

YAKEEN NEET 2.0

2026

Plant Kingdom

Botany

Lecture – 03

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Topics to be covered

1

Liverworts

2

3

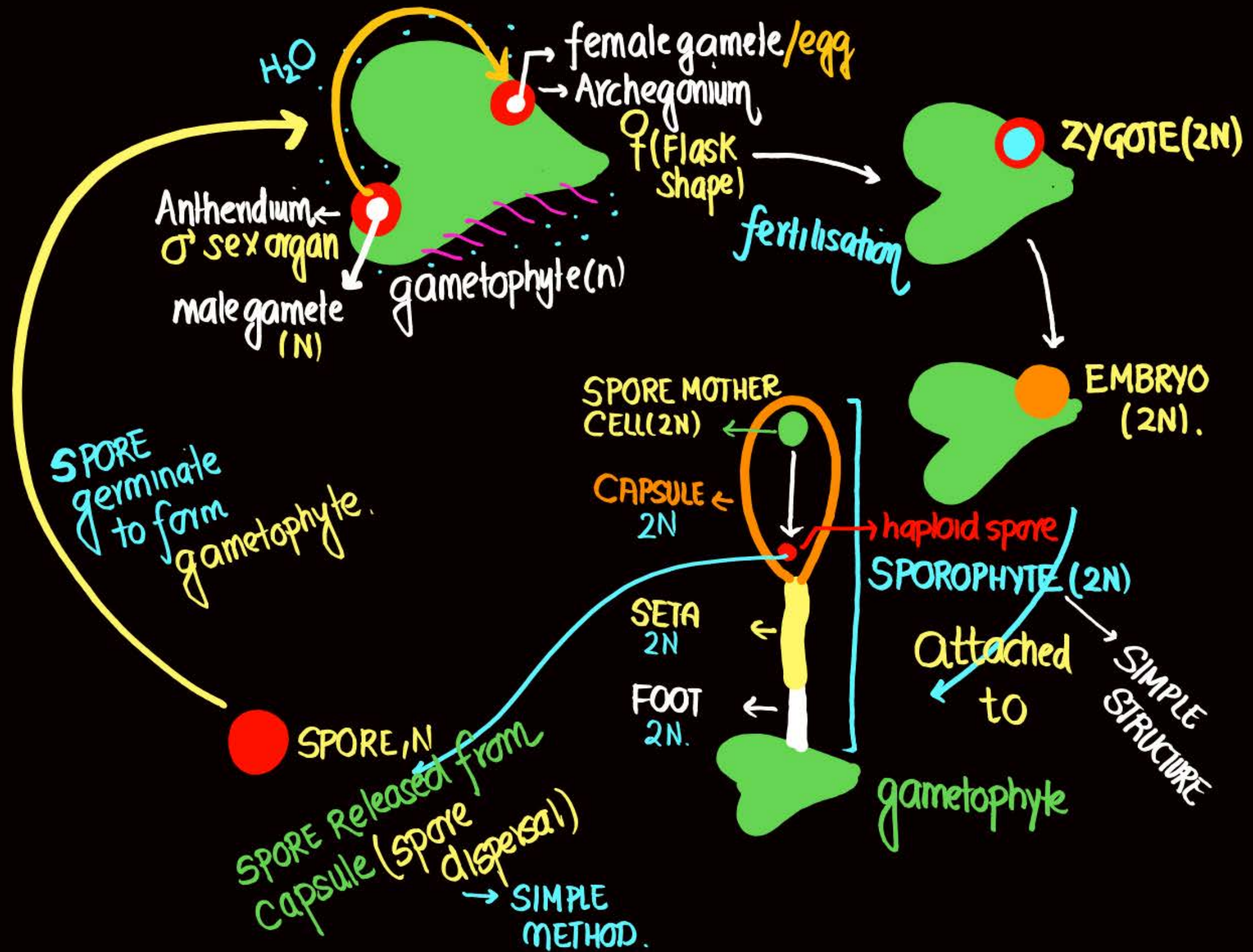
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LIFE CYCLE OF ALGAE

- ① formation of gametophyte
- ② formation of sex organ on gametophyte
- ③ formⁿ of gametes in sex organ
- ④ Transfer of gametes into H_2O / oogonium
- ⑤ fertilisation
- ⑥ zygote formation
- ⑦ Zygote undergoes meiosis
- ⑧ spore formation
- ⑨ spore germinate to form haploid gametophyte.

