Dr. Narendra Kumar Singh
Dept. of Botany
K. S. M. College, Aurangabad

Study material for B.Sc. I. Hons
for Dated 21.04.2020

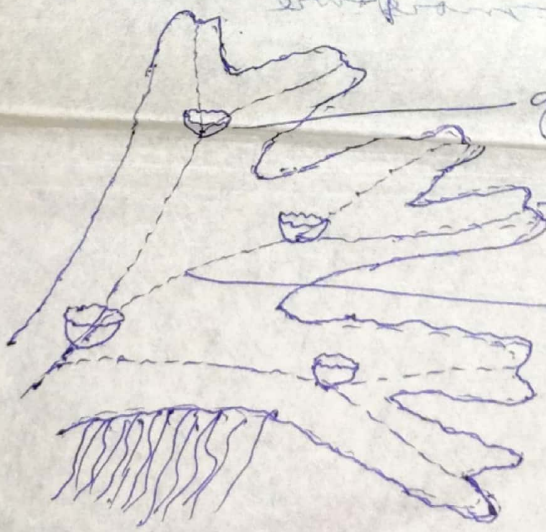
Marchantia (Systematic position)

Division – Bryophyta
Class – Hepaticopsida
Order – Marchantiales
Family – Marchantiaceae
Genus – Marchantia

Habit & Habitat :-

Thallus of Marchantia is flattened, dorsiventral (पृष्ठाधारी). Species of Marchantia are terrestrial (स्थलीय). They are found on damp or moist soil or moist rocks. Commonly found near bank (किनारा) of streams (धारा). They commonly grow on burnt soil in forests.

Structure of the plant body



External morphology :- The thallus of Marchantia is flattened, dorsiventral and dichotomously branched. On the dorsal surface mid-rib is distinct. Gemma cups are found on the dorsal surface generally at the dichoto-

Mid-rib of each branch ends in an apical notch (शीर्ष) At the base of the apical notch apical cell is situated.

On the ventral surface two types of structures are found – (1) unicellular rhizoids (मूलाभ) & (2) multicellular scales.

(1) Rhizoids :- These are unicellular structures. two types of rhizoids are found –

(a) Smooth walled rhizoids :- They have smooth inner surface.

(b) Tuberculated rhizoids :- They have peg (खूंटी) like projections on their inner surface.

Fig:- Smooth walled rhizoid

Fig:- Tuberculated rhizoids

Function – (1) Absorption of water & minerals from soil (2) Fixation of thallus to the soil.

(2) Scales :- These are multicellular, purple to brown coloured structures. They are found along the mid rib region, a little apart from this region and also intermediate between these two regions. The median scales (along the mid rib region) and the marginal scales are larger in size but the intermediate scales are comparatively (तुलनात्मक रूप से) smaller in size.

