\text{H}^+ \\ \text{III} = 4\text{H}^+ \\ \text{IV} = 2\text{H}^+ \end{cases}$$

⑥ Proton gradient

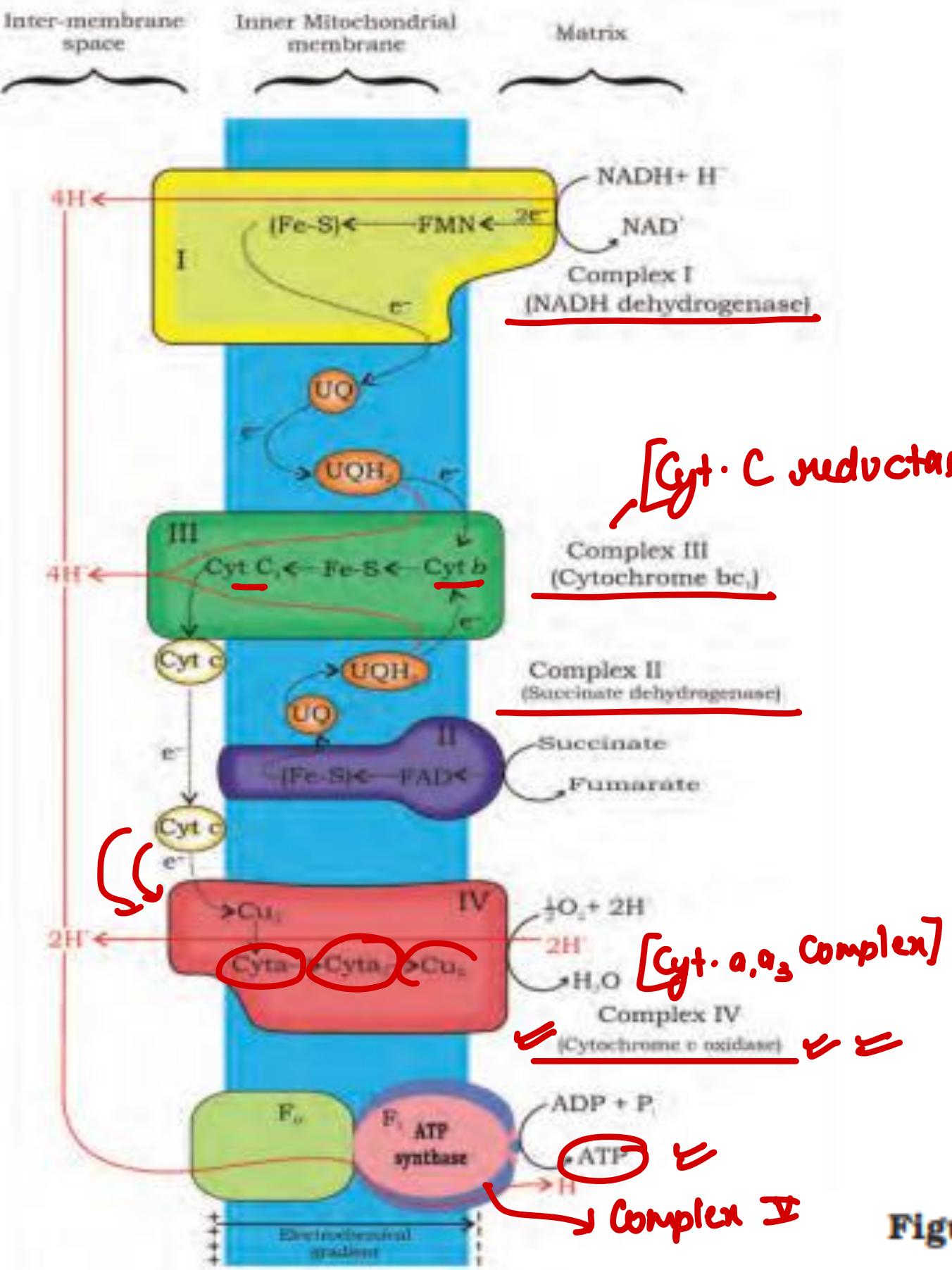


⑦ $\text{ATP} = \text{Complex V}$

Figure 14.4 Electron Transport System (ETS)

① H-Carrier = UQ *

② Mobile e- carrier = Cyt c → Outer side of Inner Mitochondrial membrane



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Figure 14.4 Electron Transport System (ETS)

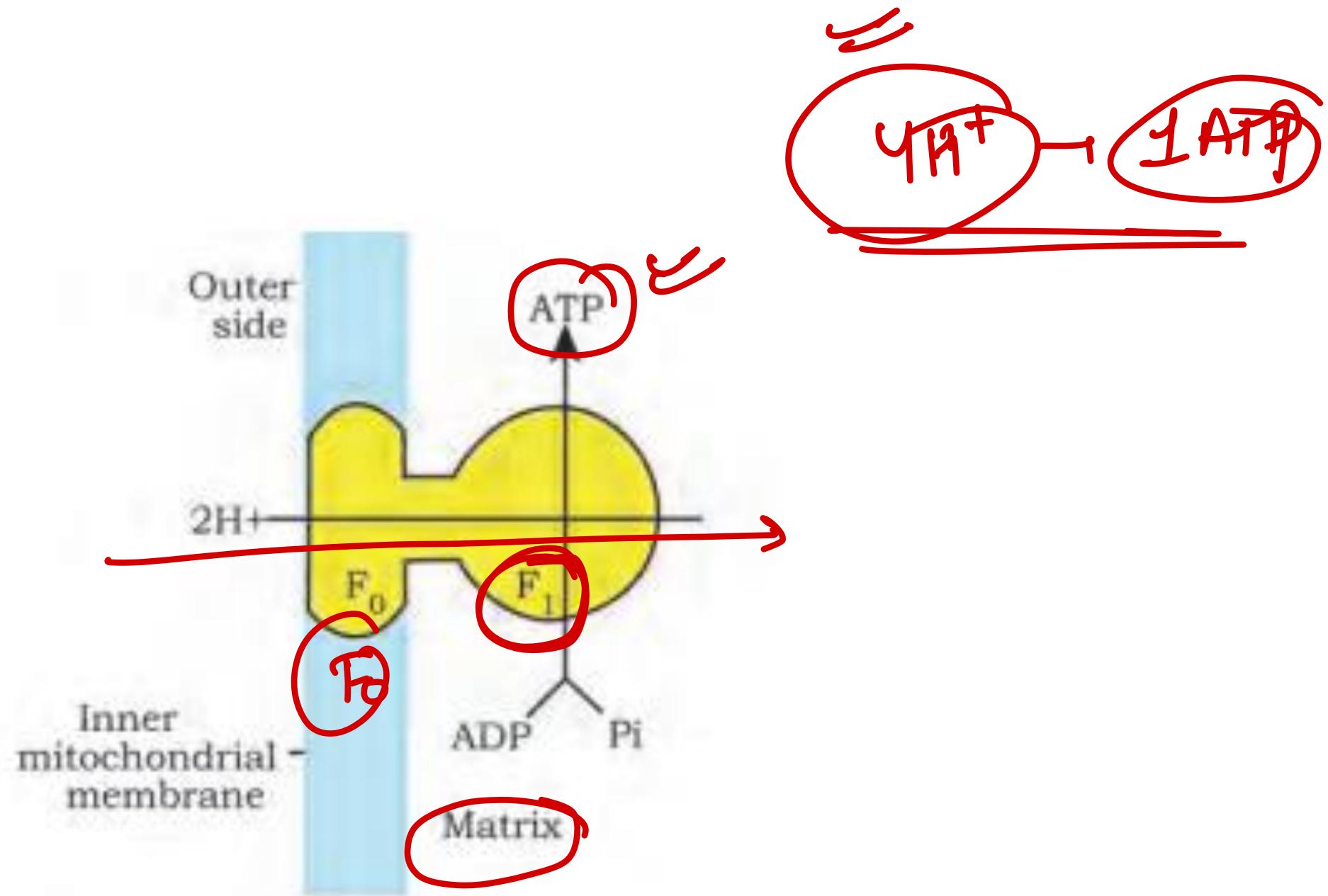
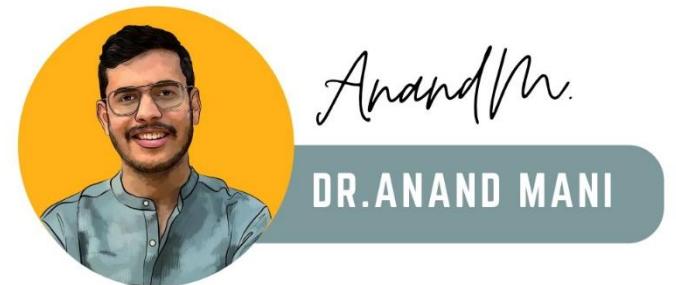
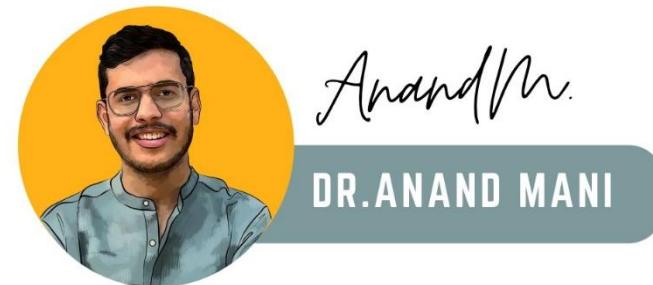


Figure 14.5 Diagrammatic presentation of ATP synthesis in mitochondria



Amphibolic Pathway

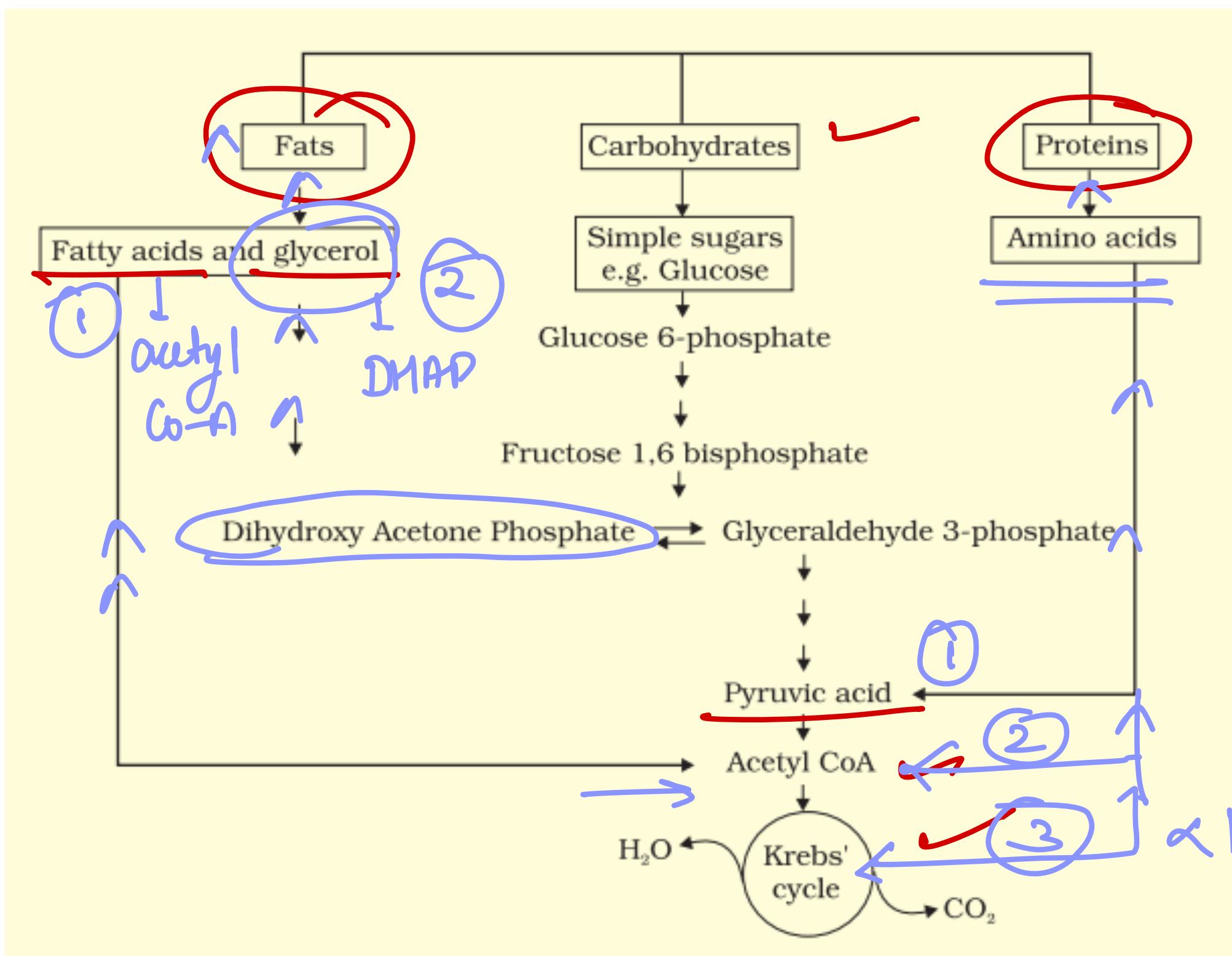


Figure 14.6 Interrelationship among metabolic pathways showing respiration mediated breakdown of different organic molecules to CO_2 and H_2O

CHAPTER-15

PLANT GROWTH AND DEVELOPMENT



Epi
geal
germination

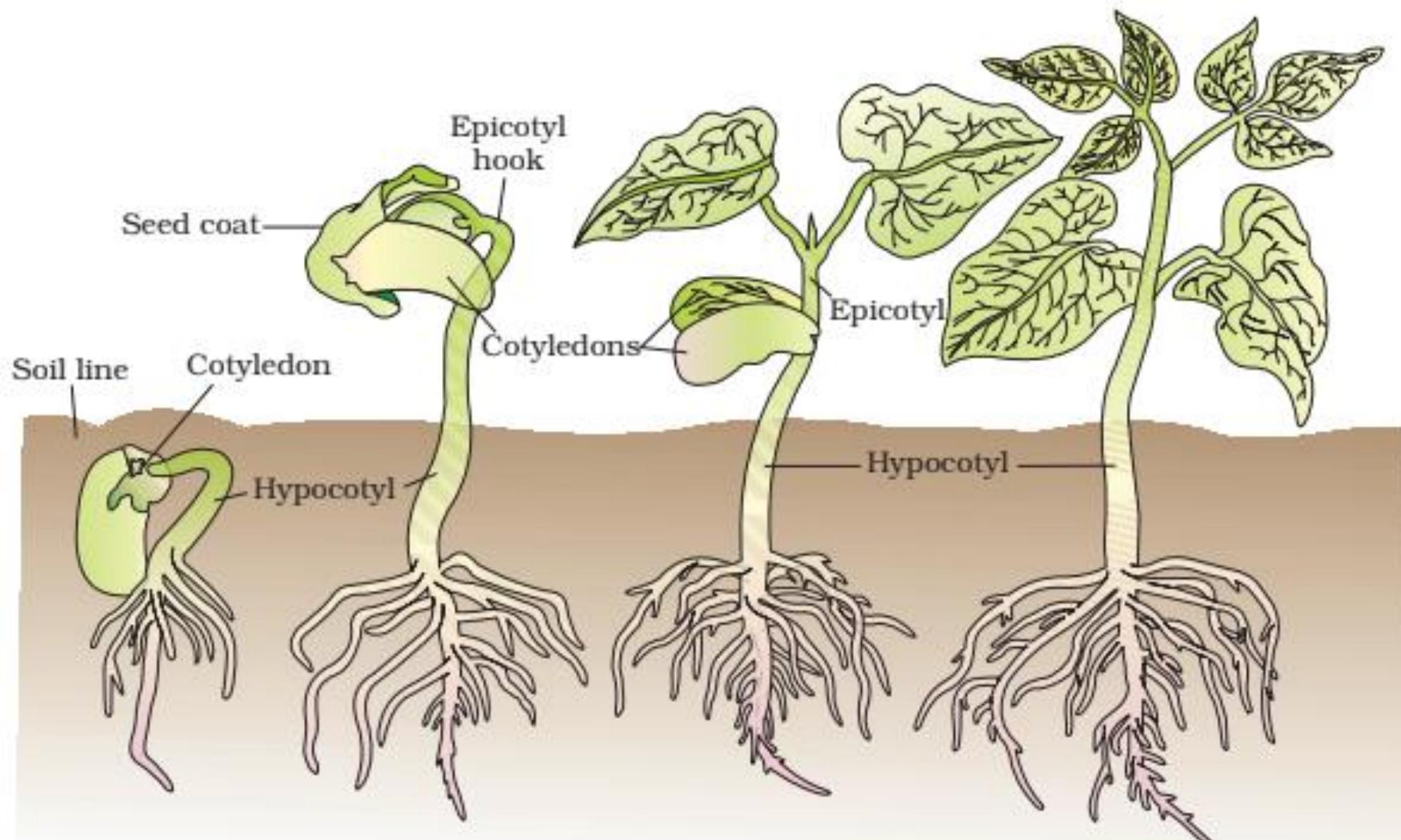


Figure 15.1 Germination and seedling development in bean

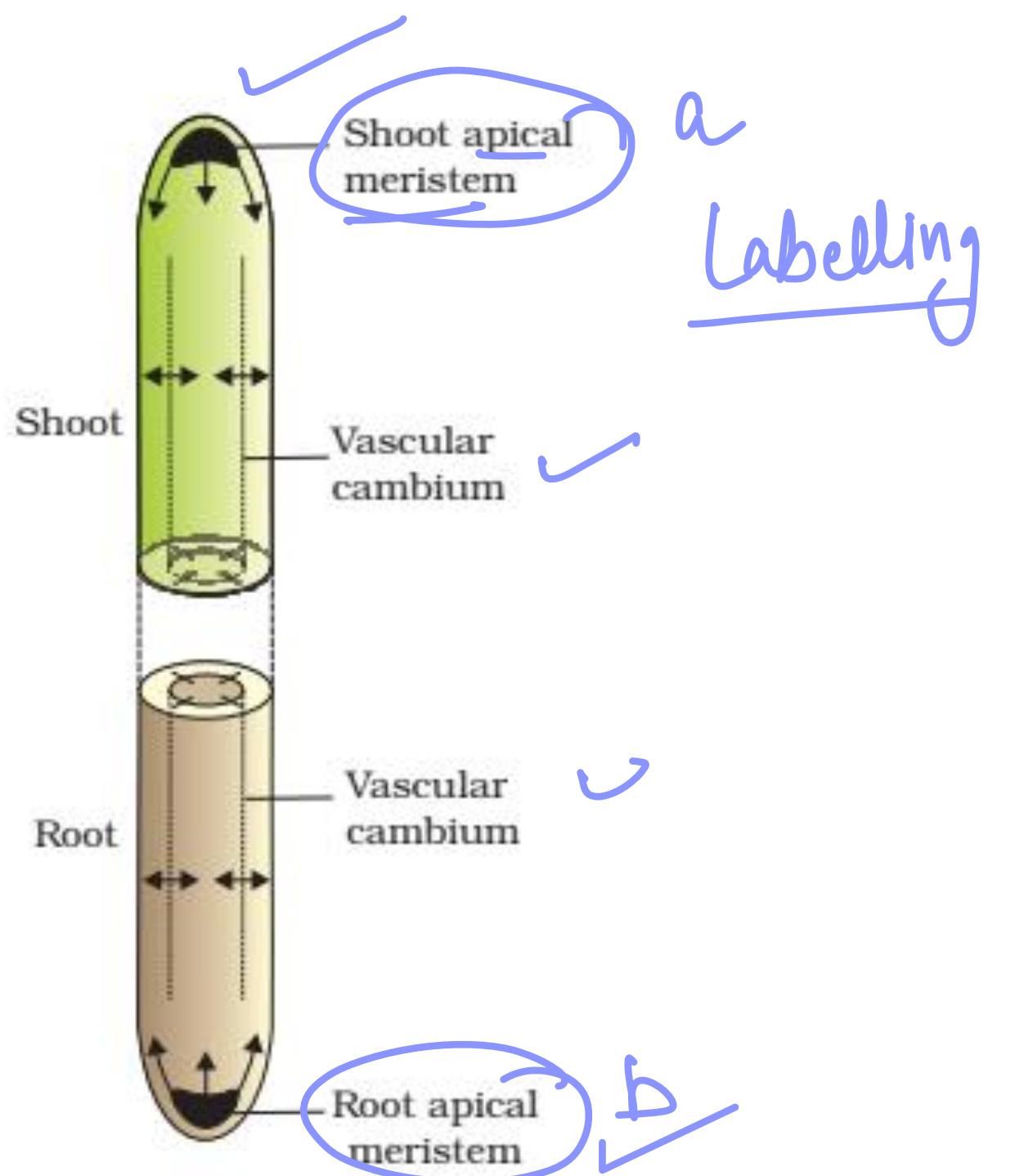


Figure 15.2 Diagrammatic representation of locations of root apical meristem, shoot apical meristem and vascular cambium. Arrows exhibit the direction of growth of cells and organ

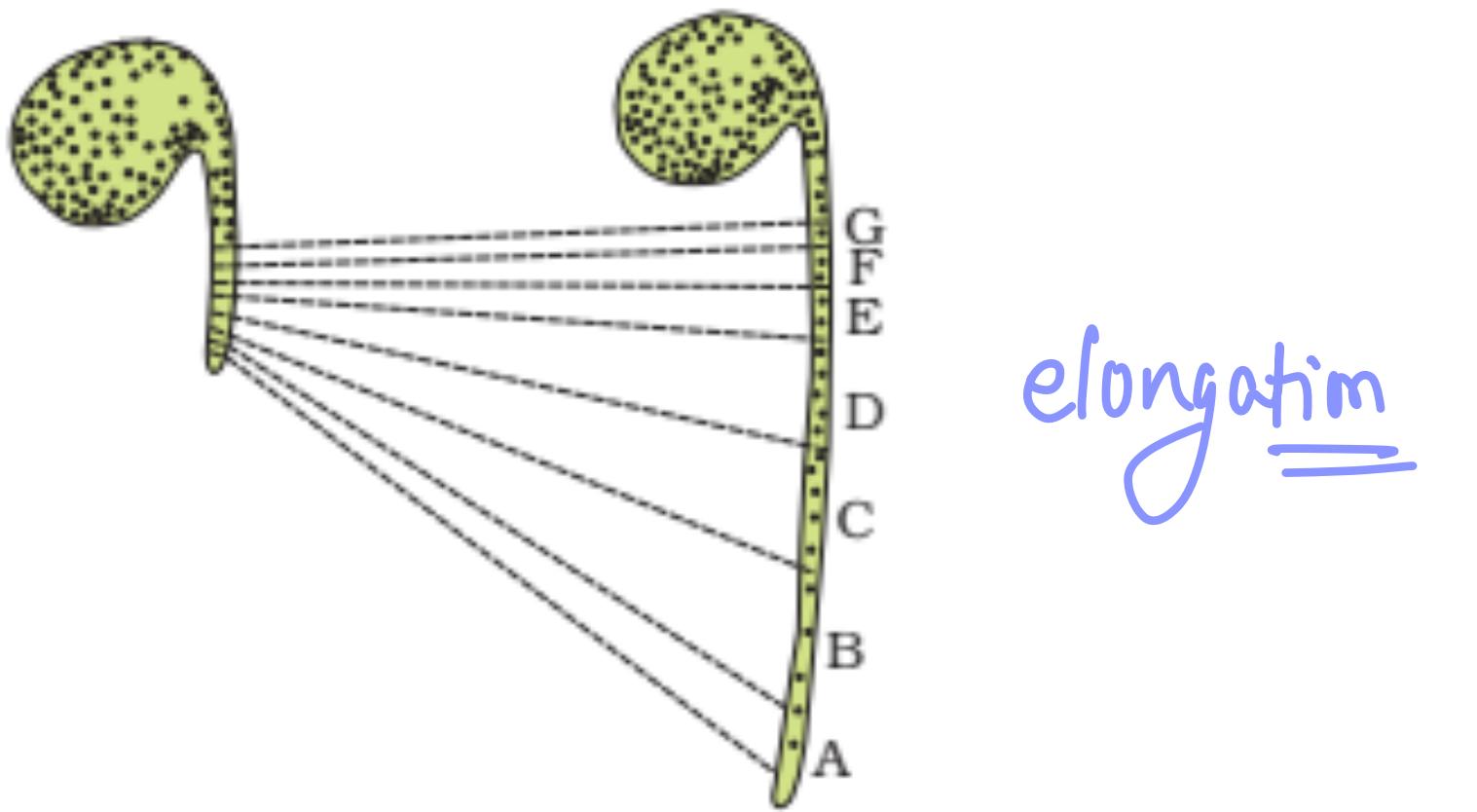
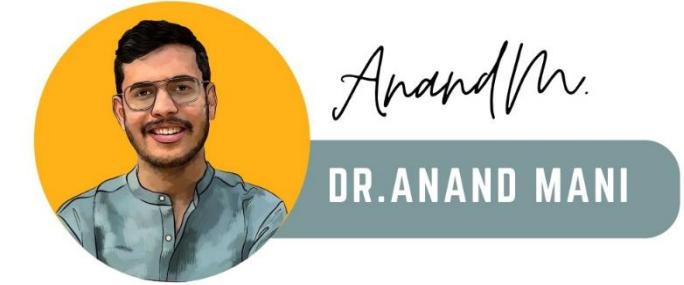


Figure 15.3 Detection of zones of elongation by the parallel line technique. Zones A, B, C, D immediately behind the apex have elongated most.

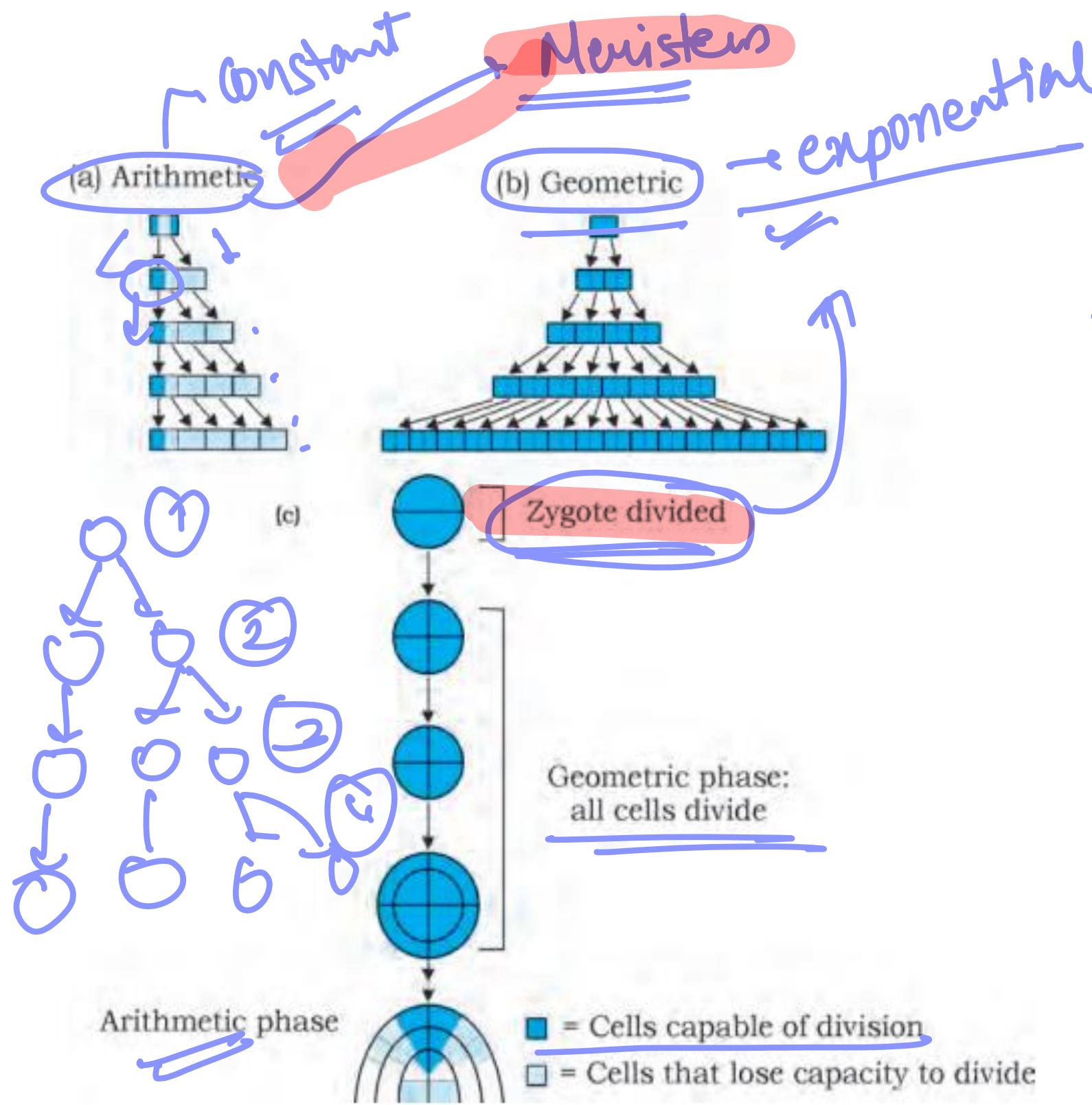
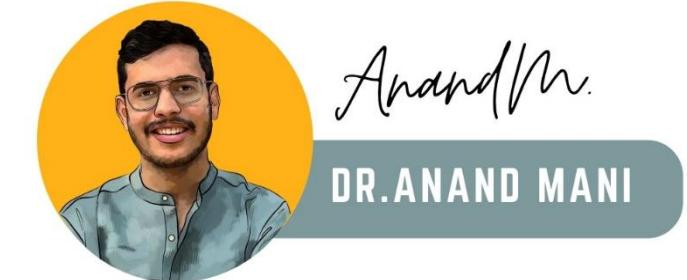


Figure 15.4 Diagrammatic representation of : (a) Arithmetic (b) Geometric growth and (c) Stages during embryo development showing geometric and arithmetic phases



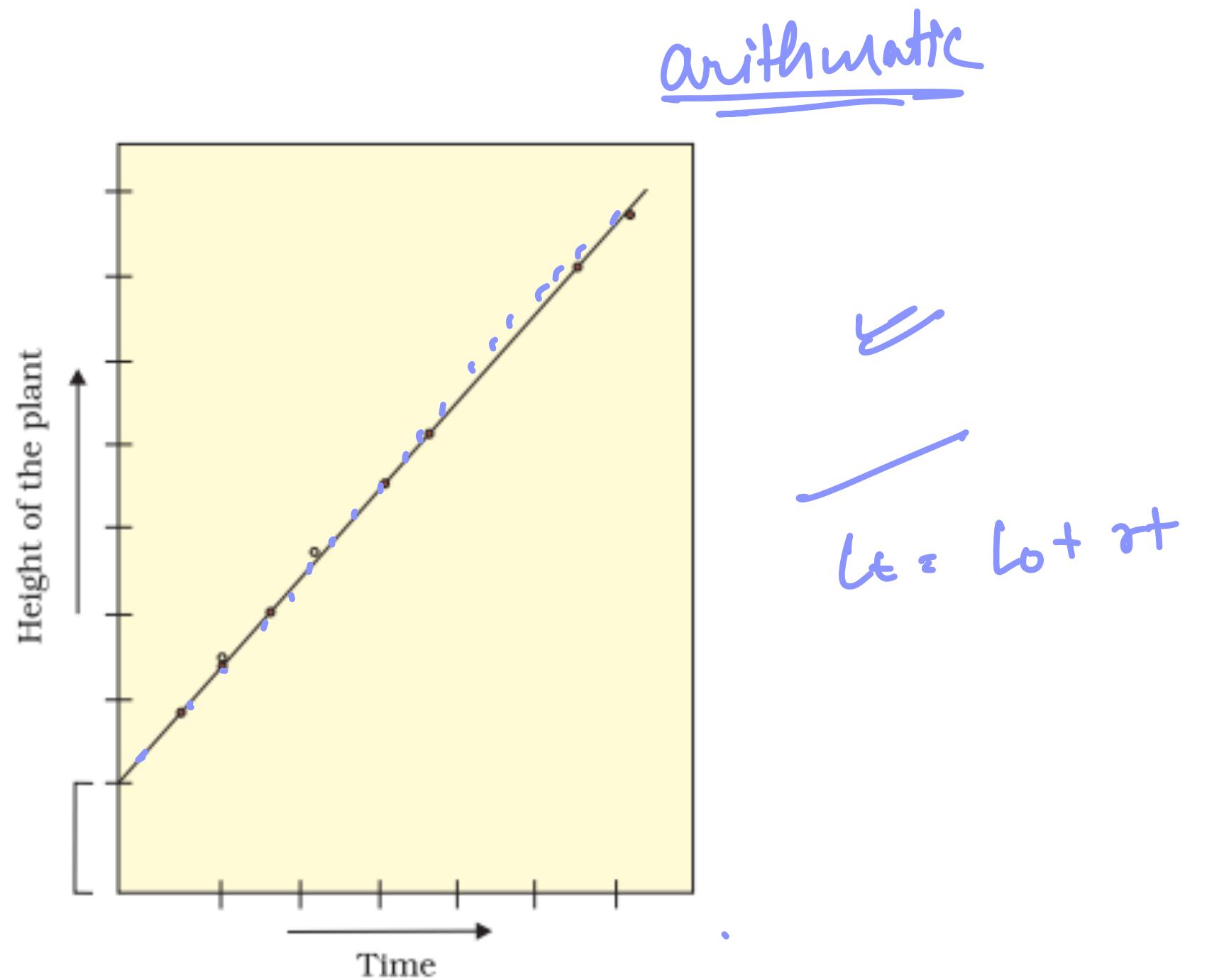
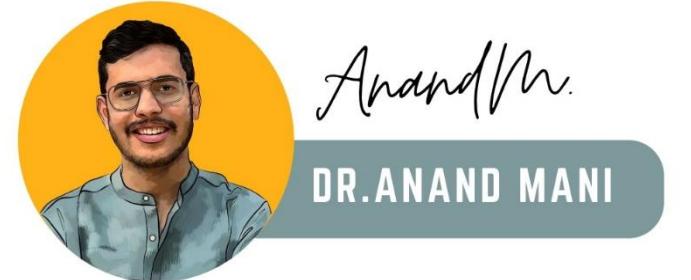


