General characteristics of the Mosses, Lycopodium, Horsetails

Material:
Division Hepaticophyta – Liverworts
Class Hepaticopsida
Order Marchantiales
Family Marchantiaceae
Genus *Marchantia*, Species *M. polymorpha*

Objects:
Herbarium of ***Marchantia polymorpha***
Permanent preparations of antheridium and archegonia.

Objective:
To familiarize with the structural features of ***Marchantia polymorpha***

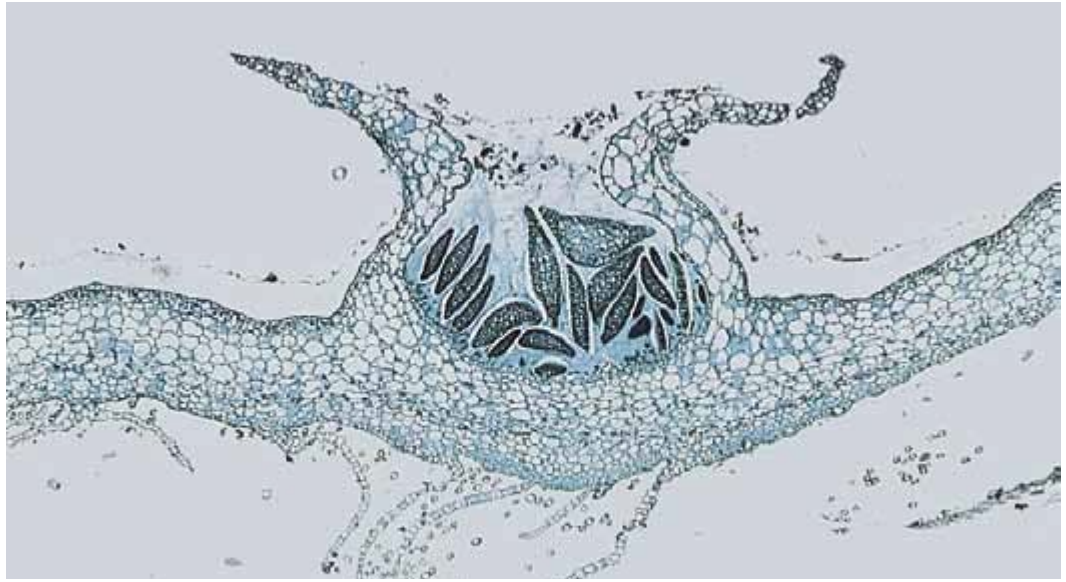
Tasks of work:
Recognize and draw an appearance of a thallus, antheridium and archegonia.
Denote dichotomous branching of a thallus, gemma cups.
Recognize and draw Liverwort Life Cycle, cross section of gemma cup, antheridium and archegonia.

Vegetative Reproduction:

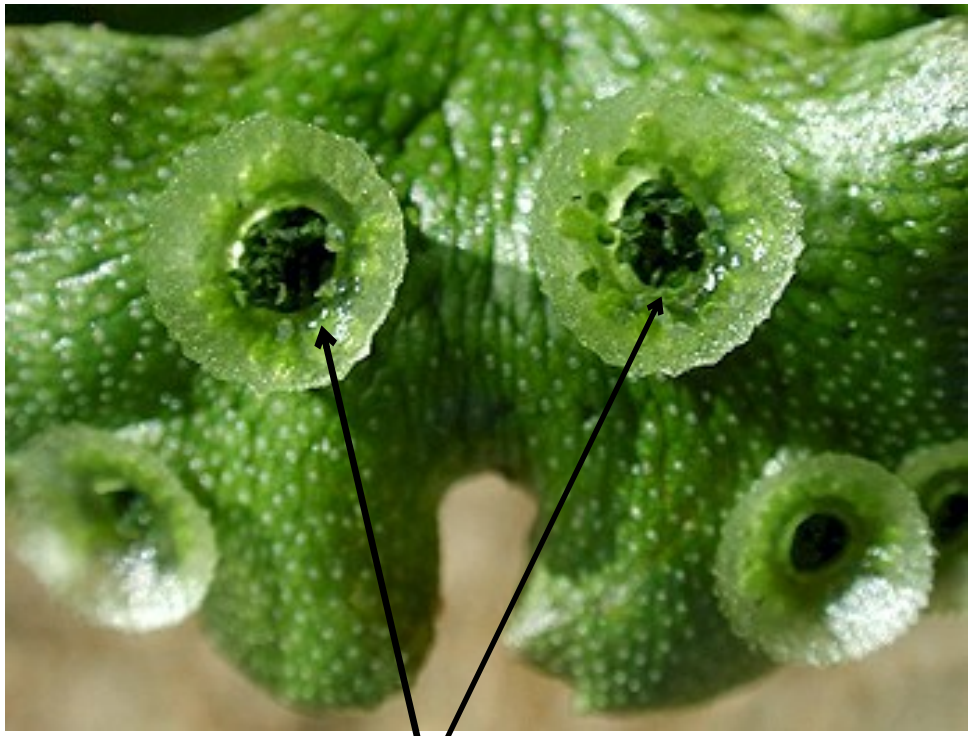
In *Marchantia* it is quite common and takes place by the following methods:

By Gemmae:

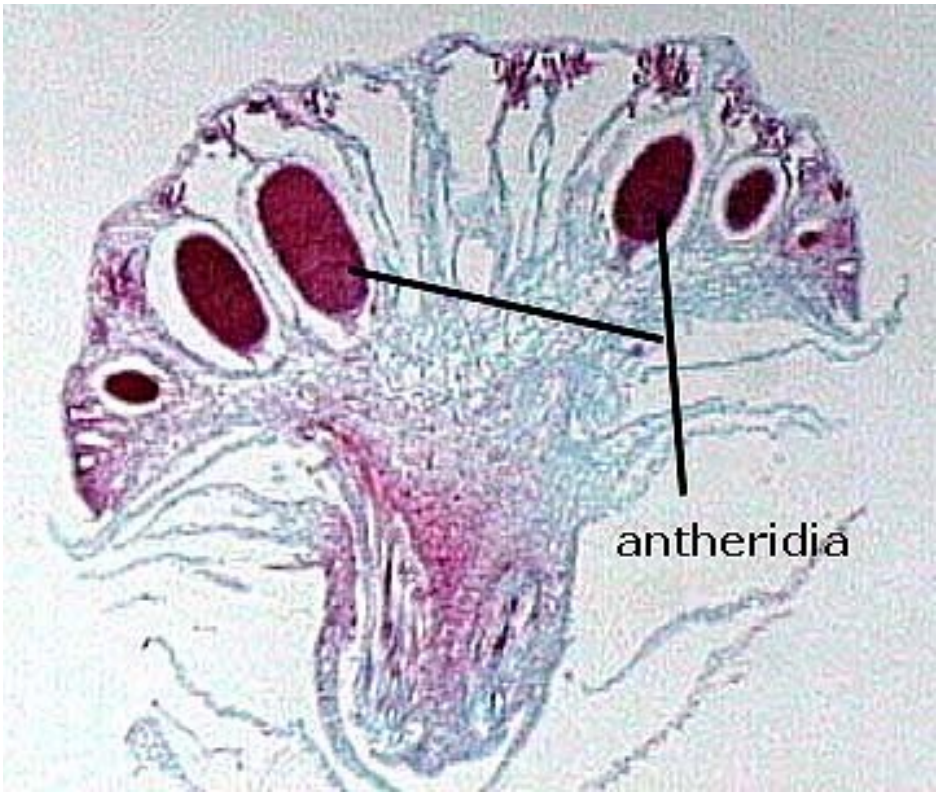
The cup like structures is found on the midrib of dorsal surface. Within gemma cup small stalked structures are formed called gammae. The gammae are asexual reproductive structures, which are made up of parenchymatous cells. On the lateral side of gemmae notch is present. The cells of the gammae are filled with chloroplast. When the gemmae fall on the ground, they produce new plant body.



