Introduction to Bryophyta

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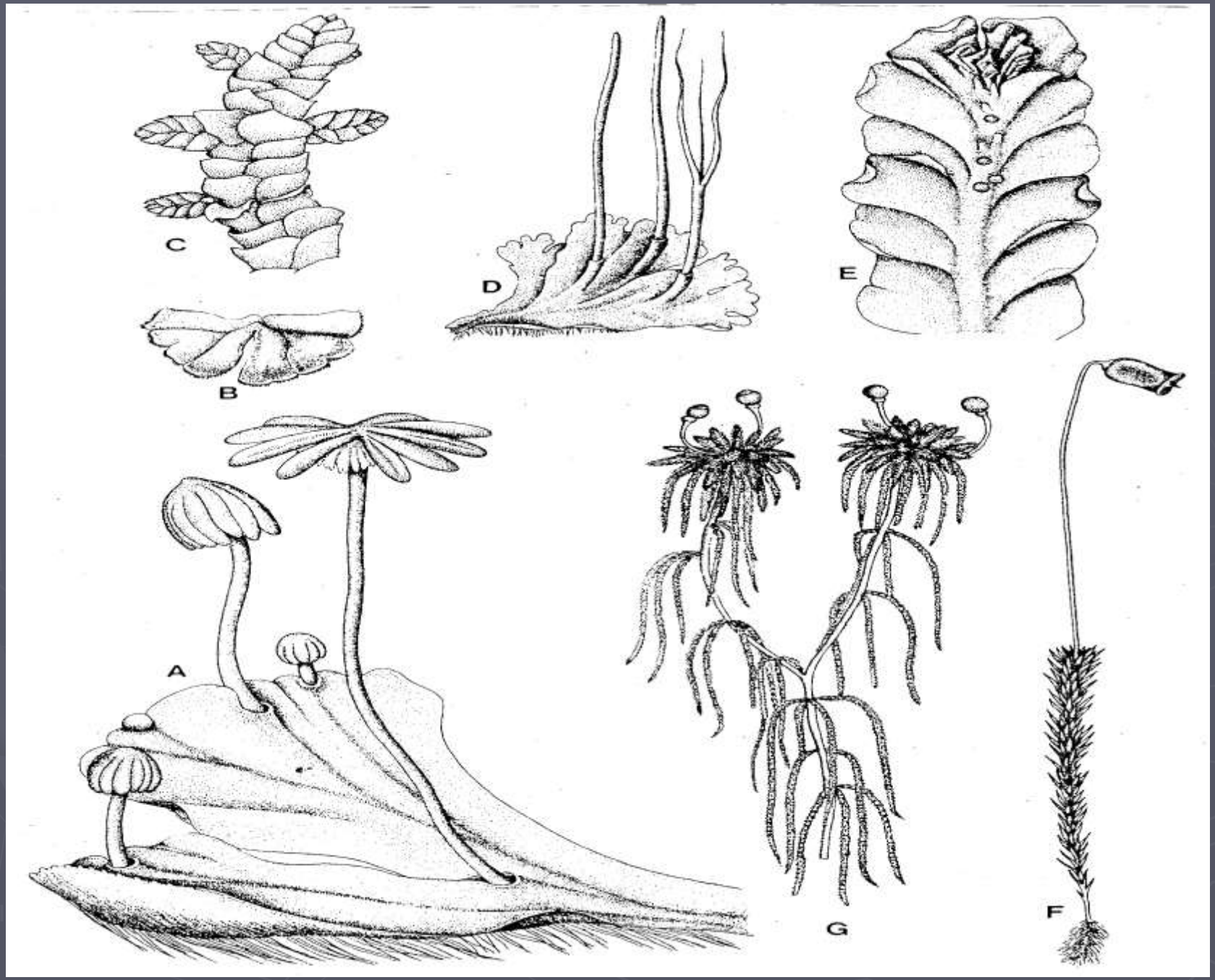
- Bryophyta (Greek Bryon = Moss, phyton = plants) is a group of simplest and primitive plants of the class Embryophyta.
- The group is represented by about 960 genera and 24,000 species.
- They represented by the swamps and the areas where water and land meet. It may well be called the amphibious zone. Inhabiting the amphibious zone are the mosses , liverworts and hornworts which collectively constitute of non vascular land plant called the bryophytes.

