Intro to Bryophytes

COASTAL MAINE BOTANICAL GARDENS

liverworts
peat moss
'true' mosses

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DigitalNaturalist.info

Schedule (?)

- Introduction
- Guided examination of key groups
- Grouping activity with specimens
- Field
- Lunch
- Specimen examination
- Field

Fast Facts

- photosynthetic plants
- non vascular
- leaves are a single layer of cells
- require water for reproduction
- reproduce by spores
- no significant human uses

Taxonomy

Common Names

unfamiliar vocabulary ahead

liverwort vs moss

LIVERWORTS	MOSSES
1. **Dorsoventrally flattened plant body**.	1. **Plant body has a radial symmetry** (excl *Fissidens, Schistostega*).
2. Branching is generally dichotomous.	2. Branching is lateral and extra-axillary.
3. Plants are leafy or thalloid	3. Plants are **always leafy** (excl *Pogonatum* & *Buxbaumia*).
4. Leaves are without a midrib.	4. Leaves often have a midrib.
5. Stem and leaves are undifferentiated tissue.	5. Differentiated into stem-like and leaf-like structures.
6. May bear simple multicellular scales or amphigastria (underleaves).	6. Scales or amphigastria are absent.
7. Rhizoids are unicellular.	7. Rhizoids are multicellular, branched with oblique septa.
8. Sex organs on dorsal surface and develop from superficial cells (excl leafy liverworts).	8. Sex organs develop from superficial cells at the apex of leafy gametophyte.
9. Seta develops rapidly **after** the maturity of spores.	9. Seta grows slowly & is fully developed before the spores mature.
10. Sporophyte is not photosynthetic.	10. Sporophyte is photosynthetic.
11. Sporophyte may lack foot and seta.	11. Sporophyte is differentiated into foot, seta and capsule.
12. Stomata are absent in the wall of the capsule of the sporophyte.	12. Stomata are present in sporophyte.
13. **Columella & peristome are generally absent**.	13. **Capsule contains a sterile columella & peristome teeth** (excl *Sphagnum* & *Andreaea*).
14. Dehiscence of capsule is simple.	14. Dehiscence of capsule is complex.
15. **Elaters are generally present in the capsule** (excl *Riccia*).	15. **Elaters are absent**.
16. Spores germinate directly into a new plant; protonema stage is absent.	16. Spores germinate to form a filamentous protonema; protonema bear buds laterally which give rise to leafy new plant.
17. Leaves lack cuticle.	17. Leaves with cuticle.
18. Lack any transport tisses.	18. Have hydroids and leptoids for transport.
19. Lack stomata; some have pores.	19. Stomata present.
20. Cannot distinguish D-methionine*.	20. Distinguish D-methionine & L-methionine.

