Laboratory 3: Lycophytes and Eusporangiate Ferns

This week in lab we will be examining material from the two earliest extant lineages of tracheophytes: the Lycophytes (containing the Club mosses, Spike mosses, and Quillworts) and the Pteridophytes (containing the ferns and “fern-allies”). This week we will cover the lycophytes and the eusporangiate ferns (the basal members of the Pteridophytes); in the next lab we will cover the leptosporangiate ferns (for a distinction between eusporangiate ferns and leptosporangiate ferns, see table at end of this lab). We will see the move from microphylls (reduced leaves with a single vein, also called “lycophylls”) to megaphylls (larger leaves with multiple veins, also called “euphylls”), as well as one of the origins of heterospory in green plants.

• For this lab and the remainder of the labs, the goal is to learn the plant groups to the **family level** – do not concern yourself with learning genus or species names. Common names are sometimes helpful for memorization, but you will need to know only the **Latin family names**. For each family, distinctive traits are listed, followed by several representative genera. Be sure to examine all plants carefully as you will only get one lab period in which to do so. Additional information on these families is available on pages 77-87 in the Simpson textbook.

**Lycophytes**

Lycopodiaceae – Club Moss Family (3 genera/380 species): **homosporous**; microphyllous leaves; only primary growth, no ligules present.
- Huperzia
- Lycopodium
- Lycopodiella

Selaginellaceae – Spike Moss Family (1 genus/700 species): **heterosporous**; microphyllous leaves, often **dimorphic**; ligule present; only primary growth.
- Selaginella

Isoetaceae – Quillwort Family (1 genus/150 species): **heterosporous**; microphyllous leaves; ligule present; cormose stem, aquatic or terrestrial; limited secondary growth.
- Isoetes

**Pteridophytes: Part I – Eusporangiate Ferns**

Psilotaceae – Whisk Fern Family (2 genera/17 species): **homosporous**; eusporangiate; microphyllous leaves in *Tmesipteris* or enations (poorly defined leaves, possibly highly-reduced lateral stems) in *Psilotum*; **sporangia 2-3 chambered**, subtended by forked sporophylls (spore bearing leaves); true roots lacking (anchored by stems); usually epiphytic, and often with mycorrhizal associations; dichotomously branched (in *Psilotum*); gametophyte subterranean and non-photosynthetic.
- Psilotum
- Tmesipteris
**Ophioglossaceae** – Adder’s-tongue Family (3 genera / ~80 species): homosporous; eusporangiate; true roots present, but lacking root hairs; gametophytes bisexual and non-photosynthetic; **fertile fronds divided into fertile and sterile segments**; stipe fleshy, sori embedded in tissue of the fertile spike; terrestrial or epiphytic, often with mycorrhizal associations.

- *Ophioglossum*
- *Botrychium*
- *Helminthostachys*

**Equisetaceae** – Horsetail Family (1 genus / ~15 species): homosporous (some extinct forms possibly heterosporous); leaves reduced and **scale-like in a whorl** at each node; stems jointed; mostly primary growth (secondary growth in some); sporangia produced on sporangiophores organized into a terminal strobilus, sometimes on separate, unbranched stems.

- *Equisetum*

**Marattiaceae** (4 genera / ~600 species): – *Homosporous; eusporangiate* with sporangia united into **synangia** or ± free in *Angiopteris*; fleshy **stipules** present; **rachis often with swollen nodes (pulvini)**; fronds can reach up to 8 m in length.

- *Marattia*
- *Angiopteris*
- *Danaea*
- *Christensenia*

---

### Eusporangia
- Arise from several initial cells
- Sporangium wall more than one cell layer thick
- Produces many spores (generally 100+ spores per sporangia)
- Various dehiscence mechanisms, no annulus

### Leptosporangia
- Arise from a single initial cell
- Sporangium wall composed of only a single layer of cells
- Produces fewer spores (generally 64 or fewer per sporangia)
- Specialized dehiscence mechanism, typically with annulus