Function :- To retain (धारण) moisture

Anatomy (internal structure) of thallus :-

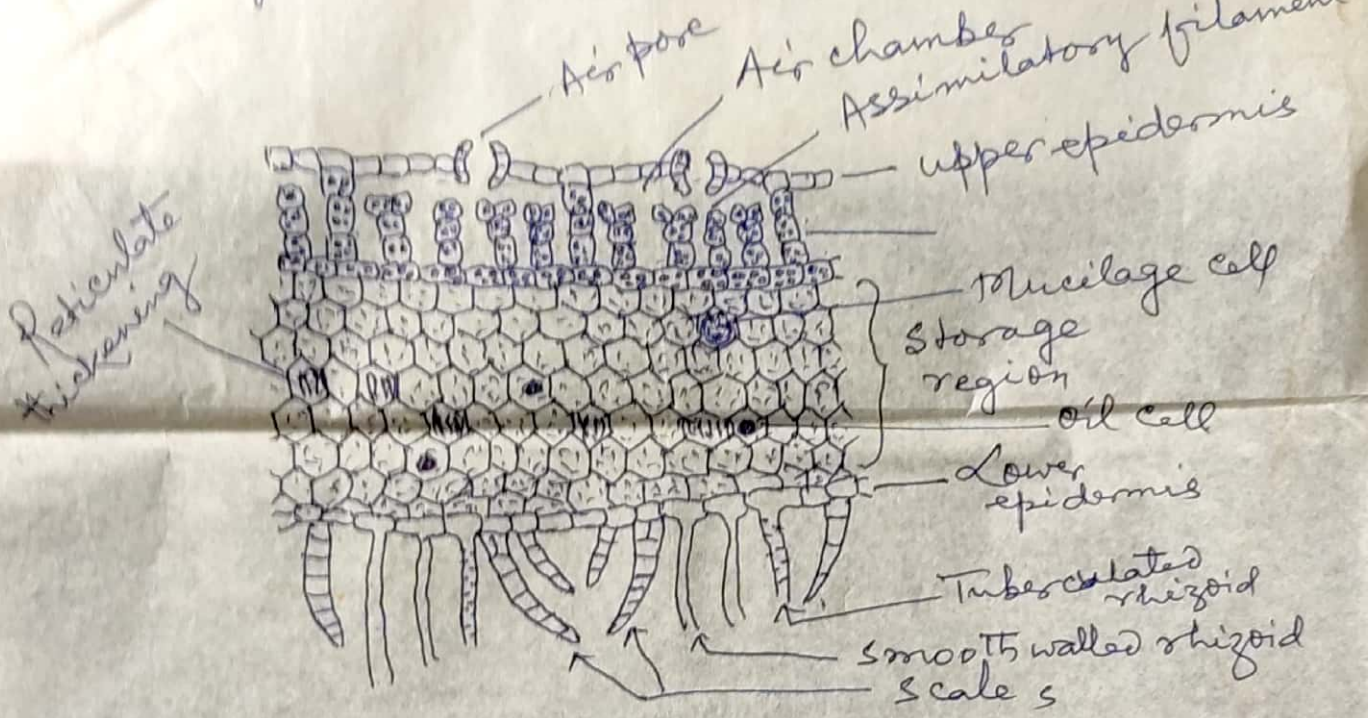


Fig:- T.S. of thallus of Marchantia

Following structures are seen in T.S. of Marchantia thallus under a microscope

(i) Upper epidermis :- Single layered of parenchymatous cells. It is discontinuous due to presence of barrel shaped (बैरल आकार) pores.

(ii) Air chambers :- Arranged in single horizontal layer. Air chamber open outward by barrel shaped pores for exchange of gases. Air chambers are partitioned (विभाजित) by septa (Sing. septum) made up of 4 to 6 cells in height containing chloroplast). From the floor of air chambers branched or unbranched filaments of chlorophyll containing cells are developed.
It is assimilatory or photosynthetic zone.

(iii) Storage region :- It is situated between floor of air chambers & lower epidermis. The cells stored food materials. It is main storage zone. Some cell contain oil drops (oil cells) while some contain mucilage (mucilage cells). The cells below the mid-rib have reticulate thickening.

(iv) Lower epidermis :- Single layered of parenchymatous cells. Two types of structure develop from lower epidermis -

(a) Rhizoids — Unicellular Colourless & are of two types - Smooth walled tuberculated
Function - Absorptive

(b) Scales — Multicellular arranged in 4-8 rows purple or Brown in colour. Function - To retain

Growth :- It takes place by apical meristem (शीर्षस्थ विभाज्य ऊतक) which consists a horizontal row of meristematic cells.

Vegetative Reproduction :- It takes place in the following manner :-

(1) By Progressive death and decay (क्रमिक मृत्यु एवं क्षय) of older parts of thallus :- It is a common process of vegetative reproduction in the members of hepaticopsida (liverworts). When the progressive death and decay reaches a dichotomy (द्विशाखण) then the two branches become isolated (पृथक्) & they grow independently and form new thalli.

