LYCOPODIUM

BY

Dr. T. Senthil kumar

LYCOPODIUM

Club moss, Ground pines or trailing evergreens

Distribution

- World wide
- Commonly in tropical and sub tropical
- Commonly found in humus soil in moist shady places

Hanging epiphytes

- Lycopodium phlegmaria
- Lycopodium squarrosum

Indian species (Eight species)

- L. clavatum
- L. cernum
- L. heamilitonii
- L. setaceum
- L. plegmaria
- L. wightiana
- L. serratum
- L. phyllanthum

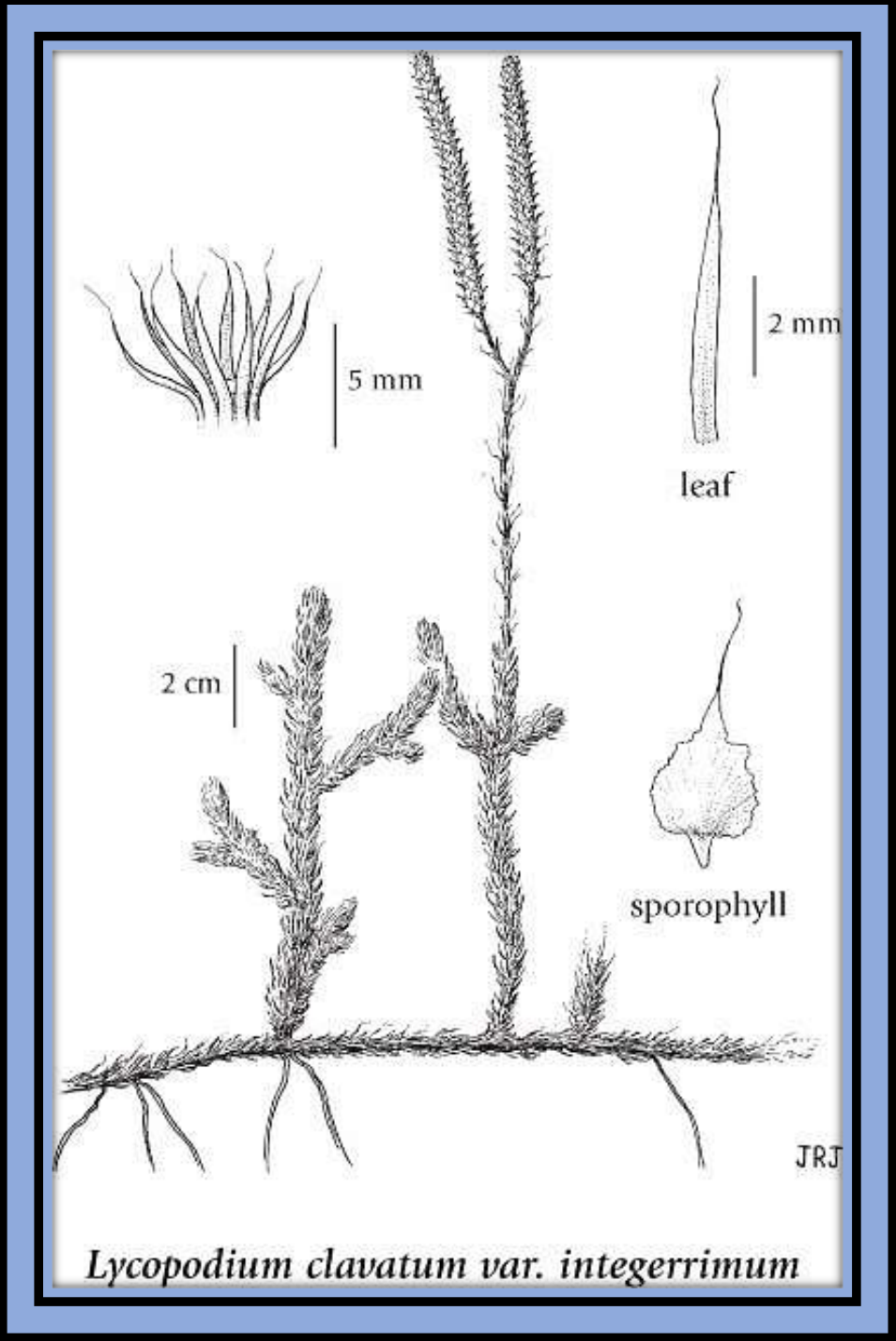
L. clavatum is most common species

Habit

- All the species posses small, herbaceous or shrubby sporophyte
- The stem is delicate and weak
- Stem and its branches densely covered by leaves
- According to pretzel (1900) divided into two sub genera

- **Urostachya**

- **Rhopalostachya**



Urostachya sps

- Branched or unbranched stems
- Erect or pendant
- Never creeping
- Ex : L. selago, L. lucidulum, L. phlegmaria
- If the stem is branched, branching always dichotomous

