

Biology 11

Kingdom Plantae:
Algae and Bryophyta

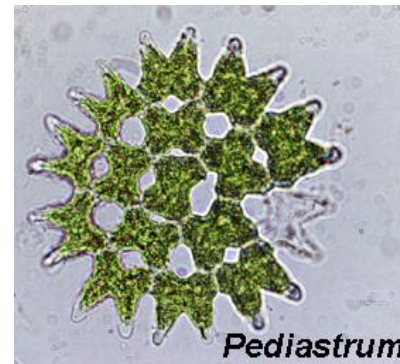
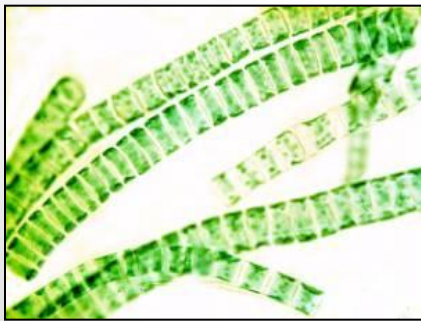
Objectives

By the end of the lesson you should be able to:

- State the 3 types of algae
- Why we believe land plants developed from algae
- Lifecycle of a bryophyte
- Examples of bryophytes

The First “Plants”

- For more than 3 billion years, Earth’s terrestrial surface was lifeless
 - life evolved in the seas
 - plant life evolved in the seas from algae
 - 1st photosynthetic organisms were aquatic green algae



Chlamydomonas

Brown Algae



Kelp

- Kingdom Protista
- Phylum
Heterokontophyta
- Mostly marine and temperate.

Red Algae



- Kingdom Protista
- Phylum Rhodophyta
- Most common in warmer tropical waters
- In temperate zones, found in deeper water



Turkish Wash Cloth

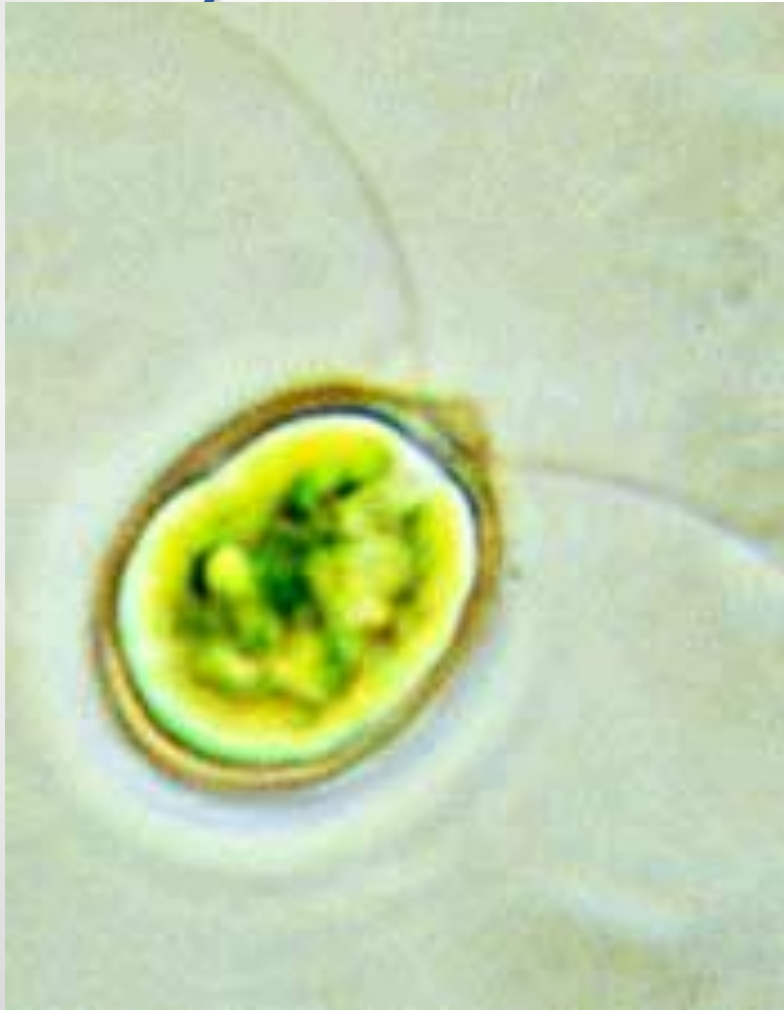
Green Algae

- Kingdom Protista
- Phylum Chlorophyta
- Very diverse group
- Include 3 forms:
 - unicellular
 - colonial
 - multicellular
- Live in all environments: fresh and salt water, soil



