

YAKEEN NEET 2.0

2026

Plant Kingdom

Botany

Lecture – 04

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Topics to be covered

1

BRYOPHYTES

2

3

4

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 *zoospore*
- (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~~ ^{mostly.} 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 (B)
- C. marine forms edible like laminaria, ~~porphyra~~ (Brown algae) RA
- D. primary ^{RA} producer of energy rich compound ✓
- E. marine ~~green~~ ^{Brown.} and red algae produce hudrocollud
- F. Algin : ~~red~~ ^{Brown.} 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) ~~(kelps)~~
- (C) a, c fucoxanthin ~~absent~~ ^{complex.}
- (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) ~~post~~ fertilisation changes ~~simple~~ *complex*.
- ~~(B)~~ only oogamous where male gamete is ~~motile~~
- ~~(C)~~ asexual by motile spore
- ☒ (D) vegetative by fragmentation

MOSS

★ gametophyte consist of Two stage

① protonema: 1st n

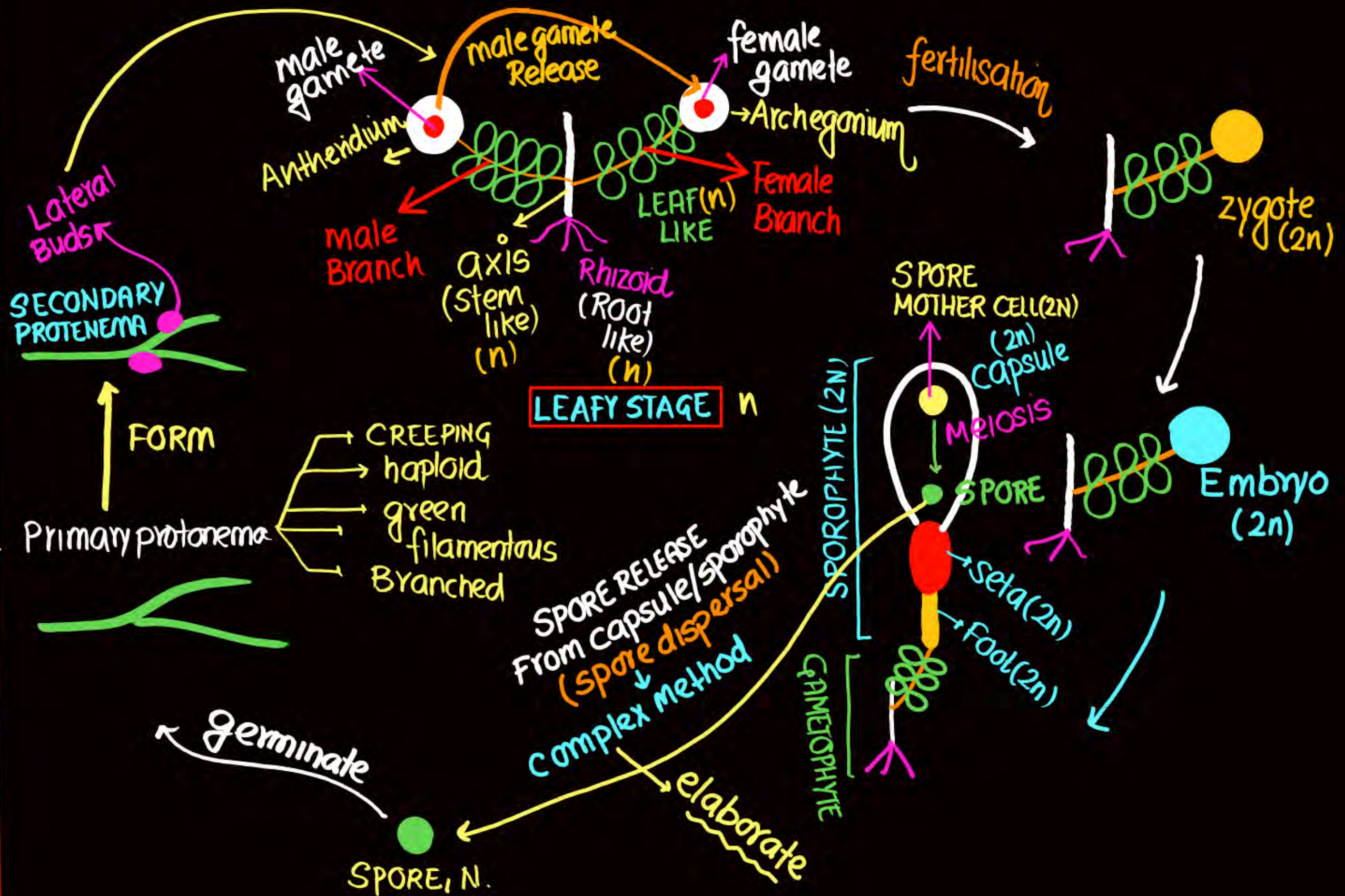
② leafy stage: 2nd n

★ Rhizoids: multicellular Branched

★ Sex organ present at apex of leafy shoot

★ leafy stage Bear sex organ

★ sporophyte of moss more elaborate than Liverworts.



all are Homosporous

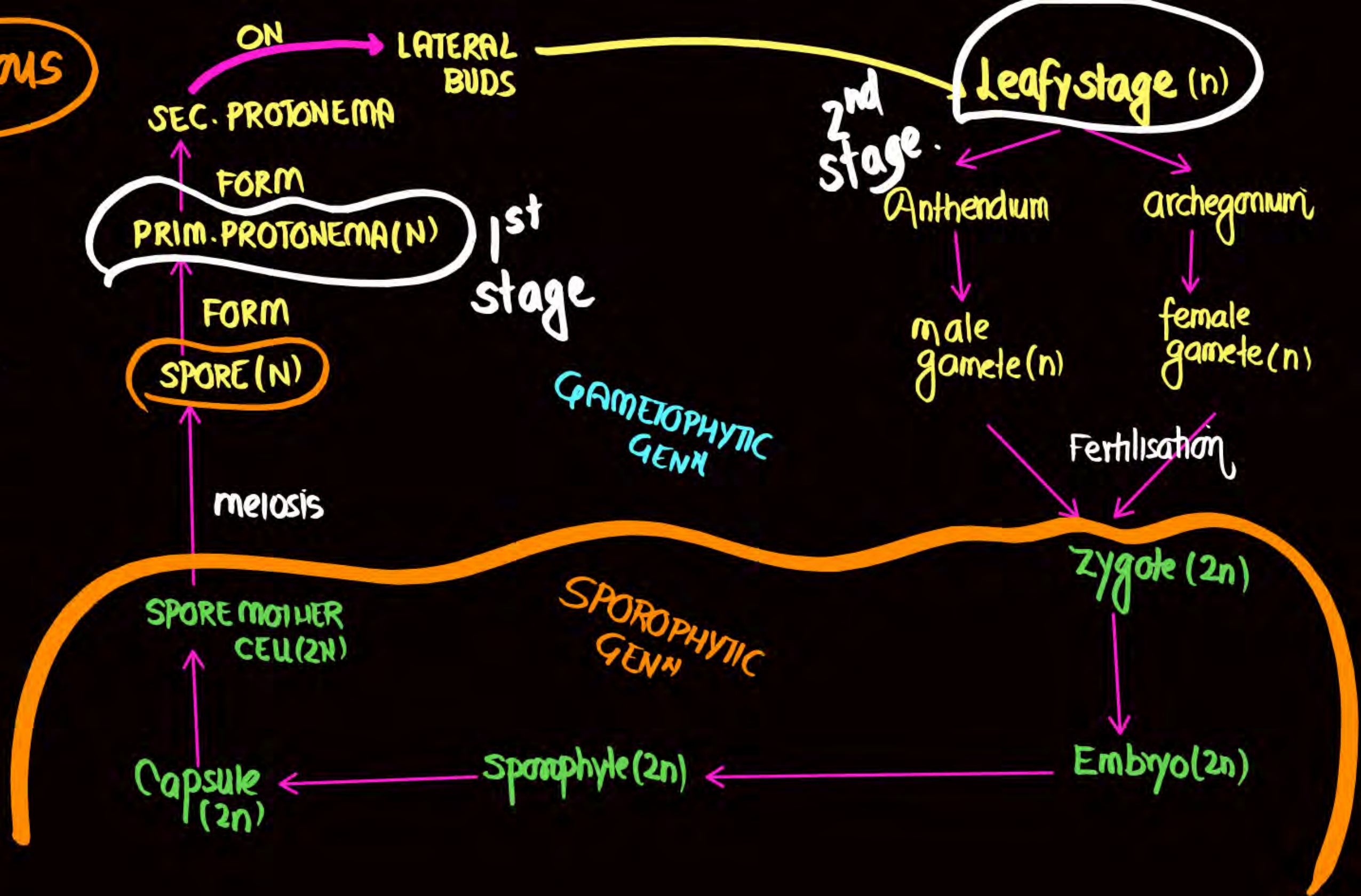
Simple form
Life cycle:



Rhizoids

septa present

NOTE: Body of Bryophyte is more differentiated than algae.



Steps

- ① formation of gametophyte (leafy stage)
- ② " " sex organ
- ③ " " gametes
- ④ Transfer of gamete.
- ⑤ fertilisation
- ⑥ zygote formⁿ
- ⑦ embryo formⁿ
- ⑧ sporophyte formⁿ
- ⑨ spore mother cell formation
- ⑩ smc undergoes meiosis
- ⑪ spore formation
- ⑫ spore form primary protonema
- ⑬ formⁿ of secondary protonema from prim. protonema
- ⑭ Lateral Bud of 2nd ^{ry} protonema from leafy stage

PLOIDY

SPOROCTE OR

- ★ sporophyte, zygote, embryo, foot, seta, capsule, spore mother cell: $(2n)$
- ★ gametophyte, Rhizoid, gemma, spore, gametes, axis, leaf like, male & female Branch, prim protonema, secondary protonema, (n)

LIVERWORTS

GEMMAE

Rhizoids

PROTONEMA

SPORE

sporophyte

spore dispersal
method

sporophyte

sex organ



Unicellular unbranched



form gametophyte

simple

Simple

complete depend upon gametophyte
Non photosynthetic

Stalk / Thallus embedded

→ Marchantia

→ Riccia

MOSSES



Multicellular Branched.



form primary protonema

Complex

elaborate/complex

Funaria
Sphagnum
Polytrichum

partially depend upon gametophyte
photosynthetic

But need H_2O from gametophyte

Present on apex of leafy shoot

Pteridophyte

★ Main Body: sporophyte: differentiated into ²ⁿ ROOT, ²ⁿ STEM, ²ⁿ LEAF ^{1st Time}
 (2n)
 Vascular Tissue (xylem, phloem)

★ seed, flower, fruit: absent

★ sporophyte: photosynthesis, dominant, free living, independent.