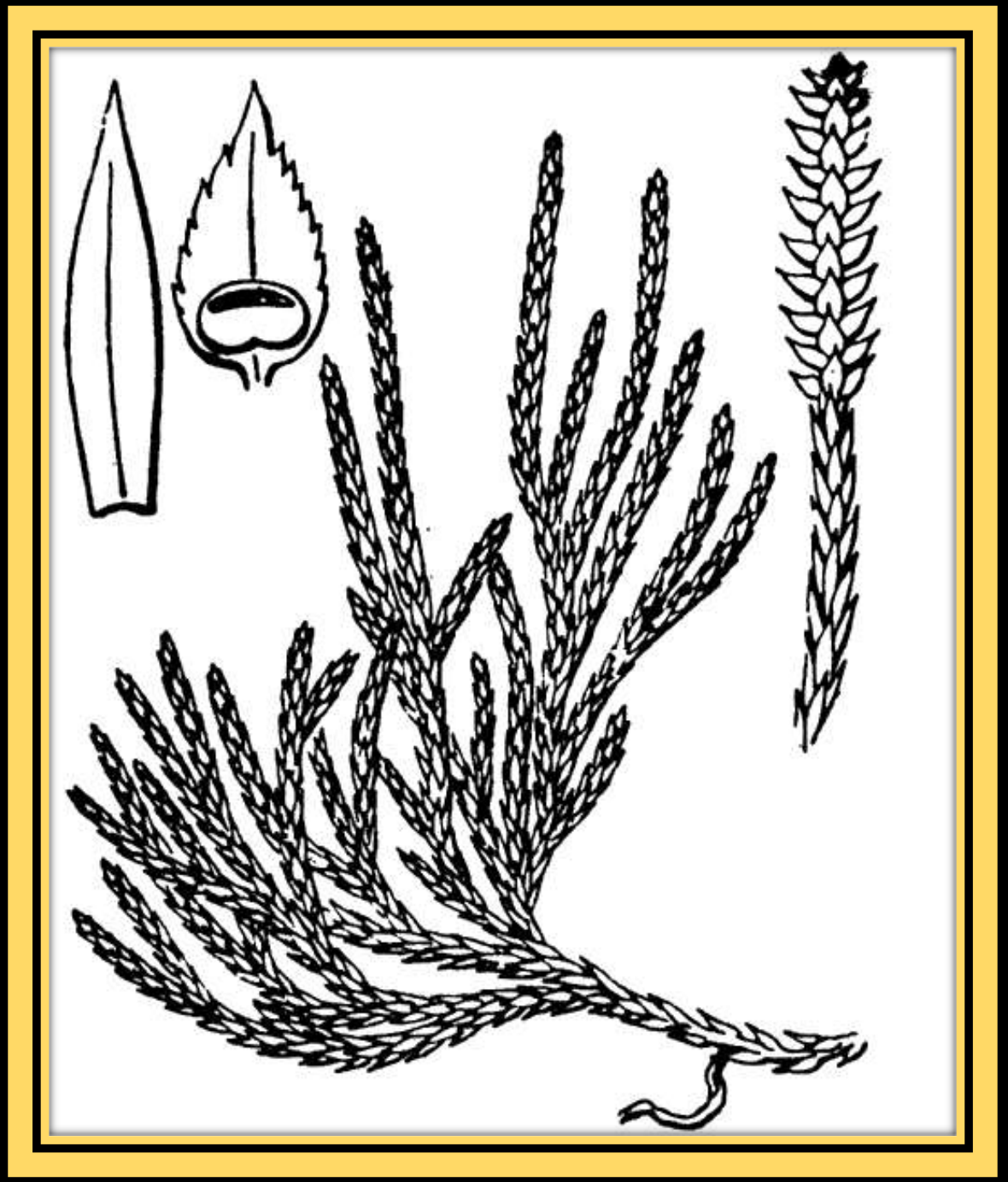
Rhopalostachya

- Posses prostrate stem bearing upright branches
- First formed portion may be dichotomous
- Later developed portion always monopodial
- Ex: L. clavatum, L. inundulatum, L. cernuum

Leaves

- Small
- Sessile
- Numerous and cover with the axis closely
- 2 – 10 mm long
- Usually closed spirals (ex. L. clavatum and L. annonatum)
- Other cases arranged in whorls (ex. L. verticillatum and L. cernuum)

- In some species arranged in opposite leaves
- Ex. L. alpmum



- Usually leaves are lanceolate in outline
- First formed leaves do not bear midrib
- Later formed posses single unbranched vein
- But it did not reach the apex

- The leaves are all alike in size and shape
- In few species shows dimorphic leaves like selaginella
- L. complanatum
- L. volubile
- L. chamaecypari

LEAF TYPES

- L. Clavatum
- L. annnonatum

SPIRAL

- L. Cernum
- L. verbicillatum

WHORL

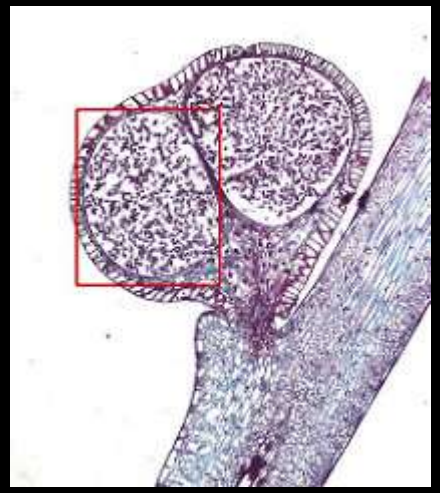
- L. alpimum

OPPOSITE PAIR

- L. Complantum
- L. volubile

DIMORPHIC

Development of sporangium: Eusporangiate and Leptosporangiate



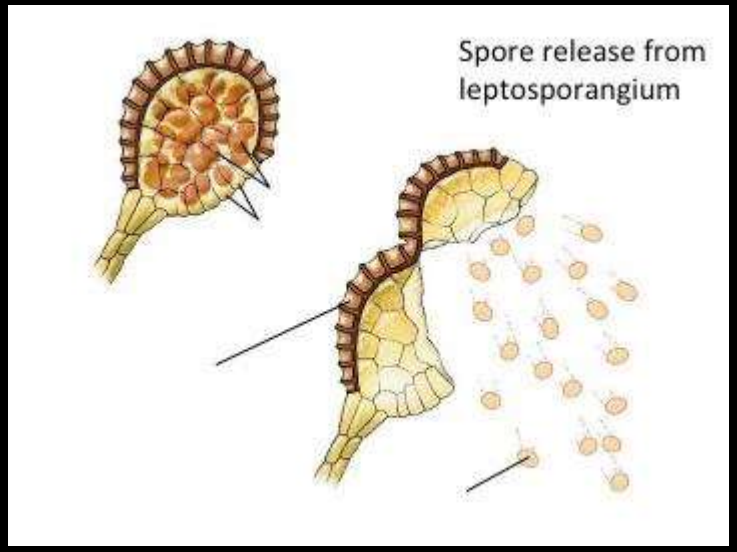


Table 7.1 : Distinction between eusporangiate and leptosporangiate pteridophytes

Eusporangiate pteridophytes	Leptosporangiate pteridophytes
1. The sporangium originates from a group of initial cells.	1. The sporangium originates from a single initial.
2. The sporangium has a multilayered wall.	2. The sporangium has a single-layered wall.
3. The spore output is unlimited (containing a large number of spores).	3. The spore output is limited (containing a limited number of spores).
4. The antheridia are sunk within the thallus and contain a large number of sperms.	4. The antheridia are projecting out of the thallus and contain a limited number of sperms.
5. The first division of the zygote is transverse.	5. The first division of the zygote is vertical or oblique.