Liverwort Major Groups

thalloid

leafy

Conocephalum salebrosum

Liverwort Major Groups

leafy

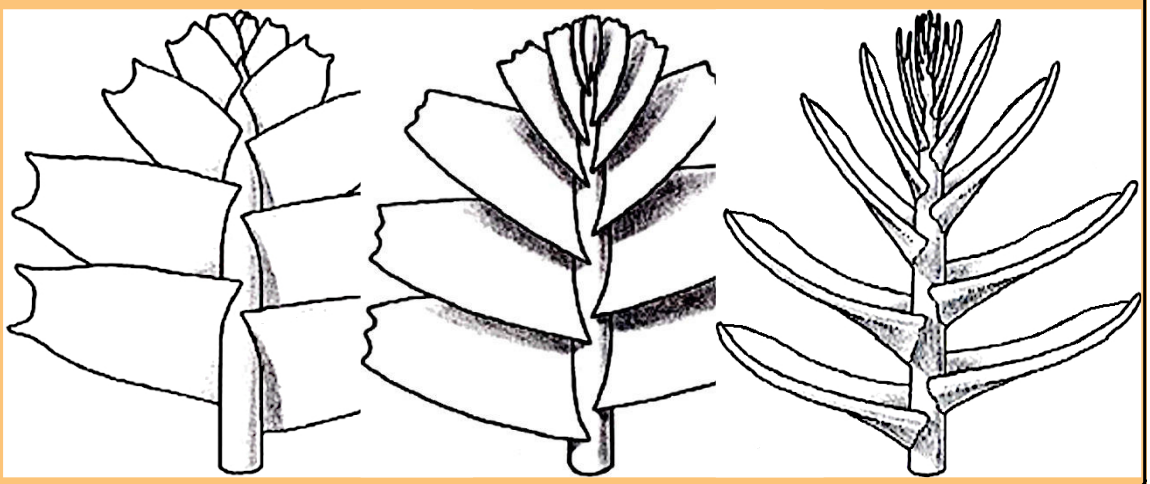
Frullania asagrayana

leafy liverwort - *Bazzania trilobata*

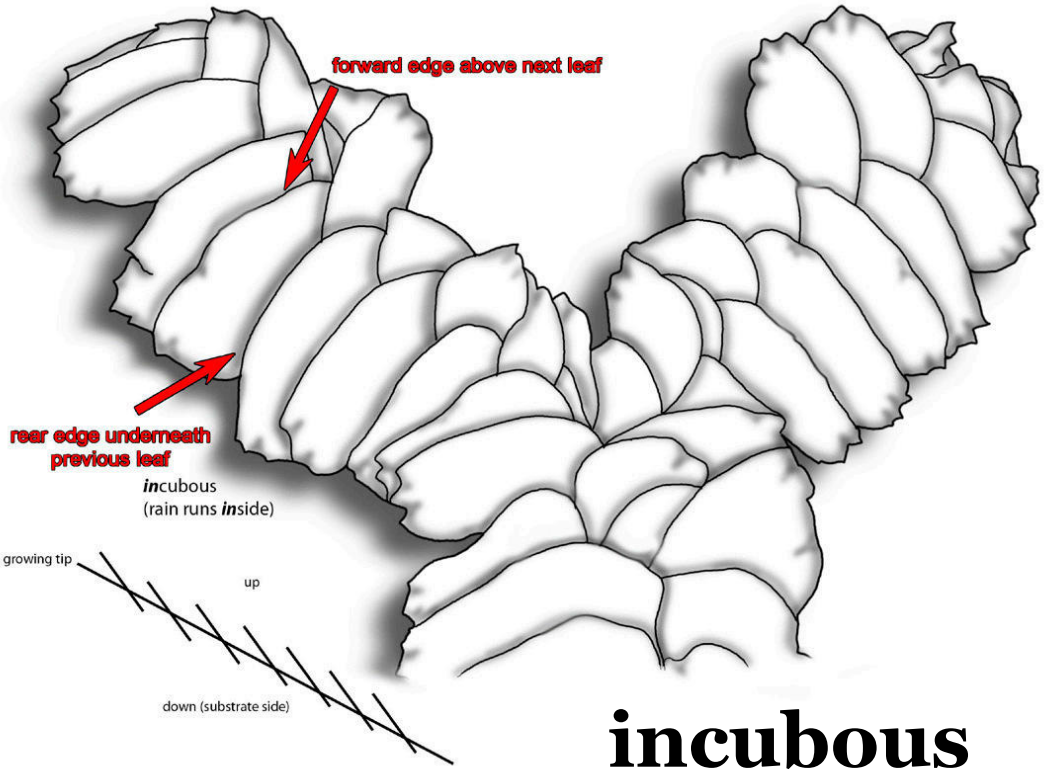
Leafy Characteristics

- leaf insertion
- habitat
- leaf margin
- underleaves
- perianth
- gemmae

Leaf Insertion

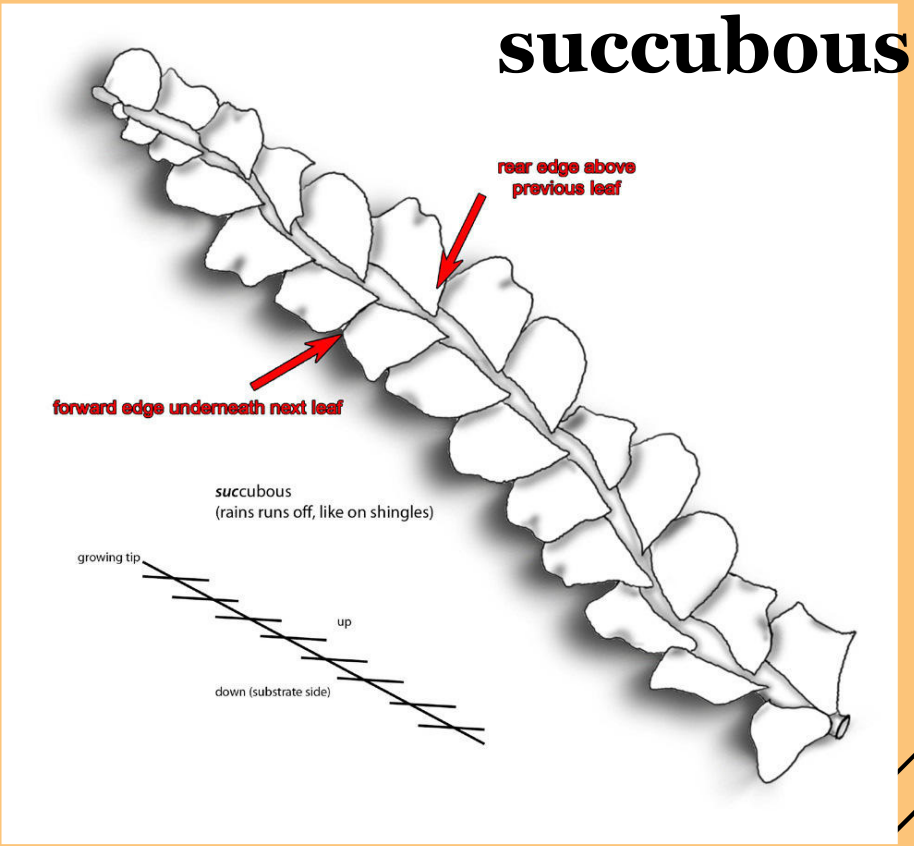


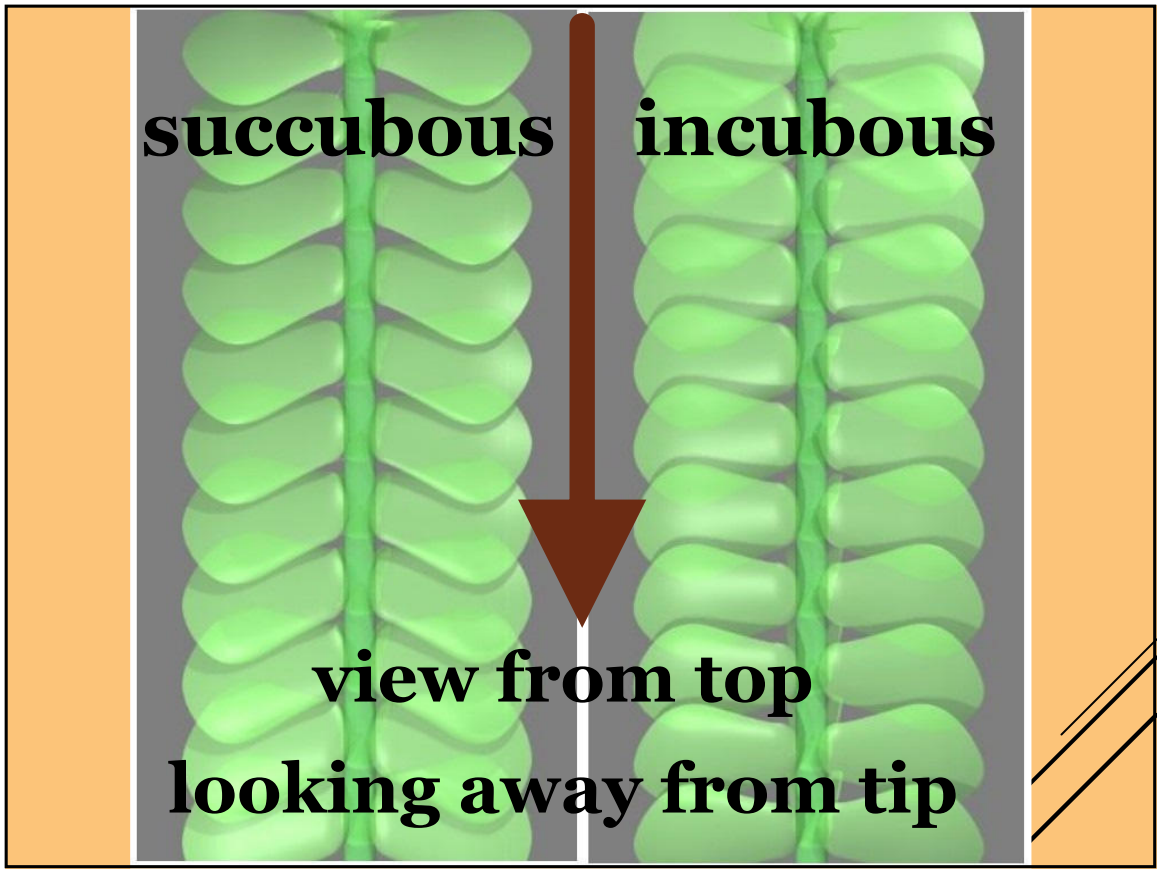
incubous succubous transverse



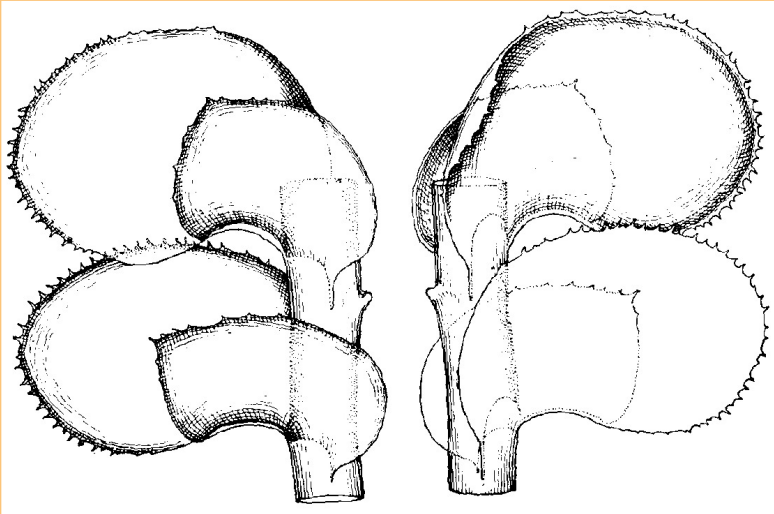