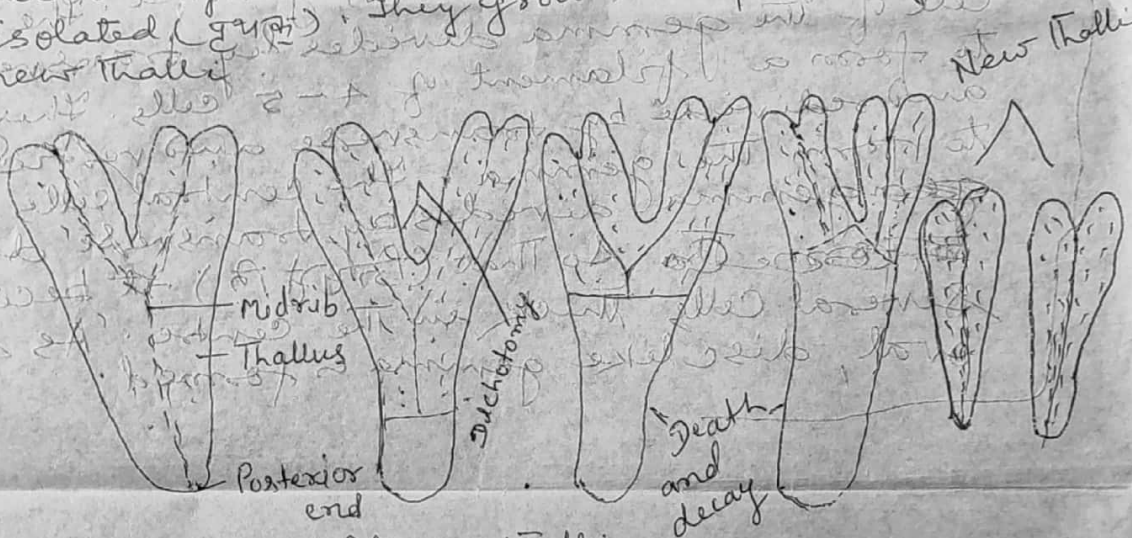


Fig:- Formation of new thalli by progressive death & decay of older part of Thallus

(2) By adventitious (अपस्थानिक) branches :- In some cases adventitious branches originate from the ventral surface of thallus or from the disk of antheridiophore usually between the lobes. In M. palmata adventitious branches originate from stalk or disc of Archegonio phore. After isolation (पृथक्करण) from the mother thalli they grow and form independent thalli.

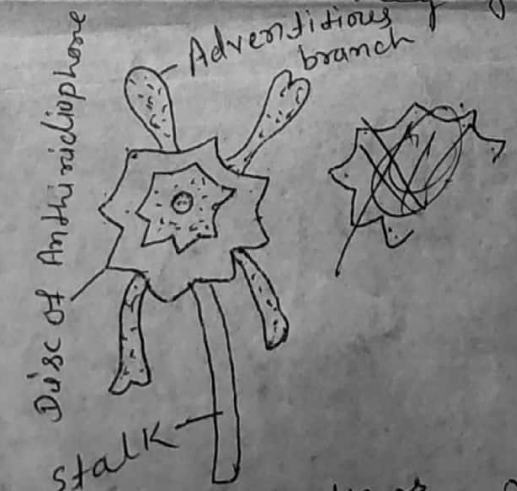


Fig:- Adventitious branches formed on antheridiophore.

(3) By Gemmae :- (Sing. gemma) The common process of vegetative reproduction in Marchantia is by gemmae. These gemma are produced in cup like structures called gemma cups. The Gemma cups have hollow cavities and fringed (toothed) margins. Gemmae are produced on the floor of cavities of gemma cups.

At first gemma cups develop as (प्रारम्भ में) circular areas on the dorsal (upper) surface of the thallus

Soon (शीघ्र ही) The neighbouring vegetative cells (tissues) grow upward and Cup like structure is formed Called gemma cups.