Figure 15.5 Constant linear growth, a plot of length L against time t



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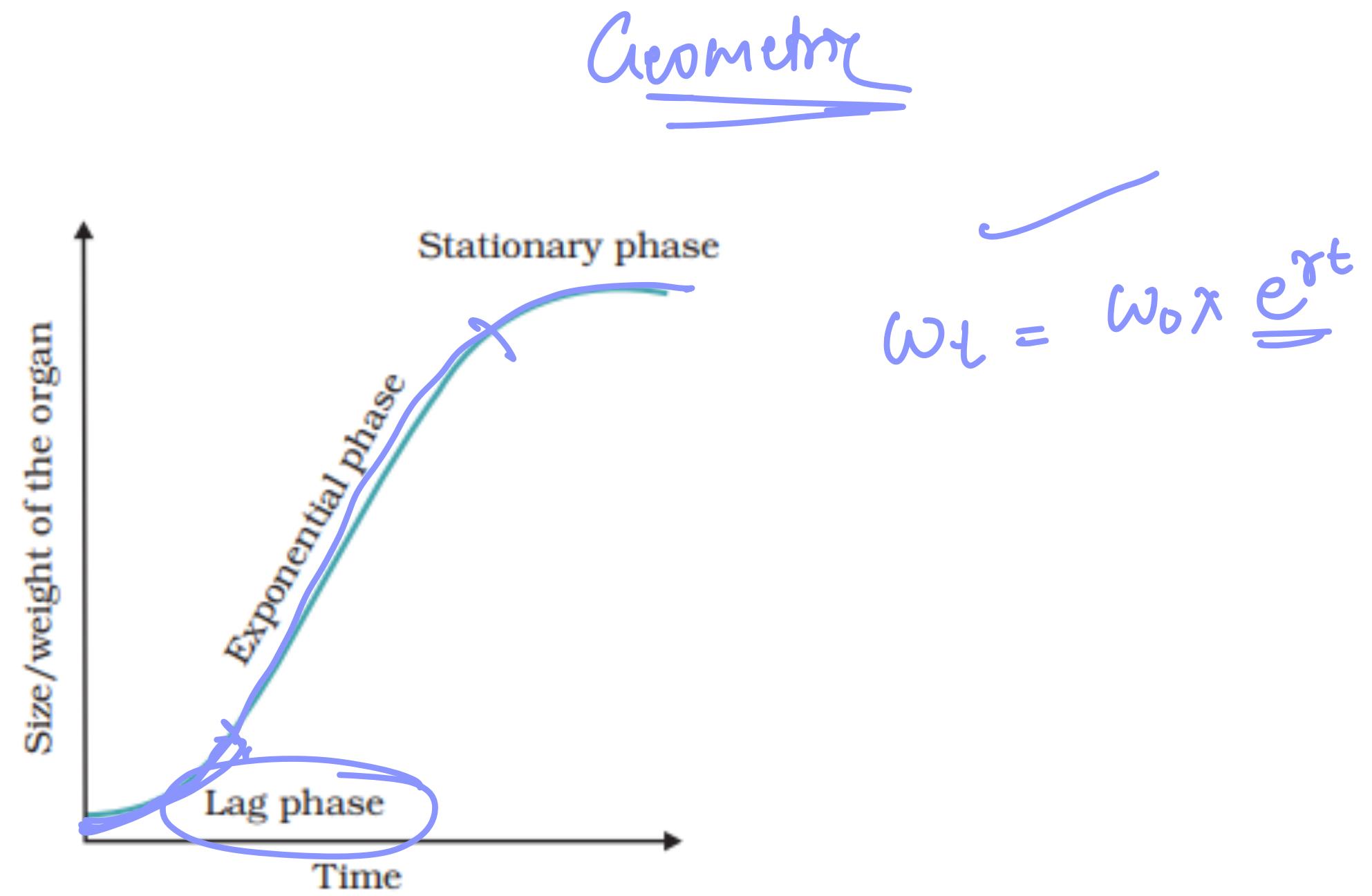
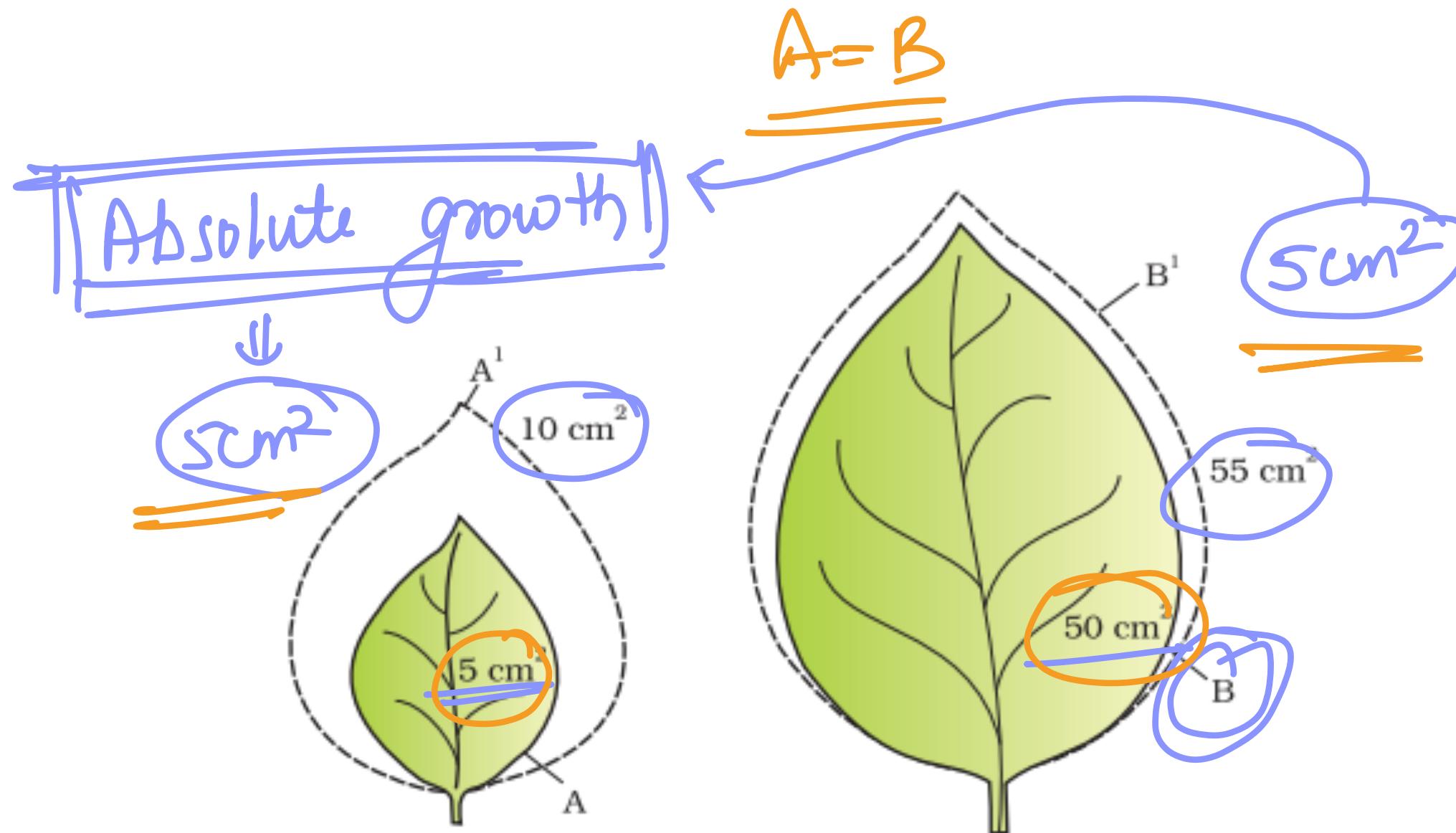


Figure 15.6 An idealised sigmoid growth curve typical of cells in culture, and many higher plants and plant organs



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Figure 15.7 Diagrammatic comparison of absolute and relative growth rates. Both leaves A and B have increased their area by 5 cm^2 in a given time to produce A^1 , B^1 leaves.

$$\text{Relative growth} = \frac{\%}{\%}$$

$$A \Rightarrow \frac{5}{5} \times 100 = 100\%$$

$$B \Rightarrow \frac{5}{50} \times 100 = 10\%$$

$$\underline{\underline{A > B}}$$

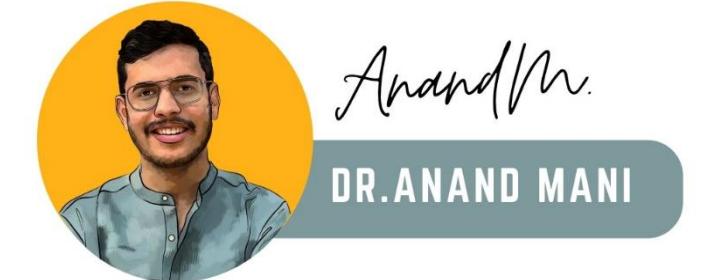
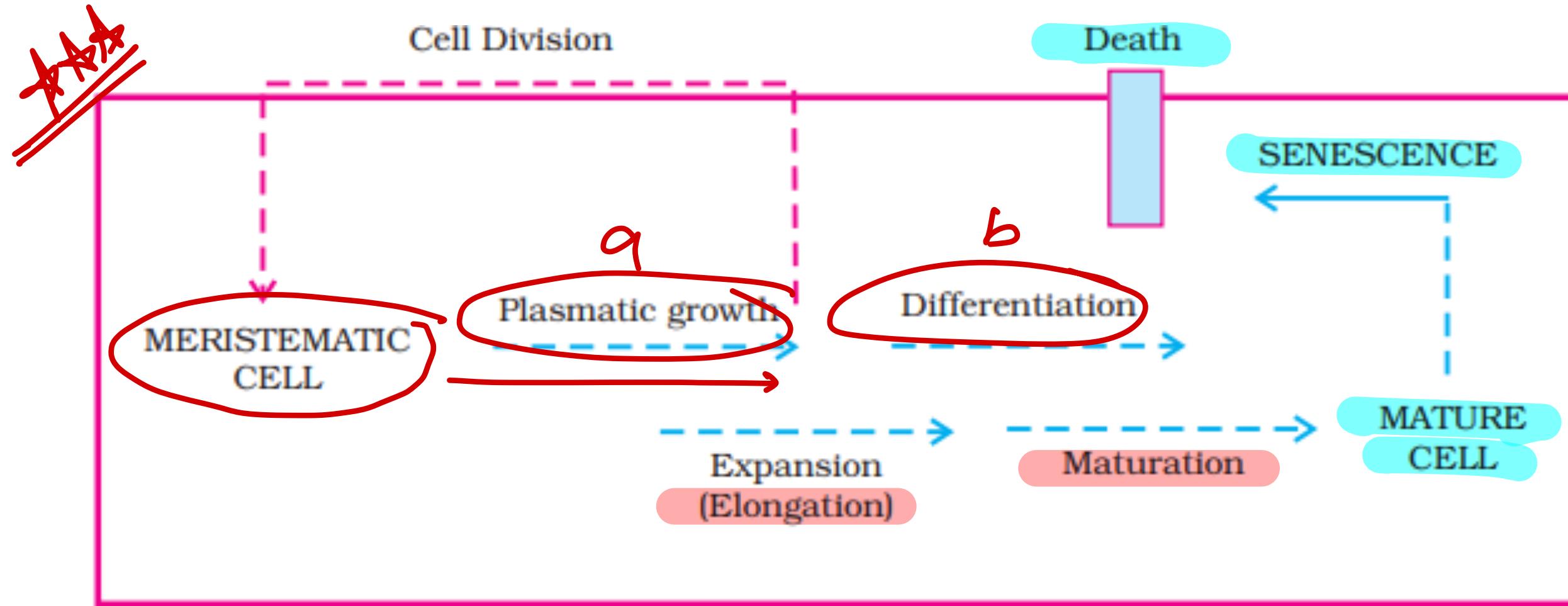


Figure 15.8 Sequence of the developmental process in a plant cell

\curvearrowleft development = life stages from birth to
 natural death
 \downarrow
 growth + differentiation

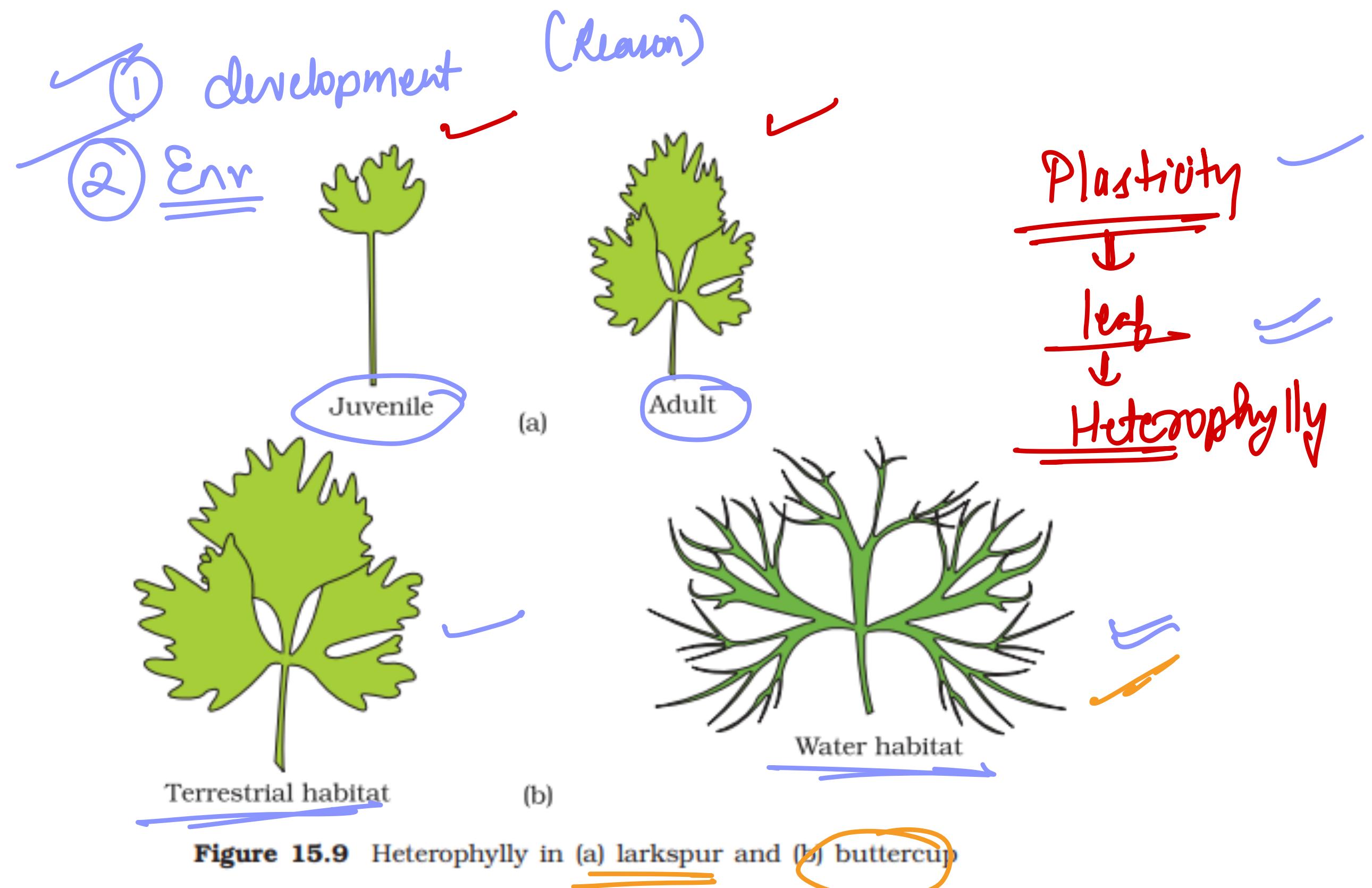
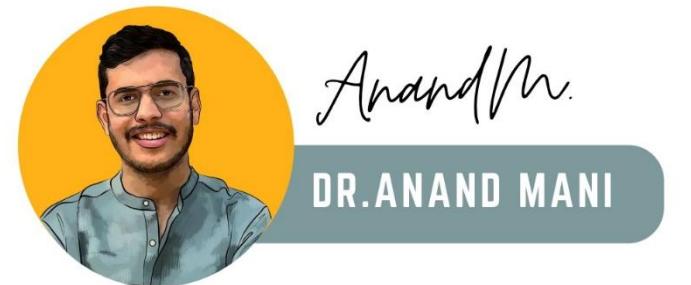


Figure 15.9 Heterophily in (a) larkspur and (b) buttercup

Cotton,
Coriander

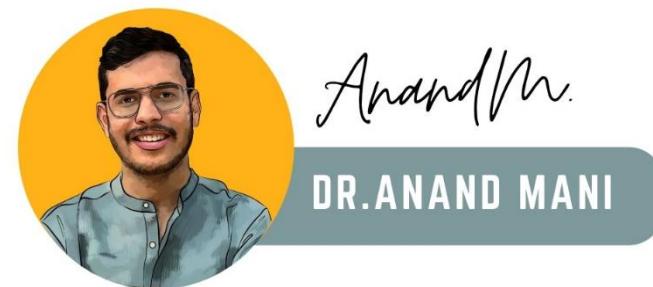
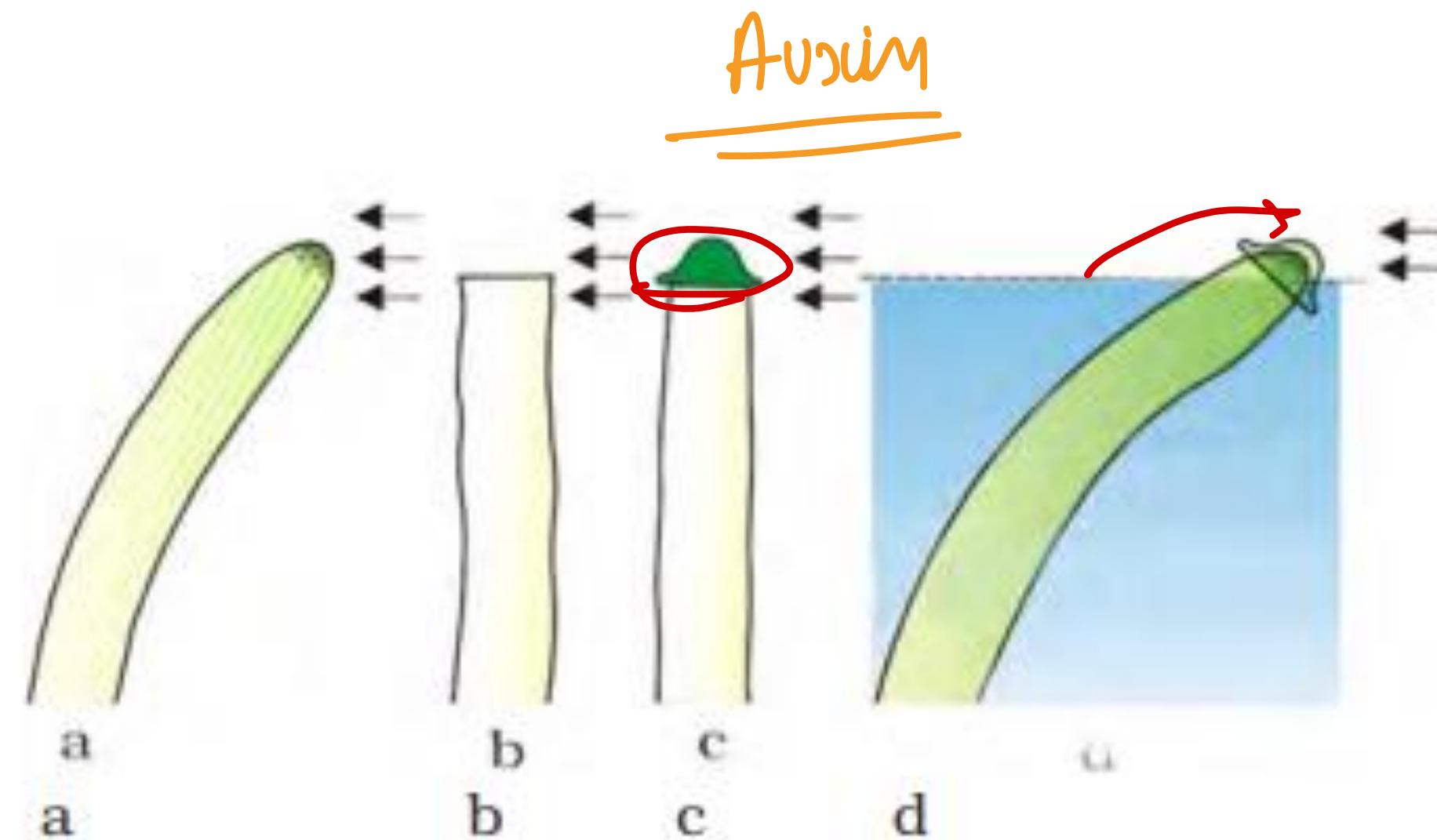


Figure 15.10 Experiment used to demonstrate that tip of the coleoptile is the source of auxin. Arrows indicate direction of light

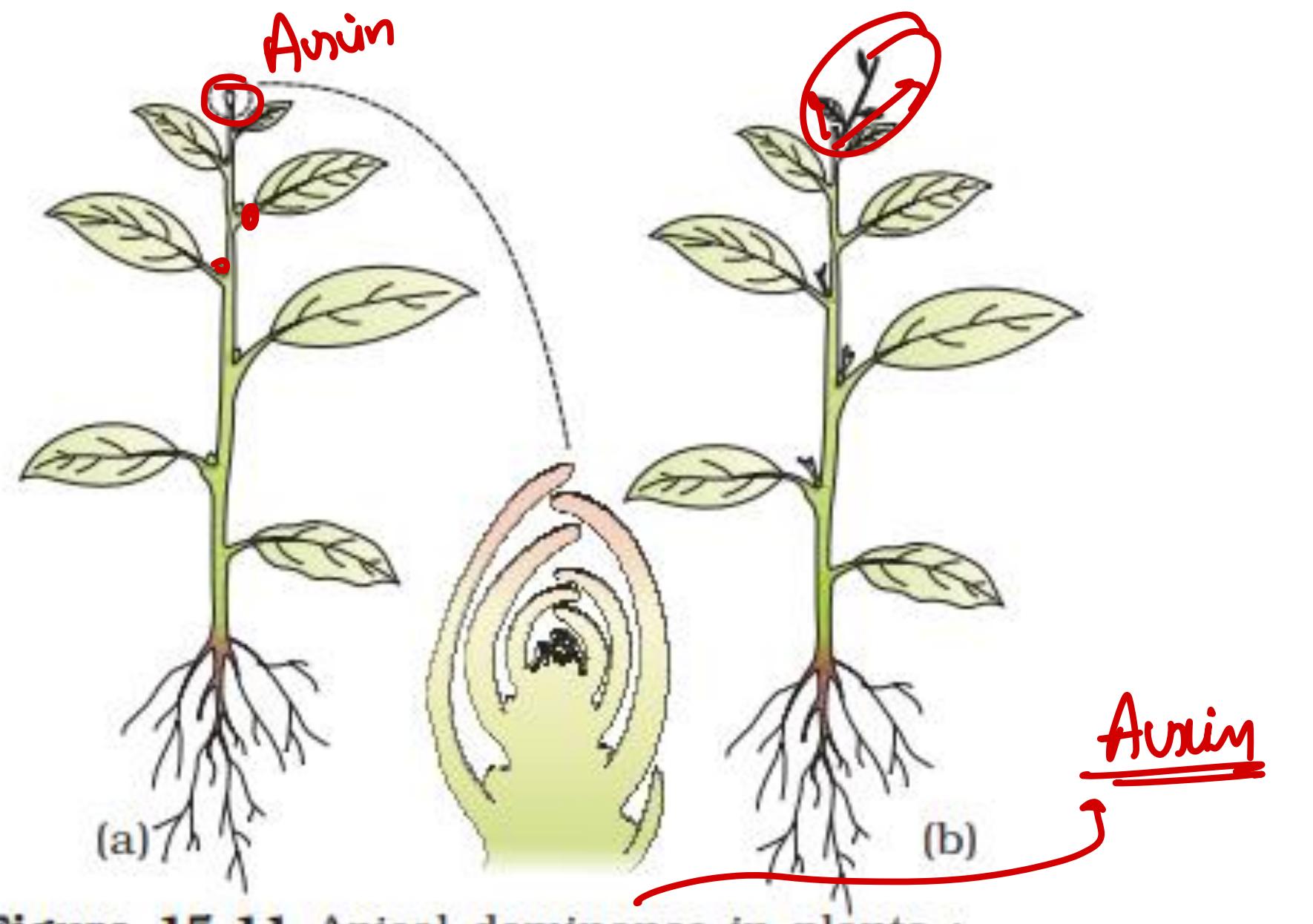
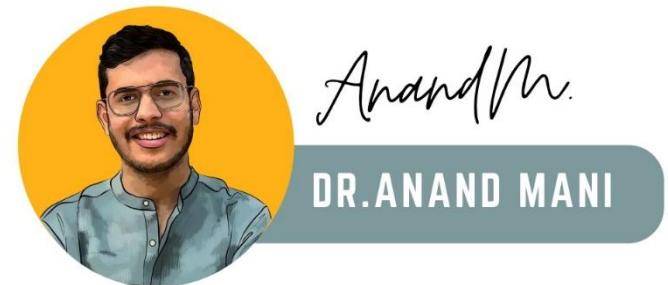


Figure 15.11 Apical dominance in plants :

- (a) A plant with apical bud intact
- (b) A plant with apical bud removed

Note the growth of lateral buds into branches after decapitation.





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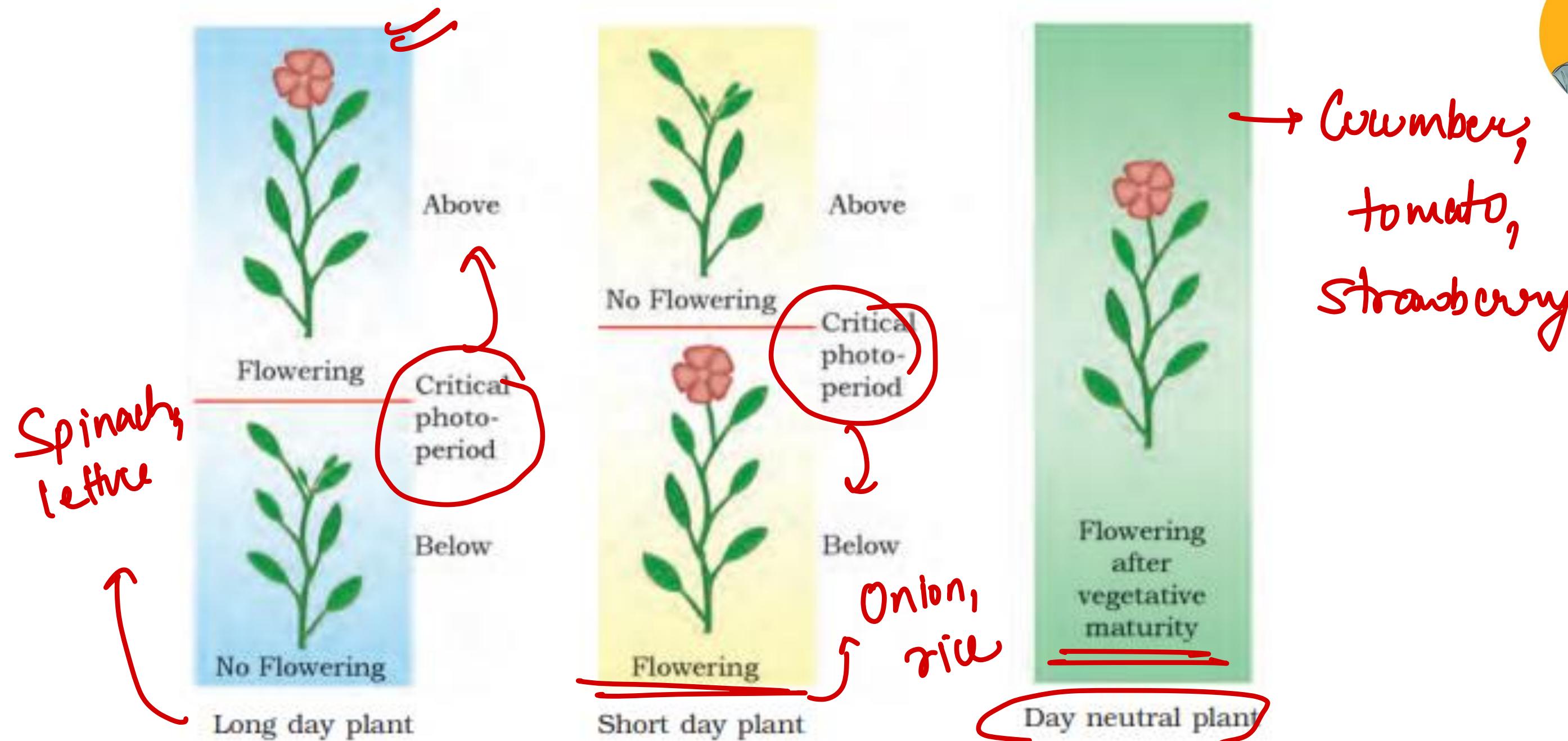


Figure 15.12 Photoperiodism : Long day, short day and day neutral plants

HUMAN PHYSIOLOGY

CHAPTER-16

DIGESTION AND

ABSORPTION

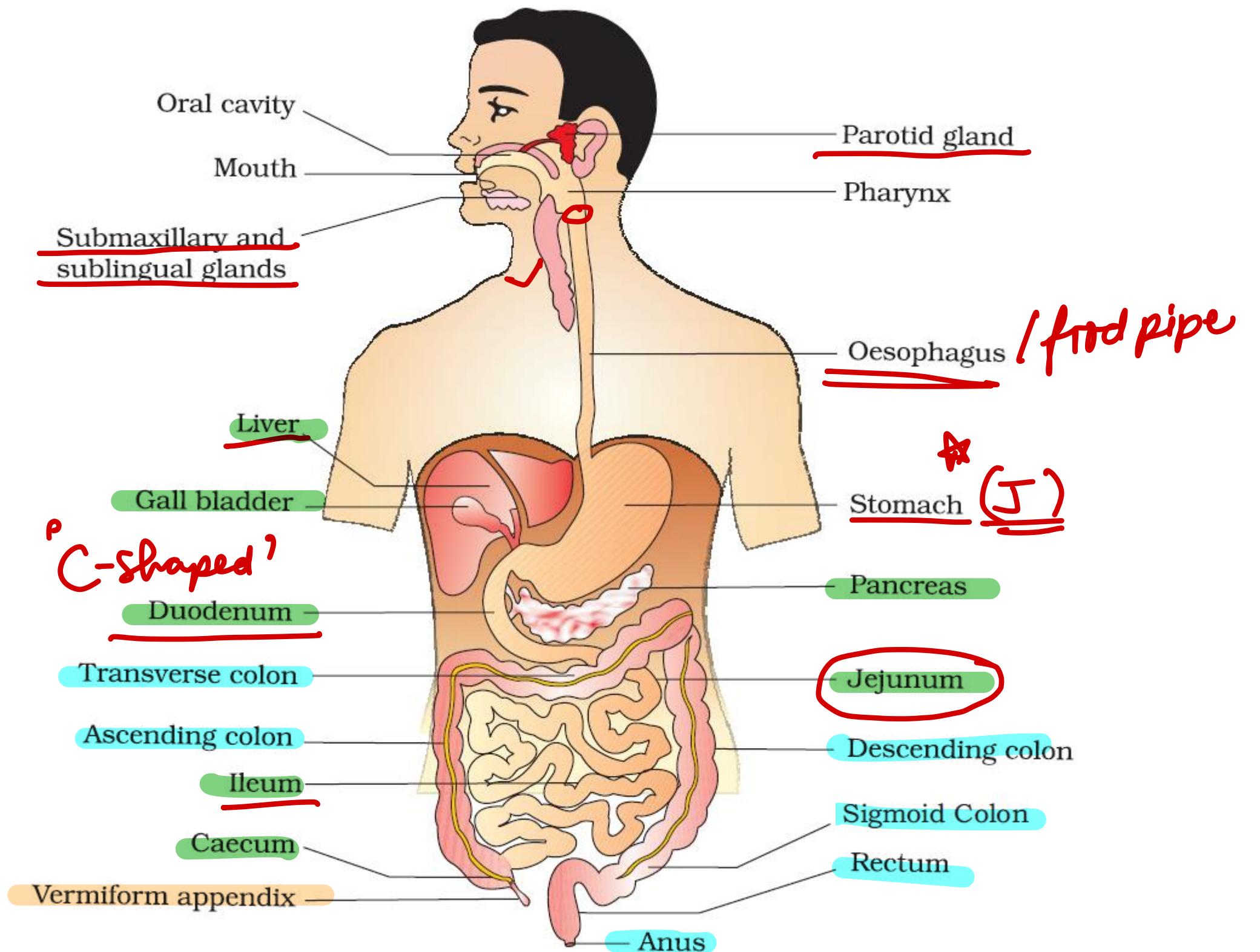
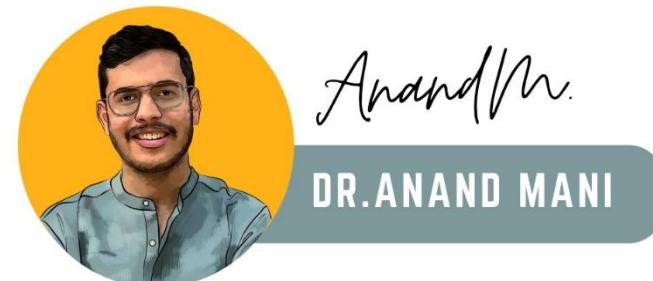