Development of sporangium (Eusporangiate type)

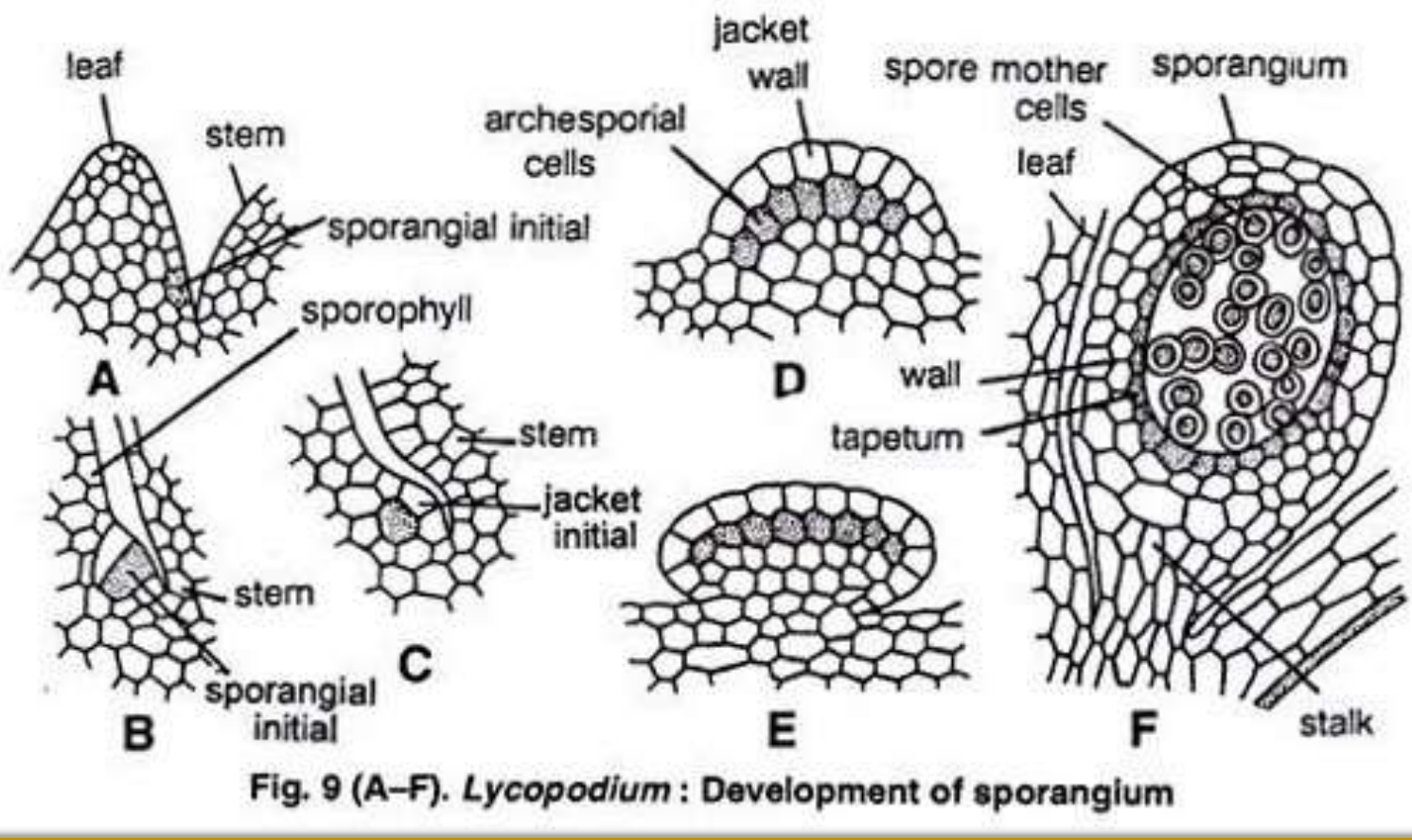
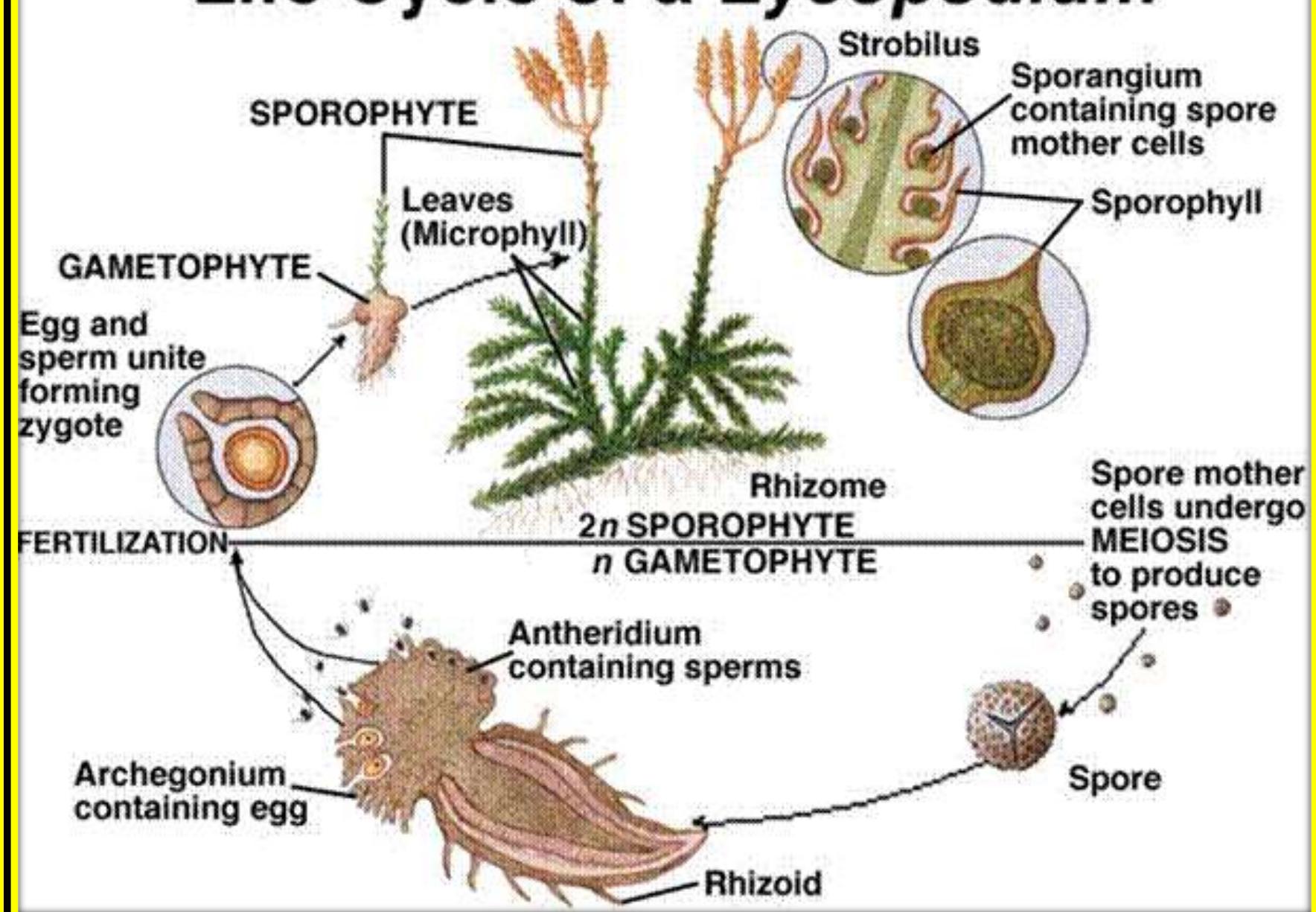


