

③ Plant - Kingdom

Algae (Haploid)

Study → Phycology

Algal component → Phycobiont

Characters

- Fresh water, Marine water, Terrestrial region
- ¹⁰ Chlorophyllous, Thalloid body (can't differentiate root, stem, leaf)

Autotrophic, Tissue system $\ominus$ nt

- Algae $\longleftrightarrow$ Fungi } Relation → Lichen

- Algae + animal $\Rightarrow$ sloth bear (symbiotic associⁿ)
सूत

- Form & size (highly variable)

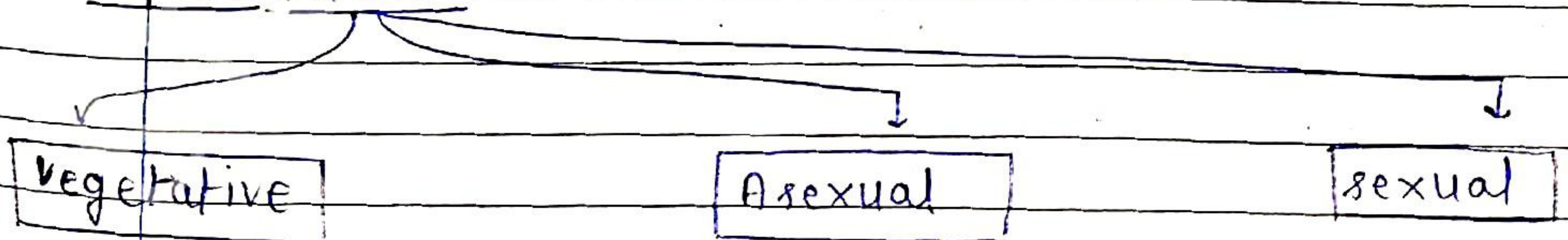
(I) unicellular algae → Chlamydomonas

(II) colonial → Volvox (Flagellated)

(III) ²⁰ Filamentous → Ulothrix, Spirogyra, Ectocarpus
(USE)

(IV) massive plant bodies → Kelps → Brown algae
(बहुल बड़े) 100 m

• Reproduction



Reproduction

Vegetative

Asexual

Sexual

Ex Fragmentation

All Filamentous algae

Zoospore

(motile)

Imp Biflagellated
(pear shape)

Ex: Brown Algae

Flagellated

Iso (2 gamete same size)

Aniso

oogamous

Biflagellated
↓
Cladophora

Imp Flagellated
↓
Ulva

Non flagellated
↓
Spirogyra

Anisogamous (dissimilar in size)

2020 Neet

Ulothrix

Oogamous

♂ (small)

♀ small

Motile

♀ (large)

Large

Non-Motile

eg: Volvox, Fucus

M. Imp

NOTE

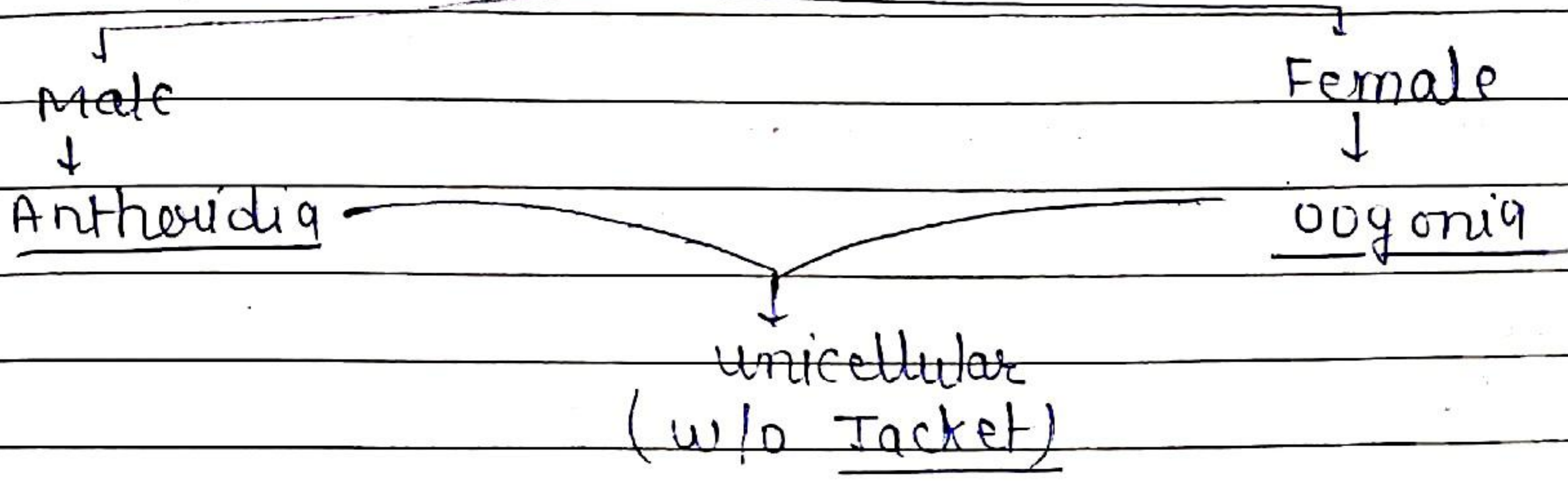
Sexual
→ Isogamous
→ Anisogamous
→ Oogamous

Green & Brown Algae (3 types)

only

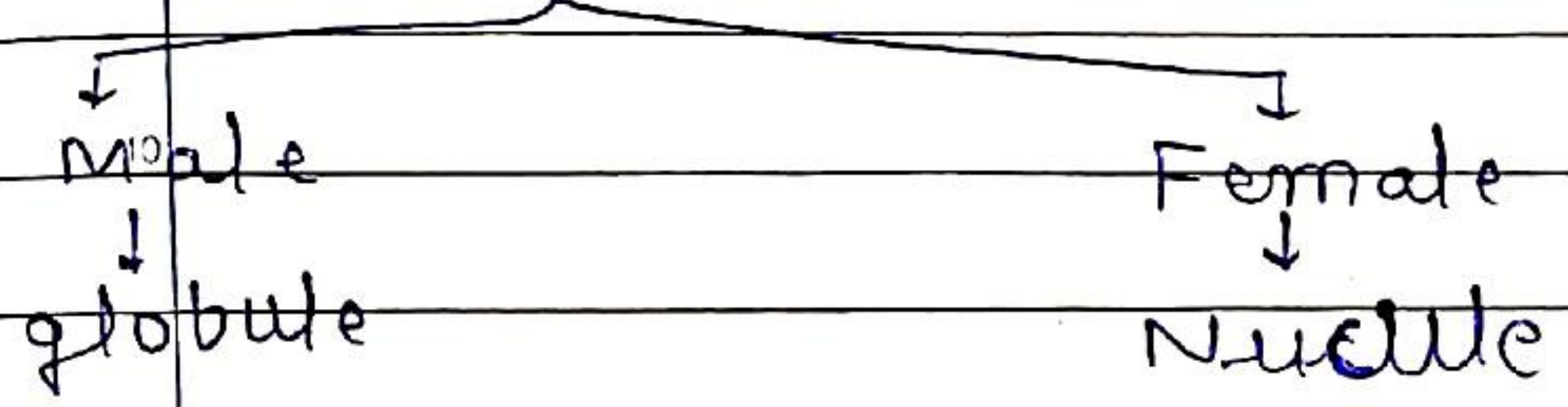
Red Algae (Most primitive)

Oogametes



Green Algae

Chara



Algae → Haploid → Haplontic life cycle.

zygotic Meiosis

Exception → Brown Algae (Diploid)

Eg: Ectocarpus (2n) Polysiphonia (n) Kelps (2n)

* Haplodiplontic (Haplontic → dominant stage)

Brya

(n) dominant haploid

(2n)

Pterido

(2n) dominant diploid

(n)

diplo-haplontic life cycle.

Haplodiplontic life cycle

Economic importance of Algae

Neet

Page :
Date :

Economic Importance

① दुनिया की $1/2$ CO_2 fixation $\rightarrow$ By Photosynthesis

② Primary Producer of energy

③ Edible $\rightarrow$ P L S को खाते हैं (फ्लेक्स)
फलस

* * Porphyra, Laminaria, Sargassum } edible.

Neet

④ Algin & Carrageen

Brown
Algae

Red
Algae

Trick $\rightarrow$ रस है $\rightarrow$ Red

Water Holding substances } used in transport
(Hydrocolloids)

⑤ Agar - Agar $\Rightarrow$ Red Algae $\Rightarrow$ Gelidium & Gracilaria
culture medium (growing microbes)
Ice cream, jelly preparation.

Trick Agar Agar $\rightarrow$ Gelidium & Gracilaria

⑥ space Traveller

$\rightarrow$ Chlorella & Spirulina * * } Protein rich

divisions $\rightarrow$ Algae

Chlorophyceae

Green algae

Phaeophyceae

Brown algae

Rhodophyceae

Red algae

Imp

Basis $\rightarrow$ Photosynthetic pigments

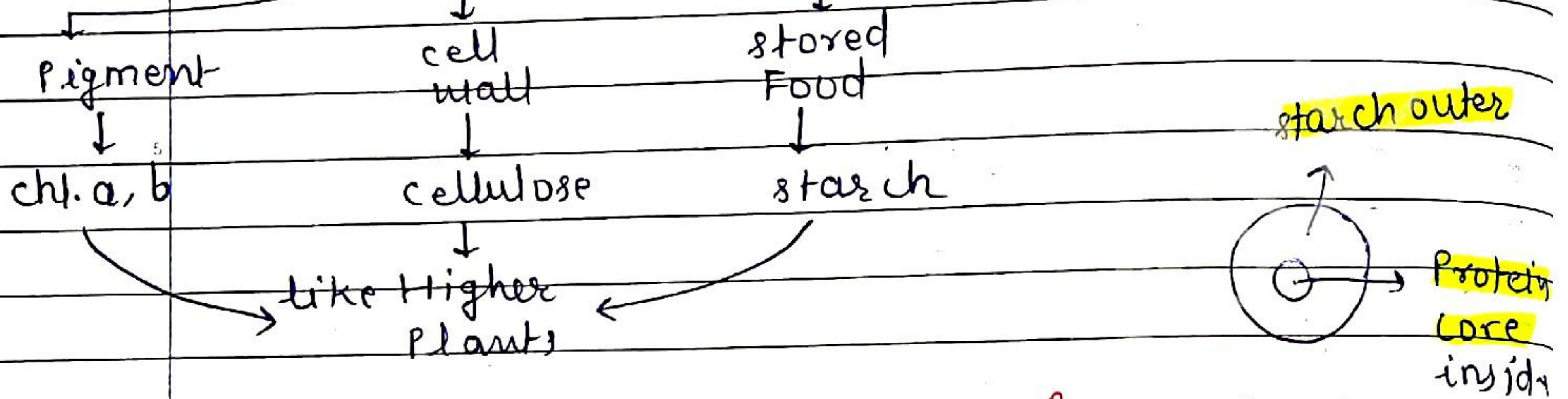
of classification $\rightarrow$ cell wall composition

$\rightarrow$ stored Food.

Class	Common Name	Major Pigments	Reserve Food Materials	Cell wall	Flagella No.
Chlorophyceae	Green Algae	Chl. a + b Pigment $\ominus$ nt	Starch	Pectose + cellulose	2, 8 equal (apical)
Phaeophyceae	Brown Algae	Chl. a + c Pigment $\downarrow$ Fucoxanthin	Isid Mannitol Laminarian Starch $\rightarrow$ Brown Starch M.A L.A	Cellulose & Algin	2 unequal (lateral)
Rhodophyceae	Red Algae	Chl. a + d Pigment $\downarrow$ Phycocyanin Red colour	Floridian starch	Cellulose & Pectin with Polysulphate ester	Flagella $\ominus$ nt

① Chlorophyceae (Green Algae)

"Most advanced" *



• stored Food → starch

In chloroplast → Pyrenoids ^{M. Imp} ***

starch + Protein / oil droplets

*** chloroplast shape

ex: Volvox

Chlamydomonas

Spirogyra

Ulothrix

Chara

cup shaped

Ribbon / spiral shape

girdle shape

discoid shape.

chloroplast shape.

