

AN ABSTRACT OF THE THESIS OF

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Title AN ILLUSTRATED KEY TO THE FERNS OF OREGON

Abstract approved 
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The purpose of the work is to enable students of botany to identify accurately Oregon ferns, both as living plants and as dried specimens. Therefore, it provides vegetative keys to the families, genera and species of the ferns (Class FILICINAE) found in Oregon. Correct names have been determined using the latest available information and in accordance with 1961 edition of the International Code of Botanical Nomenclature. The synonymy, a description, and original drawings of each species and subspecific taxon are included. An illustrated glossary and a technical glossary have been prepared to explain and clarify the descriptive terms used. There is also a bibliography of the literature used in the preparation of the paper.

The class FILICINAE is represented in Oregon by 4 families, 20

genera, 45 or 46 species, 4 of which are represented by more than one subspecies or variety. One species, Botrychium pumicola Coville, is endemic. The taxa are distributed as follows: OPHIOGLOSSACEAE, 2 genera: Botrychium, 7 species, 1 represented by 2 subspecies, 1 by 2 varieties; Ophioglossum, 1 species. POLYPODIACEAE, 15 genera: Woodsia, 2 species; Cystopteris, 1 species; Dryopteris, 6 species; Polystichum, 5 species, 1 represented by 2 distinct varieties; Athyrium, 2 species; Asplenium, 2 species; Struthiopteris, 1 species; Woodwardia, 1 species; Pitrogramma, 1 species; Pellaea, 4 species; Cheilanthes, 3 or 4 species; Cryptogramma, 1 species; Adiantum, 2 species; Pteridium, 1 species; Polypodium, 2 species, 1 represented by 2 varieties. MARSILEACEAE, 2 genera, Marsilea and Pilularia, each with 1 species. SALVINIACEAE, 1 genus, Azolla, 1 species.

AN ILLUSTRATED KEY TO THE FERNS OF OREGON

by

HELEN PATRICIA O'DONAHUE PEMBROOK

A THESIS

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APPROVED:



Professor of Botany

In Charge of Major



Chairman, Department of Botany



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AN ILLUSTRATED KEY TO THE FERNS OF OREGON

INTRODUCTION

The purpose of this paper is to enable students of botany to identify accurately Oregon ferns, both in the field as living plants and in the herbarium as dried specimens. To this end it provides: vegetative keys, illustrations, and descriptions; names determined using the latest available information and in accordance with the 1961 edition of the International Code of Botanical Nomenclature (27); lists of synonyms to enable students of the history of Oregon botany to identify ferns mentioned in historical literature.

The keys are based on observations of living plants and of specimens in the Oregon State University Herbarium, the University of Oregon Herbarium, and the Peck Herbarium at Willamette University. These keys are artificial, and vegetative characteristics appear first in the key descriptions, while reproductive structures are added when they are really helpful in separating the groups. Illustrations are intended to show the general appearance of the plants as well as key characters. To make the illustrations, original photographs and ink drawings and tracings of herbarium specimens were traced onto the multilith master stencil with the aid of a light box.

The taxonomic lists are based on the original edition and supplements of Carl Christensen's Index Filicum (10, 11, 12, 13), and on the Gray Herbarium Card Index (24). The order of genera and species

is that of Christensen (13) and G. H. M. Lawrence (30). Where names differ from those used by either J. W. Thompson in Peck (35) or W. R. Maxon in Abrams (1), the reason for the choice is explained in a note accompanying the synonymy. It should be mentioned, however, that I have decapitalized all specific and trivial epithets (27, p. 28; p. 53, 55) and have changed "Polystichum andersoni", "Polystichum lemmoni" and "Adiantum jordani" to P. andersonii, P. lemmonii and A. jordanii in accordance with the International Rules concerning orthography (27, p. 53, 55). I have not specified varieties or subgroups unless they are widely recognized, have been used or mentioned in major floras of the area (see Bibliography), or are species synonyms. Descriptions are based on those of Maxon (1) or R. T. Clausen (14), but have been modified by comparison with specimens from Oregon. Material from Peck (35), Abrams (1) or Lawrence (39) has been rewritten and freely incorporated without citation. Descriptions of ranges of the species within Oregon are derived from a series of spot maps based on locality data from specimens in the herbaria cited, sites of personal collections, and references in the literature.

Definitions in the glossary are based on those of Lawrence (30), Peck (35) and R. Tryon (44). The illustrated glossary is placed at the beginning of the paper in the hope that the reader will acquaint himself with the terminology before trying to use the keys. In citations to the figures in the illustrated glossary, the first number is the plate (1 or

2), the letter is the figure group, and the following number or lower case letter is the specific figure. The bibliography is not intended to be complete. It includes widely used floras of the Pacific states which have in them treatments of ferns; fern or pteridophyte floras of the Pacific States; theses, articles and monographs pertaining to Oregon ferns; articles of taxonomic significance for problematic groups; and taxonomic works concerned with ferns in general.

The ferns (Class FILICINAE) are usually distinguished from other leafy herbs by their pinnately lobed or compound leaves, their underground stems (rhizomes), and the presence of sori, the so-called "fruit-dots" (clusters of sporangia) on the under-surfaces of their leaves. Because some atypical species lack these characteristics, and because some flowering plants have rhizomes and pinnate leaves, it may prove difficult for the beginner to distinguish between ferns and certain other groups of plants. Additional characteristics that can be used to recognize ferns are: veins or veinlets in the leaves branching dichotomously; veinlets free, ending in or near the leaf margins without coming together to form a netlike pattern; the young leaf uncoiling as it develops (circinate vernation). One fern is a floating aquatic plant with tiny scalelike leaves, one resembles four-leafed clover (all the leaves are lucky!), and one has simple threadlike leaves. These characteristics, or combinations of them, distinguish the ferns found in Oregon.

There are, in Oregon, representatives of 4 families and 20 genera of the FILICINAE. These comprise 45 species, 4 of which are represented by more than one subspecies or variety. One species, Botrychium pumicola Coville, is endemic.

PICTURE GLOSSARY

PLATE I

- A. Fern morphology
1. Frond (leaf)
 2. Blade
 3. Stipe (petiole)
 4. Rhizome (stem)
 5. Roots
 6. Young frond showing circinate vernation
 7. Pinna (primary segment)
 8. Pinnule (secondary segment)
 9. Tertiary segment, also an Ultimate segment
 10. Rachis (axis)
 11. Rachilla (secondary rachis or axis)
 12. Rachilla (tertiary rachis or axis)
 13. Terminal segment
- B. Blade dissection
14. 1-pinnate
 15. Pinnate-pinnatifid
 16. 2-pinnate
 17. 2-pinnate-pinnatifid
 18. 3-pinnate
 19. Pinnate, the pinna 2-pinnatifid
- C. Blade ternate
20. Axis three-parted
 21. Major segments or divisions
- D. Segment insertion
22. Oblique (to the rachis)
 23. Spreading
 24. Reflexed or deflexed
- E. Segment-pair relationship
25. Alternate
 26. Subopposite
 27. Opposite
- F. Branching patterns
28. Dichotomous
 29. Pinnate
- G. Surface orientation
30. Rhizome (stem or axis)
 31. Growing point
 32. Ventral surface (upper side)
 33. Dorsal surface (lower side)
- H. Ultimate segment parts
34. Rachis or rachilla
 35. Stalk or Petiolule
 36. -38. Veinlet terminations
 36. Inframarginally
 37. Marginally
 38. Excurent
 39. Reticulate (netted) veinlets
 40. Areole
 41. Free venation
 42. Veinlets
 43. Midrib, midvein
 44. Lamina (leaf tissue)
- I. Indusia positions
- a. Central (superior)
 - b. Lateral (superior)
 - c. Basal (inferior)
 - d. Marginal
45. Sorus with receptacle
 46. Indusium
- J. Sporangium (Polypodiaceae)
47. Stalk or sporangiophore
 48. Lip cells
 49. Annulus
 50. Capsule
 51. Spore
 52. Sporangium dehiscing

