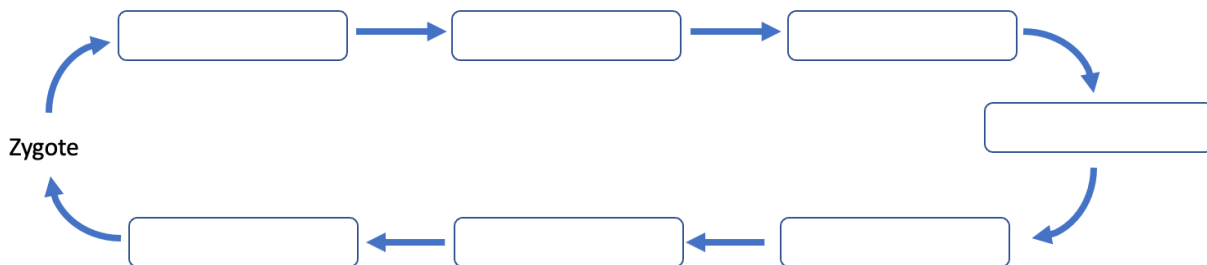


Your name: \_\_\_\_\_

Total out of 81: \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_/12%

**EEB 3240 Assessment 1 (worth 12% of final grade)**  
**Lectures covered: 1–7**  
**Wed. March 1<sup>st</sup> at 1.30PM.**

(\_\_/5.5 pts) Fill in the boxes of life cycle of a sexually reproducing embryophyte: it should highlight that this is for an embryophyte, include seven stages (in addition to zygote in boxes). The life cycle should reflect the alternation of generation and **identify the PROCESSES** (label arrows) linking the alternating generations. Clearly **mark the ploidy** of the generations (draw a line across the cycle and mark both halves).



Stages: embryo-sporophyte-sporangium-spore-gametophyte-gametangium-gametes;  
processes: meiosis and syngamy (or fertilization)

(\_\_/2.5 pts) What stages are unicellular? **Spore, zygote and gametes**

(\_\_/2 pts) List the stages of the life cycle that can be dispersed? **Spores and gametes**

(\_\_/2 pts) What is the dominant generation in a bryophyte? **gametophyte**

(\_\_/2 pts) Justify your answer (in other words, why did you choose that particular generation?)  
**Gametophyte is vegetative, independent generation; sporophyte is attached to it and shorter lived.**

(\_\_/4 pts) What are the two main functions of the gametophyte in a bryophyte?

- 1. vegetative growth – photosynthesis ...**
- 2. as the word indicates, produce gametes**

(\_\_/2 pts) How does the life cycle of a bryophyte reflect **matrotrophy**?

**The sporophyte is attached to the maternal gametophyte, which is feeding it.**

(\_\_/3 pts) Describe the two lives or functions of the archegonium during the life cycle of a **moss**.

- 1. holding on to the egg**
- 2. protecting the apex of the sporophyte during the elongation of the seta, i.e., prior to capsule maturation**

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( \_\_/6 pts) Compare and contrast 3 vegetative traits that **distinguish** hornworts from mosses.

Trait	Hornworts	Mosses

( \_\_/8 pts) Compare and contrast 4 sporophytic traits that **distinguish** hornworts from liverworts

Trait	Hornworts	Liverworts

( \_\_/2 pts) Which lineages of bryophytes produce stomata? [Hornworts and mosses](#)

( \_\_/2 pts) In these lineages, what organ develops stomata? [Capsules](#)

( \_\_/2 pts) What is the function of stomata in these lineages? [Allow for the spore mass to dry out to optimize “dispersal ability”.](#)

( \_\_/2 pts) Assuming that one lineage does not produce stomata, how else may the function you just described, accomplished? [The capsule wall may be thinner, have less of a cuticle, such that water escapes. \(for your info: A good example is liverworts, the sporophyte is protected by maternal tissues, developing within a protective layer of leaves or thallus growth, and dehydrates following the elongation of the seta\).](#)