Figure 16.1 The human digestive system



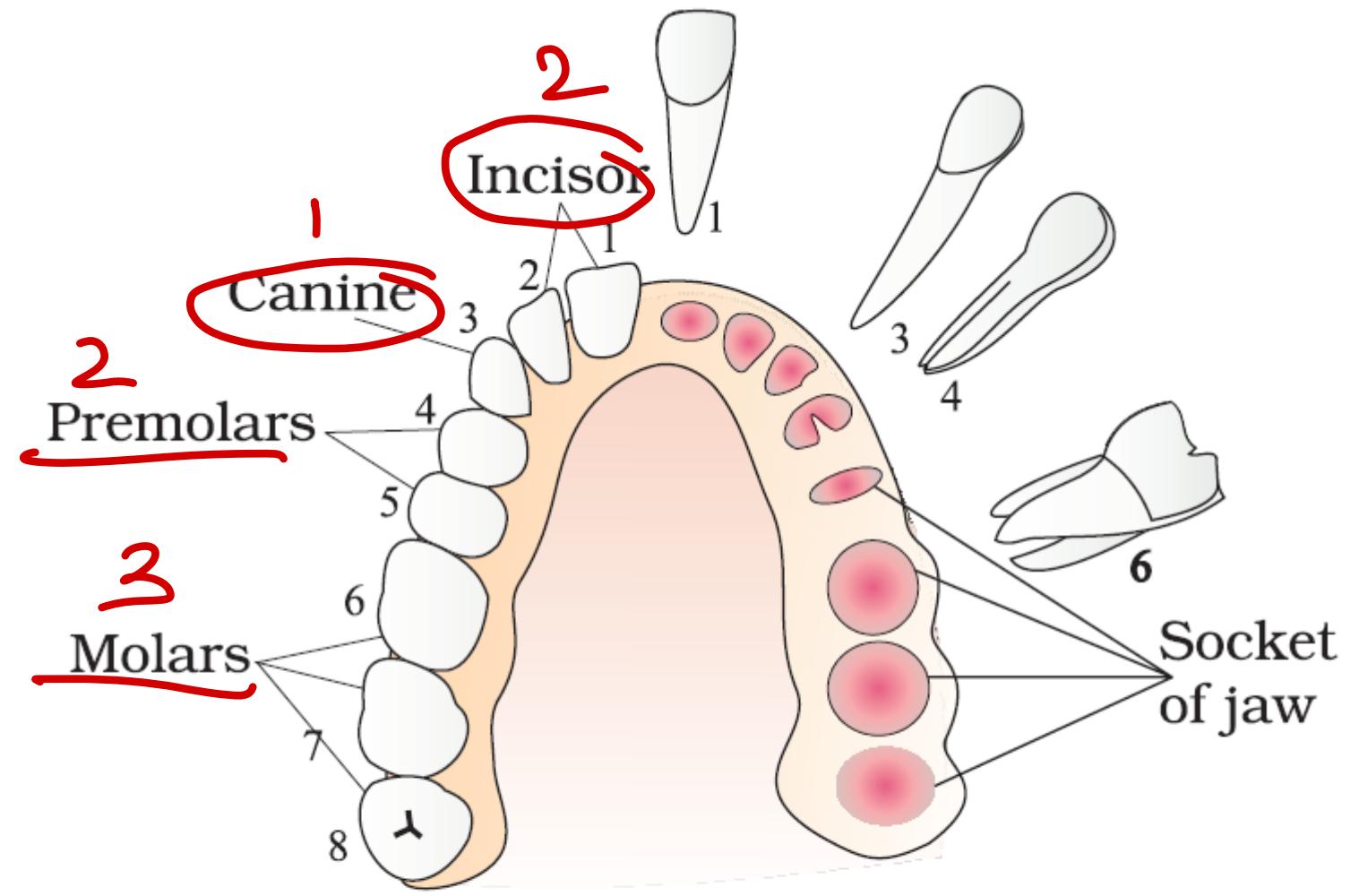


Figure 16.2 Arrangement of different types of teeth in the jaws on one side and the sockets on the other side

Premolar
last molar

$$\text{Infants} = \frac{2102}{2102}$$

Dental formula

$$\frac{2123}{2123}$$

- Heterodont
- Thecodont
- Diphyodont



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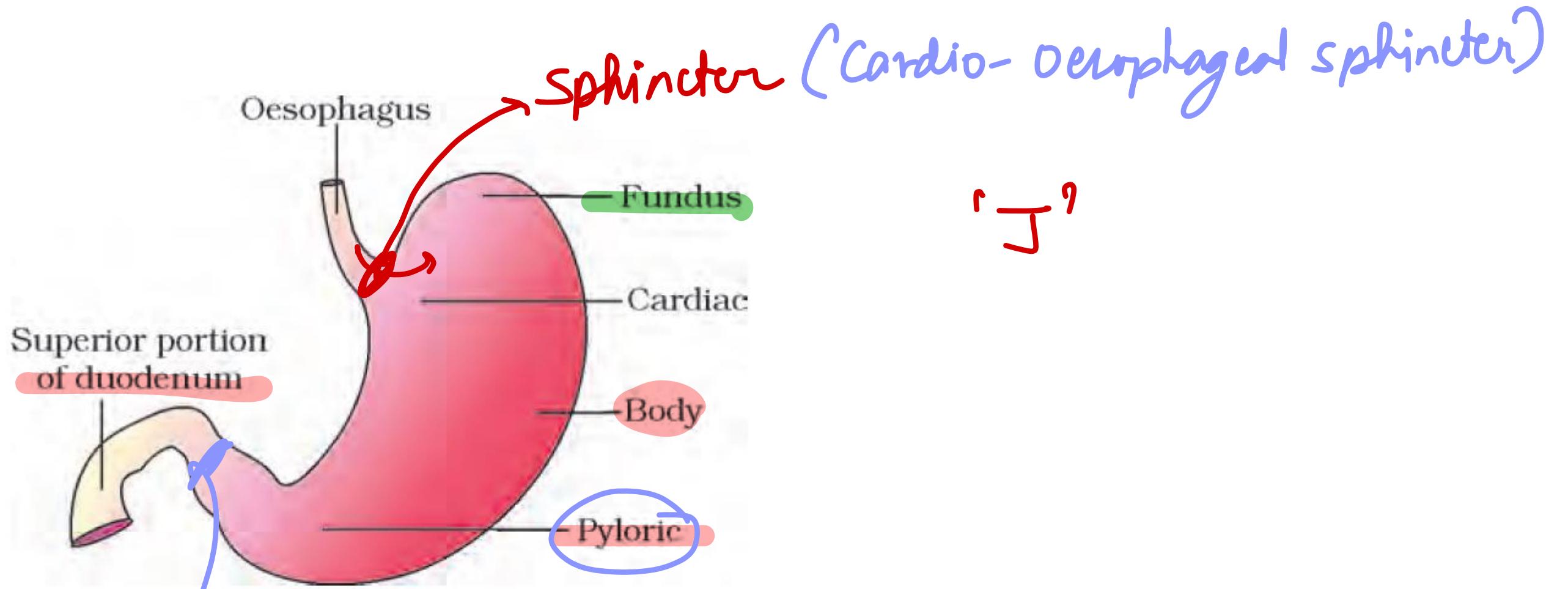
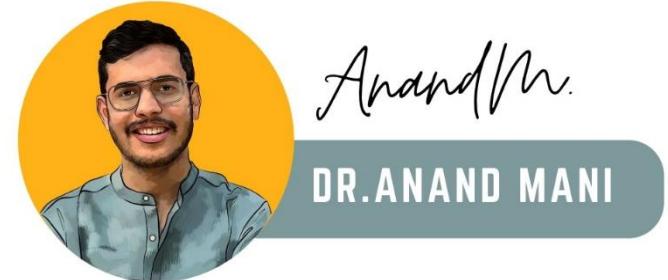
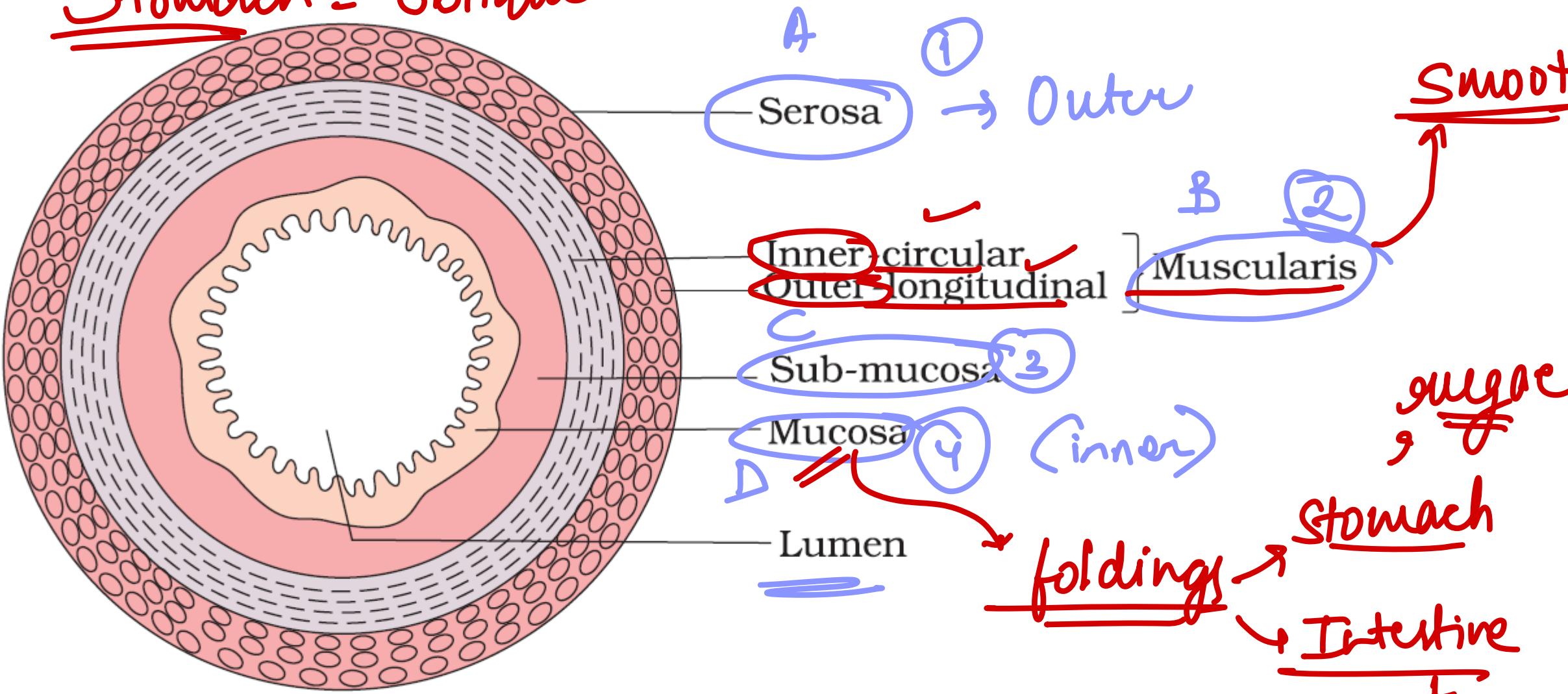


Figure 16.3 Anatomical regions of human stomach

Pyloric sphincter



Stomach = oblique



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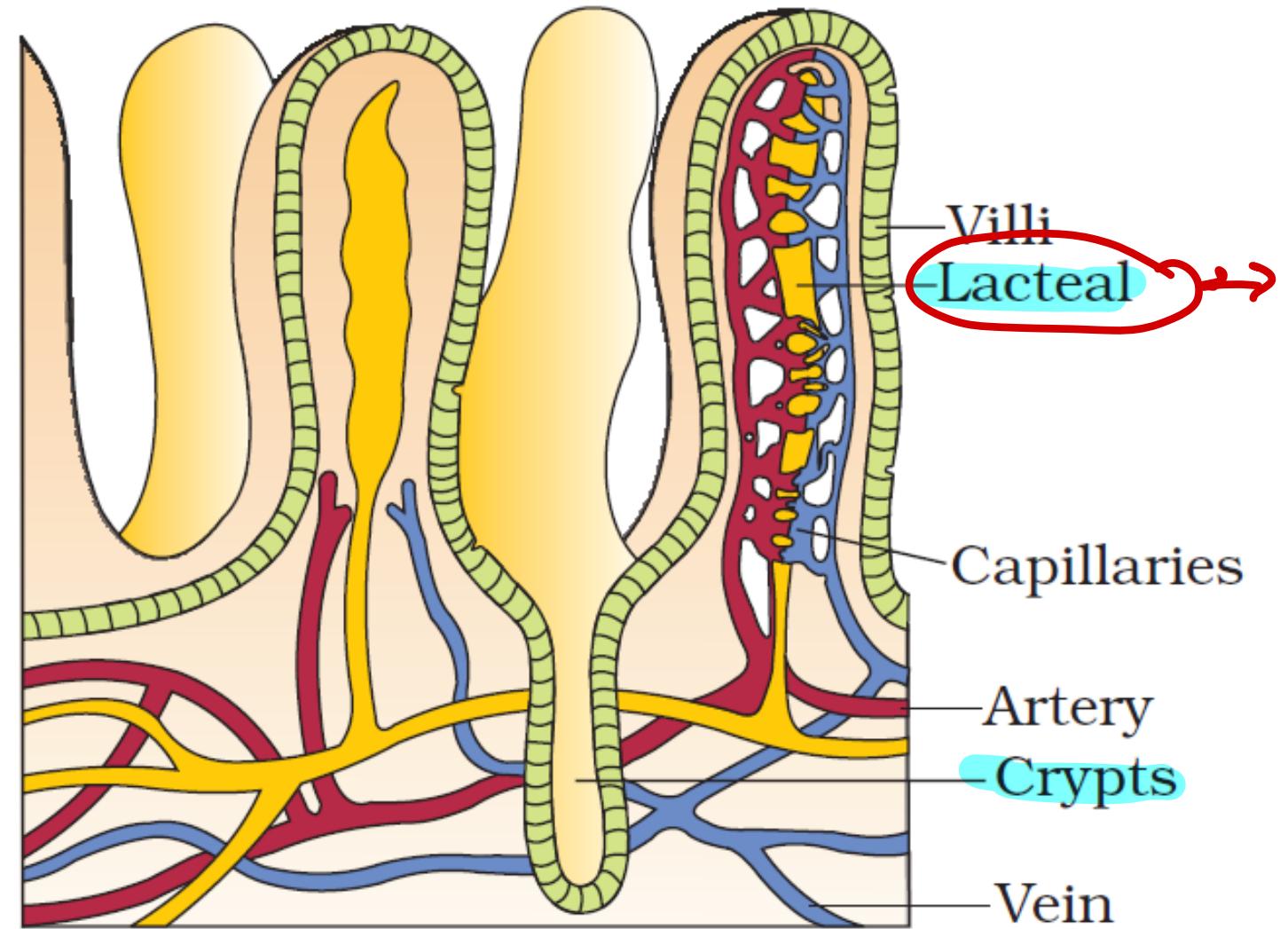
Figure 16.4 Diagrammatic representation of transverse section of gut

① \Rightarrow Layer = ④

② \Rightarrow Sequence

③ Brunner's gland \rightarrow Sub mucosa

④ arteries / veins , nerves = Sub mucosa



Villi
Lacteal
Capillaries
Artery
Crypts
Vein

lacteal lymphatic vessel
↓
Fat absorption

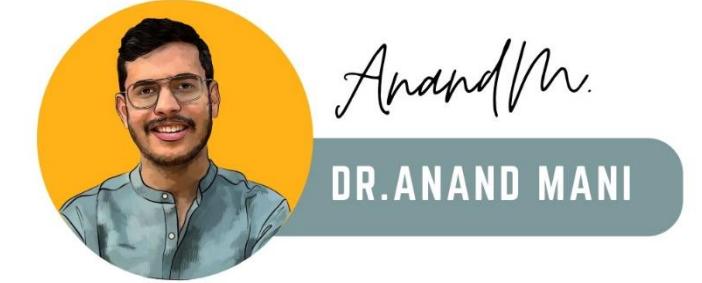


Figure 16.5 A section of small intestinal mucosa showing villi

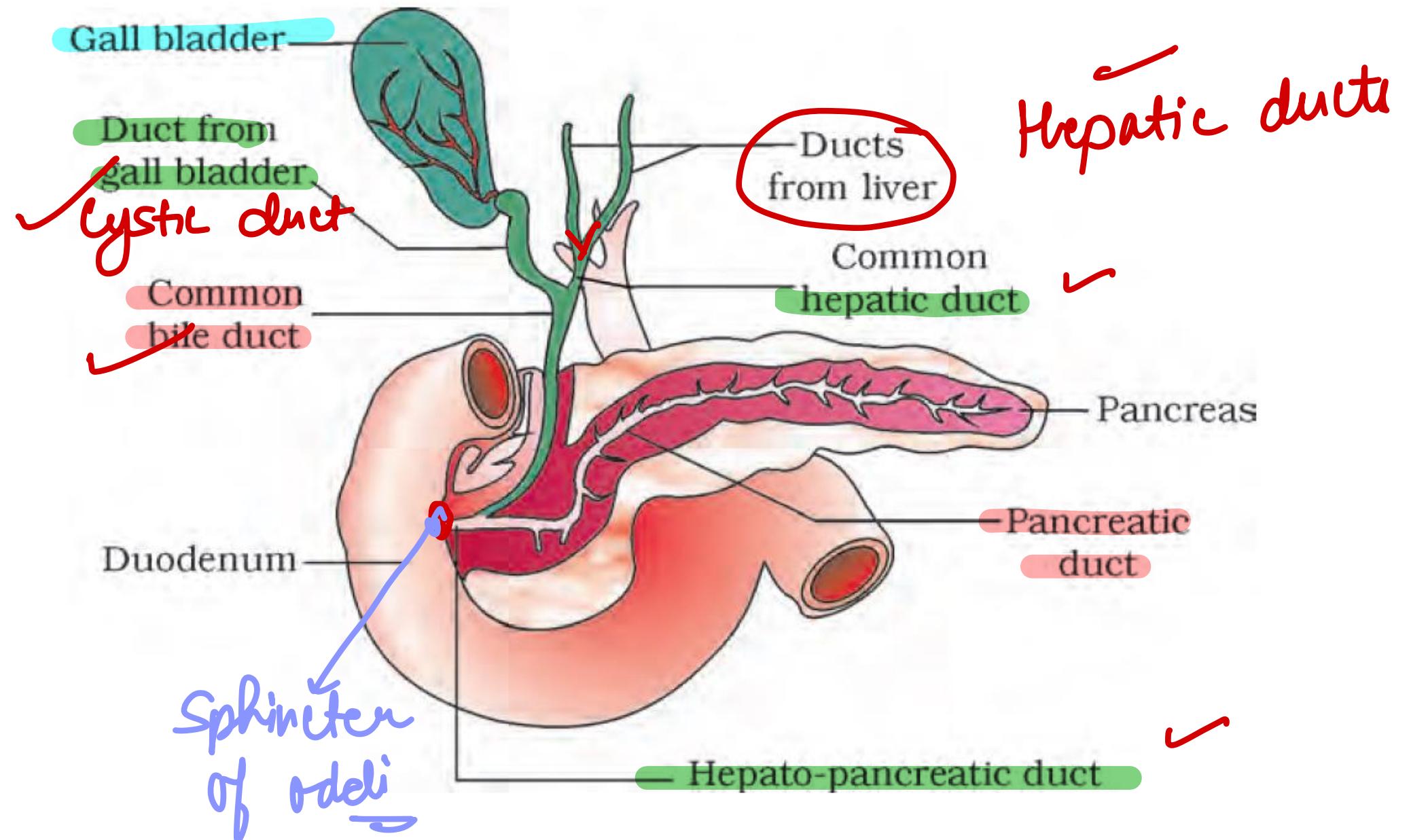
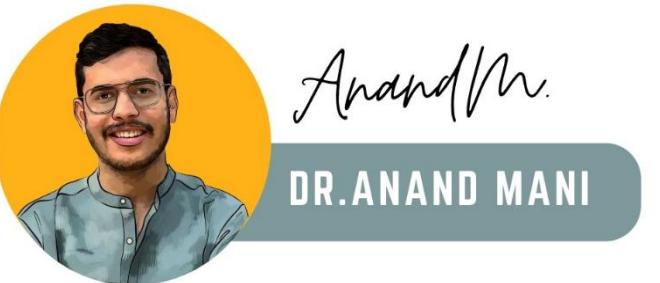


Figure 16.6 The duct systems of liver, gall bladder and pancreas

CHAPTER-17



BREATHING AND EXCHANGE OF GASES

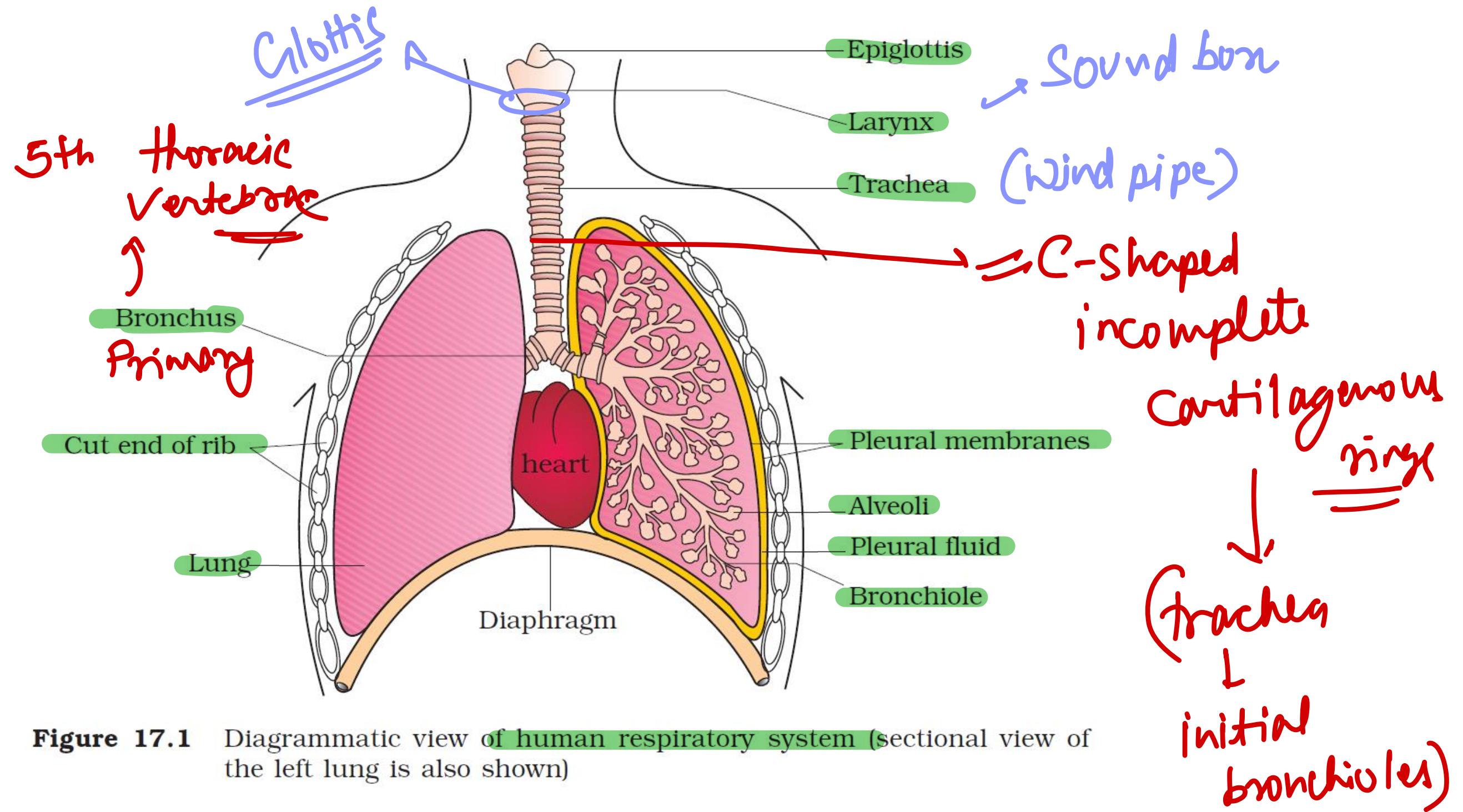
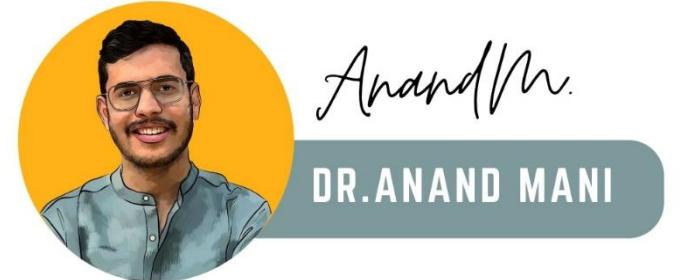
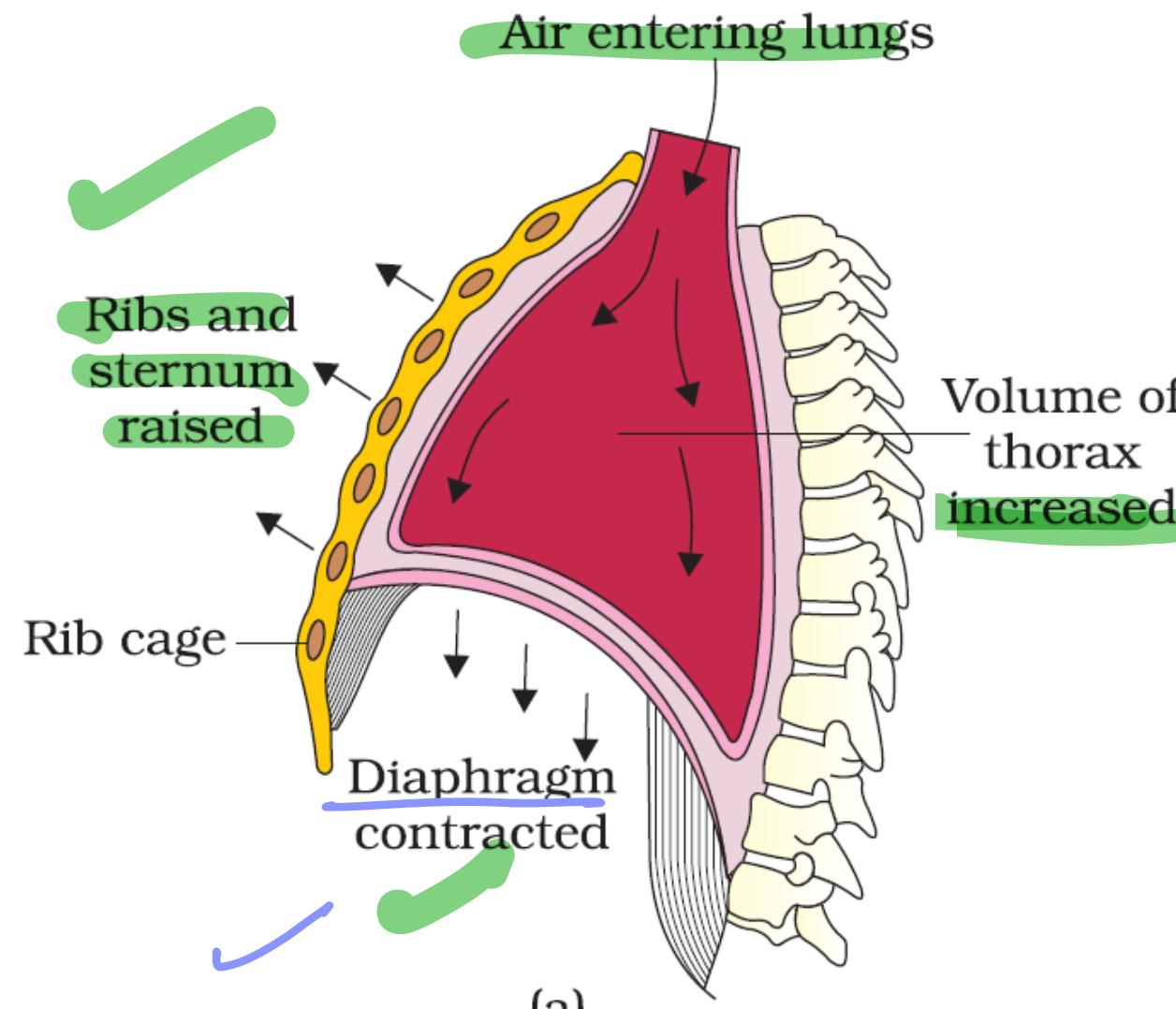


Figure 17.1 Diagrammatic view of human respiratory system (sectional view of the left lung is also shown)



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Intra pulmonary pressure
Atm pressure
Intra pulmonary volume ↑↑↑