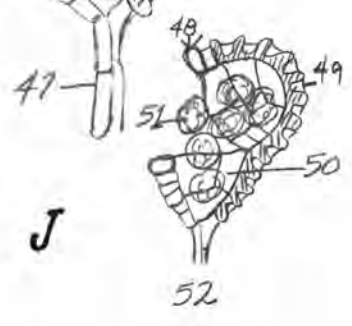
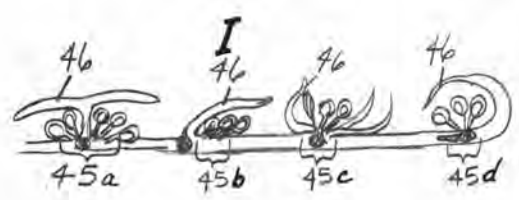
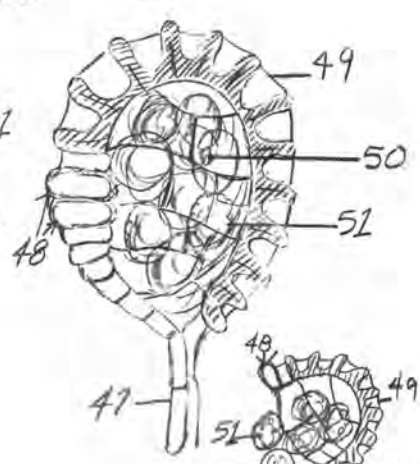
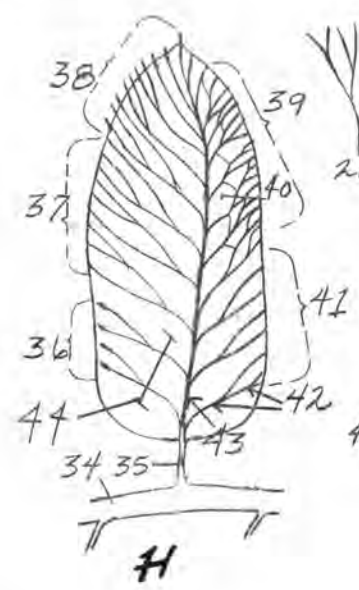
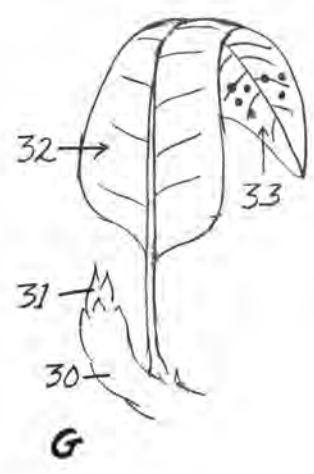
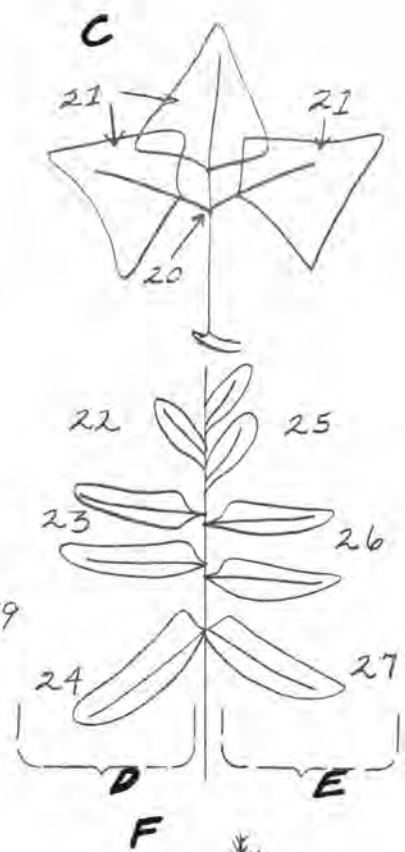
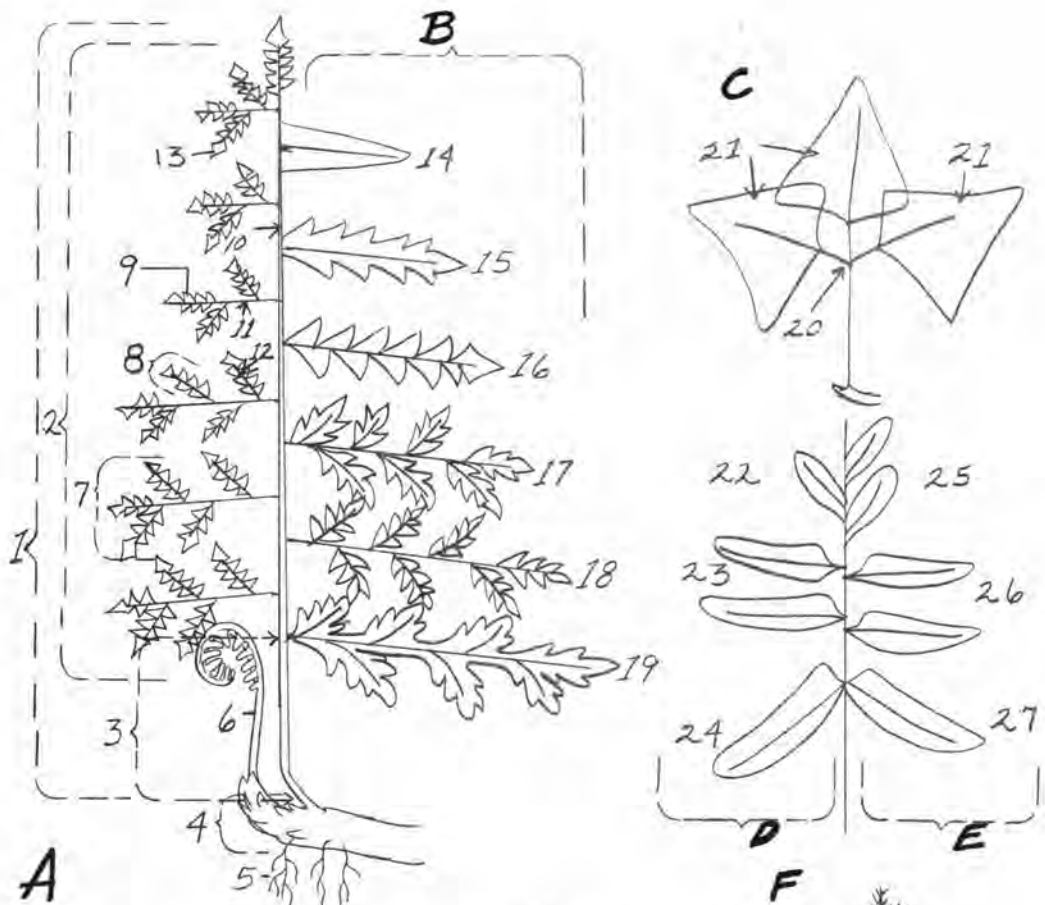
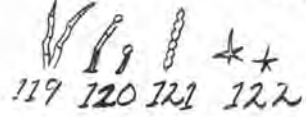
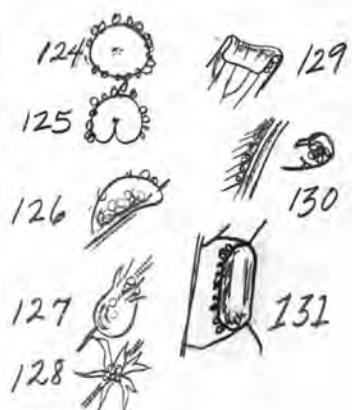
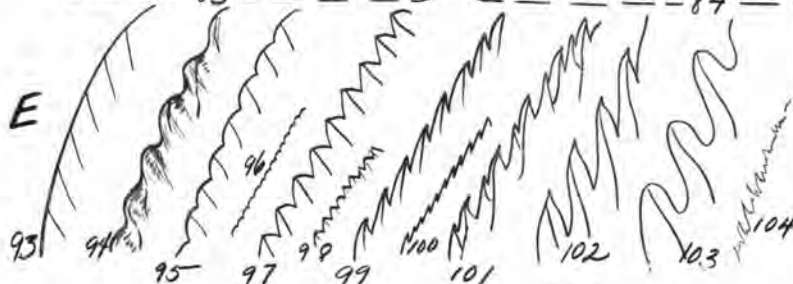
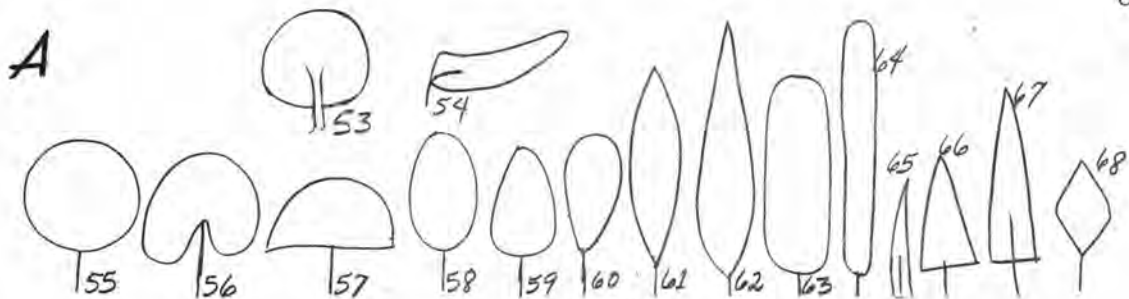


PLATE 2

- A. Shapes(Blades, segments, indusia, etc.)
53. Peltate
 54. Falcate
 55. Circular(orbicular)
 56. Reniform
 57. Lunate
 58. Oval
 59. Ovate
 60. Obovate
 61. Elliptical
 62. Lanceolate
 63. Oblong
 64. Linear
 65. Acicular
 66. Deltoid
 67. Triangular
 (elongate-deltoid)
 68. Rhombic
- B. Degree of division
69. Pinnate(compound)
 70. Pinnatifid
 71. Pinnately lobed or
 incised
 72. Radially incised
 73. Bifid
 74. Palmately compound
- C. Apex shapes
75. Rounded
 76. Obtuse
 77. Acute
 78. Acuminate
 79. Attenuate(may apply
 to base)
 80. Caudate or apiculate
 81. Mucronate
 82. Notched (retuse)
- D. Base shapes
83. Sessile
 84. Stalked or petioled
 85. Dilatate
 86. Decurrent
 87. Constricted
 88. Cordate
89. Truncate
 90. Cuneate
 91. Oblique
 92. Auricled
- E. Margins
93. Entire
 94. Undulate
 95. Crenate
 96. Crenulate
 97. Dentate
 98. Denticulate
 99. Serrate
 100. Serrulate
 101. Biserrate
 102. Incised
 103. Lobed
 104. Erode
- F. Margin parts
105. Sinus
 106. Lobe or tooth
- G. Sorus position
107. Dorsal(laminar)
 108. Marginal, con-
 fluent
 109. Confluent on the
 veinlets(Pityro-
 gramma)
 110. Inframedial(dor-
 sal)
 111. Distant from the
 midrib or mar-
 gin
 112. Inframarginal
 (dorsal)
 113. Marginal, mar-
 gin reflexed
- H. Vesture types
114. Tomentose(to-
 mentum)
 115. Villous
 116. Woolly
 117. Scale(paleaceous,
 scales small to
 ciliate)
 118. Scale(paleaceous,
 scales large)
119. Septate hairs
 120. Glandular hairs
 121. Moniliform
 hair
 122. Stellate hairs
 123. Cilia, the mar-
 gin ciliate
- I. Indusium types
124. Centrally pel-
 tate(Polysti-
 chum)
 125. Reniform
 (Dryopteris)
 126. Lateral (Athyri-
 um, Asple-
 nium)
 127. Cup-like, Blad-
 der-like; Infer-
 ior(Cystop-
 teris)
 128. Stellate:Inferior
 (Woodsia)
 129. False(the sorus
 on the reflexed
 portion)
 130. Marginal(Pteri-
 dium, Cheilan-
 thes, Crypto-
 gramma,
 Pellaea)
 131. Inframedial,
 attached
 along outer
 edge (Wood-
 wardia);
 running the
 length of the
 pinna(Stru-
 thiopteris)



I

KEY TO THE FAMILIES

- A. Leaves scalelike, overlapping; plants aquatic, floating on the surface, very small 4. SALVINIACEAE
- AA. Leaves variously expanded; plants attached
- B. Leaves cloverlike with 4 leaflets, or threadlike; globose reproductive structures (sporocarps) attached to the slender rhizome near the leaf bases. 3. MARSILEACEAE
- BB. Leaves (fronds) with blades expanded, usually pinnately divided (undivided in Ophioglossum); reproductive structures (sporangia) borne on the leaves
- C. Fronds 1 or 2 only per plant (old leaves may persist at the base of the new one), bud enclosed by the leaf base; mature leaves divided into 2 distinct parts, an expanded leafy sterile portion (blade) attached below a fertile portion (sporophyll) which lacks leafy tissue and bears globose sporangia on its divisions
 1. OPHIOGLOSSACEAE
- CC. Fronds several to many, the buds never enclosed, arising singly from a long rhizome or clustered; fronds either fertile or sterile; sporangia borne in clusters (sori) on the undersurfaces of the leaflets, in the laminae or at the margins. 2. POLYPODIACEAE

1. OPHIOGLOSSACEAE

Terrestrial herbs; rhizomes cormlike, not creeping; roots usually somewhat fleshy; vernation not circinate. Leaves solitary or few, in two parts, a sterile foliaceous blade subtending a fertile nonfoliaceous segment (sporophyll), both arising from a common stipe. Blade simple, lobed or variously compound. Plants homosporous. Sporophyll simple or compound; sporangia large, the walls more than one cell thick, without an annulus, dehiscing by a transverse slit; spores many, thick-walled. A worldwide family of three genera and about 60 species, as treated by R. T. Clausen (14).

Sterile blade compound or lobed; veins free....1. Botrychium

Sterile blade simple; veins netted.....2. Ophioglossum

1. BOTRYCHIUM

Botrychium Swartz, Schrad. Journ. 1800(2):110. 1801. Pl. 3, 4 & 5.

Plants somewhat fleshy; rhizomes relatively small; roots fleshy, often corrugated; bud for the following season borne at the apex of rhizome, enclosed within base of leaf, wholly concealed or visible along one side, fertile and sterile segments erect or bent down in the bud; leaves 1-3. Common stipe erect, short to elongate; sterile blade sessile to long-petioled, 1- to 4-pinnate or ternate; veins free, branching dichotomously; fertile segment (sporophyll) a simple spike

or a 1- to 5-pinnate panicle, erect, long-stalked to nearly sessile; sporangia large, globose, not united, sessile or nearly so (Pl. 4, Figure 7), borne in 2 rows on the ultimate divisions; spores sulphur yellow. About 23 species, mostly of north and south temperate regions; 11 species native to temperate North America. Type species: Osmunda lunaria L.