Longitudinal section of a gemma cup. The gemmae are the dark structures, which in sectional view appear more or less lens-shaped.



Gemma cup of *Marchantia*



Antheridium of *Marchantia*

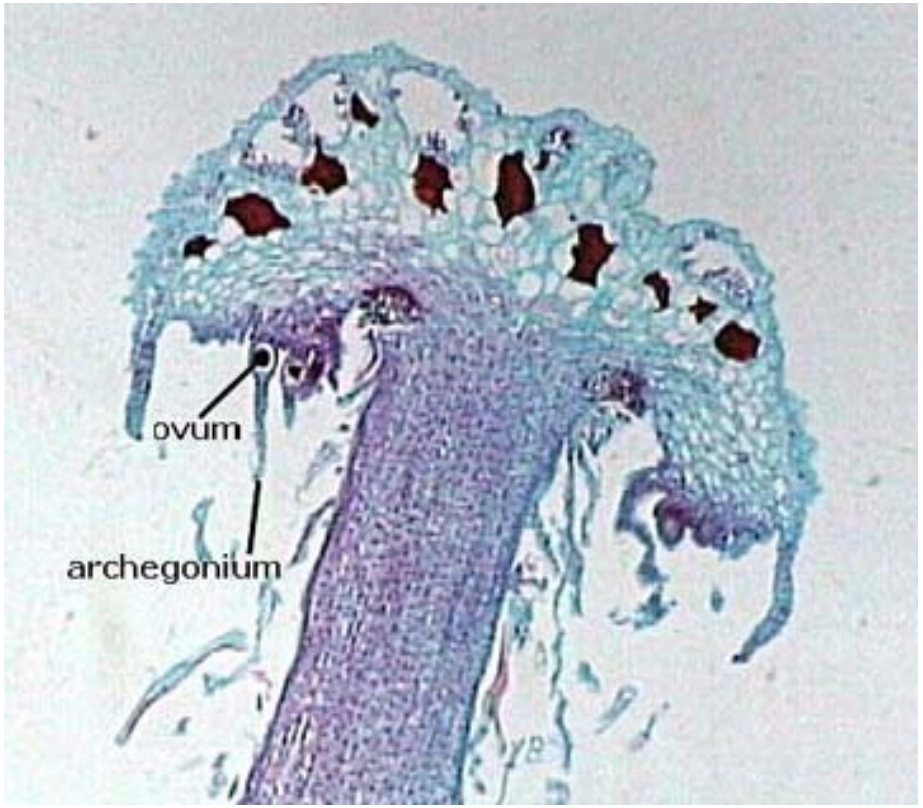
Archegonia

venter

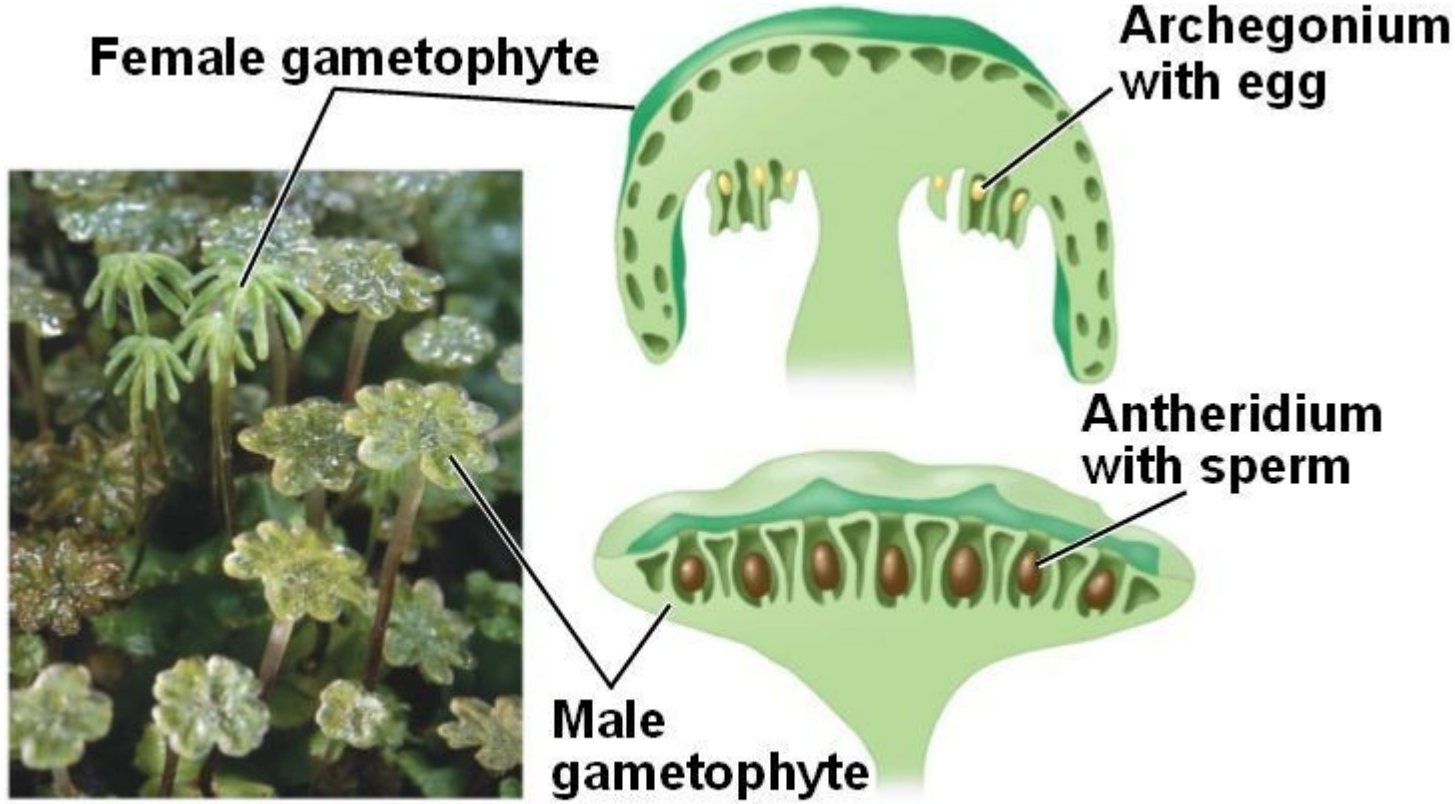
egg

neck

canal cell

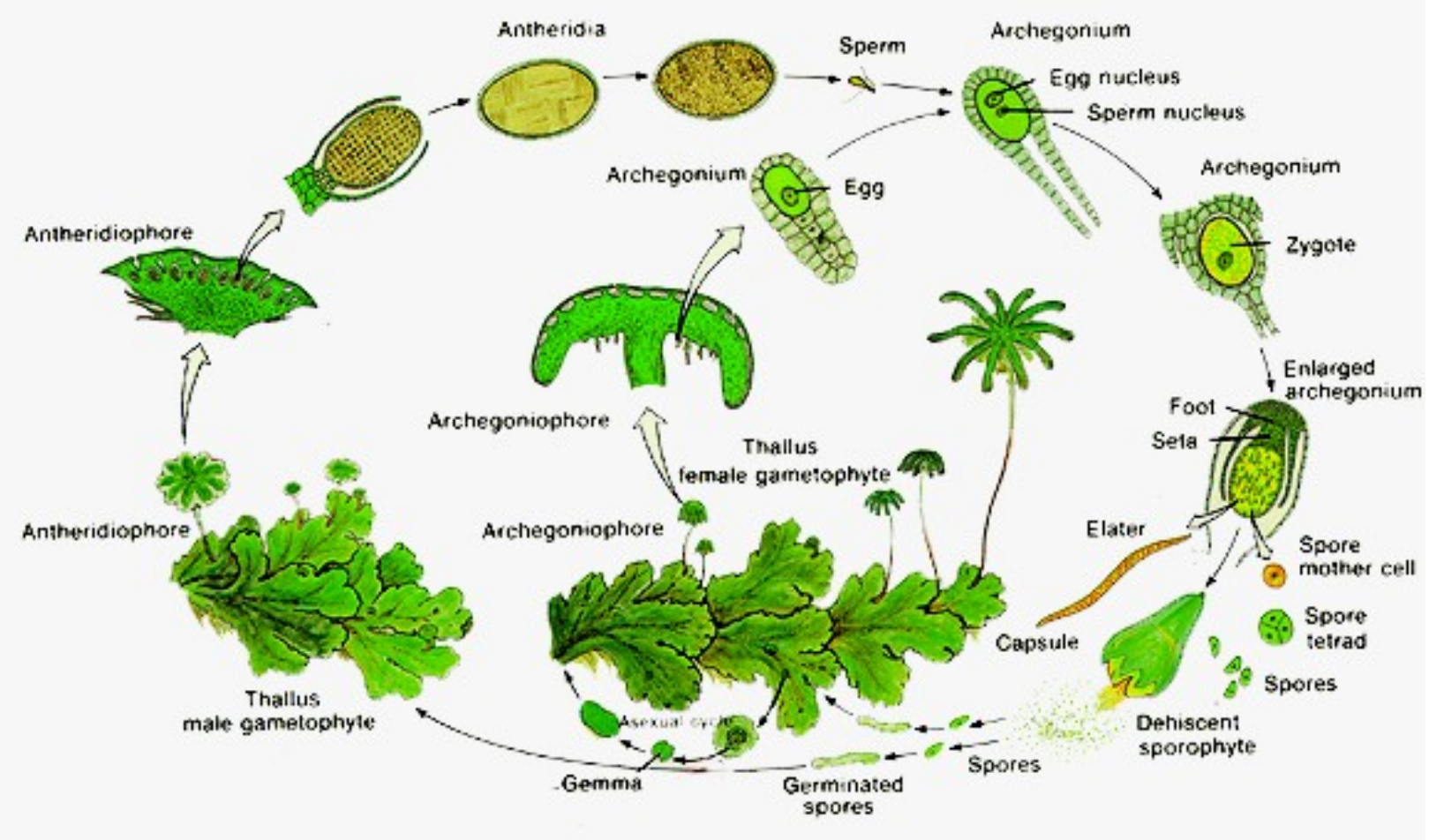


Archegoniophore of Marchantia.

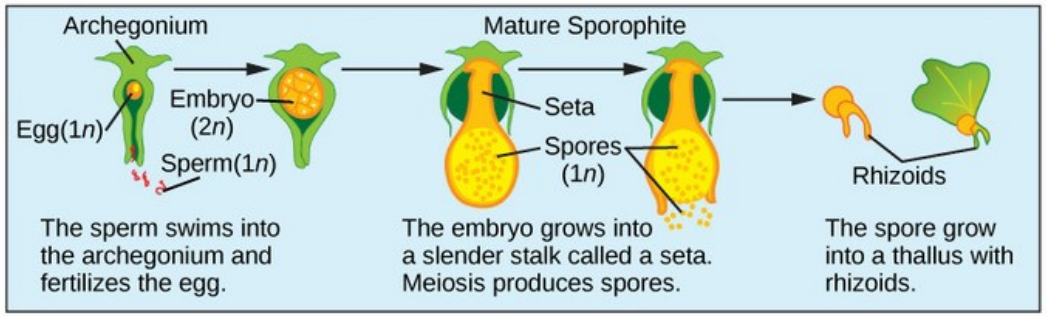


Archegonia and antheridia of *Marchantia* (a liverwort)