Ulva sp. Sea lettuce

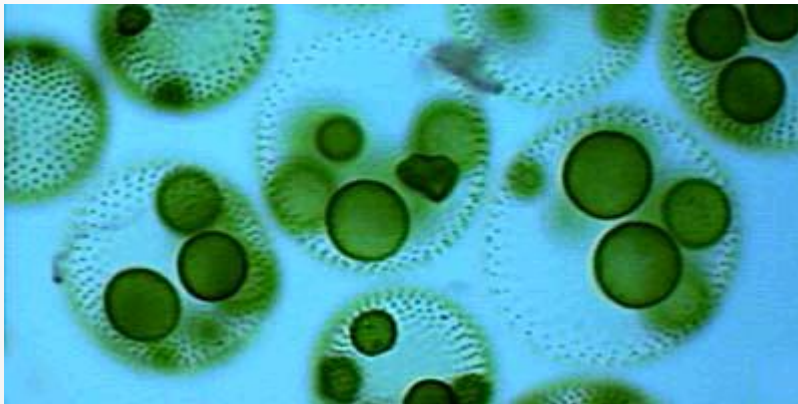
A) Unicellular Green Algae



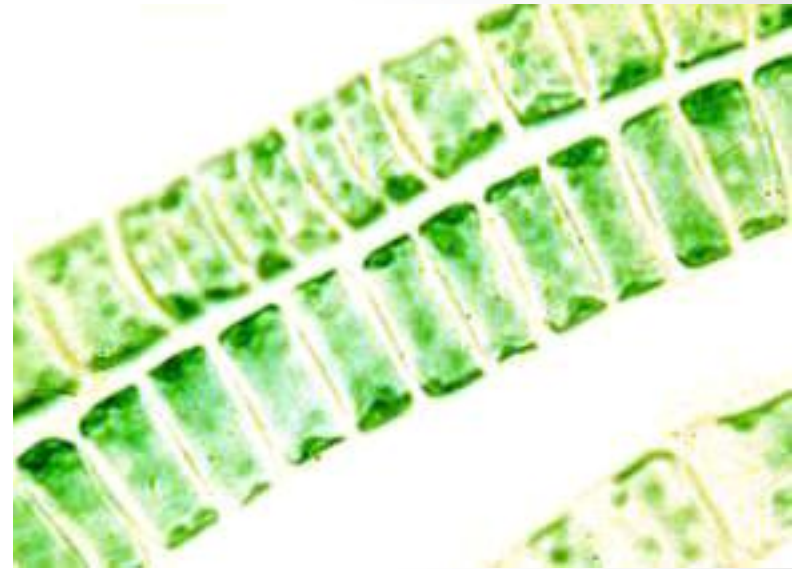
- Very common in fresh water as part of phytoplankton.
- Ex. Chlamydomonas sp.

B) Colonial Green Algae

- Live in long filaments or as colonial spheres.