- A. Segments of the sterile blade pointed or toothed
- B. Sterile blade long-petioled, attached near base of plant 1. B. multifidum
- BB. Sterile blade sessile, attached near middle of plant
- C. Primary divisions of blade 1-pinnatifid only 6. B. lanceolatum
- CC. Primary divisions of blade at least 2-(usually 3-) pinnate or pinnatifid. 7. B. virginianum
- AA. Segments of sterile blade rounded at tips, not toothed
- D. Sterile blades attached at or near base of plant, lowest pair of pinnae shaped unlike the others. 3. B. simplex
- DD. Sterile blades attached near or above middle of plant
- E. Blades ternate; segments very close and overlapping, dissimilar in shape; common stipe mostly underground 4. B. pumicola
- EE. Blades pinnate throughout, all divisions of similar shape

- F. Pinnae lunate or fan-shaped, outer margins entire or radially incised into irregular lobes 2. B. lunaria
- FF. Pinnae pinnately lobed 5. B. boreale

1. Botrychium multifidum (Gmel.) Rupr.

Osmunda multifida Gmel. Nov. Comm. Ac. Petr. 12. 1768.

Botrychium multifidum (Gmel.) Rupr. Beitr. 11:40. 1859.

This species represented by two subspecies in our area:

Ultimate segments of the blade very close, overlapping; plants very

stout, fleshy, leaf bases enlarged. . . .lb. B. m. ssp. coulteri

Ultimate segments of blade not overlapping, plants fleshy but rela-

tively slender, the basal portions not much enlarged.

. 1a. B. m. ssp. silaifolium

1a. Botrychium multifidum (Gmel.) Rupr. ssp. silaifolium (Presl)

Clausen. Leathery Grape-fern. Plate 3, Figure 1 & 2.

B. australe R. Br. Prod. Fl. Nov. Holl. 1:164. 1810, of authors.

B. silaifolium Presl, Rel. Haenk. 1:76. 1825

B. ternatum (Thnbg.) Sw. β australasiaticum & vulgare Milde (in part), in Verh. Zool. Bot. Ges., Wien 19:157. 1869.

B. t., var. australe (R. Br.) D. C. Eat. Ferns N. Am. 1:149. 1879 (in part).

B. t., var. a., subvar. intermedium D. C. Eat. loc. cit.

B. occidentale Underw. Bull. Torrey Bot. Club 25:521. 1898.

B. obliquum Muhl. ex Willd., intermedium Underw. Our Nat. Ferns, ed. 6:72. 1900.

B. t. obliquum (Muhl. ex Willd.) D. C. Eat., f. intermedium (D. C. Eat.) Clute, Fern Bull. 11:117. 1903.

B. t. silaifolium (Presl) Clute, Fern Bull. 11:117. 1903.

Sceptridium silaifolium (Presl) Lyon, Bot. Gaz. 40:458. 1905.

- Sceptridium obliquum (Muhl. ex Willd.) Lyon, intermedium (Underw.) Lyon, Bot. Gaz. 40:458. 1905.
- B. t. obliquum, f. silaifolium (Presl) Clute, Fern Bull. 13:118. 1905.
- B. t., var. intermedium D. C. Eat. in Gray's Manual, ed. 7. 49. 1908.
- B. t., var. silaifolium (Presl) M. E. Jones, Bull. Univ. Montana Biol. ser. 15:8. 1910.
- B. multifidum (Gmel.) Rupr., var. australe (D. C. Eat.) Farwell, Rep. Mich. Acad. Sci. 18:86. 1916.
- B. m., var. intermedium (D. C. Eat.) Farwell, op. cit. 18:86. 1916.
- B. multifidum, ssp. silaifolium (Presl) Clausen, Bull. Torrey Bot. Club 64:271. 1937.
- B. m., var. silaifolium (Presl) M. Broun, Ind. N. Am. Ferns, 41. 1938.

Rhizomes short, roots numerous, long, thick and corrugated; both blade and sporophyll completely reflexed in bud, bud very hairy; plants fleshy, 10-50 cm high; common stipe short, stout, underground; sterile blades 1 or 2, inserted near base of leaf, somewhat coriaceous, long-petioled, ternate, 7-30 cm broad, nearly as long; ultimate segments not closely crowded, ovate to obovate, 4-10 mm long, 4-8 mm wide, margins slightly crenate; sporophyll long petioled, stout, 15-45 cm long, 2- to 5-pinnate. Spores shed during August and September. Sphagnum bogs along coast and shaded borders of mountain lakes and streams, Transition Zone and Boreal Region. Alaska to northern California, east to Wisconsin and northern New England. Type locality: Nootka Sound. Oregon: Along coast; Cascade Mts.; Wallowa Mts.; not common, but our most abundant Botrychium.

- 1b. Botrychium multifidum (Gmel.) Rupr., ssp. coulteri (Underw.) Rocky Mountain Grape-fern. Plate 3, Figure 3 & 4.

PLATE 3

Figure 1 & 2. Botrychium multifidum ssp. silaifolium

Figure 1. Habit

 1a. Blade

 1b. Sporophyll

Figure 2. Ultimate segment showing venation

Figure 3 & 4. B. multifidum ssp. coulteri

Figure 3. Portion of blade showing closeness of segments

Figure 4. Base of leaf and rhizome with corrugated roots,
 showing thick, fleshy character

 4a. Position of bud

 4b. Blade base

 4c. Sporophyll base

 4d. Old blade bases

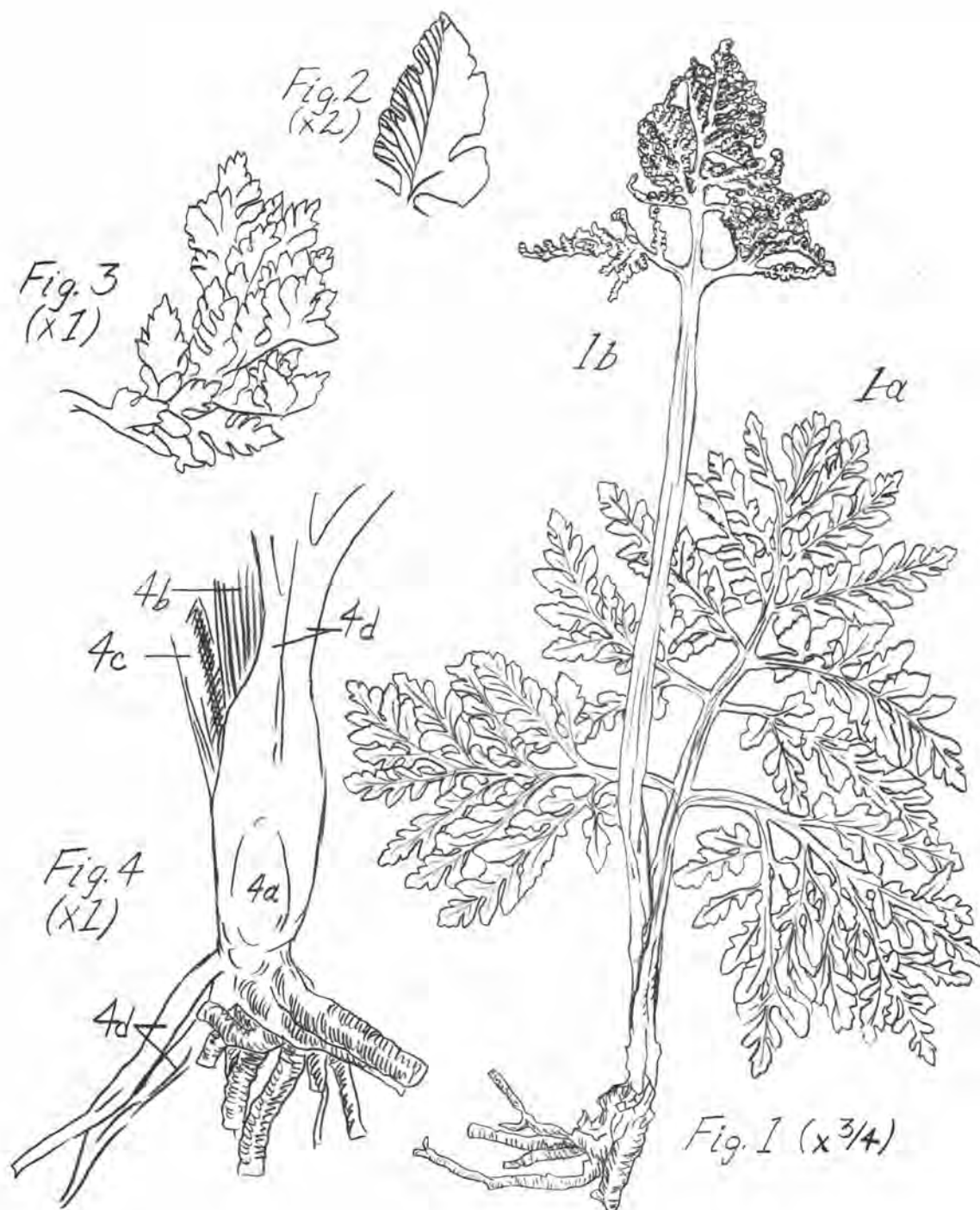


Plate 3

- B. coulteri Underw. Bull. Torrey Bot. Club 25:537. 1898.
B. ternatum (Thnbg.) Sw., obliquum (Muhl. ex Willd.) D. C.
 Eat., f. coulteri (Underw.) Clute, Fern Bull. 11:116. 1903.
Sceptridium coulteri (Underw.) Lyon, Bot. Gaz. 40:457. 1905.
Sceptridium ternatum (Thnbg.) Lyon, coulteri (Underw.) Clute,
 Fern Bull. 14:48. 1906.
B. t., var. coulteri (Underw.) M. E. Jones, Bull. Univ. Mon-
 tana, Biol. ser. 15:7. 1910.
B. silaifolium Presl, var. coulteri (Underw.) Jeps. Man. Fl.
 Pl. Calif. 26. 1925.
B. multifidum (Gmel.) Rupr., ssp. coulteri (Underw.) Clausen,
 Mem. Torrey Bot. Club 19(2):36. 1938.
B. m., var. coulteri (Underw.) M. Broun, Ind. N. Am. Ferns
 40. 1938.
B. silaifolium Presl, f. coulteri (Underw.) C. C. Hall, Am.
 Fern J. 33:124. 1943.

Differing from B. m. silaifolium in the following characteris-
 tics: plants very stout and fleshy, compact; ultimate segments of
 blade small and crowded, overlapping. Spores shed during July and
 August. Grassy meadows and geyser formations; Montana, Wyoming,
 Colorado, Pacific coast states. Type locality: Yellowstone National
 Park. Oregon: Wallowa Mts.; Upper Klamath Marsh, Klamath Co.,
 "Abundant," 1902, W. C. Cusick, but now rare.

2. Botrychium lunaria (L.) Sw.

Besides the typical variety, one other variety is found in
 Oregon. They may be distinguished as follows:

Pinnae lunate or fan-shaped, outer margins nearly entire

. 2a. B. l. var. lunaria

Pinnae with outer margins deeply and irregularly incised

. 2b. B. l. minganense

2a. Botrychium lunaria (L.) Sw., var. lunaria. Moonwort. Plate 4,
 Figure 1 & 2.

Osmunda lunaria L. Sp. Pl. 2:1064. 1753.

Ophioglossum pinnatum Lamarck, Flore Française 1:9. 1779,
 based on Osmunda lunaria L.

