
COLLEGE BOTANY PRACTICAL

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BRYOPHYTES

Procedure for Laboratory Examination

Freshly collected or preserved specimen is mounted on a slide or taken on a watch glass with little water for microscopic observation of the thallus morphology. Simple light microscope or optical stereoscope can be used for this purpose. Morphology of both vegetative and reproductive parts can be examined in this way.

The internal structure of the thallus or reproductive organs, however, is examined after thin sectioning of the plant part concerned with or without staining. Normally, for permanent preparation of thallus, component dehydration followed by single staining can be made. The detailed schedule was discussed in College Botany Practical Vol. I.

Description and Identification

Only the microscopically observable characters should be described after proper drawing and labelling. Camera lucida or drawing prism can be used for magnified drawing. Identification of the specimens should be done on the basis of monograph, manuals and other publications on this subject. Sometimes, measurement of the reproductive parts, in particular, is needed for identification. Then, with the use of micrometer, it could be done with precision.

N. B. : Sometime special techniques should be adopted for preparation of selected plant parts for microscopic study. For example, peristome layer removal from capsule and subsequent mounting is necessary for examination of moss capsule.

1. RICCIA

Vegetative Structure :

Plant body is thallose, dorsiventrally differentiated, prostrate with dichotomous branching. Each dichotomy is linear to wedge-shaped and the median portion is thickened. There is a conspicuous longitudinal furrow on the dorsal side. The ventral surface bears a corresponding ridge and a transverse row of scales, one cell in thickness, which are more crowded near the apex and overlap the growing point. Lower down, the scales are in two marginal rows, violet in colour. In addition, there are two types of rhizoids – smooth walled and tuberculate, being on the ventral ridge of the thallus.

In T.S. through the thallus, the following layers can be seen : (a) dorsal side bears a tissue in which there are a few vertical rows of chlorophyllose cells separated by narrow vertical air canals, so that the top of the thallus is porose. This is chlorophyllose or assimilatory tissue. (b) Ventral region of the thallus is formed by a compact colourless parenchymatous tissue which serves as the storage region and often contains

starch. One cell thick scales and unicellular rhizoids (smooth walled and tuberculate) are developed from the outermost layer of the ventral surface. Upper epidermis is one layered with colourless cells. Air pores are bounded by four epidermal cells as seen in tangential section. Lower epidermis is a continuous layer.

Reproductive Structure :

Plants are mostly monoecious but rarely dioecious. Sex organs develop singly and acropetally in a linear row on the dorsal median furrow. The mature antheridium is stalked, pear-shaped and its single layered jacket (wall) encloses a number of sperm or androcyte mother cells. Mature archegonium is flask-shaped with a short stalk, a swollen basal venter containing the large egg together with a ventral canal cell and an elongated neck containing a row of four neck canal cells. Sex organs are embedded within the thallus and included in air chambers (antheridial and archegonial chambers).

Sporogonium is somewhat round, sac-like and embedded within the thallus. It contains a single layered jacket (gametophytic cells) enclosing many spores which are often in tetrads.

Mature spores show 3 layers exosporium (outermost), mesosporium (middle) and endosporium (innermost). Spores often remain in tetrads (Fig 5.1).

IDENTIFICATION :

Thallus dorsiventrally flattened and prostrate; sporophytes simple and always of limited growth, columella absent inside capsule.

CLASS : *HEPATICOPSIDA*

Plant body prostrate, ribbon-shaped, dichotomously branched, dorsiventrally flattened; dorsal tissue layers green and with air canals or chambers; thallus with scales and rhizoids on ventral surface, sex organs on dorsal surface (embedded), sporophyte devoid of columella or elaterophore.

ORDER : *MARCHANTIALES*

Sporophyte having only sac-like capsule and embedded within the gametophytic thallus; thallus dichotomously branched with sex organs along the entire length of the median furrow.

FAMILY : *RICCIACEAE*

Thallus linear to wedge-shaped, internally composed of vertical rows of cells on the dorsal side, air canal present in between two vertical rows

