

Lycophytes & Pteridophytes

Lycophytes and pteridophytes are comprise the basal grade of vascular plants. Unlike the seedplants, lycophytes and pteridophytes are free-sporing, seedless and pollenless. Lycophytes comprise the most phylogenetically distant clade of vascular plants and are characterized by vascular plant plesiomorphies of microphyllous leaves and dichotomous branching. The pteridophytes comprise a morphologically diverse clade marked by the vascular plant apomorphy of macrophyllous leaves except where these were secondarily reduced in the horsetails and whisk-ferns.

I. Families to Know on Sight (no keying allowed for lab quizzes or final)

1. Lycopodiaceae (lycopods, lycophytes, club-mosses) – p. 63

Diagnostic Summary: Stoloniferous herbs with numerous spirally arranged microphylls and dichotomously branched stems; sporangia in terminal strobili or in the axils of leaves.

2. Equisetaceae (horsetails & scouring-rushes) – p. 73

Diagnostic Summary: Rhizomatous herbs with hollow, ribbed, silicaceous green stems; Leaves minute & inconspicuous, fused, in whorls at nodes; branches (if any) whorled or opposite; sporangia in strobilus borne terminally on aerial stem.

3. Polypodiaceae *sensu lato* (ferns) – p. 78

Diagnostic Summary: Rhizomatous, locally acaulescent herbs with aerial rosettes of usually pinnate leaves (“fronds”) with dichotomous venation; flowers and strobili lacking, sporangia borne in sori on the undersides of leaves or on specialized and highly modified fertile leaves.

II. Genera to Know (you can write your own key to genera and use on lab final)

A. Equisetaceae – p. 73

1. *Equisetum* (herbs)

6. *Asplenium* (herbs)

7. *Dennstaedtia* (herbs)

B. Lycopodiaceae – p. 63

2. *Diphasiastrum* (herbs)

8. *Dryopteris* (herbs)

3. *Huperzia* (herbs)

9. *Onoclea* (herbs)

4. *Lycopodium* (herbs)

10. *Polystichum* (herbs)

11. *Polypodium* (herbs)

12. *Pteridium* (herbs)

C. Polypodiaceae s.l. – p. 78

5. *Adiantum* (herbs)

III. Some Economic Botany

- Coal is responsible for 60% of the electricity generated in the US, and most coal is the fossilized remains of Carboniferous horsetails, lycopods, and ferns.
- Lycopodiaceae includes several species (e.g., *Lycopodium* spp.) used historically as a source of flammable spores used in flash powder and theatrical pyrotechnics.
- Osmundaceae and Polypodiaceae are a source of numerous ferns in ornamental horticulture. Some have limited use for their edible fiddleheads (e.g., the ostrich fern, *Matteuccia struthiopteris*), but since many or most are poisonous, one must be cautious when collecting and consuming such products.

Fern Taxon Morphological Data Sheet

Genus	Family
Habit	a. Terrestrial vs. Emergent or Submergent Aquatic b. Caulescent vs. acaulescent c. Herb, Shrub, Tree, Vine/Liana d. Succulent vs. Not succulent
Armature	Armed (Spines, Prickles, Thorns) vs. Unarmed. If armed, where:
Lvs	<p>Form: Broad, Needle-like, Scale-like or Microphyllous</p> <p>Complexity: Simple, Pinnate, Palmate, Dissected</p> <p>Phyllotaxy: Alternate (spiral, distichous), Opposite, Whorled, Rosette.</p> <p>Attachment: Petiolate, Pseudo-petiolate, Sessile, Sheathing.</p> <p>Leaf Petiole or Rachis Scales: Lacking or sparse, Petiole proximal, Petiole distal, Rachis</p> <p>Margin: Entire, Toothed (serrate/dentate/crenate), Lobed (pinnate/palmate/other), Undulate</p> <p>Venation: Parallel, Pinnate, Palmate, Dichotomous</p> <p>Overall Leaf Shape Above Petiole: Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Pyramidal or Deltoid</p> <p>Lower Pinnae: Longer than middle, Shorter than middle</p> <p>Shape (blade): Orbicular, Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Other:</p> <p>Apex (blade): Acute, Acuminate, Obtuse, Round, Mucronate, Emarginate, Other:</p> <p>Stipules: Stipulate, Exstipulate</p> <p>Upper Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p> <p>Lower Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p>
Sp	<p>Position: Under vegetative leaf, On modified leaf or other structure</p> <p>Shape: Round, Reniform, Linear</p> <p>Covering: Naked, Indusiate</p> <p>Other:</p>