PLATE 4

- Figure 1. Botrychium lunaria (from Oregon), habit
- Figure 2. B. lunaria (from Scandinavia): typical blade
- Figure 3. B. lunaria var. minganense, habit
- Figure 4. B. pumicola, habit
- Figure 5. B. simplex, habit
- Figure 6. B. simplex, blade, showing differently shaped lower pinnae
- Figure 7. Sporangia of Botrychium, after dehiscence

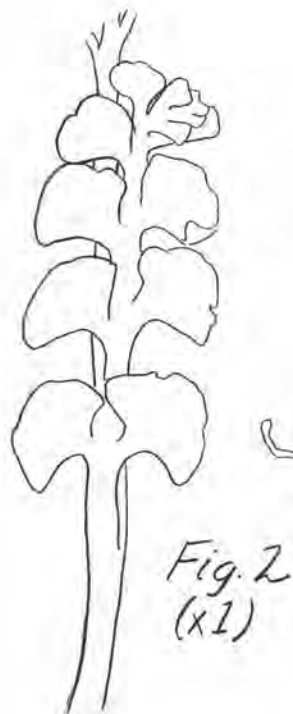
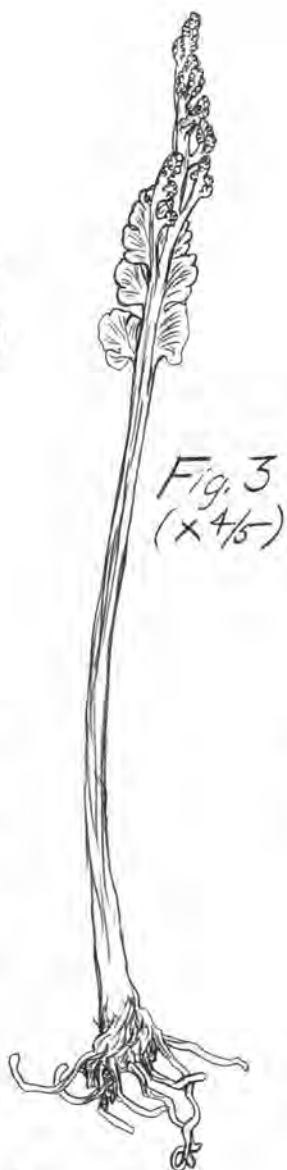


Plate 4

- Osmunda ramosa Roth, Tent. Fl. Germ. 1:444. 1788.
Osmunda lunata Salisb., Prod. 401. 1796.
Botrychium lunaria (L.) Sw. in Schrad. Journ. 2:110. 1800.
Botrypus lunaria (L.) Richard in Marthe, Cat. Jard. Med., Paris. 120. 1801.
Botrychium lunatum (Salisb.) S. F. Gray, A Nat. Arr. Brit. Plants. 2:19. 1821.
Botrychium racemosum Bubani, Fl. Pyr. 4:438. 1901, based on Lunaria minor of Fuchs, Hist. Stirp. 481-482. 1542.
Botrychium lunaria, var. typicum Clausen, Mem. Torrey Bot. Club 19(2):62. 1938.

Rhizome erect, slender; but smooth, both fertile and sterile segments erect in veneration, apex of blade usually slightly inclined over tip of sporophyll; plants rather stout, 4-30 cm high; common stipe 2-13 cm long, $\frac{3}{4}$ to $\frac{1}{2}$ length of plant; blade usually sessile, coriaceous, triangular, 1-6 cm long; pinnate with lobes fan-shaped or lunate, often overlapping; margins entire or slightly incised, segments all similar in shape; sporophyll 1-15 cm long, but usually surpassing the sterile blade, 1- to 3-pinnate; spores mature from June to early August. Moist meadows, open fields and woods, usually over limestone rocks; Boreal Region and Alpine Zone. Alaska to Labrador and Newfoundland, Greenland, south to Vermont, Michigan, Minnesota, and in the mountains to Colorado and southern California; also in Eurasia, Argentina, Australia, New Zealand: one of the most widespread of vascular plants. Type locality: European, Oregon: ? Mt. Hood area, L. F. Henderson; Steens Mts., 1954, C. G. Hansen; very rare.

- 2b. Botrychium lunaria (L.) Sw., var. minganense (Victorin) Dole. Victorin's Moonwort. Plate 4, Figure 3.

B. minganense Victorin, Contrib. Lab. Bot. Univ. Montreal, No. 11:331. 1927.

B. lunaria (L.) Sw., var. minganense (Victorin) Dole, in Flora of Vermont, 3d ed. 1. 1937. Fide F. M. - Victorin

B. lunaria, f. minganense (Victorin) Clute, Our Ferns, 76, 384. 1938.

Differs from the species in the following characteristics:

spores somewhat larger, sterile blade variable, sometimes inserted below the middle of plant, regularly much longer than wide, with pinules radially divided and bearing sporangia; segments of blade obovate to rhombic, cuneate at base, often much incised; plants yellowish green, tending to grow in clumps with roots of plants interwoven.

Coniferous and mixed woods and meadows, in calcareous soil.

Labrador and Nova Scotia, west to Michigan and Wisconsin, in western mountains from Alaska to California, Montana, Colorado,

Nevada. Type locality: Mingan Islands (Isle Niapisca), Quebec.

Oregon: ?Mt. Hood region; very rare.

3. Botrychium simplex Hitchc. var. simplex. Little Grape-fern.
Plate 3, Figure 5 & 6.

B. simplex Hitchc. Am. J. Sci. 6:103. 1823.

B. lunaria (L.) Sw., var. cordatum Fries, Summa Veg. Scand. 1:251. 1846.

B. kannenbergii Klinsm. Bot. Zeit. 10(22):379. Pl. 6a. 1852.

B. virginicum (Houtt.) Willd., var. ?simplex (Hitchc.) A. Gray, Manual, 2d ed. 602. 1856.

B. reuteri Rayor, Cat. Foug. Mont-Blanc. 15. 1860.

B. lunaria, var. simplex (Hitchc.) Watt, Can. Nat., II. 3:160. 1867.

B. simplex, var. cordatum (Fries) Wherry, Am. Fern J. 27:58. 1937.

B. simplex, var. typicum Clausen, Mem. Torrey Bot. Club 19(2):70. 1938.

Rhizome short and slender; plants slender, 3-20 cm high, erect; bud with blade straight or slightly bent, sporophyll erect; common stalk very short, $1/3$ or less the length of the plant; sterile blade petioled, circular to deltoid-ovate, 1-5 cm long, simple and 3-lobed, ternate, or pinnate with lowest pair of divisions somewhat enlarged; segments entire or incised, cuneate or fanshaped, dissimilar; sporophyll long-stalked, 2-15 cm long, simple to 2-pinnate, lax; spores mature in May and June. Grassy meadows and open slopes and woods; mostly Transition Zone. British Columbia to Southern California, Rocky Mts. to Colorado, east to Quebec and New England; also Europe, Japan. Type locality: Conway, Massachusetts, Oregon: Warner Mts., Lake County; very rare.

4. Botrychium pumicola Coville. Oregon Grape-fern, Oregon Moonwort. Plate 4, Figure 4.

B. pumicola Coville in Underw. Our Native Ferns, 6th ed. 69. 1900; Coville, Bull. Torrey Club 28:109 pl. 7. 1901.

Rhizome stout, elongate, roots dense; plants stout, 8-14 cm high; fronds 1 or 2; common stipe underground, 4-9 cm long, thickly sheathed with bases of old fronds; bud with apex of blade bent down, tip of sporophyll recurved; sterile blade sessile, triangular, 2-4 cm long, 1.5-4 cm broad, ternate; divisions broadly oblong to deltoid, pinnate; segments closely imbricate, sublunate to fan-shaped, broadly crenate to incised, or larger ones radially cleft into cuneate lobes,

dissimilar in shape, very glaucous; sporophyll sessile or short petioled, equal to or longer than the sterile blade. Fine pumice gravel on grassy slopes; Hudsonian Zone. Oregon: Llao Head, Crater Lake National Park, Klamath Co., (type locality); Mt. Newberry, Deschutes Co., 1928 L. E. Detling; a rare endemic.

5. Botrychium boreale Milde, ssp. obtusilobum (Rupr.) Clausen.
Northern Grape-fern. Plate 5, Figure 1.

B. boreale Milde, Bot. Zeit. 15(51):880. 1857.

B. crassinervium Rupr. in Milde, var. obtusilobum Rupr.
Beitr. Pfl. Russ. Reich. 11:42. 1859.

B. pinnatum St. John, Am. Fern J. 19:11. 1929.

B. boreale, ssp. obtusilobum (Rupr.) Clausen, Mem. Torrey
Bot. Club 19(2):81. 1938.

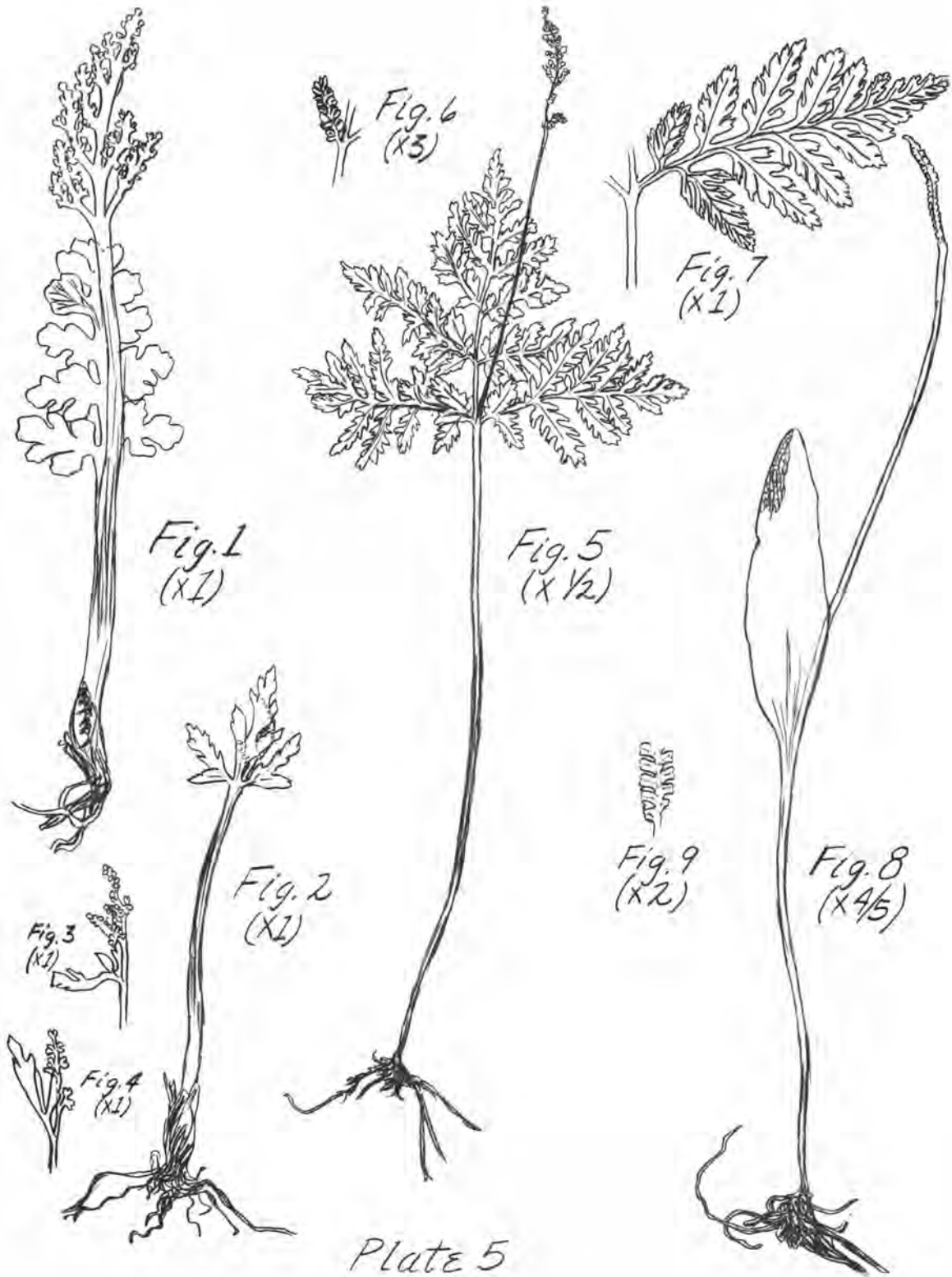
B. boreale, var. obtusilobum (Rupr.) M. Broun, Index N. Am.
Ferns, 33. 1938.

