BRYOLOGY

Classification of Bryophytes

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Classification of Bryophytes:

According to the latest recommendations of ICBN (International Code of Botanical Nomenclature), bryophytes have been divided into three classes.

- 1. Hepaticae
  - (Hepaticopsida = Liverworts)
- 2. Anthocerotae
  - (Anthocertopsida= Hornworts)
- 3. Musci
  - (Bryopsida= Mosses)

According to the Crandall-Stotler bryophytes have been divided into three classes.

- 1. Marchantiophyta
  - (Liverworts)
- 2. Anthocerotophyta
  - Hornworts)
- 3. Bryophyta
  - (Mosses)

- **Class 1. Hepaticae or Hepaticopsida:**
- 1. Gametophytic plant body is either thalloid or foliose. If foliose, the lateral appendages (leaves) are without mid-rib. Always dorsi-ventral.
- 2. Rhizoids without septa.
- 3. Each cell in the thallus contains many chloroplasts; the chloroplasts are without pyrenoid.


RICCIA


Marchantia


Porella

- 4. Sex organs are embedded in the dorsal surface.
- 5. Sporophyte may be simple (e.g., Riccia) having only a capsule, or differentiated into root, seta and capsule (e.g., Marchantia, Pallia and Porella etc.)
- 6. Capsule lacks columella.

Hepaticae or Hepaticopsida

It has 4 orders:

- (i) Calobryales
- (ii) Jungermanniales
- (iii) Spherocarpales
- (iv) Marchantiales.

- **Class 2. Anthocerotae or Anthocerotopsida:**
- 1. Gametophytic plant body is simple, thalloid; thallus dorsiventral without air cambers, shows no internal differentiation of tissues.
- 2. Scales are absent in the thallus.
- 3. Each cell of the thallus possesses a single large chloroplast with a pyrenoid.

- 4. Sporophyte is cylindrical only partly dependent upon gametophyte for its nourishment. It is differentiated into bulbous foot and cylindrical capsule. Seta is meristematic.
- 5. Endothecium forms the sterile central column (i.e., columella) in the capsule (i.e. columella is present).
- 6. It has only one order-
  - Anthocerotales.

- **Class 3. Musci or Bryopsida:**
- 1. Gametophyte is differentiated into prostrate protonema and an erect gametophores
- 2. Gametophore is foliose, differentiated into an axis (stem) and lateral appendages like leaves but without midrib.

- 3. Rhizoids multicellular with oblique septa.
- 4. Elaters are absent in the capsule of sporangium.
- 5. The sex organs are produced in separate branches immersed in a group of leaves.

- It has only three orders:
- (i) Bryales,
- (ii) Andriales
- (iii) Sphagnales

- **Apospory** is the development of 2*n* gametophytes, without meiosis and spores, from vegetative, or non reproductive, cells of the sporophyte.
- In contrast, **apogamy** is the development of 1*n* sporophytes without gametes and syngamy from vegetative cells of the gametophyte.
- **Parthenogenesis** is the formation of a 1*n* embryo directly from an unfertilized egg.

Alternation of Generations

- The bryophytes show an alternation of generations between the independent gametophyte generation, which produces the sex organs and sperm and eggs, and the dependent sporophyte generation, which produces the spores.

- The haploid phase (n) is the gametophyte or sexual generation. It bears the sexual reproductive organs which produce gametes, i.e., antherozoids and eggs. With the result of gametic union a zygote is formed which develops into a sporophyte. This is the diploid phase (2n). The sporophyte produces spores which always germinate to form gametophytes.
- During the formation of spores, the spore mother cells divide meiotically and haploid spores are produced. The production of the spores is the beginning of the gametophytic or haploid phase. The spores germinate and produce gametophytic or haploid phase. The spores germinate and produce gametophytes which bear sex organs.