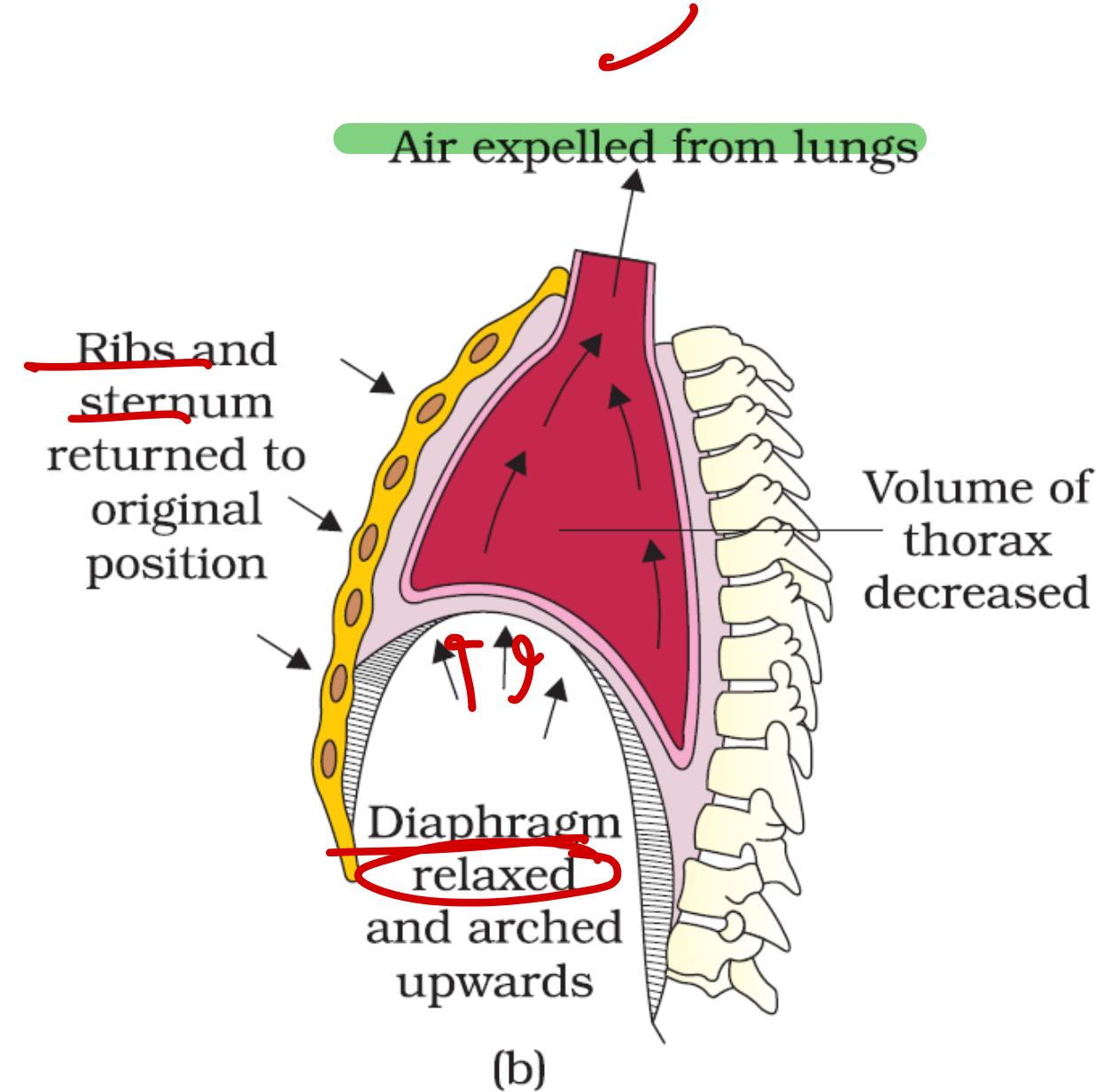


Figure 17.2 Mechanism of breathing showing :
 (a) inspiration (b) expiration

Intra Pulmonary pressure > Atm pressure
 Intra Pulmonary volume ↑↑↑

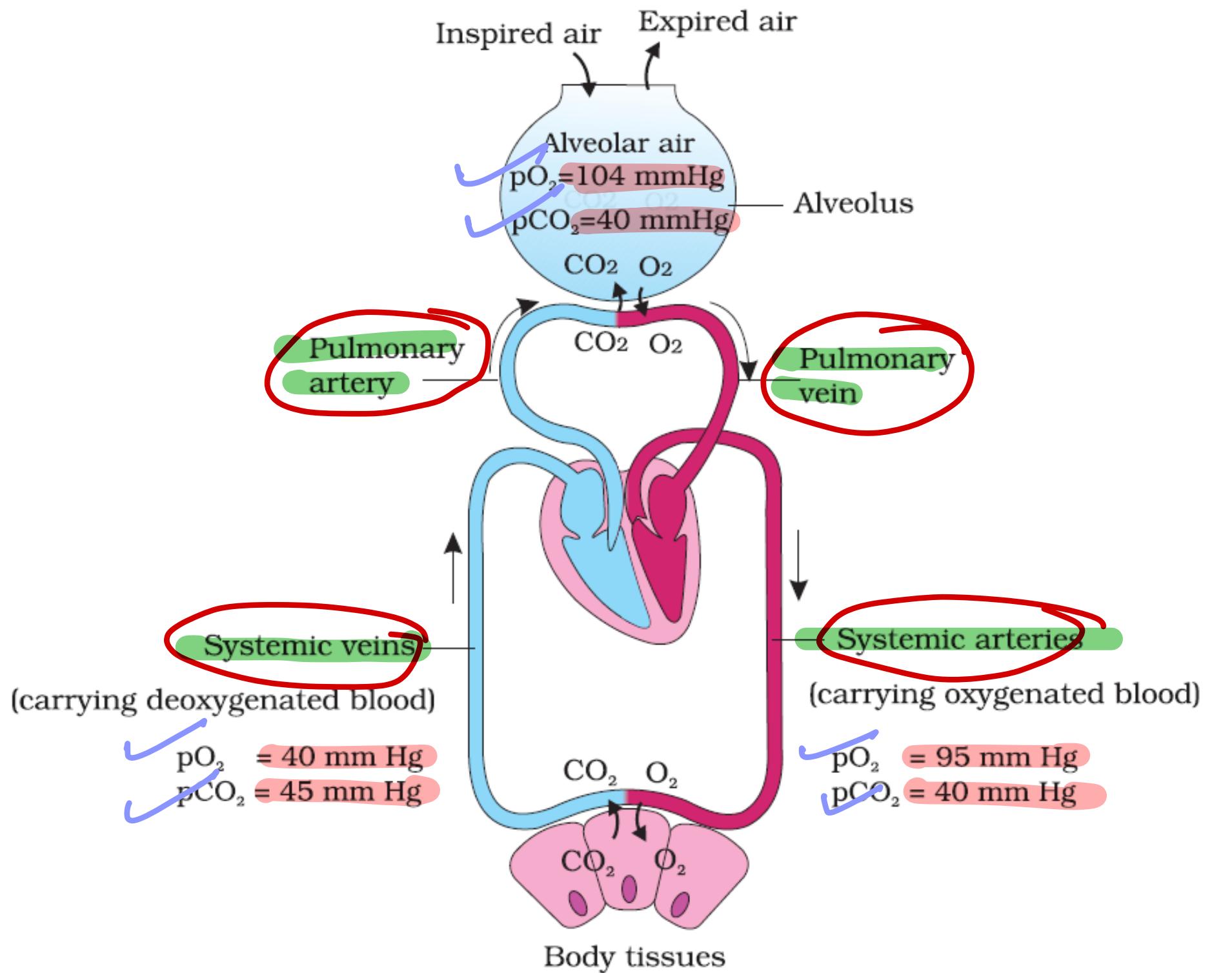
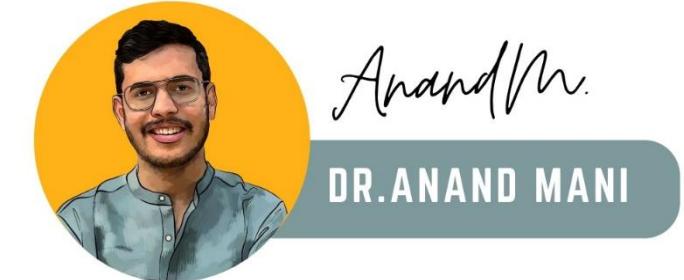


Figure 17.3 Diagrammatic representation of exchange of gases at the alveolus and the body tissues with blood and transport of oxygen and carbon dioxide

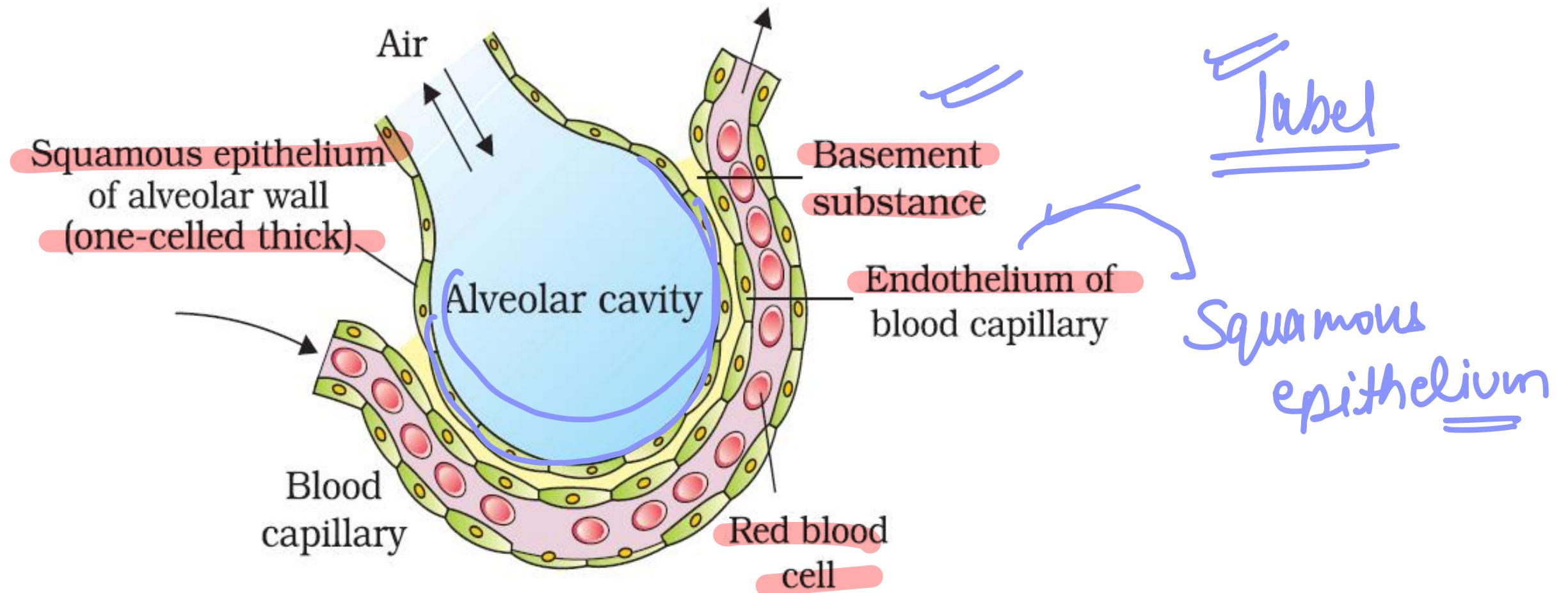
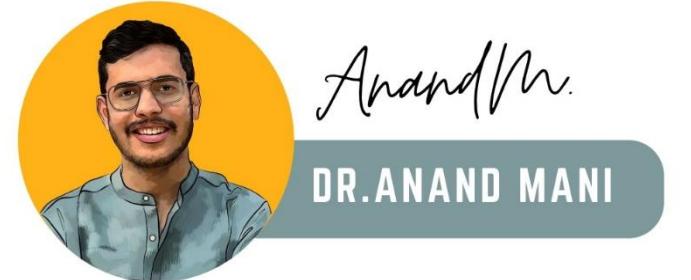


Figure 17.4 A Diagram of a section of an alveolus with a pulmonary capillary.

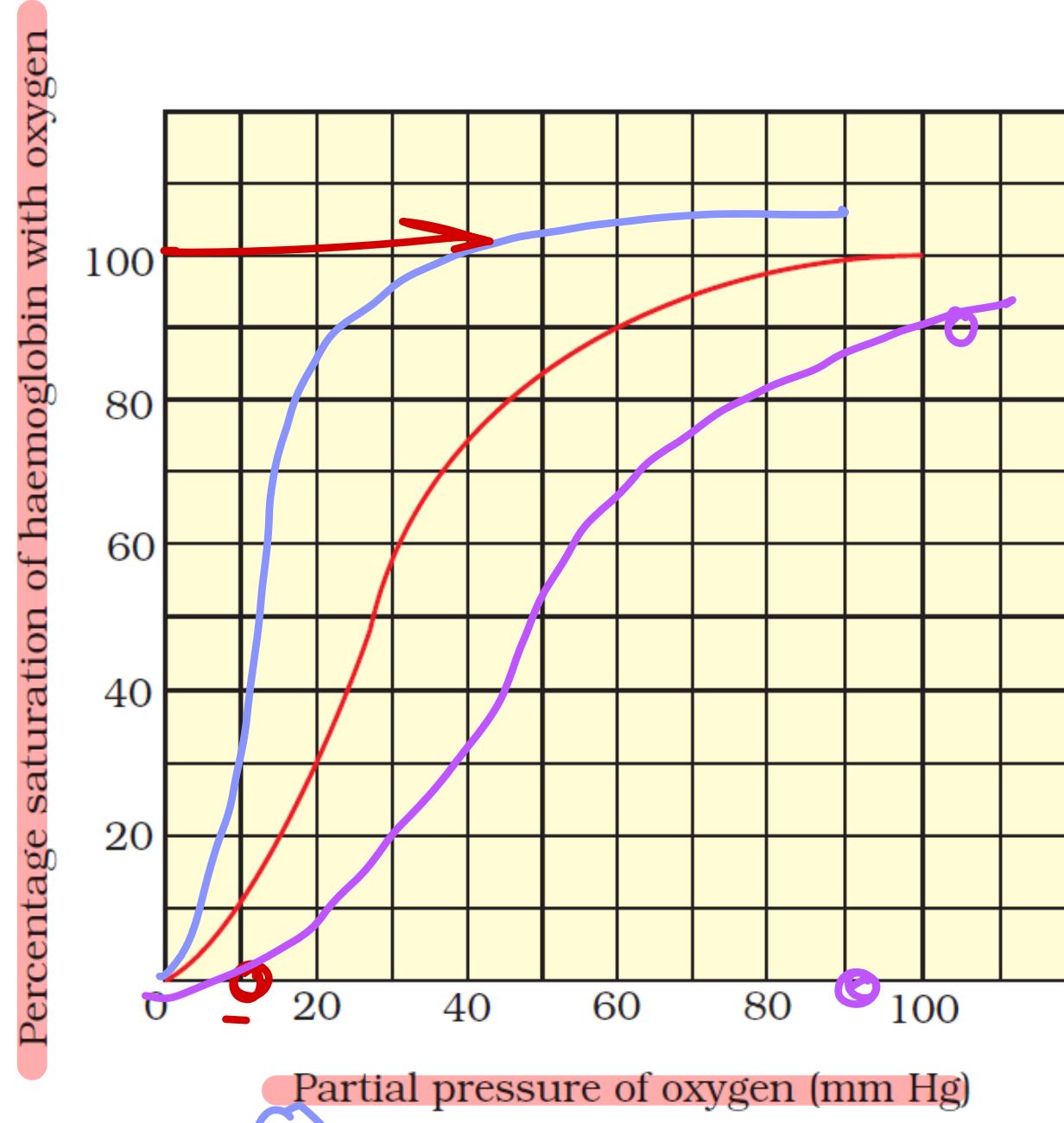


Figure 17.5 Oxygen dissociation curve

- ① $P_{O_2} \uparrow$
- ② $P_{CO_2} \downarrow$
- ③ temp \downarrow
- ④ $H^+ \text{ conc} \downarrow$
- ② Sigmoid
- ③ left shift
→ oxygen associated

- ① $P_{O_2} \downarrow$
- ② $P_{CO_2} \uparrow$
- ③ temp \uparrow
- ④ $H^+ \uparrow$
- right shift
→ oxygen dissociate



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CHAPTER-18

BODY FLUIDS AND

CIRCULATION

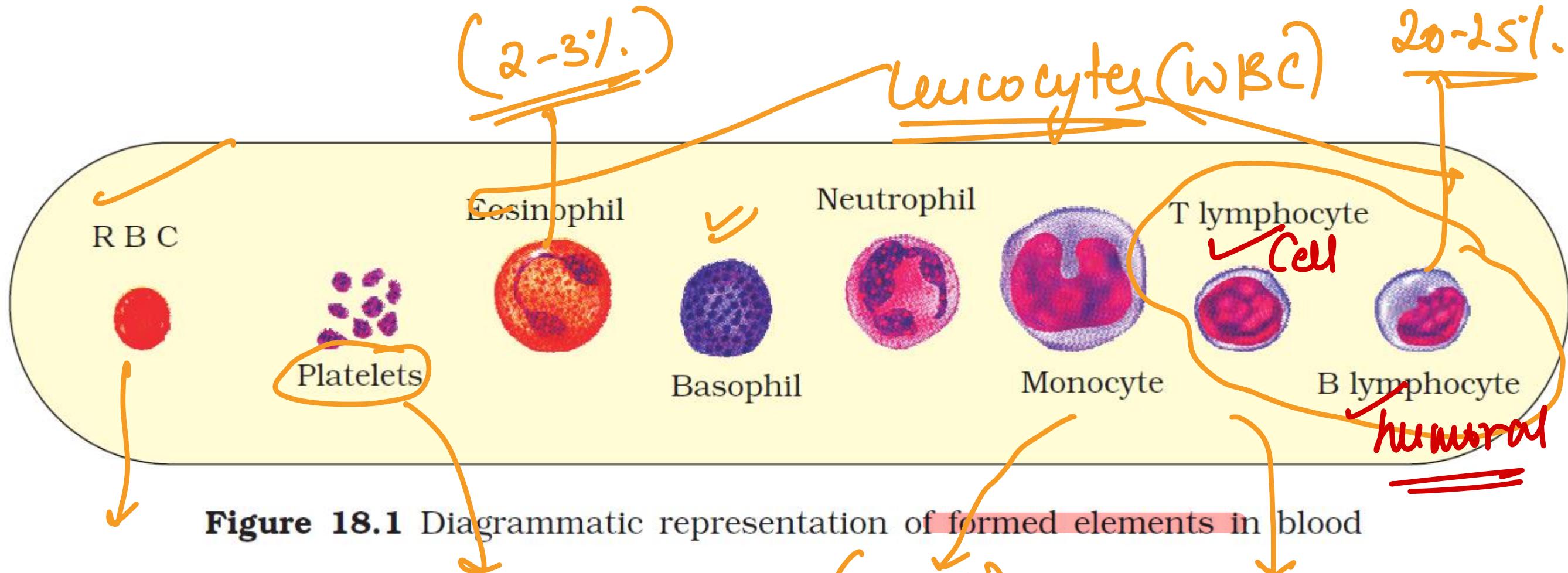


Figure 18.1 Diagrammatic representation of formed elements in blood

→ erythrocyte

- 120 days

→ Biconcave

→ enucleated

Phagocytosis
Neutro, Mono

thrombocyte

blood

coagulation

(6-8%)

Max: Neutrophils

60-65%

Min: Basophil

(0.5-1%)

[Neu > Lympho > Mono > Eosino >
Bais]



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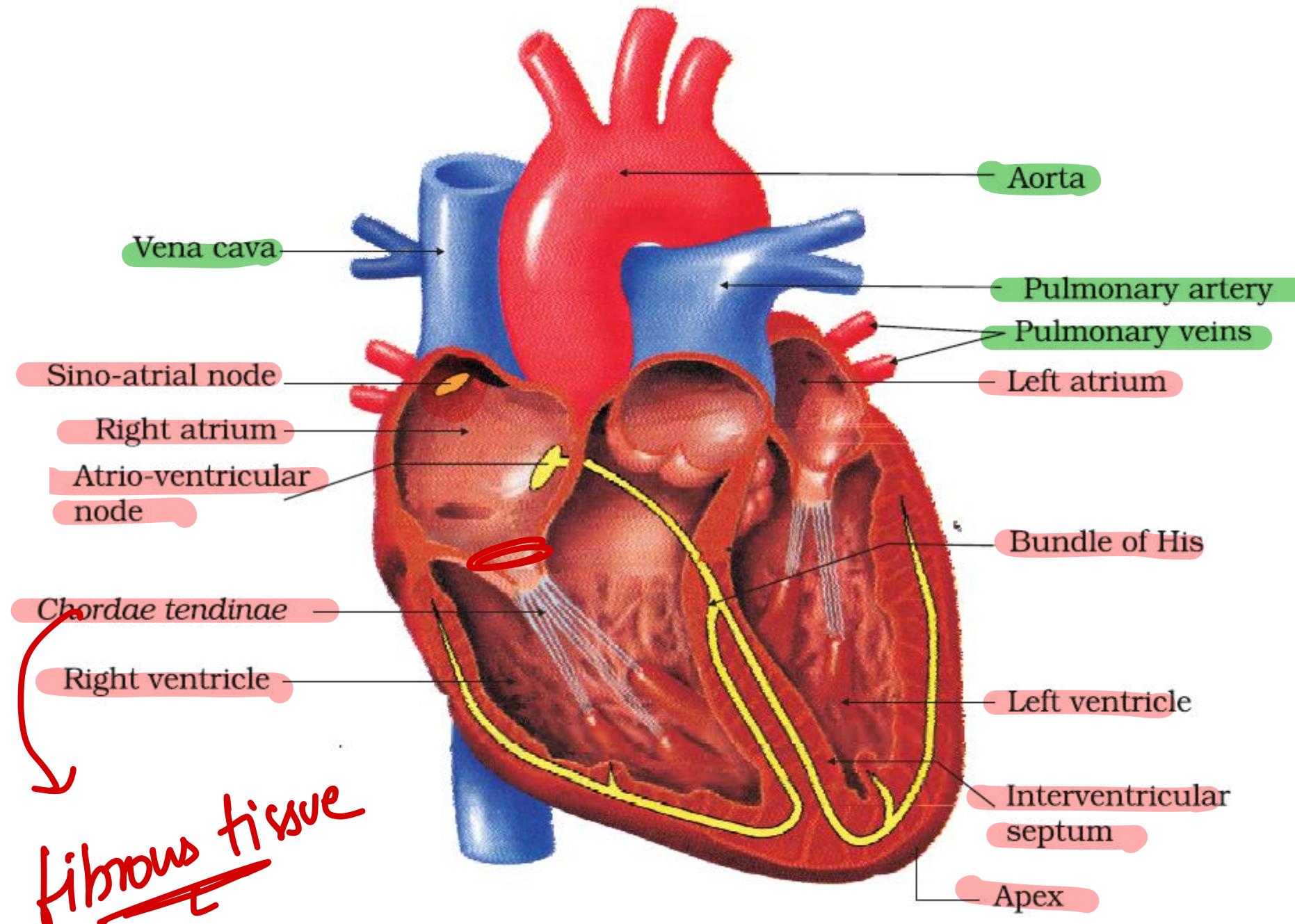
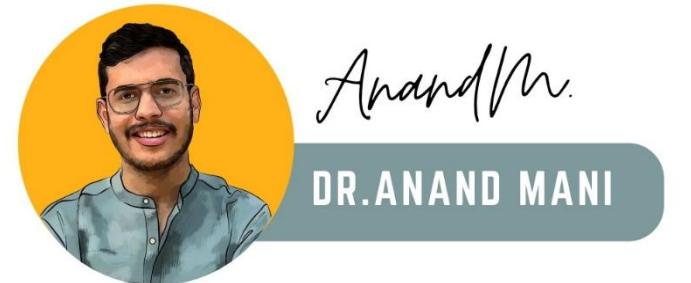


Figure 18.2 Section of a human heart

Valve
connex
papillary
muscles

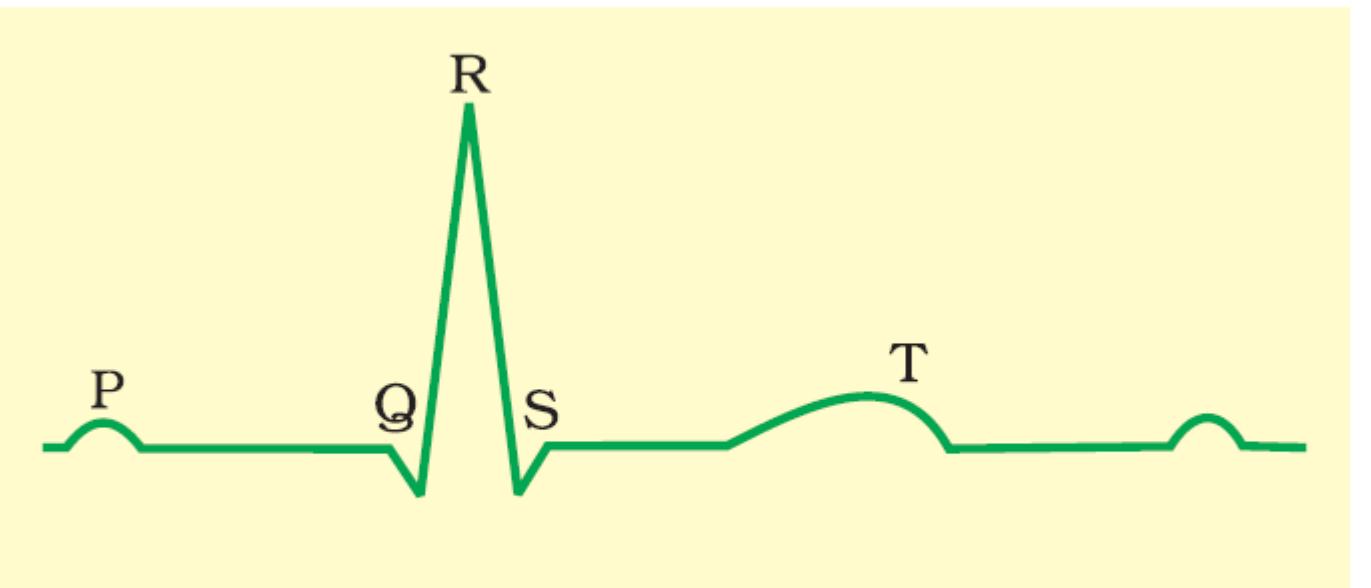
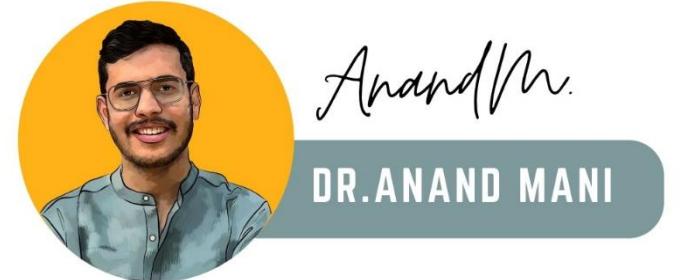


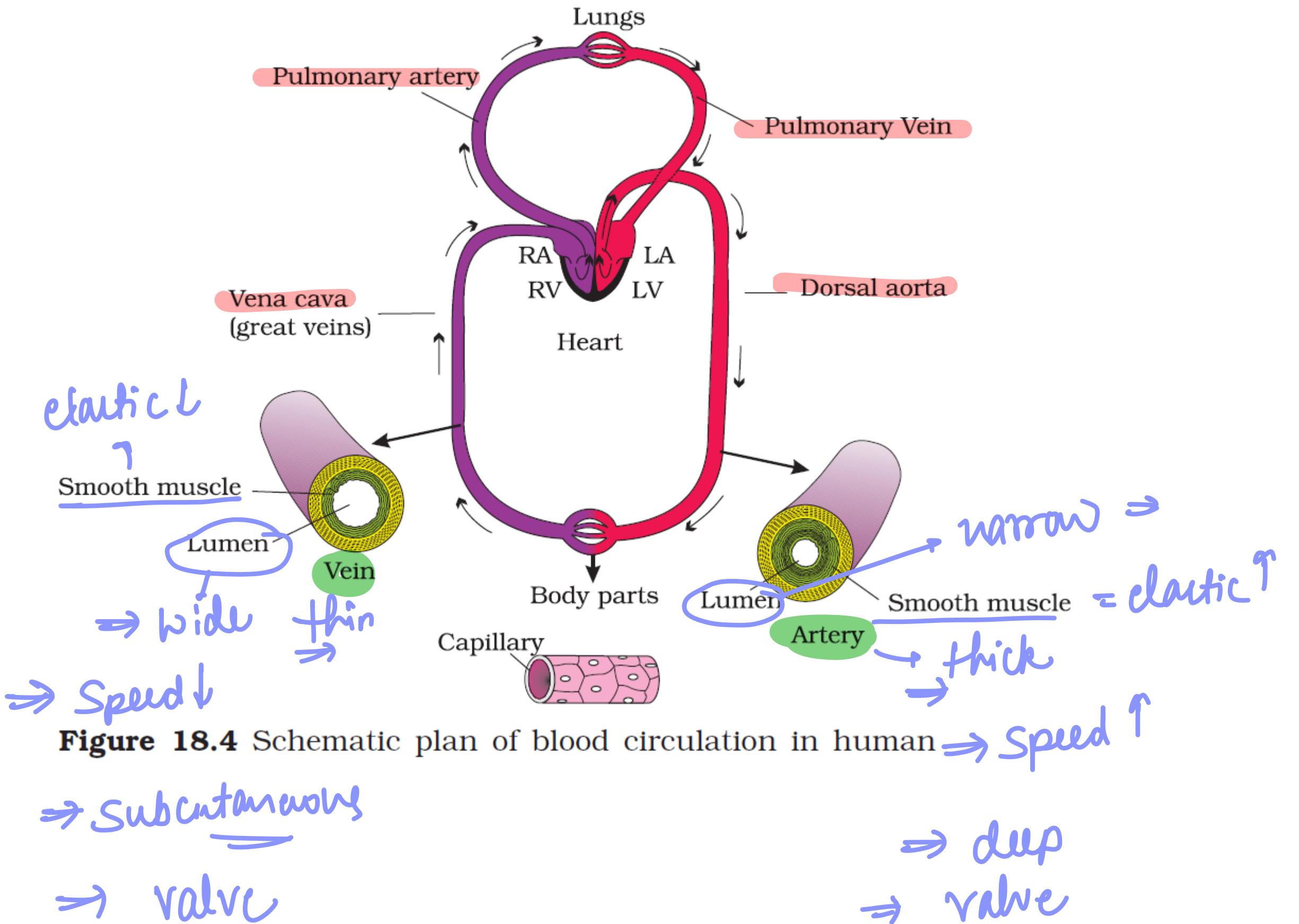
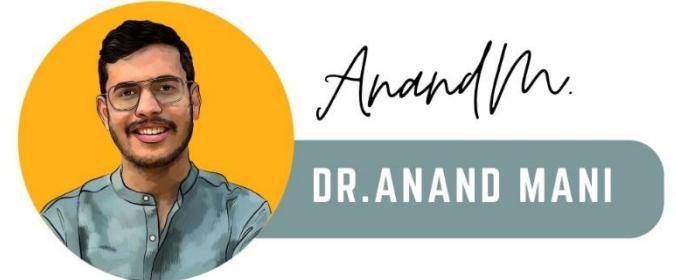
Figure 18.3 Diagrammatic presentation of a standard ECG

P = atrial Systole

QRS = ventricular Systole ✓

T = ventricular diastole

Heart rate



CHAPTER-19

EXCRETORY

PRODUCTS AND THEIR

ELIMINATION

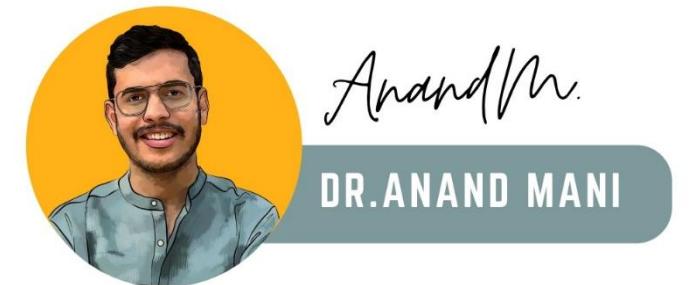
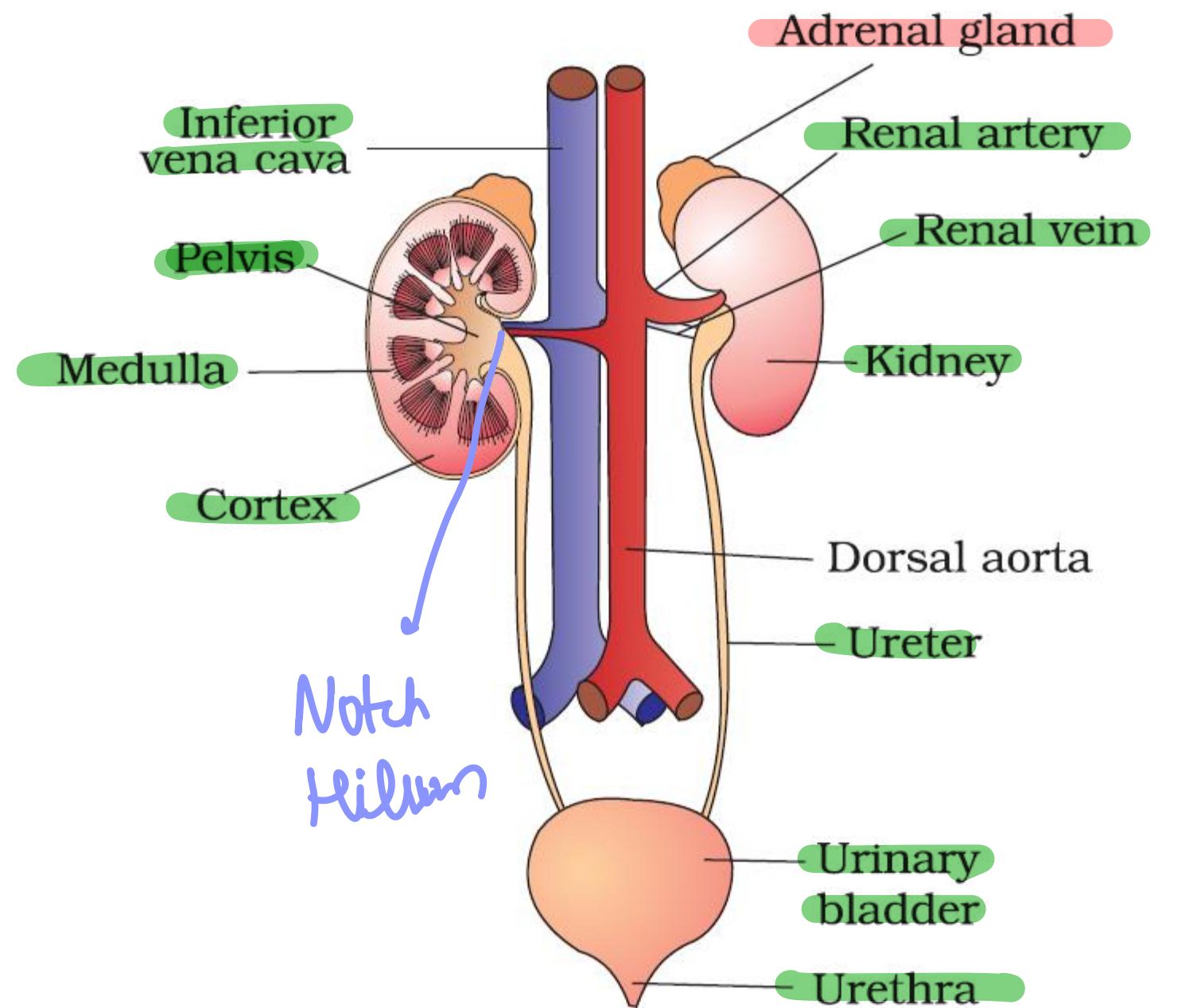
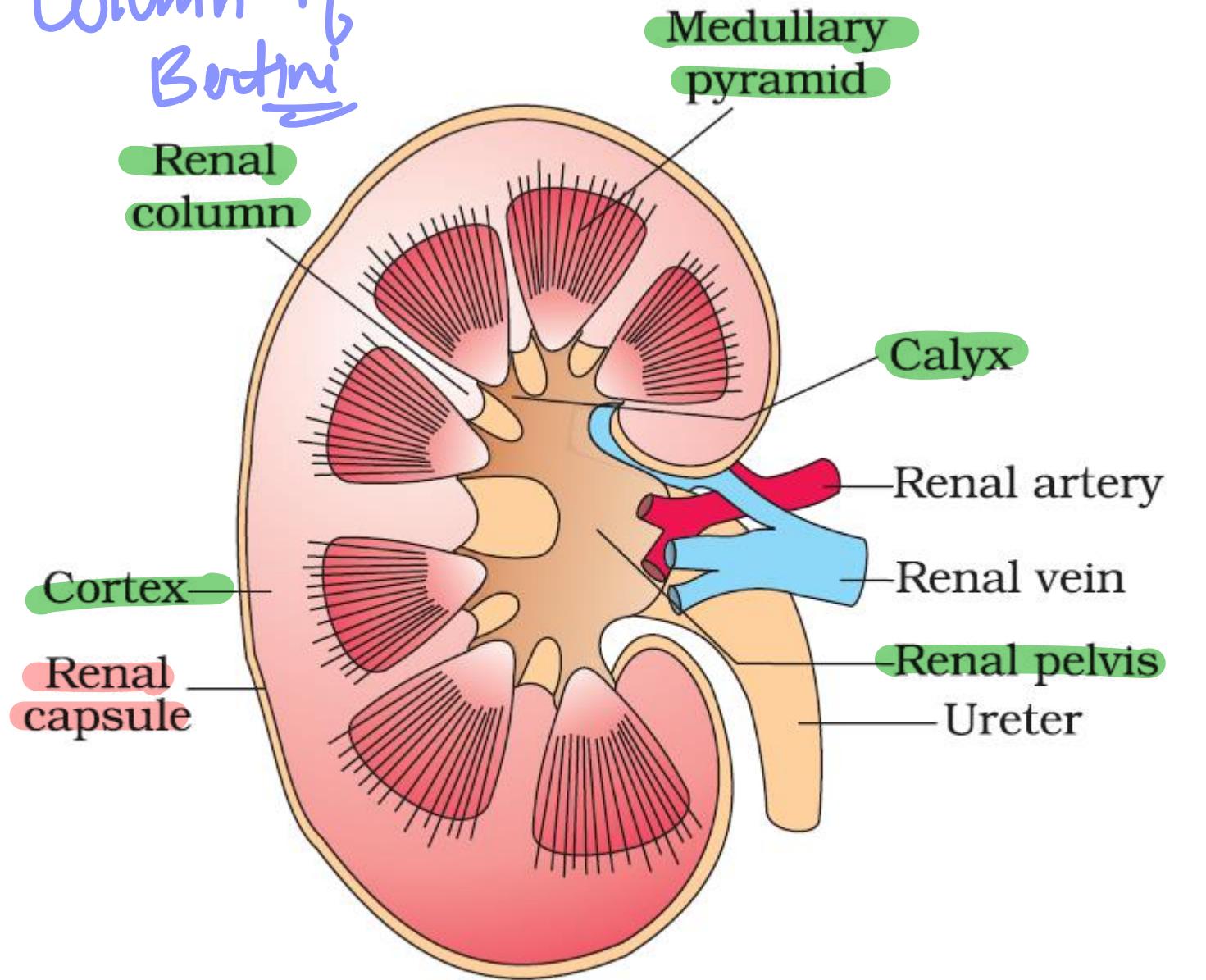