(This plant appears in most Oregon floras as St. John's Moonwort, B. pinnatum St. John.)

Plants 3-25 cm high; sterile blade oblong to triangular, 2-pinnatifid, rounded at the apex, 2-7 cm long, 1-4 cm wide; pinnae 7-15, sessile, oblong, pinnately lobed, lobes rounded; sporophyll longer than blade, erect and branched. Spores shed from July to September. Deep mossy woods, open grassy places. Alaska to Oregon, Montana, and Utah; also Siberia. Type locality: Unalaska. Oregon: Wallowa Mts., bog along Lostine R., 17 miles above Lostine, 1940, M. E. Peck; very rare.

PLATE 5

- Figure 1. Botrychium boreale ssp. obtusilobum, habit
- Figure 2, 3, & 4. B. lanceolatum
- Figure 2. Habit
- Figure 3. Blade and sporophyll
- Figure 4. Blade and sporophyll
- Figure 5, 6, & 7. B. virginianum
- Figure 5. Habit
- Figure 6. Sporangia
- Figure 7. Pinna, showing pinnatifid divisions rather than
 pinnate ones, and teeth
- Figure 8 & 9. Ophioglossum vulgatum
- Figure 8. Habit
- Figure 9. Sporangia after dehiscence (sporangia are fused
 along the dotted area)



6. Botrychium lanceolatum (Gmel.) Ångstr. Lance-leaved Grape-fern. Plate 5, Figure 2, 3 & 4.

Osmunda lanceolata Gmel. Nov. Acad. Petr. 12:516. pl. 11, f. 2. 1768.

Botrychium palmatum Presl, Abh. Böhm. Ges. Wiss. 5(4):303 1845.

B. lunaria (L.) Sw., var. lanceolatum (Gmel.) Rupr. Distr. Crypt. Vasc. Ross. 332. 1845.

(In Christiansen (10, p. 162) there appears the citation: [B.] "lanceolatum Rupr. Distr. Cr. Vasc. Ross. 33. 1845 = B. ramosum". The citation should appear thus: [B.] "(lunaria) lanceolatum Rupr. Beitr. Pfl. Russ. Reich. 3:33. 1845 = B. ramosum" [(Roth) Aschers., which is now called B. matricariaefolium A. Br.] In Beitr. Pfl. Russ. Reich., Ruprecht intended "B. lanceolatum" to be a sub-taxon of B. lunaria. If this were not the case, B. lanceolatum would have to be applied to what we now call B. matricariaefolium A. Br.)

B. matricariaefolium Freis, Summa Veg. Scand. 1:252. 1846, excluding the synonymy (not B. matricariaefolium A. Br. in Döll, 1843).

B. rutaceum Sw., β tripartitum Ledeb. Fl. Rossica 4:505. 1853.

B. lanceolatum (Gmel.) Ångstr., Bot. Notis. 68. 1854.

B. matricariaefolium Freis, var. lanceolatum (Gmel.) Watt, Can. Nat. II. 3:160. 1867.

B. rutaceum Sw., β lanceolatum (Gmel.) Hook. & Bak. Syn. Fil. 2nd ed. 447. 1874.

Plants rather stout, 5-30 cm high; common stipe 3-25 cm long; bud with both blade and sporophyll entirely bent down; sterile blade usually attached well above middle of plant, sessile, triangular, acute, 1-6 cm long, 1-8 cm wide, 1- to 2-pinnatifid; basal divisions triangular to nearly lanceolate, acute, often asymmetrical (extended below); lesser divisions oblique, variable, segments oblong or ovate to linear-lanceolate, blunt or acutish, sub-entire to obliquely incised;

sporophyll sessile or short stalked, 1- to 4-pinnate, slightly exceeding or equaling the sterile blade at maturity; spores mature in July and August. Grassy, rocky or wooded slopes; Arctic-Alpine Zone. Alaska to Oregon, Colorado, Quebec; also Europe and Asia. Type locality: European. Oregon: Wallowa Mts., Lostine R., 17 miles above Lostine, 1940, M. E. Peck; Crater Lake, 1962, R. M. Brown; very rare.

7. Botrychium virginianum (L.) Sw., ssp. europaeum (Ångstr.) Clausen. Rattlesnake-fern. Virginia Grape-fern. Plate 5, Figure 5, 6, & 7.

The synonymy of the species as a whole:

Osmunda virginiana L. Sp. Pl. 2:1064. 1753.

O. virginica Houtt. Pfl. Syst. 13(1):57. 1786.

Botrychium virginianum (L.) Sw. Schrad. Journ. 1800(2):111. 1803.

Botrypus virginicus (Houtt.) Michx. Fl. Bor. Am. 2:274. 1803.

Botrychium virginicum (Houtt.) Willd. Sp. Pl. 5:64. 1810.

Our subspecies.

Botrychium charcovense Portenschl ex Presl, Suppl. Tent. Pter. 47. 1845.

B. anthemoides Presl, Abh. Böhm. Ges. Wiss. 5(5)323. 1847.

B. virginianum (L.) Sw., var. europaeum Ångstr., Bot. Notis 68:1854.

B. v., var. laurentianum Butters, Rhodora 19:208. 1917.

B. v., var. intermedium Butters, in part, op. cit., p. 210.

B. v., var. occidentale Butters, in part, op. cit., p. 213.

B. v., ssp. europaeum (Ångstr.) Clausen, Mem. Torrey Bot. Club. 19:98. 1938.

B. v., f. europaeum (Ångstr.) Clute, Our Ferns, 64. 1938.

Plants 10-40 cm high; common stipe slender, almost wholly above ground, comprising 1/2 to 2/3 the height of the plant; bud

silky, both blade and sporophyll bent down; sterile blade broadly triangular, more or less ternate, 5-15 cm wide, about as long, sessile, spreading, 2-pinnate-pinnatifid or pinnate-2-pinnatifid; segments numerous, often rather crowded or imbricate, ultimate ones oblong, obtuse, toothed; leaf tissue thin, variable in color;

sporophyll long-stalked, 2- to 3-pinnate, the divisions slender.

Spores mature from May to July. Mostly coniferous forests, moist meadows and mossy open places; Transition and Canadian Zones.

Labrador and Newfoundland west to British Columbia, south to southern New England, Michigan, Wisconsin, Minnesota, Colorado, Oregon; also in northern Europe, Asia. Type locality: northern Europe. Oregon: Hood River; McKenzie R. (Cascade Mts.); Wallowa Mts.; Blue Mts.; rare.

2. OPHIOGLOSSUM

Ophioglossum [Tourn.] L. Sp. Pl. 2:1062, 1753.

Rhizome short, erect, terminating in the erect exposed bud for the following season; leaves 1-4, erect, glabrous, fleshy, arising at side of apical bud; common stipe short to elongate, slender; sterile blade simple, sessile or short-petioled, linear-lanceolate to ovate or reniform; veins reticulate throughout lamina; sporophyll simple, slender, long-stalked; sporangia in 2 ranks, large, globose,

marginal, joined together, transversely dehiscent (Plate 5, Figure 9).

One species in Oregon. 1. O. vulgatum

1. Ophioglossum vulgatum L. Adder's tongue fern. Plate 5, Figure 8 & 9.

O. vulgatum L. Sp. Pl. 2:1062. 1753.

O. arenarium E. G. Britton, Bull. Torrey Bot. Club 24:555, pl. 318, 319, f. 3. 1897.

O. alaskanum E. G. Britton, op. cit., p. 556. pl. 319, f. 5.

Rhizome cylindrical, rather slender; fronds usually solitary, 10-40 cm long; common stipe comprising 1/3 to 2/3 the height of the plant; sterile blade usually sessile, lanceolate to spatulate to ovate, 2.5-12.0 cm long, 1-5 cm wide, rounded or obtuse, sometimes acute, translucent when dry; middle areoles long and narrow, outer ones successively shorter, hexagonal, with or without included veinlets; sporophyll with spike 2-4 cm long, 1.5-3.5 mm wide, apiculate; sporangia 10-30 pairs. Moist meadows, pastures, thickets and sphagnum bogs; mainly Transition Zone, Maine and Quebec to Alaska, south to Washington (Oregon?), and the Gulf States; widespread in Europe, western Asia, but never common. Type locality: European. Oregon: very rare if present; I have found no reference to a specific locality where it has been collected here.

2. POLYPODIACEAE

Plants of diverse habit; usually rhizomatous, the rhizomes horizontal and creeping or shorter and oblique or erect, often appearing woody; leaves with circinate vernation, usually monomorphic, but dimorphic in some genera, simple to decompose; veins usually forking, free or reticulate; plants homosporous; sporangia usually in sori; sori dorsal (at the tips of veinlets ending well within the lamina or on a veinlet which then extends beyond the sorus) or marginal (at or near the tips of veinlets ending at the margins), with or without indusia, generally with sporangia in various stages of development within each sorus; sporangia thin-walled, long- or short-stalked, annulus present, vertical, incomplete (interrupted by the stalk and by lip cells), dehiscence transverse. A large, worldwide family, composed of about 170 genera and 7,000 species (30, p. 349) held together on the basis of the sporangial characteristics. It has been considered an artificial group by several workers and has been split into additional families or subfamilies. As there has not been essential agreement on a revised classification, it seems best to retain all the following genera in the Polypodiaceae (compare Munz and Keck, 34, p. 31-35).

A. Blades 1-pinnate, all pinnae sessile and their bases not constricted

B. Blades narrowly elliptical, base attenuate, much less than

- half the greatest width of the blade; fronds dimorphic, in a crown 7. Struthiopteris
- BB. Blades triangular (may be elongate), base truncate, half or more than half the greatest width of the blade; fronds monomorphic, arising singly 15. Polypodium
- AA. Blades 1 - to 4-pinnate with some or all pinna-bases stalked or constricted
- C. Ultimate segments without a midvein, conspicuous veinlets dichotomously branching from the base or from a vein along the lower edge; sori marginal; stipes and rachises dark, wiry 13. Adiantum
- CC. Ultimate segments with a more or less distinct midvein, the veinlets arising pinnately from them (veinlets may be indistinct in some species)
- D. Undersurface of lamina yellow- or white-powdery; sporangia not in distinct sori, but contiguous on the veinlets 9. Pityrogramma
- DD. Undersurface of lamina glabrous, hairy or scaly but not powdery; sori separate and dorsal, or marginal and confluent
- E. Veinlets conspicuously forming a network; sori separate, oblong, parallel to the midveins; indusia fleshy, persistent, attached at outer margin 8. Woodwardia
- EE. Veinlets entirely free; sori more or less circular or oval or marginal; indusia membranous,

fleshy or absent

F. Terminal segment composed of pinnae or pinnules that gradually become smaller and less distinctly separated from each other, not shaped like other ultimate segments.