incubous

succubous



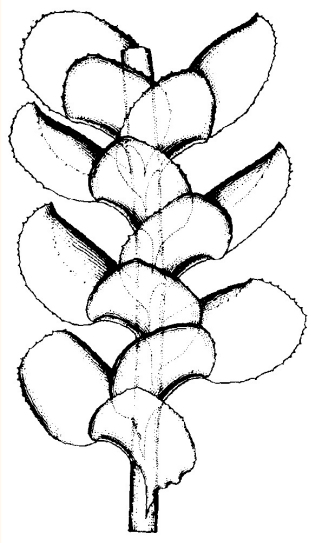

succubous
incubous
view from top
looking away from tip

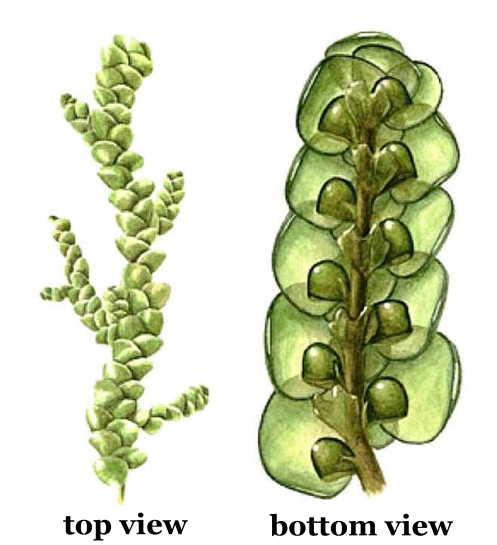
Leaf Insertion



complicate-bilobed

Leaf Insertion



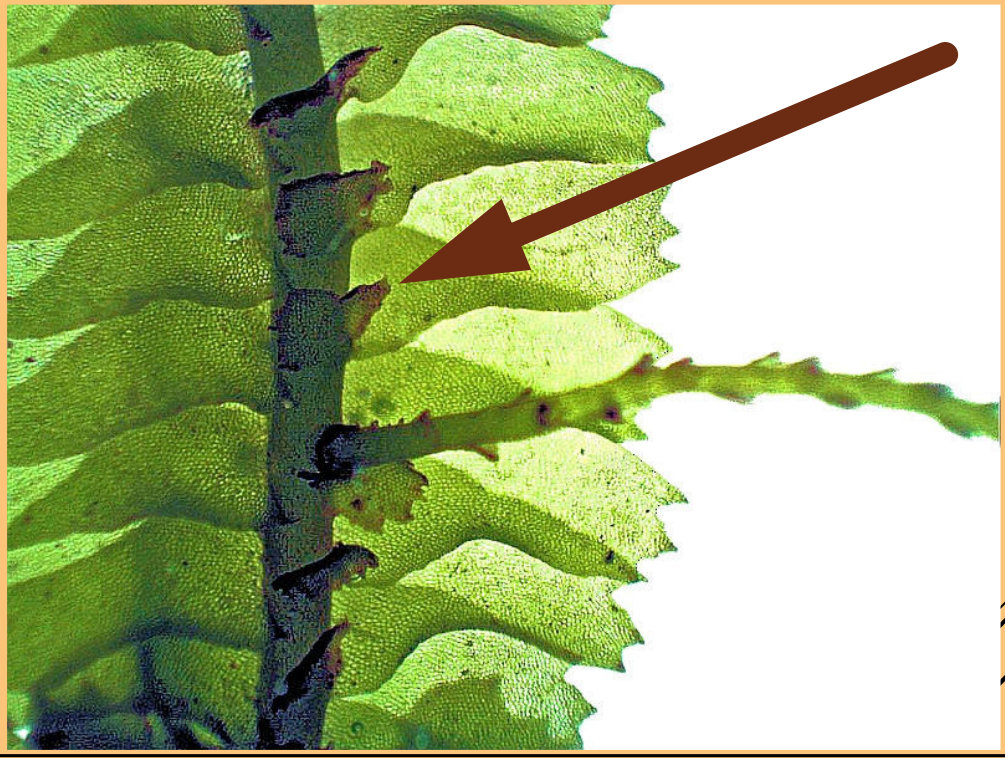


complicate-bilobed


0.1 mm
Frullania asagrayana


Scapania nemorea

Bazzania trilobata



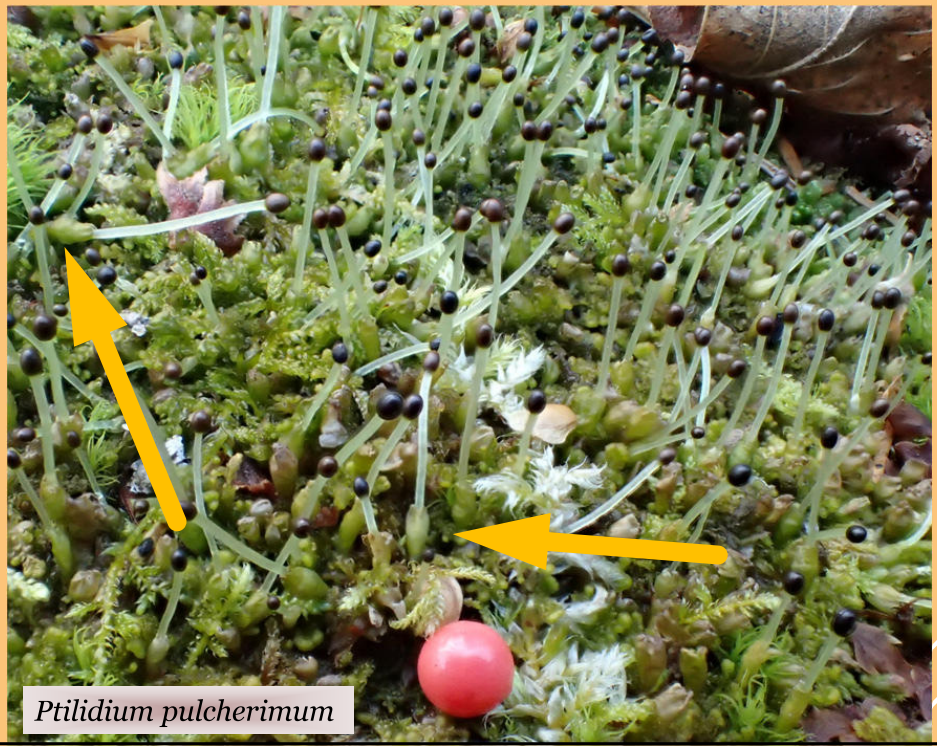
perianths

Frullania asagrayana

perianths

Lophocolea heterophylla

perianths