Figure 19.1 Human Urinary system

*Column of
Bertini*



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Figure 19.2 Longitudinal section (Diagrammatic) of Kidney

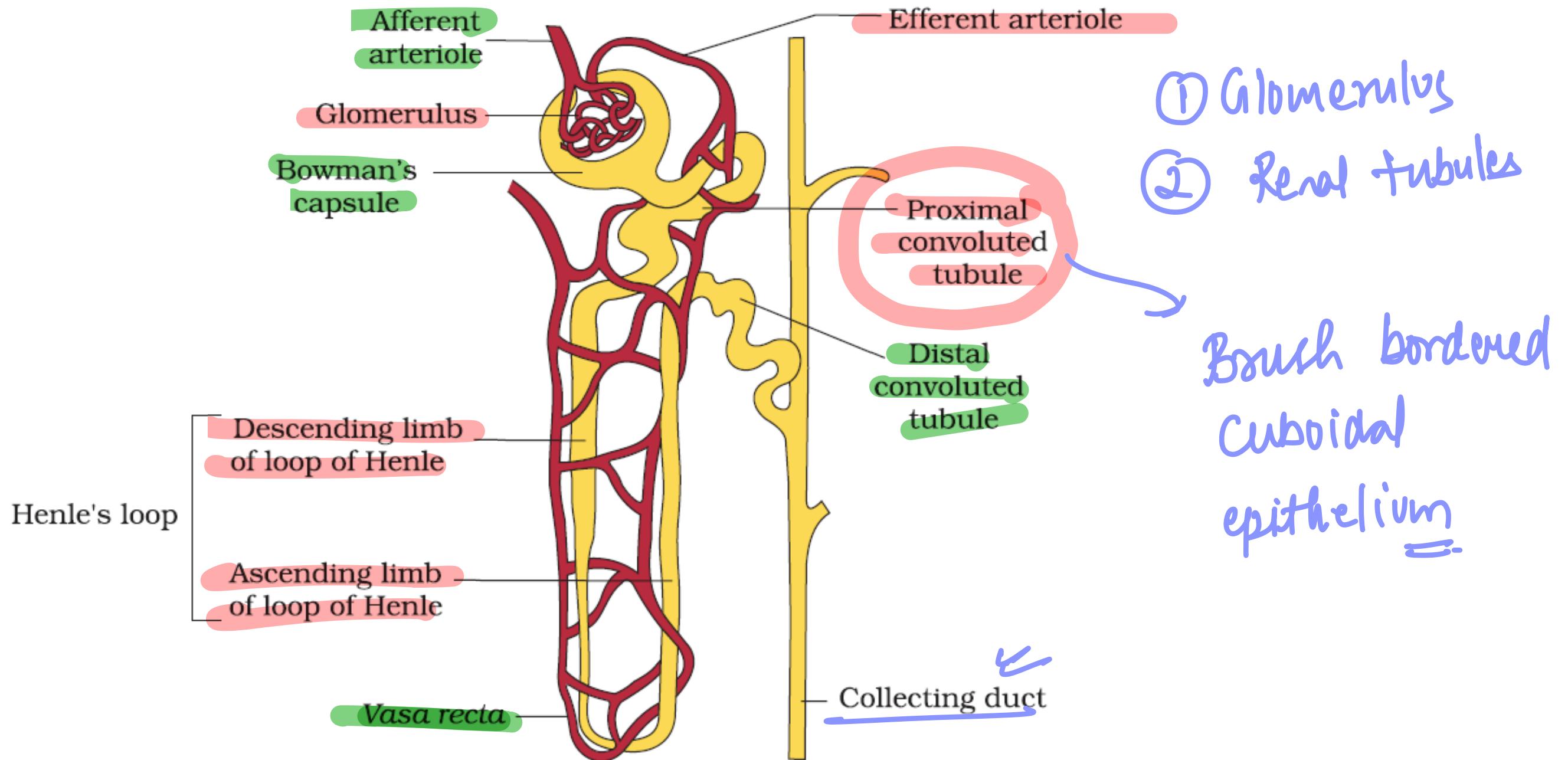
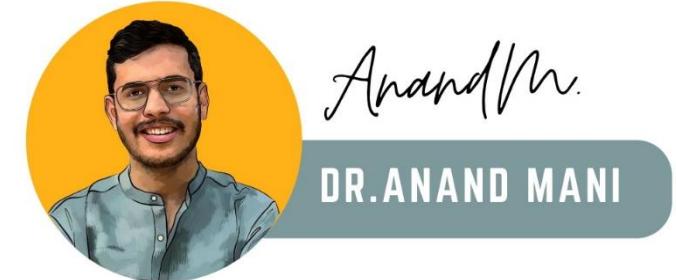


Figure 19.3 A diagrammatic representation of a nephron showing blood vessels, duct and tubule



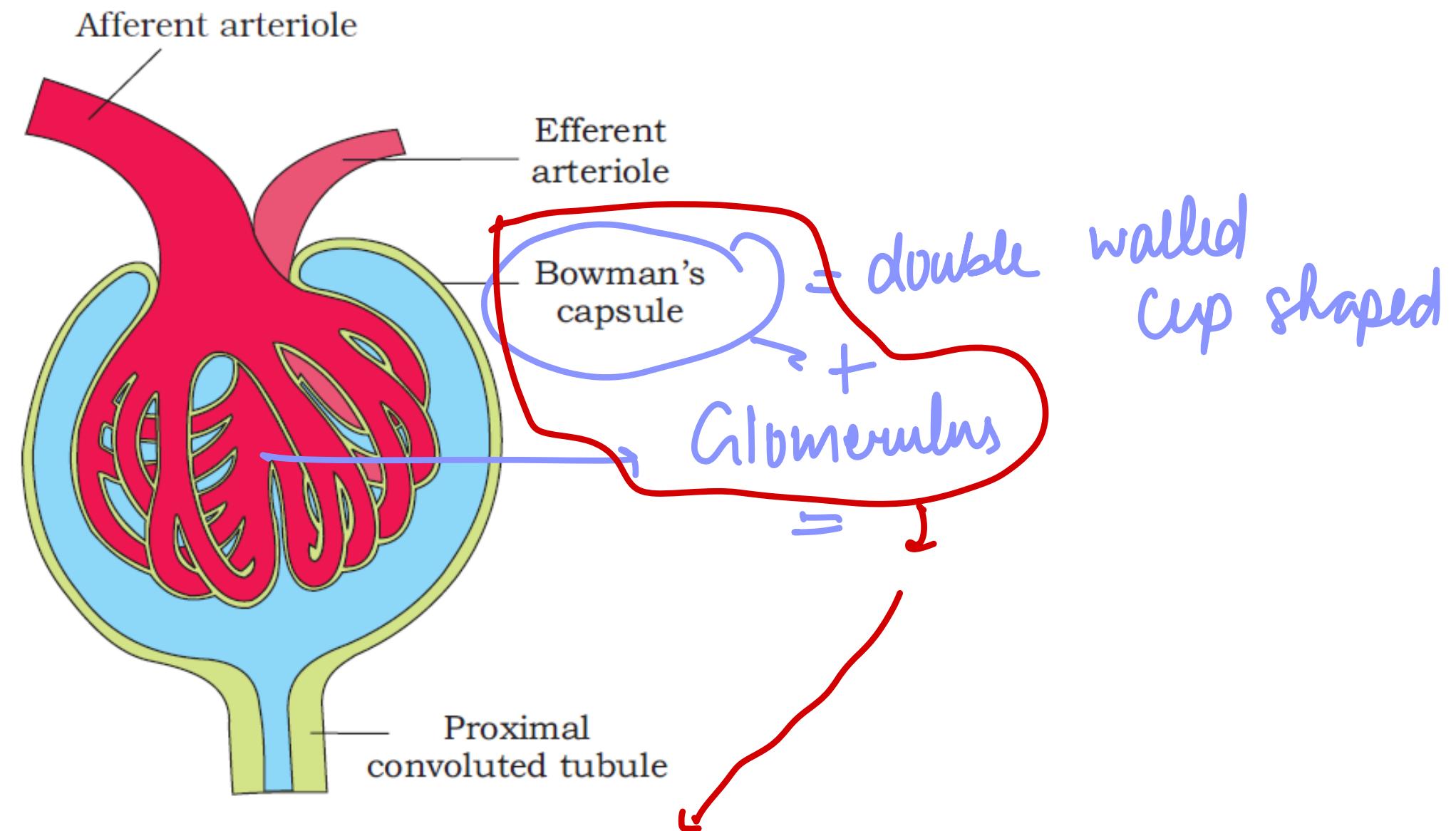
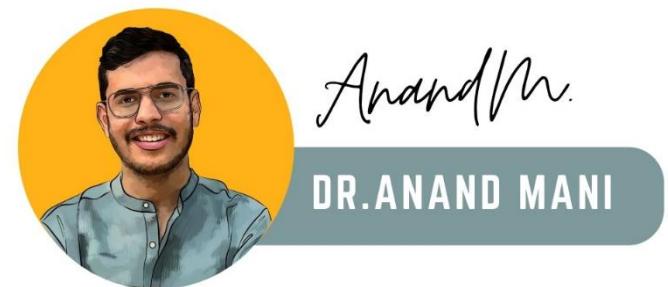
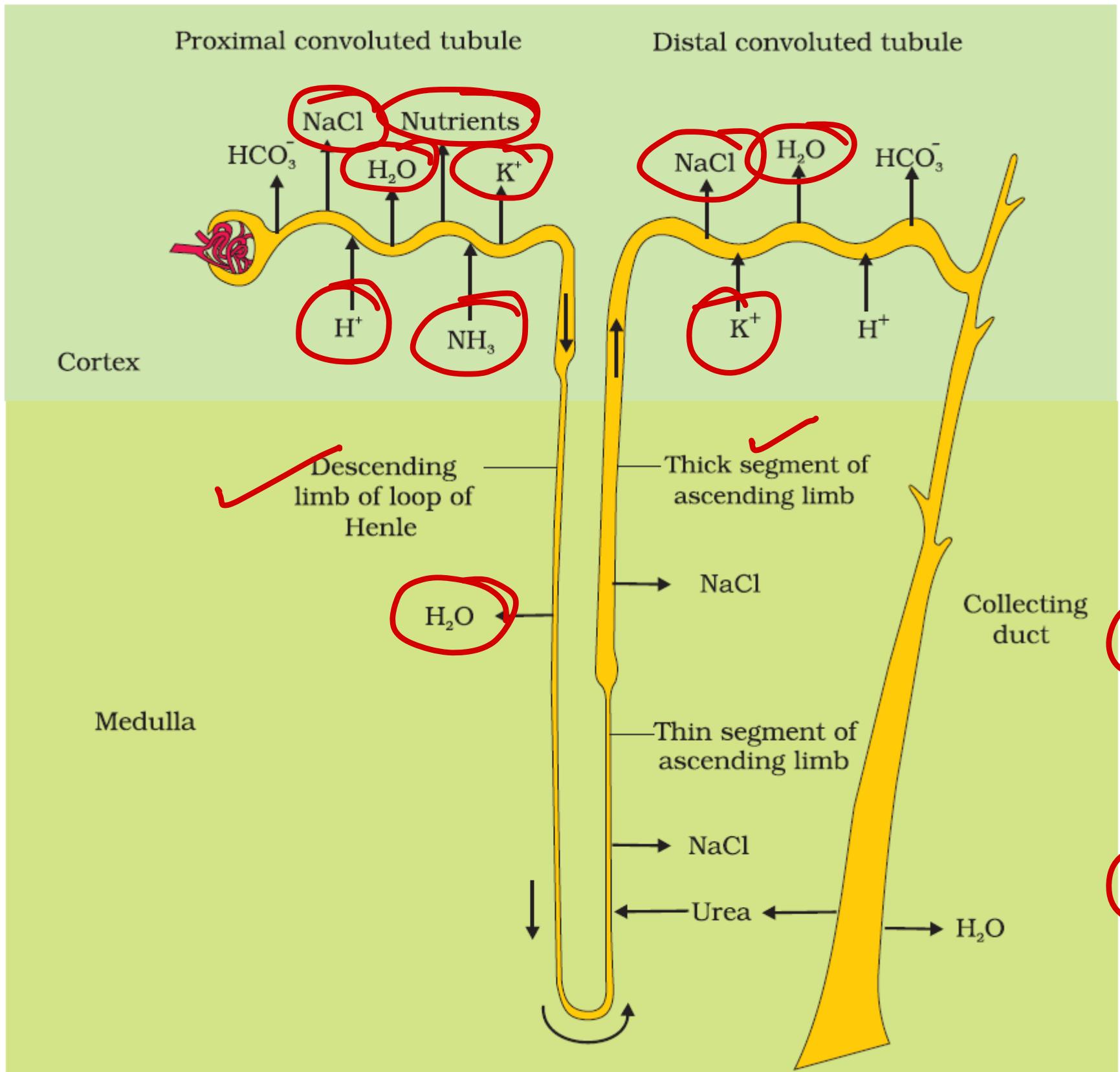


Figure 19.4 Malpighian body (renal corpuscle)





Secretion

- ① H^+
- ② NH_3
- ③ K^+

① descending

H_2O permeable

② Ascending

H_2O impermeable



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Figure 19.5 Reabsorption and secretion of major substances at different parts of the nephron (Arrows indicate direction of movement of materials.)

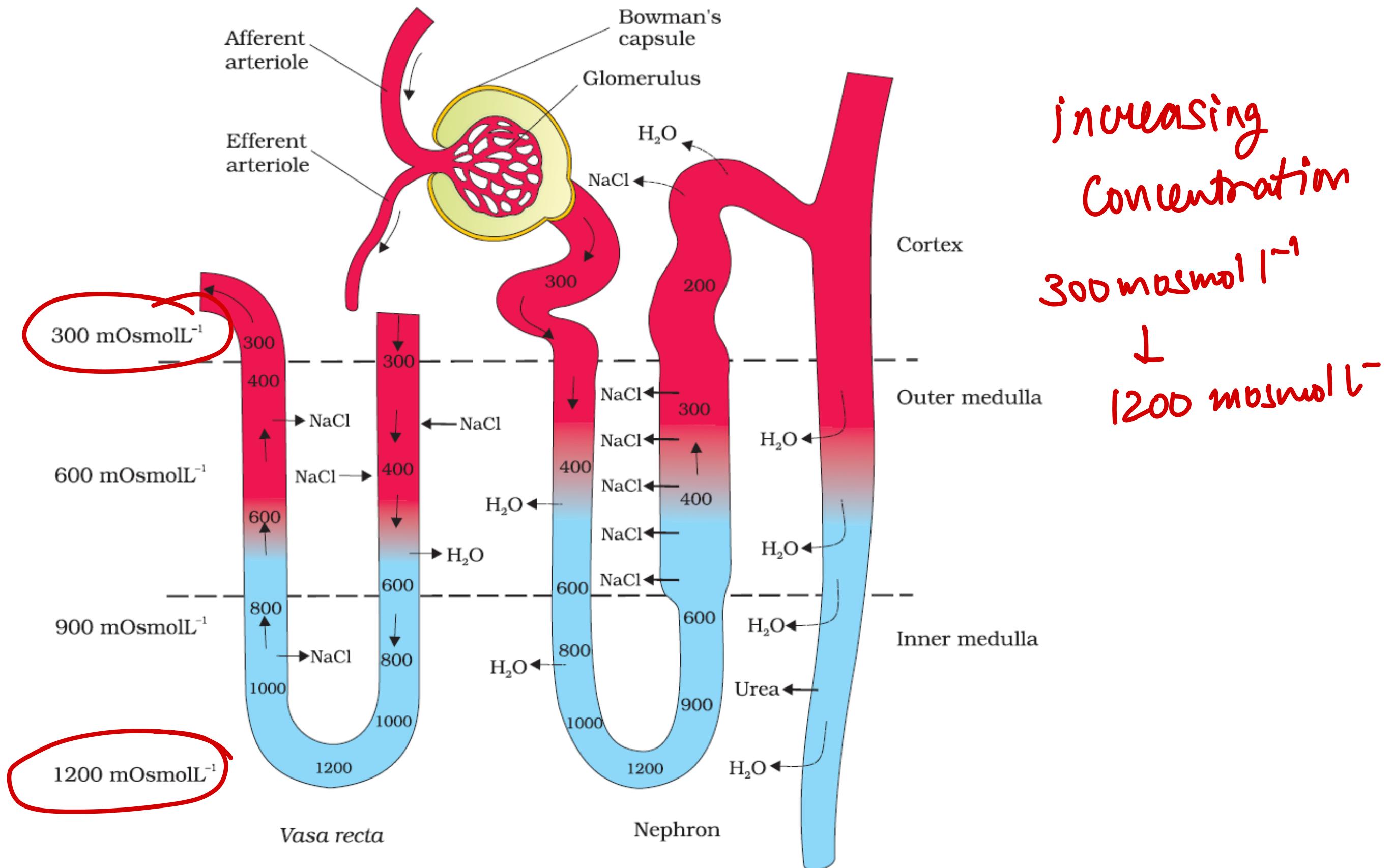
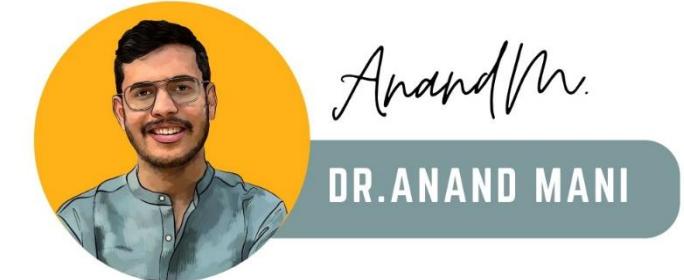
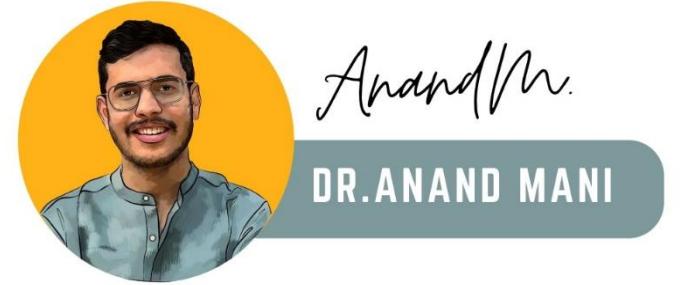


Figure 19.6 Diagrammatic representation of a nephron and *vasa recta* showing counter current mechanisms



CHAPTER-20

LOCOMOTION AND

MOVEMENT

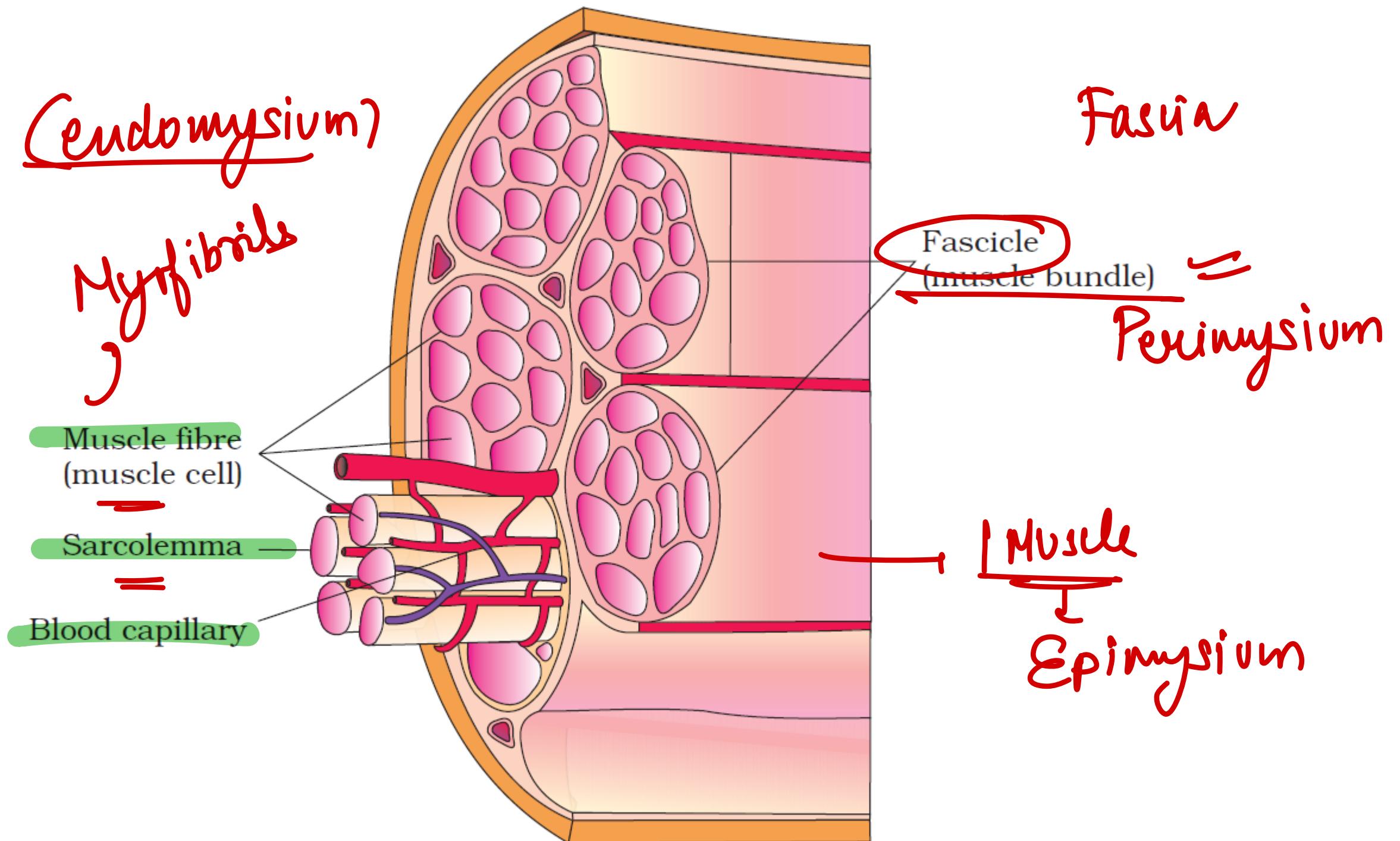
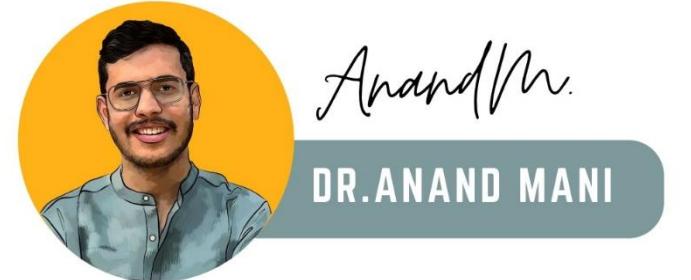


Figure 20.1 Diagrammatic cross sectional view of a muscle showing muscle bundles and muscle fibres

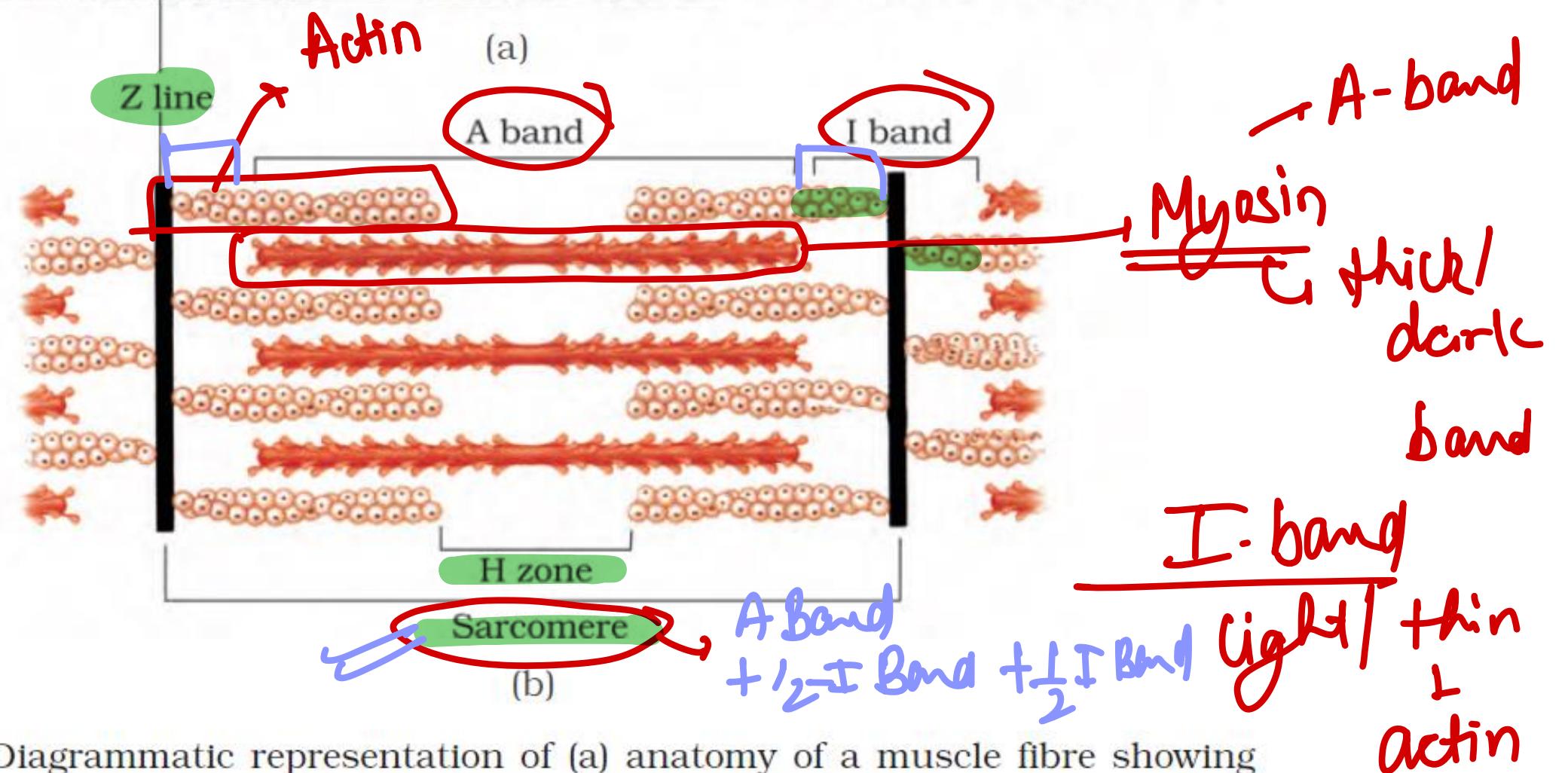
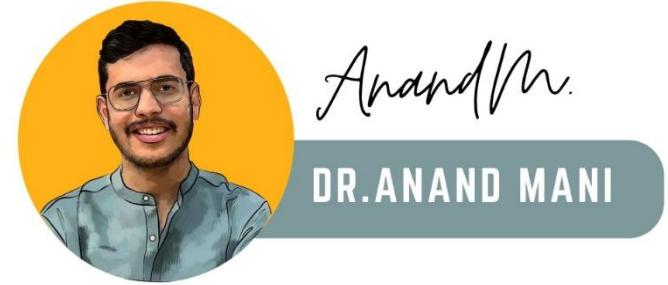
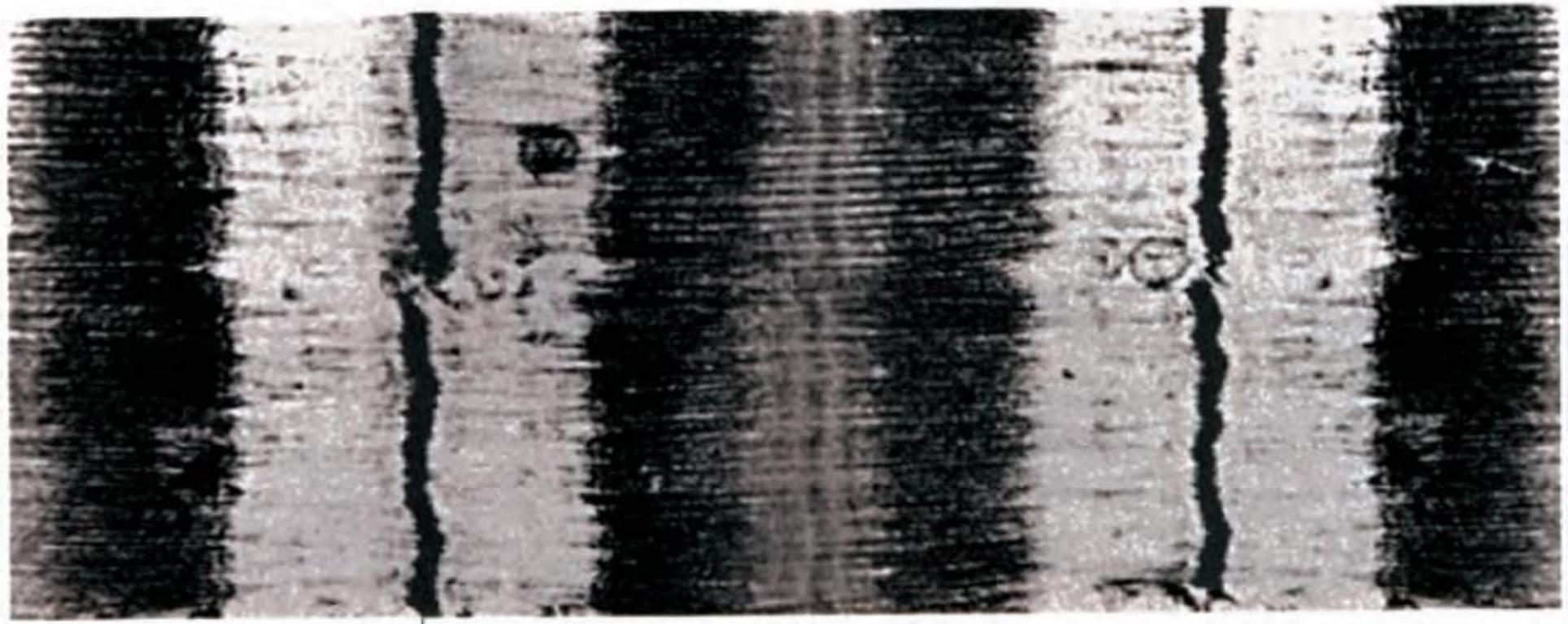