Fig. 9 (A–F). *Lycopodium* : Development of sporangium

Life Cycle of a *Lycopodium*



Development of archegonium

- Single superficial cell
- Known as archegonial initial

Primary cover cell

Central cell

Divides anticlinally
Neck initial
(3-4 cell height)

Divides periclinally
Primary canal
(6 neck canal cell
&venter canal cell)
Primary venter cell

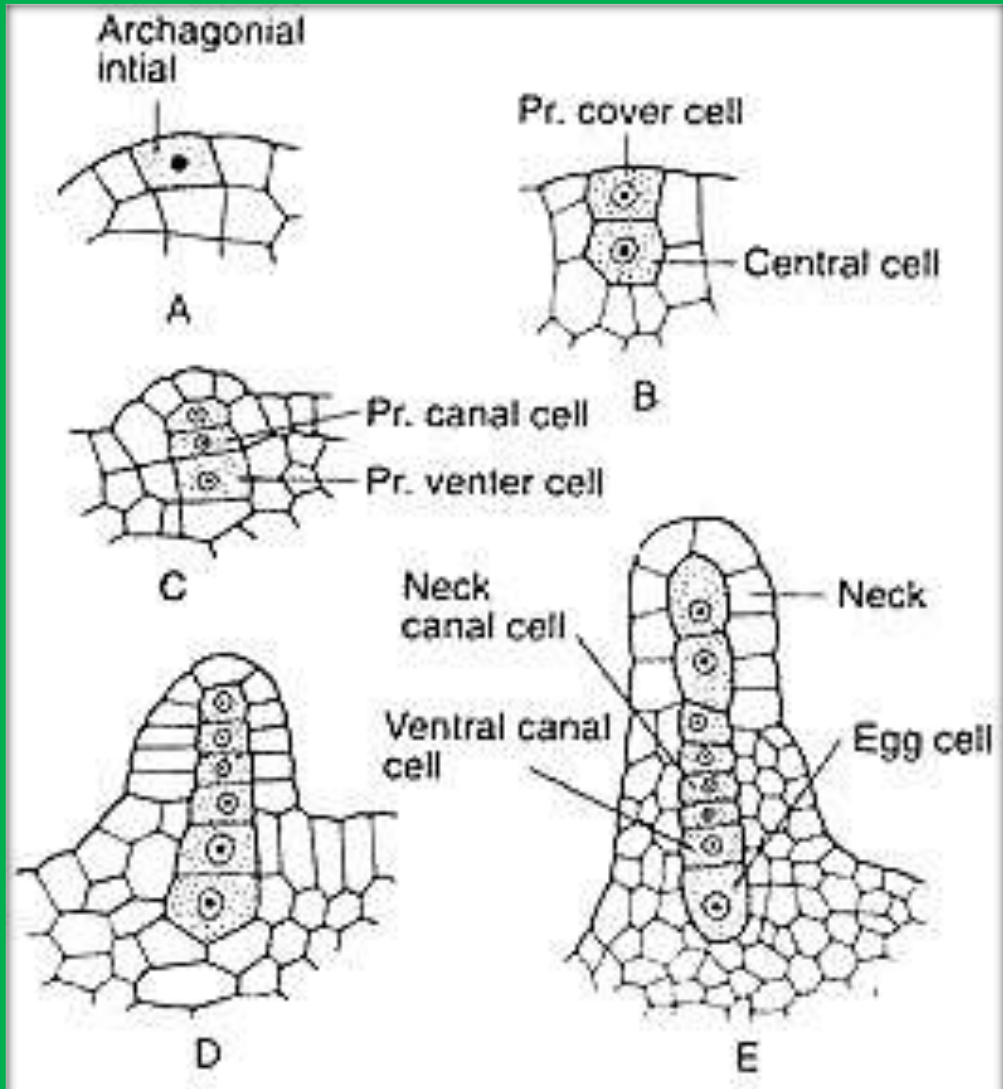
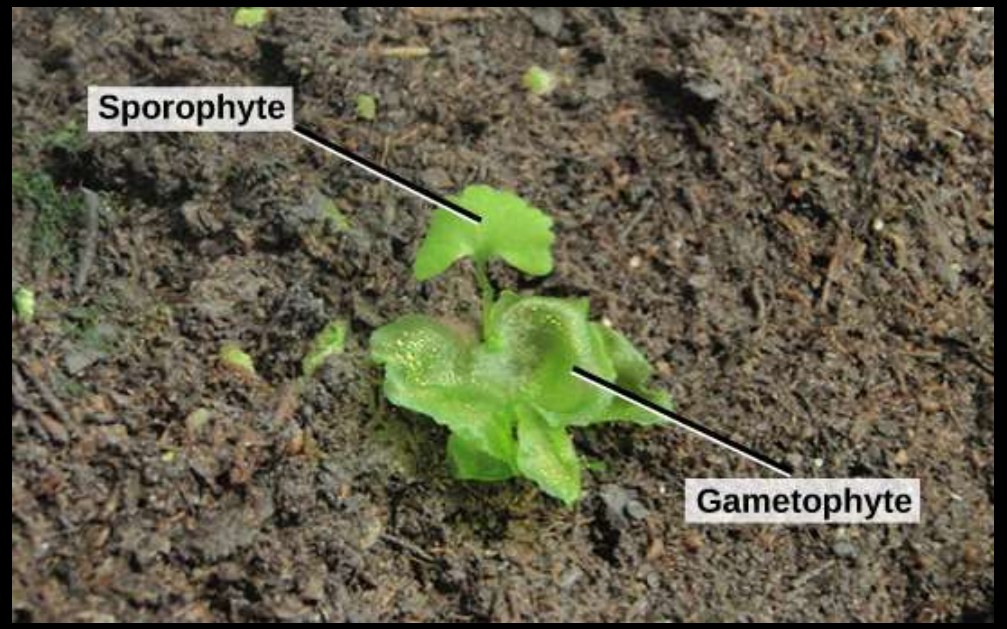


Fig. 7.32 : *Lycopodium* : A–D. Stages in the development of archegonium, E. A mature archegonium

- DEVELPOMENT OF GAMETOPHYTE
- Takes place from the haploid spores
- Chlorophyll may or may not be present in different species
- Germination - within a few days after liberation
- Some species the spores germinate when they are 3-8 years old
- formation of mature sex organs may take a time of 8 months to 6 or even 15 years.
- The male sex organs are produced earlier than female sex organs.
- at the time of germination of spore, it swells up to absorb water



