Laboratory 5: Mosses Part 1.

Mosses differ fi	rom liverworts and hornworts by a sui	te of characters, but share traits v	vith both or one
of them. They	evolved from a unique common ancest	or with liverworts and the combi	ned lineage is
called	because they share	in the sporophytic boo	ly.
This lab allows	you to become familiar with vegetativ	e and sporophytic traits discussed	l in lecture.
You should be a	able to convince yourself that mosses	ike other bryophytes have an alte	ernation of
generations, wi	th the sporophyte attached to the gar	netophyte.	
•	ve body of mosses		
The gametophy	rte of mosses is always	and never	as in
some liverwort	s and all hornworts. The photosynthet	ic appendages/organs of mosses	are highly diverse
in outline, arch	itecture, ornamentation,		
Hedwigia ciliat	a is a local perennial moss growing in	rocks. <i>Climacium americanum</i> is	a distinctive moss
with a subterra	nean stem and erect branches bearing	g a canopy of secondary branches	, giving the plant
the look of a m	iniature tree.		
Take a stem/br	anch of each and remove a few leaves	, trying to gently pull them off the	e axis so as to get
a complete leaf	f. Transfer one leaf of each to a new sl	de, in a small drop of water and t	ry to align the
leaves before c	overing the drop with the cover slip. Y	ou should have a complete leaf o	f each species on
the slide. What	distinguishes both leaves from typical	flowering (e.g. oak) leaves?	
Chose traits by	which the leaves differ (1-4) and whic	h they share (5-8)	

Trait	Hedwigia	Climacium

Sketch the leaves highlighting the similarities and differences.
Poikilohydry
One nature shared by many mosses and other bryophytes is poikilohydry (poikilo: variable; hydry:
hydration), the ability to control the state of internal hydration based on external water availability; i.e.
absorb and release water through the surface of the plant body. Take a sample of Syntrichia papillosa
growing on bark. Place under the dissecting scope and add a drop of water and describe what happens:
Also, note the unusual "structure" that became apparent following hydration. What may these be?
Are these reproductive structures? Are these clonal structures? Justify (this is the critical part!)
What may be the fitness advantage of this strategy?
Would you predict that this is species dioiocous or monoicous?

Thuidium delicatulum is common moss on 'dry" soil in open habitats or on rocks and logs in forests. The	ıe
gametophyte is typically branched like a feather, but this sample was left in the growth chamber, and	
while the main axis continue to grow, branches were not formed. The axes grew upright and develop	
numerous rhizoids. The stem is also covered by other filamentous structures.	

Take one axis and place on a slide and cover with water and slip and observe under the compound scope. Observe the rhizoids. How do they differ from those of liverworts and hornworts?
Describe the other filaments on the stem. How do they differ from rhizoids?
Given those differences, what may be their function?

We may discuss in an upcoming lecture that these may also be involved in holding external water .

Atrichum crispulum is a local species growing	in shaded river banks for example.
This moss belongs to the family of haircap mos	sses, which is characterized by features of its leaves.
Gently remove a couple of leaves from the ste	em and place two of them in a drop of water, one facing up
and one facing down. Compare the two sides of	of the leaf. What are obvious features you notice?
	vater facing down. Make a cross section of the leaf! Gently e and section by running your razor blade against the
needle. You do not need a perfect section but	one thin enough for it to lay on its side. If you are
successful, you should see a unique feature of	this leaf! What may be the function of these structures?
	Note also the anatomy of the costa (midrib). Are all
	cells similar or are they organized in "tissues"?
Return to the stem and remove most or all rer	maining leaves, clean your slide and place the stem in a
small drop of water. Make a transverse section	n of the stem.
Are the cells similar as you move from the out	er layer inward?
How do the cells differ? Sketch a pie-section o	f the stem to highlight the organization of the stem.
	

Life cycle

Plagiomnium cuspidatum (Hedwig) T. Koponen is a perennial local moss growing on soil in mesic
habitats. The species undergoes sexual reproduction in the fall and the immature sporophytes
overwinter and resume their maturation in the spring. We have collections of the population made
(today) and last spring, that exhibit these two developmental stages.
The winter sample bears sporophytes in the spear stage, whereas the spring sample has fully developed
sporophytes. Observe under the dissecting scope and describe how they differ.
Can you distinguish the calyptra on the winter sporophyte? What is the calyptra?
Sketch the two sporophytes and annotate the parts.
How does this mode of development differ from that observed in liverworts?
What may be the advantage of the mode of sporophyte development in mosses?
Take on stem/branch bearing a spear shaped sporophyte. Determine the sex of this gametophyte, i.e., whether the gametophyte is dioicous or monoicous. Where would you look? Justify your answer.