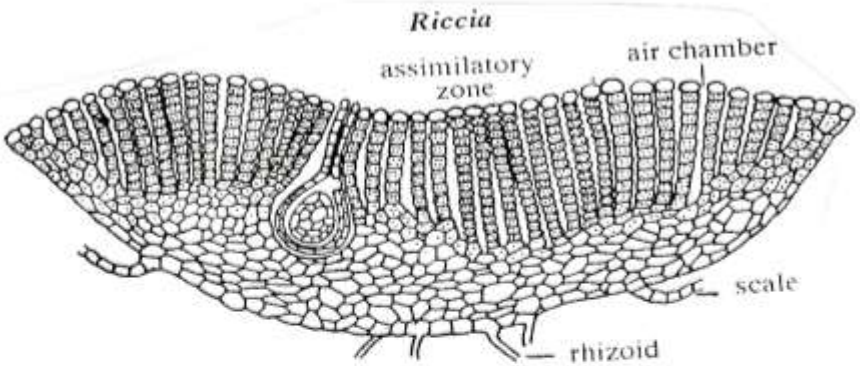
- They require water for fertilization this group is therefore regarded as plant amphibians.
- In India most of the species of bryophytes are confined to Northern and Southern Himalayas and the Nilgiri hills.
- Most of the bryophytes are land dwellers which inhibit damp shaded and humid localities. A few of them , however live in or float on water (e.g.,*Riccia fluitans, Ricciocarpus natans, Riella*).

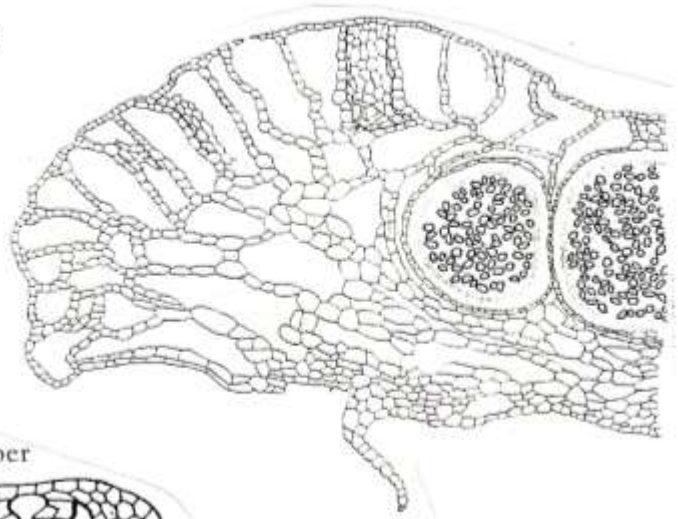
- Many masses and almost all species of *Dendroces* grow as epiphytes on the stem of the plant of tropical rain forest.
- *Buxbaumia minakate, B. aphylla* and *Cryptothallus mirabilis* are saprophytic species of bryophytes.
- Some bryophytes thrive on dry rocks with scanty soil and moisture (e.g., *Porella platyphylla*)

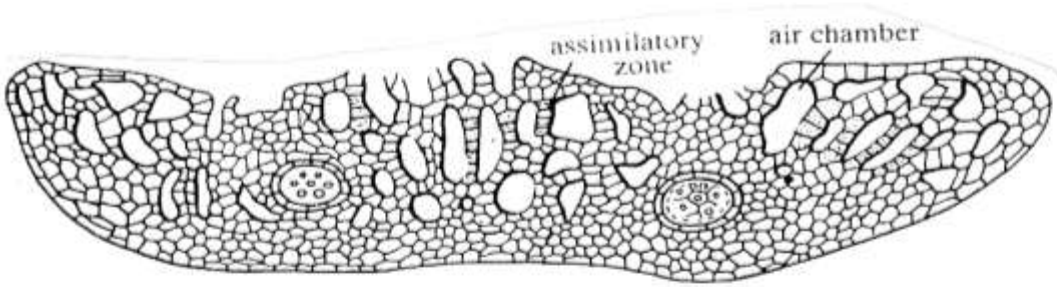
- Gametophytic and sporophytic phases are present in the life cycle of bryophytes and both theses phases are morphologically distinct (Heteromorphic).
- Bryophytes are leafy or thalloid green plants and they lacks true roots, stem and leaves.
- In primitive form (Riccia & Marchantia) the gametophytes is prostrate and thalloid but in mosses the plant body is erect.