Liverwort Life Cycle: The life cycle of a typical liverwort follows the pattern of alternation of generations. Spores are released from sporophytes and form the gametophyte. Male gametes fertilize female gametes to form a zygote, which grows into a sporophyte. This sporophyte disperses spores with the help of elaters; the process begins again.



Liverwort Life Cycle

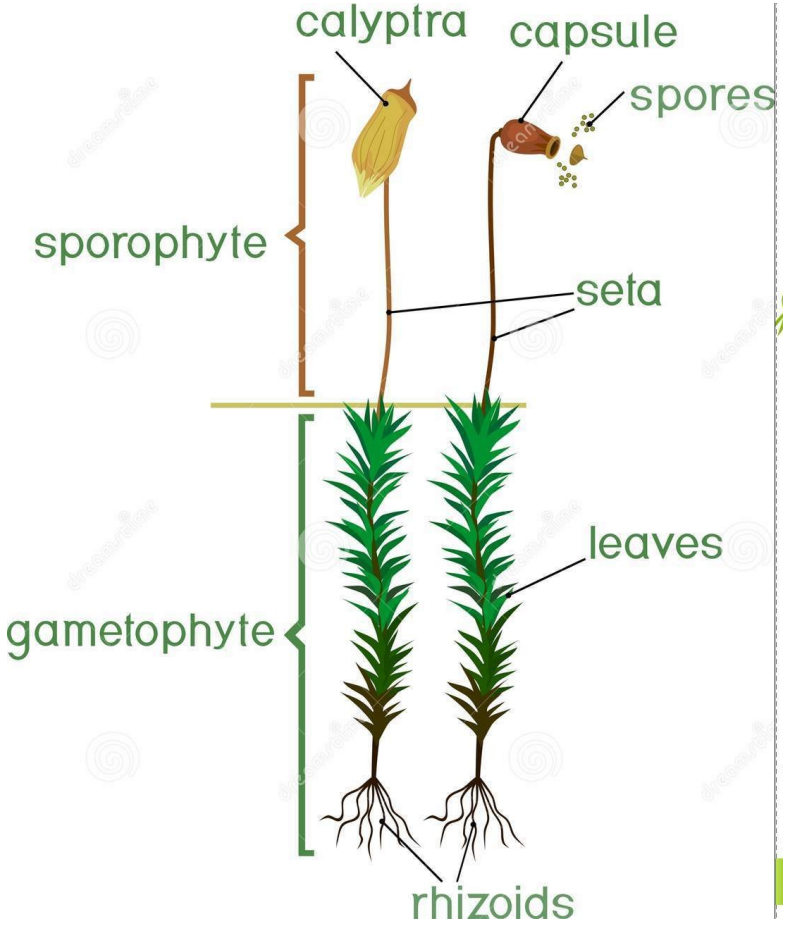


Material:
Phylum- Bryophyta (Mosses)
Class- Bryopsida = Musci (True Mosses)
Order- Polytrichales
Family- Polytrichaceae
Genus- *Polytrichum* (Hair-cap Mosses), Species – *P. commune*

