



1. What is the basis of classification of algae?

Solution: Fritsch (1935), has classified algae considering phylogeny, affinities and inter-relationships of various forms. He classified algae mainly on the basis of the characters like structure of plant body, nature of the pigments, reserve food material, number and position of flagella, chemistry of cell wall and methods of reproduction etc. Algae is divided into 11 classes but among them 3 main classes are Chlorophyceae, Phaeophyceae and Rhodophyceae.

2. When and where does reduction division take place in the life cycle of a liverwort, a moss, a fern, a gymnosperm and an angiosperm?

Solution: All of these plants show life cycle with one gametophytic (n) generation and one sporophytic ($2n$) generation. Reduction division or meiosis that produces haploid (n) cells from diploid cells ($2n$) is necessary in their life cycles to restore gametophyte generation after sporophytic generation. It occurs in different body structures according to the basic body design of these groups. Reduction division in a liverwort and moss takes place at the end of the sporophytic generation, where haploid spores are formed by reduction division of spore mother cell inside capsule. Spores germinate to produce dominant gametophytic generation. Reduction division in fern takes place at the end of the dominant sporophytic generation inside the sporangium from spore mother cell by reduction division. Spores may be of one type (homospory) or of two types (heterospory). Reduction division in gymnosperms takes place at the end of dominant sporophytic generation. Megaspore and microspores are produced by the reduction division of diploid megaspore mother cell and diploid microspore mother cell respectively, inside megasporangium and microsporangium. Reduction division in angiosperms takes place at the end of dominant sporophytic generation. The haploid pollen grain or microspore and the haploid egg cell are produced by the reduction division of diploid (microspore) mother cell and diploid megaspore mother cell respectively. Microsporic division occurs inside anther and megasporic division occurs inside gynoecium (ovary).

3. Name three groups of plants that bear archegonia. Briefly describe the life cycle of any one of them.

Solution: The three groups of plants that bear archegonia are bryophytes, pteridophytes and gymnosperms.

Life cycle of a bryophyte is as follows: The main plant body of bryophyte is gametophytic (n), which is independent and may be thallose (no differentiation in root, stem, leaves) e.g., *Riccia*, or may be foliose (having leafy axis) e.g., *Funaria*. The dominant phase in the life cycle of *Funaria* is the gametophyte, which occurs in two stages, the protonema stage and the erect, leafy gametophytic plant.

The leafy gametophyte consists of an upright, slender axis (stem-like) that bears spirally arranged leaves and is attached to the substratum by multicellular, branched rhizoids. Vegetative reproduction takes place by fragmentation; by the buds formed in secondary protonema etc. The sex organs, antheridia and

archegonia are produced in dusters at the apices of the leafy shoots. Antheridia produces antherozoids and archegonia produces egg. Antherozoid (male gamete) and egg (female gamete) fuses and form zygote. Zygote develops into a sporophyte; which is differentiated into foot, seta and capsule and spores are produced in the capsule. Spores on reaching a suitable substratum germinate to produce a filamentous juvenile stage, called the primary protonema, which later produces secondary protonema that forms erect leafy plants.

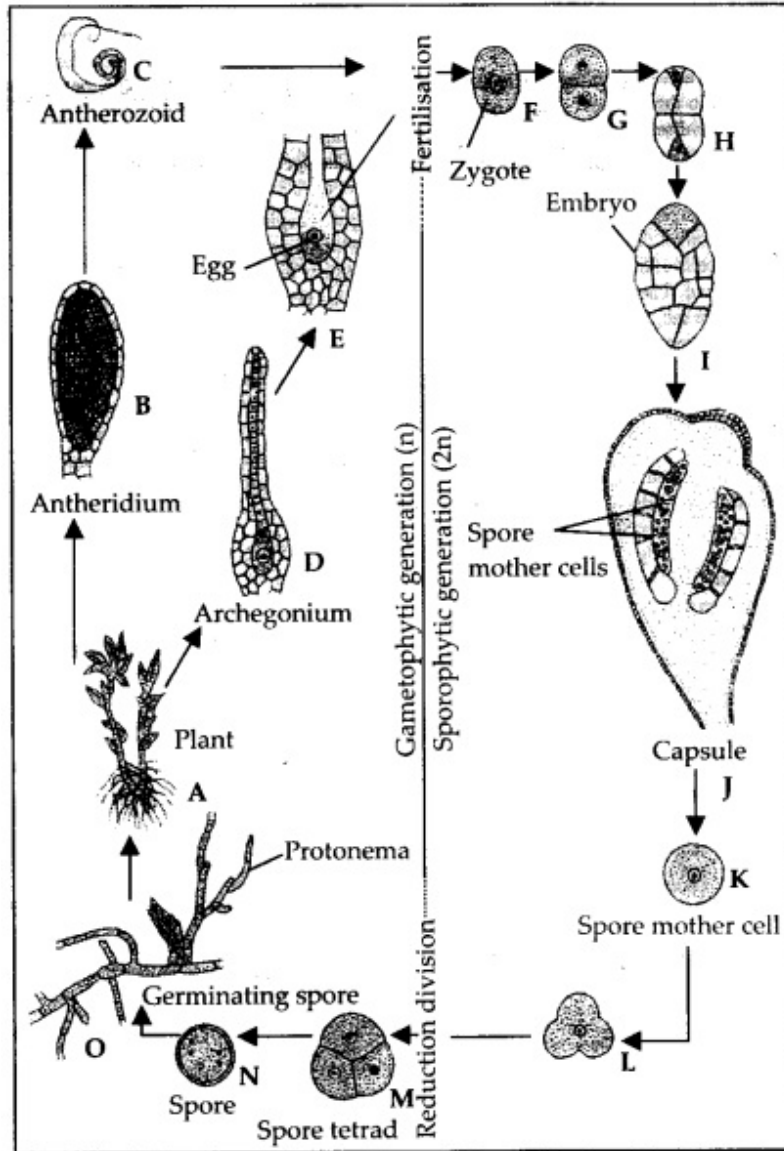


Fig.: Diagrammatic representation of life cycle of *Funaria*

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