

Gametophyte of Marchantia.

Marchantia - a colonial genus - comprises 65 sps. out of which about 11 sps have been reported from India. The commonest species is Marchantia polymorpha. It is commonly found in moist, cool, shady situations and areas of burnt ground. It prefers damp soil, the sides of streams, springs, walls of wells, wet rocks etc. It belongs to

Phytophyta
Hepatopsida
• Marchantiales
Marchantiaceae.

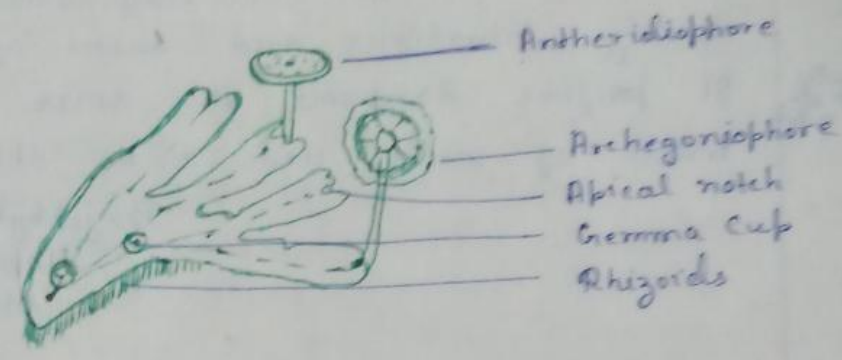
External features :-

The plant body consists of a richly dichotomously branched prostrate, dorsiventrally flattened thallus with an apical notch. The growing point is seated at the base of notch. The dorsal surface bears numerous rhombic areas, each with a central pore. Along the mid rib there are many cup like structures found on the dorsal surface. These are known as Gemma cup containing gametes which are the vegetative reproductive bodies.

On maturity, umbrella like structure - antheridiophores and archegoniophores are present on the dorsal surface which bear antheridia and archegonia respectively.

The ventral surface bears scales and rhizoids. The scales are multicellular but one celled thick. They are protective in junction. In Marchantia, scales are triseriate on either side of midrib. These are median scales.

intermediate scales and marginal scales.
 Rhizoids are fixative and absorptive structure. They are unicellular and are of two types - smooth walled and tuberculate.



Internal structure: - In a vertical section, the thallus is many cells deep. The cells are arranged in three regions - 1. Epidermal region 2. Assimilatory region 3. Storage region.

1. Epidermal region: - It consists of upper epidermis & lower epidermis.

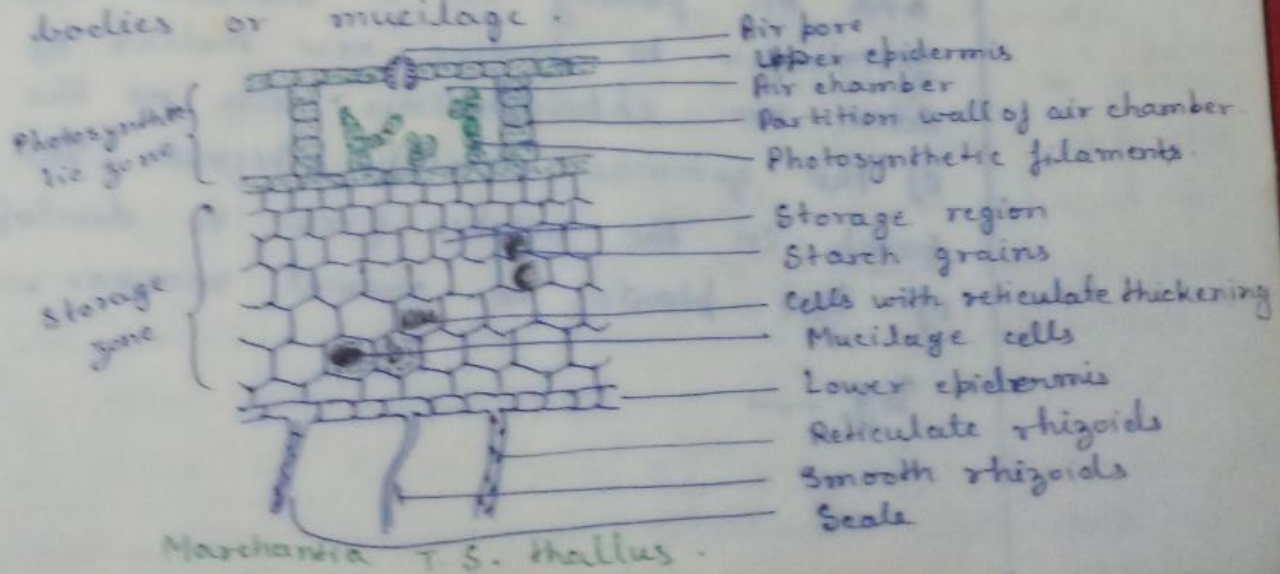
(A) upper epidermis: - The upper epidermis forms the surface layer over the assimilatory region. It consists of a single layer then walled cells with slightly thickened outer walls. The epidermis is thus protective in function. Embedded in the epidermis are special barrel shaped air pores. Each pore is surrounded usually by four tiers of four or five cells each. Each pore leads into an underlying chamber. The presence of air pores in the epidermis facilitates gaseous exchange necessary for photosynthesis & respiration.