Objects:
Herbarium and permanent preparation of *Polytrichum commune*

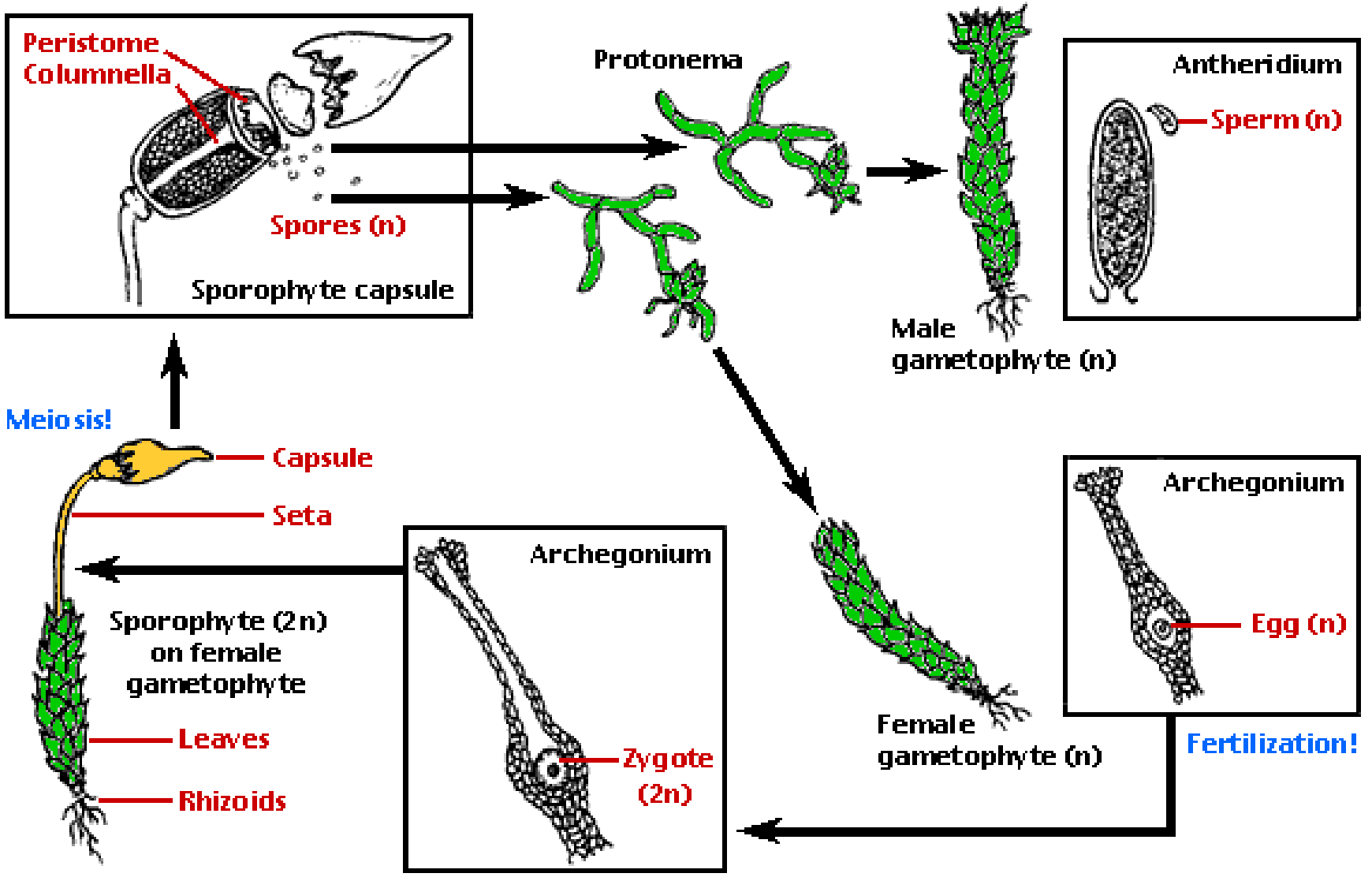
Objective:
To investigate the structural features of *Polytrichum commune*

Tasks of work:
Draw the appearance of the shoots of *Polytrichum commune*.
Draw and denote a moss sporophyte, showing the seta (stalk), capsule (sporangium), operculum (cap), peristome teeth, and spores.
Draw Life Cycle of *Polytrichum commune*



Polytrichum commune

Life cycle of mosses: The alternation of generations cycle begins when the gametophyte germinates from a haploid spore and forms a protonema. Apical meristem-like cells divide and give rise to the gametophores. The archegonium (female organ) and antheridium (male organ) develop on separate gametophores. After fertilization, the zygote divides and grows into a sporophyte, which stays attached to the gametophyte. Spores released from the sporophyte germinate and produce gametophytes; the process begins again.



