Riccia – Morphology, Anatomy and Reproduction

Riccia is a simple thalloid liverwort belonging to Division **Bryophyta**. It is commonly studied to understand the basic structure and reproduction of liverworts.

1. Morphology of the Gametophyte Thallus

External Features (Dorsal and Ventral View)

- The plant body is a flat, ribbon-like thallus that grows prostrate on moist soil.
- The thallus shows clear dorsiventral differentiation.
- Repeated dichotomous branching produces a rosette-like arrangement.
- Each branch is linear to wedge-shaped with a notch at the apex.
- A thick midrib runs along the center; a shallow groove is visible on the dorsal side.
- The ventral surface bears rhizoids and scales.
- Scales occur near the margins and appear violet in color.
- Rhizoids arise from the midrib region.

Rhizoids

Two types are present:

1. **Smooth-walled rhizoids** – inner walls are smooth.
2. **Tuberculate rhizoids** – inner walls form peg-like projections extending into the lumen.

Scales

- Violet colored
- Multicellular

- One cell thick

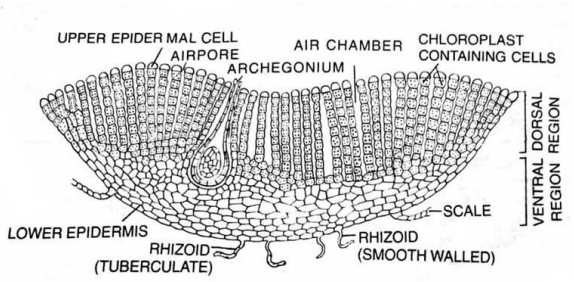
Riccia: Thallus
Dorsal View of the Thallus

Sex Organs

- Embedded in the mid-dorsal groove.
- Mature sporophytes appear as black dots under a dissecting microscope.

2. Anatomy of the Riccia Thallus (Gametophyte)

A transverse section (T.S.) shows the internal organization.



Riccia: Thallus VS

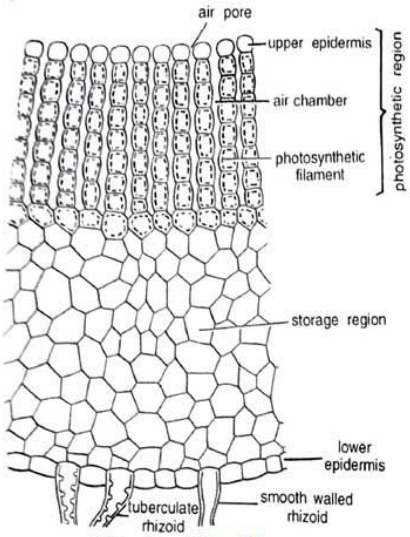
General Structure

- The thallus appears boat-shaped in cross-section.
- It is thickest at the midrib and thinner at the edges.
- Two distinct regions are visible:
    - Upper photosynthetic region
    - Lower storage region

Storage Region

- Composed of compact parenchyma cells.
- Cells store starch.
- Bounded below by a lower epidermis.

- Rhizoids originate from this region.



Riccia: Thallus
(Photosynthetic and Storage Zones

Photosynthetic Region

- Made of vertical, unbranched assimilatory filaments.
- Filaments are separated by narrow air chambers.
- Cells are barrel-shaped and contain many chloroplasts.
- Air chambers open outside through simple air pores.
- The uppermost cells lack chloroplasts and form an indistinct epidermis.
- Violet scales are visible near the margins in cross-section.

3. Riccia Antheridium (Male Reproductive Organ)

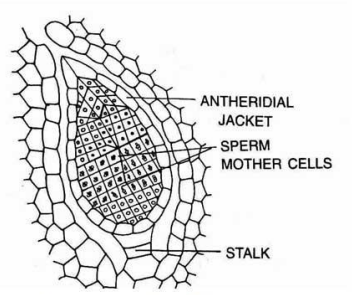
Key Features

- The plant is monoecious; both sex organs occur on the same thallus.
- Antheridia develop in the mid-dorsal groove.
- Each antheridium lies inside an antheridial chamber.
- The chamber opens to the exterior through a pore.
- The structure is partly embedded in both photosynthetic and storage regions.

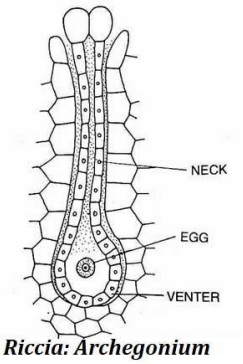
Structure of Mature Antheridium

- Short multicellular stalk
- Globular or club-shaped body
- Central mass of androcytes (antherozoids)
- Surrounded by a single sterile jacket layer

- Jacket cells are tangentially elongated



Riccia: Antheridium



Riccia: Archegonium

4. Riccia Archegonium (Female Reproductive Organ)

Key Features

- Located in the mid-dorsal groove.
- Flask-shaped at maturity.
- Short stalk present.