Volvox, spherical colonial



Filamentous green algae

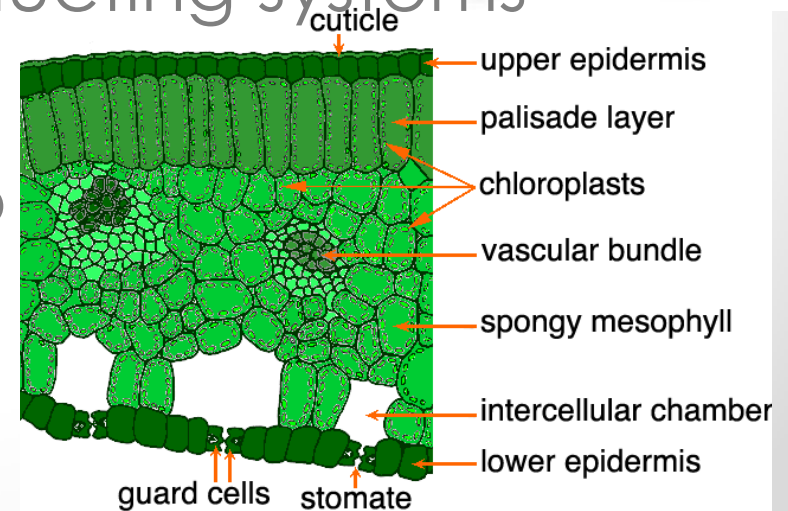
C) Multicellular Green Algae



- Mostly marine.
- Ancestors of land plants

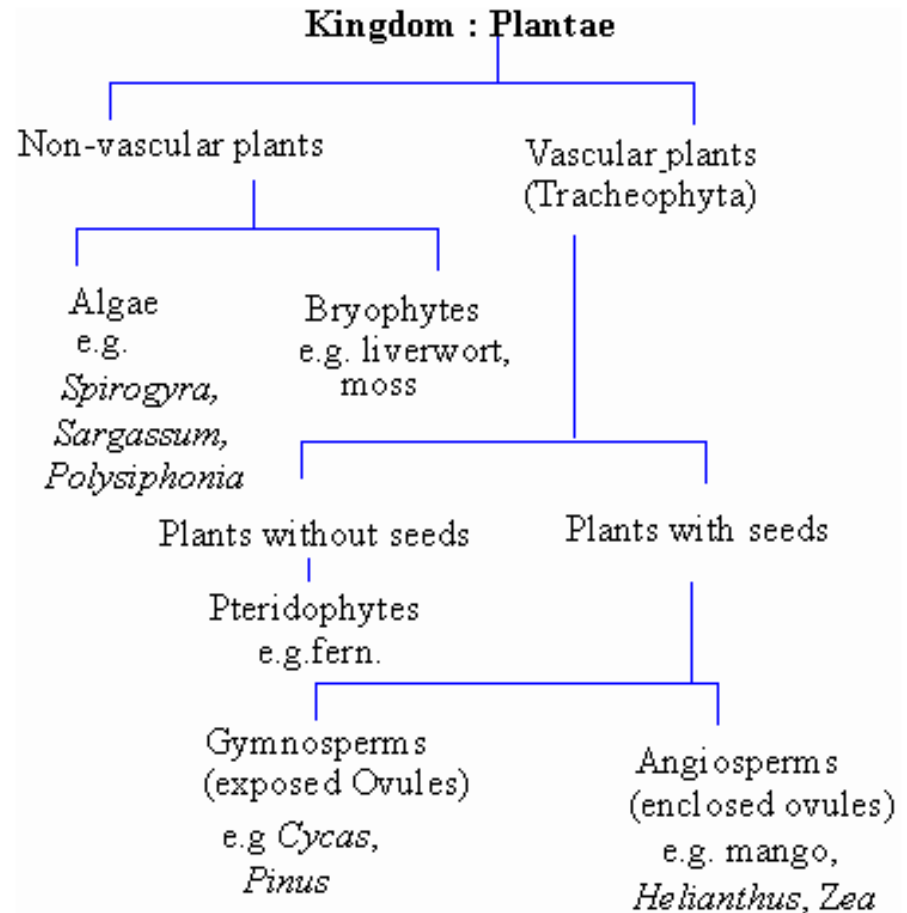
Evolution of Land Plants

- 500 mya land plants evolved
 - special adaptations for life on dry land
 - protection from drying = desiccation
 - waxy cuticle
 - gas exchange (through cuticle)
 - stomatas
 - water & nutrient conducting systems
 - xylem & phloem
 - protection for embryo
 - seeds