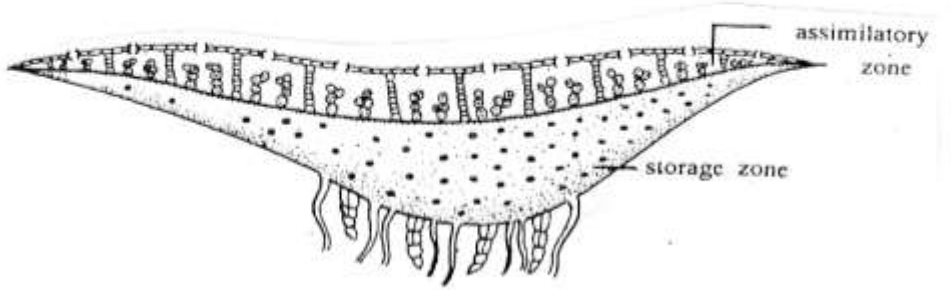
- The gametophytic phase is a more conspicuous long lived independent , where the sporophytic phase is short lived and completely dependent upon the gametophyte.
- In primitive form (Riccia and Marchantia) the gametophytes is prostrate and thalloid but in mosses the plant body is erect.

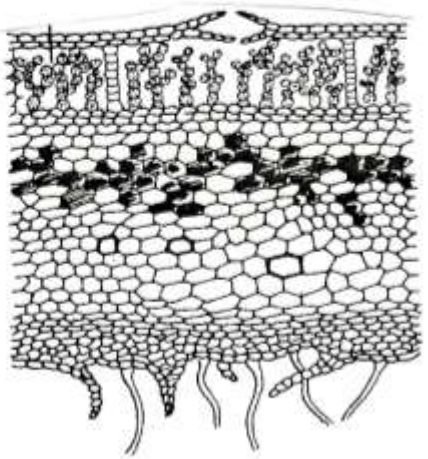

C
B
D
E
A
G
F


Riccia
assimilatory zone
air chamber
scale
rhizoid



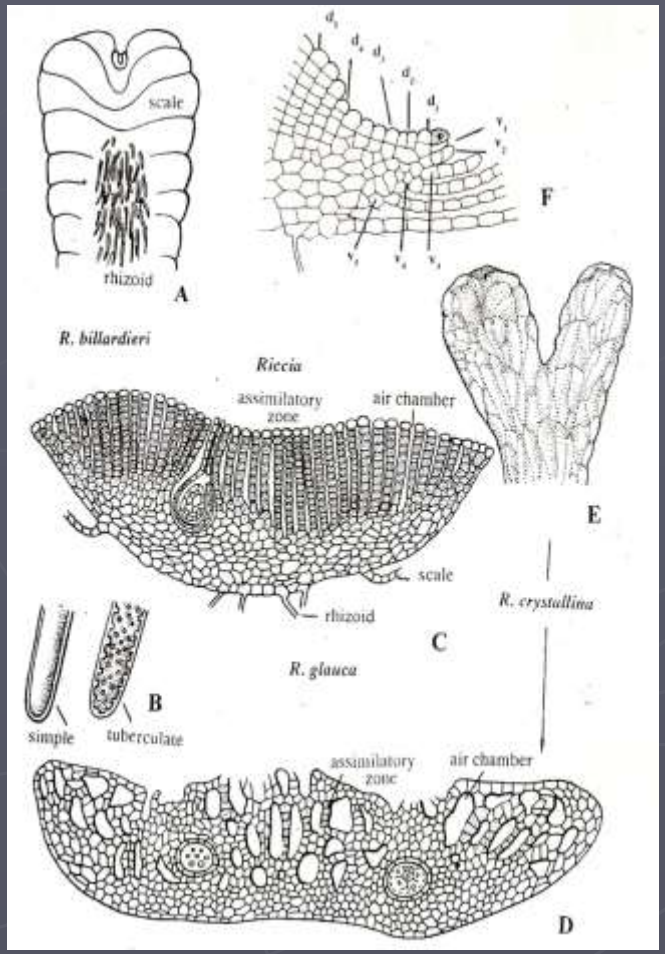

assimilatory zone
air chamber


assimilatory zone
storage zone