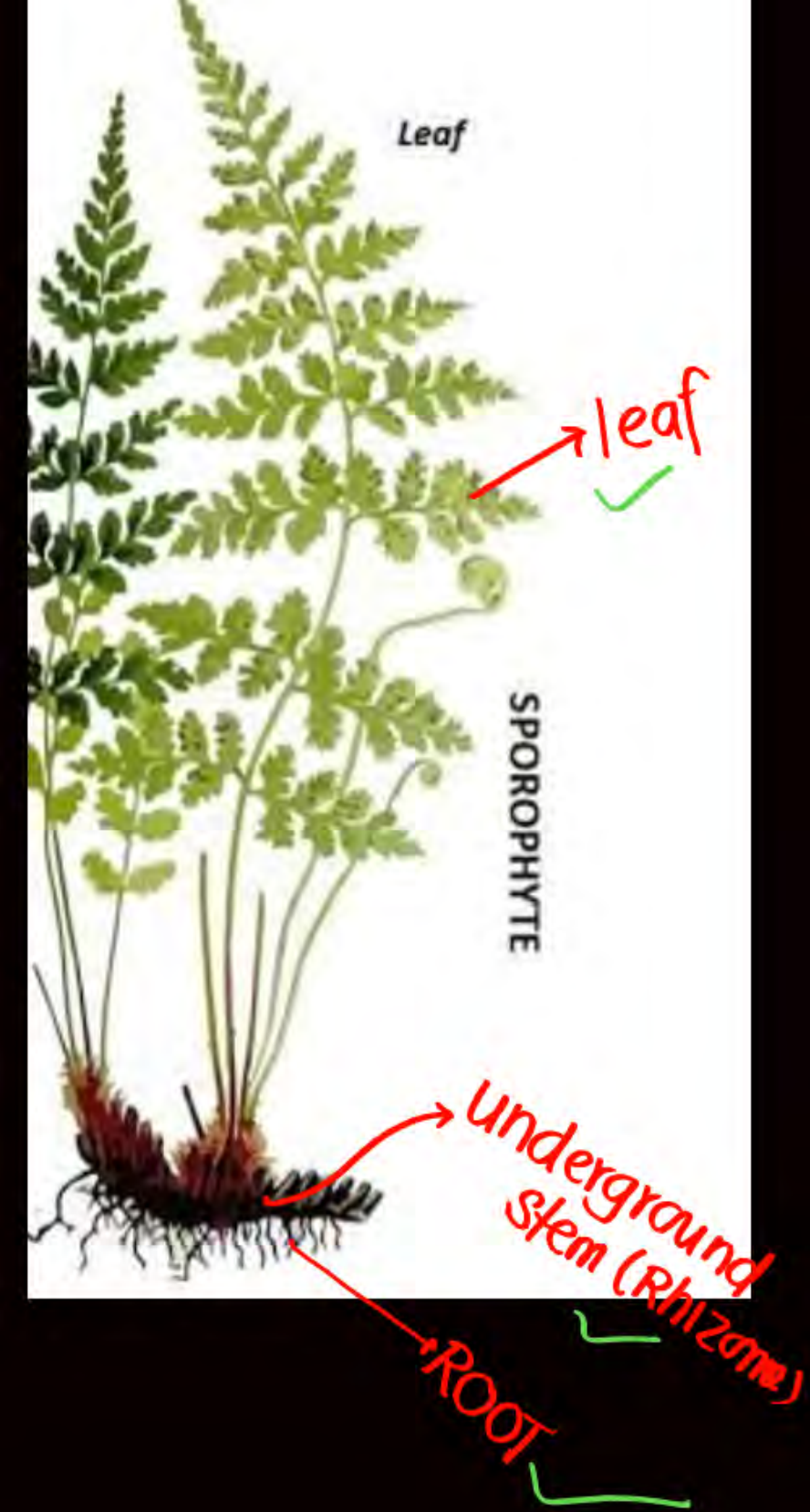
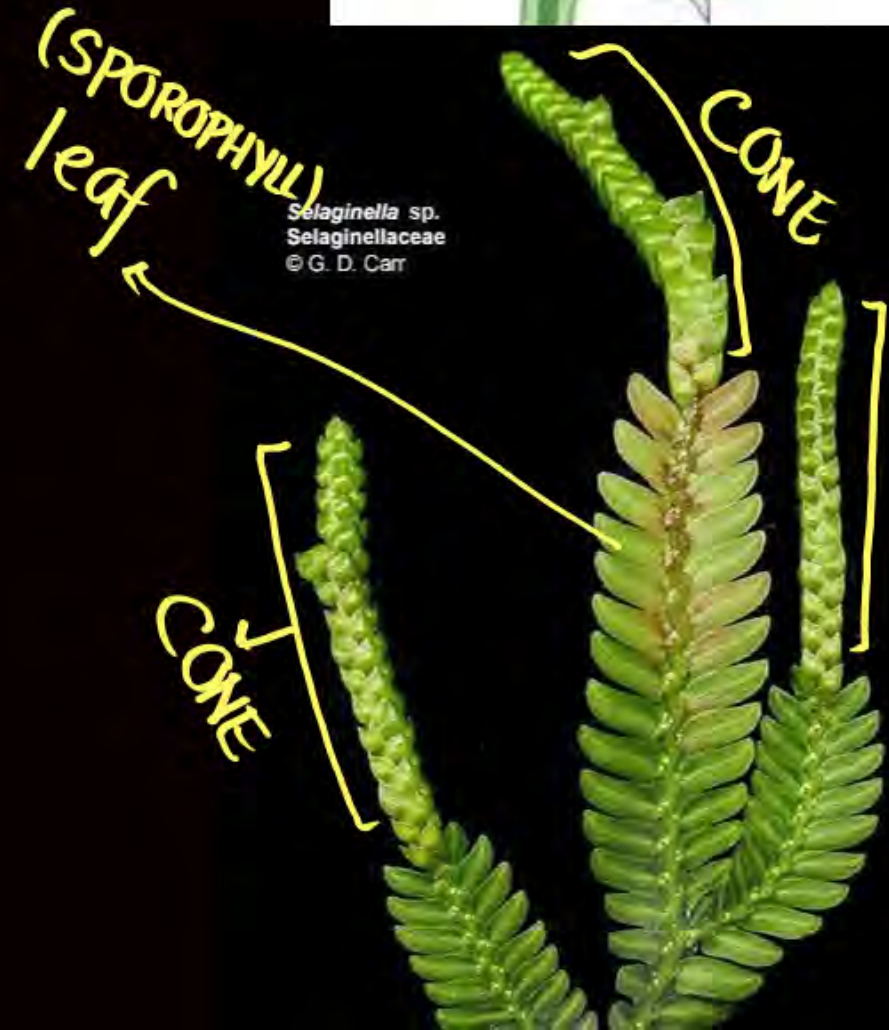
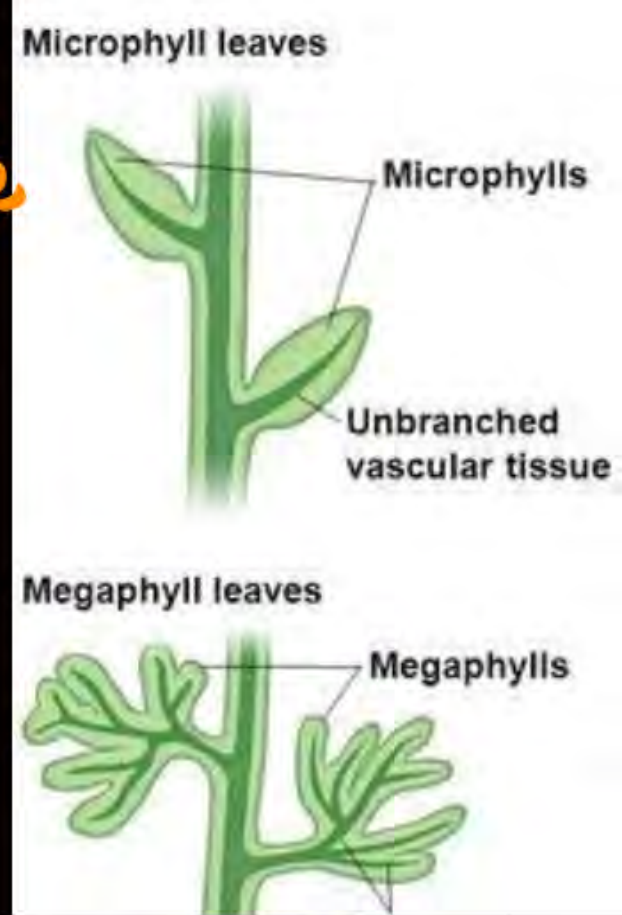
★ medicine, ornamental, prevent soil erosion (soil Binders)