- First the spore divides into two unequal cells by a lenticular division
- Forming a very small lens shaped cell known as rhizoidal cell and a bigger cell
- rhizoidal cell takes no part in further development of gametophyte and is a colourless structure
- At this two celled stage the spore will rupture at the triradiate ridge
- Second division divides the bigger cell into two equal halves,

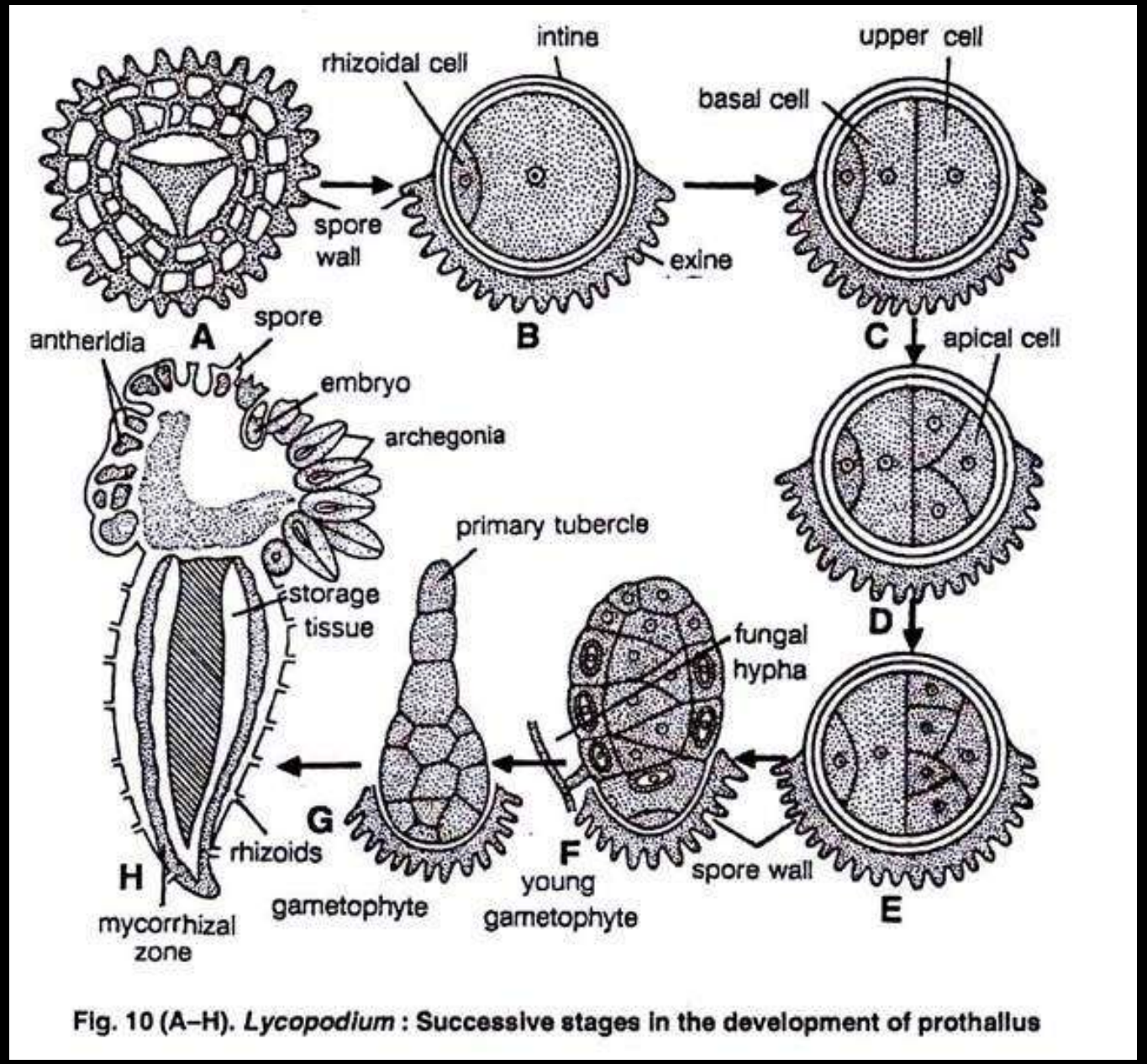


Fig. 10 (A–H). *Lycopodium* : Successive stages in the development of prothallus

- The cell near the rhizoidal cell is known as basal cell and the other one is known as upper cell
- The upper cell further divides by two successive divisions in such a way as to form an apical cell with two cutting faces
- At this stage the gametophyte is 5 celled structures and the symbiotic phycomycetous fungus (mycorrhizal fungus) attacks it
- If this fungus fails to attack at this stage, further development of gametophyte stops
- This infection takes place through the basal cell