Development of gemma:-

Each gemma develops from an epidermal cell found at the floor of gemma cup. This epidermal cell grows upward in the form of a papilla like out growth. This epidermal cell divides by two transverse divisions to form a basal cell, an intermediate stalk cell and a terminal primary cell of the gemma. The stalk cell forms a single celled stalk of gemma. The primary cell of the gemma divides by transverse division to form a filament of 4-5 cells and rediviede by transverse and vestical division. They divide to form the gemma. The central cells of the gemma divides by transverse divisions So That (जिससे कि) it becomes several cells thick in the centre. As such an oval, disc like gemma is formed.

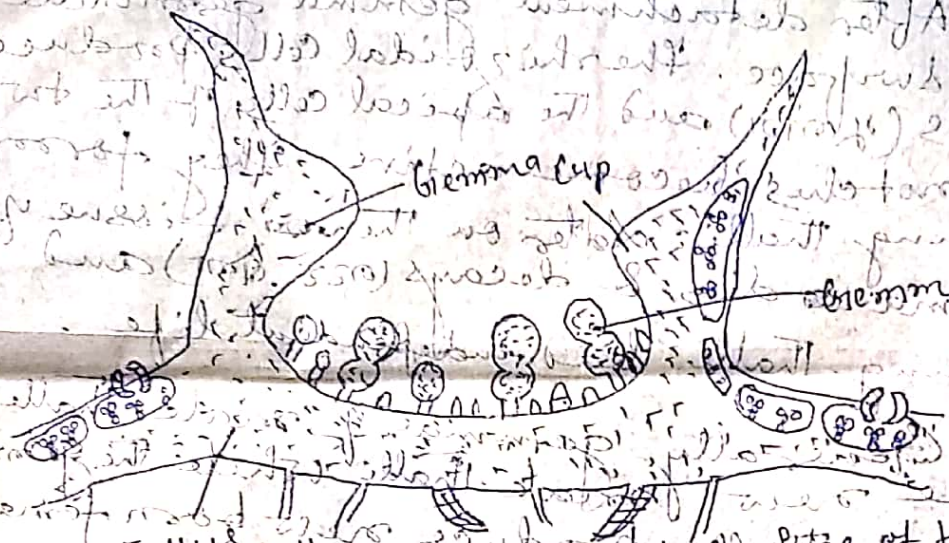


Fig:— Ventral surface of the thallus through the gemma cup.

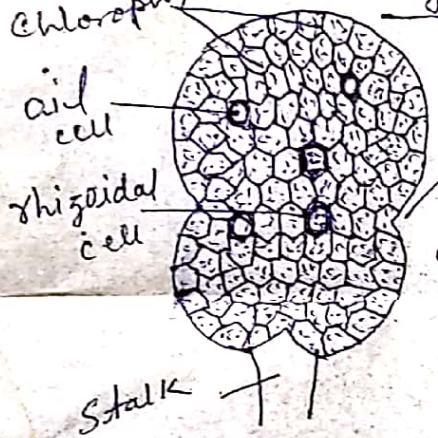


Fig:— Mature gemma of M. polymorpha

Fig:— origin and isolation of 2 thalli from a gemma

Structure of a mature gemma:- Gemma is a multicellular structure attached to the floor of gemma cup by single celled stalk. It has two lateral notches situated opposite each other. At the base of each apical notch there is apical cell. Gemma is several cells thick in the middle but is thinner towards the margins. On the gemma chlorophyll bearing cells are found. Some colourless rhizoidal cells and oil cells are also found.

Separation of gemma from the gemmacup:-

Adjacent to stalks of gemmae club-shaped mucilage hairs are found. They absorb water and cause pressure. The stalks are broken and gemmae are washed away by water drops.

Germination of gemma :-

After detachment gemma germinate on soil surface. The rhizoidal cells produce rhizoids (ग्रहणांग) and the apical cells of the two apical notches become active. They form two young thalli. Later on the tissue of gemma dies & decays (गल जाता है) and two young thalli lead independent life.

Generally gemma of male thalli produce new male thalli while the gemma of female thalli produce new born female thalli.