- Ultimately the gametic union takes place and zygote is resulted. It is diploid (2n). This is the beginning of the sporophytic or diploid phase.
  This way, the sporophyte generation intervenes between fertilization (syngamy) and meiosis (reduction division); and gametophyte generation intervenes between meiosis and fertilization

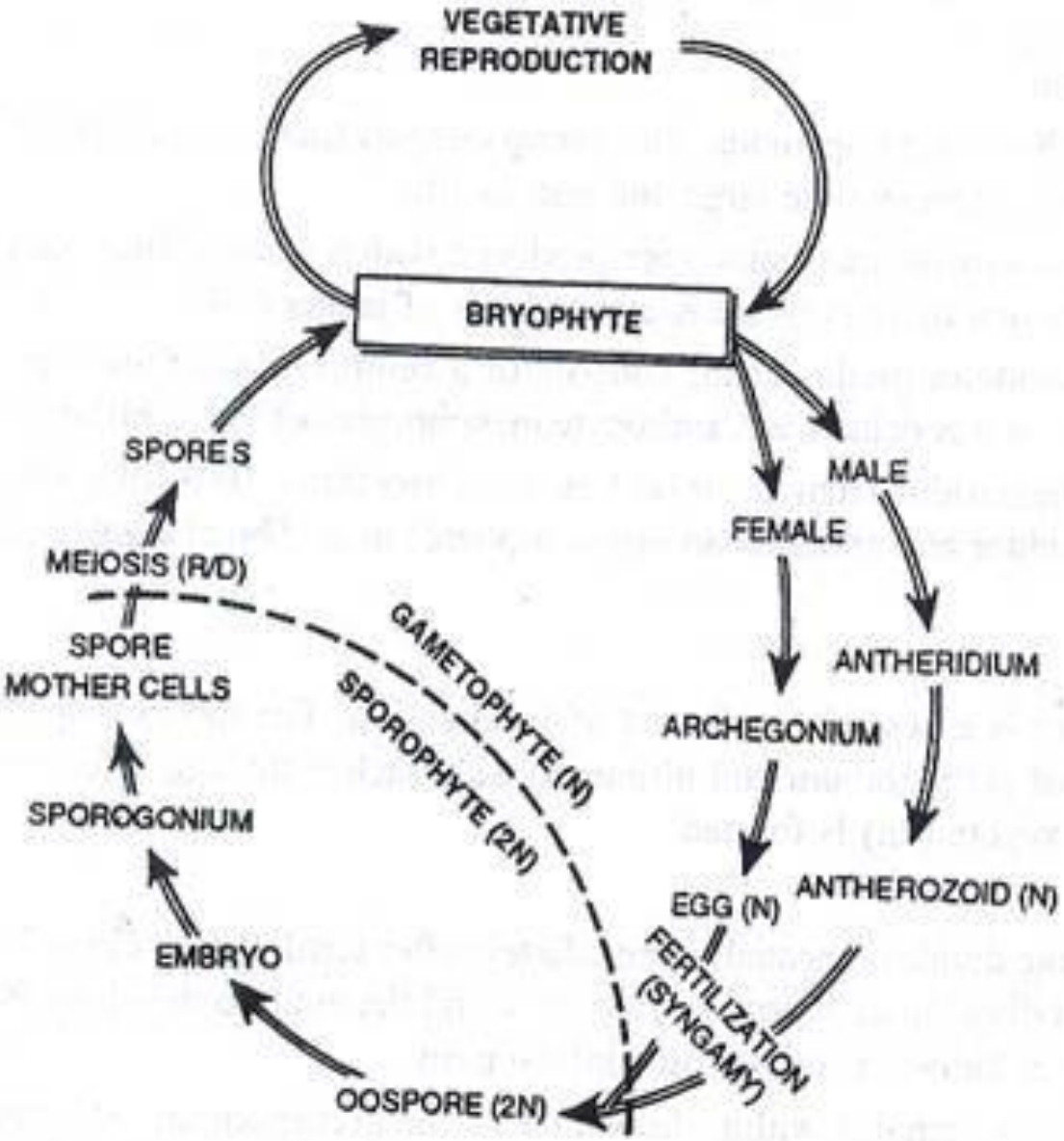

Fig. 19.1. Bryophyte. Typical graphic life-cycle.

- In bryophytes, where the two generations are morphologically different, the type of alternation of generations is known as heteromorphic.
- In the case of bryophytes the gametophyte generation is conspicuous and longer-lived phase of the life-cycle in comparison to that of sporophyte generation. Here, the gametophyte is quite independent whereas the sporophyte is dependent somehow or other on the gametophyte for its nutritive supply. The gametophyte gives rise to sporophyte and sporophyte to the gametophyte and thus there is regular alternation of generations.

Thank You

This class prepared for
Third Semester BSc Botany Students
Little Flower College, Guruvayur
Affiliated to University of Calicut

Next Class
Riccia