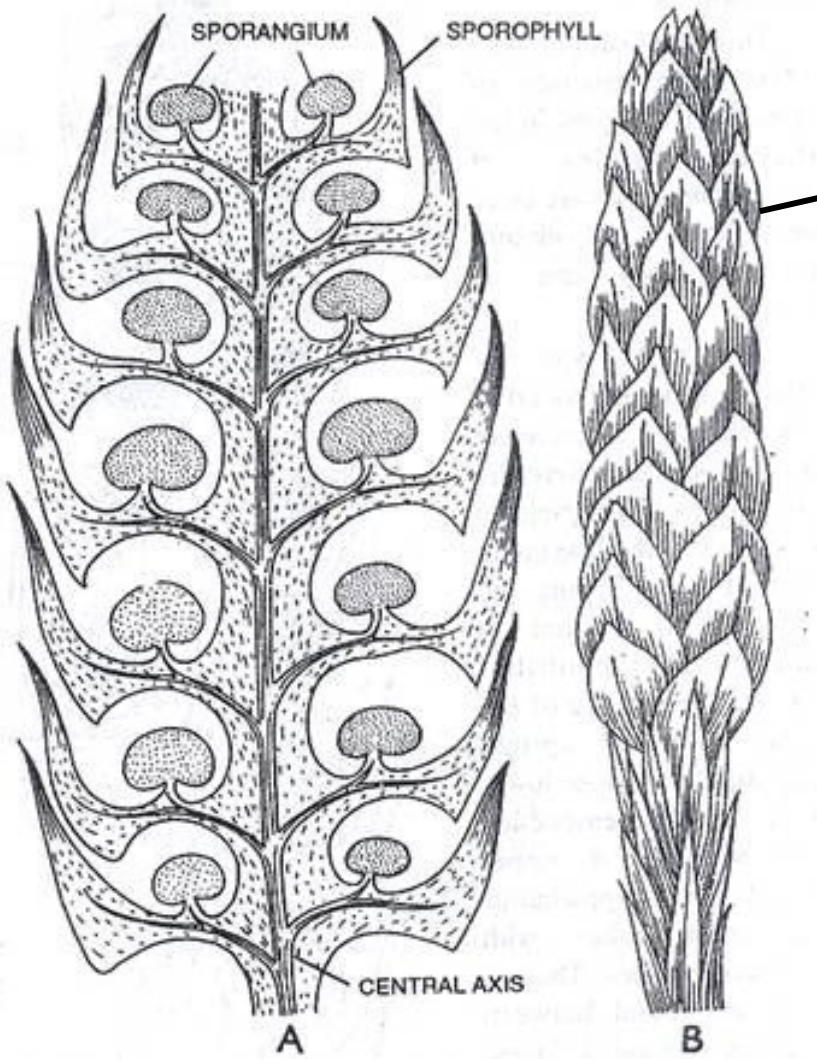
Life cycle of *Polytrichum commune*

Material:
Division Lycopodiophyta – Lycopods
Class Lycopodiopsida
Order Lycopodiales
Family Lycopodiaceae – Club-moss family
Genus *Lycopodium* – clubmoss

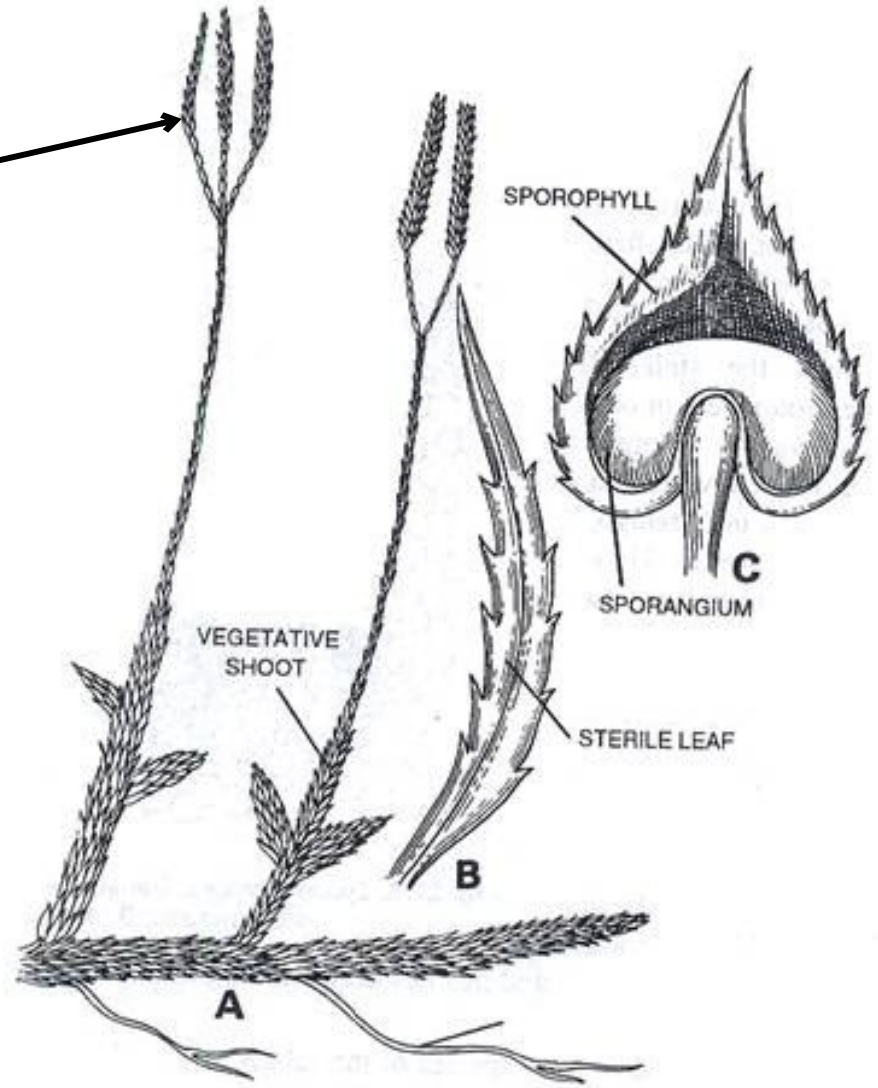
Objects:
Herbarium of *Lycopodium sp*.
Permanent longitudinal section preparation of *Lycopodium* sp. strobilus.

Objective:
To investigate the structural features of *Lycopodium* sp.

Tasks of work:
Draw and denote a *Lycopodium* shoot, showing the strobilus. Make an outline drawing of a strobilus longitudinal section, showing the sporophylls and sporangia.
Draw life cycle of *Lycopodium*.