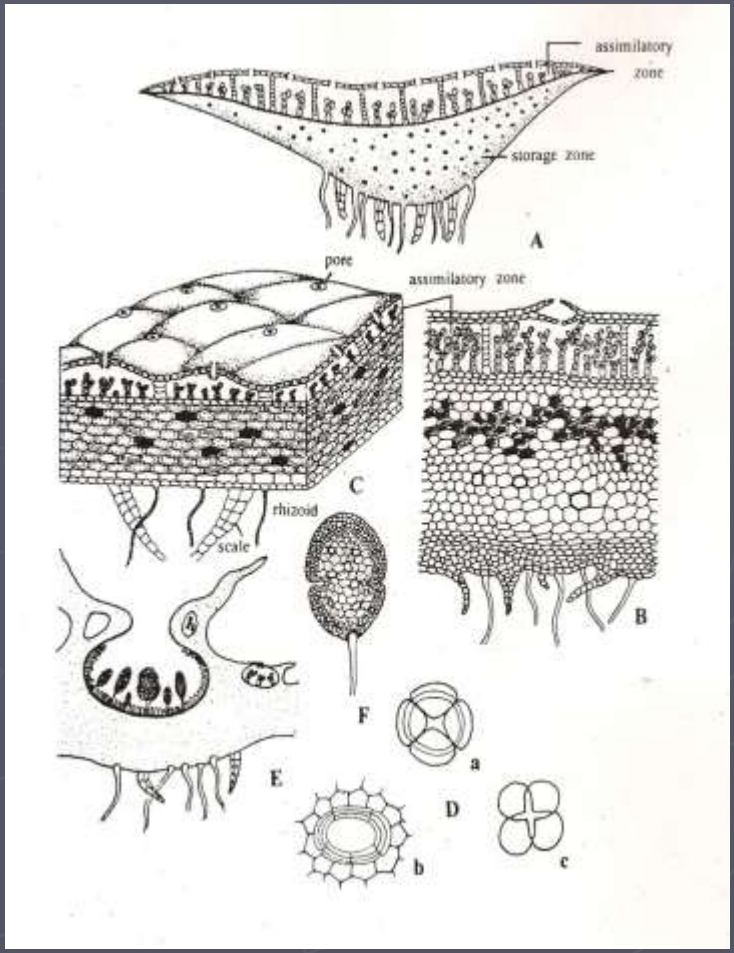


- The function of anchorage and absorption is performed by filamentous structures know as rhizoids.
- Rhizoids are either unicellular and unbranched (Hepaticopsida and Anthocerotopsida) or multcellular branched (Bryopsida).

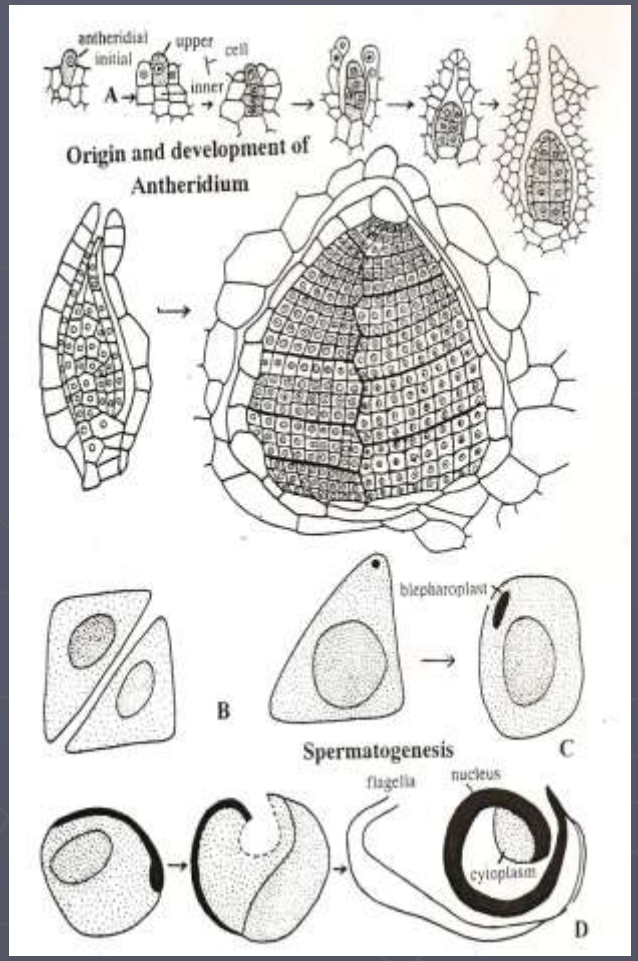
- Some member of bryophytes (marchantiales) also have multicellular scale in addition to rhizoids which protect the growing region of thallus and help in absorption of water.
- Bryophytes lack the vascular tissue (xylem and phloem).