LIVERWORTS

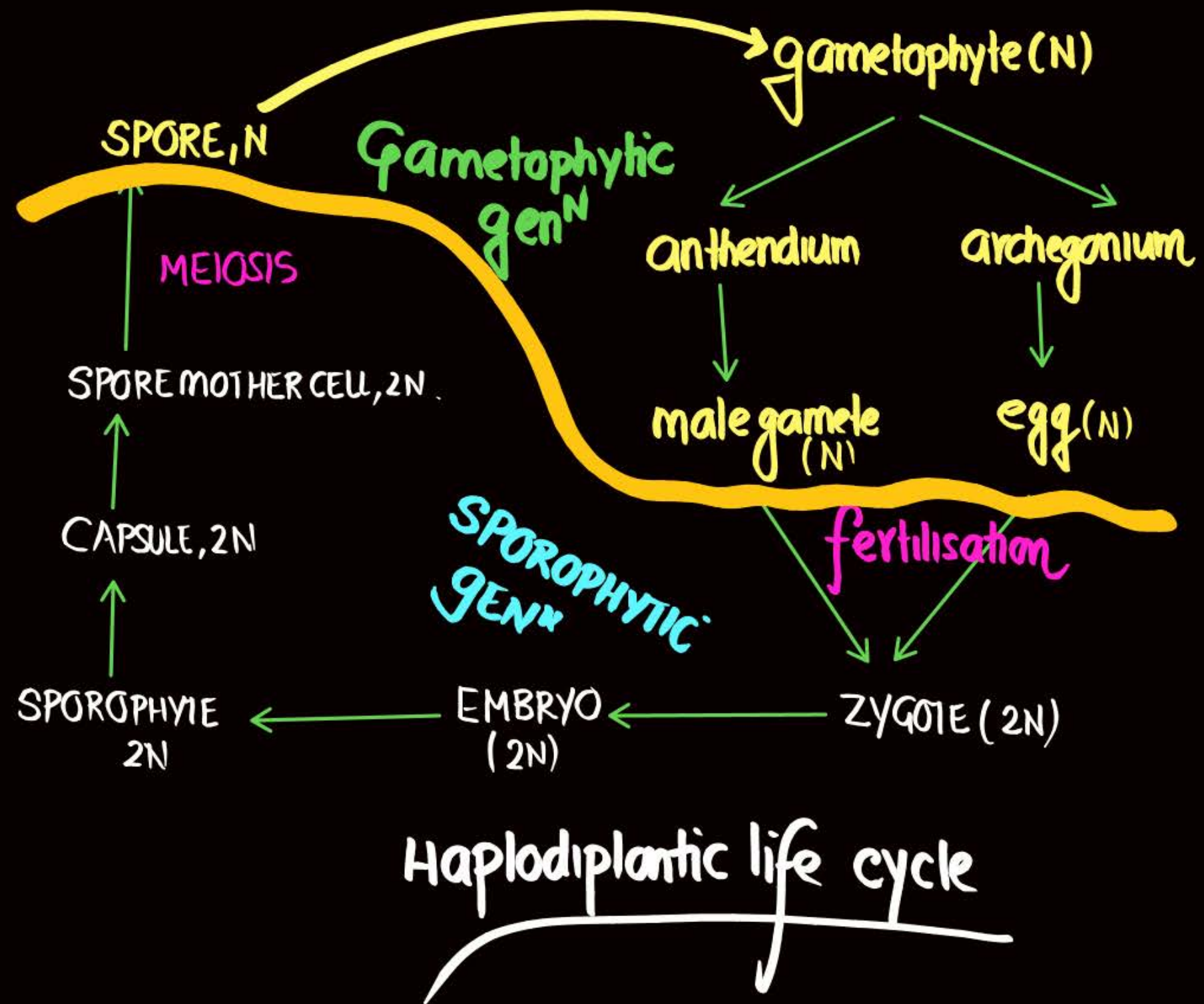
- ★ **Rhizoids**: unicellular, unbranched, N
- ★ Male gamete / antherozoids: Biflagellated
- ★ male gamete Release from antheridium & enter into archegonium with help of H_2O (Need H_2O for fertilisation) so Amphibians of plant kingdom.
- ★ Zygote do not undergoes meiosis Immediately.
- ★ SMC (spore mother cell) Undergoes meiosis to form **SPORE** haploid.