Figure 20.2 Diagrammatic representation of (a) anatomy of a muscle fibre showing a sarcomere (b) a sarcomere

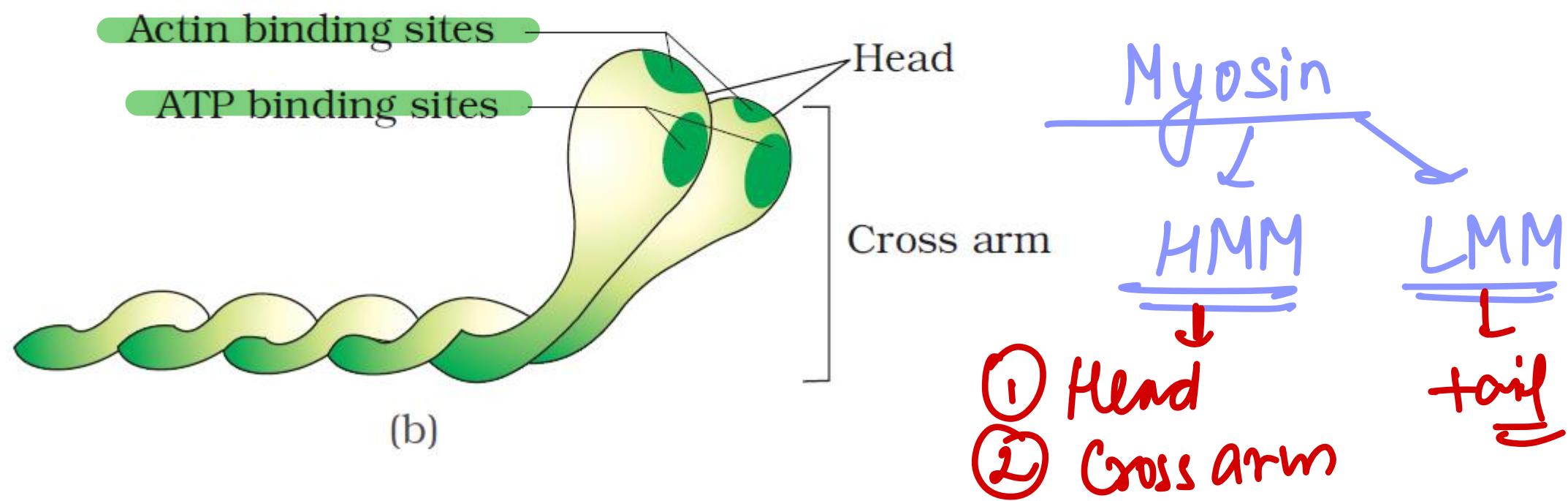
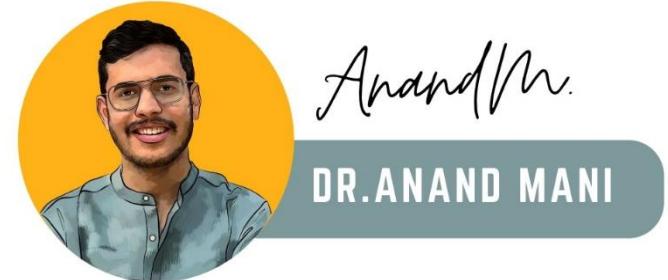
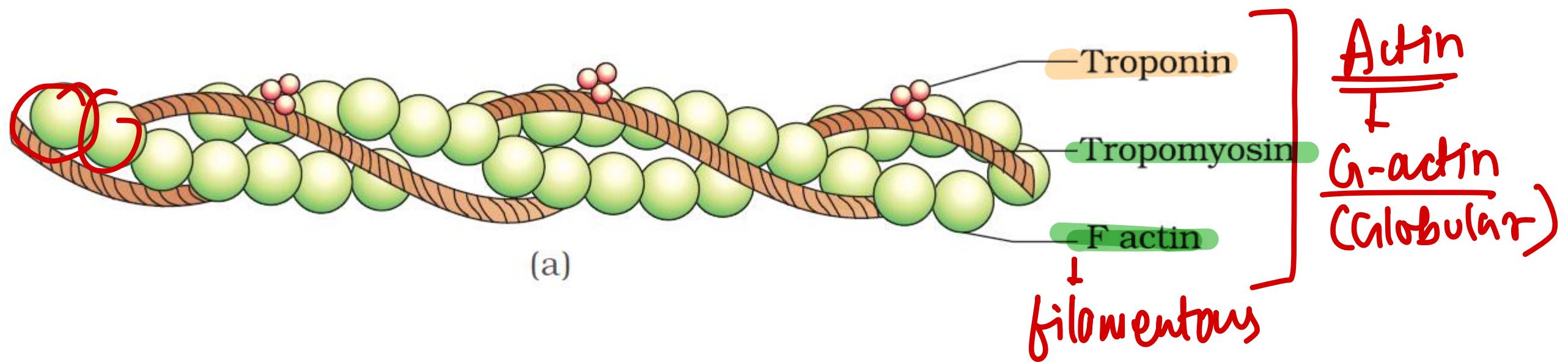


Figure 20.3 (a) An actin (thin) filament (b) Myosin monomer (Meromyosin)

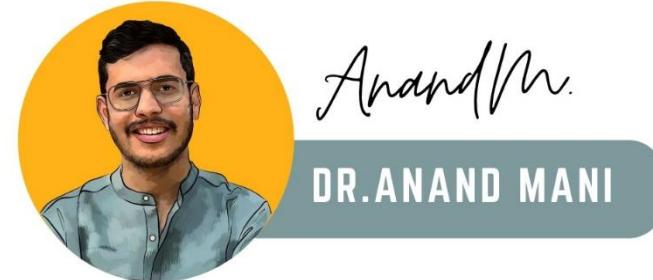
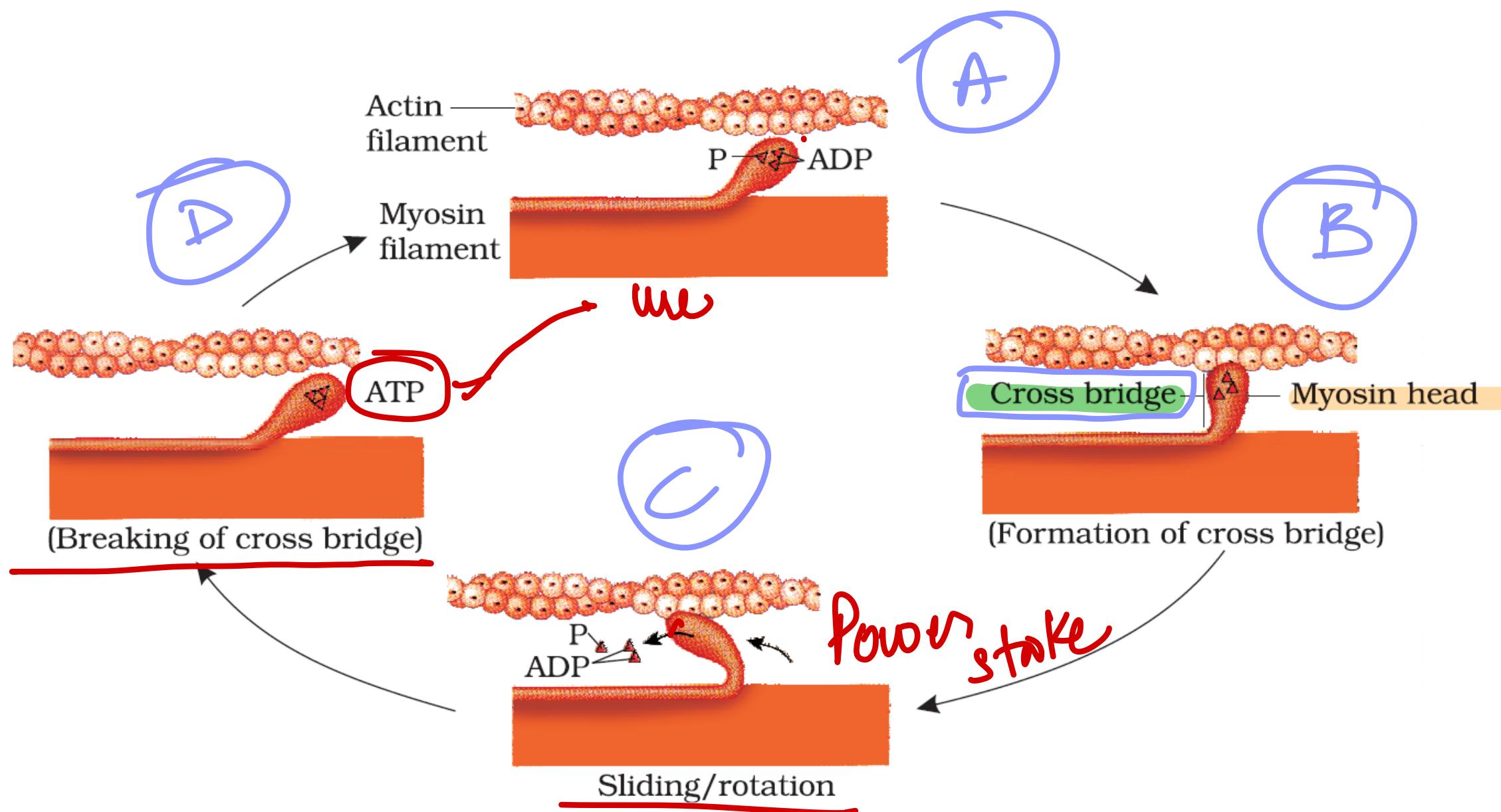


Figure 20.4 Stages in cross bridge formation, rotation of head and breaking of cross bridge

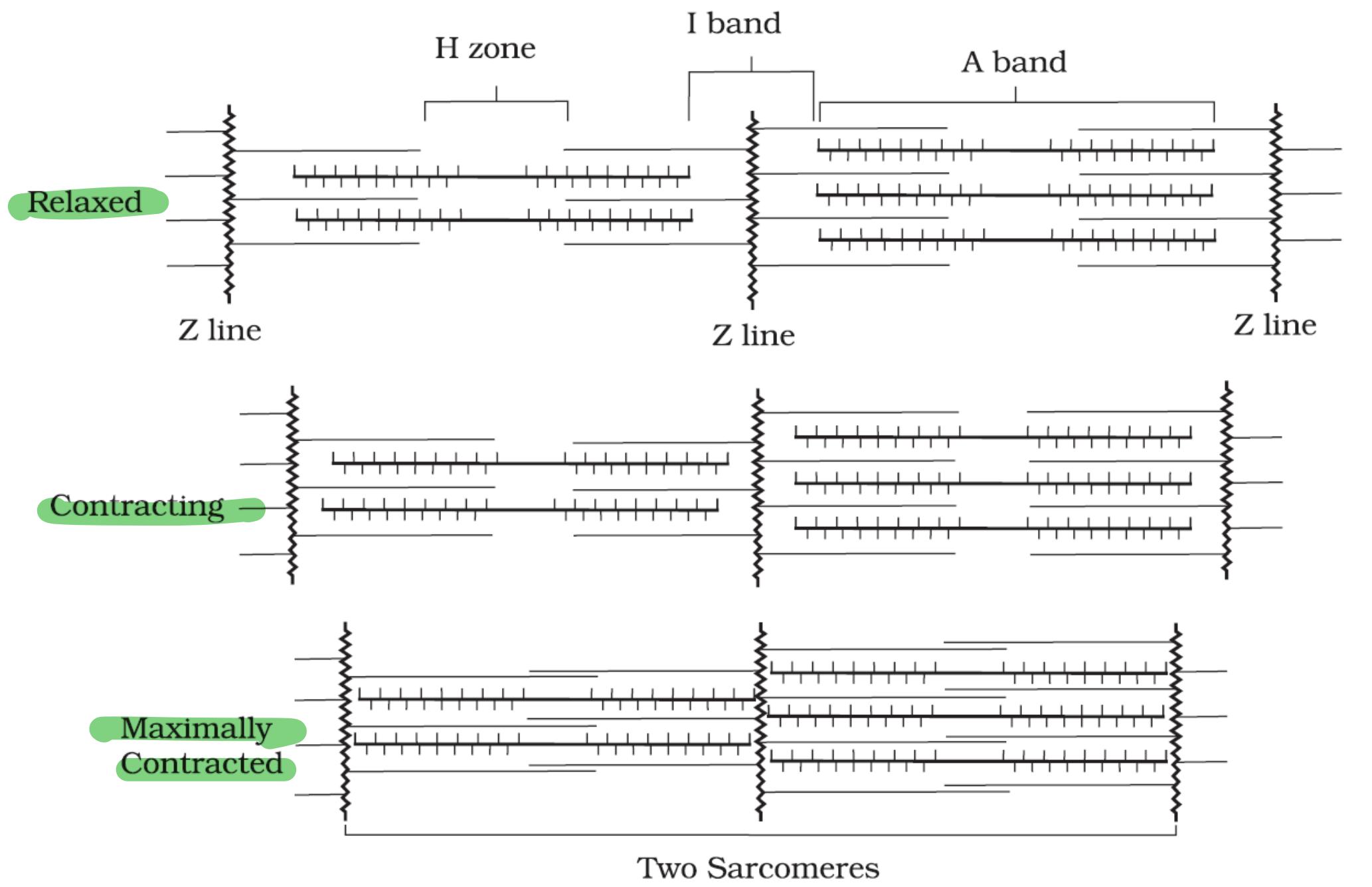
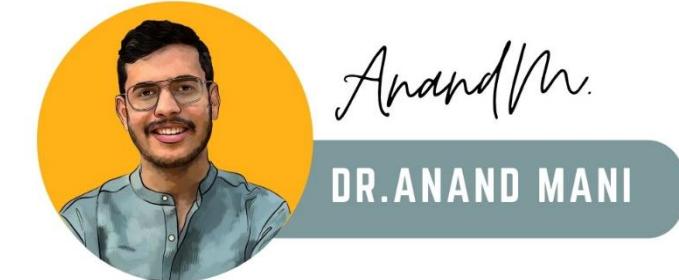
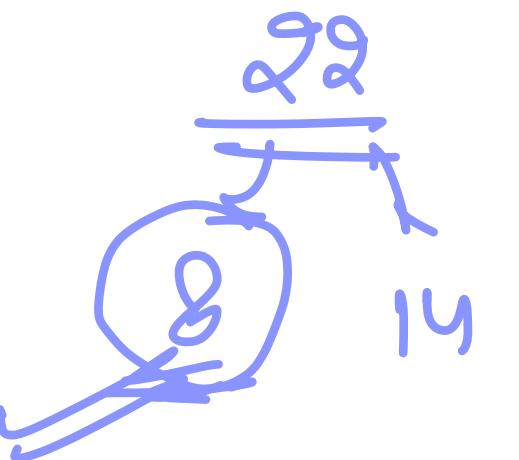
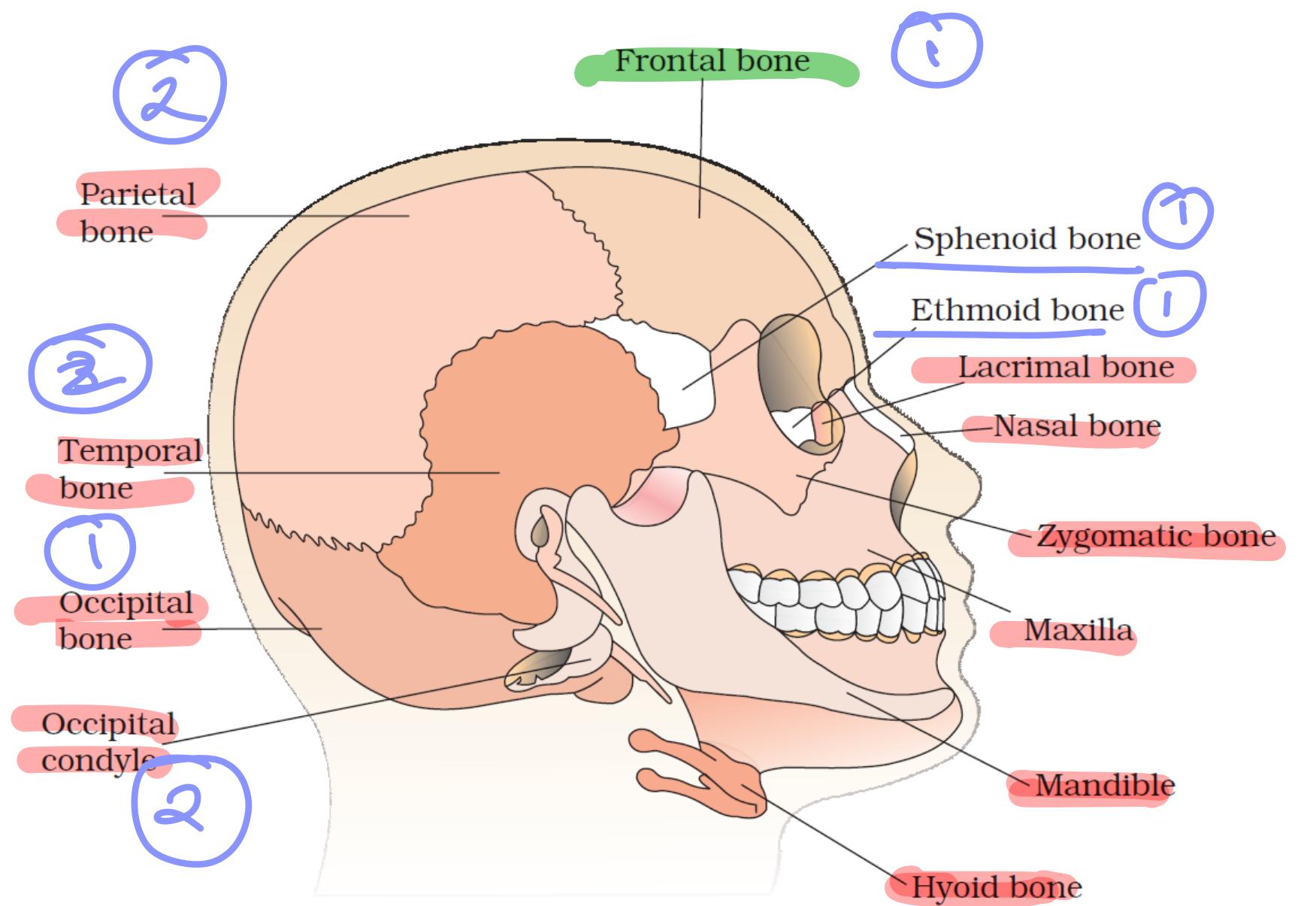


Figure 20.5 Sliding-filament theory of muscle contraction (movement of the thin filaments and the relative size of the I band and H zones)





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Figure 20.6 Diagrammatic view of human skull

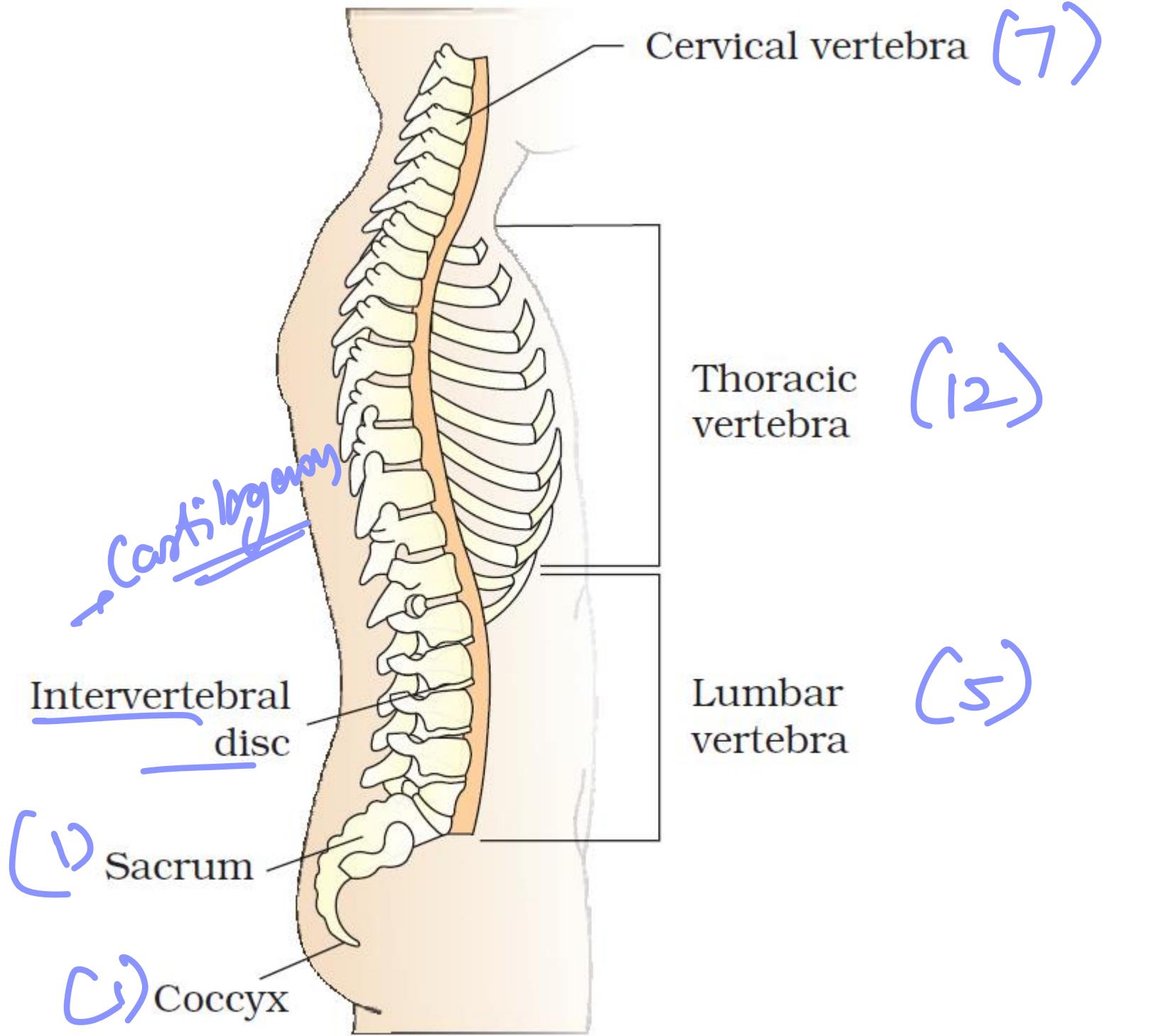
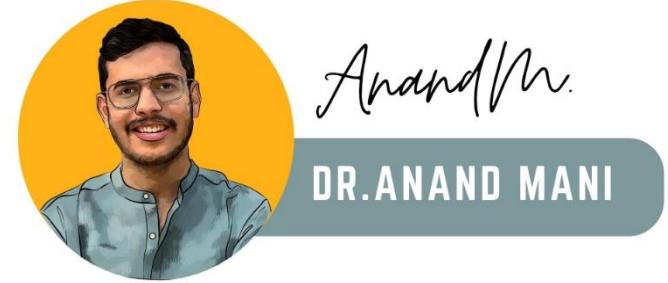


Figure 20.7 Vertebral column (right lateral view)





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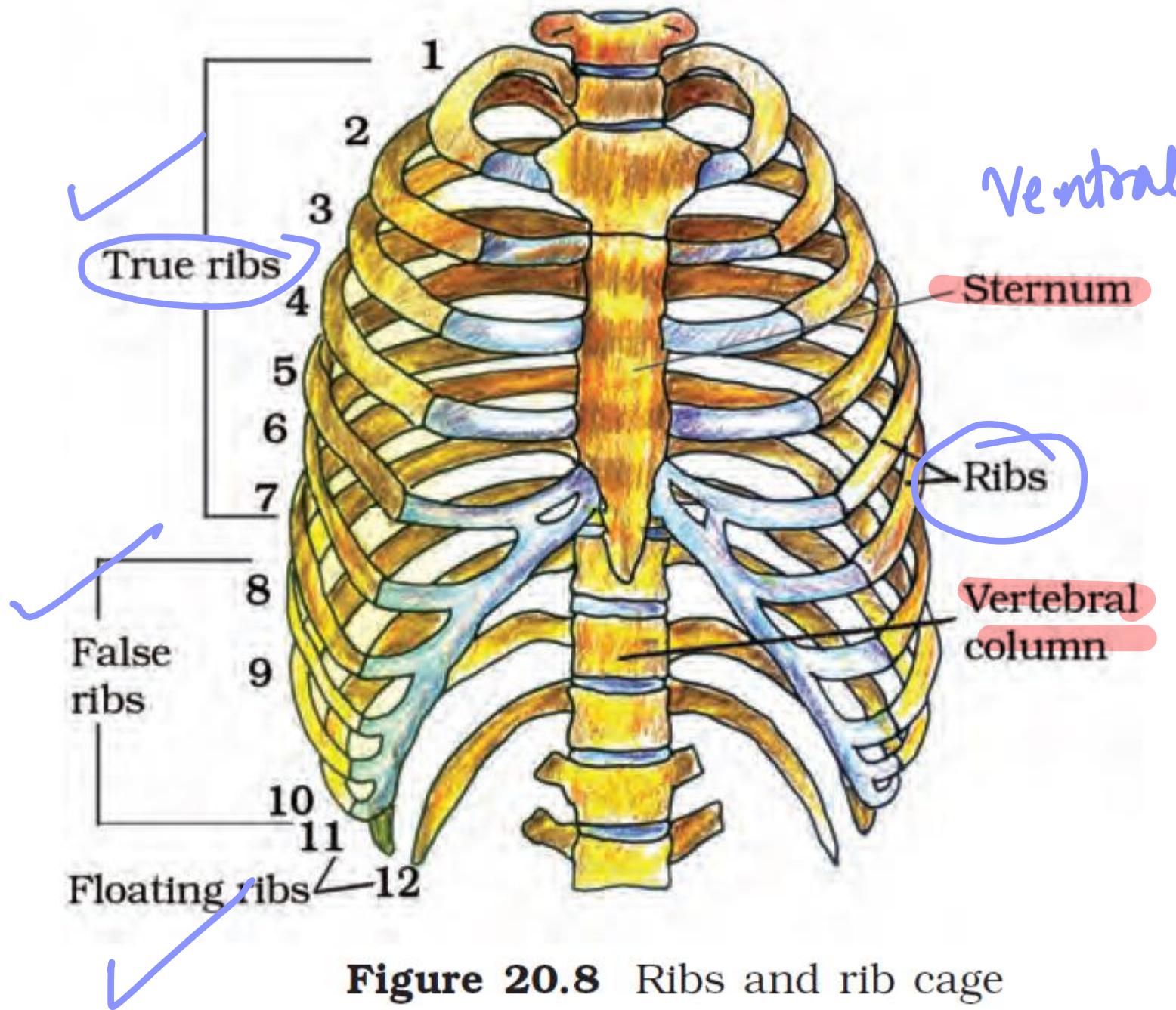


Figure 20.8 Ribs and rib cage

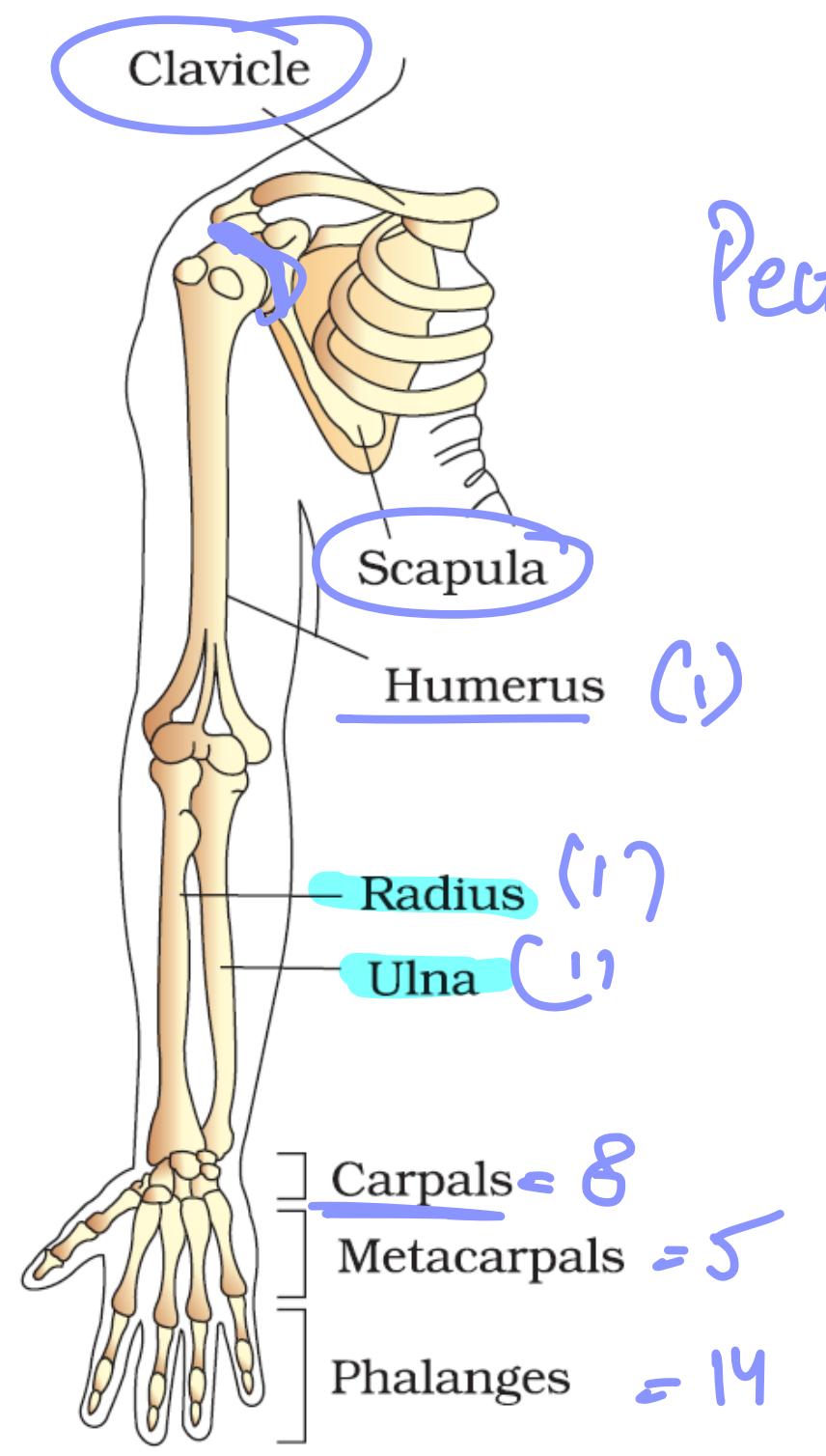
Floating ribs
11th, 12th

Ventrally
Ribs - 12 pair

dorsal

True ribs (Vertebro
Sternal
ribs)
1 → 7

False ribs (Vertebro
chondral
ribs)
8, 9, 10



Pectoral girdle

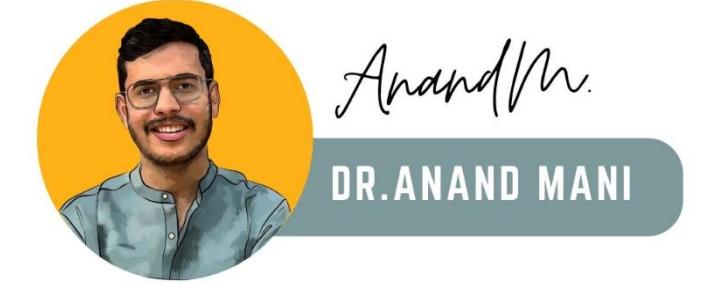
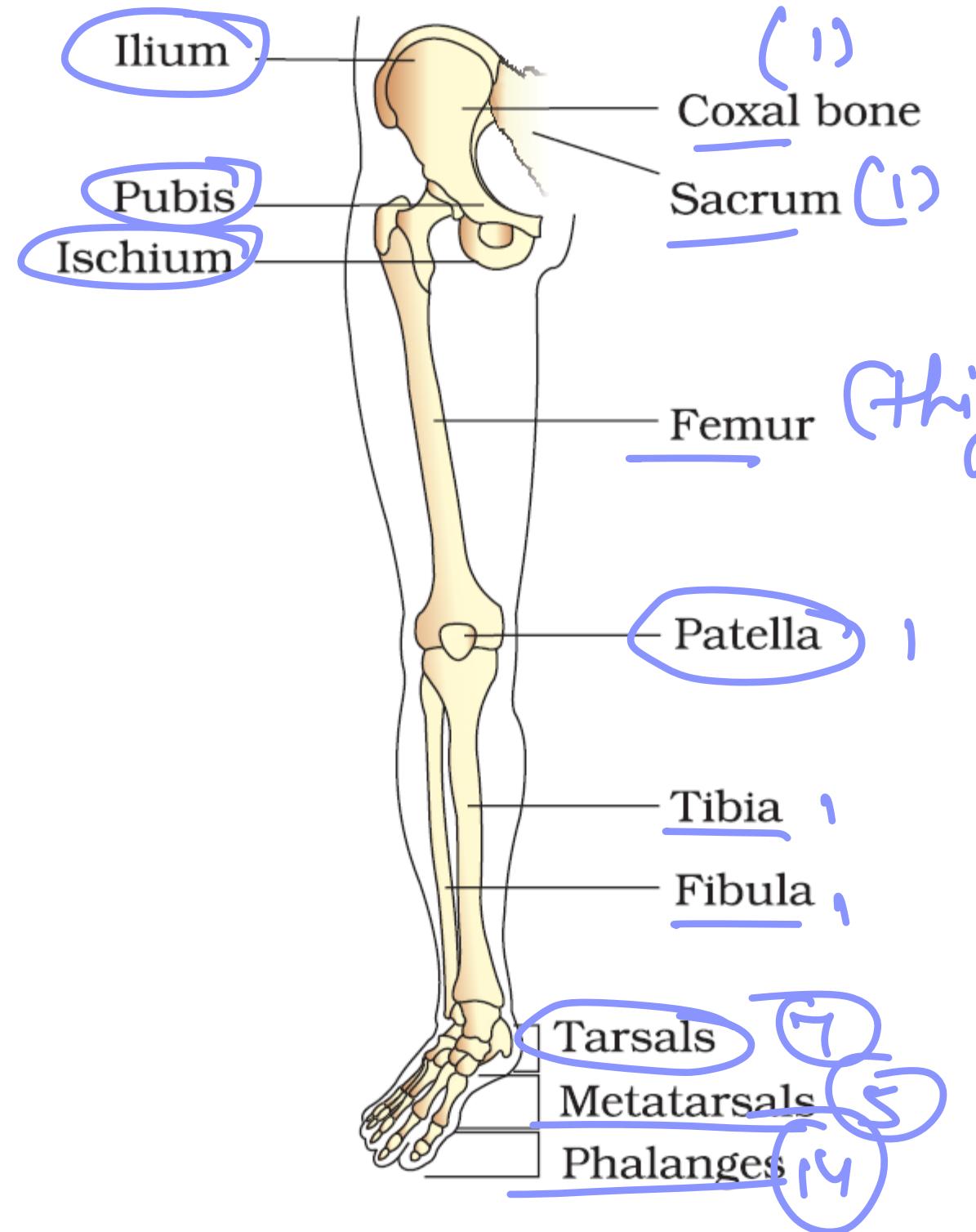