• unicellular → Chlamydomonas, Chlorella, Acetabularia

*** Largest unicellular plant

• filamentous → Ulothrix, Spirogyra

^{M. Imp} NOTE

Cephalosporium Algae → Parasitic

(... Algae)

→ cause Red Rust ***

② ^{Imp} Protein

content maximum

→ Spirulina >>> Chlorella

②

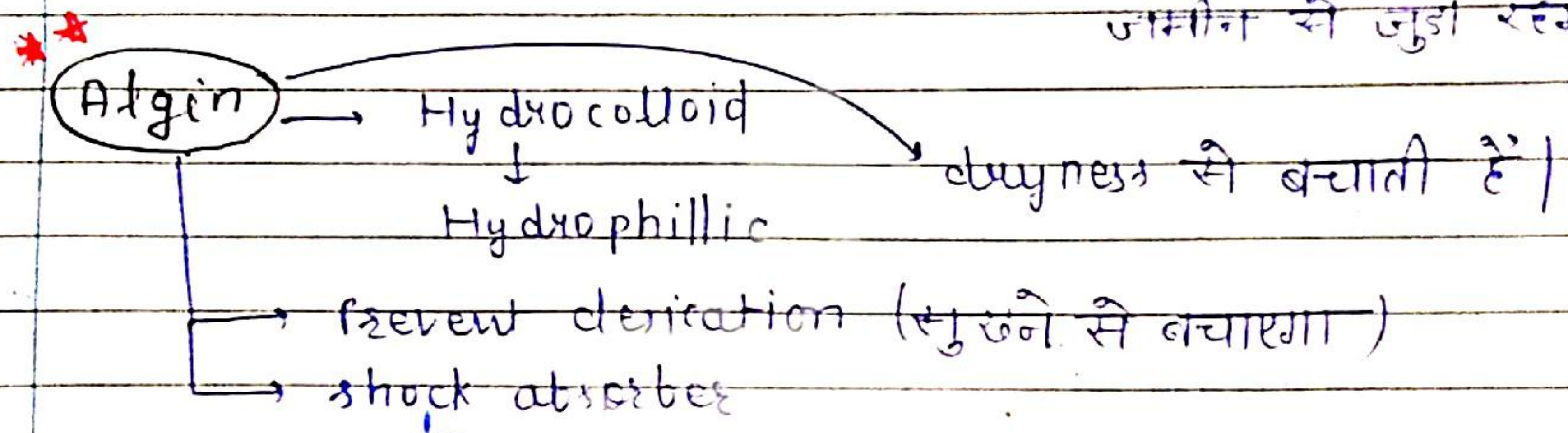
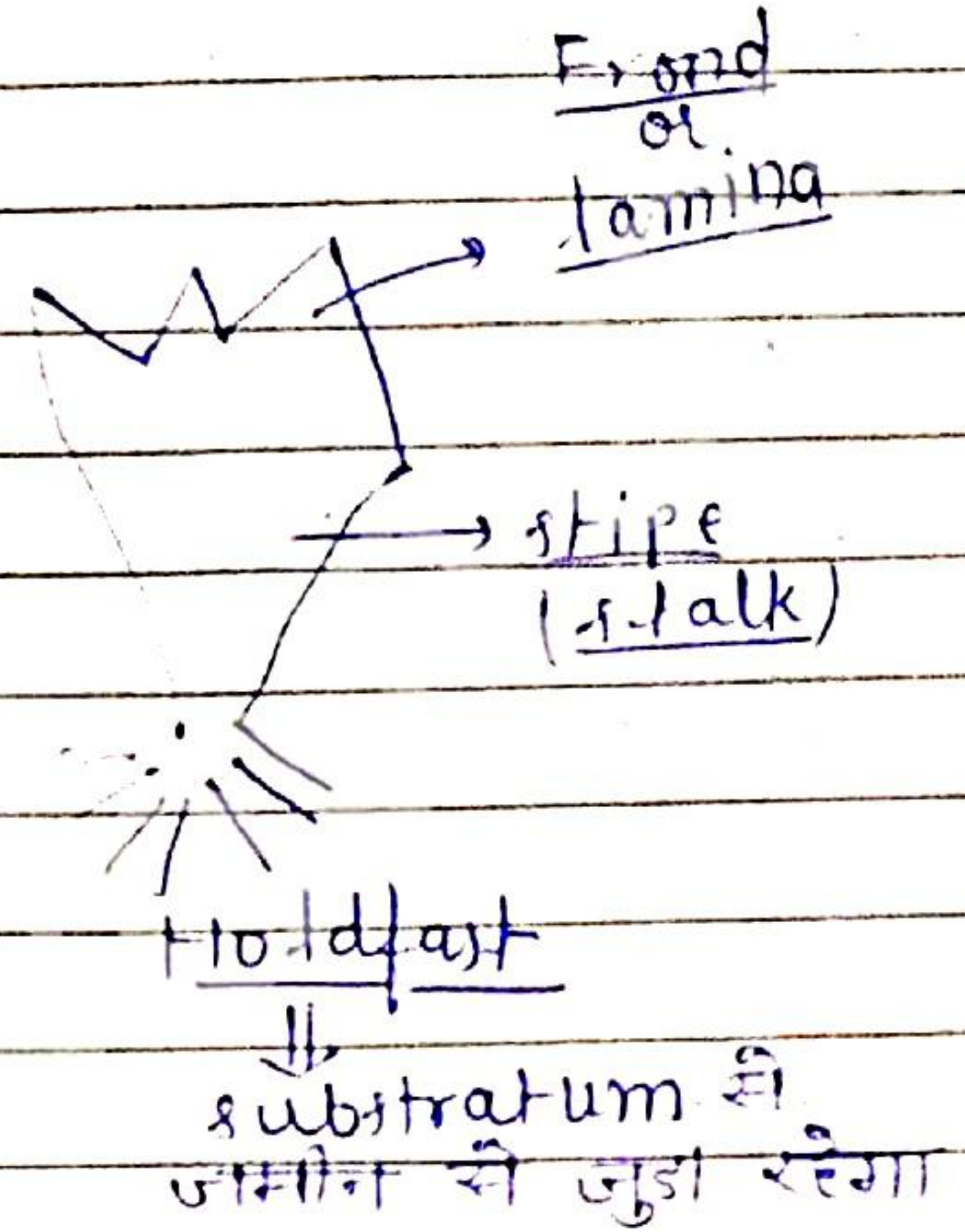
Phaeophyceae (Brown Algae)

- Mostly → Marine water
- Multicellular filamentous

↓
Longest filament
↓
100 mt

Kelps
↓
Macrocystis

Largest Brown Algae



Ex: self defense Trick

S → Sargassum

E → Ectocarpus

L → Laminaria

F → Fucus (diplontic)

D → dictyota

Imp
NCERT diag:

Part - XIII

③

Rhodophyceae (Red Algae)

③ Rhodophyceae (Red Algae)

• 2nd most ancient algae * (यू-एफ)

* (First = B.G.A) *

eg: Polysiphonia

• Mostly found = Marine water = warmer areas

exception → Batrachospermum ⇒ Fresh water
Porphyridium ⇒ Land (unicellular algae)

M. Imp. ***

→ No any motile stage (Flagella ⊖) in lifecycle.

↓

cilia & flagella = B.G.A
⊖

→ cell wall → cellulose + Pectin

→ xylane

→ galactose

→ polysulphate ester

cell wall ✓

↓
complex

↓
b/c Primitive

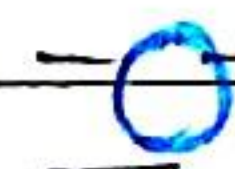
NOTE → Cell wall + CaCO_3 → corals
(coelentrata)

• Gaudikov's effect Red algae do colour change acc. to depth

surface 42

Phycocyanin ↑↑

(Blue colour)



Phycocyanin = UV, violet

↑
Colour appearance

Bottom 30

Phycocyanin

(Red colour)



Red algae colour changes according to depth

Red algae $\rightarrow n$
Brown $\rightarrow 2n$

Page :

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$\rightarrow$ gaudikov's effect $\rightarrow$ also $\oplus$ in B.G.A

• sexual Reproduction

Red algae (n)

only oogamous **

σ (sex organ)

♀ sex organ

Spermatangia

Carpogonia

spermata (male gamete)

(Non-motile)

Trichogyne

egg

Non motile

Fertilisation
पानी से

zygote

carposporophyte
($2n$)

mitosis

Carpospores

meiosis

Tetrasporophyte
($2n$)

spore
(n)

Red Algae

Imp Note *

sexual Repⁿ is oogamous and accompanied by complex Post Fertilisation development

NCERT

Note $\rightarrow$ complex Post Fertilisation development बीला है remaining algae के comparison में।

σ (male) ♀ (Female)

Algae

Anthredium

oogonium

Chara

globule

Nuticle

Red Algae

spermatogonia

carpogonia

Camlin

Ex: Red Algae

Trick $P^2 + G^2$

$P \rightarrow$ Polysiphonia
 $P \rightarrow$ Poly Posphyra
 $G \rightarrow$ gelidium
 $G =$ Gracilaria

Examples

Green

Remaining all

Brown

$S \rightarrow$ Sargassum
 $E \rightarrow$ Ectocarpus
 $L \rightarrow$ Laminaria
 $F \rightarrow$ Fuus
 $D \rightarrow$ dictyota

Red

$P^2 + G^2$

$P \rightarrow$ Polysiphonia
 $P \rightarrow$ Porphyra
 $G \rightarrow$ gelidium
 $G \rightarrow$ gracilaria

#

Bryophyta

(n) Haploid
 gametophyte (dominant)

These are 1st land plant

but unsuccessful.

<u>Roots</u> ent	<u>Vascular system</u> ent	<u>Water required</u> For fertilisation
---------------------	-------------------------------	--

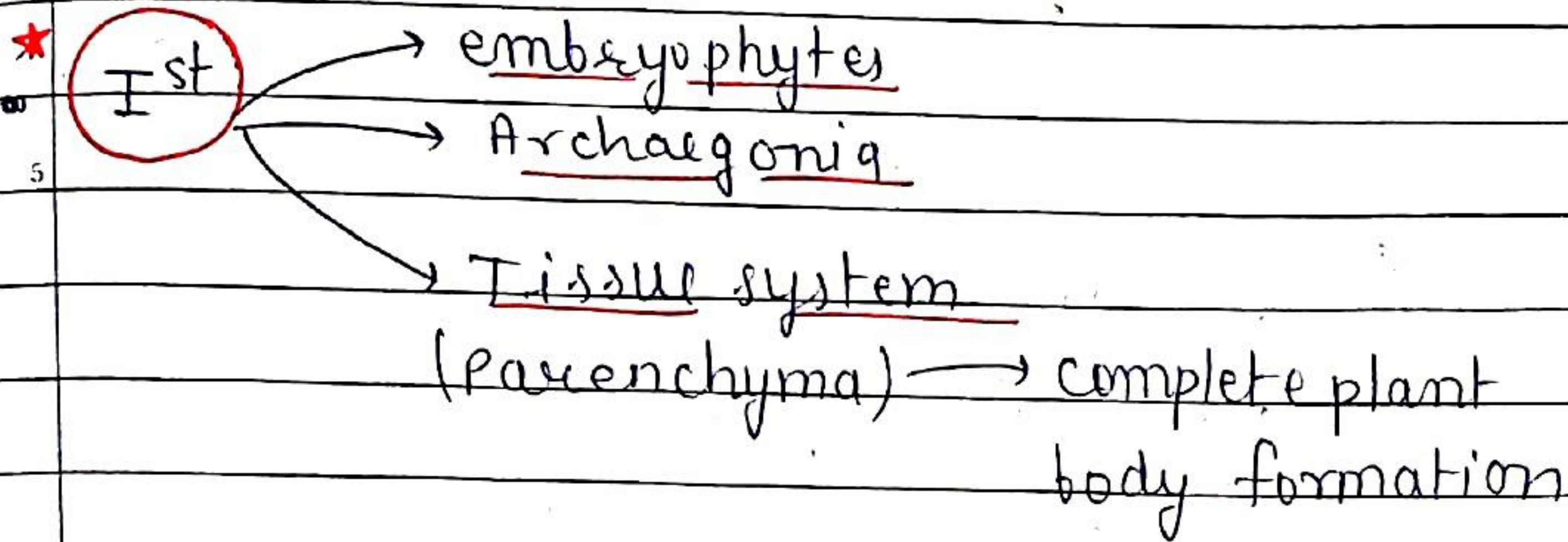
इसलिए Bryophytes
 बड़े नहीं होते
 (xylem & Phloem ent)

$\rightarrow$ Bryophytes $\rightarrow$ Amphibians of Plant Kingdom

Both $\left\{ \begin{array}{l} \text{water} \rightarrow \text{fertilisation} \checkmark \\ \text{land} \rightarrow \text{not successful. } \times \end{array} \right\}$ Amphibians of Plant Kingdom
 $\Downarrow$ sexual Reproduction $\checkmark$
 करते हैं।

- Habitat → cool, Damp, (moist), shady Areas (Sciophytes)

Near water bodies ✓



→ Cryptogamous

Habit

Primitive
Bryophyta

↓
Thallus + Rhizoids

↓
dorsiventral
(चमटा)
रोटी की तरह

eg: Liverworts, Hornworts

↓
Advanced
bryophyta

↓
Leaf like (n) + Rhizoids (n)
stem like (n) (Root like)

Ex: Mosses (n)