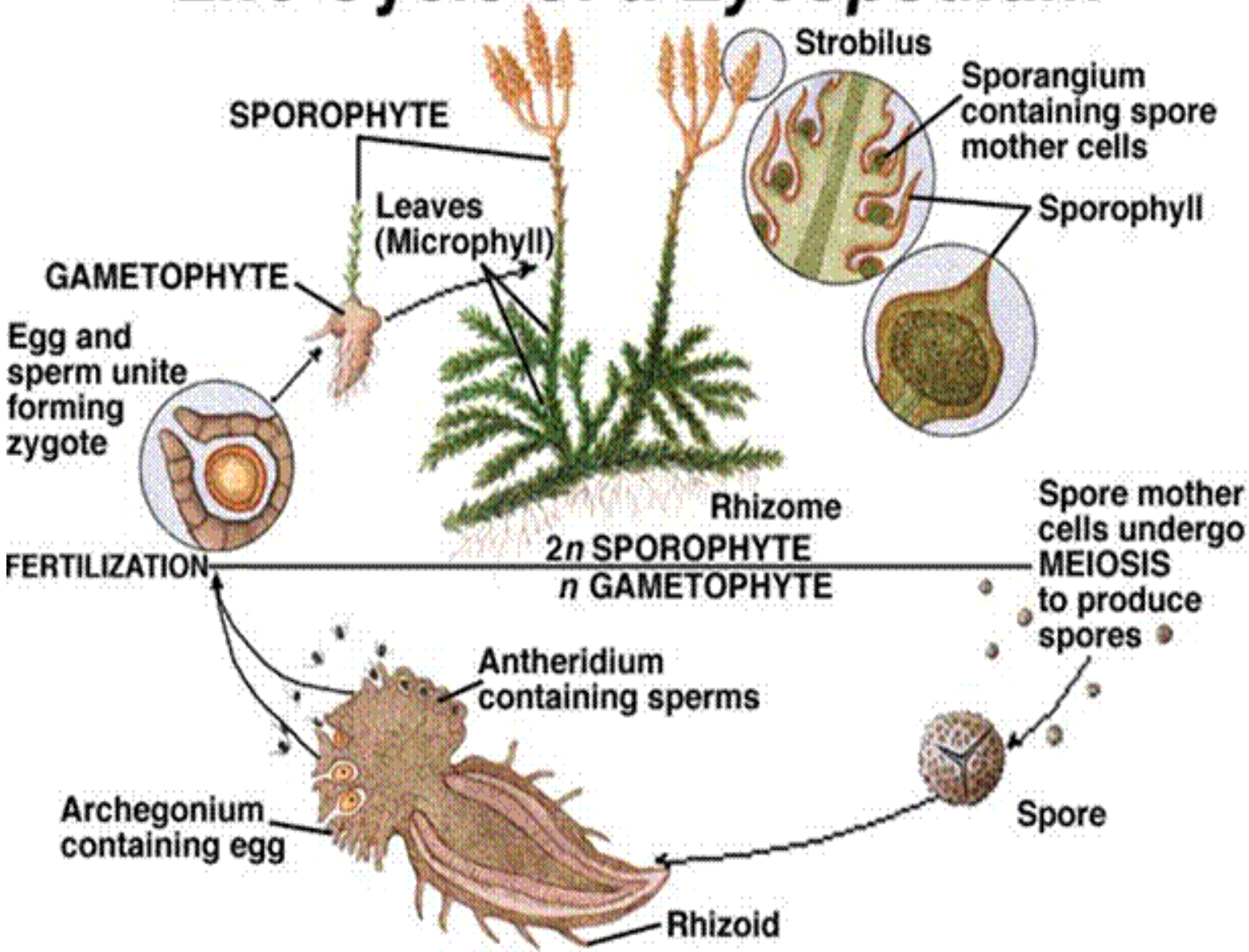


Lycopodium sp., A - strobilus bearing sporophylls and sporangia, B - strobilus



Lycopodium sp., A - shoot bearing strobili, B – sterile leaf, C – sporophyll with sporangium

Life Cycle of a *Lycopodium*

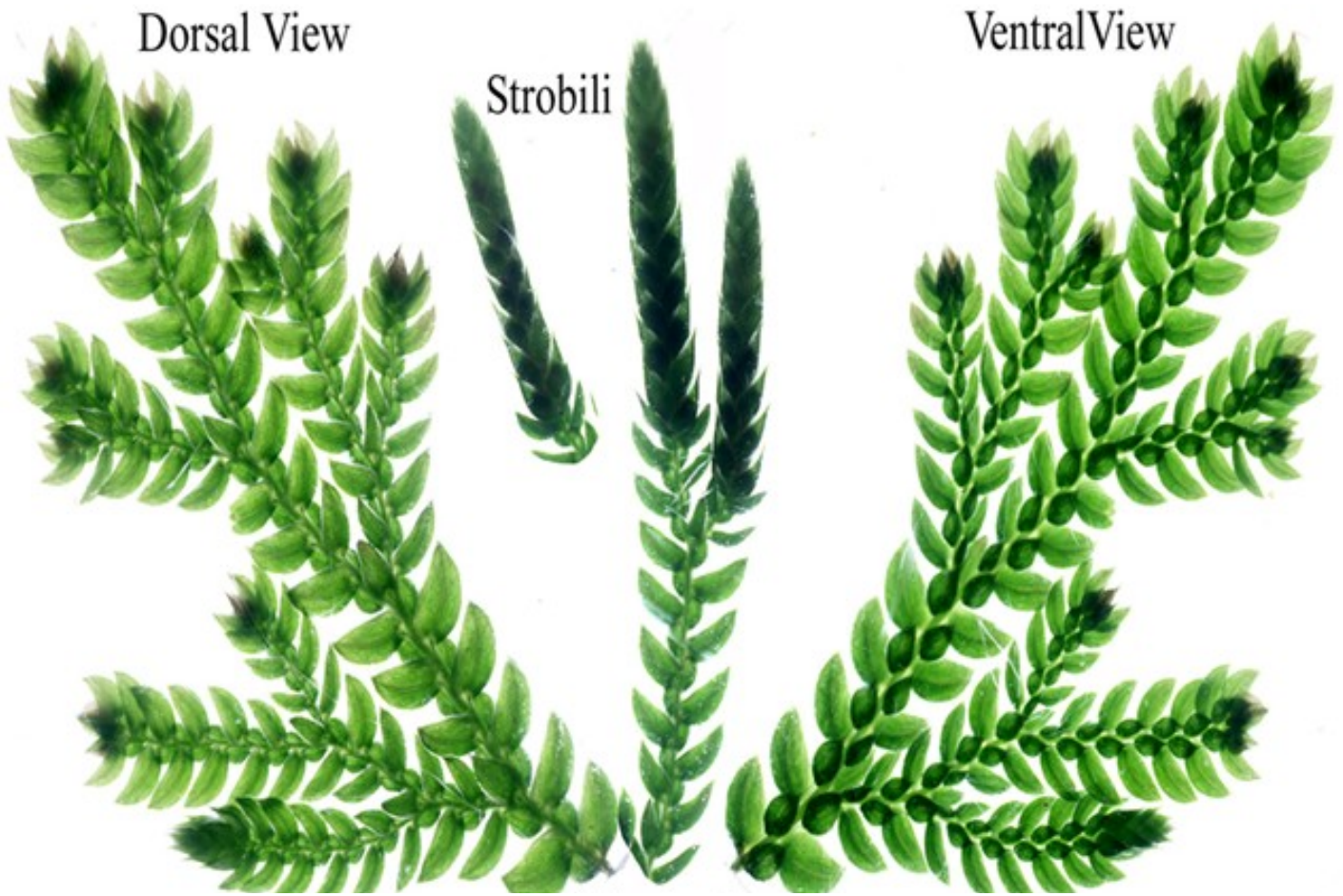


Material:
Division Lycopodiophyta – Lycopods
Class Lycopodiopsida
Order Selaginellales
Family Selaginellaceae - Spike-moss family
Genus *Selaginalla* – spikemoss

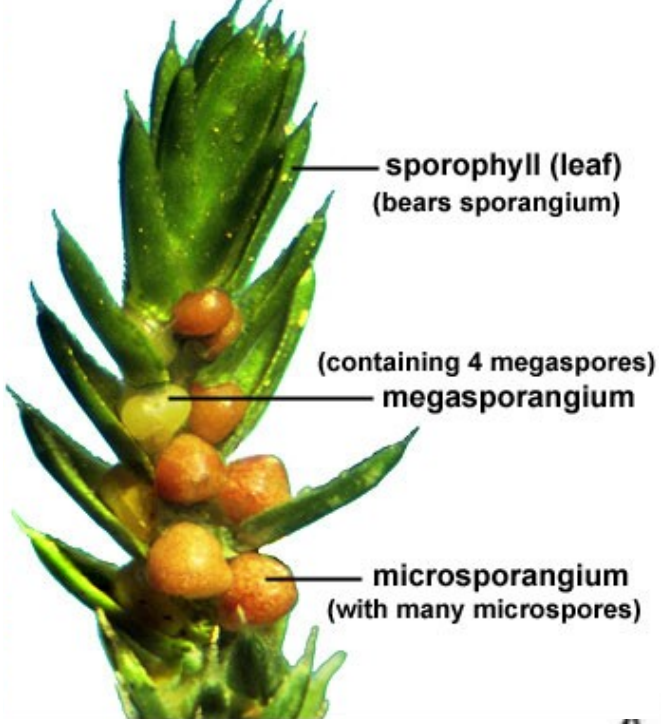
Objects:
Herbarium of *Selaginella sp*.