(1) Lower epidermis - The lowermost layer of the storage region is lower epidermis. It bears scales and rhizoids.

2. Assimilatory region - Beneath the upper epidermis are the air chambers. They are of different size and are separated from one another by one cell thick partitions. The partitions are three or four cells in height. The chambers are arranged in a single horizontal layer.

From the floor each air chamber arise simple or branched filaments formed of cells full of chloroplasts. All the cells of the floor of air chamber, side walls upper epidermis photosynthetic filaments constitute the photosynthetic region.

3. Storage region - Just below the assimilatory region lies the storage region. It is compact, many layered, composed of thin walled polygonal parenchymatous cells with few or no chloroplast. Most of them contain starch grains. Some isolated cells among them contain large oily bodies or mucilage.



Reproduction - It takes place by the following method.

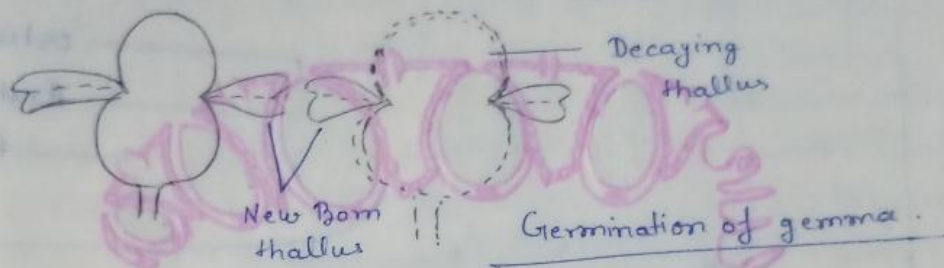
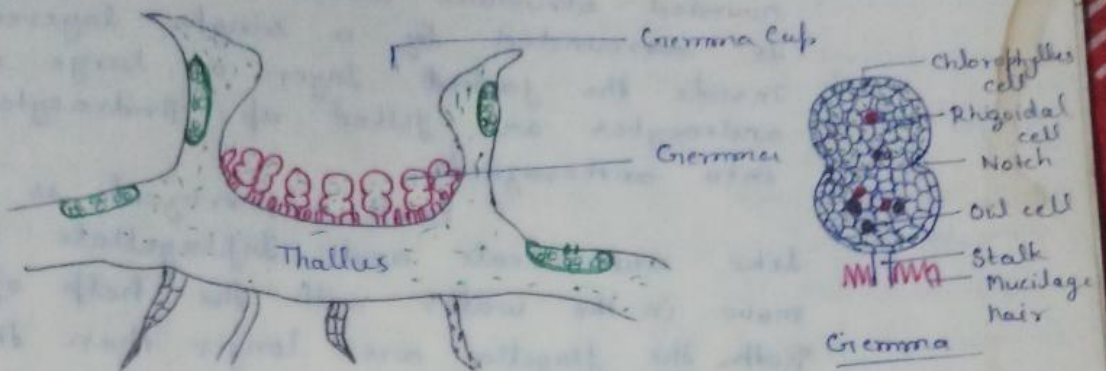
Vegetative reproduction - It takes place by the following method -

- (a) By death & decay of older portion.
- (b) By formation of adventitious branches.
- (c) By gemmae formation → Gemmae are the most specialised method of vegetative or asexual reproduction. These are developed in large numbers in small receptacles called gemma cup. The gemma cup is borne on the dorsal surface of thallus along grooves.