★ Unique character

→ कहीं नहीं मिलेगा

Mosses → हर चीज में
मोसाजी ही अच्छे
हैं

★ Reproduction

① Vegetative / Asexual Repⁿ

(A) Fragmentation

→ Thallus eg: Liverworts
Hornworts

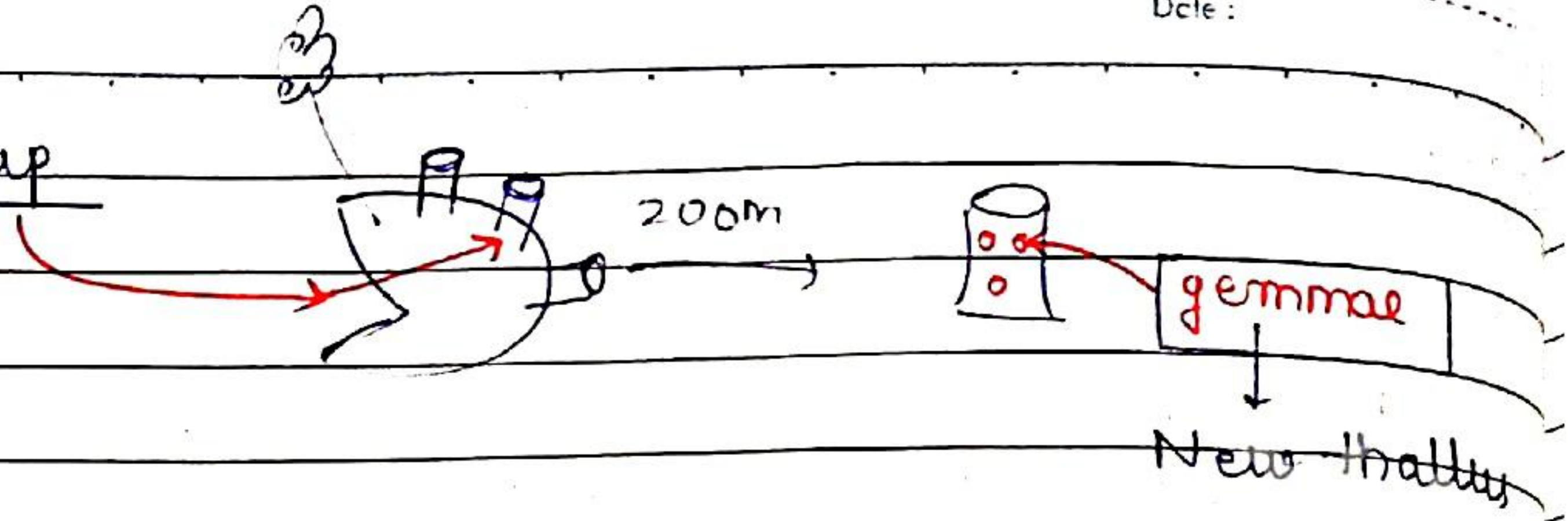
→ Marchantia ★
(dioceous) eg: Mosses

♂

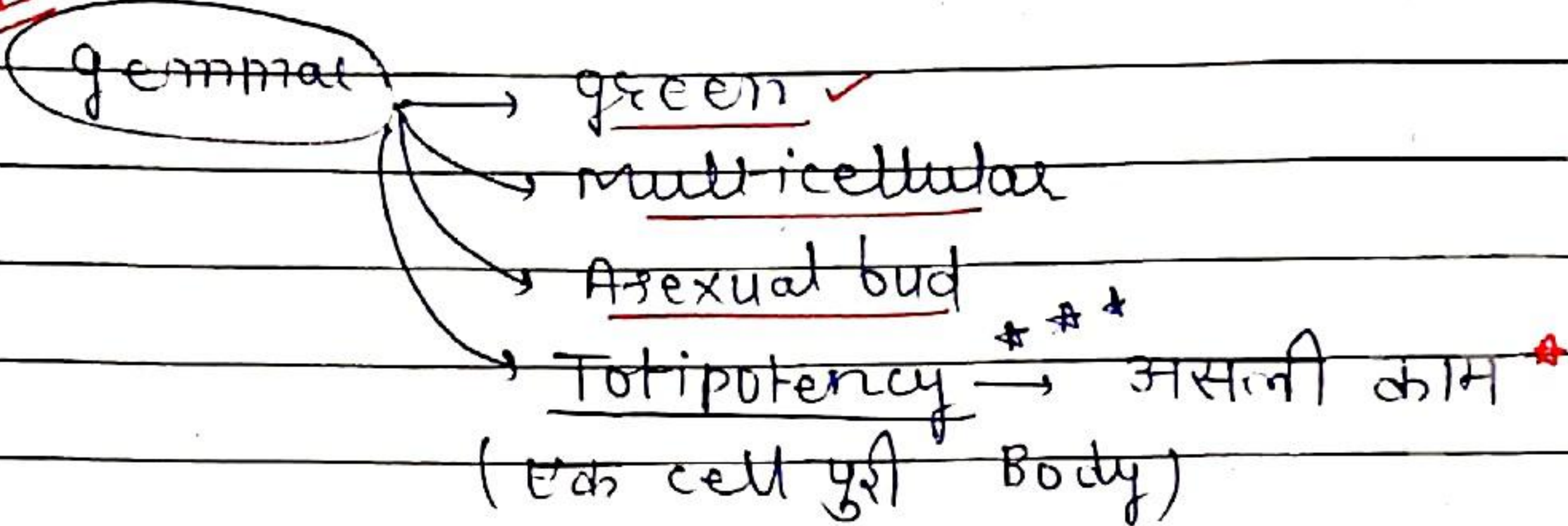
♀

Camlin

(III) Gemma cup

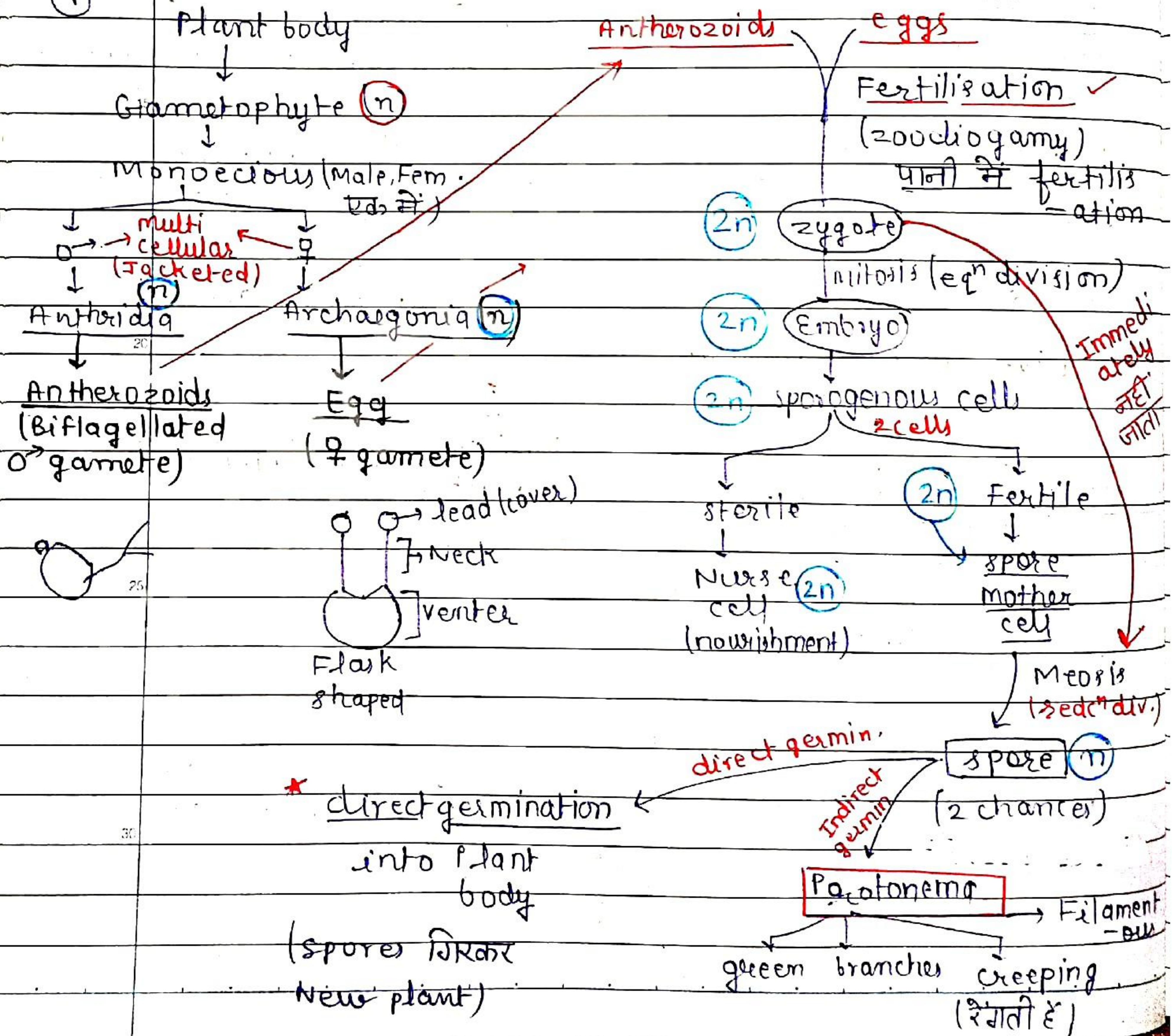


Imp

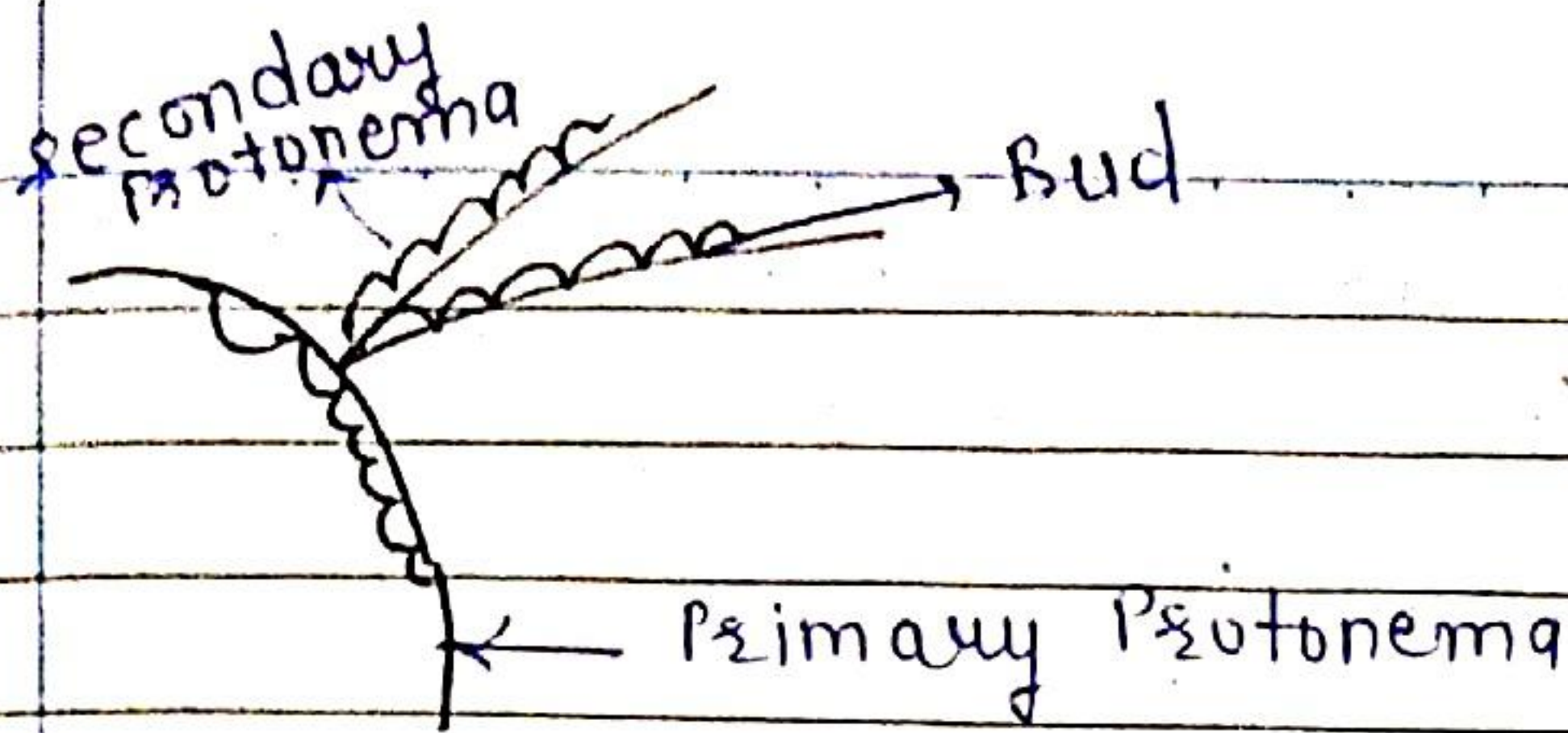


Life cycle (Sexual Reproduction)