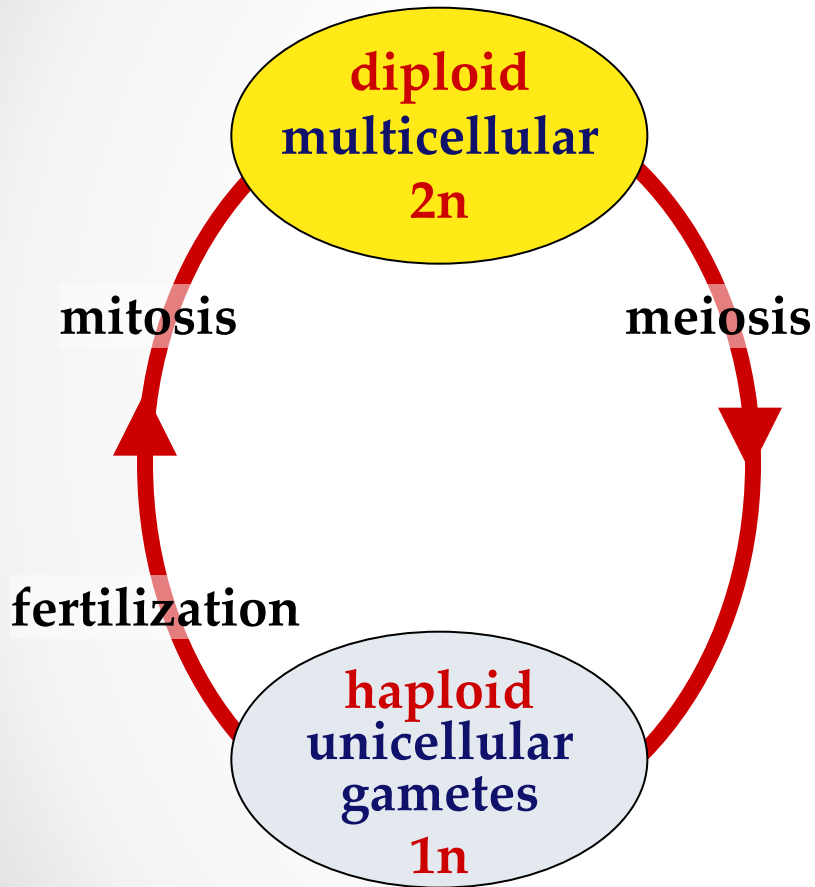
Kingdom Plantae

- Autotrophic
- Photosynthetic
- Cells contains chloroplasts
- Multi-cellular
- Sexual and asexual reproduction
- Cell wall – cellulose