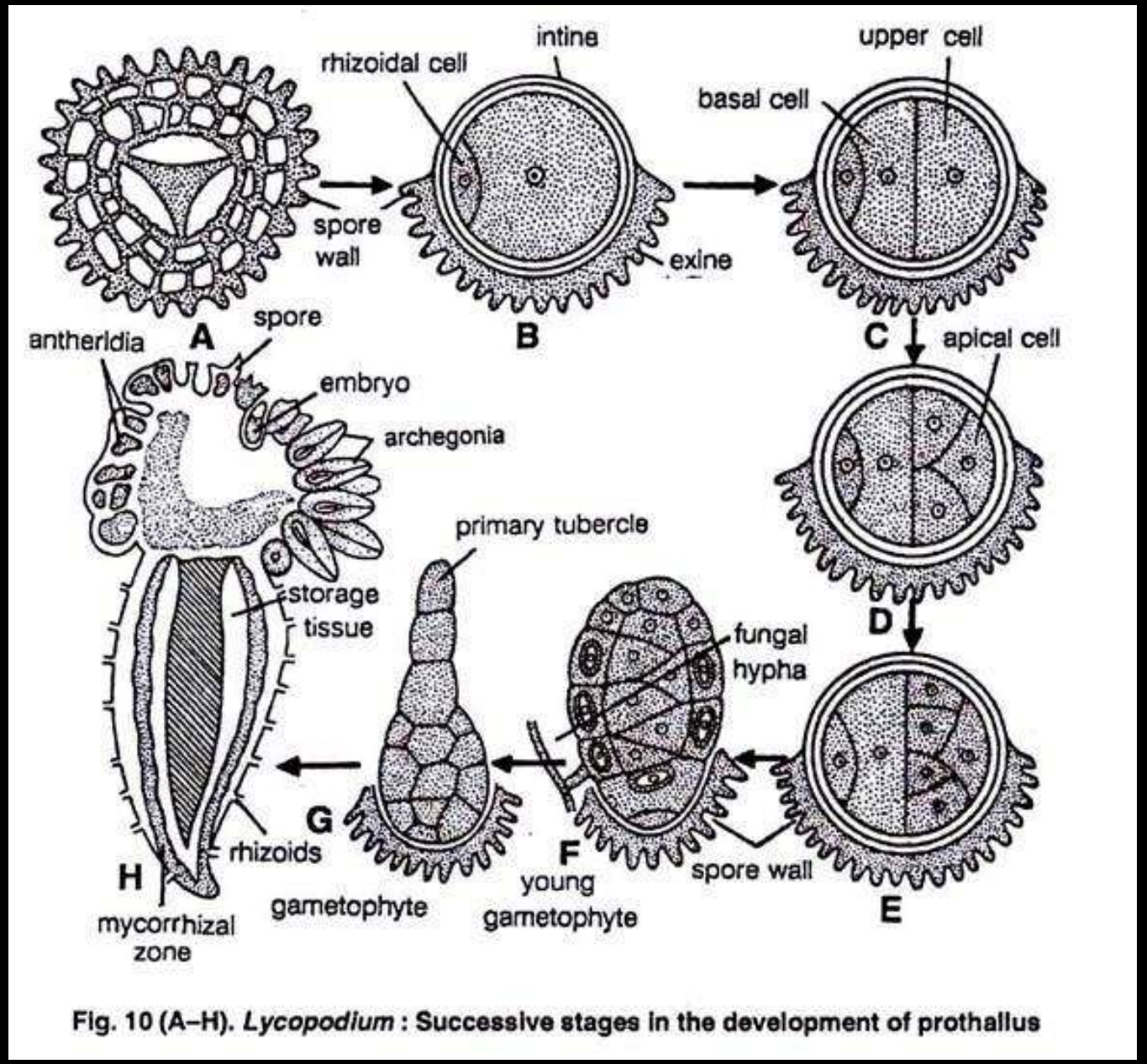


Fig. 10 (A–H). *Lycopodium* : Successive stages in the development of prothallus

- the apical cell further divides to form six or morecells
- which later on develop into meristematic cells
- These cells, by further divisions form a multicellular structure, the gametophyte (prothallus)

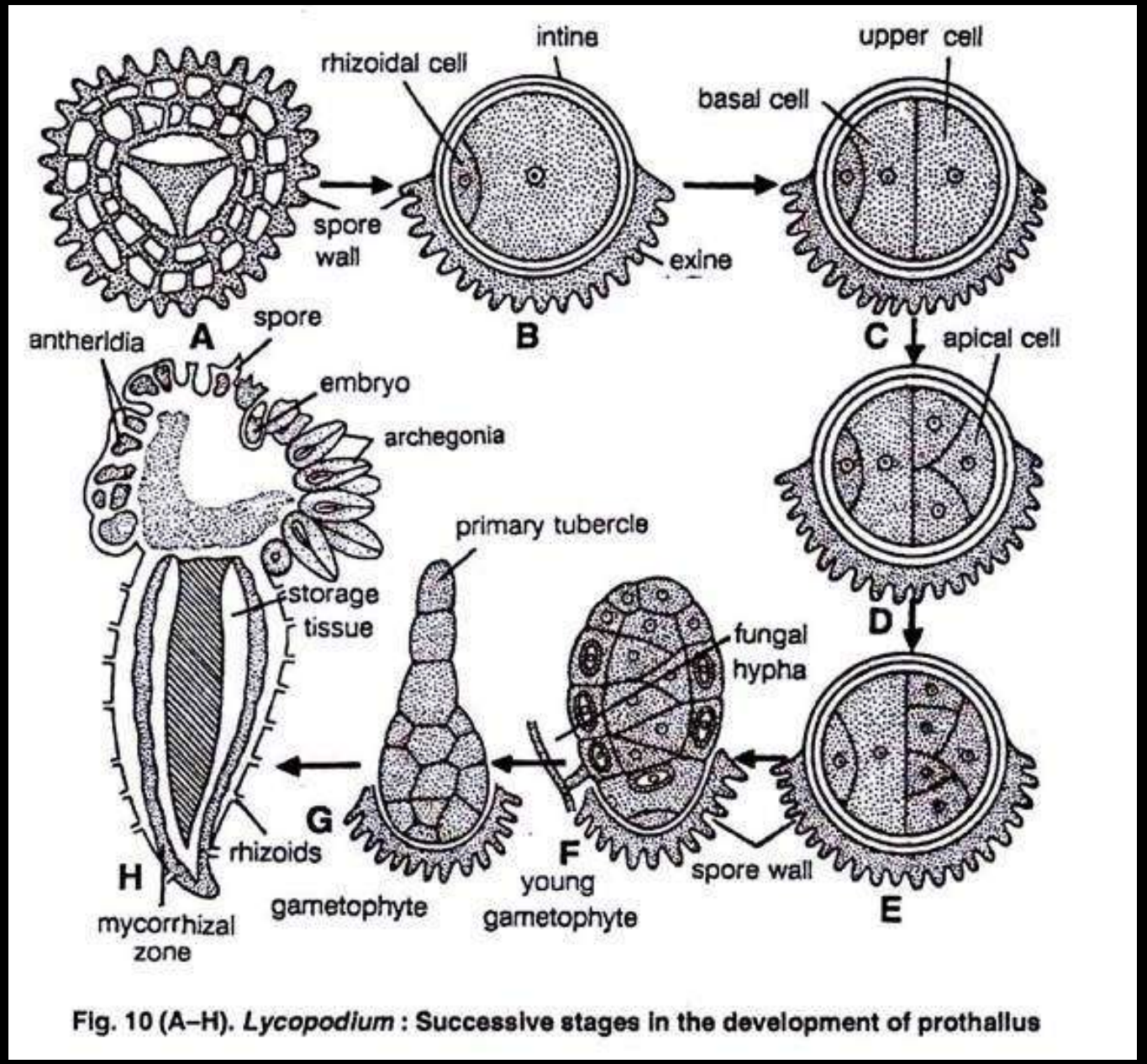


Fig. 10 (A–H). *Lycopodium* : Successive stages in the development of prothallus

Structure of the Mature Gametophytes

- In general they have been grouped under three categories
- Type I or Cernuum type
- Type II or Clavatum Type
- Type III or Phlegmaria type

Type I or Cernuum type

- Gametophyte is partially aerial and partly in soil
- Usually 2 to 3 millimetre in height and 1-2 millimetre in diameter
- colourless basal portion
- a conspicuous upright, fleshy, green aerial portion having lobes
- The sex organs develop between the green expanding lobes
- The prothallus itself is a nourishing body
- The underground part contains endophytic fungus
- e.g., L. cernuum, L. inundatum etc.

