

# **BRYOLOGY**

## **FOSSIL BRYOPHYTES**

**Dr. Sithara K Urumbil**  
**Assistant Professor in Botany**  
**Little Flower College Guruvayoor**

- Fossil evidences of bryophytes were employed for tracing the phylogeny and their inter-relationships.
- The fossils sometimes lack necessary details

- **1. Fossil Hepatophyta (Marchantiophyta):**
- The earliest record of vegetative fossil bryophyte remains is the liverwort from the Upper Devonian of New York which has been assigned to the form-genus *Pallavicinites*, (= *Hepaticites*) *devonicus* (Fig. 6.60A).
- The reproductive structures are not found with any of the species of *Pallavicinites*. The vegetative features suggested that the species of *Pallavicinites* may be more closely related to the anacrogynous *Jungermanniales*.

- Various species of *Pallavicinites* have been described from the Carboniferous to the Pleistocene deposits and can easily be compared with living bryophyte genera like *Pallavicinia*, *Metzgeria*, *Treuba* and *Fossombronia*.
- *Diettertia*, an interesting hepatic, has been identified from Cretaceous era which may be more closely compared with the *Jungermanniales*.
- The best known bryophyte fossil is ***Naiadita lanceolata*** that has been described by Harris (1938) from the Rhaetic (Upper Triassic) of England. The spores of *Naiadita* show the closest resemblance to the member of the *Marchantiales* and *Sphaerocarpaceles*.

- The type of spores, unicellular rhizoids, the nature of archegonia and capsules suggested that *Naiadita* represents a liverwort similar to the living genus *Riella* of Sphaerocarpaceae. However, Schuster (1966) argued that the vegetative features of *Naiadita* showing closer proximity to the Calobryales.

- A fossil bryophyte, *Marchantiolites*, has been described from the Lower Cretaceous rock of central Montana. *M. porosus* has been identified from the Jurassic deposit of Sweden. *Marchantiolites* has been placed in the *Marchantiales* due to the similarity in the airpores.
- A thalloid bryophyte identified from the Upper Triassic of South America has been placed in the genus *Marchantites*. *Ricciopsis*, a rosette-shaped bryophytic thallus has been identified from the Jurassic of Sweden.

- The similar rosette-shaped thallus has been identified from Deccan Intertrappean beds of India and has been placed in the modern genus *Riccia*.

