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KEY TO GENERA OF FERNS AND FERN ALLIES

By Ray C. Friesner

The keys to be found in the manuals used for taxonomic study often require the student using them to have a greater knowledge of the species under study than is obtainable from the specimen at hand. For example, the indusium regularly drops from the sorus in some genera when the fronds are young, while in other genera, indusia are never present. Examples of these are found, in the case of the former condition, in Cystopteris and Woodsia, and in the case of the latter condition, in Polypodium and Phegopteris. How is the student just beginning taxonomic work on the ferns to know, when he encounters a fruiting frond with no indusia, whether it is a case of entire absence of indusia or a species from which the indusia drop off early? He should, of course, examine a number of specimens, but the working collection available for his study does not always have both young and old specimens of each species. It should have, to be sure, but it is not always expedient for the instructor to have material representing all ages of fronds. Further, suppose the student is identifying material of his own collection instead of a set prepared for him by some one else, and he wishes to know today whether the absence of an indusium is a fixed character. He cannot always wait a year to determine his point by observation on younger fronds.

Keys, to be pedagogically sound, should meet such situations by permitting the student to take either line of diagnosis at such a point and still bring him out to the proper genus or species. The characters used in differentiating groups, whether families, genera or species, should always be definitely contrasted. One member of a set should not deal with one characteristic and the other with a different characteristic, but both should deal with the same feature of the plants. All members of a set of characters should be kept together, thus making the key more readily followed when used for identification purposes. Every second set of characters should be indented slightly, thus sharply setting off the different sets from each other. Characters which are discernible at different seasons of the year should not be brought together in the same key: e.g., flower characters of trees are present for
so short a period that they should not be used in a key based primarily upon vegetative characters. Members of a set of characters should be as brief as possible, no attempt being made to describe in detail. Relative terms, such as large and small or wide and narrow, should not be used unless definite measurements accompany them.

No attempt has been made to carry this key to species. Species differentiation is referred to the Manuals, such as Gray or Britton and Brown (for Northeastern United States). The figures in the key following generic names refer to pages in Gray's Manual, 7th edition (G), or Britton and Brown, 2nd edition (BB), where the genus is described and keys are given for the determination of species.

KEY

1. Plants floating on surface of boggy waters ........................................ 2
2. Plants not floating ........................................................................ 3
   2. Leaves apparently 2-ranked, densely papillose on dorsal side
      Salvinia, G 50; BB 36
   2. Leaves closely imbricated, glabrous on dorsal surface
      Azolla, G 50; BB 38
3. Plants twining or climbing ............................................................. Lygodium, G 46; BB 9
4. Plants neither twining nor climbing .............................................. 4
   4. Plants very slender, filiform, tortuous, 3-8 cm long
      Schizaea, G 45; BB 9
   4. Leaves 4-foliolate, plants rooted in mud of shallow water
      Marsilea, G 49; BB 36
   4. Leaves reduced to mere vestigial scales whorled at nodes of jointed stems
      Equisetum, G 51; BB 39
   4. Leaves very long and narrow, 3-20 by 0.5-1.0 cm, very closely imbricated on short corm-like stem
      Isoetes, G 58; BB 50
   4. Leaves small, 2-10 mm long, very closely imbricated .......... 5
   4. Leaves larger, broader, frond-like, common true ferns ......... 6
5. Homosporous, i.e., spores of one type only .................................. 6
6. Not (6).............. 6
   6. Fertile fronds ................................................................. 7
   7. Stipe of fronds......................................................... 8
   8. Fertile fronds......................................................... 9
   9. Fertile fronds of five pinnate ...................................... 10
   10. Stipitate fronds ..................................................... 11
   11. Vegetative fronds ................................................... 12
   12. Fertile fronds of five pinnate ...................................... 13
   13. Fronds with crowded pinnules ...................................... 14
   14. Sori on pinnules ...................................................... 15
   15. Fronds with crowded pinnules ...................................... 16
   16. Fronds with crowded pinnules ...................................... 17