★ includes: Horsetail & ferns (Adiantum, Azolla)
 Equisetum

★ Two types of leaves

Small (Microphyll)
 eg Selaginella

Large (Megaphyll)/Macrophyll
 eg ferns.



CONE/STROBILUS

leaf (sporophyll) aggregate to form CONE
eg: selaginella, equisetum



→ SPORANGIA
($2n$)

→ WAIT?

→ sporophyll (leaf)
($2n$)

3.2 BRYOPHYTES



Bryophytes include the various mosses and liverworts that are found commonly growing in moist shaded areas in the hills (Figure 3.2).

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.

The plant body of bryophytes is more differentiated than that of algae. It is thallus-like and prostrate or erect, and attached to the substratum by unicellular or multicellular rhizoids. They lack true roots, stem or leaves. They may possess root-like, leaf-like or stem-like structures. The main plant body of the bryophyte is haploid. It produces gametes, hence is called a **gametophyte**. The sex organs in bryophytes are multicellular.

Liverworts

Moss

gametophyte

sporophyte

axis

The male sex organ is called **antheridium**. They produce biflagellate **antherozoids**. The female sex organ called **archegonium** is flask-shaped and produces a single egg. The antherozoids are released into water where they come in contact with archegonium. An antherozoid fuses with the egg to produce the zygote. Zygotes do not undergo reduction division immediately. They produce a multicellular body called a **sporophyte**.

embryo

to elaters

The sporophyte is not free-living but attached to the photosynthetic gametophyte and derives nourishment from it. Some cells of the sporophyte undergo reduction division (meiosis) to produce haploid spores. These spores germinate to produce gametophyte.