G. Lower surface of segments velvety with rather dense, soft, pale hairs, upper surface nearly glabrous; sori marginal with narrow marginal indusium; fronds arising singly from long underground rhizome . . 14. Pteridium

GG. Lower surface of segments glabrous, or variously hairy or scaly on both surfaces with scattered hairs or scales of varying lengths, not velvety

H. Stipes (at least the lower portions of mature ones) dark and lustrous; small, rock-dwelling plants

I. Dried stipes inflated, smooth; indusia stellate; fronds densely tufted . . 1. Woodsia

II. Dried stipes withered, collapsed; indusia

cup-like, attached below, free edge fringed;

fronds close but not tufted

. 2. Cystopteris

HH. Stipes greenish, straw-colored, grayish or blackish (if dark, then dull). NOTE: Genera in this part of the key are difficult to characterize vegetatively, hence several characters must be taken in combination for each genus; fertile material is very desirable.

J. Blades commonly 1-pinnate, or if 2-pinnate, then very much longer than wide, the pinnules bearing teeth mostly on the outer margins (if the teeth are obscure, then 5 or fewer pairs of pinnules per pinna); indusia centrally pel-
tate 4. Polystichum

JJ. Blades 2- to 3-pinnate, elliptical or lanceolate to broadly triangular, teeth (when present) on both margins of the pinnule, usually 10 or more distinct pairs of pinnules per pinna; indusia lateral, reniform, or absent

K. Blades elliptical or lanceolate, margins toothed; stipe scales of one kind, elongate, crinkled, dark, rather scattered, or

nearly absent; indusia lateral or absent . . .

. 5. Athyrium

KK. Blades triangular and pinnule margins toothed or entire (in the most common species); in rare species, blades elliptical, with pinnule margins entire or with pinnule margins toothed and the stipe scales of several kinds, large ovate ones interspersed with small, more numerous hairlike ones, all light yellowish-brown; indusia reniform or absent

. 3. Dryopteris

FF. Terminal segments distinct (occasionally with 1 or 2 basal lobes), stalked or constricted at base, about same shape as other ultimate segments, although sometimes smaller; mostly small, rock-dwelling plants

L. Stipes straw-colored throughout; fronds dimorphic, sori marginal with a marginal indusium, fertile fronds less divided and longer than sterile ones . . .

. 12. Cryptogramma

LL. Stipes mostly dark, brownish to nearly black; usually monomorphic, slightly dimorphic in some species

- M. Blades 1-pinnate, pinnae stalked, entire, crenate, cuneate at base; sori dorsal and indusia lateral 6. Asplenium
- MM. Blades 1- to 3-pinnate; if 1-pinnate, the pinnae sessile, obtuse or cordate at base; sori marginal
- N. Pinnules very close to one another, usually numerous; ultimate segments oval or round with scales or hairs on undersurface (or if glabrous, then lanceolate); blades 2- to 3-pinnate11. Cheilanthes
- NN. Pinnules rather distant from one another, few per pinna; ultimate segments glabrous, variable in shape but not lanceolate; blades 1- to 3-pinnate10. Pellaea

1. WOODSIA

Woodsia R. Br. Prod. Fl. Nov. Holl. 1:158. 1810; Tr. Linn. Soc. 11:170. 1815.

Physematium Kaulf. Flora 341. 1829.

Small ferns of rocky habitats; rhizomes short-creeping or ascending, branched and the branches densely tufted; fronds numerous, sometimes jointed above the base and separable; blades linear to lance-ovate, 1- to 2-pinnate, the segments pinnatifid, glabrous to variously hairy or paleaceous; veins free; sori round, separate, often confluent with age; indusia inferior in attachment, round or cleft into lacerate divisions or stellate (Figure 21128), the divisions mostly concealed beneath the sporangia or inflexed and partially covering them. About 35 species, mainly temperate and boreal, 8 occurring in the United States. Type species: Polypodium ilvense L.

Pinnules glandular hairy; segments of stellate indusia membranous, pa-

perly 1. W. scopulina

Pinnules nearly glabrous or with sessile glands; segments of indusia

threadlike, beaded (moniliform) 2. W. oregana

1. Woodsia scopulina D. C. Eat. Rocky Mountain Woodsia. Pl. 6, fig. 1, 2, & 3.

W. scopulina D. C. Eat. Can. Nat. 2(2):91. 1865.

W. obtusa (Spreng.) Torr., var. lyallii Hook. Syn. Fil. 1st ed. 48. 1866.

Physematium scopulinum (D. C. Eat.) Trev. Nu. Giorn. Bot.

PLATE 6

- Figure 1, 2 & 3. Woodsia scopulina
- Figure 1. Habit
- Figure 2. Pinna with sori, showing position
- Figure 3. Segment with sori, showing indusia and
 pubescence.
- Figure 4, 5 & 6. W. oregana
- Figure 4. Habit
- Figure 5. Pinna
- Figure 6. Sorus showing moniliform segments of
 indusium



Fig. 1
(x 3/4)



Fig. 3 (x8)



Fig. 2
(x3)

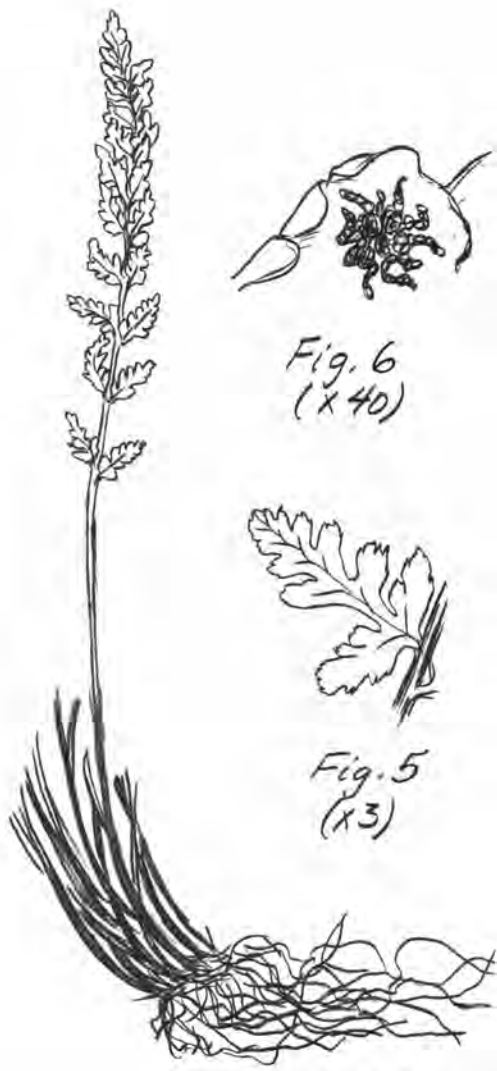


Fig. 4 (x 4/5)



Fig. 6
(x 40)



Fig. 5
(x3)

Plate 6

It. 7:161, 1875.

Rhizomes short-creeping, paleaceous; scales pale brown, thin; fronds tufted, erect, 6-40 cm long; stipes about half the length of the blade, inflated, stout, stramineous to castaneous, base dark, chaffy; blades 1- to 2-pinnate, linear to oblong to lanceolate, short-acuminate, 3.5-25.0 cm long, 1.5-6.0 cm wide; pinnae subopposite to opposite, oblong to deltoid-ovate, acute; pinnules oblong, joined at bases, larger ones free; margins serrate to deeply toothed; sori small, supramedial; indusia attached around bases of sori, deeply cleft, the divisions spreading, membranous, with filamentous tips (Pl. 6, fig. 3); pinnules, stipes and rachises glandular-puberulent, and with few to many flat, septate, whitish hairs. Crevices and talus of cliffs; Transition Zone. Alaska to Quebec, Ontario, South Dakota, Colorado, Utah, and California, also West Virginia and North Carolina. Type locality: Rocky Mountains (40° N. Lat.). Oregon: Columbia Gorge; Wallowa Mts.; Blue Mts.; eastern slopes of the Cascades; locally common in parts of Union County where it appears with W. oregana. In dry habitats, the leaves dry up and the plant becomes dormant after the middle of July.

2. Woodsia oregana D. C. Eat. Oregon Woodsia. Pl. 6, fig. 4, 5, & 6.

W. oregana D. C. Eat. Can. Nat. 2(2):90. 1865.

Physematium oreganum (D. C. Eat.) Trev. Nu. Giorn. Bot.
It. 7:161. 1875.

Rhizomes slender, short-creeping, branches tufted, densely paleaceous; scales pale brown, thin; fronds many, erect, tufted, 6-25 cm long; stipes slender but firm, stramineous from a castaneous base; blades 2-pinnate or nearly so, linear to lance-oblong, acute, 5-13 cm long, 1.0-3.5 cm wide; pinnae opposite or subopposite (higher ones becoming alternate), distant below, deltoid-oblong (lower ones deltoid, slightly reduced), acute; pinnules few, oblong, obtuse, larger ones free, others decurrent and connected at base; margins crenate or crenately lobed, commonly reflexed, partially concealing the sori; sori small, round, sometimes crowded, submarginal; indusia round, divided into beaded filiform segments (Pl. 6, fig. 7); leaf tissue delicate; glands, if present, nearly sessile; fronds ephemeral, drying with onset of hot weather (June). Crevices of dry cliff and rock slopes, sagebrush scablands, in thin soil; Arid Transition Zone. British Columbia to South Dakota, Nebraska, Wisconsin, New Mexico, Arizona, California, and eastern Quebec. Type locality: The Dalles, Oregon. Oregon: Columbia Gorge west to Multnomah County; Wallowa Mts; Blue Mts. (Union and Grant Counties). Growing in same localities as W. scopulina and easily confused with it, but key characters distinguish them.

2. CYSTOPTERIS

Cystopteris Bernh. Schrad. Neu. Journ. 1(2):5, 26. 1806 [Nomen conservandum (27, p. 230)].

Filicula Sequier, Pl. Veron. Suppl. 55. 1754.

Filix Ludwig, Inst. 2d ed. 1757, not Hill, Fam. Herb. 171. 1755.

Filix Adanson, Fam. Pl. 2:20, 558. 1763 [Nomen rejiciendum (27, p. 230)].

Cystopteris Bernh. 1806.

Cyclopteris S. F. Gray, Nat. Arr. Brit. Pl. 2:9. 1821.

Cystea J. E. Sm. Engl. Flora 260, 284. 1828.

Plants small, delicate, of shaded rocky and alluvial habitats; rhizomes slender, creeping; fronds erect to recurved spreading, somewhat succulent; stipes slender, not jointed to the rhizome; blades 1- to 4-pinnate, delicate, fertile ones commonly with narrower pinnales and longer stalked than the sterile; sori round, dorsal, separate; indusia membranous, hoodlike, attached at the inner side of the broad base and partly under the sorus (Pl. 7, fig. 4a)(fig. 21127), early thrust back by the sporangia and partly concealed (Pl. 7, fig. 4b), withering, the older sori thus appearing naked. About ten species, mostly of temperate and boreal regions, three in North America. Type species: Polypodium bulbiferum L.

One species in Oregon 1. C. fragilis

1. Cystopteris fragilis (L.) Bernh. Brittle-fern. Pl. 7, fig. 1, 2, 3 & 4.

Polypodium "F. fragile" (a misprint) L. Sp. Pl. 1091. 1753.