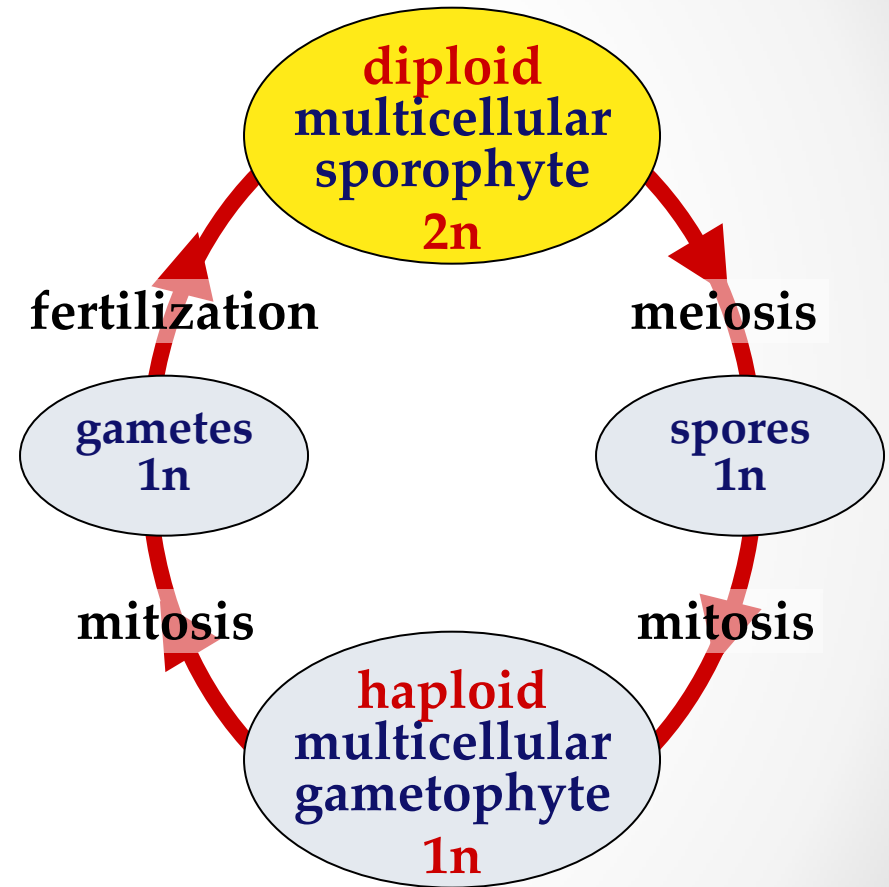


Animal vs. Plant life cycle

Animal



Plant



alternation of generations

First land plants

- Bryophytes: mosses & liverworts

- non-vascular

- no water transport system
- no true roots

- swimming sperm

- flagellated sperm

- lifecycle dominated by
diploid gametophyte stage

fuzzy moss plant you are familiar with is haploid

- spores for reproduction

- haploid cells which sprout to form gametophyte

Where must mosses live?



The Bryophytes

- Includes: mosses, liverworts and hornworts
- Called “non-vascular plants” because their dominant stage (gametophyte) lacks vascular tissues
- Show many of the characteristics believed to be in the first land plants
- What problems did the Bryophytes face when moving onto land from water?



