

REPRODUCTION IN SPHAGNUM

PAPER - I
Group-B

Botany (Hon) Part I
(20.5-22)

Sphagnum, known as 'hog moss' or 'peat moss', is a pteridophyte of nearly cosmopolitan distribution growing in swamps, ponds or other moist places on high altitude, where water is acidic and contains little lime. The gametophyte is an upright leafy shoot with radially arranged leaves and creeping branches. It reproduces both by vegetative and sexual methods.

(A) Vegetative Reproduction:

- Brought about by the lateral branches
- Drooping lateral branches fix well within the substratum and after the death of the mother plant become independent individuals.

(B) Sexual Reproduction:

- (i) Gametophyte reproduces sexually by means of well developed antheridia and archegonia (♂ & ♀) organs.
- (ii) Plants may be monoecious or dioecious branches, and even on the monoecious species male and female sex organs borne on separate branches.
- (iii) Antheridia develop in acropetal succession in the axils of the leaves of the antheridial branch.
- (iv) A mature antheridium is globose/sub-globose with a 2-celled, thick, long stalk.
- (v) Jacket of the antheridium is single layered.
- (vi) Antherozoids are liberated by rupture of the antheridial jacket. They are biflagellate, spirally wiled and slender.
- (vii) Archegonia borne at the apices of the archegonial branches.
 - Usually there are three archegonia at the apex of each branch.
 - (ix) Mature archegonium relatively large with a stalk, a long neck and a massive venter.
 - Neck contains several neck canal cells.

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②
Whereas venter contains one ventral canal cell and an egg.

(x) Genetic union occurs during the spring.
(xi) Liberated antherozoids swim towards the mature archegonium.

Meanwhile, neck canal and ventral canal cells disintegrate forming a continuous passage.

(xii) Finally, only one antherozoid swims into the archegonium and fertilizes the egg.

(xiii) Fertilization of an ovum by the ventral canal nucleus has also been reported in a number of cases.

(xiv) Fertilized egg surrounds itself by a wall forming the oospore.

(xv) With fertilization and formation of oospore, the sporophyte (diploid; $2n$) generation begins.

The Sporophyte:

(i) Oospores by repeated transverse divisions forms a filamentous embryo.

(ii) Sporophyte is distinguished into foot, seta and capsule.

(iii) Capsule develops from the upper portion of the filamentous embryo, the seta and foot from the sub-median region, and the haustorium from the lowermost portion.

(iv) Hhaustorium absorbs nutrients from the gametophyte and gets obliterated at maturity.

(v) Foot and seta are rudimentary.

(vi) By successive cell divisions the capsular portion of the filamentous embryo forms a massive structure, in which periclinal divisions cut off an outer amphithecium and an inner endothecium.

(vii) Columella (sterile central region of the capsule) develops from the endothecium.

(viii) Amphithecium divides periclinally to form outer and inner regions.

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(3)

(ix) Sporogenous tissue, overarching the columella develops from the inner layers of the amphithecium, while the multi-layered jacket develops from the outer region.

(x) Outermost layer of the jacket forms the epidermis bearing stomata.

(xi) At the apical region of the mature capsule, the outermost layer forms a thick-walled lid or operculum.

(xii) Spore mother cells within the spore-sac, by reduction divisions (meiosis), form spores in tetrad.

(xiii) With reduction division and formation of spores, the new gametophytic or haploid generation begins.

(xiv) Mature capsule is protected by the calyptra, which ~~is~~ remnants of the archegonial venter.

(xv) At the time of dehiscence, mature capsule is elevated by a gametophytic tissue called pseudopodium.

(xvi) Due to a differential air pressure inside the spore sac, operculum is explosively hurled off thus liberating the spores.

New Gametophyte:

(i) A spore, falling on a suitable substratum, germinates into a few-celled thalloid protonema.

(ii) Through subsequent cell divisions and growth, protonema becomes a flat, green, prostrate thalloid structure attached to the substratum with the help of multicellular rhizoids.

(iii) A single lateral bud developing on the protonema ultimately forms the new gametophytic plant called gametophore.

[Figs. – Below]