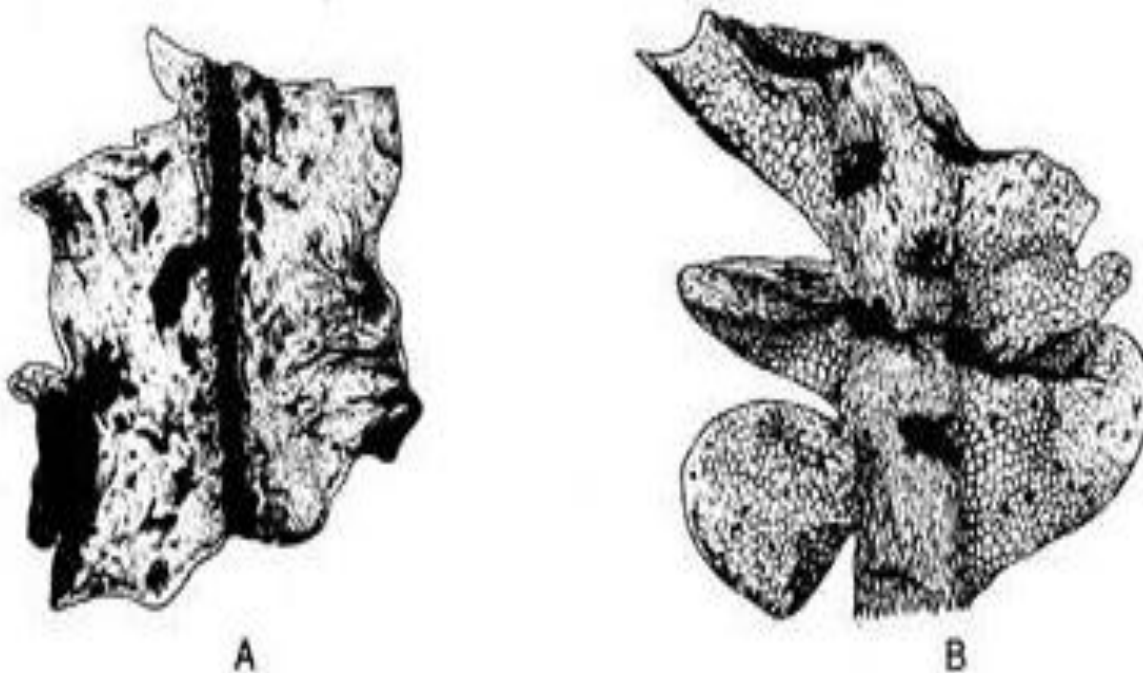
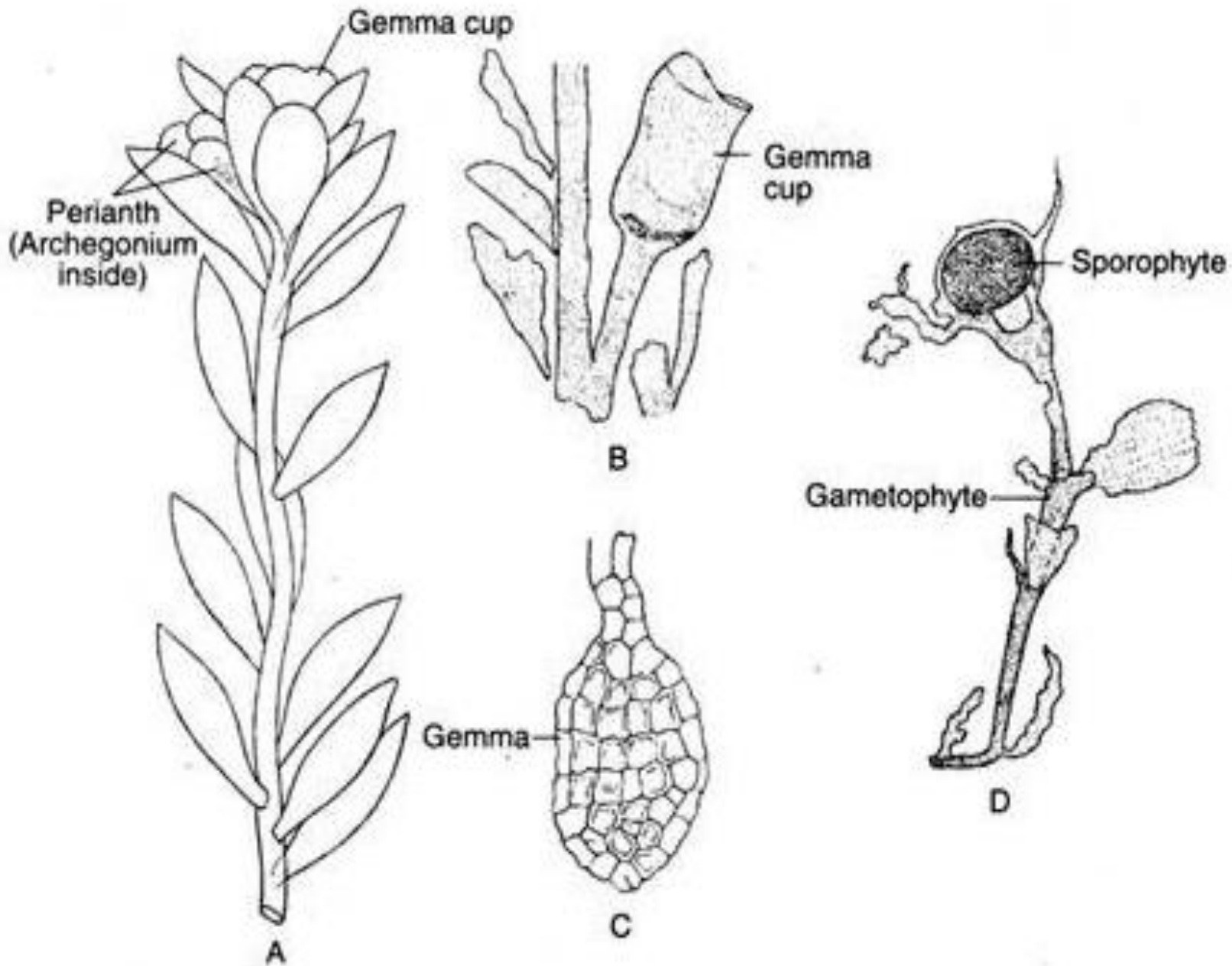