Ptilidium pulcherimum

Liverworts

- **~270 species**
- **many are small, most are tiny**
- **compound microscope required**
- **often accidental discoveries**

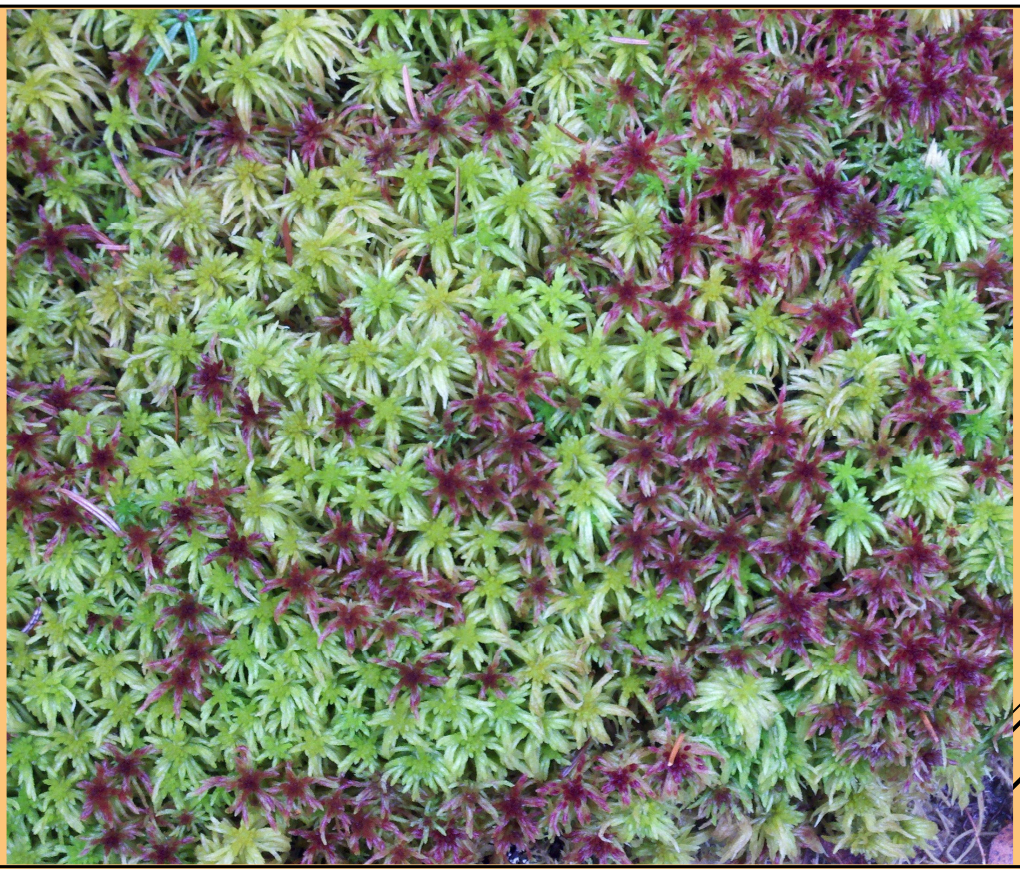
Peat Moss – *Sphagnum* sp.

Sphagnum palustre

Sphagnum characteristics

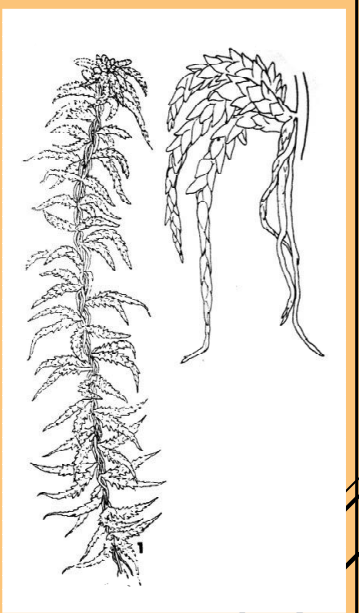
- Capitulum
- Hanging & spreading branches
- Imbricate leaves
- Stem leaves*
- Hyaline cells*

Peat Moss – *Sphagnum* sp.

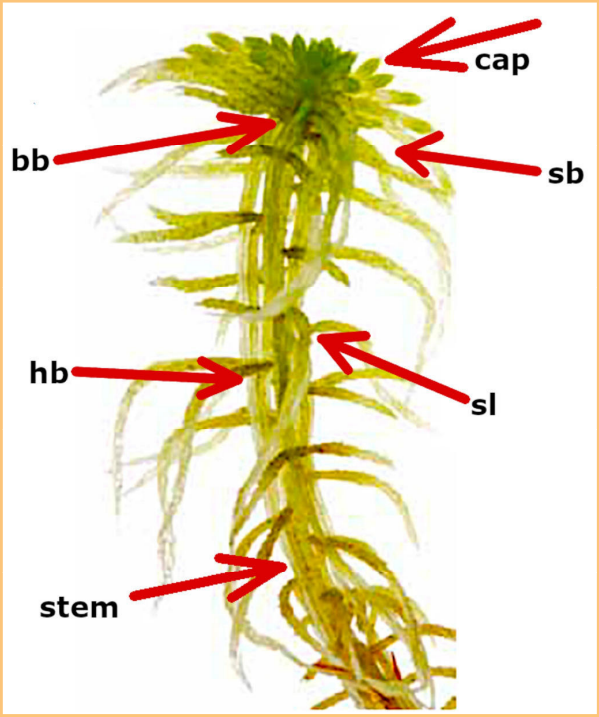


Peat Moss – *Sphagnum* sp.