Capsule.

SMC

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.

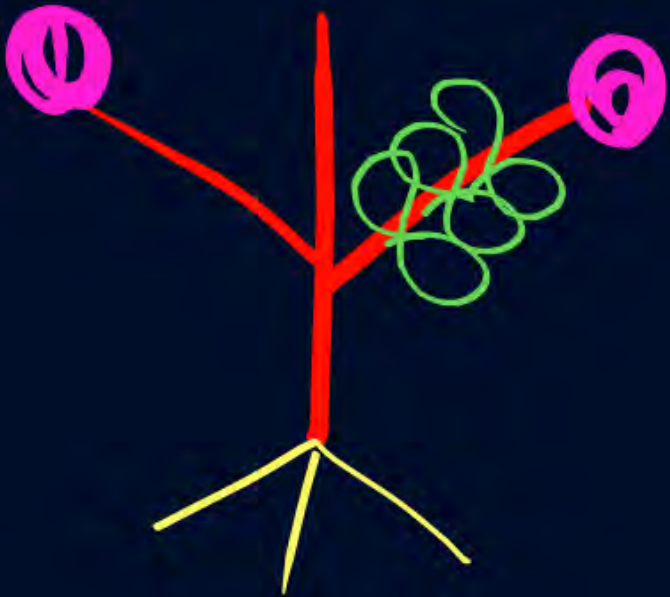
They decompose rocks making the substrate suitable for the growth of higher plants. Since mosses form dense mats on the soil, they reduce the impact of falling rain and prevent soil erosion. The bryophytes are divided into **liverworts** and **mosses**.

3.2.2 Mosses

The predominant stage of the life cycle of a moss is the gametophyte which consists of two stages. The first stage is the **protonema** stage, which develops directly from a spore. It is a creeping, green, branched and frequently filamentous stage.