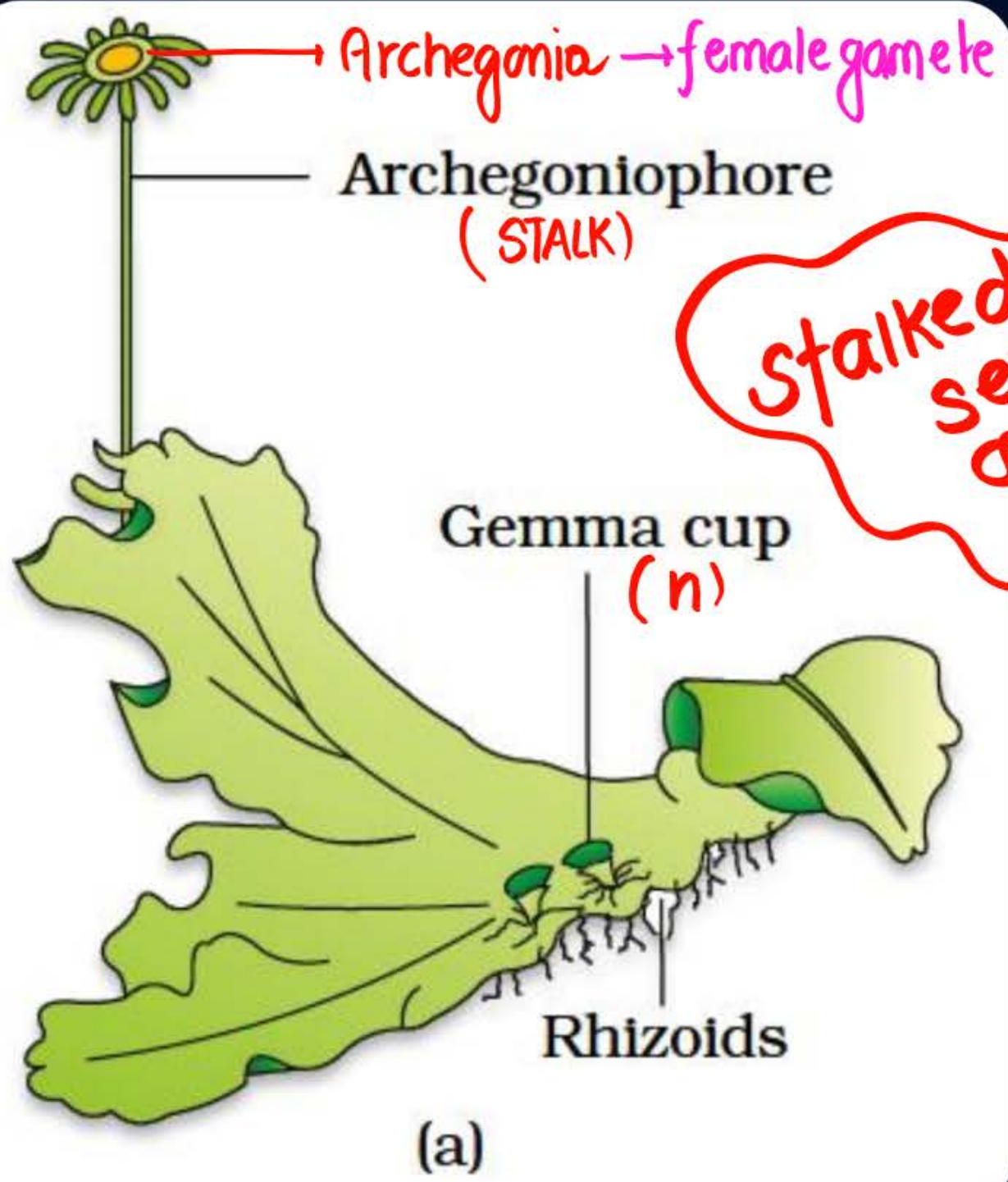


STEPS

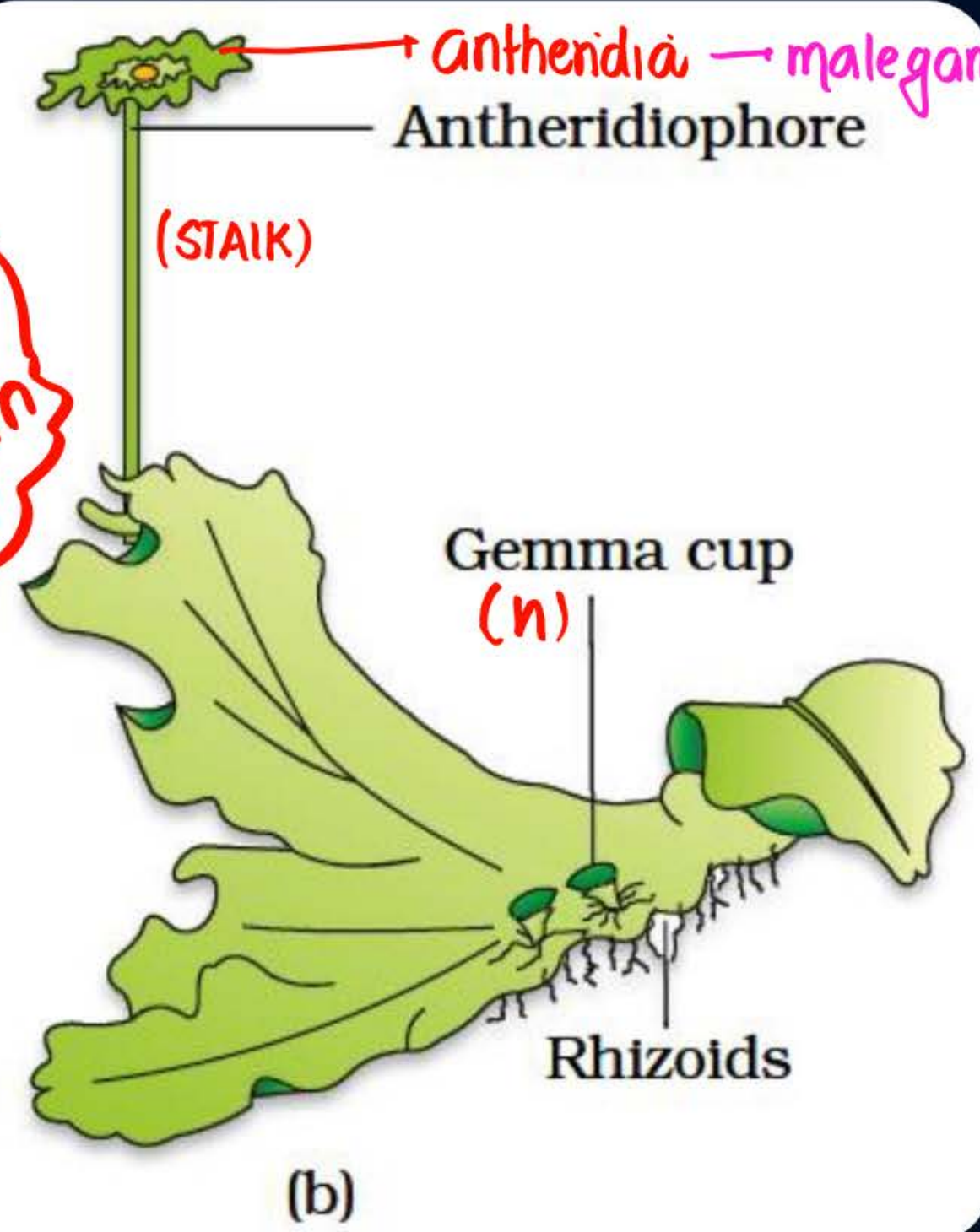
- ① formⁿ of gametophyte
- ② " " sex organ on gametophyte
- ③ " " gametes in sex organ
- ④ Transfer of male gamete into archegonium
- ⑤ fertilisation
- ⑥ zygote formⁿ
- ⑦ Embryo "
- ⑧ sporophyte "
- ⑨ SMC undergoes meiosis
- ⑩ Haploid spore formed
- ⑪ spore Release from capsule/sporophyte
- ⑫ spore germinate from gametophyte.