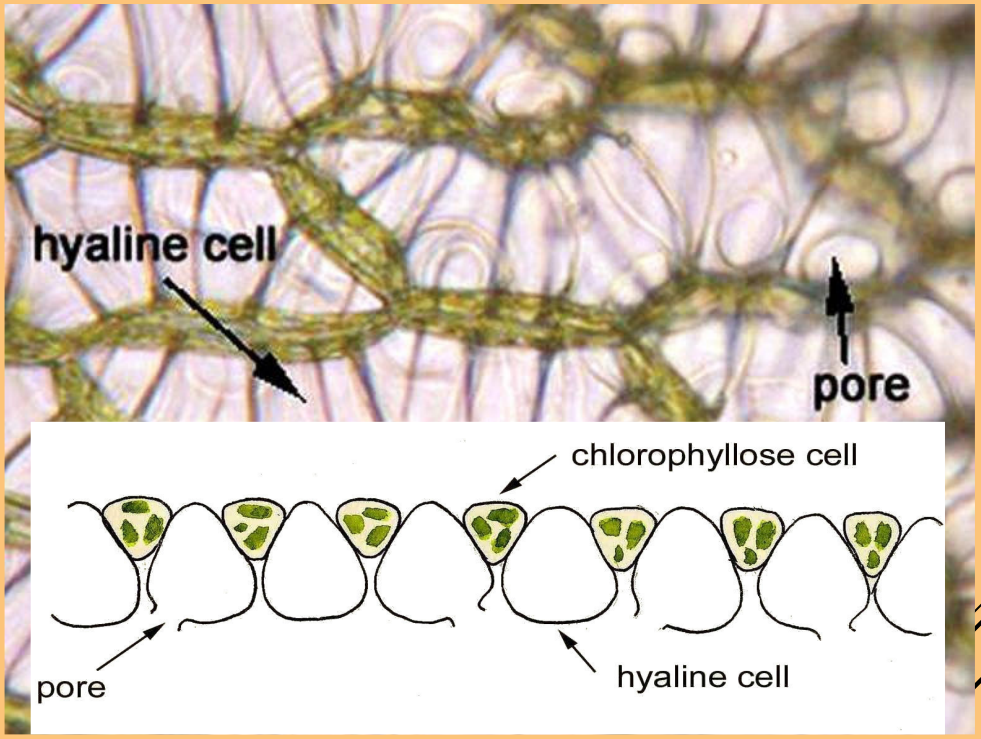
Sphagnum cupidatum



Peat Moss – *Sphagnum* sp.



Peat Moss – *Sphagnum* sp.



Sphagnum sp.