The gemmae are stalked multicellular discoid bodies ^{regional} constricted at the middle. The two notches in the constriction contain two growing point. Most of the cells contain chloroplast but some may be colourless, containing oil bodies. Each gemma is vertically attached to the base of the gemma cup by a one celled stalk. The cup also contains club shaped hairs.

On detachment from the cup and on falling on a suitable host, the gemmae germinate to produce new thallus of Monochantia. Some non-chlorophyllous cells on the lower face of the gemmae develop rhizoids. The two growing point in the notches grow to develop the thallus of two plants in normal manner.

Fig. —



Sexual reproduction :- It is oogamous. Thalli are dioecious. The sex organs are borne on special branches called antheridiophore & archegoniophore. Antheridiophore and archegoniophore are actually direct prolongations of the horizontal thallus.

Antheridiophore :- The antheridiophore consists of a two to three centimeters long stalk and a flattened, usually eight lobed disc at its apical end.

The disc of antheridiophore is somewhat convex at its upper face. The upper epidermis is interrupted by several usual barrel shaped air pores which open in the air chamber. Several flask like cavities are also found in the neighbourhood of these air chambers.

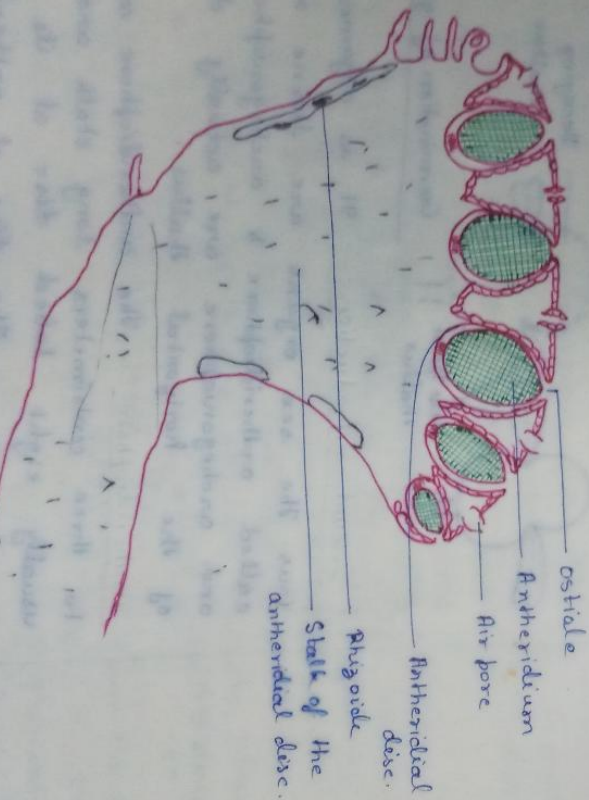
Structure of mature antheridium :- The mature antheridium consists of a short stalk and a

actually = in fact

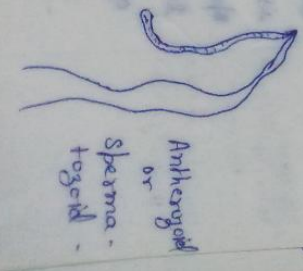
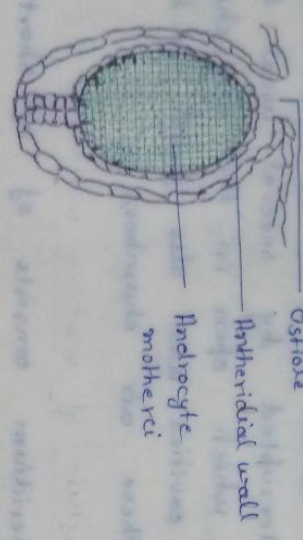
intercept = रोका
घेरना

neighbourhood = पड़ोस
vicinity = पड़ोस

rounded structure above it. The antheridium proper is surrounded by a single layered jacket. Inside the jacket layer a large number of androcytes are filled up. Androcytes metamorphose into antherogoids. Each antherogoid is elongated, rod-like, uninucleate and bi-flagellate. The antherogoids move in the water with the help of their flagella. Both the flagella are longer than the main body.