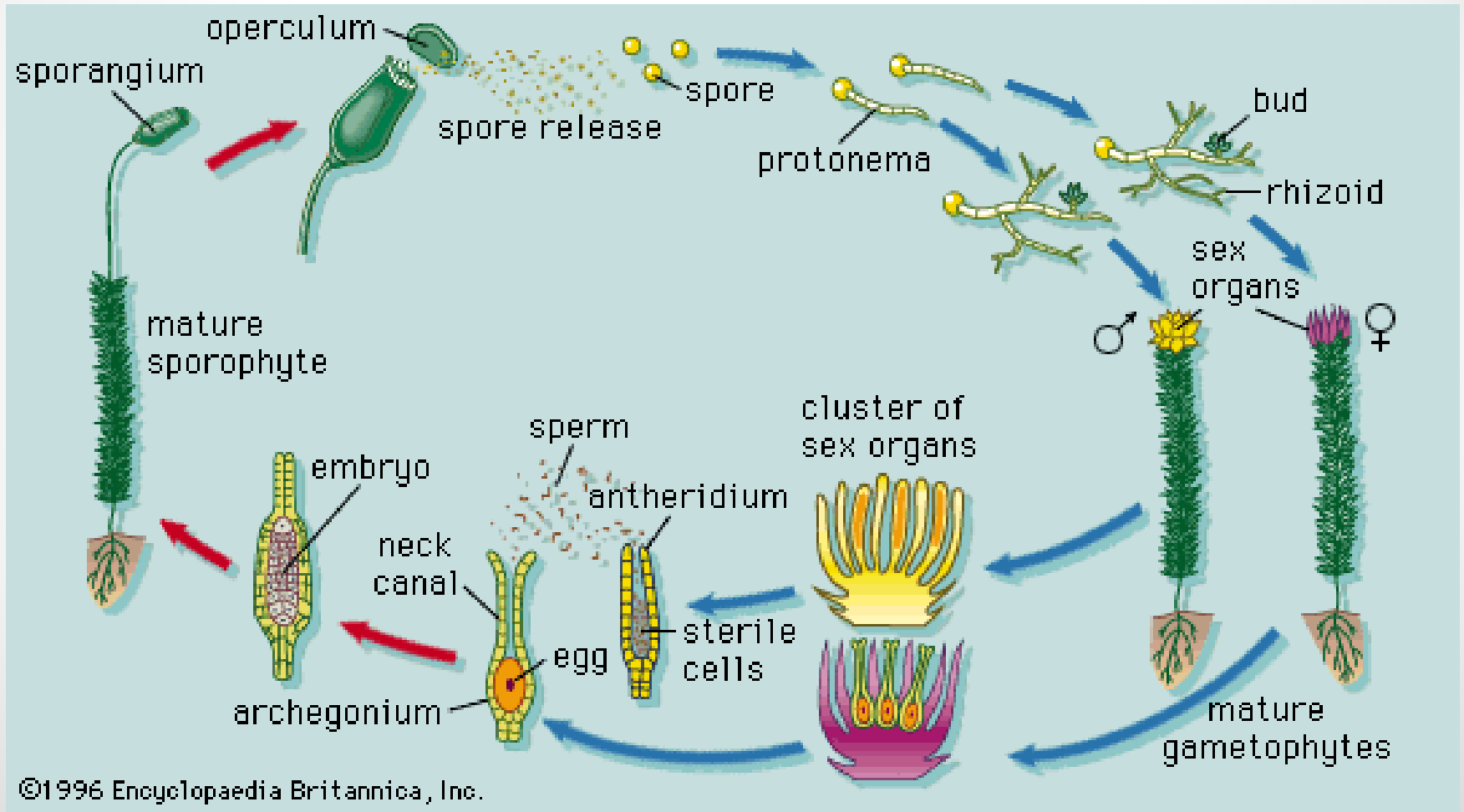
The Bryophytes



Their Solutions:

- Protect the embryo
- Thin waxy cuticle
- Utilizing air for species distribution

Typical Life Cycle

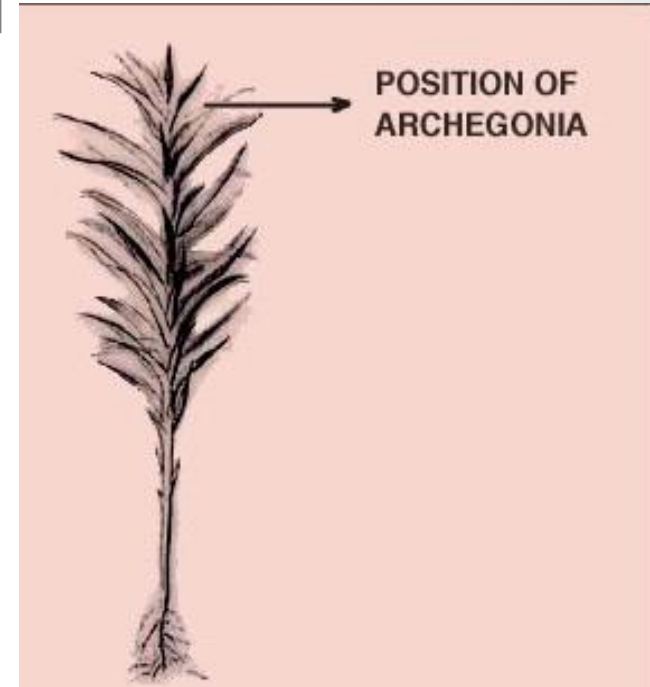


The Bryophyte Life Cycle

- Utilize Alternation of Generations from algae
- **Gametophyte** (n) shows two distinct sexes: the male antheridium and the female archegonium
- This is the dominant stage (gametophyte) and is involved in sexual reproduction

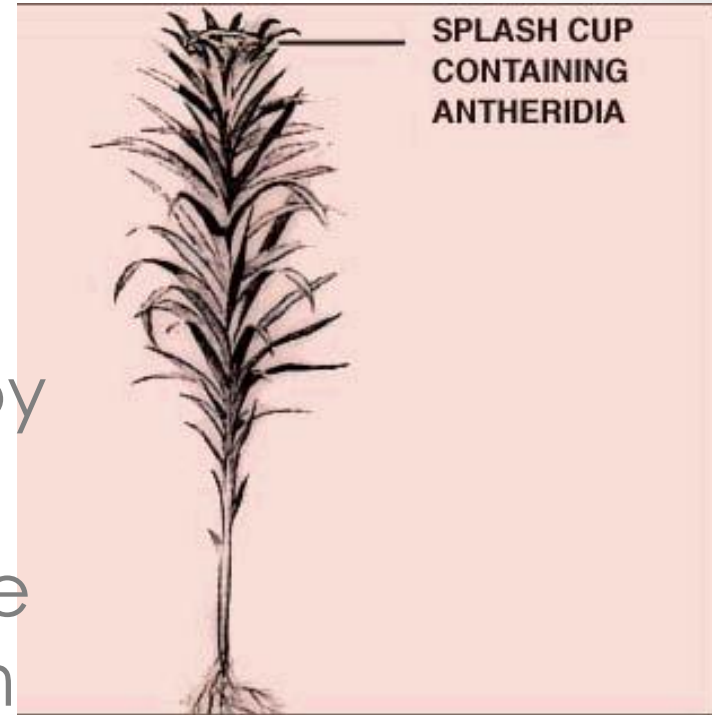
The Archegonium

- This is the female shoot
- It contains the archegonium (at the top of the shoot) which is:
 - dominant
 - haploid (n)
 - produces by mitosis and contains the egg