Objective:
To investigate the structural features of *Selaginella sp*.

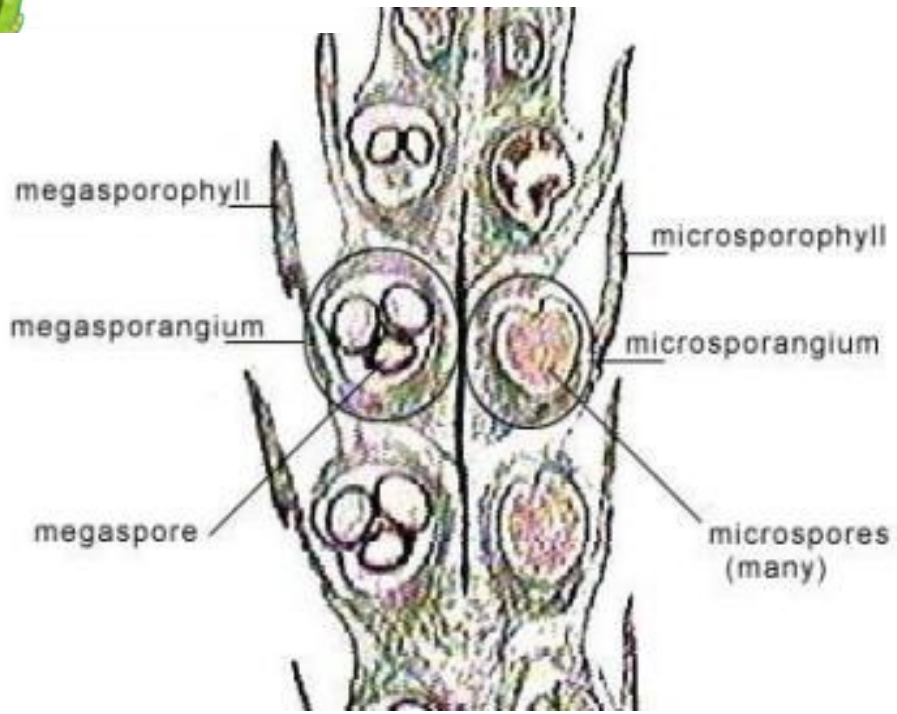
Tasks of work:
Draw and denote a *Selaginella* sporangia. Observe the longitudinal-section of *Selaginella*, showing microsporangia, with microspores, and megasporangia, with megaspores.
Note the vast difference in spore size.
Draw life cycle of a *Selaginella*.