①



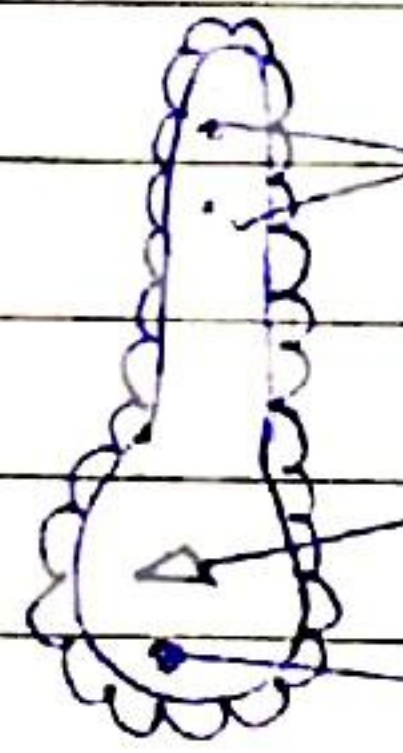
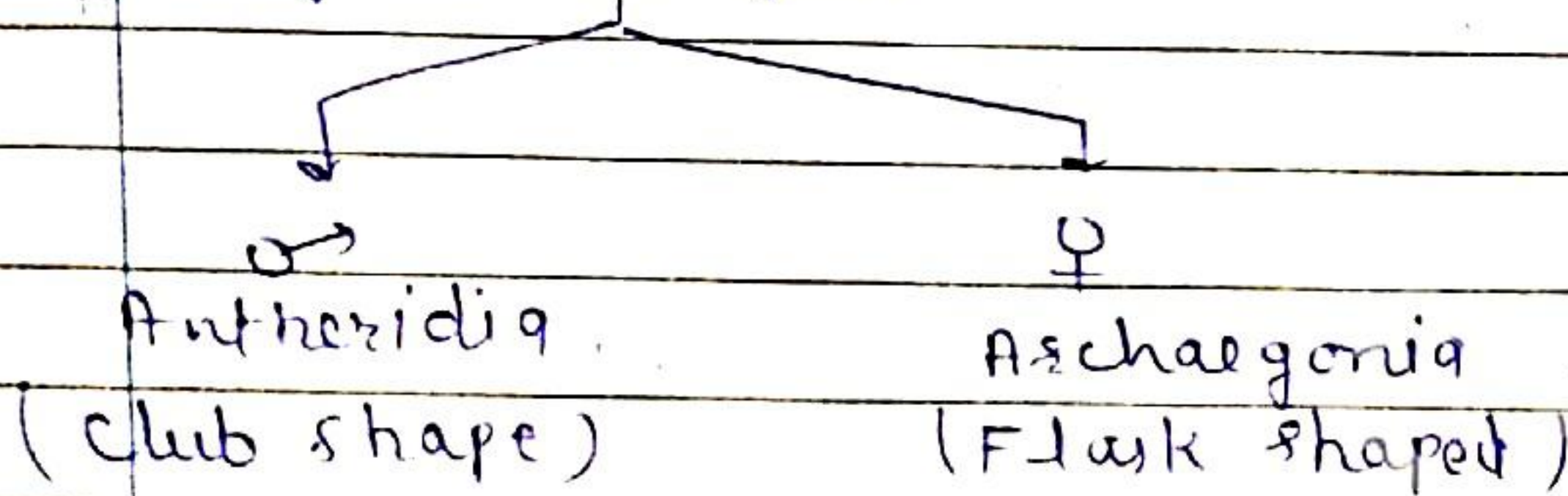
Protonema



(Indirect germination)

★ zygote do not undergoes ——— Reductional division
Immediately.

Bryo sex organs



N.C.C. (Neck canal cell)

V.C.C. (ventral canal cell)

egg

↓
① V.C.C.

Sex organ composition

Algae	B / P
Unicellular	multicellular
Jacketless	Jacketed

except: Chara

Part XIV

Bullet Points

Bryophytes

- 1st embryophytes
 - 1st archaegoniate.
- 1st land plant but not successful.

water → req. for fertilisation (zooidiogamy)

1st tissue system

Camlin

Scanned with CamScanner

→ Imp. Role in Plant succession on bare rocks / soil
(psim. succession)

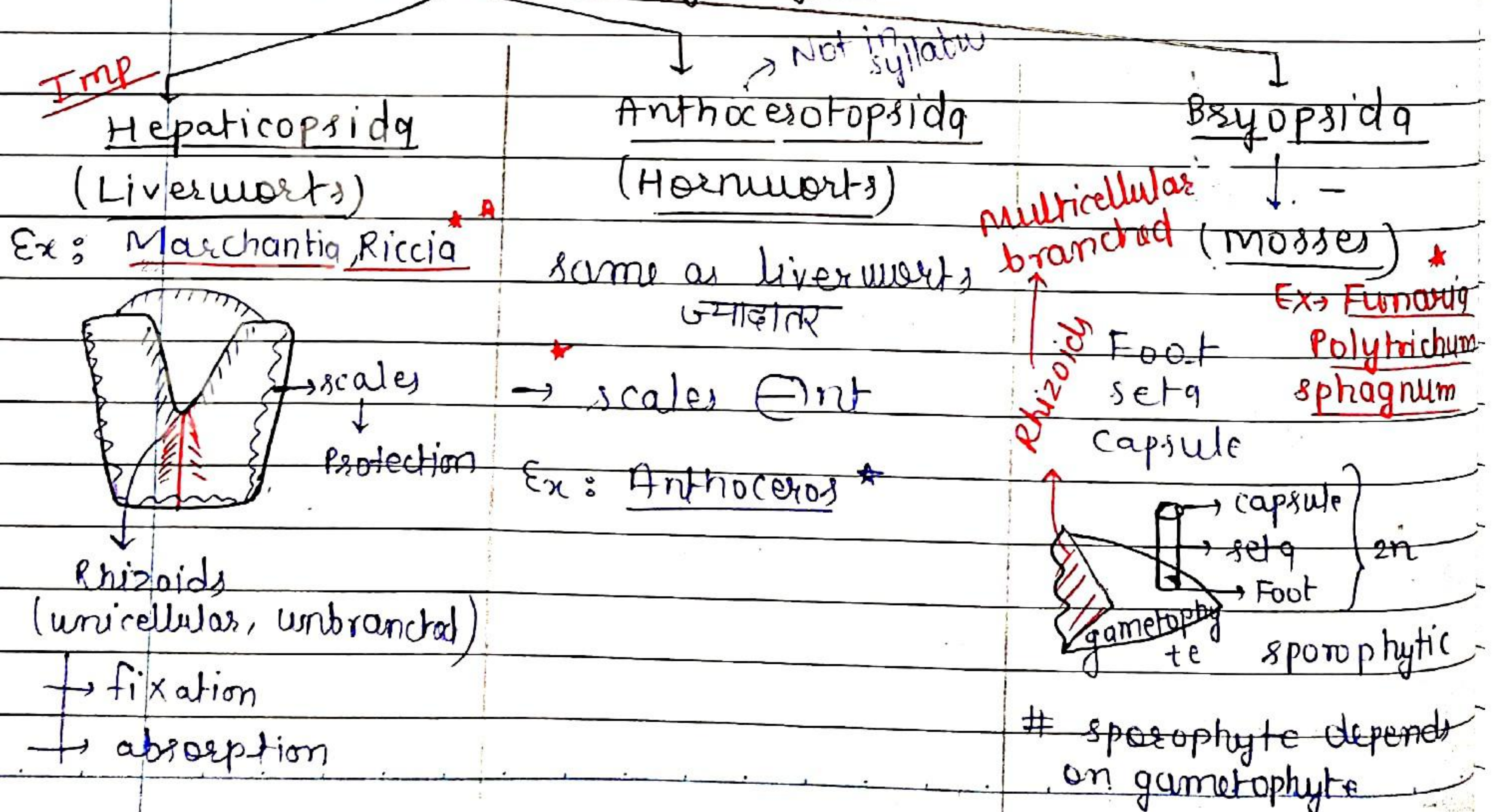
→ Main plant body → gametophyte.

Economic importance & ecological importance of Bryophytes

→ little economic importance & great ecological importance

<u>economic</u>	<u>ecological</u>
Food, → <u>sphagnum</u> (Packaging/Transportation) ↓ <u>Moss</u>	→ Prevent soil erosion → Reduce impact of falling rain → 1st organism (Lichen + Bryo) to colonise rocks. → decompose rocks for growth of higher plants.

classification of Bryophytes



sporophytic evolution → Fertile Part reduced

"अच्छा हुआ"
कम आओ अच्छा काम हो

(H)	(A)	(B)
Ex: ① Riccia → simplest bryophyte	• pseudocolors	• <u>peristomial teeth</u>
② <u>Neet</u> Marchantia → dioecious		good than elaters
gemma cup int <u>elaters</u> dispersal of spores Nutrition of spores		Best spore dispersal
Modified form of nurse cells		* मौसमी हमेशा अच्छी
• Posella ↓ Leafy gametophyte		* <u>Moss</u> ↓ spore dispersal में sporophyte में Ex. → Funaria * Polytrichum * Sphagnum *

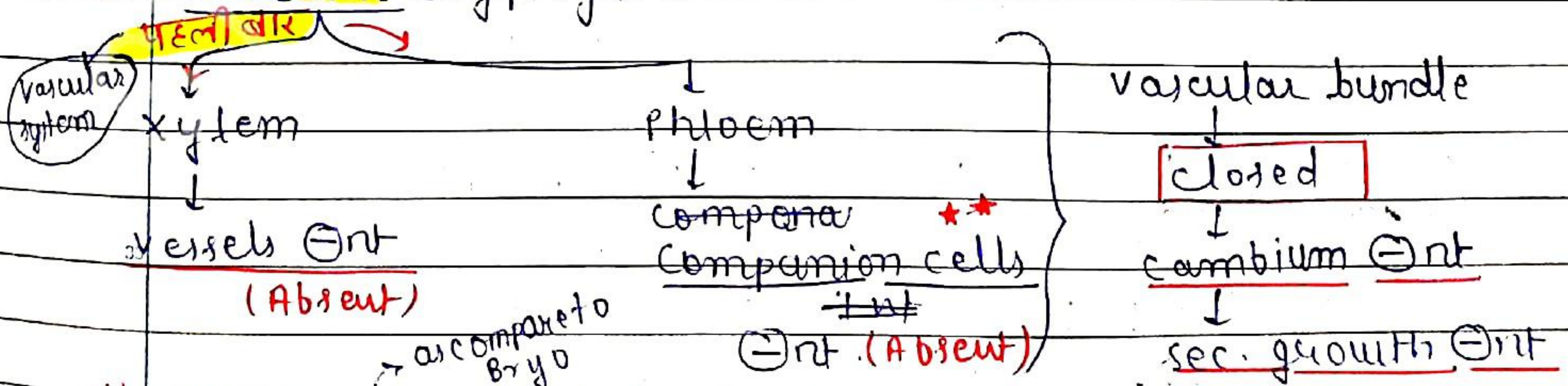
Reptiles of Plant King.
(रिंगर उडे हैं पानी पर depend)

Pteridophyta

vascular cryptogams

- Pioneer of secondary succession (Forest Fire में पहली बार यही आया)