Structure

- Broad basal venter
- Long neck

Venter contains:

- One egg cell
- One venter canal cell

Neck contains:

- Six vertical rows of cells
- 6–9 cells in height
- Four neck canal cells
- Four cover cells at the tip

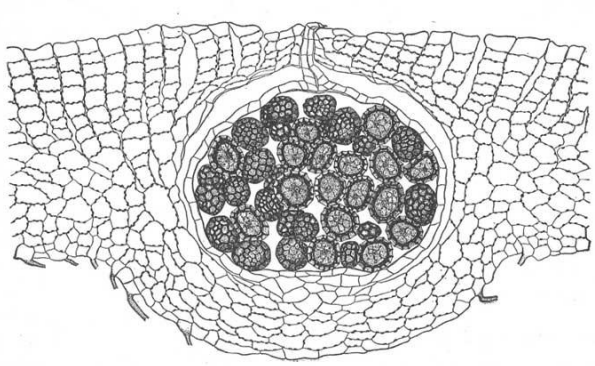
Before Fertilization

- All axial cells except the egg disintegrate.
- Cover cells separate.
- Passage is created for antherozoids to enter.

5. Riccia Sporophyte (Sporogonium)

General Characteristics

- Develops inside the fertilized archegonium.
- Remains embedded in the gametophyte tissue.
- Consists only of a capsule.
- Foot and seta are absent.



Riccia: Thallus with Sporophyte (V.S.)

Capsule Development

- Young capsule has:
    - A jacket layer
    - Two-layered calyptra
- At maturity:
    - Jacket and inner calyptra layer disintegrate
    - Only outer calyptra remains
- Spores are released after the thallus decays.

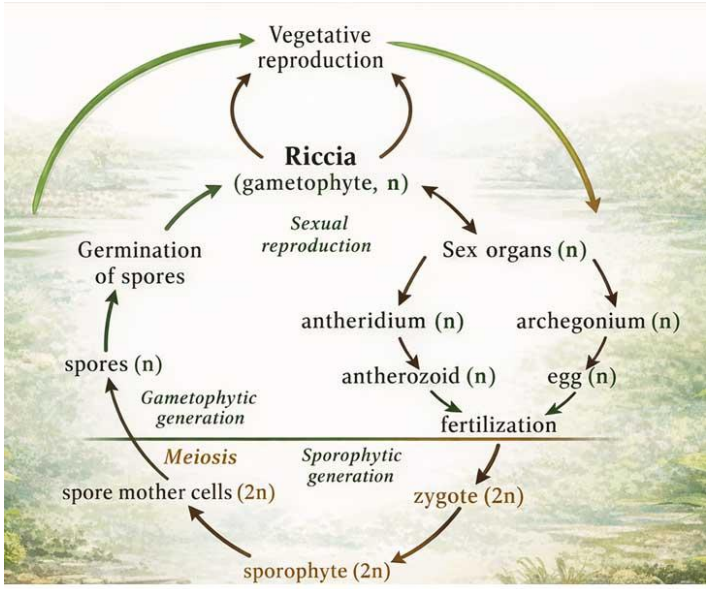
Spores

- Arranged in tetrahedral tetrads initially.
- Each spore measures about 0.05–0.12 mm in diameter.
- Contains dense cytoplasm and a nucleus.

Spore Wall Layers:

1. Exosporium – thin and cutinized
2. Mesosporium – thick
3. Endosporium – thin and homogeneous

- The wall surface is irregular and folded.



Riccia: Life Cycle

Alternation of Generation of Gametophyte and Sporophyte

6. Systematic Position of Riccia

Division: Bryophyta

- True roots absent
- Vascular tissues absent

Class: Hepaticopsida

- Mostly thalloid forms
- Rhizoids non-septate
- Chloroplasts lack pyrenoids
- Capsule lacks columella

Order: Marchantiales

- Scales present
- Two types of rhizoids
- Air chambers and pores present

Family: Ricciaceae

- Simple air pores
- Sex organs in mid-dorsal groove
- Sporophyte reduced to capsule only

Genus: Riccia

- Scales at margins

- Assimilatory filaments vertical and unbranched

7. Habitat and Collection

- Common in both plains and hilly regions.
- Grows on damp soil and rocks.
- Often appears after heavy rainfall.
- Frequently found in unused soil or brick crevices.

8. Riccia fluitans (Aquatic Species)

- Only free-floating aquatic species of the genus.
- Thallus highly dichotomously branched.
- Ribbon-like, elongated and thin.
- Rhizoids and scales absent.
- Reproduces vegetatively through adventitious branches.
- Remains sterile while floating.
- Produces sex organs when water levels drop and it becomes terrestrial.

Riccia fluitans
The only Aquatic Species of Riccia