Worksheet for Morgan/Carter Laboratory #15
“Plant Diversity I: Nonvascular Plants and Seedless Vascular Plants”

BE SURE TO CAREFULLY READ THE INTRODUCTION PRIOR TO ANSWERING THE QUESTIONS!!!

You will need to refer to your text book to answer some of the questions on this worksheet.

Ex. 15-1: NONVASCULAR PLANTS

Lab Study A: Bryophyta: Mosses

Results
2. Using two different colored writing tools (e.g. different colored pens or pen/pencil) indicate which structures in the diagram below are haploid and which are diploid.

Discussion
Refer to Plant Life Cycles in the Introduction and Figure 15.2, the generalized diagram of the plant life cycle. Answer the questions below.

1. Are the spores produced by the moss sporophyte formed by meiosis or mitosis? Thus, are the spores themselves haploid or diploid?

2. Do the spores belong to the gametophyte or the sporophyte generation?
3. Are the gametes (sperm and egg) **haploid** or **diploid**?

4. Is the dominant generation (part of the life cycle) the **gametophyte** stage or the **sporophyte** stage?

5. Can you suggest any ecological role for mosses? (What is their role in an ecosystem?)

6. What major feature of the life cycle of **bryophytes** is unique compared to all other land plants?

**Lab Study B: Hepatophyta: Liverworts**

**Results**

In the box below, make a simple drawing of a liverwort and label any structures that you observe.

---

**Drawing of a Typical Liverwort**
Discussion

1. Is the liverwort you observed the gametophyte or the sporophyte generation?

2. Are the gemmae responsible for asexual or sexual reproduction?

3. Why are these plants, like almost all bryophytes, restricted to living in moist or partially wet habitats, and why are they always relatively small? (Hint: think about transport of water and nutrients.)

4. In this lab topic, as in the next lab Plant Diversity II (Lab Topic 16) and Plant Anatomy (Lab Topic 20), you are asked to complete tables that summarize feature advantageous to the adaptation of plants to the environment on land.

You may be asked to compare these derived features with those that have changed very little called ancestral features during the evolution of plants. For example, for nonvascular plants, motile sperm might be considered an ancestral feature, while the cuticle would be considered a derived feature.

In the table below, use the Introduction to this lab to relate the features of nonvascular plants to their success in the evolutionary new land environment.

<table>
<thead>
<tr>
<th>Ancestral Features of Bryophytes</th>
<th>Derived Features of Bryophytes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lab Study A: Lycophyta: Club Mosses

Procedure

3. Observe the prepared slide of a long section through the strobilus of the plant Selaginella. Observe the microspores and megaspores on this slide under lower power.

Can you see both spores on your slide? How can you distinguish megaspores from microspores? Label the following structures on the pictures below: strobilus, microsporangium, microspores, megasporangium and megaspores.

In different colors, circle the structures that are haploid and therefore part of the gametophyte generation.
Results

1. Sketch a drawing of a typical club moss in the box below.

![Drawing of a Typical Club Moss](image)

Discussion

1. Are these leafy plants like *Selaginella* part of the sporophyte or gametophyte generation?

2. What features would you look for to determine if a plant is a seedless vascular plant?

3. Are the microspores and megaspores produced by mitosis or meiosis? (REFER to diagram 15.2 in your lab manual.)

4. Will the megaspores divide to form the female gametophyte or the male gametophyte?

Lab Study B: Pterophyta: Ferns, Horsetails and Whisk Ferns

Results

1. In the box on the next page, sketch the overall structure of a fern and label the structures noted. (You may need to refer to your text for this.)
**Drawing of a Typical Fern**

**Discussion**

1. Are the spores in the sporangia of a fern produced by mitosis or meiosis?

2. Are the sporangia themselves haploid or diploid?

3. Once they are dispersed, will the spores develop into the gametophyte or sporophyte generation?

**Lab Study C: Fern Life Cycle**

**Results**

1. Review the structures observed during the Procedure part of the exercise in your lab manual.

As you did with the Bryophyte in Lab Topic A previously, use different colors to circle the stages of the Life Cycle of a Fern below that are sporophyte and gametophyte. (REFER to diagram 15.2 in your lab manual.)
Discussion

Once again, refer to Figure 15.2, the generalized diagram of the plant life cycle and the diagram of the fern life cycle above.

1. Are the spores produced by the fern sporophyte formed by meiosis or mitosis?

2. Do the spores themselves belong to the sporophyte or gametophyte generation?

3. Are the gametes produced by meiosis or mitosis?

4. Are the archegonia and antheridia haploid or diploid? (Hint: think about which generation of the plant actually produces them.)

5. Which is the dominant generation for the fern: gametophyte or sporophyte?

6. Can you suggest any ecological role for mosses? (What is their role in an ecosystem?)

Lab Study D: Fossils of Seedless Vascular Plants

Results

1. In the box below, sketch a drawing of a fossil of a fern as it is seen imprinted in a rock.

Drawing of a Fossilized Fern
REVIEWING YOUR KNOWLEDGE

2. For each of the structures below, describe its role in as a feature that can be found in the plants studied in this lab and/or its role in reproduction. You may wish to refer to the narrative in this lab and to the text.

Gametangium:

Cuticle:

Rhizoid:

Motile sperm:

3. What is the major difference between the alternation of generations (gametophyte – sporophyte) between the life cycles of nonvascular plants and seedless vascular plants?

4. Complete the table below. Identify the function/role of each structure and whether the structure is sporophyte or gametophyte. You may wish to refer to the narrative in this lab and to the text.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Function or Role</th>
<th>Sporophyte or Gametophyte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antheridium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archegonium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gamete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhizome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gemma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sporangium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strobilus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>