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6. Fertile and vegetative fronds entirely separate and conspicuously unlike each other. ........................... 7
6. Not differentiated into separate vegetative and fertile fronds, or if so they are not conspicuously different from each other ......................................................... 10
7. Stipe of fertile frond clothed with dense brown tomentum. Vegetative fronds may be similar in this regard. ........................... Os-munda cinnamomea, G 47; BB 7
7. Stipe of fertile frond not as above....................................................... 8
8. Fertile frond bipinnate.................................................................... 9
8. Fertile frond once-pinnate.....Onoclea, G 45; BB 11
9. Fertile frond 12.5-40 cm long. Fertile portion of more than five pinnate divisions.....Onoclea, G 45; BB 10
9. Fertile frond 5-12.5 cm long. Fertile portion of five closely crowded pinnate divisions Schizaea, G 45; BB 9
10. Individual fronds composed of both entirely vegetative and entirely fertile pinnae............. 11
10. Sori borne on the backs of the otherwise vegetative fronds ................................................................................................................................. 14
11. Vegetative segment of frond simple. Ophagoglossum, G 47; BB 1
11. Vegetative segment of frond compound........................................ 12
12. Fertile segment of frond distant, above the vegetative...... 13
12. Fertile segments merely the contracted terminal portion of the ordinary frond Polystichum, G 40; BB 16
12. Fertile pinnae 1-8, in the middle portion of the vegetative frond............ Osmunda Claytoniana, G 47; BB 8
13. Frond with fleshy stipe, ultimate divisions with toothed margins Botrychium, G 47; BB 3
13. Frond without fleshy stipe, ultimate divisions with entire margins Os-munda regalis, G 46; BB 7
14. Sori not covered with an indusium; or the indusium may drop off when young...................... 15
14. Sori covered with an indusium. Forms in which indusium drops when young may be sought in either of these two characters ..................................................... 18
15. Fronds once-pinnatifid............Polypodium, G 34; BB 35
15. Fronds twice-pinnatifid to 4-pinnate, green on both surfaces 16
15. Fronds 1-4 pinnate, lower surface hairy, tomentose, or covered with a white or waxy powder Notoláena, G 35; BB 35
16. Rachis winged between the pinnae................................................................. Phegopteris, G 35; BB 23
16. Rachis not winged between pinnae........................................................................ 17
17. Stipes, rachis and ventral side of midvein minutely chaffy........................................ Woodsia, G 43; BB 11
17. Stipes, rachis and ventral side of midvein without chaff........................................ Cystopteris, G 43; BB 14
18. Indusium false, i. e., formed from the revolute margin of the frond............................. 19
18. Indusium true, i. e., not formed from the revolute margin of the frond............................. 24
19. Sori forming a more or less continuous marginal band........................................ 20
19. Sori not forming a more or less continuous marginal band........................................ 23
20. Stipe and rachis blackish or purplish................................................................. 21
20. Stipe and rachis chestnut-brown............................................................................. 24
20. Stipe straw-colored or greenish.............................................................................. 22
21. Stipe and rachis smooth and shining, without scales................................................. 23
21. Stipe and rachis clothed with brownish scales.......................................................... Notholaena, G 35; BB 35
23. Fronds not dimorphic, stipe and rachis smooth or densely chaffy throughout; pinnules glabrous or slightly pubescent on ventral surface near margins and midvein...................................................... Pteris, G 36; BB 31
23. Fronds dimorphic, fertile narrower than sterile, chaff limited to base of stipe, pinnules glabrous.............................................................. Cryptogramma, G 36; BB 52
24. Sori oblong or somewhat crescent-shaped............................................................. Adiantum, G 35; BB 31
24. Sori small, globular, at the apex of free veins, appearing as if raised upon a pedestal................................................................................................. Dicksonia, G 44; BB 14
25. Fronds transparent, consisting of a single layer of cells only...................................... Trichomanes, G 33; BB 8
25. Fronds thicker, of more than one layer of cells......................................................... 25
25. Sori more or less elongated, straight or curved......................................................... 26
25. Sori more or less rounded......................................................................................... 29
25. Sori rounded when young, but confluent when old................................................... Polystichum, G 40; BB 16
28.
26. Veins reticulated ................................................. 27
26. Veins free ......................................................... 28