Sphagnum capillafolium

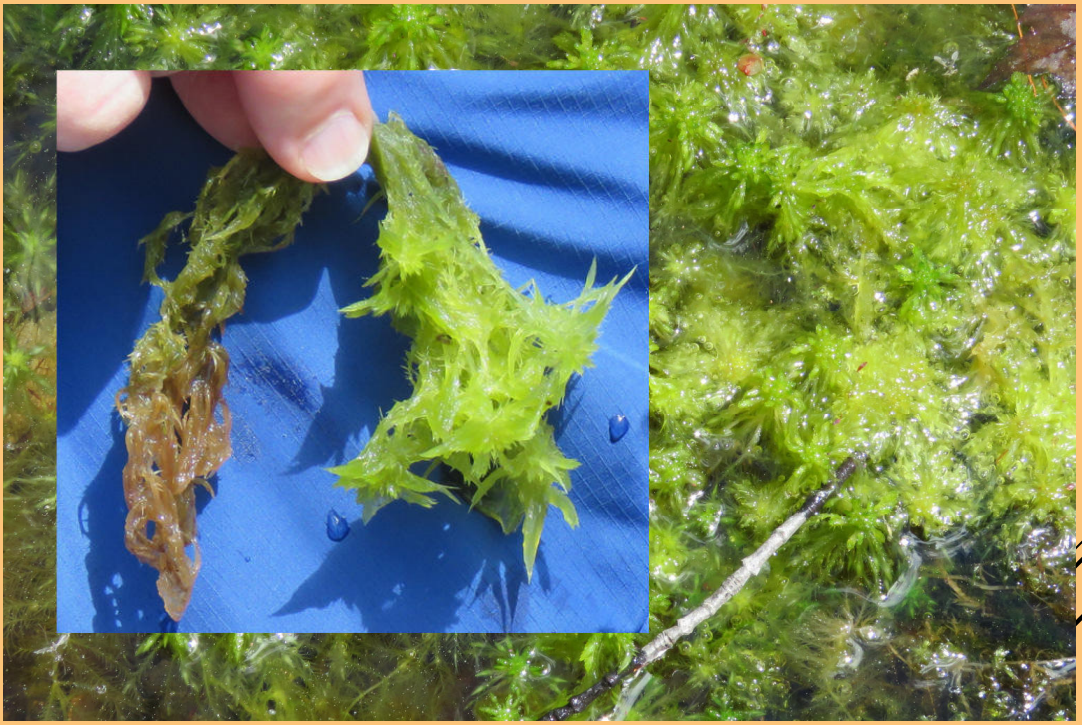
Sphagnum subsecundum s.lat

Sphagnum compactum

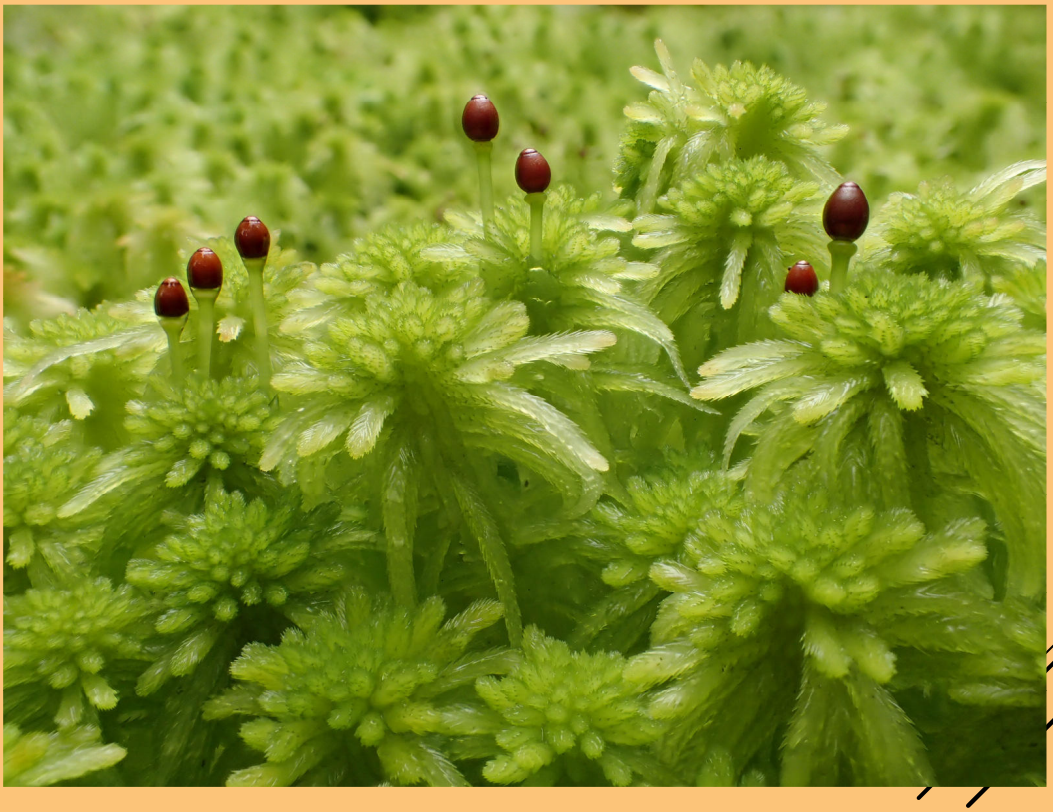
Sphagnum palustre

Sphagnum squarrosum

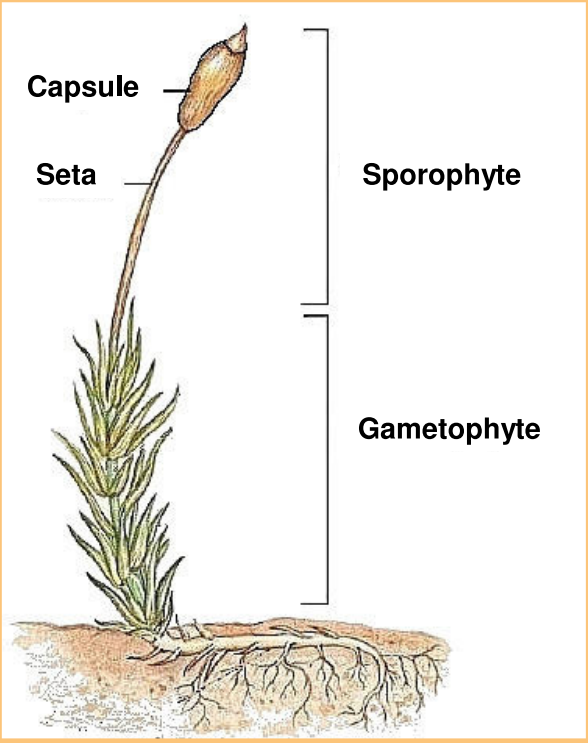
Sphagnum cuspidatum



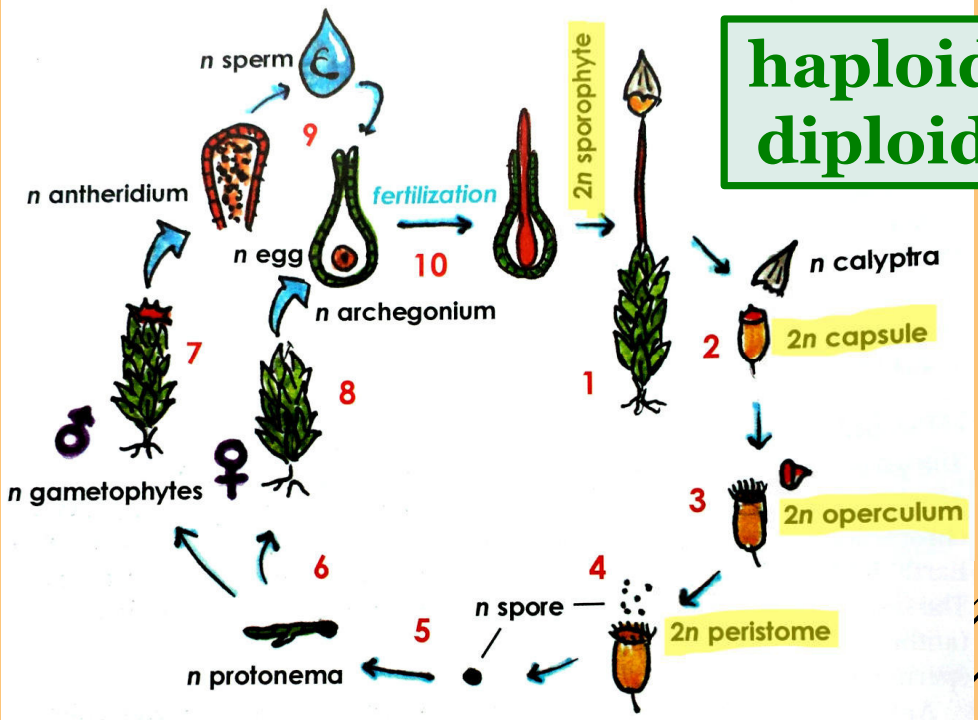
Peat Moss – *Sphagnum* sp.