SIMPLE FORM OF LIFE CYCLE





stalked sex organ



Both gametes from different plants (DIOECIOUS) eg: MARCHANTIA

female gamete

male gamete

eg: RICCIA (LIVERWORT)

Both gametes from same plant (Monoecious) (sex organ embedded on Thallus)

eg Bryophytes:
A liverwort – Marchantia (a) Female thallus (b) Male thallus

Asexual Repⁿ

Gemma: green, multicellular, asexual Bud.
present in gemma cup.

Release from cup/parent Body
(gametophyte)

gemma germinate to
form new bryophyte.

fragmentation

fragment form New
bryophyte.

Leafy member

stem like axis in two rows on which leaf like appearance
present.

Liverworts



Liverwort (Thallus, Male)



Liverwort (Thallus, Female)



Liverwort (Leafy)

stem like axis (two rows)
LEAF LIKE STRUCTURE



PORELLA
Liverworts



Note: sporophyte grows out of the gametophyte

Life cycle of *Ectocarpus* and *Fucus* respectively are:

(2017 - Delhi)

- 1 Haplontic, Diplontic
- 2 Diplontic, Haplodiplontic
- 3 Haplo-diplontic, Diplontic
- 4 Haplo-diplontic, Haplontic

Zygotic meiosis is characteristic of:

(2017-Delhi)

Haploid

1 *Marchantia* (Bryo)

2 *Fucus* ($2n$) diplontic

3 *Funaria* (Bryo)

4 *Chlamydomonas* / *Ullothrix*, *spirogyra*

Select the wrong statement:

(2013)

out of NCERT

oogamous

1 *Chlamydomonas* exhibits both isogamy and anisogamy and *Fucus* shows oogamy ✓

2 Isogametes are similar in structure, function and behaviour (C)

3 Anisogametes differ either in structure, function or behaviour (C)

4 In oogamous reproduction, female gamete is ~~smaller~~ and ~~motile~~, while male gamete is ~~taller~~ and ~~non~~ motile ✓

small

Large

non-motile.

Read the following statements and choose the set of correct statements. (2024)

In the members of Phaeophyceae,

- A. Asexual reproduction occurs usually by biflagellate zoospores. ✓
- B. Sexual reproduction is by oogamous method ~~only~~. *ISO, aniso.*
- C. Stored food is in the form of carbohydrates which is either mannitol or laminarin. ✓
- D. The major pigments found are chlorophyll a, c and carotenoids and xanthophyll. ✓
- E. Vegetative cells have a cellulosic wall, usually covered on the outside by gelatinous coating of algin. ✓

Choose the correct answer from the options given below:

1 A, C, D and E only

2 A, B, C and E only

3 A, B, C and C only

4 B, C, D and E only

Question



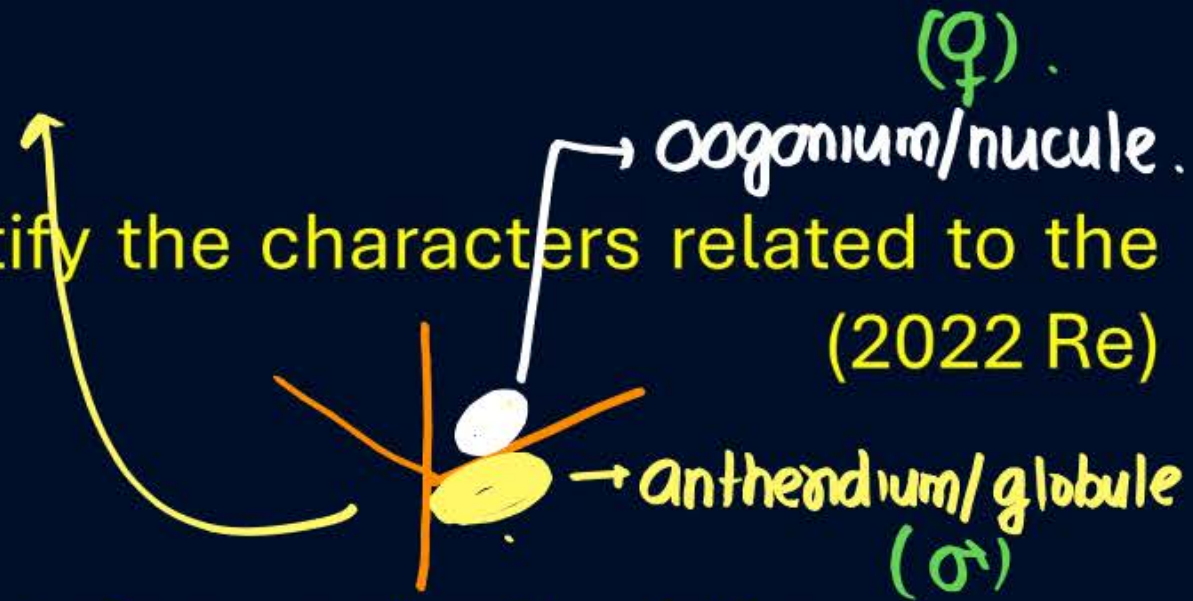
Which classes of algae possess pigment fucoxanthin and pigment phycoerythrin, respectively?
(2023-Manipur)

- 1 Phaeophyceae and Chlorophyceae
- 2 Phaeophyceae and Rhodophyceae ✓
- 3 Chlorophyceae and Rhodophyceaea.
- 4 Rhodophyceae and Phaeophyceae

Question

Read the following statements and identify the characters related to the alga shown in the diagram (2022 Re)

- On same plant:
- ☒ A. It is a member of Chlorophyceae
 - ☒ B. Food is stored in the form of starch
 - ☒ C. It is a monoecious plant showing oogonium and antheridium
 - ☒ D. Food is stored in the form of laminarin or mannitol
 - ☒ E. It shows dominance of pigments Chlorophyll a, c and ~~Fucoxanthin~~
- Choose the correct answer from the options given below:



Chara.

☒ 1 (C), (D) and (E) only

☐ 2 (A) and (B) only

☒ 3 (A), (B) and (C) only

☒ 4 (A), (C) and (D) only

Which of the following is incorrectly matched?

(2022)

GA.

1

Volvox – Starch

B.A.

2

Ectocarpus – Fucoxanthin

B.A.

3

Ulothrix – Mannitol

4

Porphyra – Floridean Starch

Hydrocolloid carrageen is obtained from:

(2022)

- 1 Phaeophyceae only
- 2 Chlorophyceae and Phaeophyceae
- 3 Phaeophyceae and Rhodophyceae
- 4 Rhodophyceae only

Which of the following algae produce Carrageen?

(2021)

- 1 Brown algae
- 2 Red algae
- 3 Blue-green algae
- 4 Green algae

(B.A)

Which of the following algae contains mannitol as reserve food material? (2021)

1 *Gracilaria* (R)

2 *Volvox* (A)

3 *Ulothrix* (A)

4 *Ectocarpus* (B) ✓

Which of the following pairs is of unicellular algae?

(2020)

- ~~1~~ *Gelidium* and *Gracilaria* (RA): *Multi*.
- ~~2~~ ^{BGA (Unicellular)}
Anabaena and *Volvox* (*Multic*)
- 3 ^{Unicell.} *Chlorella* and ^{Unice (BGA} *Spirulina*
_(protista) _{monera.}
- 4 *Laminaria* and *Sargassum*
BA (*Multicell*)

Floridean starch has structure similar to: (RA).

(2020)

1 Amylopectin and glycogen ✓

2 Mannitol and algin

3 Laminarin and cellulose

4 Starch and cellulose

Phycoerythrin is the major pigment in:

(2020-Covid)

1 Blue green algae

2 Green algae

3 Brown algae

4 Red algae



An example of colonial alga is

(2017-Delhi)

1 *Chlorella*

2 *Volvox* ✓

3 *Ulothrix*

4 *Spirogyra*

Which one of the following statements is wrong?

(2016 - II)

- 1 Agar-agar is obtained from *Gelidium* and *Gracilaria*. C
- 2 *Laminaria* and *Sargassum* are used as food. C
- 3 Algae increase the level of dissolved oxygen in the immediate environment. C
- ✓ 4 Algin is obtained from ~~red~~^{BA} algae, and carrageen from ~~brown~~^{RA} algae.