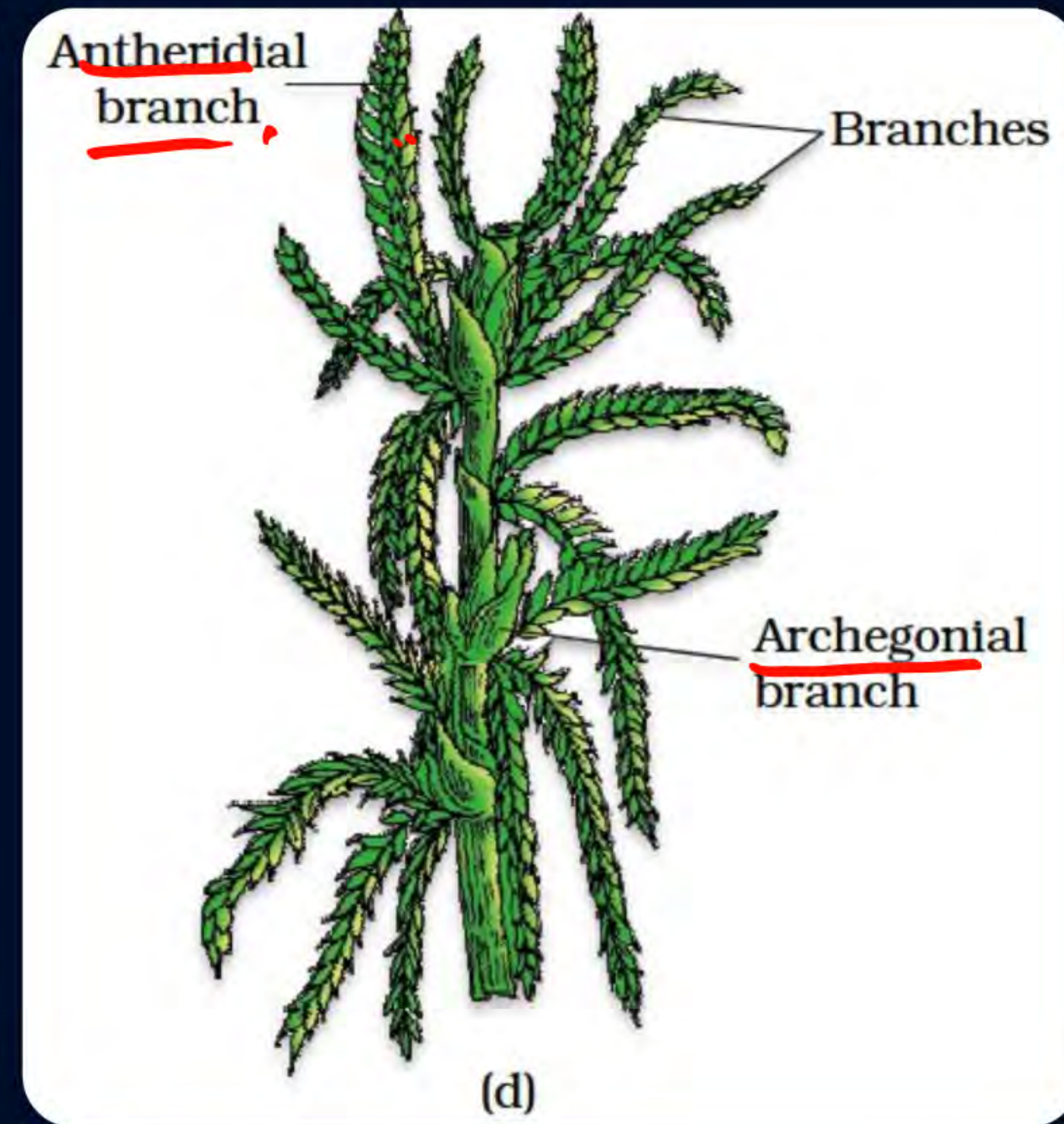
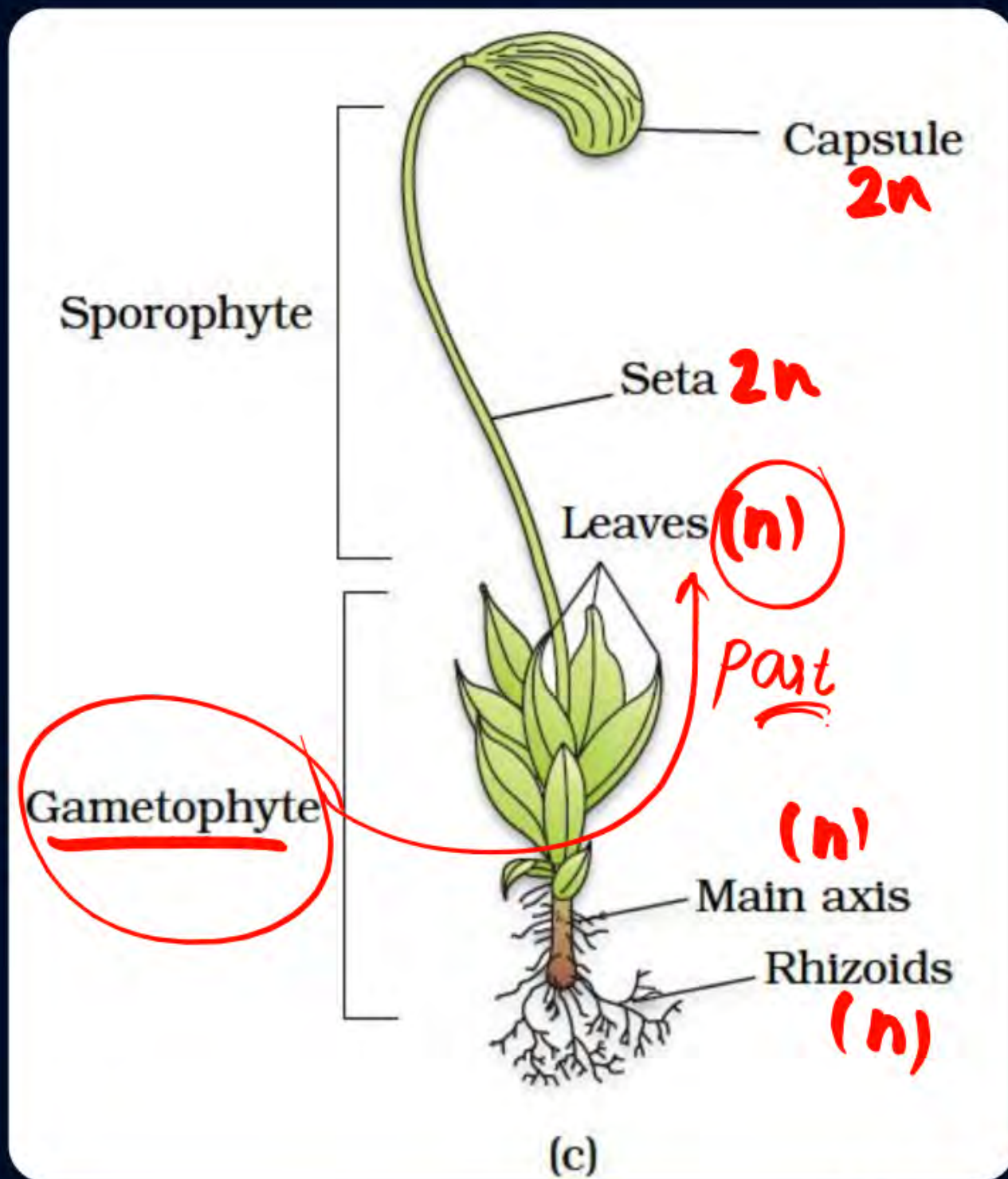
The second stage is leafy stage which develop from secondary protonema as a lateral bud.