scale
rhizoid
A
R. billardieri
F
Riccia
assimilatory zone
air chamber
E
scale
rhizoid
C
R. crystallina
R. glauca
B
simple
tuberculate
assimilatory zone
air chamber
D

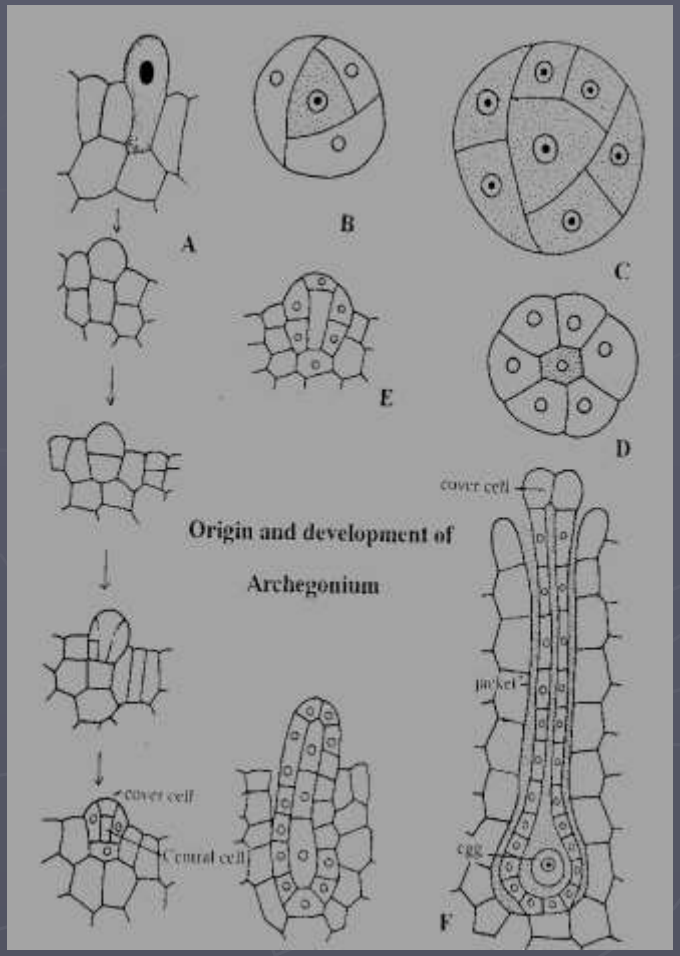
- They reproduce by vegetative and sexual methods.
- Vegetative multiplication takes place by decay and death of the older parts of the thallus, by adventitious branches or by special structure like tubers, gemmae etc.


assimilatory
zone
storage zone
A
pore
assimilatory zone
C
rhizoid
scale
B
F
a
E
D
b
c

- Sexual reproduction is oogamous type , the sex organ are multicellular and jacketed.
- The male sex organ know as antheridia are stalked, globose or somewhat elliptical. It has solid mass of fertile cell, the androcytes. The androcytes metamorphoses in to motile biflagellated antherozoids.
- Antheridia have an outer sterile one cell thick layer of jacket.


antheridial initial
upper cell
inner
A
Origin and development of Antheridium
B
blepharoplast
C
Spermatogenesis
flagella
nucleus
cytoplasm
D