PLATE 7

Figure 1, 2, 3 & 4. Cystopteris fragilis

- Figure 1. Habit
Figure 2. Pinna with sori, showing their position
Figure 3. Pinnule with indusia
Figure 4. Sori
 4a. Immature, indusium in place
 4b. Mature, indusium reflexed

Figure 5, 6, 7, 8 & 9. Cryptogramma acrostichoides

- Figure 5. Habit
 5a. Sterile frond
 5b. Fertile frond
Figure 6. Sterile pinnule, with double-toothed lobes
Figure 7. Sterile pinnule, with dentate margin (this form occasionally is partially fertile, with small sori not covered by the margins, which do not reflex over them as in the normal fertile pinnules)
Figure 8. Sterile lobe or segment, showing vein pattern
Figure 9. Fertile pinnules, dorsal surface, showing reflexed margins

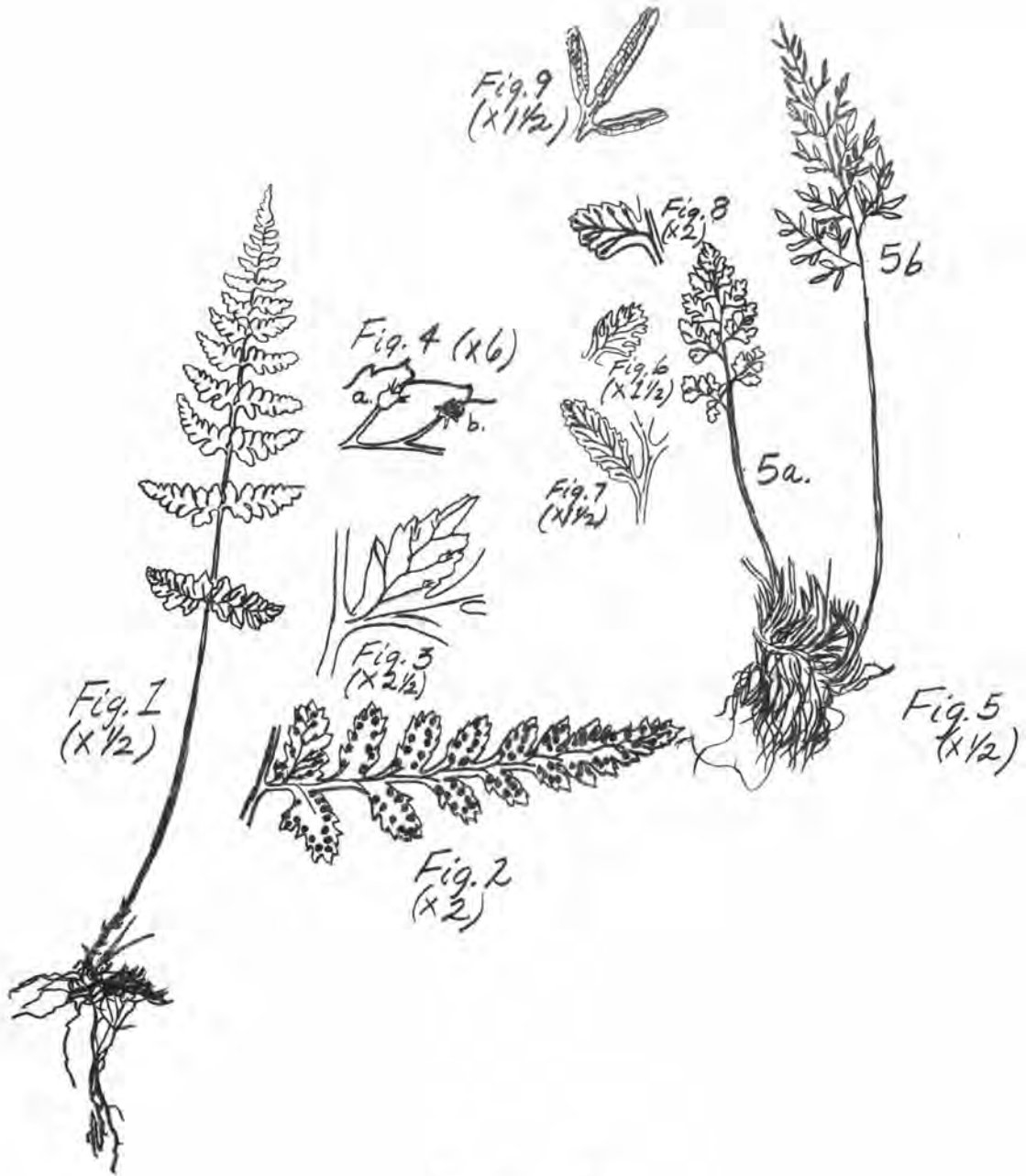


Plate 7

- Polypodium fragile L. Fl. Suecica, ed. 2:374. 1755.
Filix fragilis (L.) Gilib. Exerc. Phyt. 558. 1792.
Cyathea fragilis (L.) J. E. Sm. Mem. Acad. Turin, 5:417.
 1793.
Aspidium fragile (L.) Sw. Schrad. Journ. 1800(2):40. 1801.
Athyrium fragile (L.) Spreng. Antleit 3:136. 1804.
Cystopteris fragilis (L.) Bernh. Schrad. Neu. Journ. 1(2):26.
 pl. 2, f. 9, 1806.
Cyclopteris fragilis (L.) S. F. Gray, Nat. Arr. Brit. Pl. 2:9.
 1821.
Cystea fragilis (L.) J. E. Sm. Eng. Fl. 4:289. 1828.
Cystopteris filix-fragilis (L.) Chiov. Ann. Bot. Pirotta. 1:210.
 1903.
Filicula filix-fragilis (L.) Farwell, Am. Midl. Nat. 12:251.
 1931.

Rhizomes paleaceous toward the apex; scales light brown, thin; fronds few to several, erect-spreading or ascending, close, clustered, but not tufted, 5-50 cm long; stipes about as long as blades, delicate, stramineous above, light castaneous at base, a few basal scales; blades 2-pinnate (or pinnate-pinnatifid), 4-25 cm long, shape variable, ovate to oblong-lanceolate to lance-ovate, acuminate, basal pinnae little or not at all reduced; pinnae opposite to subopposite to alternate (lower ones distant, upper ones close), deltoid to deltoid-oblong or oblong-ovate, acute or acuminate; pinnules (or segments) few to many, spreading, decurrent and/or joined, ovate to oblong to lanceolate, acute, pinnatifid or incised; veinlets ending in marginal teeth; sori submarginal, on the veinlets, small; free margins of the indusia fringed; leaf tissue membranous, glabrous, leaves rather ephemeral in dry, hot areas. Rich woods (usually associated with rocks) and low, moister situations to arid sagebrush scabland and high altitudes,

usually at the bases of large boulders; Humid and Arid Transition, Canadian, Hudsonian, and Arctic (Arctic-Alpine) Zones. Alaska to Labrador and Newfoundland, south to southern California, Mexican border, Oklahoma, Alabama; Eurasia and mountains of tropical America. Type locality: European. Oregon: Common in rocky areas in the mountains throughout the state, especially the eastern parts; probably the only fern in some of the dryer areas. Highly variable according to light, moisture, etc. Plants growing in dark locations --- under boulders, in mouths of caves --- tend to have wider pinnules, more membranous leaf tissue, and are less fertile. Plants may be continuous in the fissures of favorable boulders, not tufted. The woodsias, with which this species is most likely to be confused, are tufted, the stipes stouter, persistent, leaf tissue less delicate, the pinnules more distinct. Dried C. fragilis is yellowish and papery, Woodsia is more brownish or reddish.

3. DRYOPTERIS

Dryopteris Adanson, Fam. Pl. 2:20. 1763 [Nomen conservandum (27, p. 230)]

Note: This genus has been reorganized as separate genera or divided into subgenera many times. The synonyms listed are those represented in our area which have been entirely included in the genus Dryopteris or whose species all have been distributed to this

and related genera. This scheme follows Christensen (13, p. 6-7); compare Munz and Keck (34, p. 41, 42).

- Filix Hill, Fam. Herb. 171. 1755, not Ludwig 1757, nor Adanson, 1763. [Nomen rejiciendum (27, p. 230)]
- Thelypteris Schmidel, Ic. Pl. ed. J. C. Keller 45. pl. 11, 13. 1762. [Nomen rejiciendum (27, p. 230)]
- Dryopteris Adanson, 1763.
- Aspidium Sw. Schrad. Journ. 1800(2):29. 1801, in part.
- Nephrodium Richard in Marthe, Cat. Jard. Med. Paris 120. 1801; Michx. Fl. Bor. Am. 2:266. 1803.
- Lastrea Bory, Dict. Class. 6:588. 1824; 9:232. 1826.
- Thelypteris Schott, Gen. Fil. pl. 10. 1834, not Adanson, Fam. Pl. 2:20. 1763.
- Gymnocarpium Newm. Phytol. 4:371. 1851; Ching, Contr. Biol. Lab. Sci. Soc. China 9:38. 1933.
- Lophodium Newm. Phytol. 4:371, app. 16. 1851, not Richard, Act. Soc. Hist. Nat. Paris 1:114. 1792.
- Filix Farwell, Ann. Rep. Mich. Acad. Sci. 18:79. 1916, based on Filix Hill, 1755. [Nomen rejiciendum (27, p. 230)]

Mainly woodland ferns of erect habit; rhizomes slender, wide-creeping and nearly naked to thick, erect, and copiously chaffy; fronds borne singly or in a crown, not jointed to the rhizome; blades monomorphic, 1- to 3-pinnate or pinnatifid, glabrous to variously pubescent, a few species conspicuously paleaceous; in north temperate and boreal species, the veins free, sori mostly round, dorsal, indusiate or not, and indusia (when present) reniform (fig. 21125). A large genus, 650 species, mainly tropical; many other species occur in North America. Type species: Polypodium filix-mas L.

- A. Blades triangular (may be somewhat elongate), widest at or near the base
- B. Blades essentially 3-pinnate (or ternate and the main

divisions 2-pinnate)

C. Margins toothed; indusia present. . . . 6. D. dilatata

CC. Margins entire or crenate; indusia absent.

. 2. D. linnaeana

BB. Blades 2-pinnate or pinnate-pinnatifid

D. Pinnae all stalked; margins toothed; indusia present,
fleshy and persistent; blades 2-pinnate

. 4. D. arguta

DD. Pinnate sessile; margins entire; indusia absent; pinnate-
pinnatifid only 3. D. phegopteris

AA. Blades elliptical, narrowed toward the base

E. Margins entire or pinnules with elongate basal lobes; stipe
nearly naked. 1. D. oregana

EE. Margins toothed; stipe scaly. 5. D. filix-mas

1. Dryopteris oregana C. Chr. Sierra Wood-fern. Pl. 9, fig. 1, 2
& 3.

Aspidium nevadense D. C. Eat. Ferns N. Am. 1:73. pl. 10.
1878, not Boiss. Elench. Pl. Nov. 1838 (which equals
Dryopteris rigida (Hoff.) Sw., var.).

Nephrodium nevadense (D. C. Eat.) Bak. Ann. Bot. 5:320. 1891.
Dryopteris nevadensis (D. C. Eat.) Underw. Our Nat. Ferns, ed.
6. 113. 1893.

Dryopteris oregana C. Chr. Ind. Fil. 281. 1905.

Filix oregana (C. Chr.) Farwell, Ann. Rep. Mich. Acad. Sci.
18:79. 1916.

Thelypteris oregana (C. Chr.) St. John, Proc. Biol. Soc. Wash.
41:192. 1928.

Lastrea oregana (C. Chr.) Copel. Gen. Fil. 139. 1947.