Other Distinctive Features

Fern Taxon Morphological Data Sheet

Genus	Family
Habit	e. Terrestrial vs. Emergent or Submergent Aquatic f. Caulescent vs. acaulescent g. Herb, Shrub, Tree, Vine/Liana h. Succulent vs. Not succulent
Armature	Armed (Spines, Prickles, Thorns) vs. Unarmed. If armed, where:
Lvs	<p>Form: Broad, Needle-like, Scale-like or Microphyllous</p> <p>Complexity: Simple, Pinnate, Palmate, Dissected</p> <p>Phyllotaxy: Alternate (spiral, distichous), Opposite, Whorled, Rosette.</p> <p>Attachment: Petiolate, Pseudo-petiolate, Sessile, Sheathing.</p> <p>Leaf Petiole or Rachis Scales: Lacking or sparse, Petiole proximal, Petiole distal, Rachis</p> <p>Margin: Entire, Toothed (serrate/dentate/crenate), Lobed (pinnate/palmate/other), Undulate</p> <p>Venation: Parallel, Pinnate, Palmate, Dichotomous</p> <p>Overall Leaf Shape Above Petiole: Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Pyramidal or Deltoid</p> <p>Lower Pinnae: Longer than middle, Shorter than middle</p> <p>Shape (blade): Orbicular, Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Other:</p> <p>Apex (blade): Acute, Acuminate, Obtuse, Round, Mucronate, Emarginate, Other:</p> <p>Stipules: Stipulate, Exstipulate</p> <p>Upper Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p> <p>Lower Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p>
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Other Distinctive Features

Fern Taxon Morphological Data Sheet

Genus	Family
Habit	i. Terrestrial vs. Emergent or Submergent Aquatic j. Caulescent vs. acaulescent k. Herb, Shrub, Tree, Vine/Liana l. Succulent vs. Not succulent
Armature	Armed (Spines, Prickles, Thorns) vs. Unarmed. If armed, where:
Lvs	<p>Form: Broad, Needle-like, Scale-like or Microphyllous</p> <p>Complexity: Simple, Pinnate, Palmate, Dissected</p> <p>Phyllotaxy: Alternate (spiral, distichous), Opposite, Whorled, Rosette.</p> <p>Attachment: Petiolate, Pseudo-petiolate, Sessile, Sheathing.</p> <p>Leaf Petiole or Rachis Scales: Lacking or sparse, Petiole proximal, Petiole distal, Rachis</p> <p>Margin: Entire, Toothed (serrate/dentate/crenate), Lobed (pinnate/palmate/other), Undulate</p> <p>Venation: Parallel, Pinnate, Palmate, Dichotomous</p> <p>Overall Leaf Shape Above Petiole: Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Pyramidal or Deltoid</p> <p>Lower Pinnae: Longer than middle, Shorter than middle</p> <p>Shape (blade): Orbicular, Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Other:</p> <p>Apex (blade): Acute, Acuminate, Obtuse, Round, Mucronate, Emarginate, Other:</p> <p>Stipules: Stipulate, Exstipulate</p> <p>Upper Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p> <p>Lower Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p>
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Other Distinctive Features