Male gametes are flagellated in:

(2015)

1. Ectocarpus (BA).

2. Spirogyra (NM)

3. Polysiphonia (NM)

4. Anabaena
(Monera)

(gamete absent / sex. Repⁿ absent)

Isogamous condition with non-flagellated gametes is found in :

(2013)

1 *Fucus*

2 *Chlamydomonas*

3 *Spirogyra*

4 *Volvox*



Bryophytes are also called amphibians of the plant kingdom because these plants can live in soil but are dependent on water for sexual reproduction. They usually occur in damp, humid and shaded localities. [They play an important role in plant succession on bare rocks/soil.]

NO SPECIES



SPHAGNUM
(PEAT MOSS)

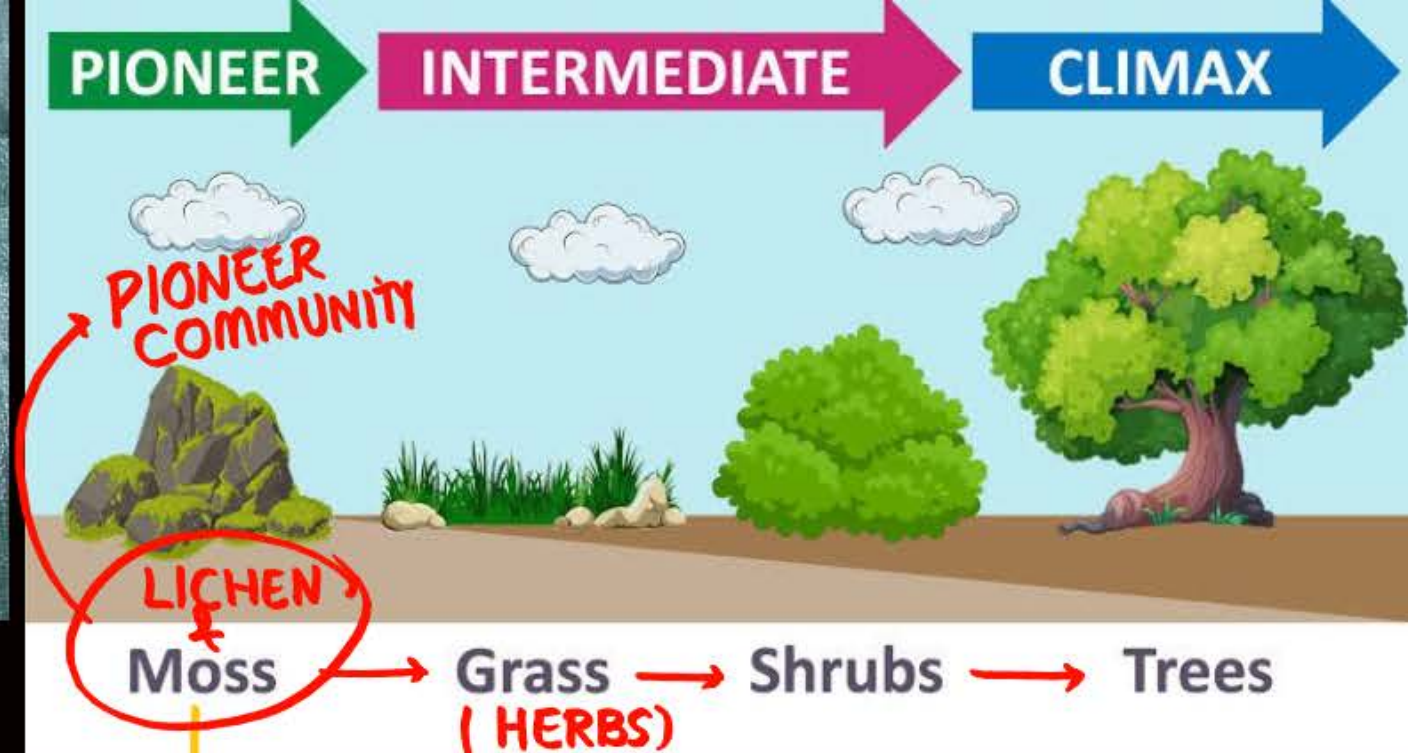
Isolate
↓
Fuel
↓
PEAT

* Moss grow dense on soil / hold soil, so Reduce the impact of Rain on soil prevent soil erosion.



SPHAGNUM,
(Hygroscopic Nature)
↓
absorb moisture from atmosphere.
(absorbent cotton)

→ Transshipment / packaging of material



① **Barren (UNFAVOURABLE CONDITION) area (NO SOIL)**
↓
BREAK ROCK
↓
SOIL FORMATION START (Favourable)

② so condition becomes favourable for higher plant (grass etc).

③ **MOSS REPLACE BY GRASS SO REPLACE-
MENT OF ONE PLANT BY ANOTHER CALLED
ECOLOGICAL SUCCESSION**

Bryophytes in general are of little economic importance but some mosses provide food for herbaceous mammals, birds and other animals.