• vascular cryptogams

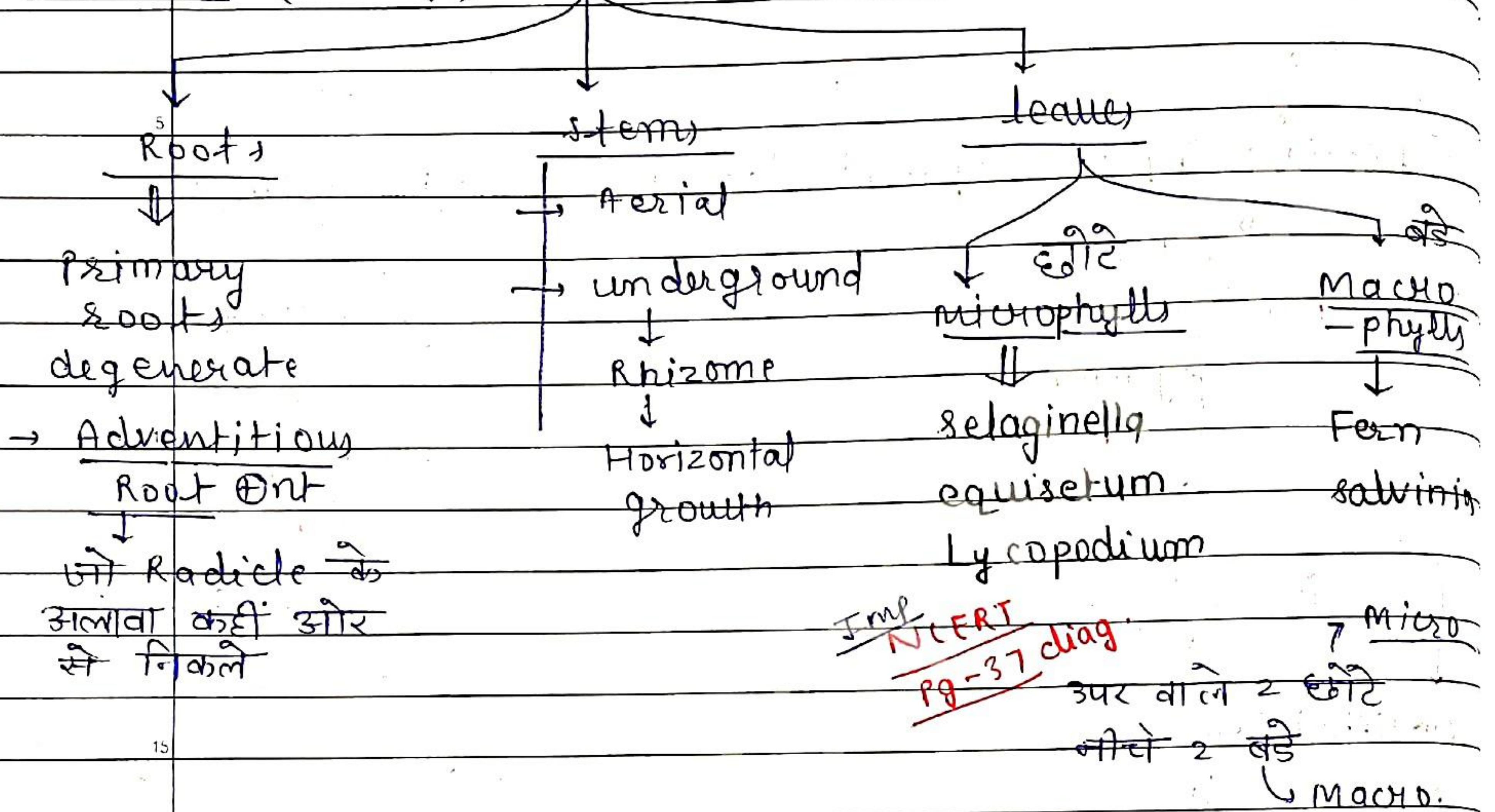


More successful land plant but not completely successful →

water required for Fertilisation
Camlin

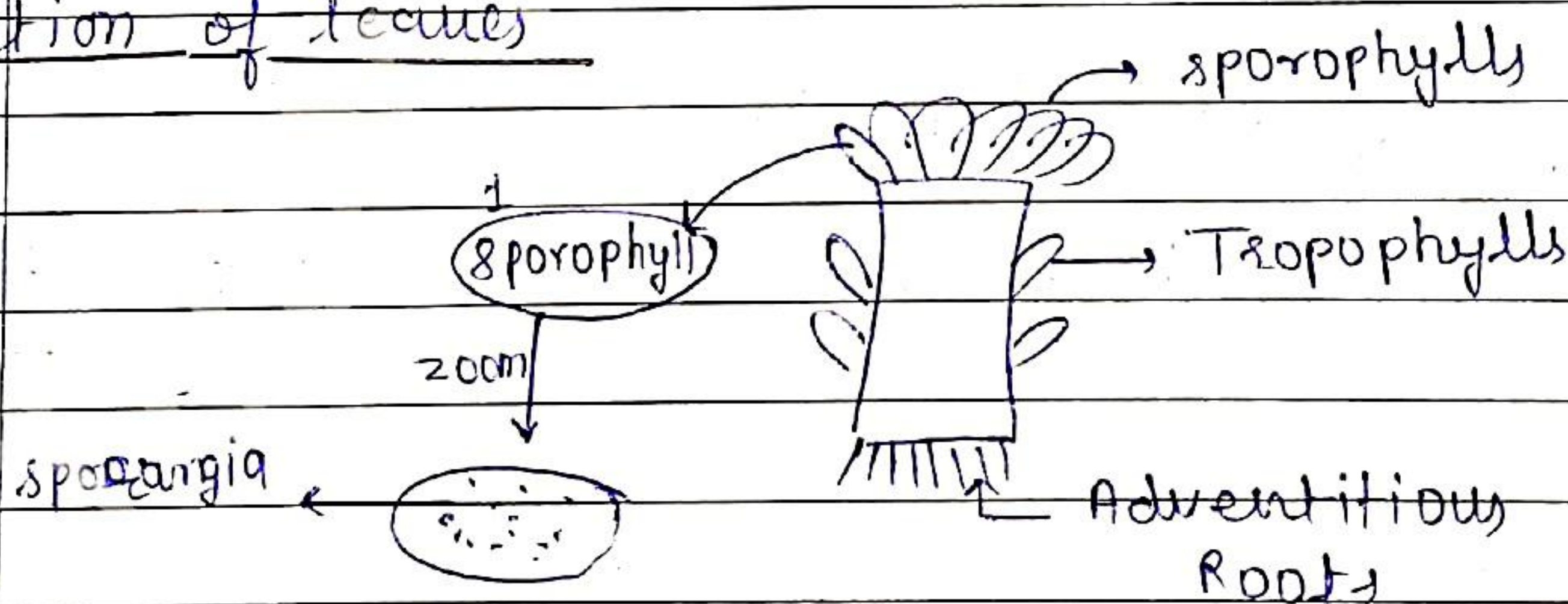
• Plant body → Better differentiation

dominant → (Sporophyte) Plant body (differentiation)



- Selaginella } संजीवनी घुट्टी (Medicinal use)
- Bryopteris }
- Fern plants → decoration.

Imp function of leaves



- strobillus → compact group of sporophyll
- strobilli / cone

Function → Trophophyll = Photosynthesis

sporophyll = (Photosynthesis + sporangia) → unique character

→ Gymno & Angio → दोनों में sporophylls $\oplus$ ant. होते हैं
But Photosynth. नहीं करते X

NOTE

Pteridophytes include Horsetails
& Ferns.

⇒ Use → medicinal purpose, soil binders, ornamental etc.
⇒ Habitat → cool, damp, shady, sandy soil

#

sporophylls → sporangia → spore mother cell ($2n$)

Meiosis

spores (n)

exosporic
germination
(जो अपने site पर
germinate न करे
बाहर जाकर
germinate करे)

Archegonium

egg

Antheridia

male
gametes

Prothallus
Features

Inspicuous (not clear)
mostly Photosynthetic
multicellular
green colour
small
monoecious

Prothallus

Heart
shaped

Rhizoids

zooidogamy
(Fertilisⁿ with water)

zygote

($2n$)

embryo → New sporophyte

NOTE #

Pteridophytes → amphibogamous condition
Need of water for fertilisation
Pioneer of sec. succession

Page :

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NOTE → Pteridophyta में independent of Alternation of generation है।

Pteridophyta → Independent alternation of generation में
पहली बार आया

Most of Pteridophytes

Spore Formation

अब तक की diversity में ऐसा पहली बार हुआ

Homospores

spores



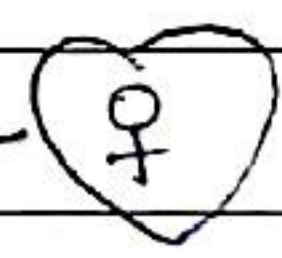
monoecious

Prothallus

Heterospores

microspore
(male)

megaspore
(female)



dioecious
Prothallus

Endo-
-sporic
germination

NCERT

→ Selaginella ***

→ Salviniella ***

→ Azolla *

→ Marsillia *

→ Isoetes *

AIMSS

Most of Pteridophyte → Homospores

All Gymno, All Angio → Heterospores.
+ कुछ Pterido

Selaginella → Exosporic → Prothallus

→ endosporic → Prothallus X

Date :

Angio
gymno } spermatophyta

Part - XV

• Maxm. diversity → Fungi
• Maxm. no → Angio
बहुत बड़ा

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Gymnosperm → seeds

Seed

Naked seeded
plants

seed is
naked
due to absence
of ovary wall
• fruit wall

Narrow distribution

Himalya Region
generally

Angiosperm

spermatophyta
(seed + nt)

seed + Fruit

widely
distributed
plant

→ 1st seeded plant in Nature

→ smallest group of Plant diversity

→ Medium size, tall trees, shrubs

sequia → Red wood Tree } Tall & giant
100 meter

Leaves

→ बदलते environment के
साथ adapt कर सकते
हैं।

→ Needle like leaf

→ Thick cuticle

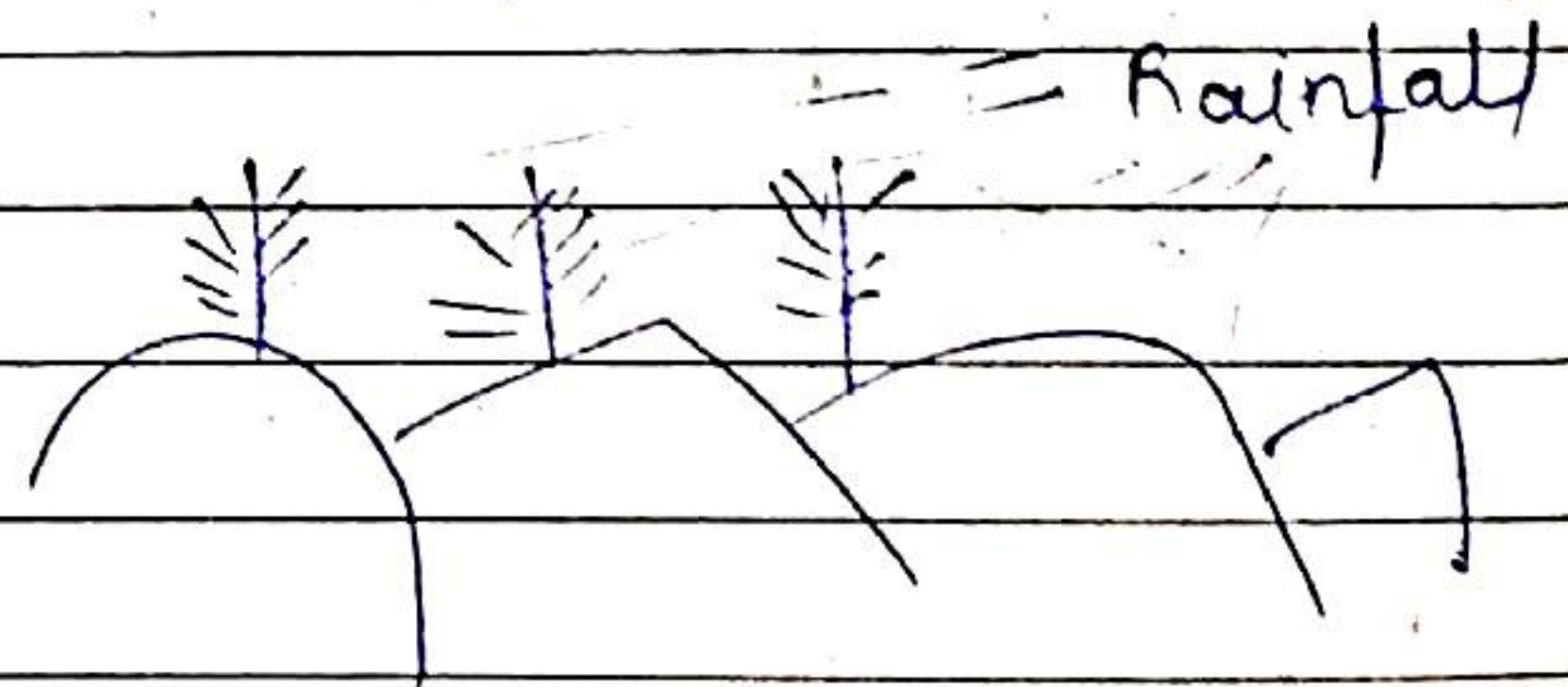
→ sunken stomata
(deep)

Xerophytes

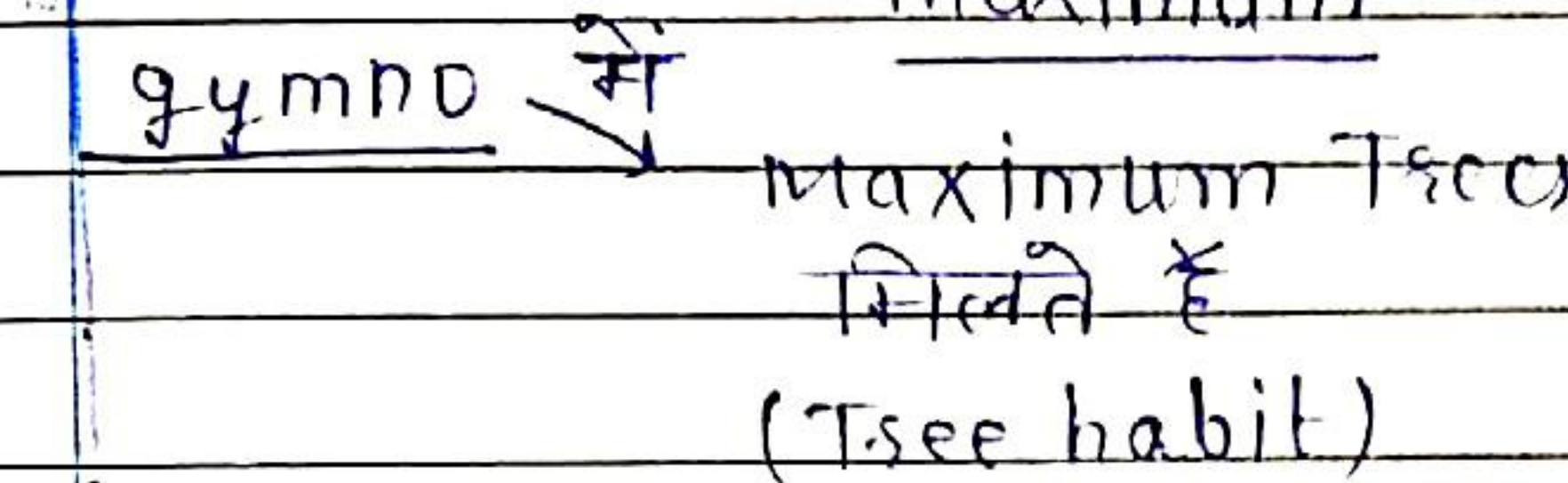
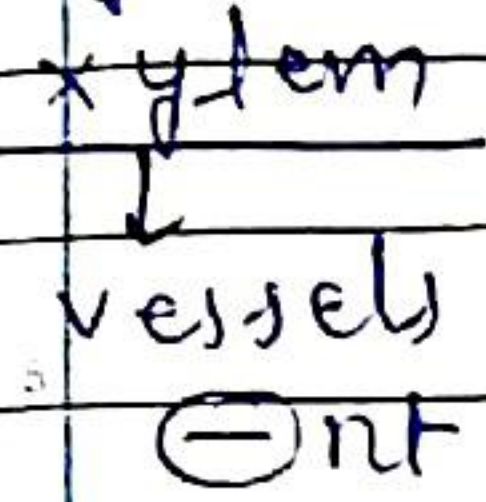
→ Physically dry