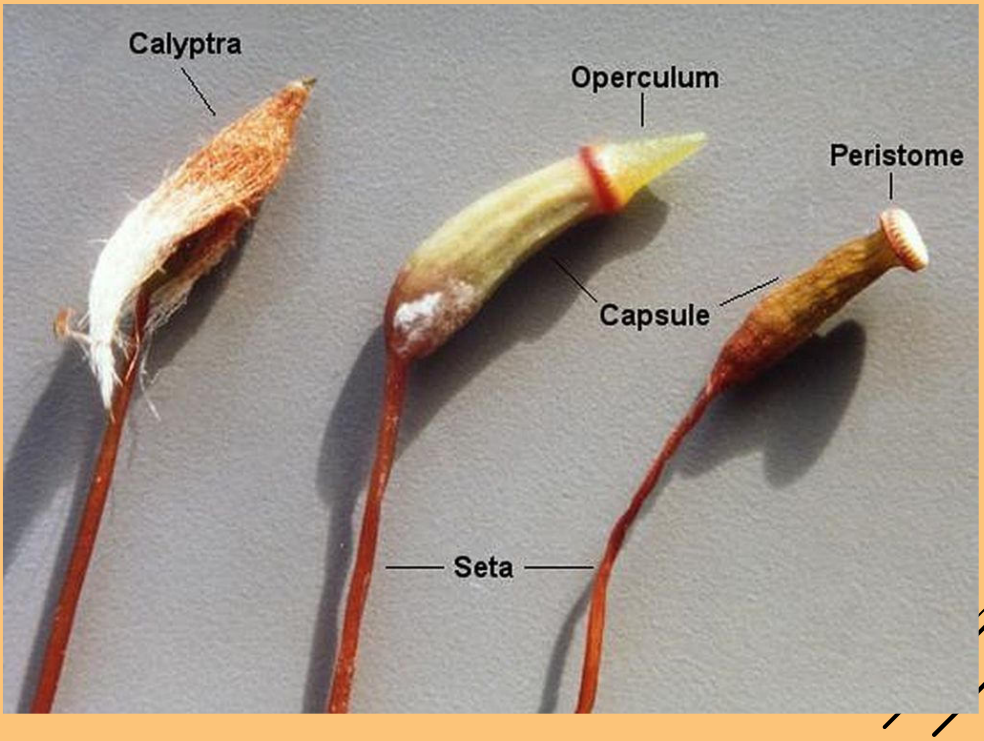
gametophyte vs sporophyte



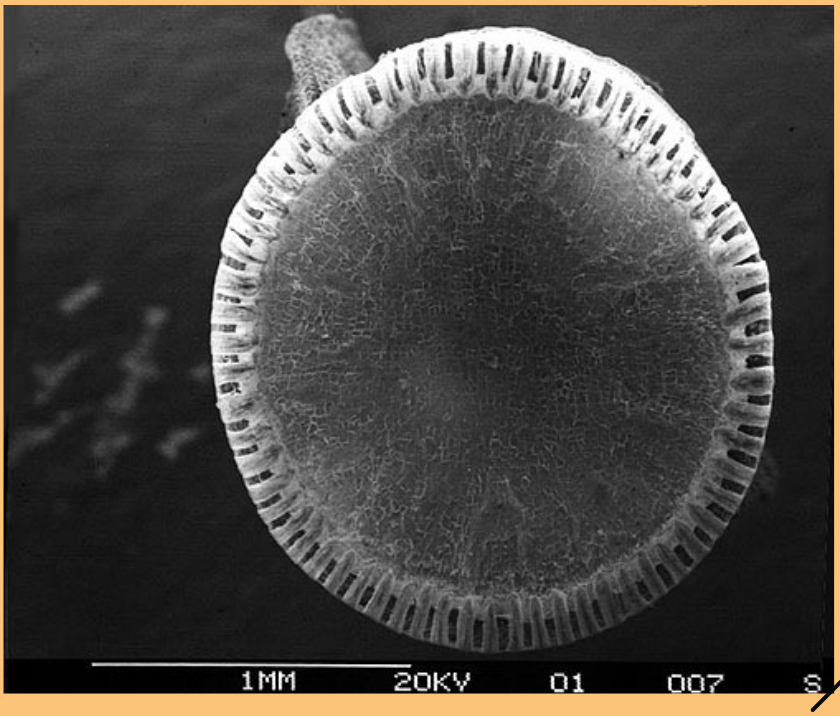
moss reproductive cycle



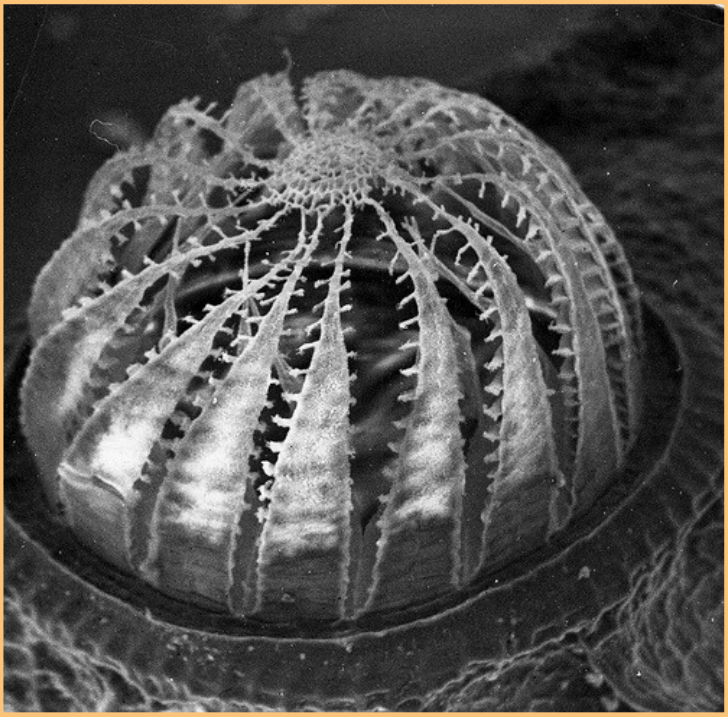
sporophyte terminology



Polytrichum peristome



Funaria peristome



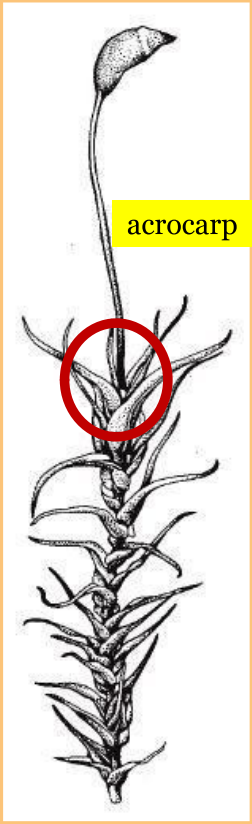
Moss Major Groups

Acrocarpous

Sporophytes emerge from the tip of the stem.

Pleurocarpous

Sporophytes emerge from side of the stem.



'typical' sporophytes

Moss Major Groups

Acrocarpous

form rarely branched tufts and cushions

Pleurocarpous

form highly branched mats and carpets

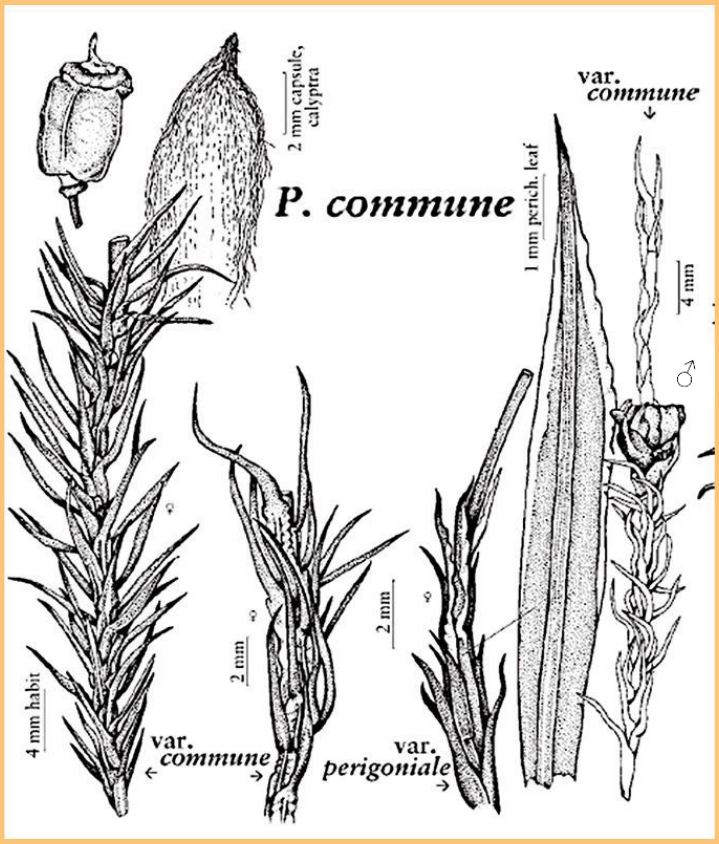
Moss Characteristics

- **sporophyte location**
- **substrate & habitat**
- **leaf shape & margin**
- **costa (midrib)***
- **capsule characters***
- **brood bodies or paraphyllia***
- **alar cells ****

acrocarpous moss
Polytrichum commune

Acrocarpous Moss

- **Sporophytes emerge from the tips of the plant.**
- **Upright growth habit, forming a mounded colony.**
- **Rarely branched.**