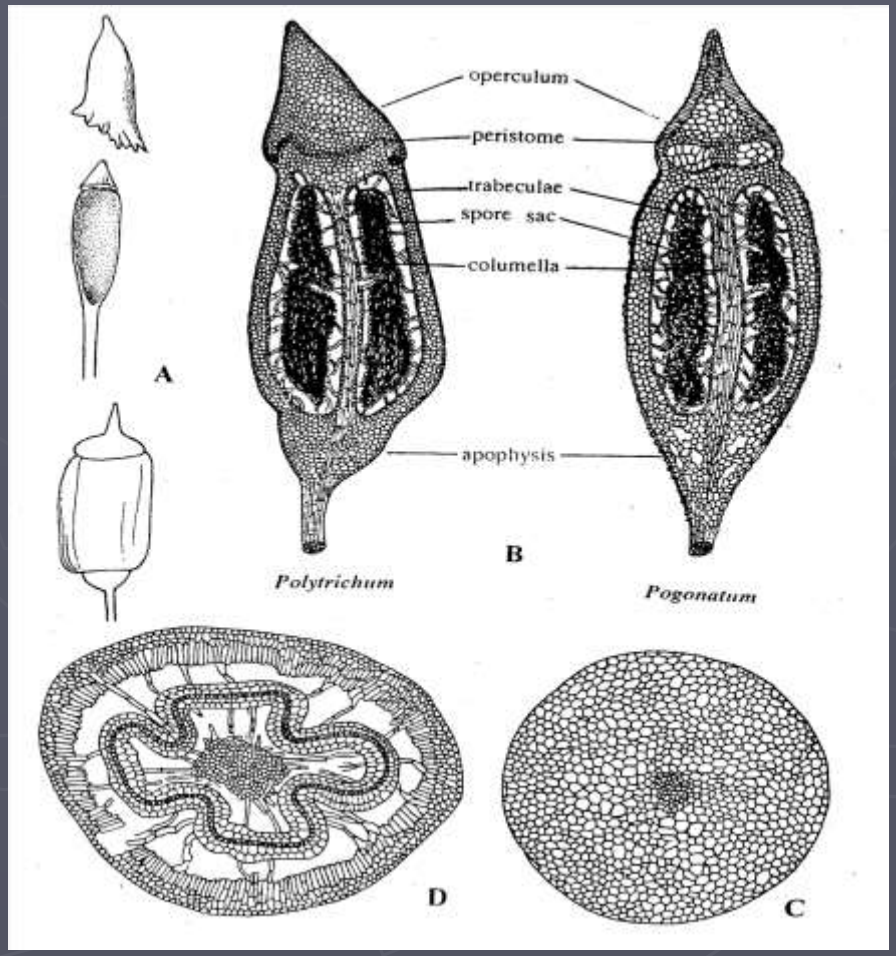
- The female sex organ know as archegonium is a flask shaped structure having a basal swollen venter and somewhat more slender elongated upper part, the neck.
- The venter and neck are surrounded by a jacket of sterile cells.


A
B
C
D
E
F
cover cell
Origin and development of
Archegonium
cover cell
Central cell
jacket
egg

- Water is necessary for fertilization.
- The fertilized egg is retained with in the venter of the archegonium.
- The zygote undergoes repeated division to form an undifferentiated, multicellular structure called the embryo.
- The development of embryo is exoscopic.

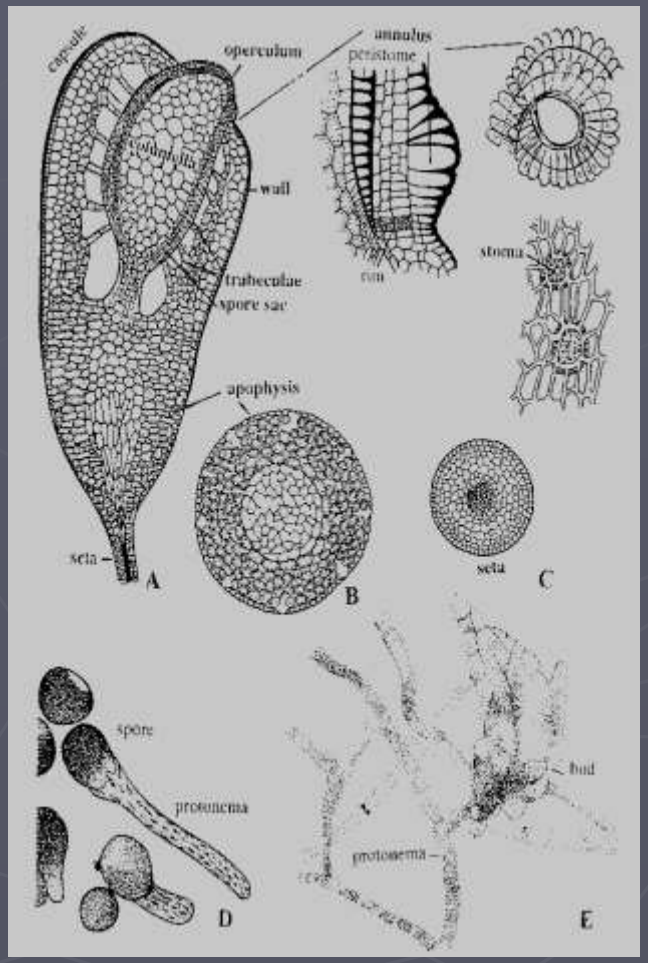
- The venter wall enlarges with developing embryo to form protective, multicellular envelop, the calyptra.
- The embryo by further division and differentiation produces a relatively small spore producing structure which is not independent. It is called sporogonium (sporophyte).