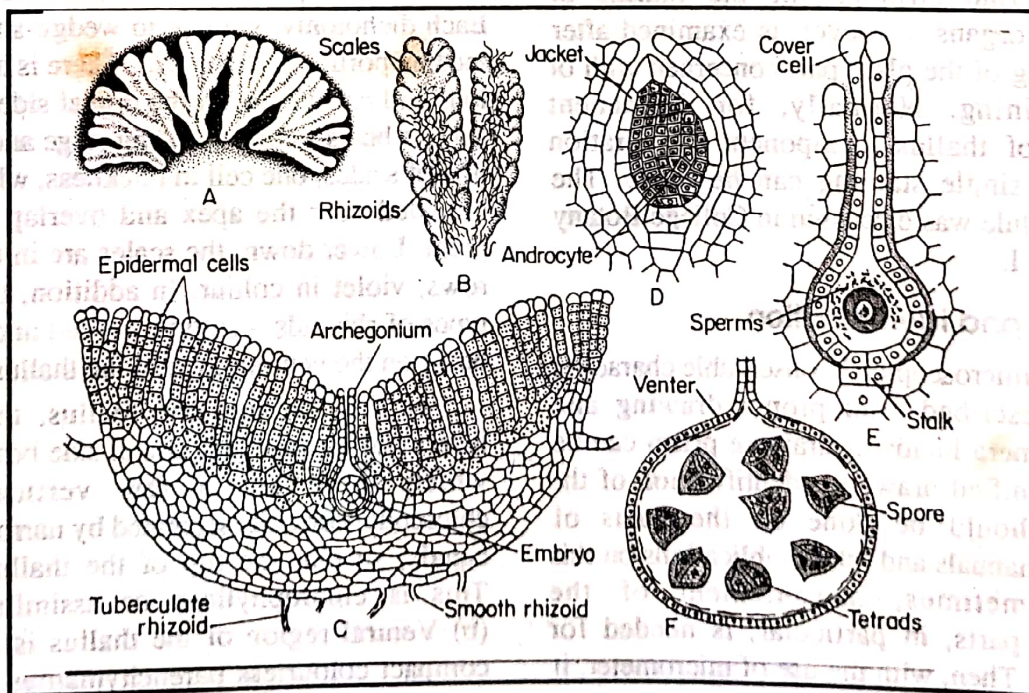


Fig 5.1 Riccia Sp.: A - Gametophytic thallus (dorsal view), B - Gametophytic thallus (ventral view), C - Vertical transverse section through gametophyte, D - Mature antheridium, E - Mature archegonium, F - Mature sporophyte.

of cells ; sporophyte sac-like and having one-layered jacket surrounding spores and nurse cells.

GENUS : *RICCIA*

2. MARCHANTIA

Vegetative Structure :

Plant body is thallose, dichotomously branched, dorsiventrally differentiated and prostrate. Dorsal surface of the thallus shows regular rhomboidal or polygonal areas with elevated pores at the centre of these areas. There is a prominent midrib on the dorsal surface of the branches and corresponding ridge on the ventral surface. Ventral surface bears 3 – 4 rows of scales on each side of the ridge. In addition, there are two types of rhizoids in between the scales – smooth-walled and tuberculate. In T.S. through thallus, the following layers of tissues can be noticed :

- The uppermost dorsal layer of cells i.e. upper epidermis is formed by quadrate cells.
- There are subepidermal air chambers with elevated air pores – at the centre of each chamber.
- There is presence of branched and unbranched photosynthetic filaments in air

chambers (chlorophyllose or assimilatory tissue).

- Ventral part of the thallus possesses compact, colourless, parenchymatous cells (storage tissue).
- On the ventral surface scales and rhizoids are present arising from lower epidermis. In tangential section, air pores are seen as barrel-shaped structures formed by 4 – 8 superimposed tiers of concentric rings, each ring being composed of 4 – 5 cells. Four inward projections arising from the lowermost tier give it a star-shaped appearance (cruciate air pores).

Reproductive Structure :

Gemma cups are present on the dorsal surface of thallus along the midrib. Gemma cup possesses a large number of stalked gemmae. Gemmae are multi cellular stalked, discoid bodies with constriction in the middle.

Plants are dioecious. The sex organs are borne on special branches (receptacles) called antheridiophore and archegoniophore. The antheridiophore shows a prismatic stalk bearing at its apex a disc which is usually 8-lobed ; each lobe bears antheridia along a dorsal median row. Each antheridium is short-stalked and developed within

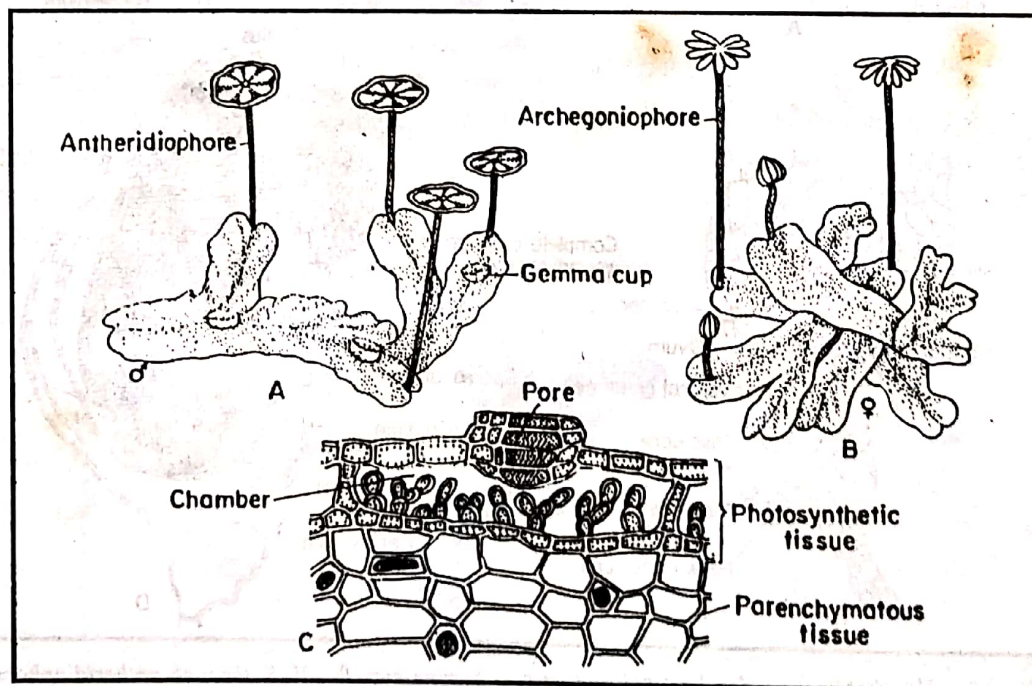


Fig 5.2. *Marchantia Sp.* : A – Male thallus, B – Female thallus, C – Section through gametophytic thallus.