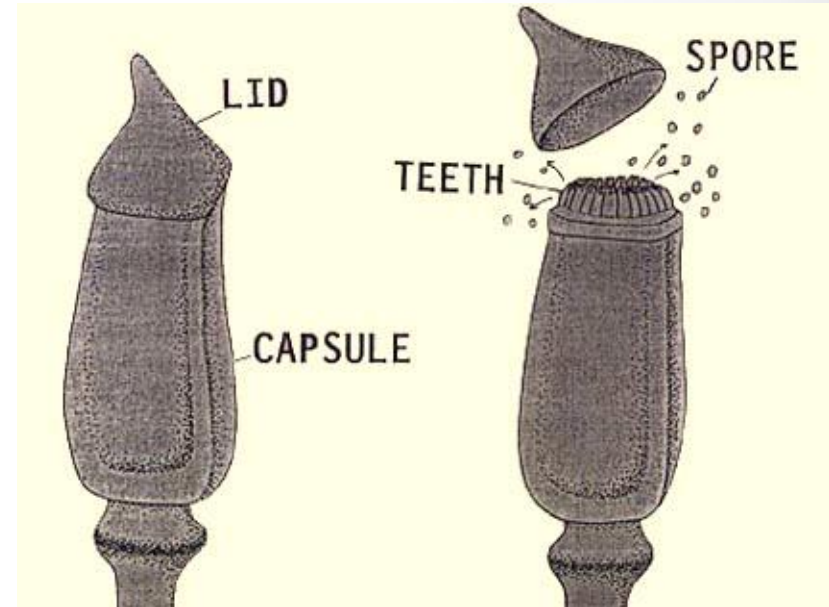
The Antheridium

- The male gametophyte, the antheridium (top of shoot), is:
 - dominant
 - haploid (n)
 - produces motile sperm by mitosis
- Fertilization occurs when there is enough water for the sperm to swim to the egg (in the archegonium)



The Sporophyte

- Fertilization results in a diploid sporophyte which grows out of the archegonium and forms a spore capsule
- Sporophyte contains vascular tissue
- It produces haploid, wind borne spores by meiosis