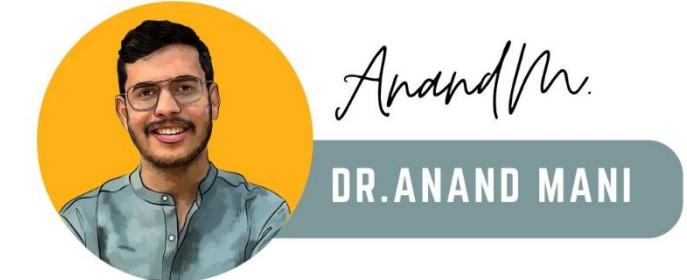
Figure 20.9 Right pectoral girdle and upper arm. (frontal view)

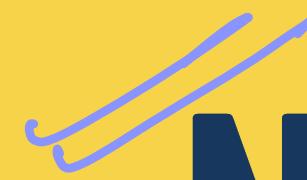


Pelvic girdle

(Thigh bone)

Figure 20.10 Right pelvic girdle and lower limb bones (frontal view)



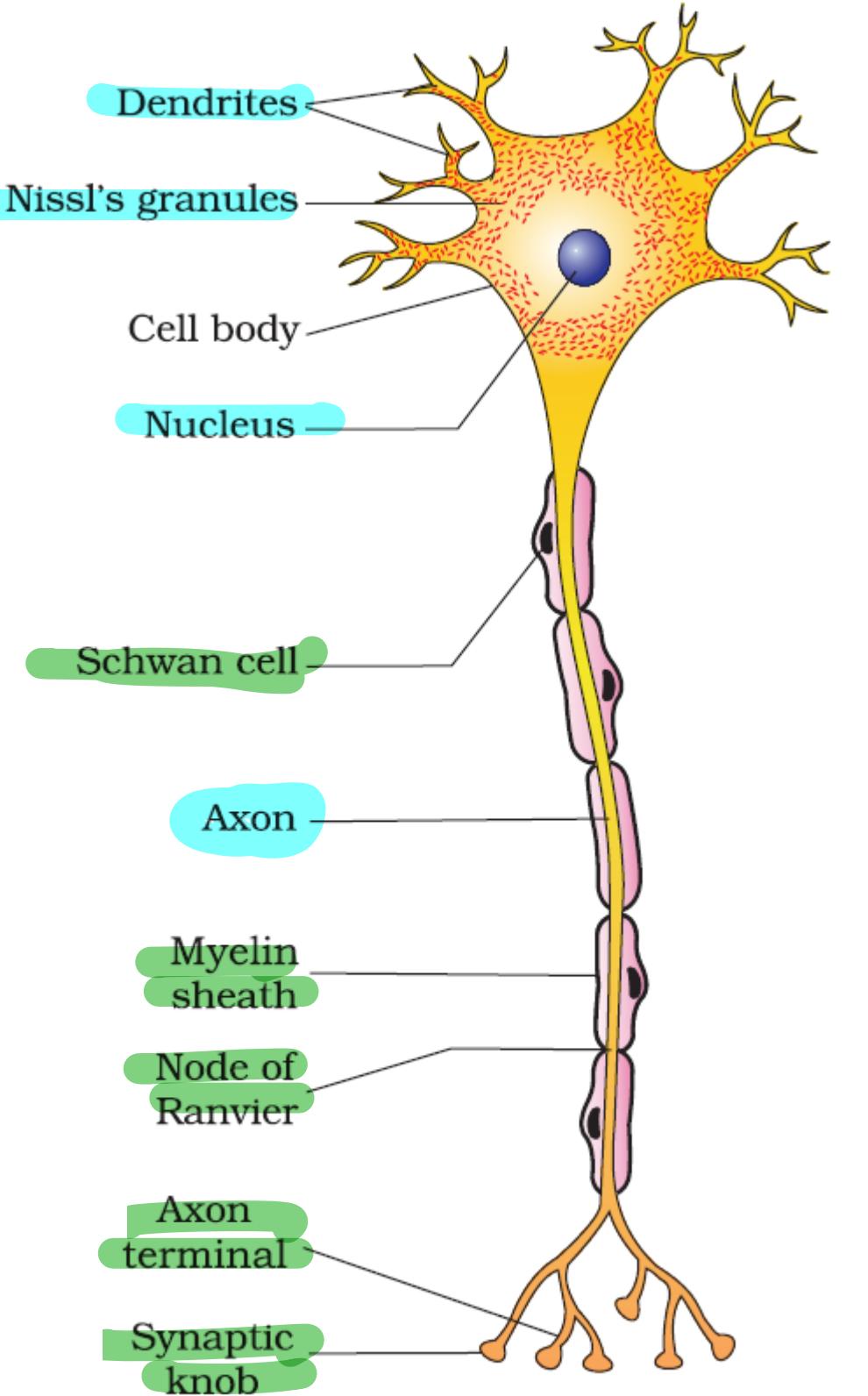


CHAPTER-21

NEURAL CONTROL

AND

COORDINATION



branches



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Figure 21.1 Structure of a neuron

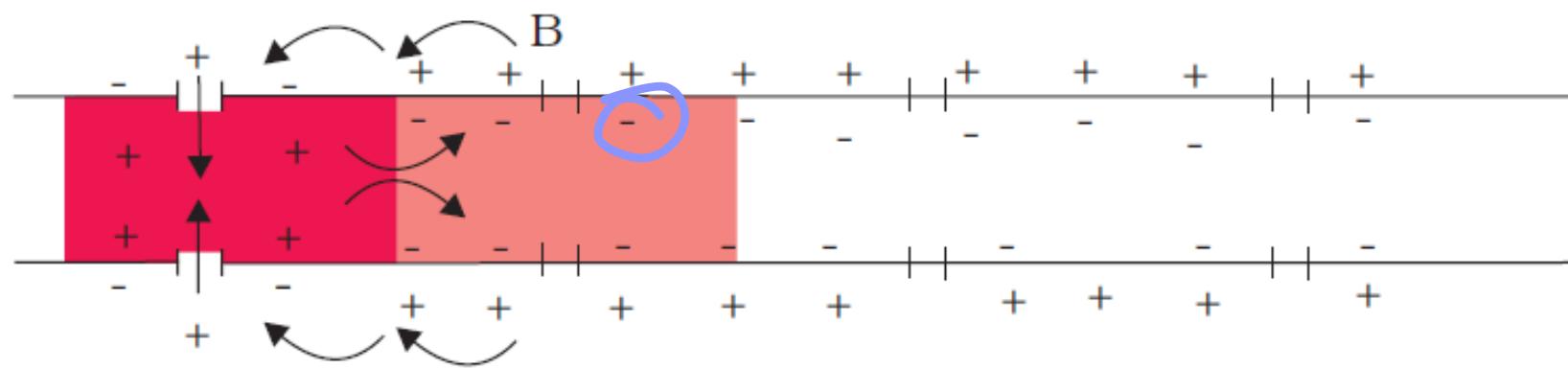
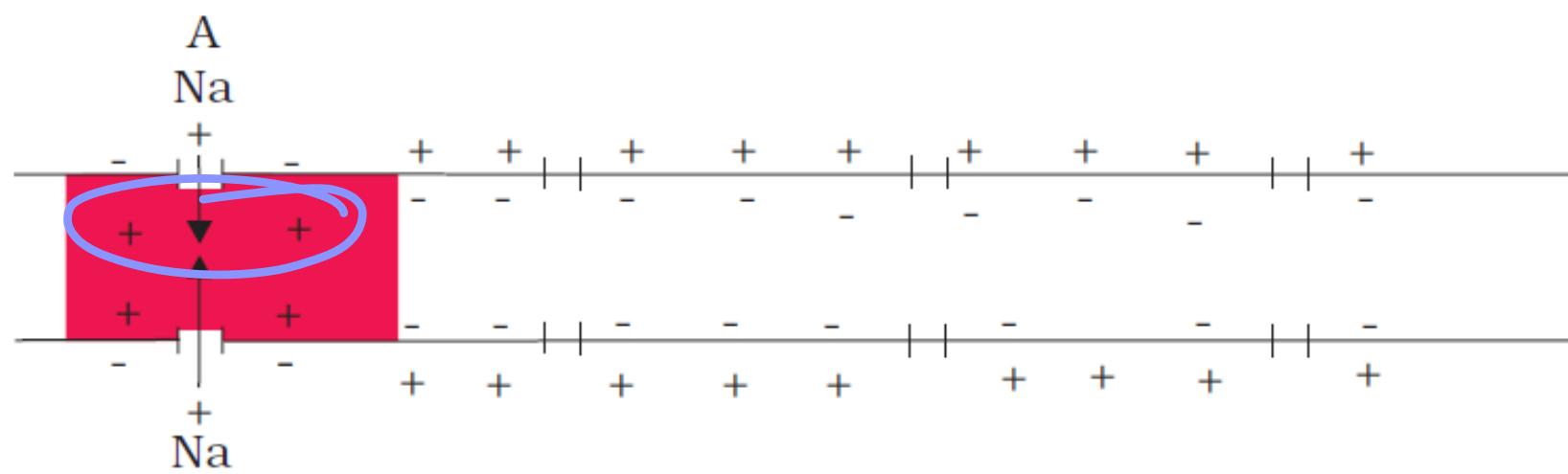
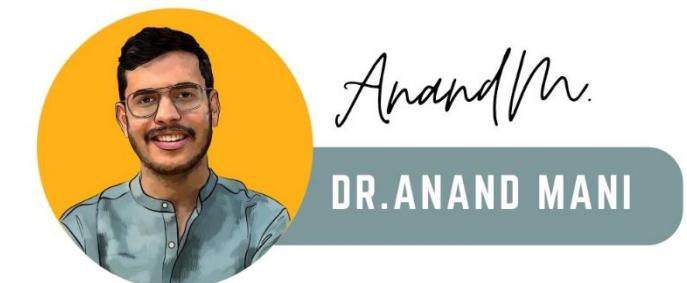
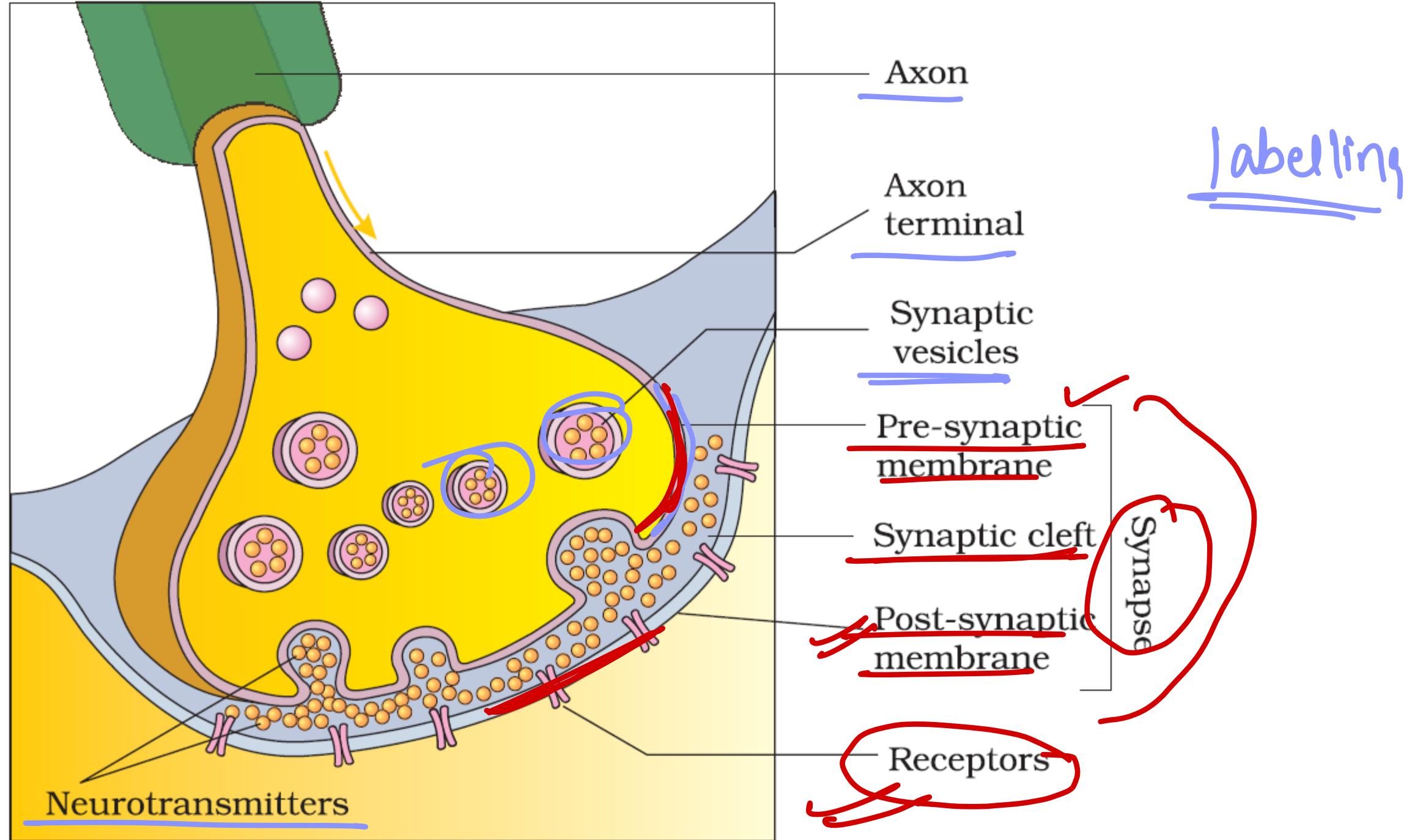


Figure 21.2 Diagrammatic representation of impulse conduction through an axon
(at points A and B)

Polarised / rest
inside = $-ve$
 $RMP \approx -70mV$

depolarized
inside = $+ve$





Labelling

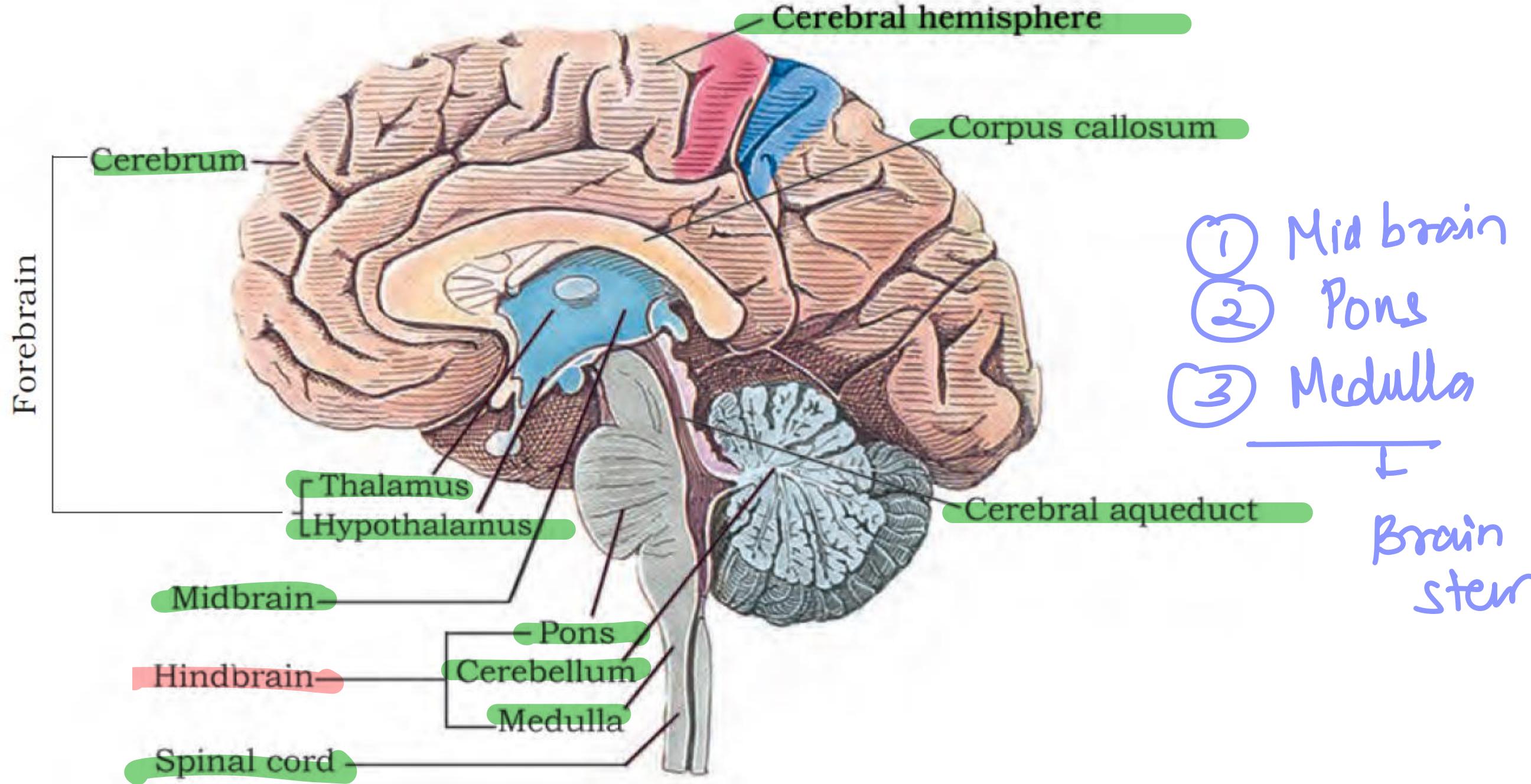


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Figure 21.3 Diagram showing axon terminal and synapse

Junction



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Figure 21.4 Diagram showing sagittal section of the human brain

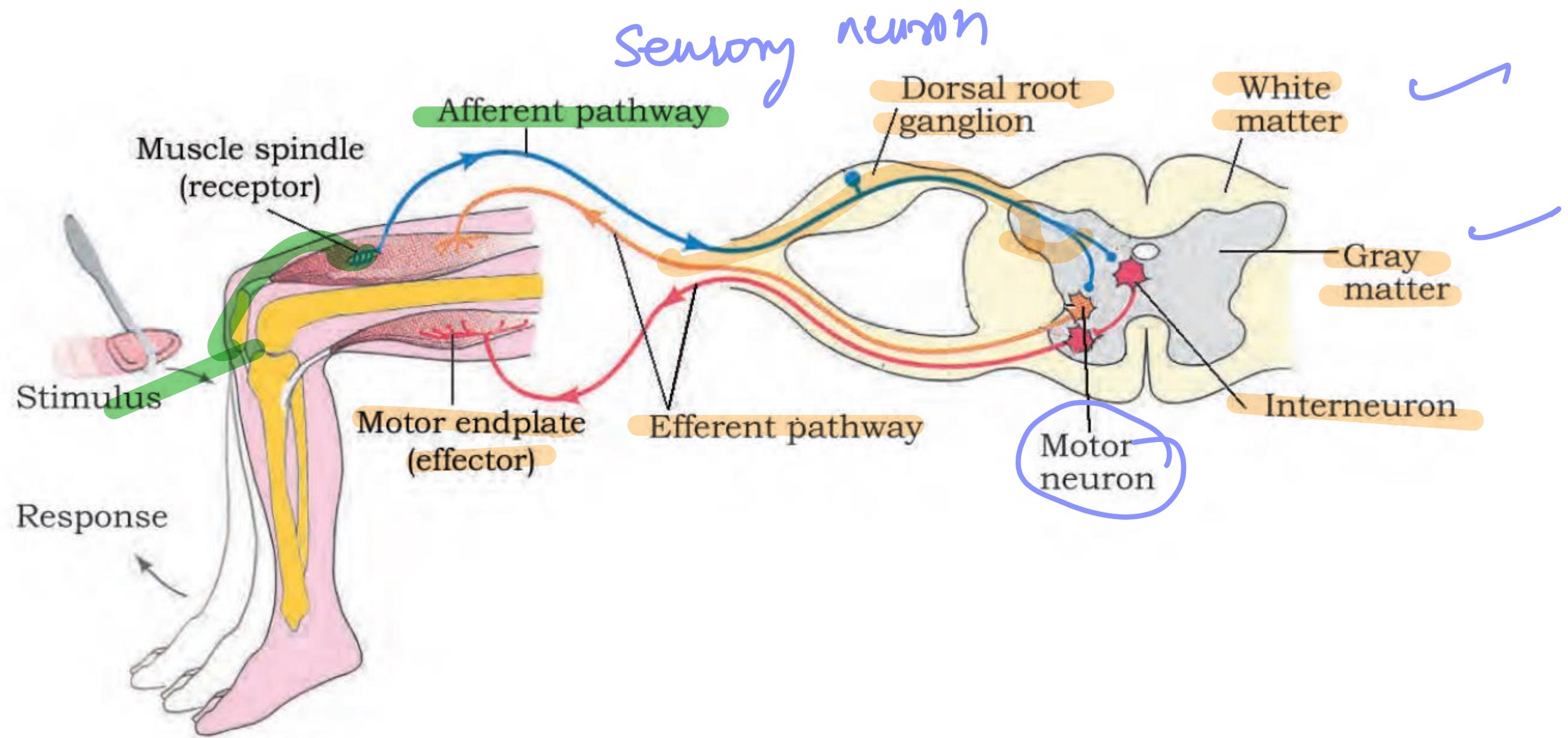
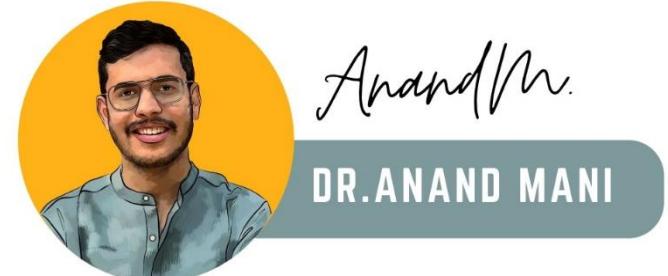


Figure 21.5 Diagrammatic presentation of reflex action (showing knee jerk reflex)



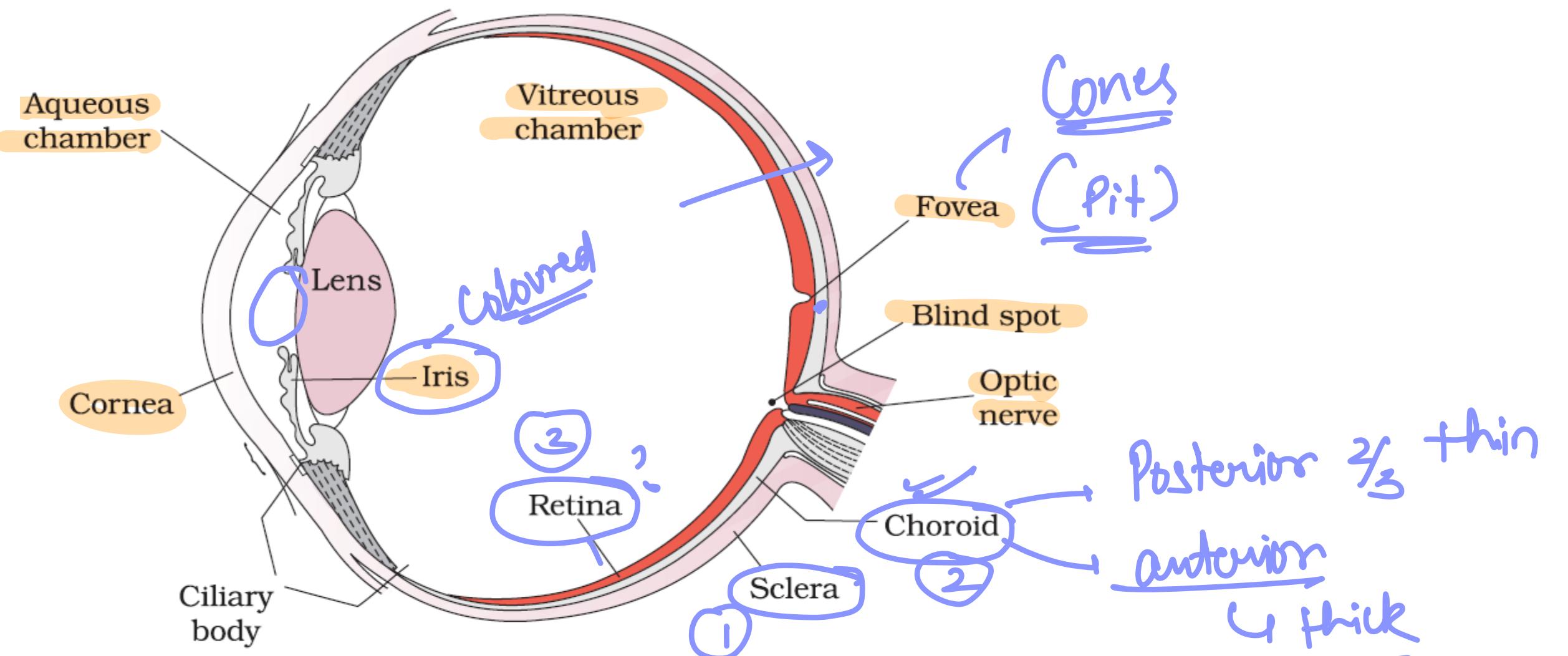
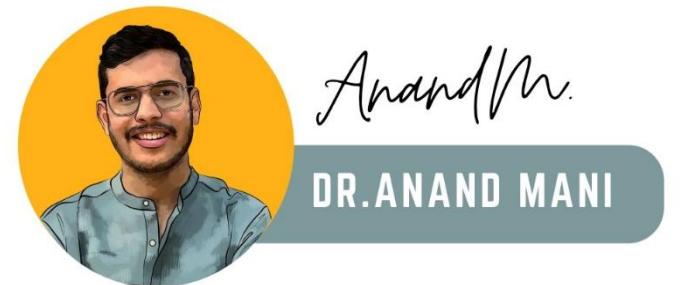


Figure 21.6 Diagram showing parts of an eye

Retina \Rightarrow Sequenues
 ↗
 Inner to outer

- (1) Ganglionic
- (2) Bipolar
- (3) Photoreceptor layer

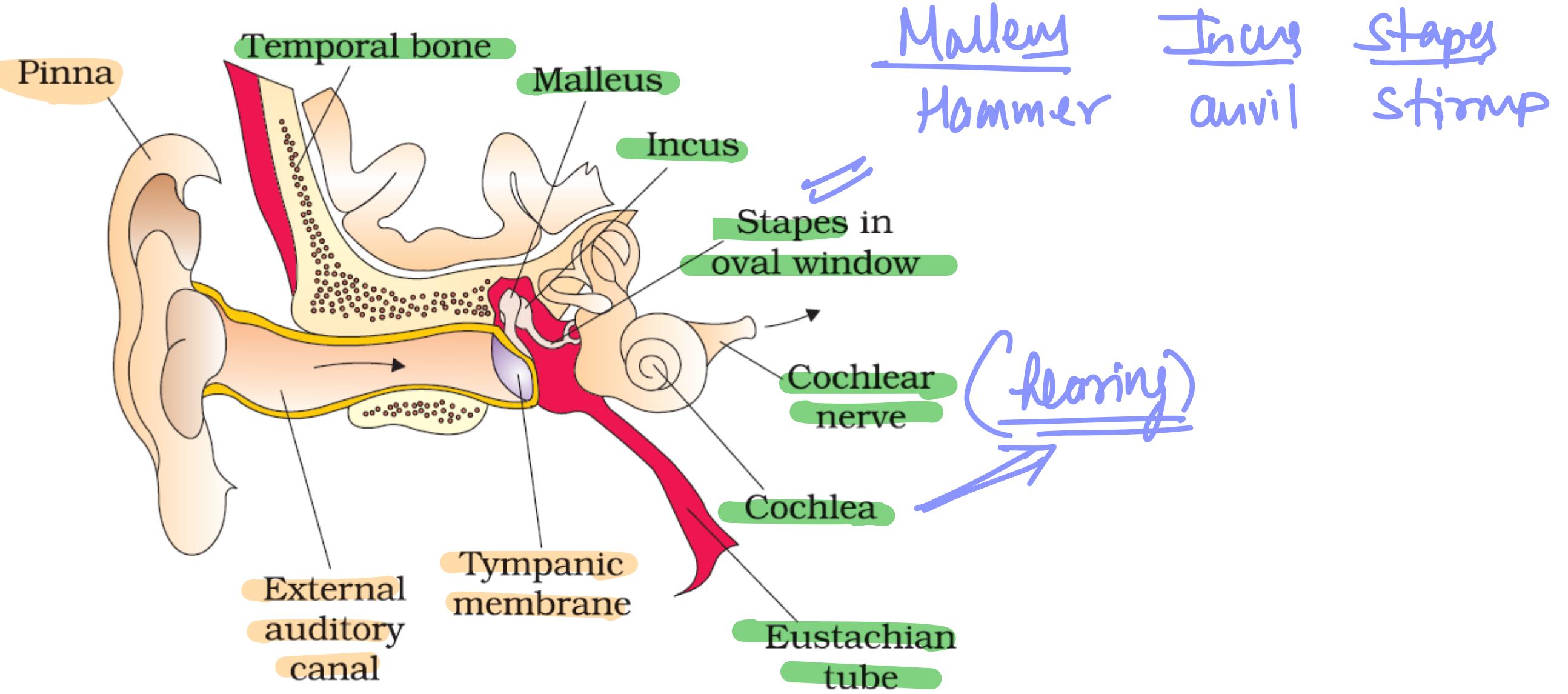
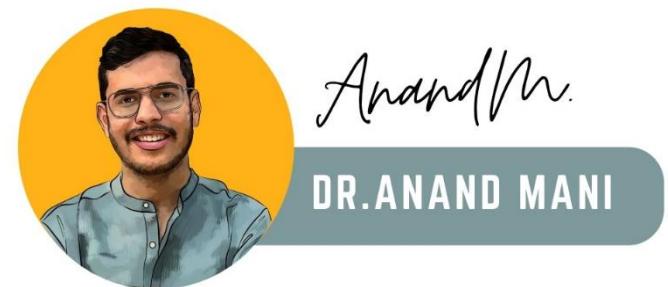