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(\_\_/2 pts) What is sexual reproduction in bryophytes depended on? **Water as the sperm cells are motile.**

(\_\_/2 pts) How do some complex liverworts overcome this constraint? (topic of video watched) **Ejecting sperm mass into the air for the sperm cells to be carried away from the paternal plant. BG: this question was not rightly worded and will be deleted from the assessment.**

### **The “arthrodontous peristome”**

(\_\_/2 pts) What lineage develops it? **Mosses, more specifically Bryopsida.**

(\_\_/2 pts) What defines it? **Teeth are composed only of adjacent cell plates from either the OPL and PPL or PPL and IPL.**

(\_\_/2 pts) How many peristomial cell layers contribute to it? **3**

(\_\_/3 pts) Provide two traits by which major arthrodontous peristome architectural types differ.

1. **Pattern of cell wall deposition and resorption (dotted lines in diagrams, ≠ diplo- and haplolepidous for example)**

2. **Pattern of cell divisions in IPL (note other traits may be proposed and be considered)**

(\_\_/2 pts) What is its function? **Control and thereby spread spore release over time.**

(\_\_/2 pts) How does it function? **The teeth are hygroscopic and can change their stature by bending outward or inward, with changes in atmospheric moisture; the thickness of the outer versus the inner wall governing the direction of bending upon hydration.**

(\_\_/4 pts) Define what a module of a moss is, by integrating the following terms in your definition: apical cell, derivatives, metamers, leaf initial and branch initial).

**A module is an architectural unit or axis of the plant body composed of cells derived from one apical cell. A module is a fundamental building unit with an apical cell giving rise to derivatives, each dividing to yield a metamer comprising a leaf and a branch initial.**

(\_\_/2 pts) Based on your definition what is meant by modular growth?

**Modular growth simply refers to growth by repetition of a fundamental unit (e.g., a branch is merely a module developed from a stem (a module itself).**

(\_\_/2 pts) How bryophytes acquire the two main substrates for photosynthesis?

**Water and carbon dioxide are both acquired through the surface of the plant body.**

(\_\_/2 pts) How do **liverworts or hornworts** acquire other nutrients?

**Members of these two lineages can host mycorrhizal fungi which are supplying the plants with water and mineral nutrients.**

(\_\_/2 pts) How do hornworts acquire organic nitrogen? **Hornworts host endophytic nitrogen fixing cyanobacteria.**

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( \_\_\_/1 pt) What unique morphological adaptation enable hornworts to “do” this? Think of a trait that distinguishes hornworts from other bryophytes and that is linked to this “mode of nitrogen acquisition).

Mucilage clefts, provide an opening on the lower surface of the thallus for cyanobacteria to enter the plant body.

( \_\_\_/2 pts) The peristome is potentially formed by 95% or so of mosses. Briefly discuss why this could be seen as a key innovation (I suggest you start by saying what a key innovation may be; if you do not know, then discuss why you think this may be such an important trait). The maintenance of the peristome during the diversification of mosses, or the evolution (innovation) of a peristome prior to the main diversification of mosses, may suggests that its function in spore dispersal/release offers significant fitness benefits, and hence can e viewed as a key innovation.

( \_\_\_/4 pts) The sporophyte of liverworts and mosses comprises a seta. Its development differs in these two lineages. How so?

In liverworts: The seta elongates merely through water uptake, increasing turgor pressure in the cells, whose cells are enclosed in a thin cell wall. Elongate occurs after the capsule is differentiated and matured (i.e., meiosis is complete and spore are ready to be dispersed)

In mosses: The seta elongates through cell division form an intercalary meristem, a meristem differentiated below the presumptive tissues of the capsule. Growth of the seta precedes maturation of the capsule, with meiosis and spore maturation completed after seta growth is more or less completed.

What would be the fitness advantage of the liverwort mode of development?

The capsule matures while protected by maternal tissues from water or other stresses.