These spores then germinate to form the gametophytes

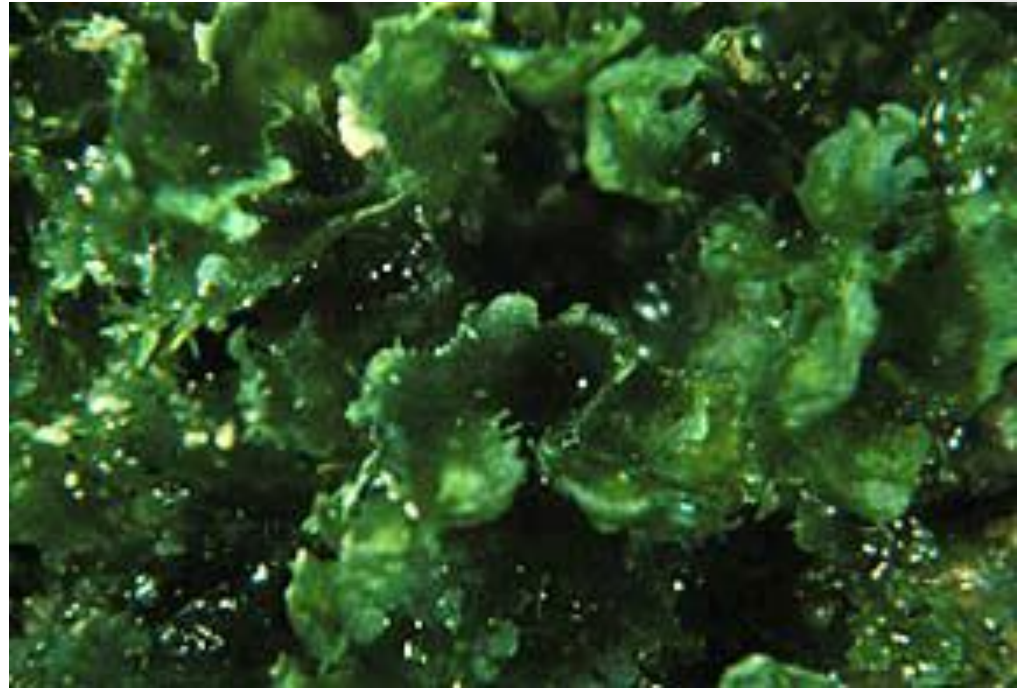
Gametophyte and Sporophyte



Other Bryophytes

The Liverworts

- There are about 8500 species of liverworts
- Live from the arctic to the tropics
- Leafy, close to the ground.
Gametophyte is dominant



Other Bryophytes

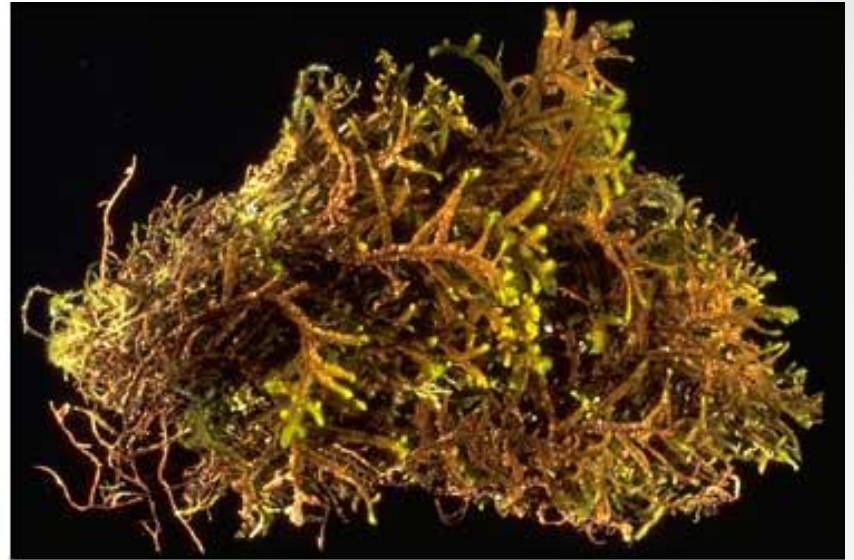
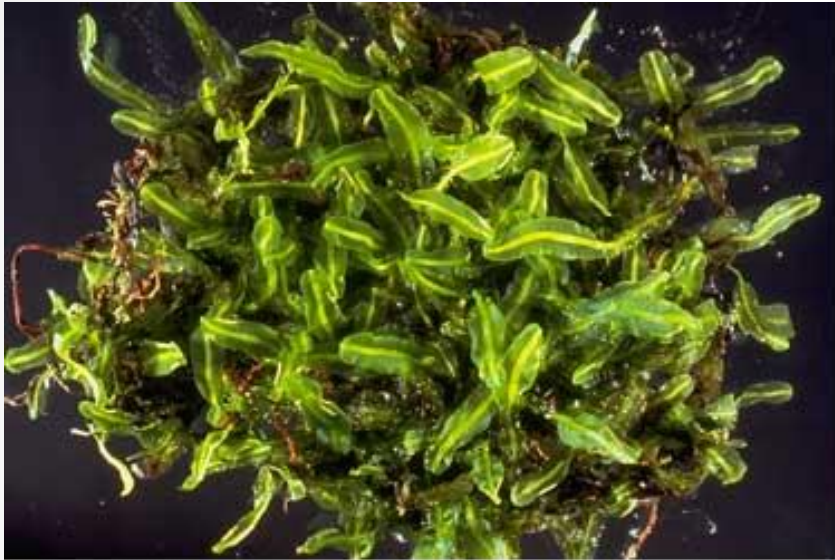


Sporophyte of a hornwort

The Hornworts

- Less common but similar in habitats
- Gametophyte is dominant with sporophyte containing a stalk with primitive vascular tissue

Bryophytes: mosses & liverworts



Peat Bog

“Peat Moss”