Fig. 6.60 : Fossil Hepatophyta : A. *Palavicinites devonicus* from Devonian (after Hueber), B. *Palavicinites kidstoni* from Upper Carboniferous (after Walton)



*Naiadita lanceolata* (after Harris) : A. Gametophyte plant, B. Gemma cup, C. A gemma, D. Plant with mature sporophyte



- **2. Fossil Anthocerotophyta (Hornworts):**
- There are no reports of fossil Anthocerotophyta thalli, although some reliable reports of hornwort spores are available from the Cretaceous (Maastrichtian) rocks of North America.
- The spores are trilete, circular and possess a distinct cingulum with variable ornamentations which are comparable with the modern hornwort genus *Phaeoceros*.
-

### ○ 3. Fossil Bryophyta (Mosses):

- The fossil record of the mosses is much less complete as compared to the fossil hepatics, though they are recorded as early as the Permian.
- An impression of a leafy shoot of *Muscites plumatus* has been described from the rocks of Lower Carboniferous age.
- This plant shows an axis, covered with helically arranged leaves. Sex organs, sporophyte capsules or rhizoids were not associated with the gametophytic plant. Several species of *Muscites* have been reported from the Upper Carboniferous of France and the Triassic of Africa.

- An extensive moss flora has been identified by Neuberg (1960) from the Permian rocks of Siberia, of which six identified genera
- (Intia, Salairia, Uskatia, Polyssaiuria, Bajdaieira and Buchtia) were placed under the Bryales
- three (Protosphagnum, Vorentannularia and Jungajia) to a new order, the Protosphagnales.

- The genus *Protosphagnum* has leaves comparable to the modern genus *Sphagnum*, except for the presence of a midrib.
- Ignatov (1990) described a diverse flora of well-preserved gametophytes of mosses from the Upper Permian of the Russian platform which are comparable to the modern forms like Dicranales, Pottiales, Funariales, Leucodontales and Hypnales.

- The permineralised well-preserved moss, *Mercerea augustica*, has been described by Smoot and Taylor (1986) from the Permian of Antarctica. The plant has a delicate axis to which are attached helically arranged leaves containing a midrib and rhizoids. Reproductive organs or sporophytes are not found associated with the plants. The external morphology and anatomy of the axes suggest its affinity with the Bryidae.
- Several compression fossils of true mosses have been described from the Mesozoic, of which *Tricostium* and *Yorekiella* from the Jurassic of the Bureja Basin, Russia and *Aulacomnium heterostichoides* from deep water varved clays (Eocene) of a fresh water lake in British Columbia.

## ○ 4. Problematic Fossil Bryophytes:

- The Lower Devonian compression fossil *Sporogonites* is one of the oldest plants that resembles a bryophyte. The plant consists of many parallel-oriented sporangial stalks that terminate in elongate capsules, developed from a common thallus.
- The sporangium is multilayered and possibly contains a central columella. Numerous trilete spores are present in the sporangium. *Sporogonites* has been considered to be an early hornwort or gametophyte-bearing sporophyte of a moss.

- A Precambrian bryophytic fossil, *Longfengshania*, has been described from China which shows striking similarity with *Sporogonites*. This unusual fossil of Precambrian age makes it doubtful about the validity of its systematic position.
- *Tortilicaulis* is an early Devonian fossil described from South Wales that shares a few morphological features common with the modern liver-wort *Pellia*.

# Thank You

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

Next Class  
Contributions of  
Indian Bryologists