→ Physiological dry
(internal)

Both



Vascular system



gymn

$47 \overline{) 50}$
 50 में 47
 1 बार

50 में 47
Three मिलेंगे

Root
↓
Tap Root system

Leaf

Branched

↓

Pinus

cidrus

PC Branching

Tsick

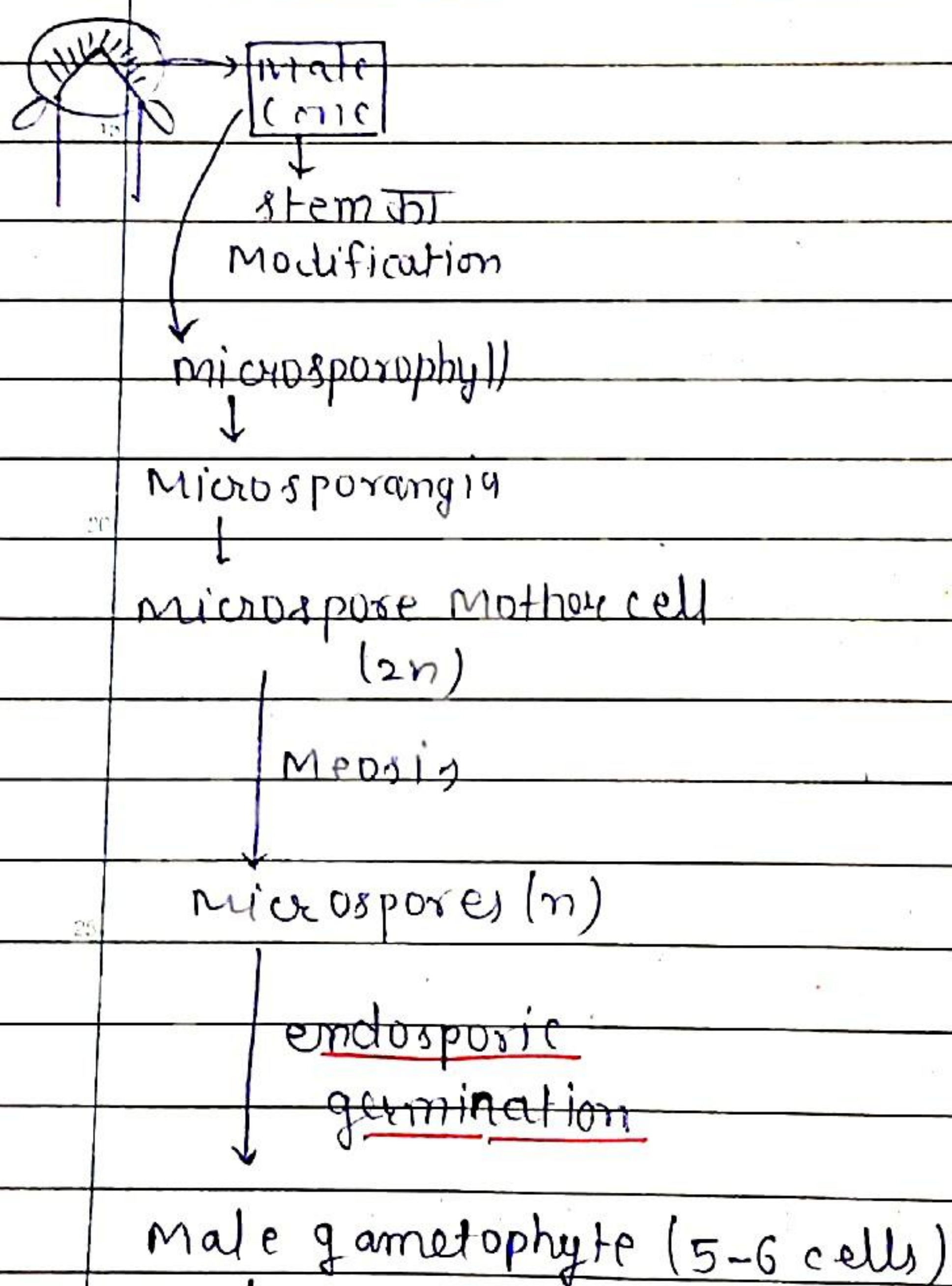
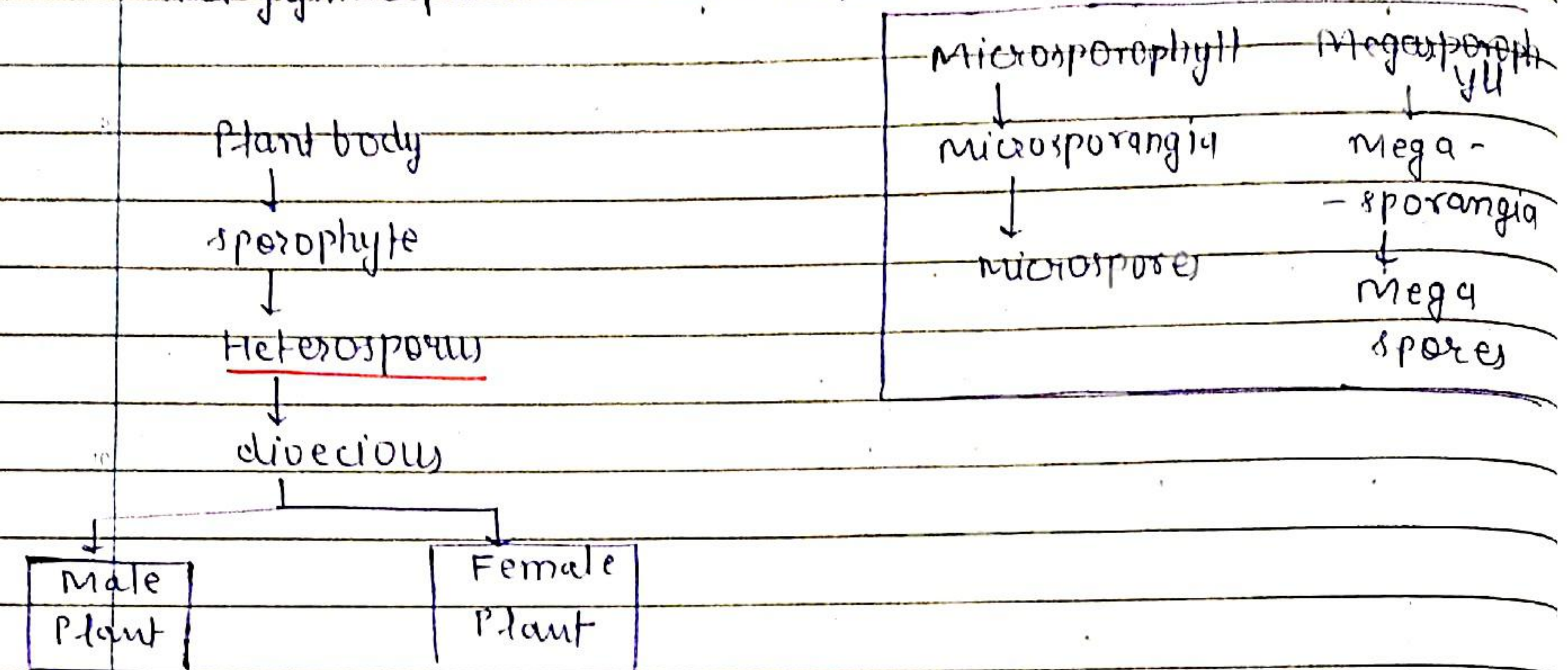
PM → Pinus monoclada
CD → Cycas dioica

Camlin

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⇒ Life cycle of gymnosperms

→ All gymnosperms = heterosporous ✓



पहली Pollen grain gymno में बनी

Pollen grain

Male gametes

Mobile → Lower gymno

(पानी पर depend)

Non-motile → Higher gymno

फिर मोटिलिटी छोड़ दी

पहले Pollen tube साइ

Neet

Cycas → 3-5 Male gametes



Top shaped, multiciliated
(बहुशुक्ल)

Female Plant (cone shaped)

Megasporophyll

Megasporangia

Megaspores

integuments

zoom

ovule

(2n) Nucellus

Integuments (2n)

1 cell of Nucellus

Megaspore Mother cell (2n)

① Functional megaspore

4 megaspore

3 degenerates

Free nuclear division

All Haploid Nucleus

cytokinesis

many cells

endosperm

pollen

Pollen chamber

Archegonia

egg

Integument

endosperm

⇒ Pollination

Anemophily (हवा से)

through water.

⇒ Fertilisation

(I) zooidisiphonogamy → Lower gymno

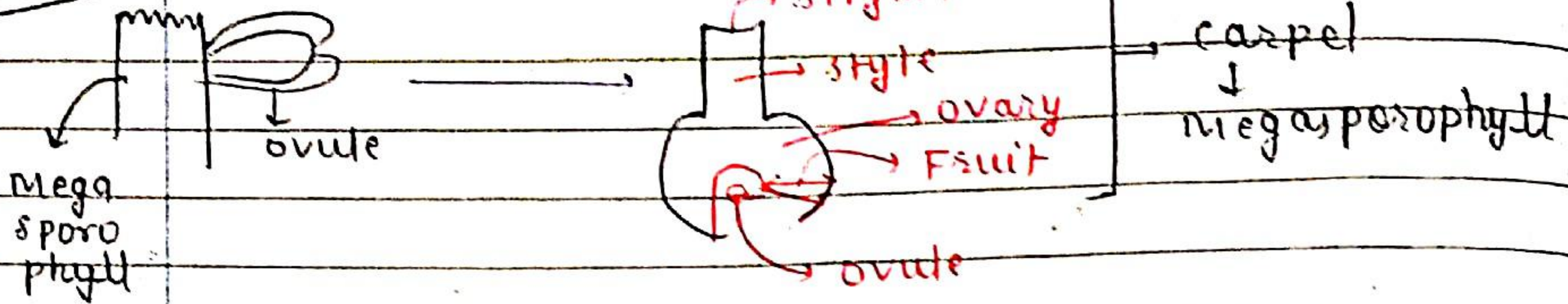
(II) siphonogamy → Higher gymno.

Camlin

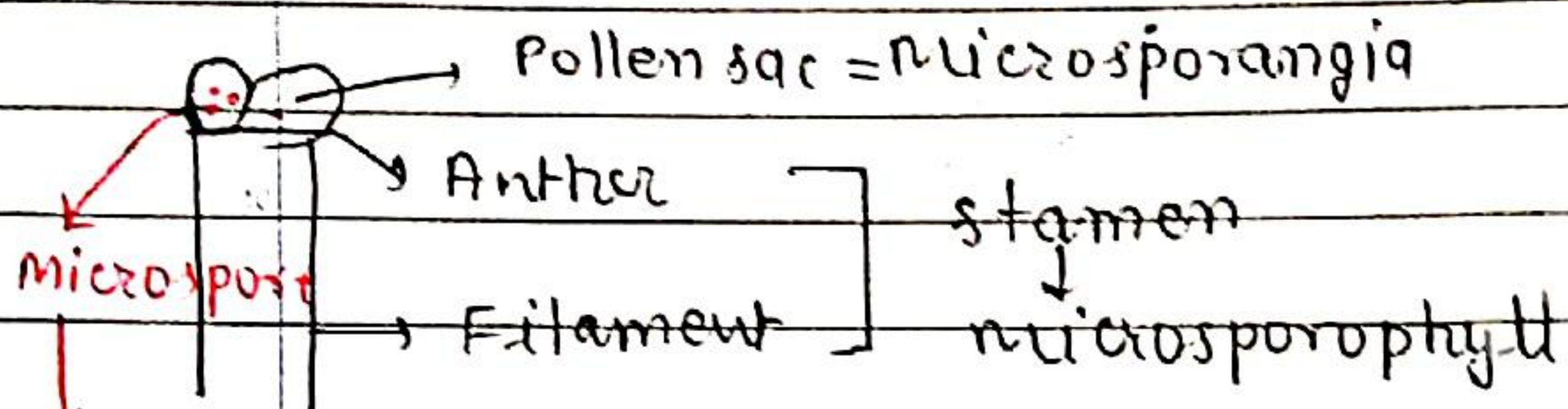
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• क्या से क्या ले गया ?

Female site



Male site



endosporic germination

male gametophyte → Pollen grain

IMP NOTE P.Y.Q **

- Last group having Antheridia → Pteridophyta *
- Last group having Archegonia → Gymnosperms *

① Ex: cycas, Pinus, Ginkgo, sequoia, cedrus

② Monoecious → Pinus ; dioecious → cycas PMCD

③ gametophyte of vascular plant ⇒ smaller & smaller sex organs.

④ seed habit requirement → Heterospory
→ endosporic germination

⑤ Bryo & Algal → gametophyte → Non vascular ✓

⑥ 1st vascular tissue → Pterido.