Fern Taxon Morphological Data Sheet

Genus	Family
Habit	m. Terrestrial vs. Emergent or Submergent Aquatic n. Caulescent vs. acaulescent o. Herb, Shrub, Tree, Vine/Liana p. Succulent vs. Not succulent
Armature	Armed (Spines, Prickles, Thorns) vs. Unarmed. If armed, where:
Lvs	<p>Form: Broad, Needle-like, Scale-like or Microphyllous</p> <p>Complexity: Simple, Pinnate, Palmate, Dissected</p> <p>Phyllotaxy: Alternate (spiral, distichous), Opposite, Whorled, Rosette.</p> <p>Attachment: Petiolate, Pseudo-petiolate, Sessile, Sheathing.</p> <p>Leaf Petiole or Rachis Scales: Lacking or sparse, Petiole proximal, Petiole distal, Rachis</p> <p>Margin: Entire, Toothed (serrate/dentate/crenate), Lobed (pinnate/palmate/other), Undulate</p> <p>Venation: Parallel, Pinnate, Palmate, Dichotomous</p> <p>Overall Leaf Shape Above Petiole: Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Pyramidal or Deltoid</p> <p>Lower Pinnae: Longer than middle, Shorter than middle</p> <p>Shape (blade): Orbicular, Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Other:</p> <p>Apex (blade): Acute, Acuminate, Obtuse, Round, Mucronate, Emarginate, Other:</p> <p>Stipules: Stipulate, Exstipulate</p> <p>Upper Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p> <p>Lower Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p>
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Other Distinctive Features

Fern Taxon Morphological Data Sheet

Genus		Family	
Habit	q. Terrestrial vs. Emergent or Submergent Aquatic r. Caulescent vs. acaulescent s. Herb, Shrub, Tree, Vine/Liana t. Succulent vs. Not succulent		
Armature	Armed (Spines, Prickles, Thorns) vs. Unarmed. If armed, where:		
Lvs	<p>Form: Broad, Needle-like, Scale-like or Microphyllous</p> <p>Complexity: Simple, Pinnate, Palmate, Dissected</p> <p>Phyllotaxy: Alternate (spiral,distichous), Opposite, Whorled, Rosette.</p> <p>Attachment: Petiolate, Pseudo-petiolate, Sessile, Sheathing.</p> <p>Leaf Petiole or Rachis Scales: Lacking or sparse, Petiole proximal, Petiole distal, Rachis</p> <p>Margin: Entire, Toothed (serrate/dentate/crenate), Lobed (pinnate/palmate/other), Undulate</p> <p>Venation: Parallel, Pinnate, Palmate, Dichotomous</p> <p>Overall Leaf Shape Above Petiole: Elliptic, (ob-)Ovate , (ob-)Lanceolate,(ob-)Cordate, Sagittate, Pyramidal or Deltoid</p> <p>Lower Pinnae: Longer than middle, Shorter than middle</p> <p>Shape (blade): Orbicular, Elliptic, (ob-)Ovate , (ob-)Lanceolate,(ob-)Cordate, Sagittate, Other:</p> <p>Apex (blade): Acute, Acuminate, Obtuse, Round, Mucronate, Emarginate, Other:</p> <p>Stipules: Stipulate, Exstipulate</p> <p>Upper Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p> <p>Lower Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p>		
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Other Distinctive Features

Fern Taxon Morphological Data Sheet

Genus	Family
Habit	u. Terrestrial vs. Emergent or Submergent Aquatic v. Caulescent vs. acaulescent w. Herb, Shrub, Tree, Vine/Liana x. Succulent vs. Not succulent
Armature	Armed (Spines, Prickles, Thorns) vs. Unarmed. If armed, where:
Lvs	<p>Form: Broad, Needle-like, Scale-like or Microphyllous</p> <p>Complexity: Simple, Pinnate, Palmate, Dissected</p> <p>Phyllotaxy: Alternate (spiral, distichous), Opposite, Whorled, Rosette.</p> <p>Attachment: Petiolate, Pseudo-petiolate, Sessile, Sheathing.</p> <p>Leaf Petiole or Rachis Scales: Lacking or sparse, Petiole proximal, Petiole distal, Rachis</p> <p>Margin: Entire, Toothed (serrate/dentate/crenate), Lobed (pinnate/palmate/other), Undulate</p> <p>Venation: Parallel, Pinnate, Palmate, Dichotomous</p> <p>Overall Leaf Shape Above Petiole: Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Pyramidal or Deltoid</p> <p>Lower Pinnae: Longer than middle, Shorter than middle</p> <p>Shape (blade): Orbicular, Elliptic, (ob-)Ovate, (ob-)Lanceolate, (ob-)Cordate, Sagittate, Other:</p> <p>Apex (blade): Acute, Acuminate, Obtuse, Round, Mucronate, Emarginate, Other:</p> <p>Stipules: Stipulate, Exstipulate</p> <p>Upper Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p> <p>Lower Surface (blade, petiole): Glabrous, Pubescent (color: texture:)</p>
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