2) BRYOPHYTA (NON-VASCULAR PLANTS)

Gk. Bryon → moss
phyton → plant.

CLASSES OF PHYLUM BRYOPHYTA

The Phylum Bryophyta include the following three classes:

1. Class Musci (Mosses)
2. Class Hepaticae (liverworts)
3. Class Anthocerotae (hornworts)

GENERAL CHARACTERISTICS OF BRYOPHYTES

* HABITAT / SIMPLEST PLANTS

Bryophytes are the first plants which migrated to land. Bryophytes comprise the small and simplest non flowering land plants which usually occur in moist shady places, rocks, walls and banks of rivers etc.

ABSENCE OF VASCULAR TISSUES

The plant body is not vascularized; it doesnot have xylem and phloem cells hence known as non-vascular plants. This absence of specialized tissues for transporting water and dissolved food throughout the

organism limits terrestrial forms to being very short plants, since the only way to move substances through the plant body is by osmosis and diffusion from surface moisture.

RHIZOIDS

Bryophytes donot have roots, but have rhizoids, which are relatively simple, sometimes multicellular filaments of thin-walled cells that extend from the photosynthetic tissue into the soil or other substrate. They anchor the plant and in some cases facilitate water and nutrient uptake.

SEXUAL REPRODUCTION

The plant body is gametophyte, which bear multicellular male and female reproductive organs called antheria (singular antheridium) and archegonia (sing. archegonium) respectively. The sex organs produce male and female gametes by mitosis. The male gametes are called sperms which are motile while the female gametes is called egg or oosphere which is non motile and one in each archegonium. The sperms swim towards the archegonium being attracted by the sweet fluid secreted by the neck of archegonium,

and fuses with it to form diploid zygote. Fusion of sperm with the egg to form oospore or zygote is called fertilization. The zygote rests in the archegonium for some time and then develops by mitosis into diploid embryo. Bryophytes are therefore, called embryophytes. The embryo develops into diploid sporophyte which produces haploid spores by meiosis. The spores then develop into gametophyte. The sporophyte remains attached to the gametophyte for nourishment and protection.

The bryophytes thus show alternation of generations, which is useful process for successful survival of the plant.

SEEDLESS PLANTS

Bryophytes produce enclosed reproductive structures but they donot produce flowers or seeds. They reproduce via spores.

PLANT BODY

Plant body is either:

1) Thalloid and attached to the substratum by hair-like structures called rhizoids or
2) Is differentiated into stem-like (caulalia) and leaf-like structures (phylids), true stems and leaves lacking.

AMPHIBIOUS PLANTS: Bryophytes are also called amphibious plants bcz they need water for development, existence and reproduction.

EXAMPLES

1. liverworts (Marchantia)
2. hornworts (Anthoceros)
3. Mosses (Funaria and Polytrichum)

THE LIFE CYCLE OF MOSS

MOSS

Moss occurs most commonly on old damp walls, trunks of trees, and on damp ground during the rainy season, while in winter, it is seen to dry up. It is gregarious in habitat; wherever it grows it forms a green patch or a soft velvet-like, green carpet.

Moss plant is small, about 2·7cm or so in height, and consists of a short axis with spirally arranged, minute, green leaves which are crowded towards the apex; true roots are absent. It bears a number of slender, multicellular, branching rhizoids which perform the functions of roots. The axis may be branched or unbranched.

LIFE CYCLE

Life Cycle Of Mosr occurs in the following steps:

STEP:1
PRODUCTION OF GAMETES

The moss plant is the gametophyte. i-e it bears gametes and reproduces by sexual method. For this purpose highly differentiated male and female organs are developed at the apex of the shoot. The male organ is known as antheridium and the female organ is the archegonium. These organs are sometimes intermixed with some multicellular hair-like structures known as the paraphyses (para, beside; physo, to grow or an off shoot). Antheridia and archegonia may occur together on the same branch or shoot or on two branches of the same plant (monoecious) or on two separate plants (dioecious).

ANTHERIDIUM

The antheridium is a multicellular, short-stalked, club-shaped body which is filled up with numerous small cells known as antherozoid cells. The antherodium bursts at the apex and the antherozoid cells are liberated through it in a mass of mucilage. The mucilaginous walls surrounding antherozoid cells dissolves in water and the antherozoids are set free. They are very minute in size, spirally coiled and

biciliated; after liberation they swim in water that collects at the apex of the moss plant after rains.

ARCHEGONIUM

The archegonium is a multicellular body, but it is flask-shaped in appearance. It is provided with a short, multicellular stalk and consists of two portions; the lower swollen portion is known as the venter (belly), and the upper tube-like portion as the neck. The neck is long, narrow and straight. Within the venter there lies a large cell which is the ovum (egg cell or oosphere) or female gamete; above this lies a small ventral canal-cell and higher up in the neck there are a few neck canal-cells. Except the ovum other cells are functionless and soon get disorganized. The neck at first remains closed at the apex by a sort of lid, but as the archegonium matures, the lid opens and allows the antherozoids to enter and pass through it.

So, the first step is the production of sperms and eggs in antheridium and archegonium respectively.

STEP 2:

FERTILIZATION

The motile sperm has reached the egg, which is retained in the archegonium and fertilization takes place. Water is necessary for fertilization because the motile sperm must swim to the egg. Egg and sperm fuse to form zygote. They get water from rain, dewdrops etc

STEP 3:

FORMATION OF EMBRYO

The diploid (2n) zygote undergoes mitosis and begins to develop into the embryo (2n).

STEP 4:

FORMATION OF SPOROPHYTE

The embryo matures into the sporophyte, the diploid plant body. The sporophyte is the small, brown, stalked structure that one sometimes sees held above the main body of the moss.

STEP 5:

MEIOSIS / FORMATION OF SPORES

Meiosis takes place in sporangium of the mature sporophyte and haploid spores are produced.

STEP 6:

FORMATION OF GAMETOPHYTE

The haploid spores are dispersed and each spore undergoes mitotic cell division to create a haploid multicellular gametophyte.