Your name: _____ Total out of 39: _____ (_____) = ____/15%

EEB 3240 lab Assessment 1 (worth 15% of final grade)
Covering all bryophyte-focused labs: 1–7
Wed. March 8, at 1.30PM. ANSWER KEY

The material you are asked questions about comes as permanent slides or pant/tissue. You should feel free to make your wet mount for observation under the compound scope.

(__/5 pts) Specimen A: microscope slide.
Describe four significant morphological traits that you can observe or infer from this sample and determine what this sample is (remember too much light can obscure traits!).
1. Seta

2. Capsule wall

3. Spores

4. Elaters

5. (bonus) No columella

To which lineage of bryophytes (M, L or H) does this specimen belong? **Liverworts**

What generation does this sample represent? **Sporophyte / diploid**

(__/ 4 pts) Sample B: live tissue.
List four traits that this sample exhibits (or that you can see it does not) and that support you assigning the specimen to either mosses, liverworts or hornworts. You may need to examine a portion of it under the compound scope to examine cell features.
1. Thalloid

2. Multiple chloroplasts per cell

3. No pyrenoid

4. No cyanobacteria endosymbiont

To which lineage of bryophytes (M, L or H) does this specimen belong? **Liverworts**

Bonus: What more specific lineage within M, L or H does it belong to? **Simple thalloids**

(__/ 3 pts) Specimen C: live tissue.
Describe two traits that you can observe from this sample that will allow you to unambiguously determine what this sample is. You may need to examine a portion of it under the compound scope to examine cell features.
1. One chloroplast per cell with pyrenoid

2. Nostoc endosymbiont

To which lineage of bryophytes (M, L or H) does this specimen belong? **Hornwort**

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(__/ 6 pts) Specimen D: live tissue.
Describe **ALL** the parts and traits that you can observe from this sample and that will inform you what organ this is and by what lineage this is developed.

1. Seta

2. Capsule wall

3. Stomata

4. Spores

5. Columella

6. Operculum

7. (bonus) Peristome

What generation of the life cycle is this? **Sporophyte / diploid**

To which lineage of bryophytes (M, L or H) does this specimen belong? **Mosses**

(__ / 3 pts) Specimen E: microscope slide.

What is this organ? **Calyptra**

How can you tell based on what you see? **Archegonial neck remnant at the tip.**

_____

_____

What lineage(s) of bryophytes develops it? **Mosses & liverworts**.

(__ / 5 pts) Specimen F: microscope slide.
Describe three traits of the leaves (including potentially traits that they do not have) or leaf types of this specimen and that could be used to determine what bryophyte lineage this specimen belongs to.

1. No costa

2. Leaf lobed

3. Underleaves present and differentiated

To which lineage of bryophytes (M, L or H) does this specimen belong? **Liverwort**

Which of the above traits unambiguously supports your answer: **Leaf lobed**

_____

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(__ / 5 pts) Specimen G: microscope slide.
Your slide holds two cover slips and hence two mounts: a) a whole leaf and B) a cross section of the leaf (you may have to look for it, but it is there).
Describe 6 traits of the leaf that may help assigning it to a lineage of bryophytes.

1. Costa

2. Lamellae on costa

3. Toothed margin

4. Tooth on leaf surface

5. Differentiated marginal cells

6. Many chloroplasts per cell

To which lineage of bryophytes (M, L or H) does this specimen belong? **Mosses**

Which of the above traits **unambiguously** supports your answer: **Costa**

(__ / 2 pts) Specimen H: live tissue.

Examine this specimen (ideally just remove at least one leaf on a slide with a cover slip) under the compound scope. This specimen shows one feature that unambiguously reveals whether this is a hornwort, moss or liverwort. What is the trait? **Oil bodies** What lineage does this belong to? **Liverworts**.

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(__/ 6 pts) Reading questions

1. Study by Villarreal et al. on pyrenoids

(__ / 3 pts) What are pyrenoids and what lineage do they characterize? **Areas in chloroplasts where RUBISCO is concentrated, in algae and hornworts.**

_____

(__ / 3 pts) Describe one major outcome / result of the study by Villarreal et al.: **Different possible answers; see abstract**

2. Study by Menand et al. on rhizoids

(__ / 2 pts) What are rhizoids and what lineages **of land plants** produce them? **Rhizoids are uniseriate filamentous organs, that can be composed of one or more cells; produced by the gametophyte, of bryophytes and ferns.**

(__ / 1 pt) What are rhizoids homologous to in other land plants? **Root hairs of the sporophyte of vascular plants**

(__ / 3 pts) What evidence was used or provided leading to this conclusion? **Phylogenetic evidence of shared ancestry of "rhizoid and root hair genes" Knocking out root hair "genes" in a flowering plant, insert rhizoid gene of a moss, thereby restoring function, i.e., root hair development.**