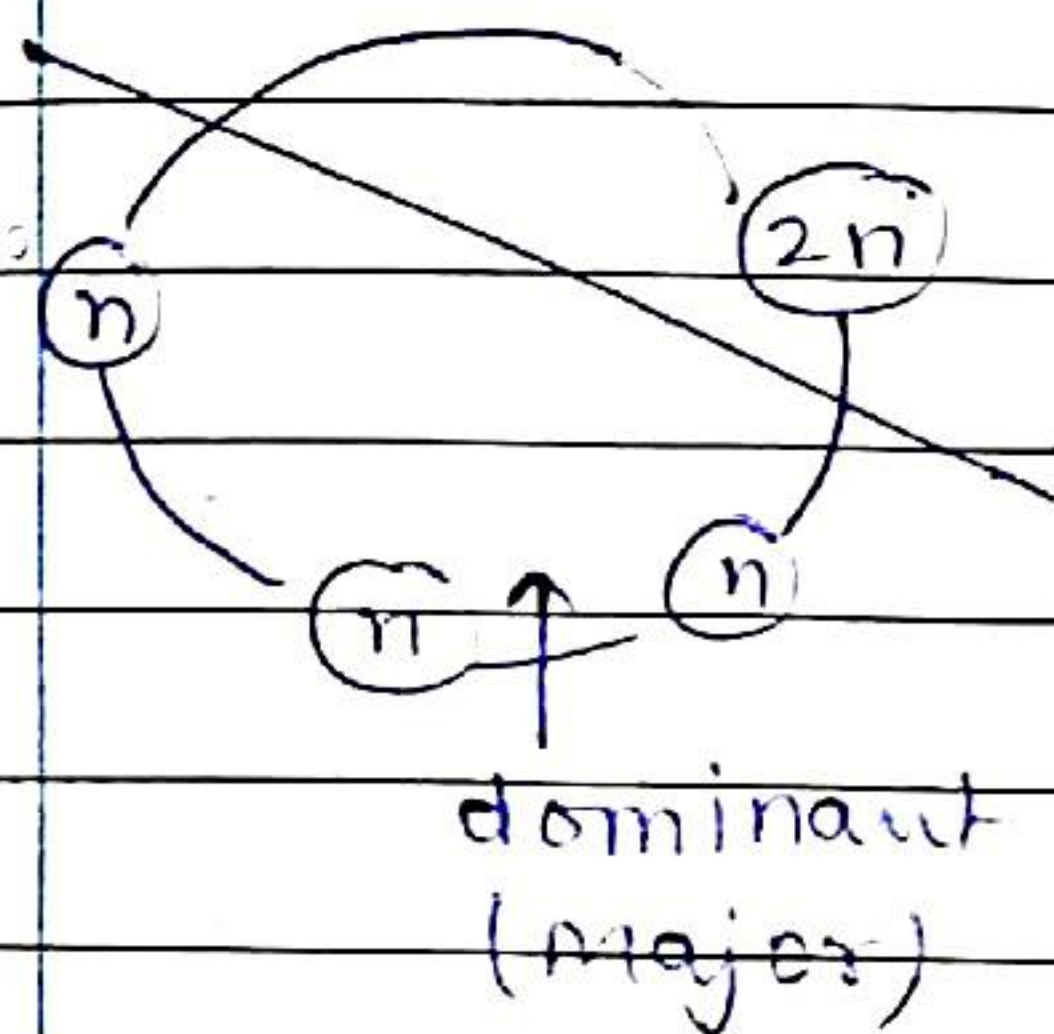
⑦ Bryo & Pterido ⇒ Male & Female gametophyte
Independent ✓

⑧ gymno & Angio → ♂ & ♀ gametophyte

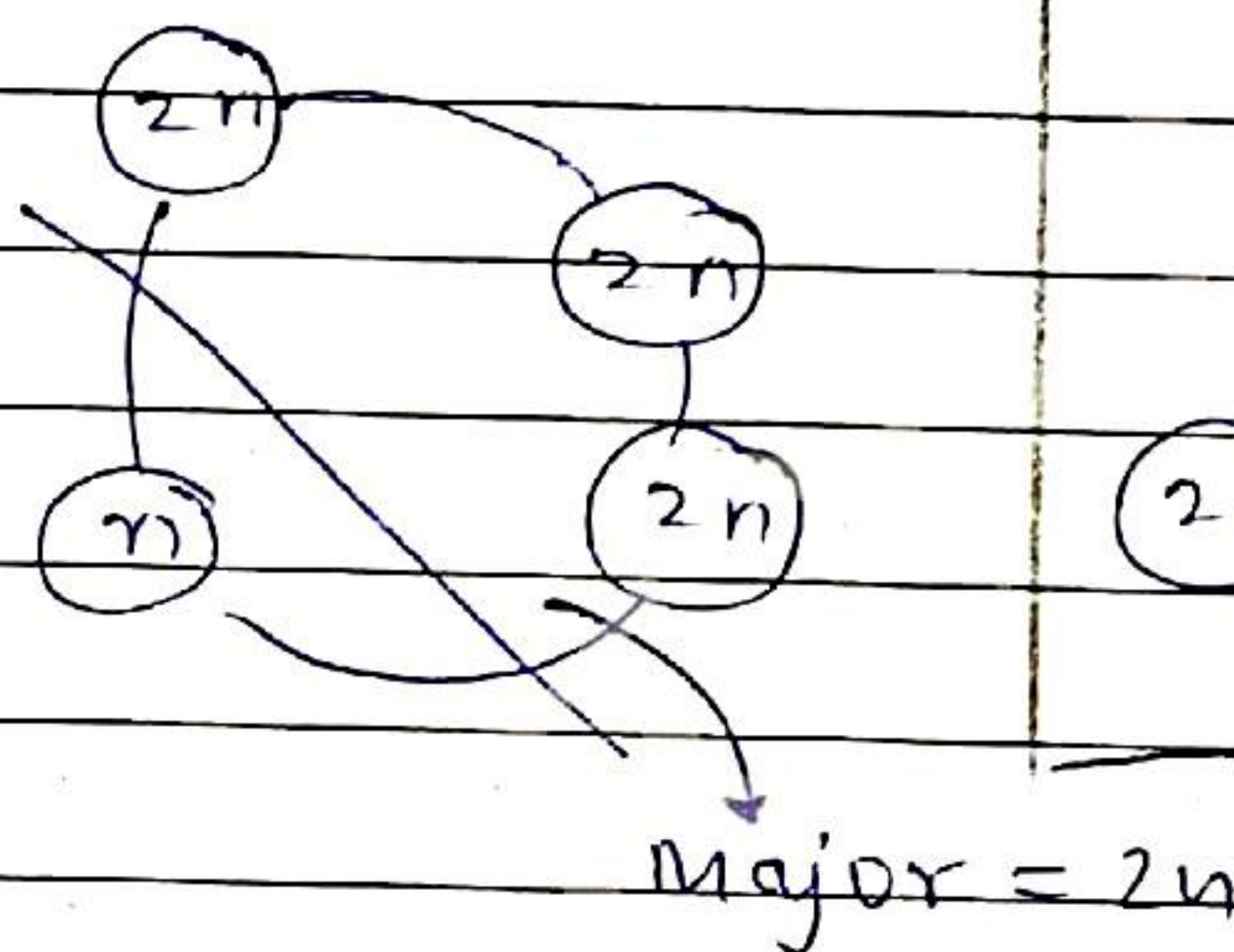
Neet dependent ✓
(do not have free living existence)

Q. (Not independent)

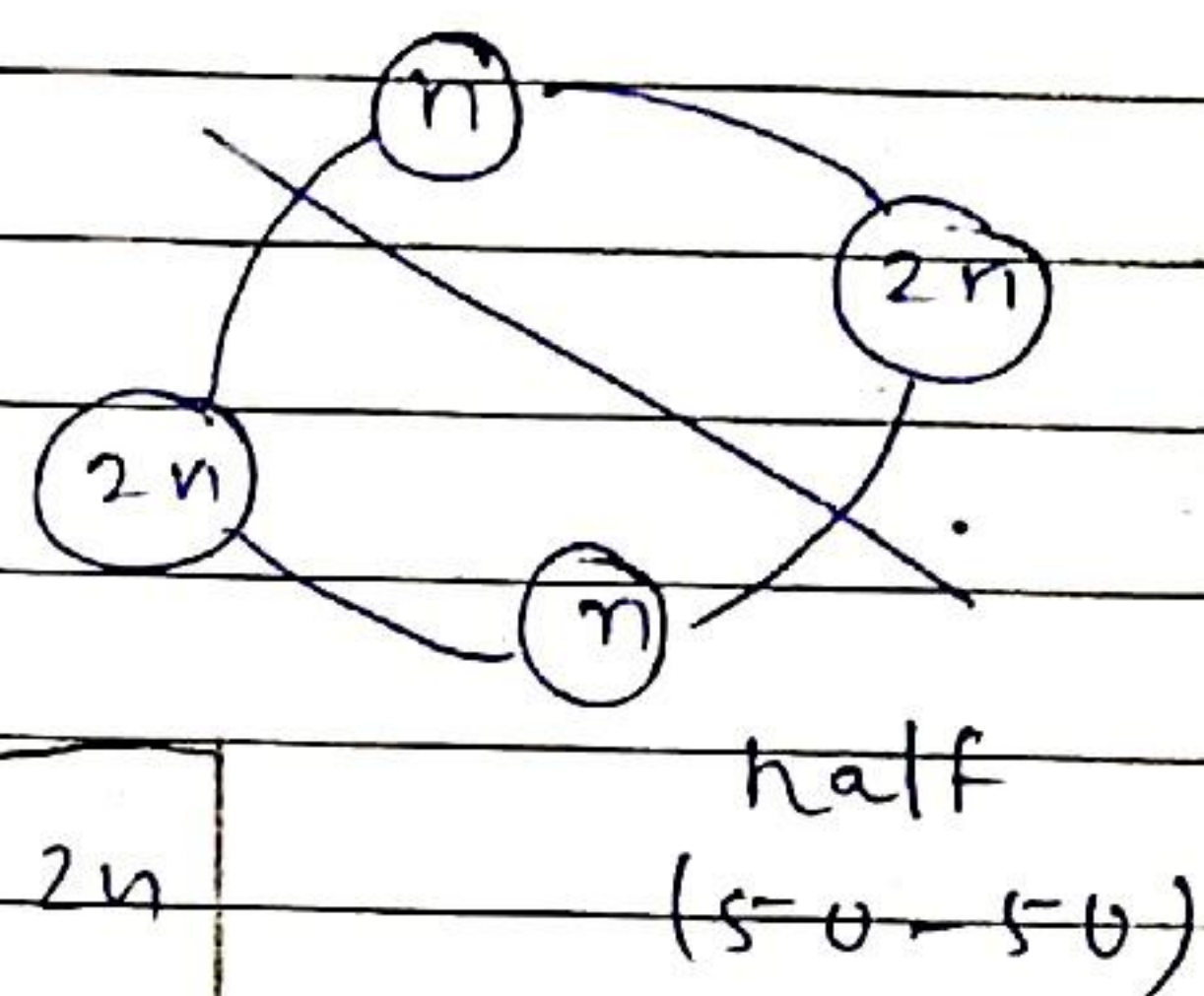
Haplontic



diplontic



Haplo diplontic



⇒ chart

Character	Bryophytes	Phenidophytes	Gymnosperms (Higher gymno)	Angiosperms
Nature of Spores	Homospous	Hetero spermatophyte	Heterospous	Hetero
Vascular Tissues	(Dn)	Dn	Dn	Dn
Tissue Root Tissue stem Tissue leaf	No	Yes	Yes	Yes
dominant Phase.	gametophyte (m)	spermatophyte	spermatophyte	spermatophyte
Fertilisation (water needed)	Yes	Yes	No (Higher gymno)	No
seeds (covering)	No	No	seed (Naked) without covering	seed (covering)
Flowers/ Cones	X	X	X cones (Dn)	✓
Ploidy	(n)	(2n)	(2n)	(2n)
Motile/ Non-motile gamete.	Motile	Motile	Non-motile	Non-motile

sanjeevani selaginella
bryopteris

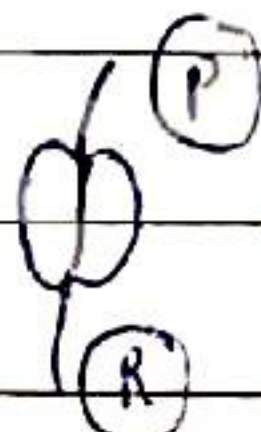
Angiosperms

- Flowering Plants
- ovules are developed in flowers
- ovules = seeds
- ovary = Fruit (Ripened ovary)
- wide range habitat (हर जगह) 4 2.5 lac spp.
- Microscopic Plants = Wolffia (बहुत छोटा)
- 100m tall = Eucalyptus (बहुत बड़ा)

- Fodder
 - Food
 - Fuel
 - Medicine
- Production.

* Angiosperm → 2 classes dicot
monocot

dicotyledon

- seeds = 2 cotyledon 

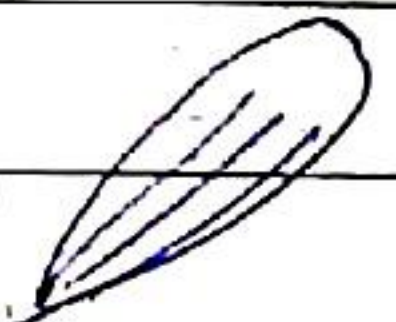
- Reticulate venation 
eg: mustard, sunflower, Rose etc.