P. commune
2 mm capsule, calyptra
var. commune
1 mm perich. leaf
4 mm
♂
4 mm habit
2 mm
var. commune
2 mm
var. perigoniale

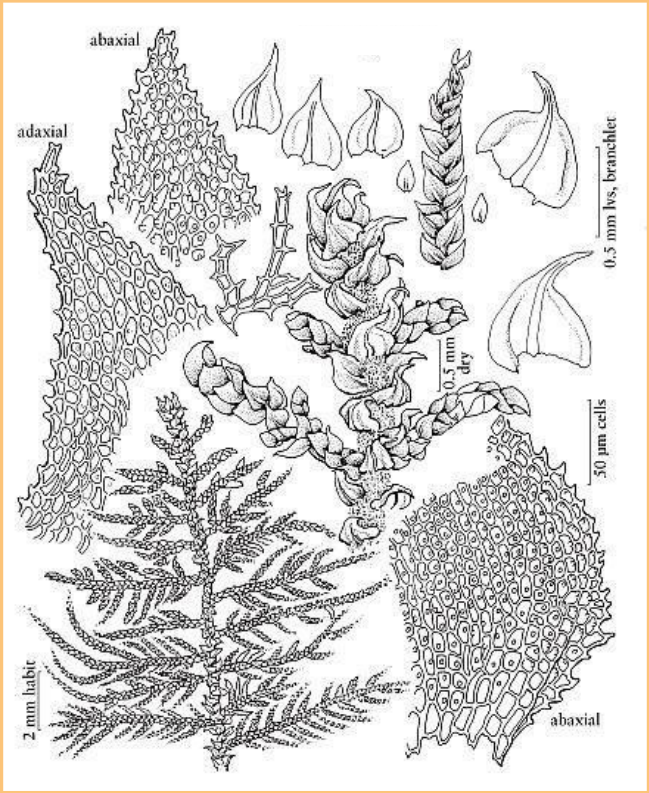

lamellae

Pleurocarpous moss

- **Sporophytes emerge mid stem.**
- **Form spreading carpets; prostrate growth habit.**
- **Freely branching; creeping.**

pleurocarpous moss

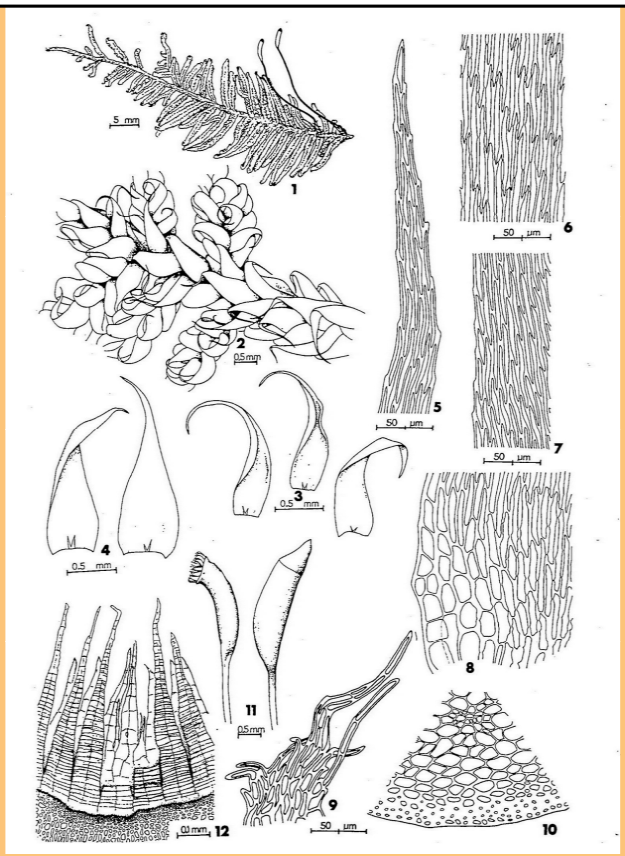
Thuidium delicatulum



Thuidium delicatulum

pleurocarpous moss

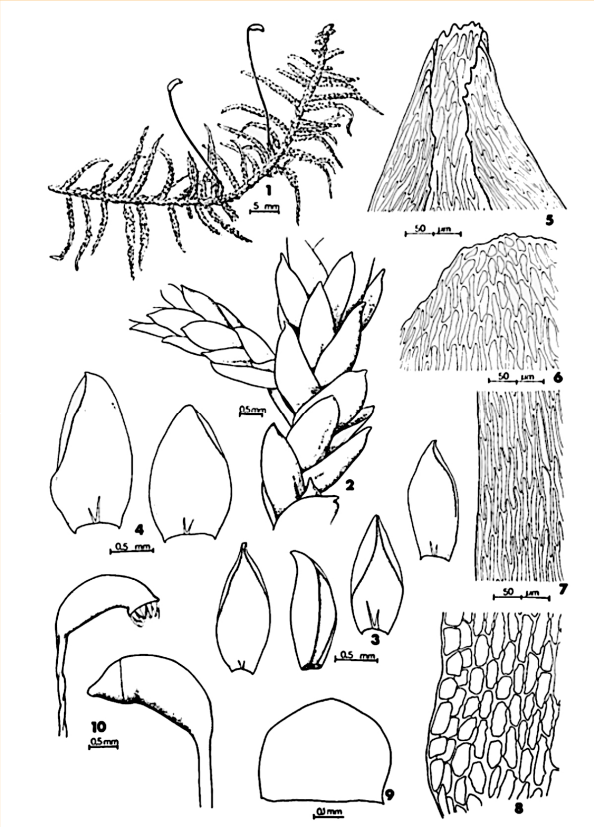
Cyrtohypnum minutulum



Hypnum imponens

pleurocarpous moss

Pleurozium schreberi



Pleurozium schreberi

Vocabulary Summary

thalloid & leafy liverworts

complicate-bilobed, incubous, succubous, transverse capitulum, hanging/spreading branches, stem leaves

sporophyte & gametophyte

seta, capsule, peristome, calyptra

acrocarp & pleurocarp

scientific names

liverwort or moss?

If **liverwort:** thalloid or leafy?

If **moss:** acrocarp or pleurocarp?