[Species of *Sphagnum*, a moss, provide peat that have long been used as fuel,] and as [packing material for trans-shipment of living material because of their capacity to hold water.] Mosses along with lichens are the first organisms to colonise rocks and hence, are of great ecological importance.]

↓
PIONEER
COMMUNITY
(FIRST)

They decompose rocks making the substrate suitable for the growth of higher plants. [Since mosses form dense mats on the soil, they reduce the impact of falling rain and prevent soil erosion.] The bryophytes are divided into **liverworts** and **mosses**.

Grass
| (herb)
Shrub
Tree

soil formⁿ
start.
([condition]
favourable)

3.2.1 Liverworts

The liverworts grow usually in moist, shady habitats such as banks of streams, marshy ground, damp soil, bark of trees and deep in the woods. The plant body of a liverwort is thalloid e.g., Marchantia. The thallus is dorsiventral and closely appressed to the substrate. The leafy members have tiny leaf-like appendages in two rows on the stem-like structures.

LEAVE
ROOT
STEM } ABSENT

Small

Rhizoids

Soil/Rock

eg.
Porella

Asexual reproduction in liverworts takes place by fragmentation of thalli, or by the formation of specialised structures called **gemmae** (sing. gemma). Gemmae are green, multicellular, asexual buds, which develop in small receptacles called gemma cups located on the thalli.

↓
gametophyte

The gemmae become detached from the parent body and germinate to form new individuals. During sexual reproduction, male and female sex organs are produced either on the same or on different thalli. The sporophyte is differentiated into a foot, seta and capsule. After meiosis, spores are produced within the capsule. These spores germinate to form free-living gametophytes.

✓ Bryophytes

Riccia

Marchantia

Correct is : (Algae)

- (A) thalloid autotrophs embryo present
- (B) present only in soil and wood
- (C) present on sloth bear
- (D) not associated with fungi

Correct is : (Algae)

- (A) Form size is not variable
- (B) ulothrix and spirogyra. : filamentous brown algae
- (C) volvox -colonial red algae
- (D) kelps : marine, massive

Correct is : (Algae)

- (A) zoospore : endogenous, non motile
- (B) only fragmentation present for reproduction
- (C) gametes are motile in ulothrix (anisogamous)
- (D) non motile gametes in spirogyra

Correct is : (Eudorina)

- (A) green algae
- (B) anisogamous
- (C) member of chlorophyceae
- (D) all are correct

Correct is : (Oogamous)

- (A) male gamete is always motile
- (B) male gamete mostly motile
- (C) female is larger and motile
- (D) example: volvox and fucus
- (E) both (B) & (D)

The correct statement/s is/are :
(Chlorophyceae)

- A. unicellular, colonial only
- B. chl - a, b
- C. pigment not absent in chloroplast
- D. pyrenoid absent
- E. pyrenoid contain protein beside starch

Options

- (A) 2 (B) 3 (C) 1 (D) 4

Importance of Algae

- A. increase oxygen level
- B. chlorella : BGA, space food
- C. marine forms edible like laminaria, porphyra (Brown algae)
- D. primary producer of energy rich compound
- E. marine green and red algae produce hudrocollud
- F. Algin : red algae
- G. Agar agar : Gracilaria, Gelidium used in ice cream and jellies, also to grow microbes in lab

Options

- (A) 2 (B) 3 (C) 4 (D) 1

Correct is : (Chlorophyceae)

- (A) stored food only oil droplets not starch
- (B) cell wall is single layer
- (C) asexual : zoospore exogenous
- (D) sexual isogamous anisogamous only
- (E) all are incorrect

Correct is : (Pheophyceae)

- (A) variation in size and forms
- (B) simple branched filamentous (kelps)
- (C) a, c fucoxanthin absent
- (D) stored food simple carbohydrate (laminarin /mannitol)

Correct is : (Brown algae)

- (A) body divided into two parts
- (B) frond is non photosynthesis
- (C) holdfast not for attachment
- (D) pear shape biflagellated zoospore lateral attach flagella

Correct is : (Red algae)