27. Sori forming a chain-like row on either side of midvein........

27. Sori scattered, some parallel with midvein and some parallel
with lateral veins...........................................Camptosorus; G 40; BB 25

28. Sori single, frond once-pinnatifid to 4-pinnate...................

28. Sori confluent in pairs, frond entire or merely undu-
late ......................................................... Asplenium, G 38; BB 26

29. Indusium attached by the center...................................

29. Indusium attached by one side............Cystopteris, G 43; BB 14

29. Indusium inferior, i. e., attached at two or more points beneath
the sporangia .................................................. 31

30. Indusium round, without a sinus.................................

30. Indusium round or reniform, with a sinus

31. Indusium two-valved, cup-shaped..............Dicksonia, G 44; BB 14

31. Indusium with more than two valves...........Woodia, G 43; BB 11

CHECK-LIST OF INDIANA FERNS AND FERN ALLIES

The following sixty-five species of ferns and fern allies are to be
found growing out of cultivation in Indiana:

Adiantum pedatum L. .................................................. A. pinnatifidum Nutt.
A. pinnatifidum (L) Oakes.
A. marginale Sw. .................................................... A. Platycerium L.
A. noveboracense (L) Sw. ........................................... A. Trichomanes L.
A. spinulosum (Mueller) Sw. .......................... Asolla caroliniana Wild.
A. viridis (Mueller) Sw. ............................................ Botrychium obliquum Muhl.
A. spinulosum intermedium (Muhl.) Eaton. .................. B. obliquum dissectum (Spreng)
A. Thelypteris (L) Sw. ............................................. Clute.
A. Thelypteris (L) Sw. ............................................. D. C. Eaton.
A. acrostichoides Sw. .............................................. B. ternatum intermedium
A. angustifolium Michx. .......................................... B. simplex E. Hitch. (Doubtful.)
A. eigenoides R. A. Scott. ....................................... B. obliquum Muhl.
A. Filix-femina (L) Bernh. .................................... B. virginianum (L) Sw.
Camptosorus rhizophyllus (L) Link.
Cheilanthes lanosa (Michx.) Walt.
Cystopteris bulbifera (L) Bernh.
C. fragilis (L) Bernh.
Dicksonia puncitoloba (Michx.) Gray.
Equisetum arvense L.
E. fluviatile L.
E. hyemale L.
E. hyemale intermedium A. A. Eaton.
E. laevigatum A. Br.
E. robustum A. Br.
E. variegatum Schleich.
Lycopus clavatum L.
L. complanatum L.
L. inundatum L.
L. lucidulum Michx.
L. oscurum L.
L. oscurum dendroides (D. C. Eaton) Michx.
L. porophillum (L. and U.) Clute.
L. selago L.
Marsilea quadrifolia L.
Onoclea sensibilis L.
O. Struthiopteris (L) Hoffm.
Ophioglossum vulgatum L.
Osmunda cinnamomea L.
O. cinnamomea frondosa Gray.
O. cinnamomea incisa J. W. Huntington.
O. Claytoniana L.
O. regalis L.
Pellaea atropurpurea (L) Link.
Phegopteris Dryopteris (L) Fee.
P. hexagonoptera (Michx.) Fee.
P. polypliodides (L) Fee.
Polystichum acrostichoides (Michx.) Schott.
P. acrostichoides Schneemitzii (Beck) Small.
Polypodium polypliodides (L) A. S. Hitch.
P. vulgare L.
Pteris aquilina L.
Selaginella apus (L) Spreng.
S. rupestris (L) Spreng.
Woodia obtusa (Spreng.) Torr.
Woodwardia virginica (L) Sw.