They consist of upright, slender axes bearing spirally arranged leaves. They are attached to the soil through multicellular and branched rhizoids. This stage bears the sex organs.



Vegetative reproduction in mosses is by fragmentation and budding in the secondary protonema. In sexual reproduction, the sex organs antheridia and archegonia are produced at the apex of the leafy shoots.

After fertilisation, the zygote develops into a sporophyte, consisting of a foot, seta and capsule. The sporophyte in mosses is more elaborate than that in liverworts. The capsule contains spores. Spores are formed after meiosis. The mosses have an elaborate mechanism of spore dispersal. Common examples of mosses are *Funaria*, *Polytrichum* and *Sphagnum* (Figure 3.2).



Bryophytes:

Mosses – (c) Funaria, gametophyte and sporophyte
(d) Sphagnum gametophyte

Bryophytes

- (A) include liverworts not mosses
- (B) grow in moist shady, humid place but not in damp region
- (C) cannot live in soil
- (D) depend upon water for fertilisation so called amphibians of plant kingdom

Bryophytes

- (A) role in plant succession on rock
- (B) body is less differentiated than algae
- (C) always have unicellular rhizoid
- (D) lack true root, stem, leaf
- (E) (A) & (D) are correct

Bryophytes

- (A) main body is haploid, sporophyte
- (B) main body is gametophyte, diploid
- (C) sporophyte and gametophyte are unicellular
- (D) gametophyte produce gametes

Bryophytes

- (A) sex organ : unicellular
- (B) male gamete is uniflagellated
- (C) female sex organ is antheridium
- (D) female sex organ is flask shape

Bryophyte

- (A) zygote undergoes meiosis immediately
- (B) zygote produce unicellular body sporophyte
- (C) sporophyte attached to gametophyte for food
- (D) some cell of gametophyte undergoes meiosis to produce spore

Bryophyte

- (A) more economic importance
- (B) some mosses food for mammals birds, animals
- (C) sargassum is peat moss
- (D) sphagnum used in packaging of material
- (E) sargassum hold water
- (F) (B) & (D) are correct

Bryophytes

- (A) moss along with lichen first organism to colonise on rock
- (B) it is economic importance
- (C) moss form loose mat on soil
- (D) moss reduced impact of rain on soil so promote soil erosion

Liverworts

- (A) marchantia is monoecious
- (B) leafy members have tiny leaf like appendages in two rows on true stem
- (C) asexual reproductive by Gemma
- (D) Gemma are green, unicellular, asexual bud formed in Gemma cup

Liverworts

- (A) sex organ always present on different thallus
- (B) sporophyte is divided into foot seta capsule (haploid)
- (C) spore germinate to form unicellular free living gametophyte
- (D) none



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module

: Bryophyte
Question

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