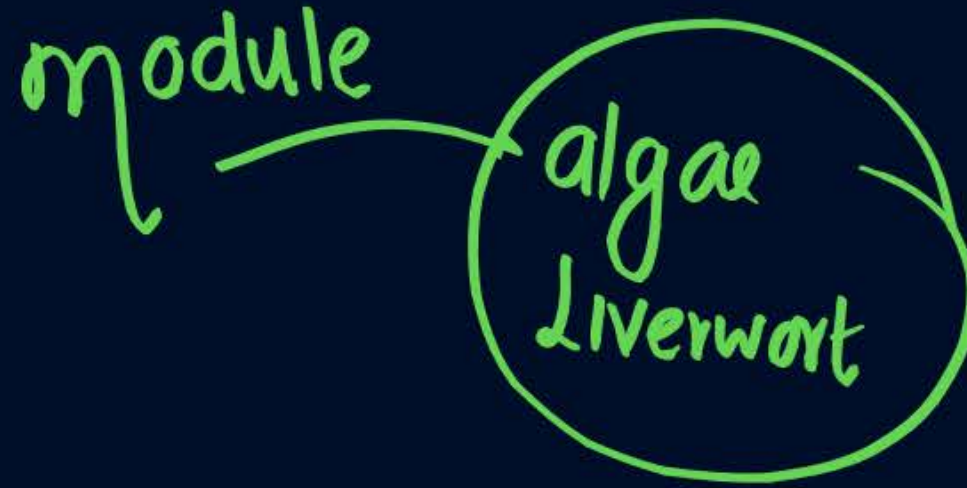
- (A) chl a, d phycoerythrin absent
- (B) pyrenoid present
- (C) pectin, poly sulphate ester in cell wall
- (D) marine multicellular, some have complex body
- (E) stored food : Floridian starch similar to amylopectin and glycogen
- (F) all correct except (A) & (B)

Correct is : (Red alage)

- (A) pre fertilisation changes simple
- (B) only oogamous where male gamete is motile
- (C) asexual by motile spore
- (D) vegetative by fragmentation



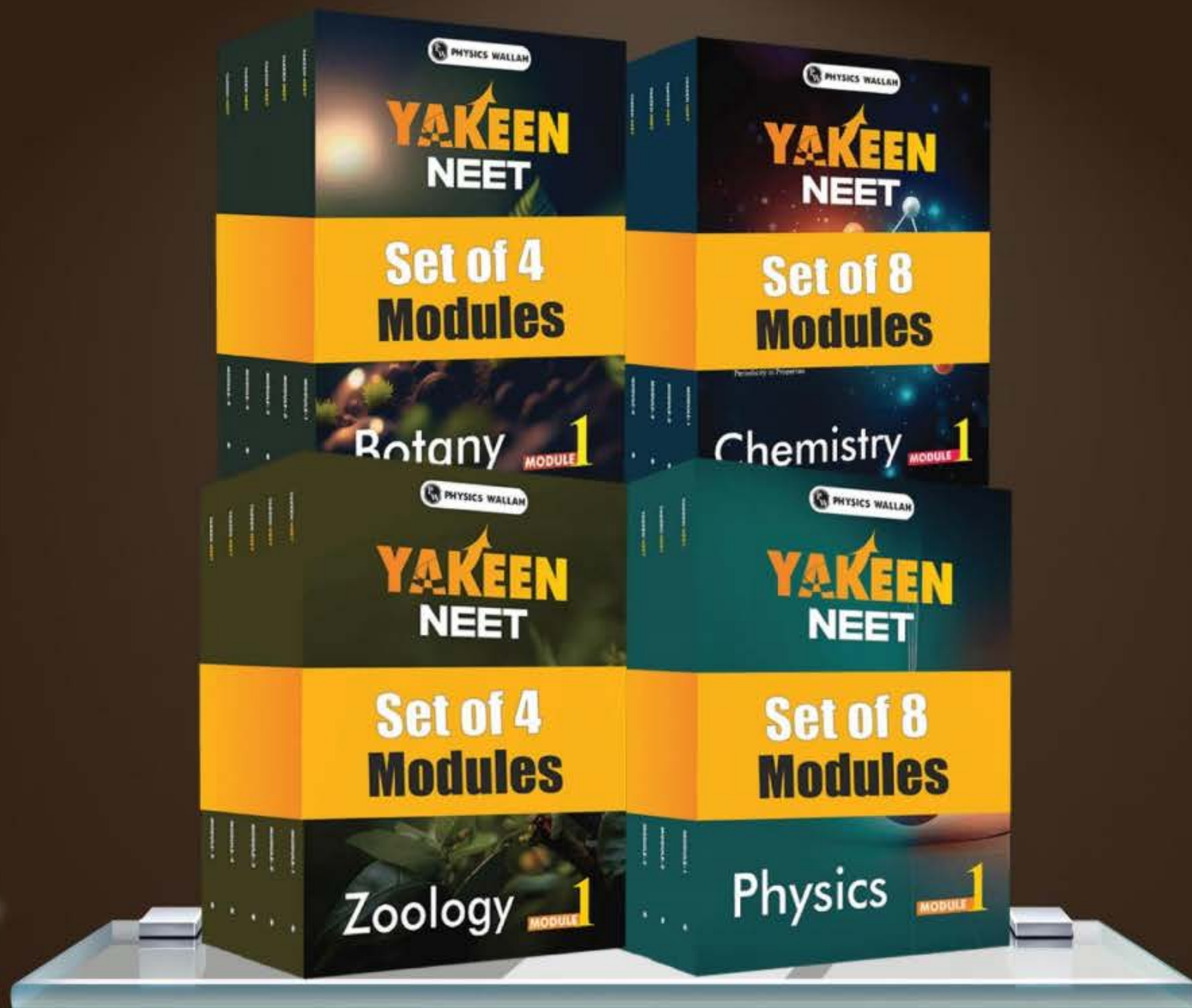
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