L.S of antheridophore with antheridia



Archegoniophore & Archegonia - The archegoniophore also contains a stalk and a disc and develops in the same way as the antheridiophore. This disc bears 9 rays instead of lobes. In the early stage, the archegonia develop on the dorsal face of the disc in the same manner as the antheridia. The fertilization takes place in this stage. As soon as the fertilization is over, the marginal portion of the disc becomes inverted and the archegonia become up side down i.e. their necks become downward. Now the oldest archegonia are situated towards periphery of the disc and youngest towards the stalk. After this curvature, a one layered plate of tissue develops on the either side of each row of archegonium and forms a perichaetium enclosing all the 12 to 15 archegonia in a row.

Structure of archegonium - A mature archegonium is flask shaped structure. It is found attached to the lobe of the disc by a small stalk. The archegonium consists of an elongated neck and a bulbous venter. The neck consists of the jacket cells arranged in six vertical rows. Four or more neck canal cells are found in the neck canal. The venter is surrounded by a single layered jacket. It is somewhat dilated and contains a large egg and a venter canal cell situated above the egg cell. At the top of the neck there are four or five cover cells, which give way for the entrance of the antherozoids at the time of fertilization, by their disintegration.

Fertilization - Usually the antherozoids from the top

instead of 12
radial &
vascular

towards all side

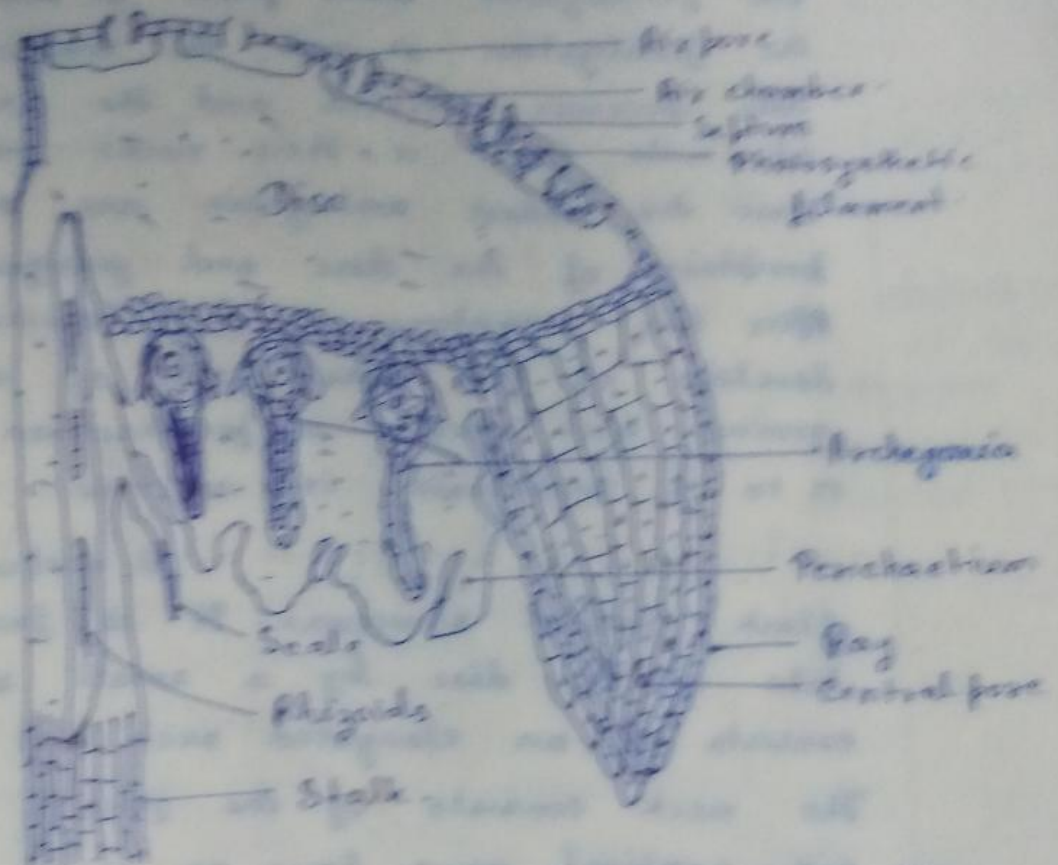
cupulate: 2000
type

margin

somewhat: 195,
195-200

isolated: 2000
2000

of the archegoniophore does not splashed by rain water on to the archegoniophores which are very short at this stage. The archegonids then swim in the moisture and ultimately reach the egg. One of the archegonid penetrates the egg and fertilization is effected resulting zygote.



L.S. In part of archegoniophore