Figure 21.7 Diagrammatic view of ear



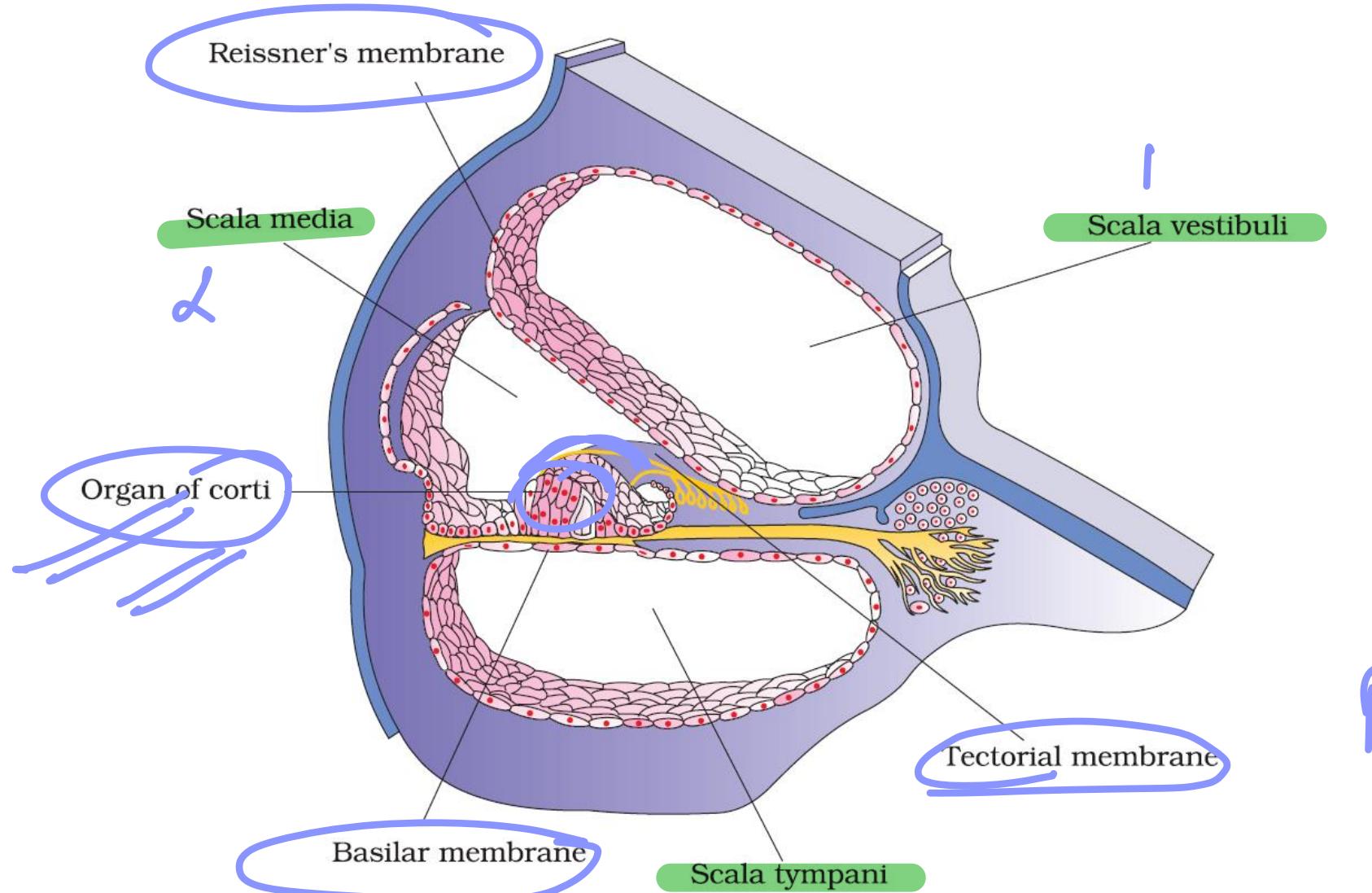
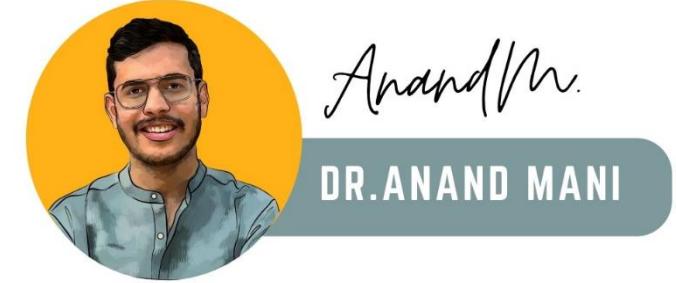


Figure 21.8 Diagrammatic representation of the sectional view of cochlea

1
 labyrinth
 ↓
 Bony
 ↓
 Perilymph
 ↓
 Membranous
 ↓
 endolymph



CHAPTER-22

CHEMICAL COORDINATION AND INTEGRATION

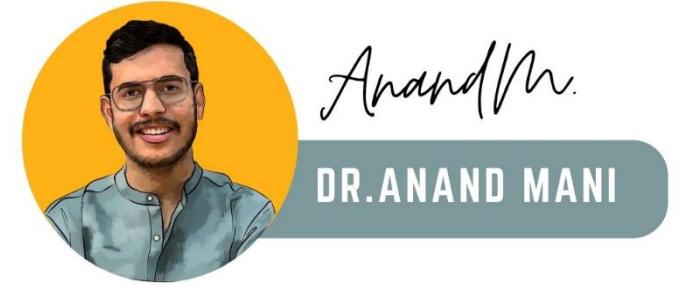
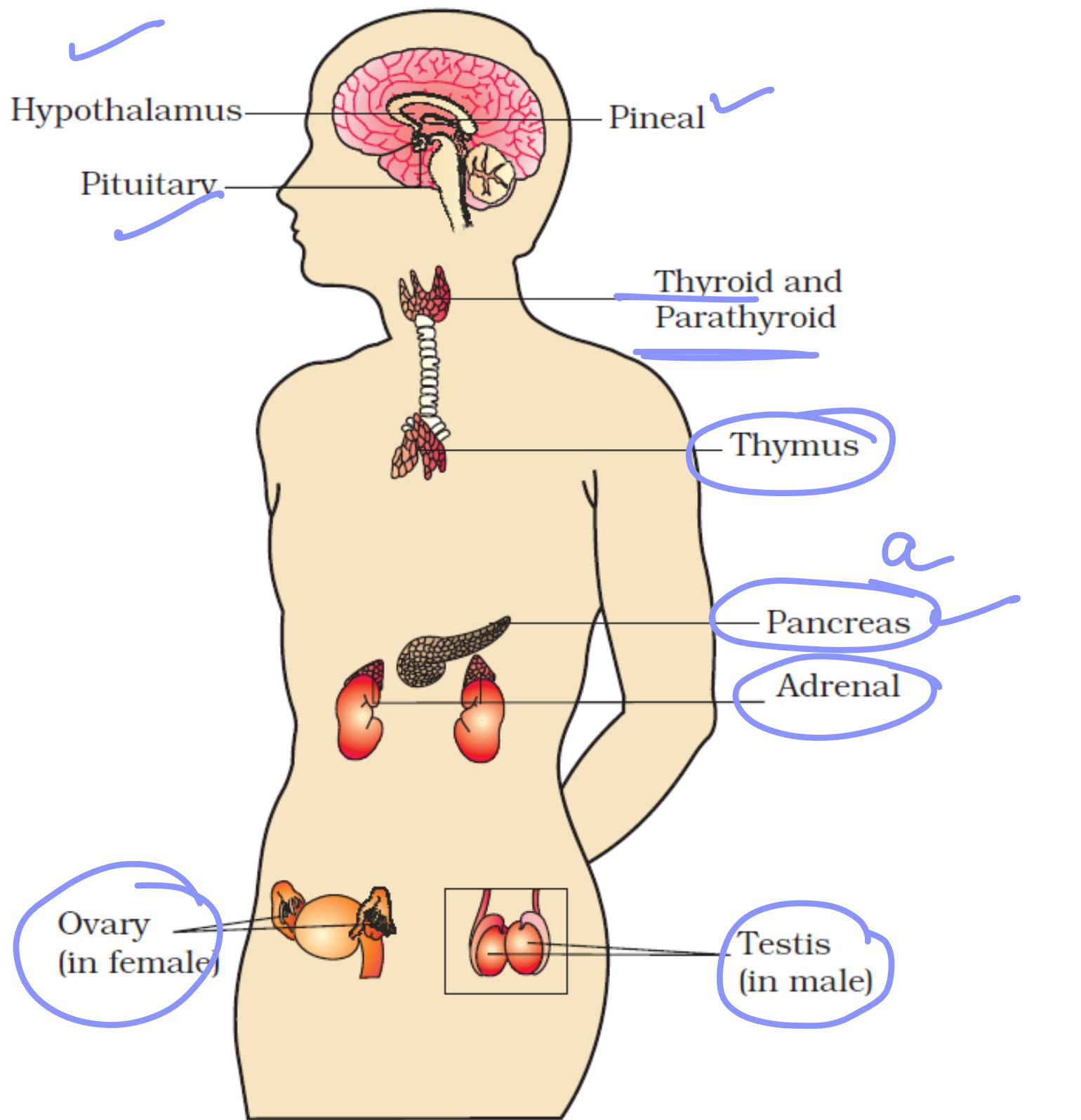


Figure 22.1 Location of endocrine glands

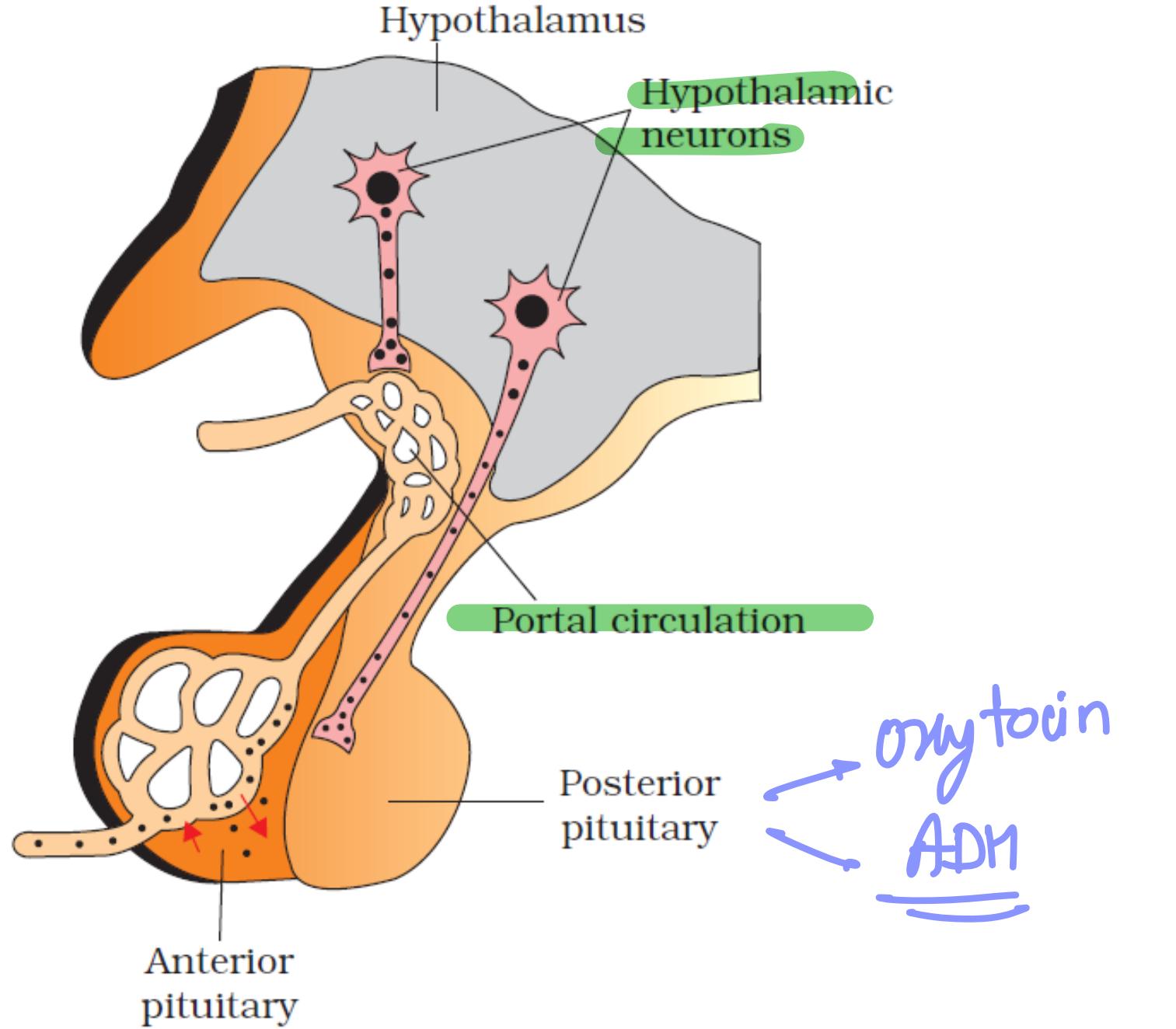
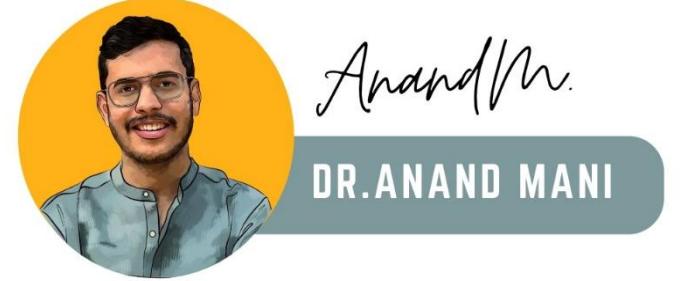


Figure 22.2 Diagrammatic representation of pituitary and its relationship with hypothalamus



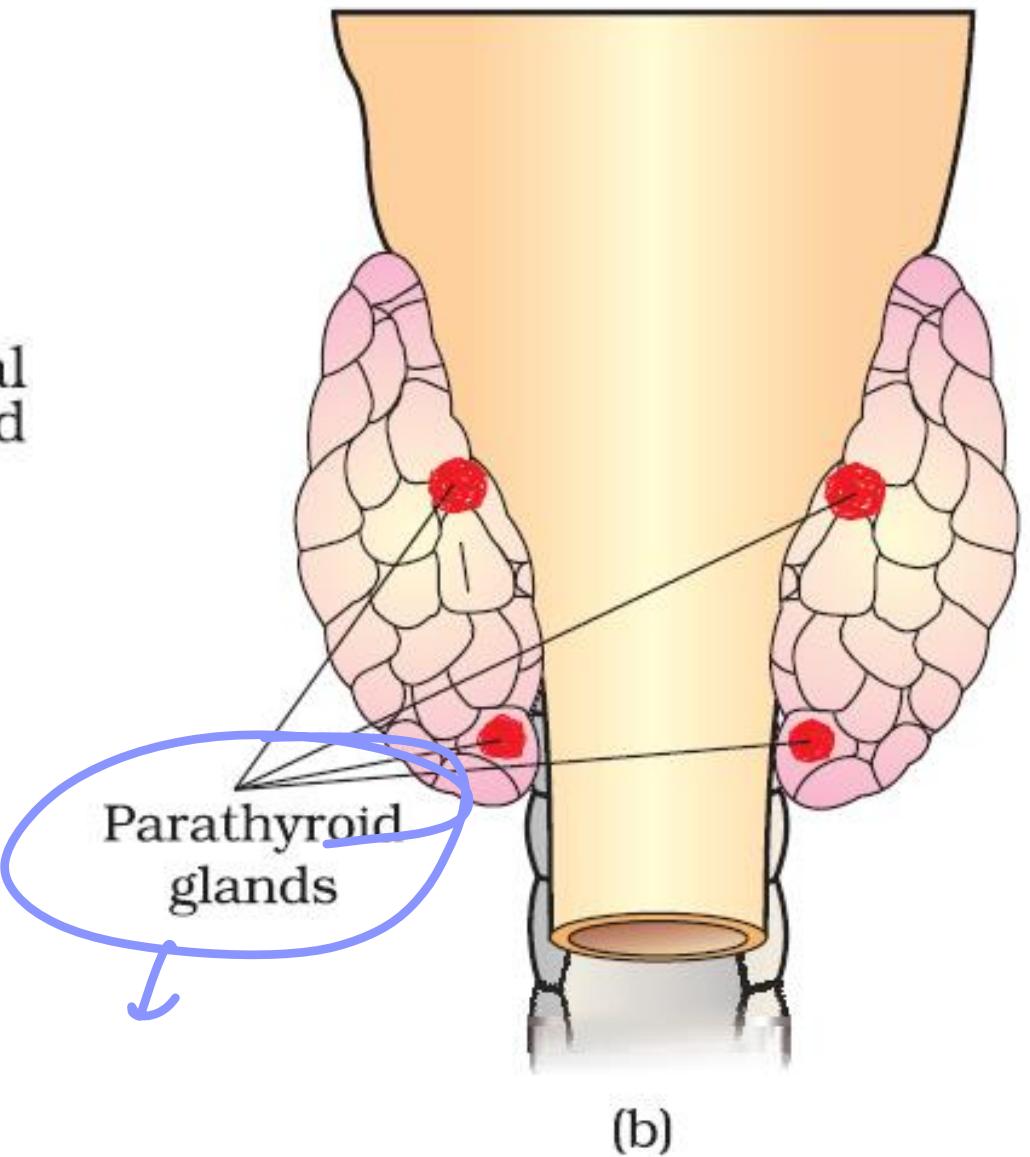
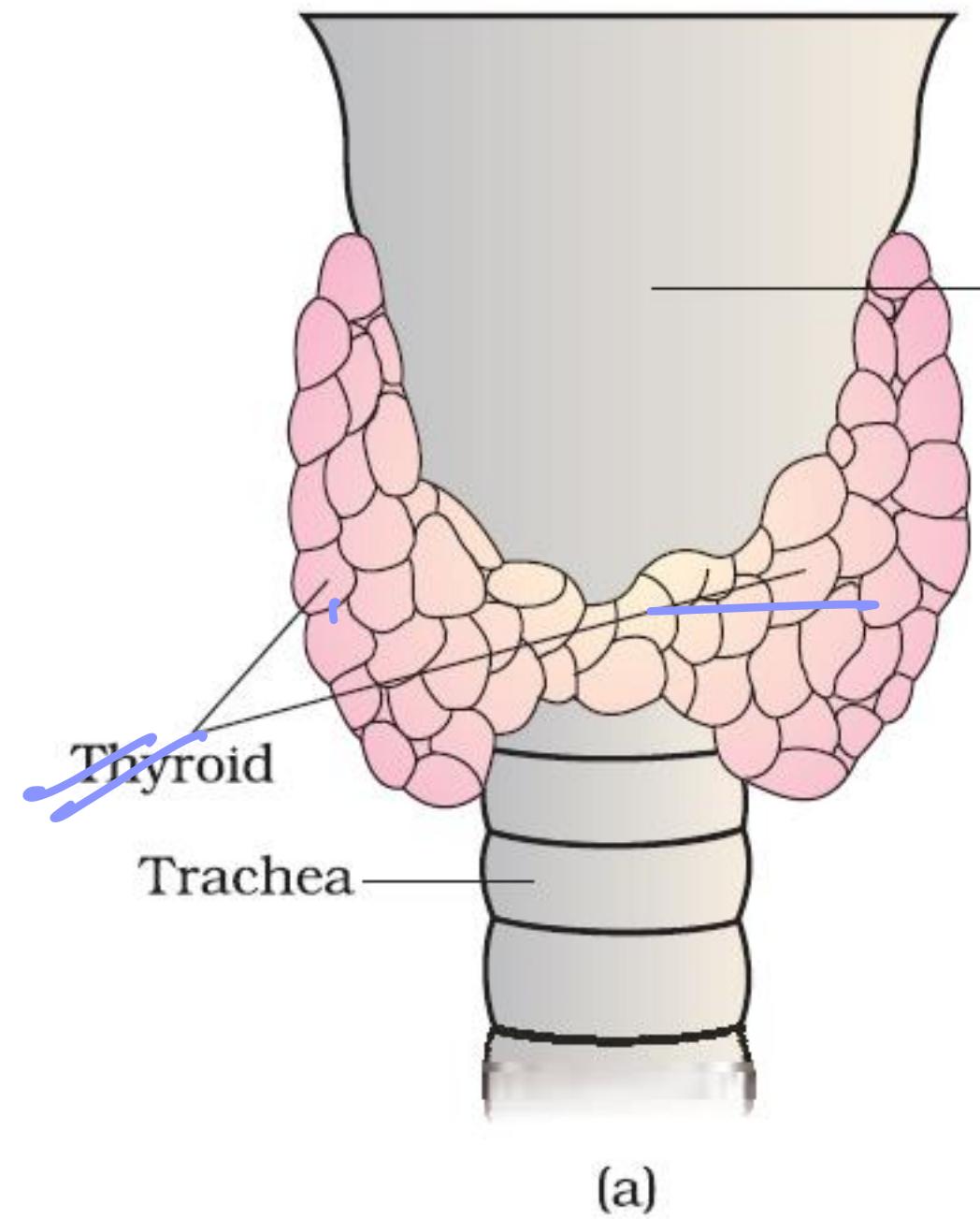


Figure 22.3 Diagrammatic view of the position of Thyroid and Parathyroid
(a) Ventral side
(b) Dorsal side



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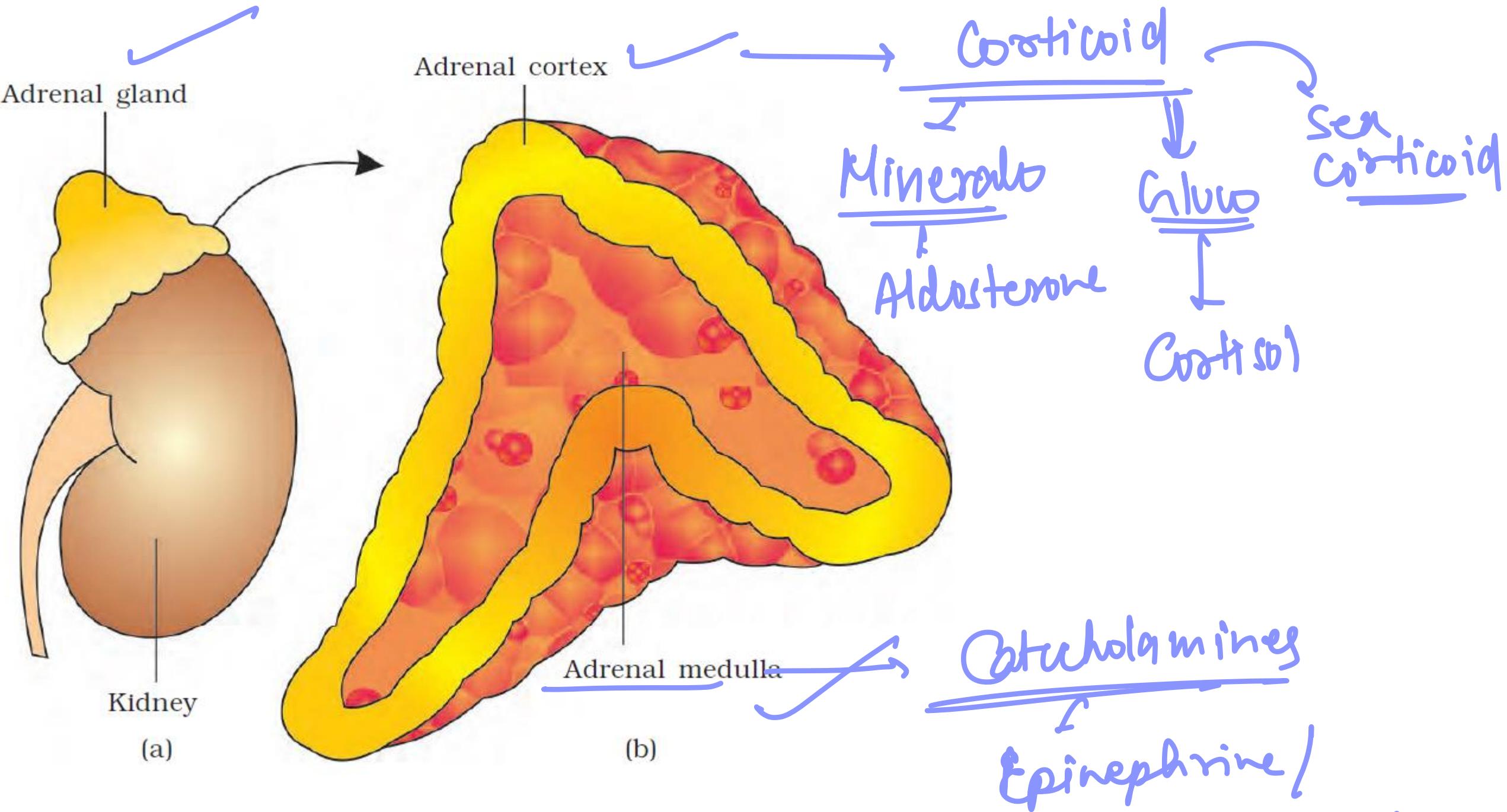
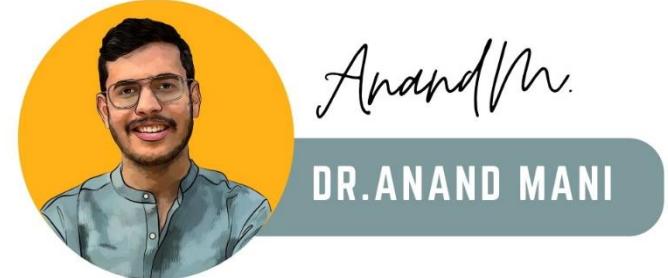
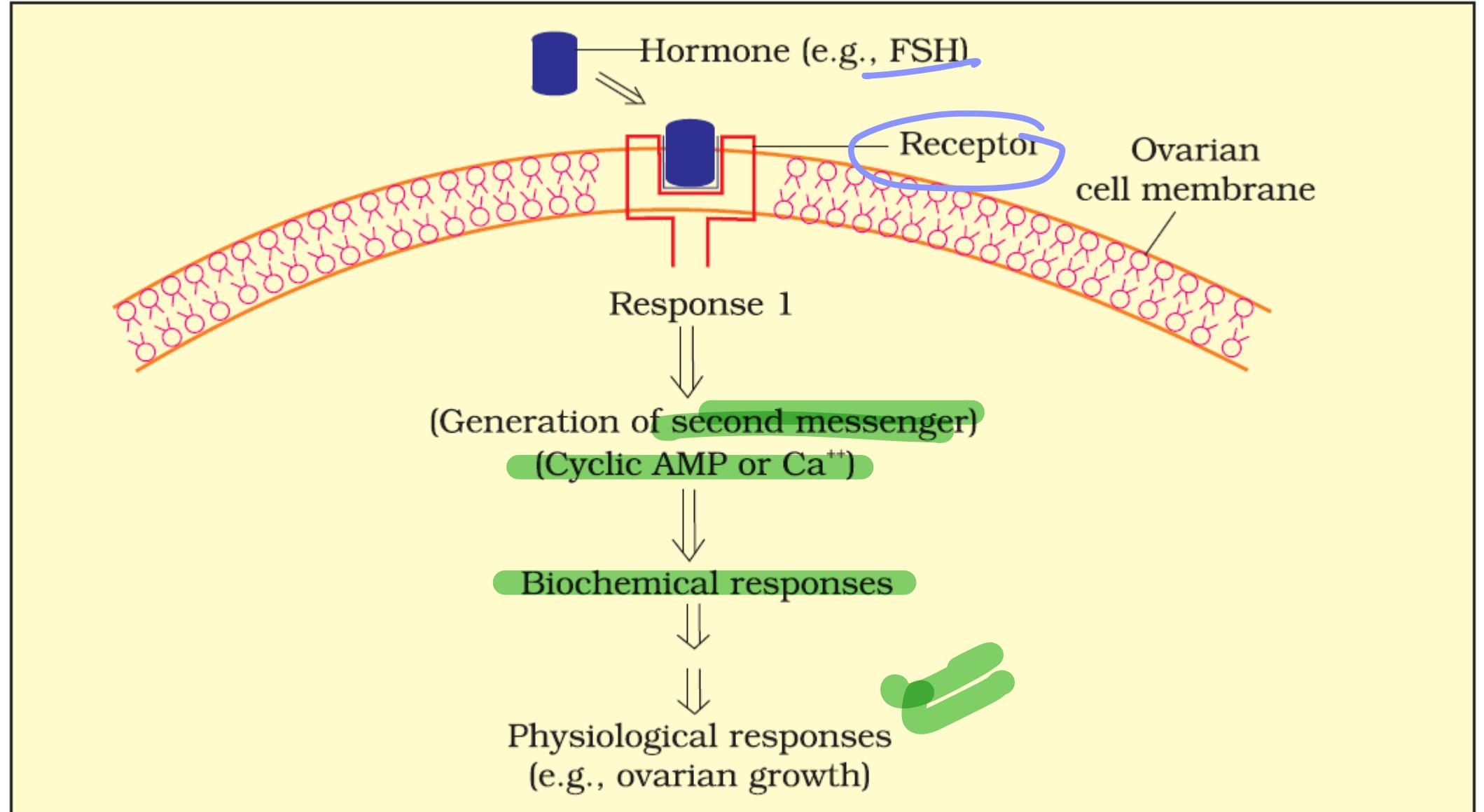


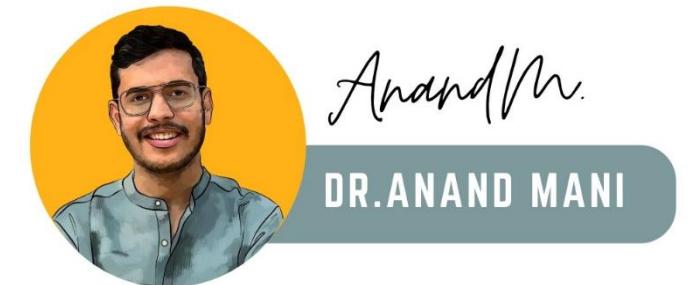
Figure 22.4 Diagrammatic representation of :
 (a) Adrenal gland above kidney
 (b) Section showing two parts of adrenal gland





(a)

Figure 22.5 Diagrammatic representation of the mechanism of hormone action : (a) Protein hormone

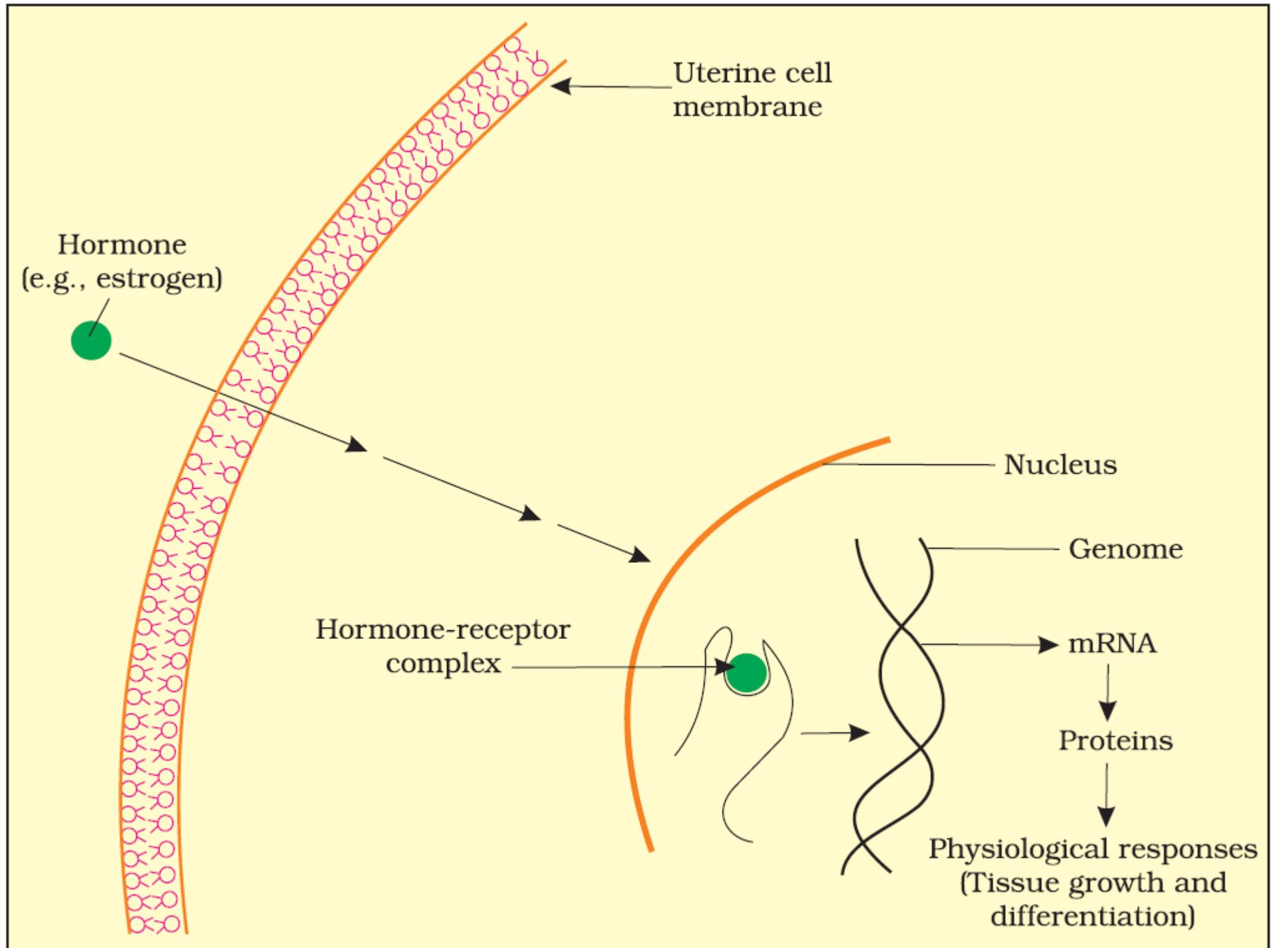


testosterone
estrogen
Progesterone
Tetrahydrocannabinol
Steroidal



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(b)

Figure 22.5 Diagrammatic representation of the mechanism of hormone action : (b) Steroid hormone

Complete.



THANK YOU