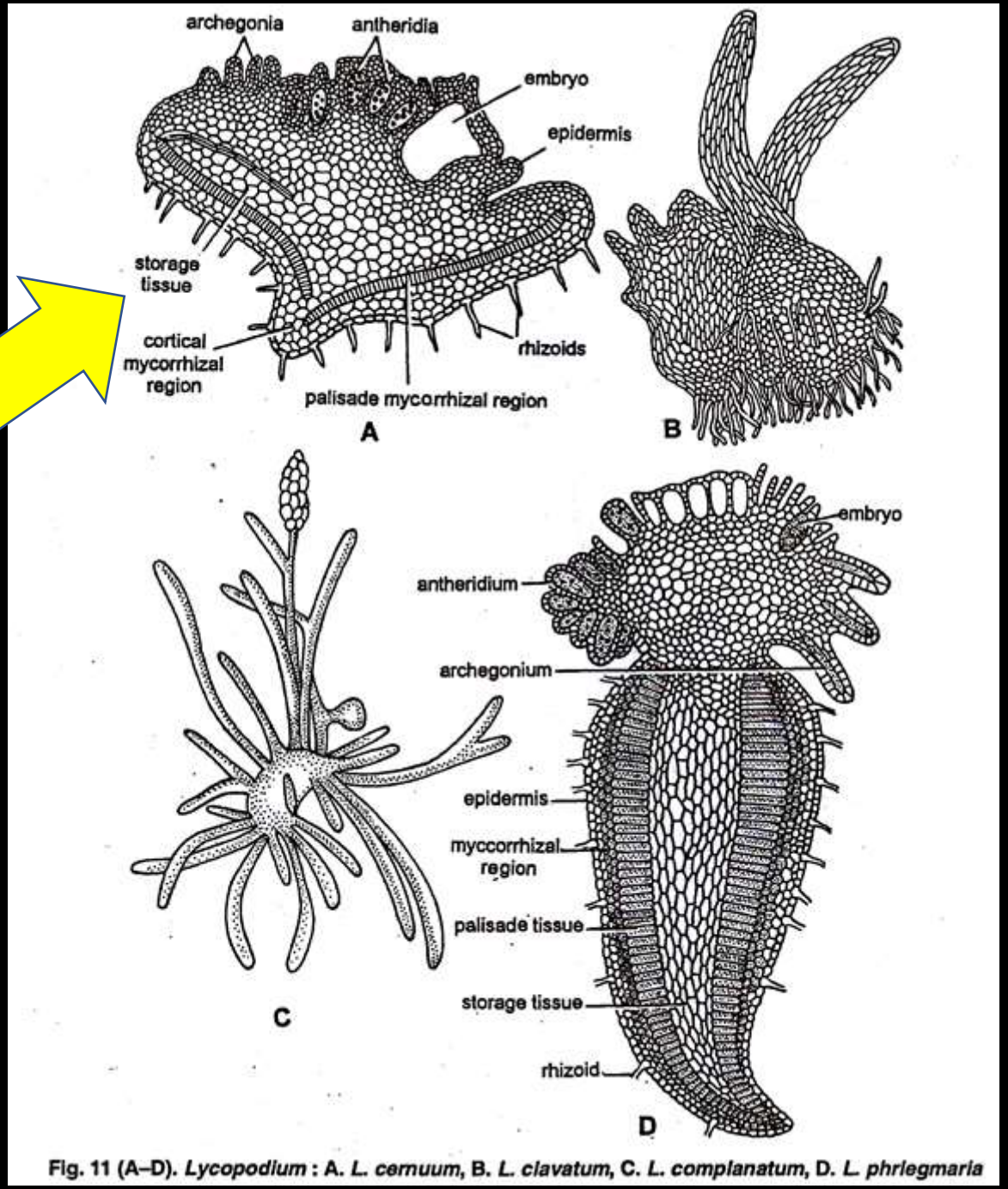


Fig. 11 (A–D). *Lycopodium* : A. *L. cernuum*, B. *L. clavatum*, C. *L. complanatum*, D. *L. phriegmaria*

Type II or Clavatum Type

- The gametophyte is wholly subterranean and totally saprophytic
- non- green structure
- It is tuberous and without lobes
- It may be one to two centimentre long
- conical or discoid in shape
- The endophytic fungus is present
- Sex organs are formed on the upper surface
- e.g. L. annotinum, L. complanatum, L. clavatum etc.