- Pentamerous / Tetramerous (sepal, petal)

Primary root long lived

Monocotyledon

- 1 cotyledon

- Parallel venation 
ex: grass, bamboo, banana etc.

- Tricimerous (3x)

Tepal → can't diff. b/w sepal & petal
→ Liliaceal Family

- Primary root short lived.

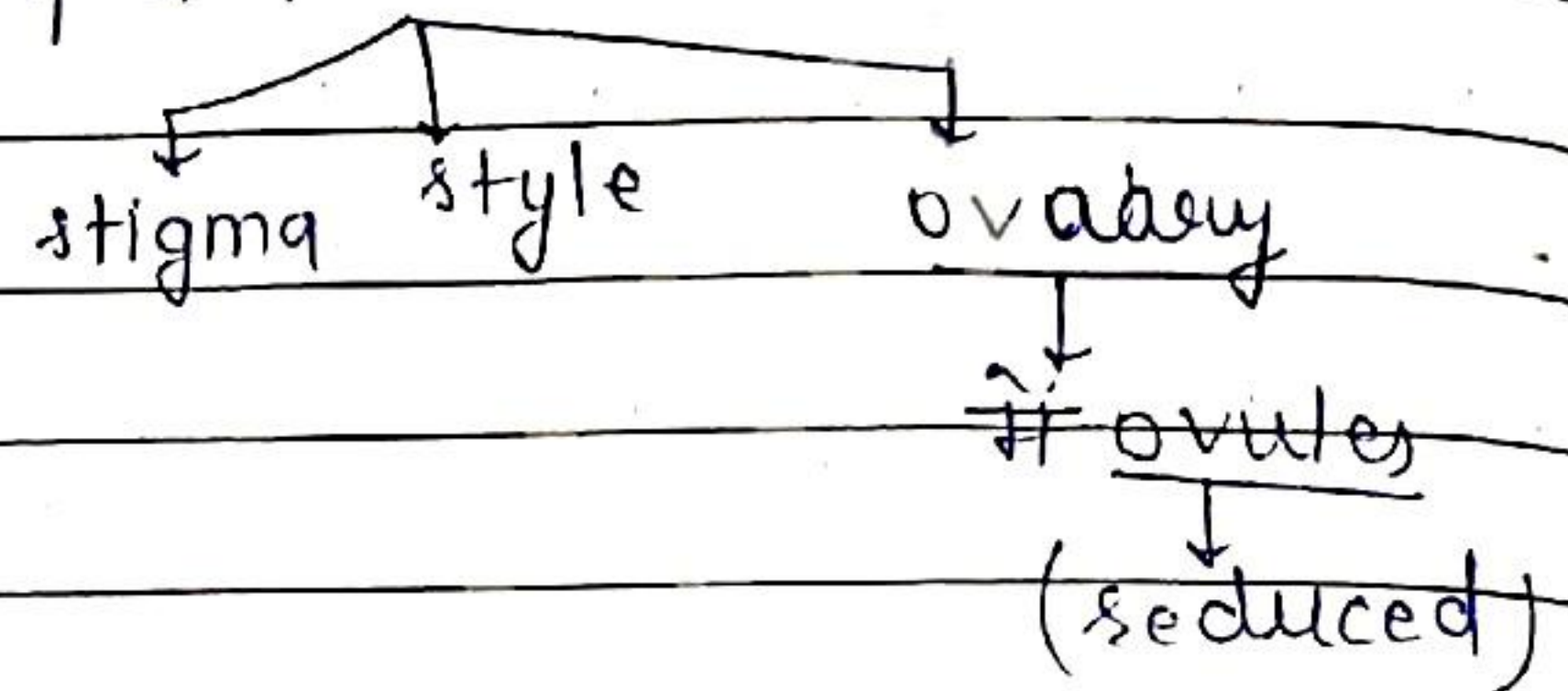
morpho
NCERT

• development of flower & fruit

→ Male sex organ = stamen (Anther & filament)

→ meiosis in anther produce Pollen grains

→ Female sex organ = carpel / Pistil



• Life cycle of Angiosperms

→ Each "embryo sac" (n) (Female gametophyte = highly Reduced)

contains

① Antipodal cells (3)

② synergids (2)

③ egg cell (1)

④ central cell (1) = 2 polar nuclei

Neet

NOTE

Neet

→ 7 celled - 8 Nucleated condition } Embryo sac.

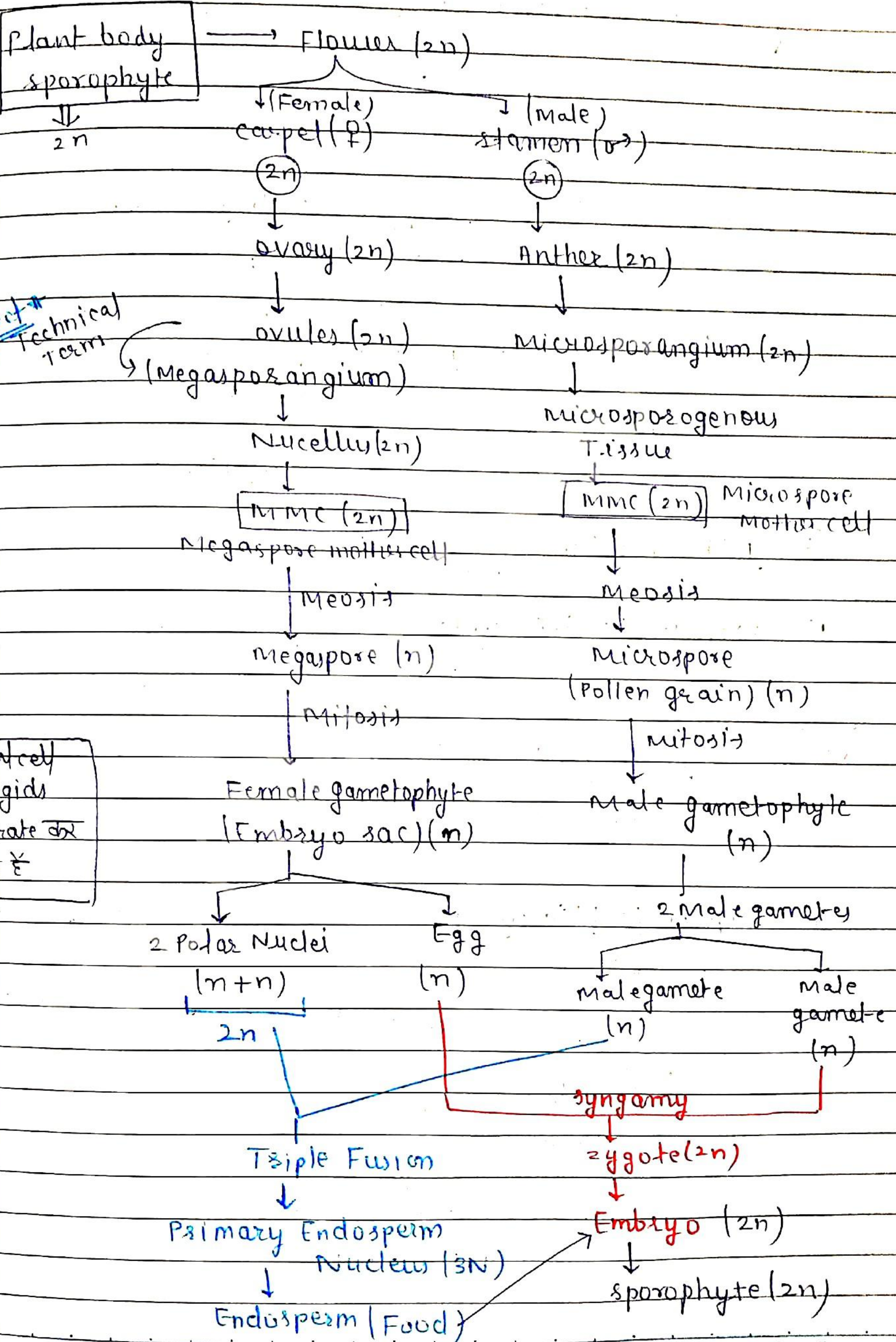
• Angio → dominant part = sporophyte ($2n$) (well develop)

↓
gametophyte Reduced (less develop)
(n)

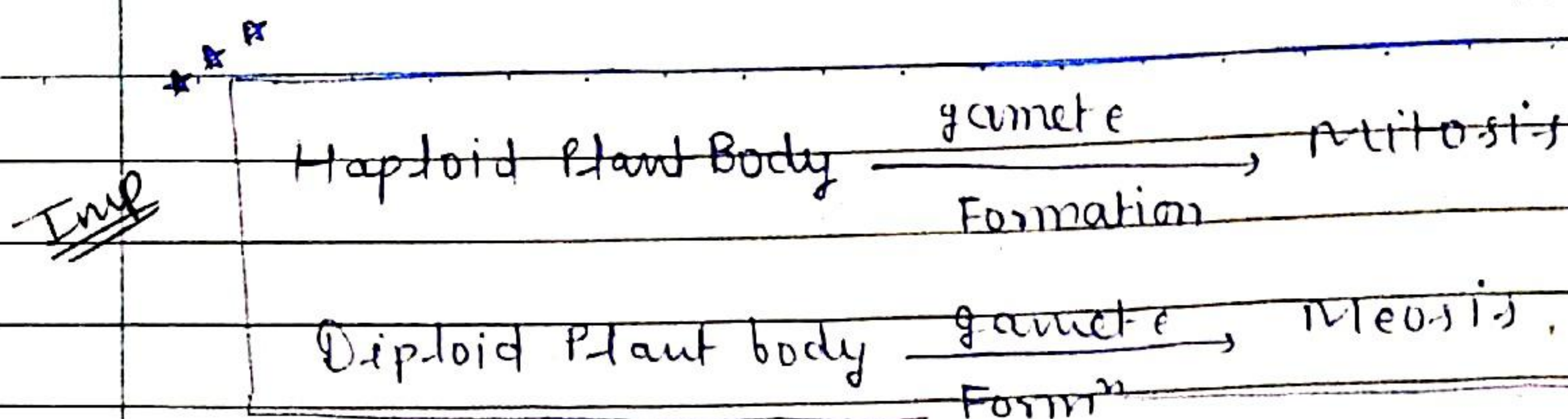
m. Imp
Neet

• Double Fertilisation → unique event to angiosperms

Tsipple fusion + syngamy



Camlin



#	all	
Bryophyte	(n)	zygote, embryo = 2n
Pterido	(2n)	gametes, spores = n
Gymno	(2n)	gametes, spores, endosperm = n
Angio	(2n)	gametes, spores = n
		endosperm = 3n *
	all cells.	exception *

Alternation of generations

(A) Haplontic life cycle : gametophyte (n)

dominant (main plant body)
Phase

* Neet Example

Ex: Many Algae (Volvox, spirogyra, some species of Chlamydomonas)
↓
majority **

(B) Diplontic Life cycle → sporophyte (2n) → dominant phase

Imp 2018 **
Ex: Fucus, gymnosperms, Angiosperms (main plant body)

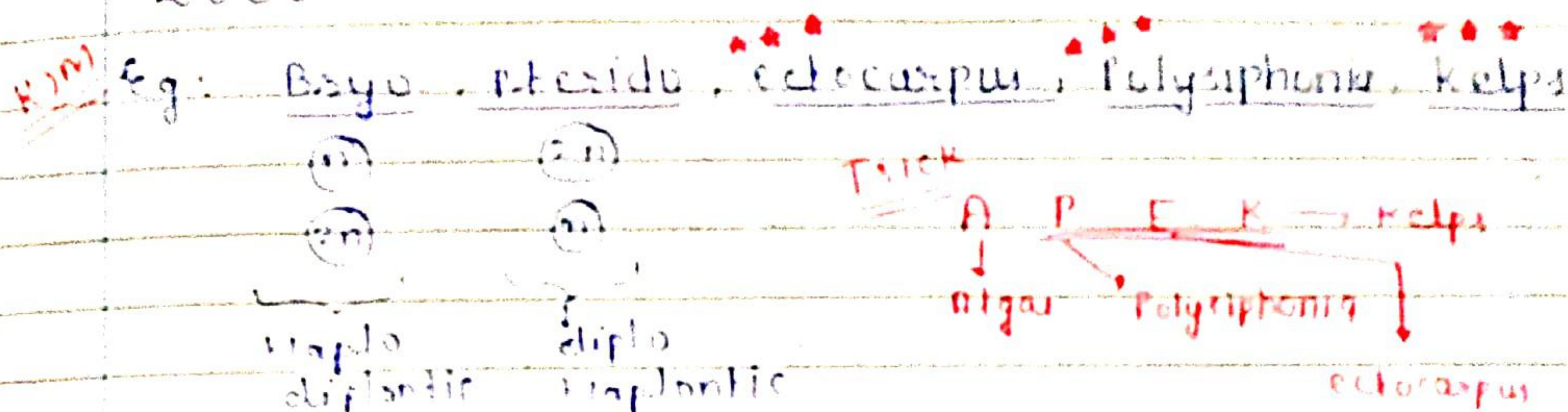
Brown Algae but → diplontic

Trick → Fd **

Also
sargassum → diplontic

③ Haplo-diplontic life cycle (50-50)

Intermediate condition (haplontic-diplontic life cycle)



• green alga green alga = haplontic