- Rhizoids, leaves and stem are absent in sporophyte.
- Sporophyte is a projecting structure, differentiated into foot, seta and capsule. The sporogenous cells present in the capsule form haploid spores after reduction division.


operculum
peristome
trabeculae
spore sac
columella
apophysis
A
B
Polytrichum
Pogonatum
D
C

- Morphologically the meiospores in a given species are of one kind .Thus the bryophytes in general are described as homosporous.
- The spores are non motile and they disseminate exclusively by wind.

- Under favorable condition, the spore either form a filamentous germ tube which divides to give rise to young gametophyte (*Riccia, Marchantia*) or form a protonema.
- Protonema bears buds which develop into erect gametophores.


capsule
operculum
annulus
peristome
columella
wall
trabeculae
spore sac
apophysis
seta
A
B
C
stoma
rim
spore
protonema
bud
protonema
D
E

- The occurrence of heterologous type of alternation of generation is a constant feature of the life cycle of bryophytes.

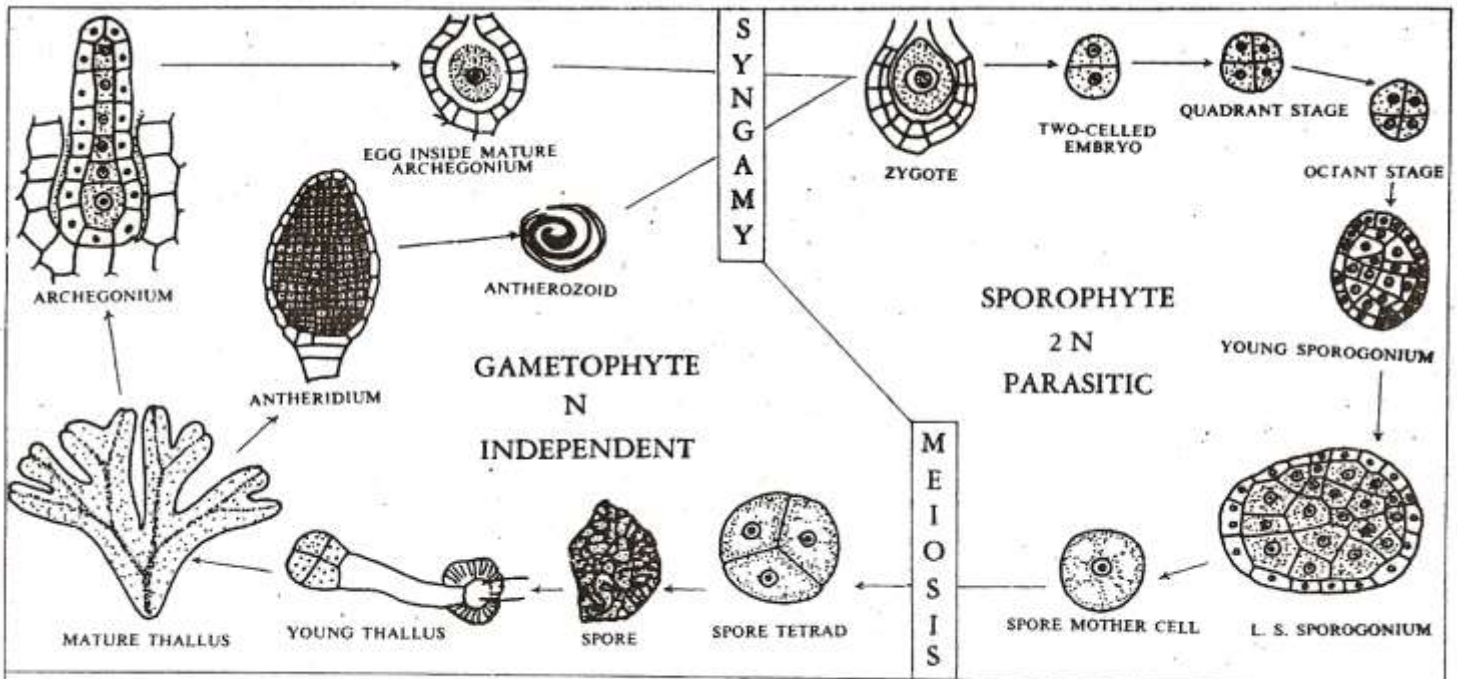
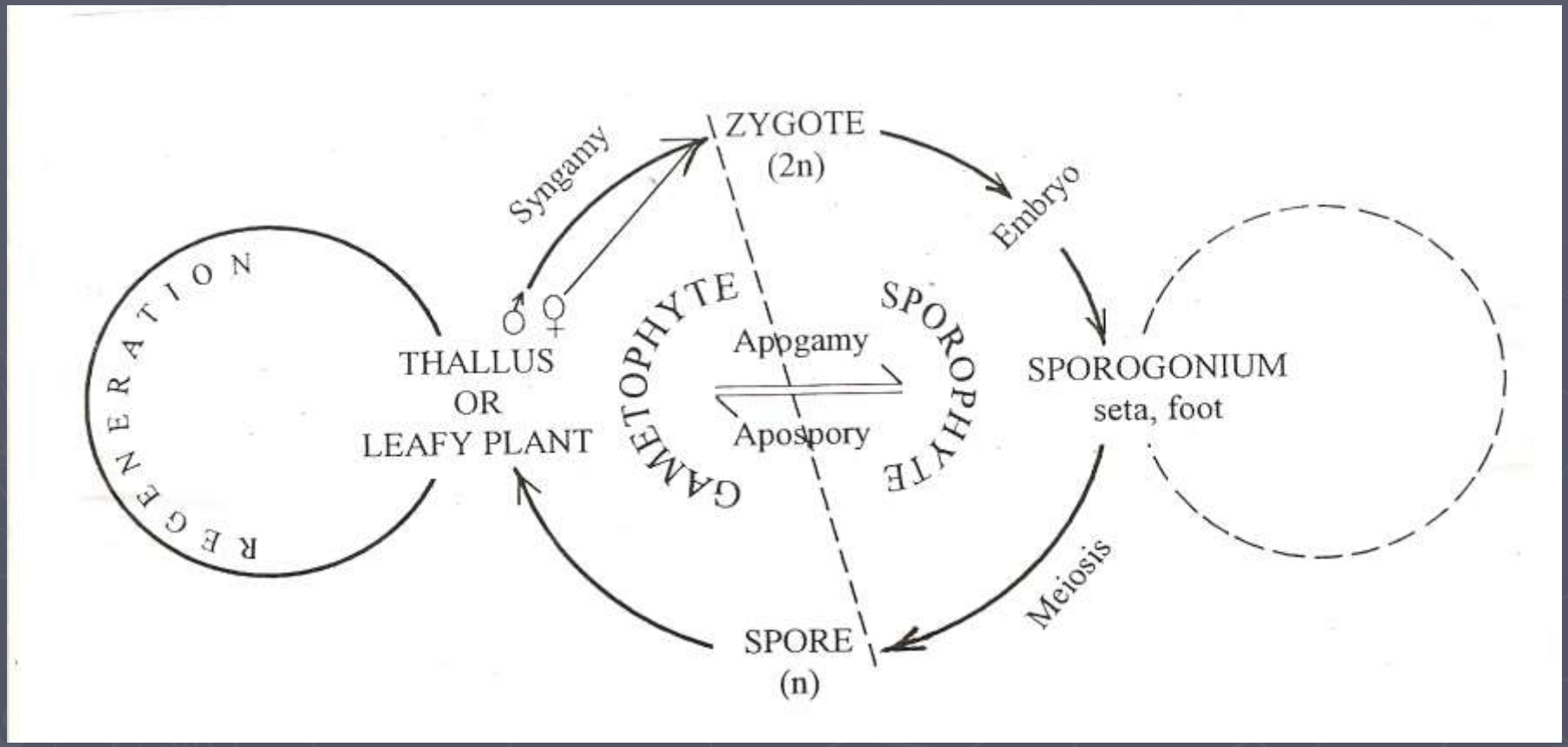


Fig. 10.

Diagrammatic representation of the life-history of *Riccia*. (The word *parasitic* in the case of sporophyte only connotes that it is dependent on the gametophyte for water and mineral nutrients.)


ZYGOTE
(2n)
Syngamy
Embryo
REGENERATION
THALLUS
OR
LEAFY PLANT
♂ ♀
GAMETOPHYTE
Apogamy
Apospory
SPOROPHYTE
SPOROGONIUM
seta, foot
SPORE
(n)
Meiosis

Thank You