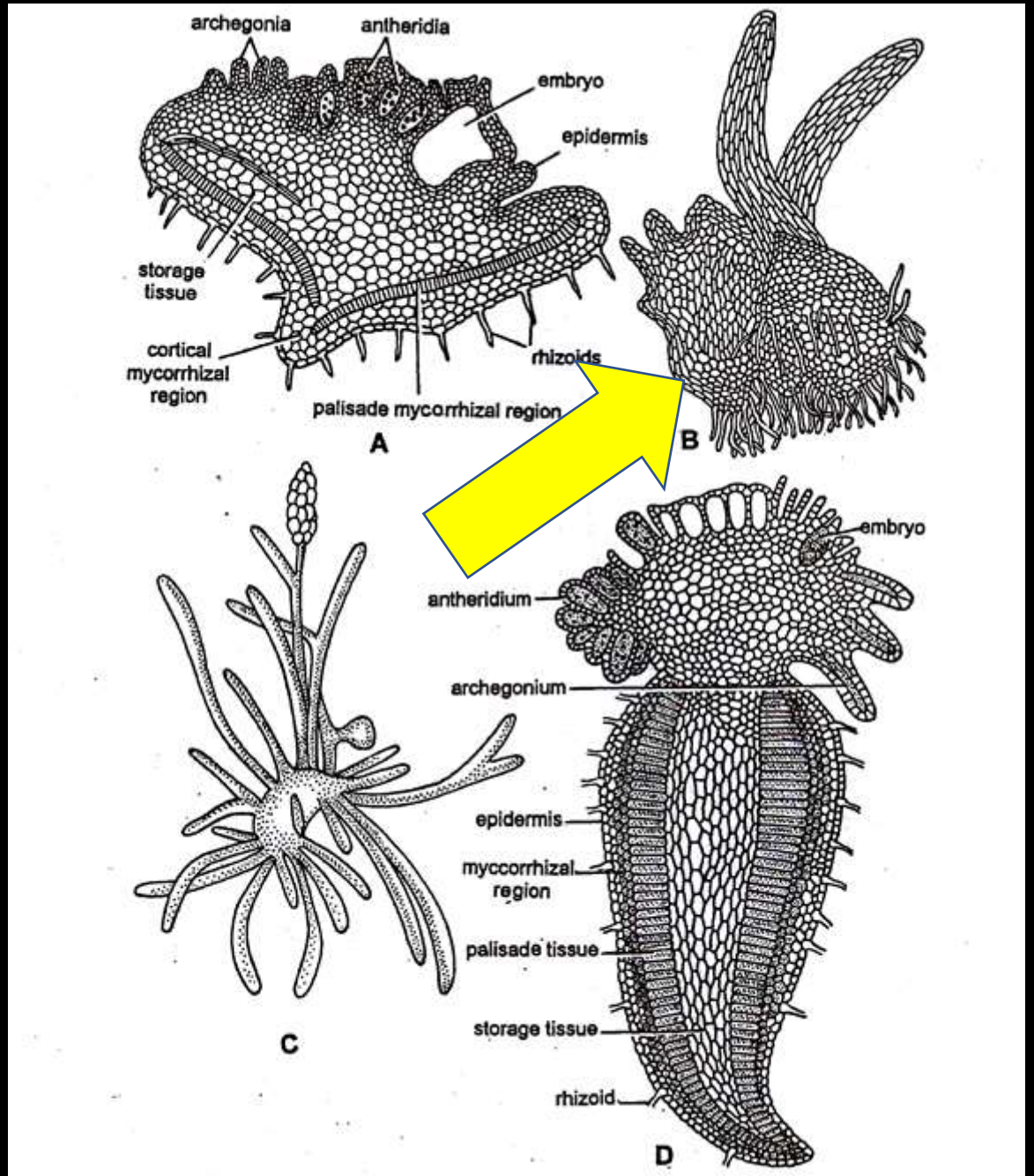


Fig. 11 (A–D). *Lycopodium* : A. *L. cernuum*, B. *L. clavatum*, C. *L. complanatum*, D. *L. phriegmaria*

Type III or Phlegmaria type

- The gametophyte is wholly subterranean and totally saprophytic
- non- green structure
- monopodially branched
- It may be one to two centimentre long
- The endophytic fungus is present
- Sex organs are formed on the upper surface
- e.g. L. phlegmaria.

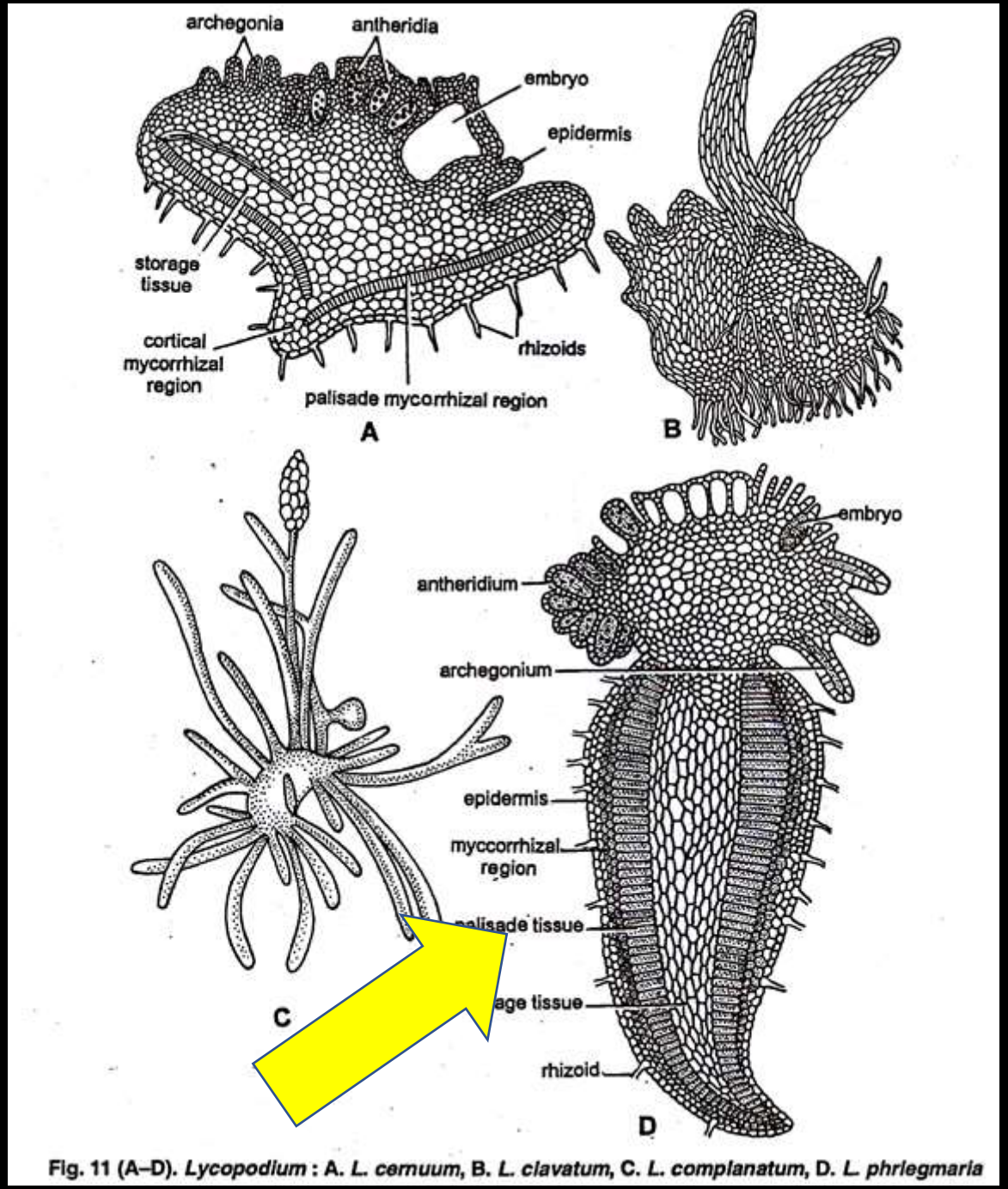


Fig. 11 (A–D). *Lycopodium* : A. *L. cernuum*, B. *L. clavatum*, C. *L. complanatum*, D. *L. phriegmaria*

References

- A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany, 1/e, 2006, A.V.S.S. Sambamurty .

- A TEXTBOOK OF BOTANY: VOLUME - II, 13/e, S N Pandey, PROF S.P. MISRA & PROF P.S. TRIVEDI

- **College Botany Volume II, 22/e B P Pandey,** S. Chand Publishing