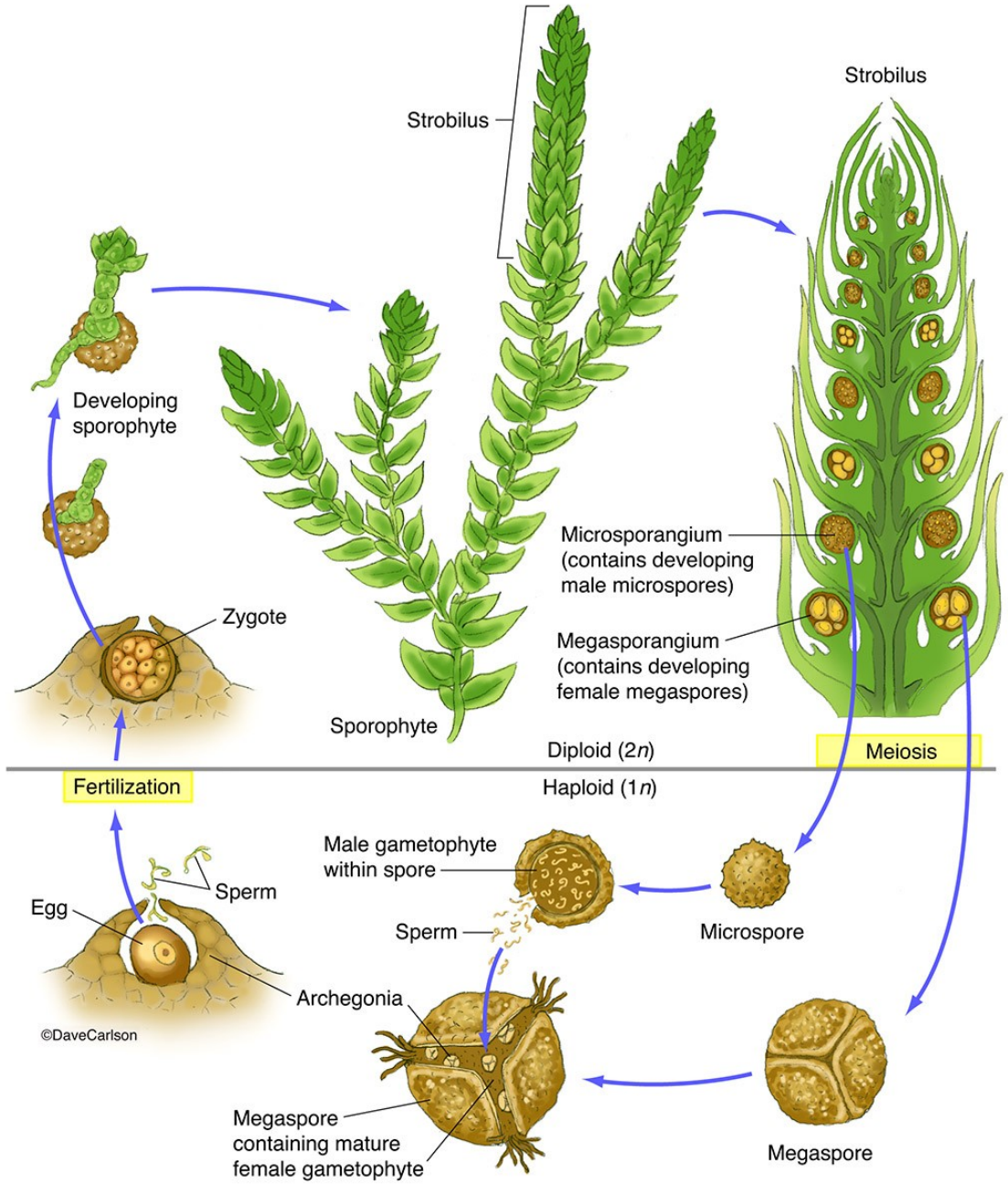


***Selaginella*: plant body, strobilus**



Strobilus of *Selaginella sp.*





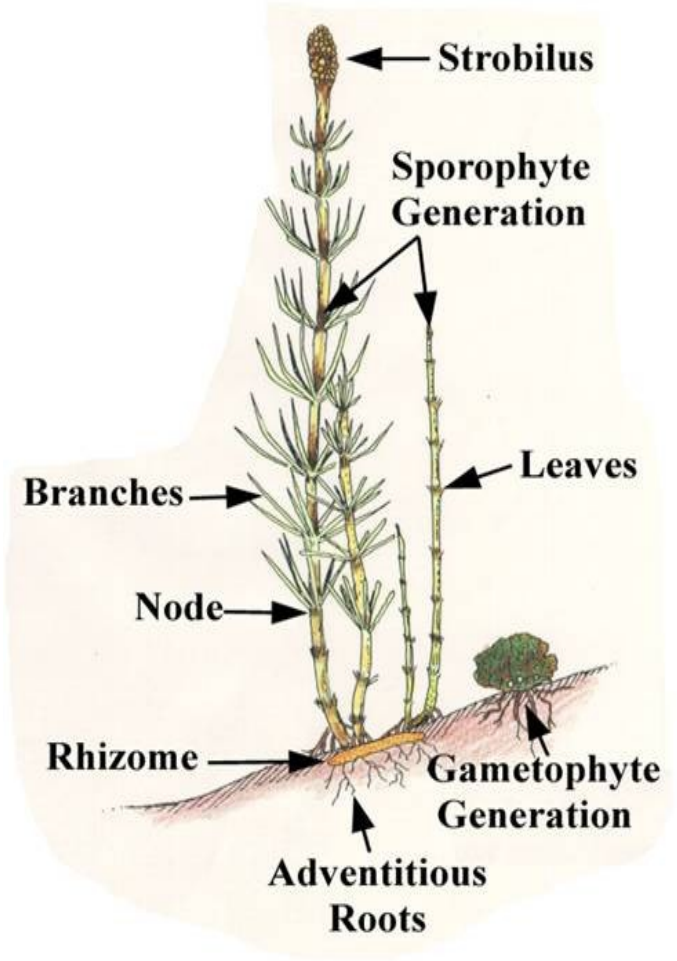
Life cycle of *Selaginella*

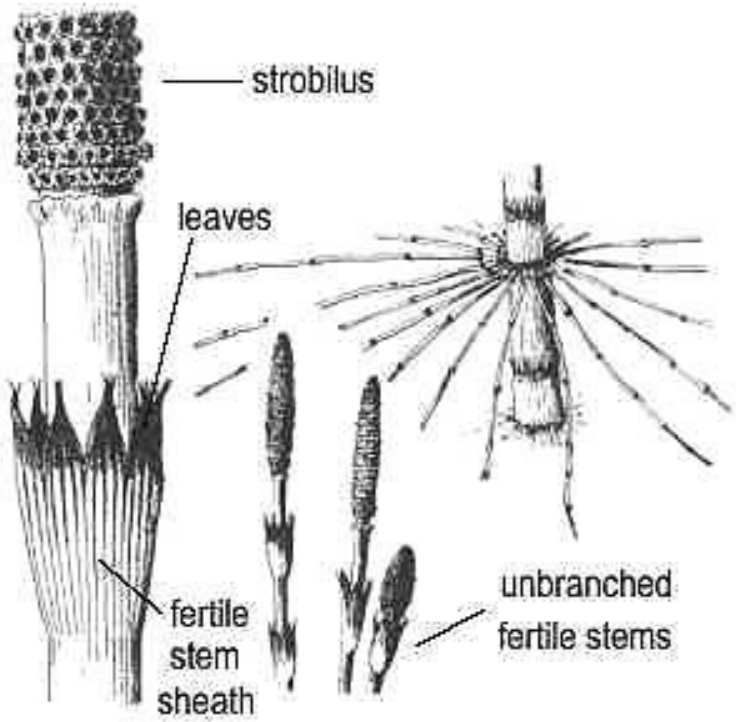
Material:
Division Equisetophyta – Horsetails
Class Equisetopsida
Order Equisetales
Family Equisetaceae – Horsetail family
Genus *Equisetum* – horsetail

Objects:
Herbarium of *Equisetum sp.*
Permanent preparation of *Equisetum* strobilus.

Objective:
To investigate the structural features of *Equisetum sp.*

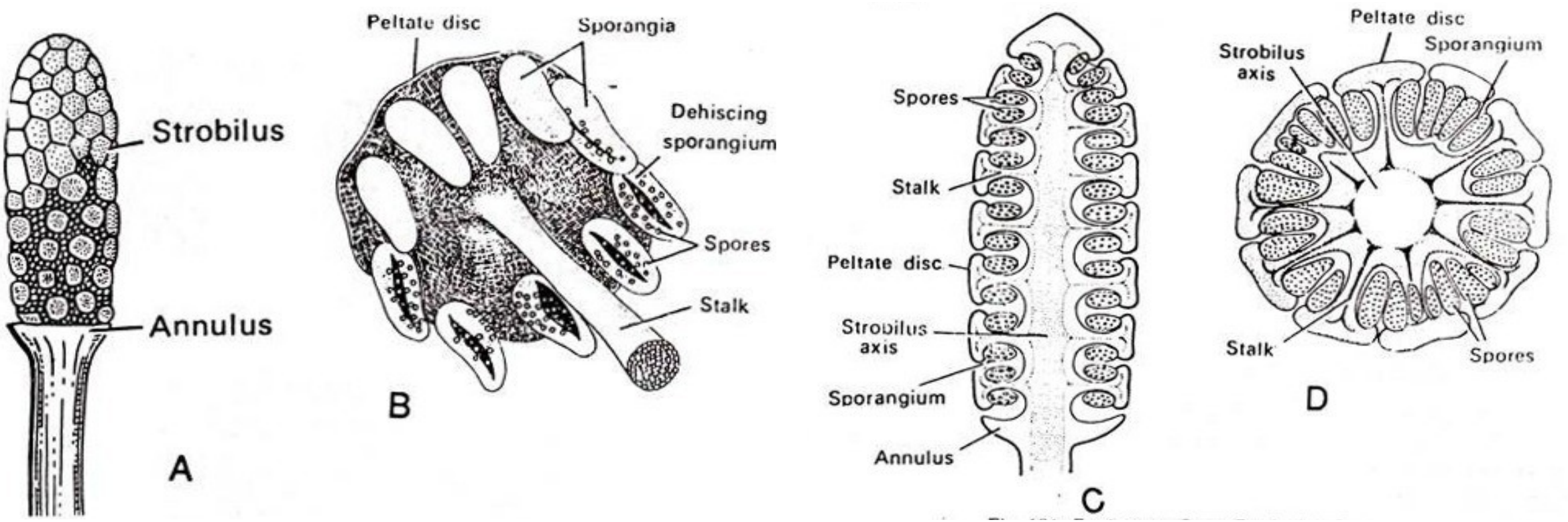
Tasks of work:
Draw and label a close-up of the ridged stem, whorled leaves, and (if present) lateral branches
Observe the strobilus (cone) of *Equisetum*. Observe a sporganiophore with sporangia.
Make a wet mount of the spores and view with the compound microscope. Draw and label the strobilus, sporangiophore, and spore.
Draw life cycle of *Equisetum*.





Equisetum plantbody

***Equisetum*: spores**



***Equisetum*: A –cone, B – ventral view of sporganiophore , C - longitudinal-section of cone, D – cross-section**

Life Cycle of *Equisetum*