PLATE 8

- Figure 1. Dryopteris ptegopteris (habit)
- Figure 2 & 3. D. linnaeana
- Figure 2. Habit
- Figure 3. Pinnule with sori, showing position



Fig. 1
(x 1/2)

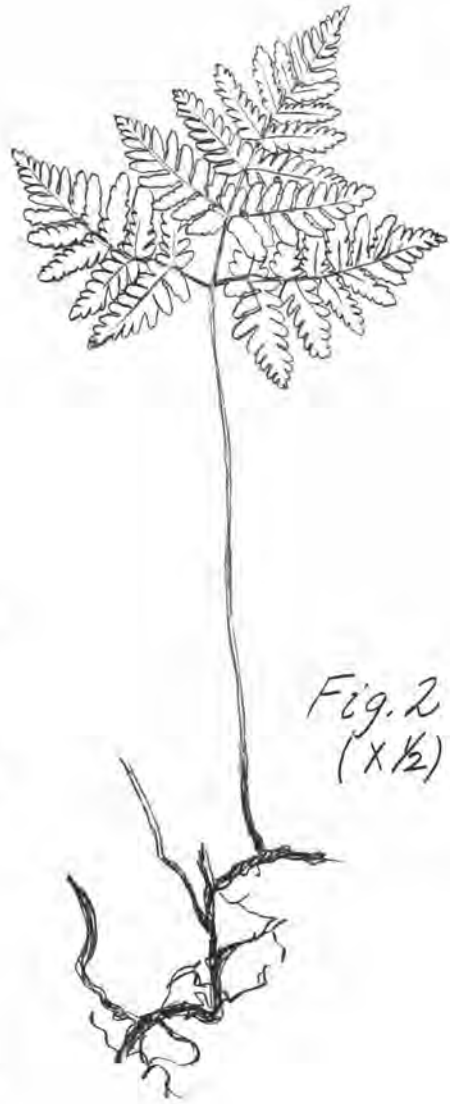


Fig. 2
(x 1/2)



Fig. 3
(x 1)

Plate 8

Rhizomes slender, creeping, apical portion covered with imbricate stipe bases of old fronds; scales yellowish brown, ovate, thin; fronds few, in close terminal crown, ascending, 50-90 cm long; stipes much shorter than the blade (to about half its length), slender, stramineous, base dark, nearly naked except for few scales near base; blades pinnate-pinnatifid to 2-pinnate, 40-60 cm long, 10-16 cm wide, elliptic-lanceolate, acuminate, long-attenuate to a very narrow base; pinnae sessile, horizontal, linear to oblong-linear, acuminate (upper pinnae close, basal ones distant, very small) pinnules close, oblong, obtuse, slightly oblique; margins entire or undulate, a few deciduous, minutely resinous-glandular cilia present; veins mostly simple, slightly hairy beneath; sori small, submarginal; indusia minute, very thin, long-ciliate, glandular, reniform and attached at the sinus (visible only in very young sori, Pl. 9, fig. 3); leaf tissue membranous, slightly pubescent; many fronds sterile. Moist meadows and open glades on forested slopes; Canadian and Transition Zones. Mt. Ranier, western Cascades of Oregon and the Sierra Nevada of northern California. Type locality: Plumas County, California. Oregon; Mt. Hood region; MacKenzie and Blue River regions, Lane Co.; the Siskiyou Mts.; rather rare.

2. Dryopteris linnaeana C. Chr. Oak-fern. Pl. 8, fig. 2 & 3.

Polypodium dryopteris L. Sp. Pl. 2:1093. 1753.

PLATE 9

- Figure 1, 2 & 3. Dryopteris oregana
- Figure 1. Habit
- Figure 2. Pinna showing position of sori and incised basal pinnules
- Figure 3. Pinnule, with sori, showing fringed margins of the reniform indusia and simple, unforked veins
- Figure 4, 5, 6, 7 & 8. D. filix-mas
- Figure 4. Habit: young frond, showing general elliptical shape of the blade
- Figure 5. Pinnae of mature frond
- Figure 6. Basal pinnules
- Figure 7. Pinnule (ventral or upper surface) showing position of sori and shape of marginal teeth
- Figure 8. Sori and indusia, and marginal teeth on one of the upper pinnules



Fig. 1
(x 1/2)



Fig. 2
(x 1 1/10)

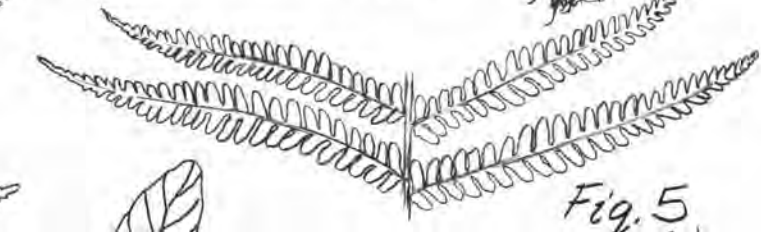


Fig. 3
(x 6)

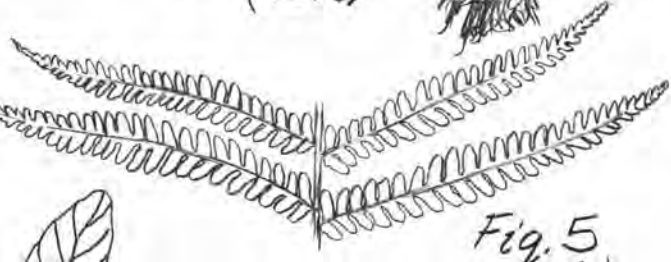


Fig. 4
(x 1/2)



Fig. 5
(x 2)



Fig. 6
(x 1 1/6)



Fig. 7
(x 3)



Fig. 8
(x 1/2)

Plate 9

- Polystichum dryopteris (L.) Roth, Röm. Arch. 2(1):106. 1799.
Nephrodium dryopteris (L.) Michx. Fl. Bor. Am. 2:270. 1803.
Lastrea dryopteris (L.) Bory, Dict. Class. 9:233. 1826.
Aspidium dryopteris (L.) Baumg. Enum. Stirp. Trans. 4:29.
 1846.
Gymnocarpium dryopteris (L.) Newm. Phytol. 4:app. 24. 1851.
Phegopteris dryopteris (L.) Fée, Gen. Fil. 243. 1852.
Dryopteris linnaeana C. Chr. Ind. Fil. 275. 1905.
Dryopteris dryopteris (L.) Christ, Bull. Acad. Internat. Geogr.
 Bot. 20(1):151. 1909.

Rhizomes slender, cordlike, wide-creeping, nearly naked with a few scales on the branches; scales light brown, small, ovate, mostly on growing portions; fronds arising singly, erect, distant, 20-60 cm long; stipes much longer than blades, stramineous from chaffy, black bases; blades appearing ternate due to enlargement of basal pinnae, the primary divisions 2-pinnate, deltoid, acute (basal parts long-stalked, somewhat asymmetrical), pinnae gradually simpler, sessile or joined, all opposite; pinnules oblong, rounded-obtuse, larger ones pinnately lobed or divided, margins entire to crenate, not toothed; sori fairly numerous to few per frond, submarginal, small, oval to round, gray-brown; indusia absent; leaf tissue thin, glabrous. Moist woods, thickets, and swamps, often in deep shade; Canadian and Transition Zones. Alaska to Newfoundland, south to Oregon, Arizona, New Mexico, Kansas, South Dakota, Wisconsin, mountains of Virginia; Greenland, Europe, northern Asia, Japan, China, western Himalaya Mts. Type locality: European. Oregon: Columbia Gorge to the slopes of the Cascade Mts.; Blue Mts.;

Wallowa Mts.; Siskiyou Mts.; fairly common but not abundant. Listed by Peck (35, p. 21) as a characteristic plant of the Canadian Zone in Oregon (as Phegopteris dryopteris (L.) Fée).

3. Dryopteris phegopteris (L.) C. Chr. Beech-fern. Pl. 8, fig. 1.

Polypodium phegopteris L. Sp. Pl. 2:1089. 1753.

Polystichum phegopteris (L.) Roth, Röm. Arch. 2(1):106. 1799.

Lastrea phegopteris (L.) Bory, Dict. Class. 9:233. 1826.

Aspidium phegopteris (L.) Baumg. Enum. Strip. Trans. 4:28. 1851.

Gymnocarpium phegopteris (L.) Newm. Phytol. 4: app. 23. 1851.

Phegopteris polypodioides Fée, Gen. 243. 1850-52.

Phegopteris vulgaris Mett. Fil. Lips. 83. 1856.

Phegopteris phegopteris (L.) Keys. Pol. Cyath. Herbar. Bung. 50. 1873.

Nephrodium phegopteris (L.) Prantl, Nat. Pfl. 170. 1884.

Dryopteris phegopteris (L.) C. Chr. Ind. Fil. 384. 1905.

Rhizomes very slender, wide-creeping; scales few; fronds few, distant, ascending, 13-55 cm long (ours reach about 30 cm); stipes as long as or much longer than the blades, slender, stramineous, with a few scales; blades pinnate-pinnatifid, deltoid, long-acuminate, 6.5-25.0 cm long, 5-8 cm wide; pinnate opposite to subopposite, mostly close, joined at the bases, spreading, lower ones distant, deflexed, narrowly ovate; margins entire or crenate, white-ciliate; veins mostly simple; sori fairly numerous in fertile fronds (but many fronds sterile), submarginal; indusia absent; leaf tissue thin, white-hairy on both surfaces (chiefly along the veins), the rachis, midribs, and bases of the pinnae with a few small rusty, lanceolate scales. Moist,

rocky forests, crevices of shaded ledges in the mountains; Canadian and Transition Zones. Alaska to Newfoundland, south to Washington and Oregon, Minnesota, Wisconsin, Ohio, and the mountains of Virginia; Greenland, Europe, Asia Minor, northern Asia, Himalaya Mts., Japan. Type locality: European. Oregon: reported from Columbia county; very rare.

4. Dryopteris arguta (Kaulf.) Watt. Coastal Wood-fern. Pl. 10. fig. 4 & 5.

Aspidium argutum Kaulf. Enum. 242. 1824.

Lastrea arguta (Kaulf.) Brack. Expl. Exped. 16. 1854.

Dryopteris arguta (Kaulf.) Watt, Can. Nat. 2(13)159. 1867.

Aspidium rigidum (Hoffm.) Sw., var. argutum (Kaulf.) D. C. Eat. in Wheeler, Rep. U. S. Geograph. Surv. 6:333. 1879.

Dryopteris rigida (Hoffm.) Underw., var. arguta (Kaulf.)

Underw. Our Nat. Ferns 6th ed. 116. 1893.

Nephrodium argutum (Kaulf.) Diels in Nat. Pfl. 173. 1899.

Filix rigida (Hoffm.) Farwell, var. arguta (Kaulf.) Farwell, Rep. Mich. Acad. Sci. 18:82. 1916.

Rhizomes large, stout, woody, short-creeping, densely pale-aceous; scales bright castaneous, thin, lance-oblong or narrower, attenuate; fronds several, close, erect, evergreen, 25-90 cm long; stipe short, to about one half the length of blade, stout, usually stramineous above, base dark; blade 2-pinnate, acuminate, lance-ovate to oblong or deltoid-oblong, lowest pinnae little if at all reduced, 16-65 cm long, 8-32 cm wide; pinnae subopposite to alternate, spreading, oblong-lanceolate, long acuminate, sessile, lower ones broadest; pinnules spreading, oblong, mostly rounded-obtuse, lower

PLATE 10

Figure 1, 2 & 3.

Dryopteris dilatata

Figure 1.

Habit

Figure 2.

Pinnule showing sorus position

Figure 3.

Sorus and indusium

Figure 4 & 5.

D. arguta

Figure 4.

Habit

Figure 5.

Pinnule with sori, showing indusia, and marginal teeth

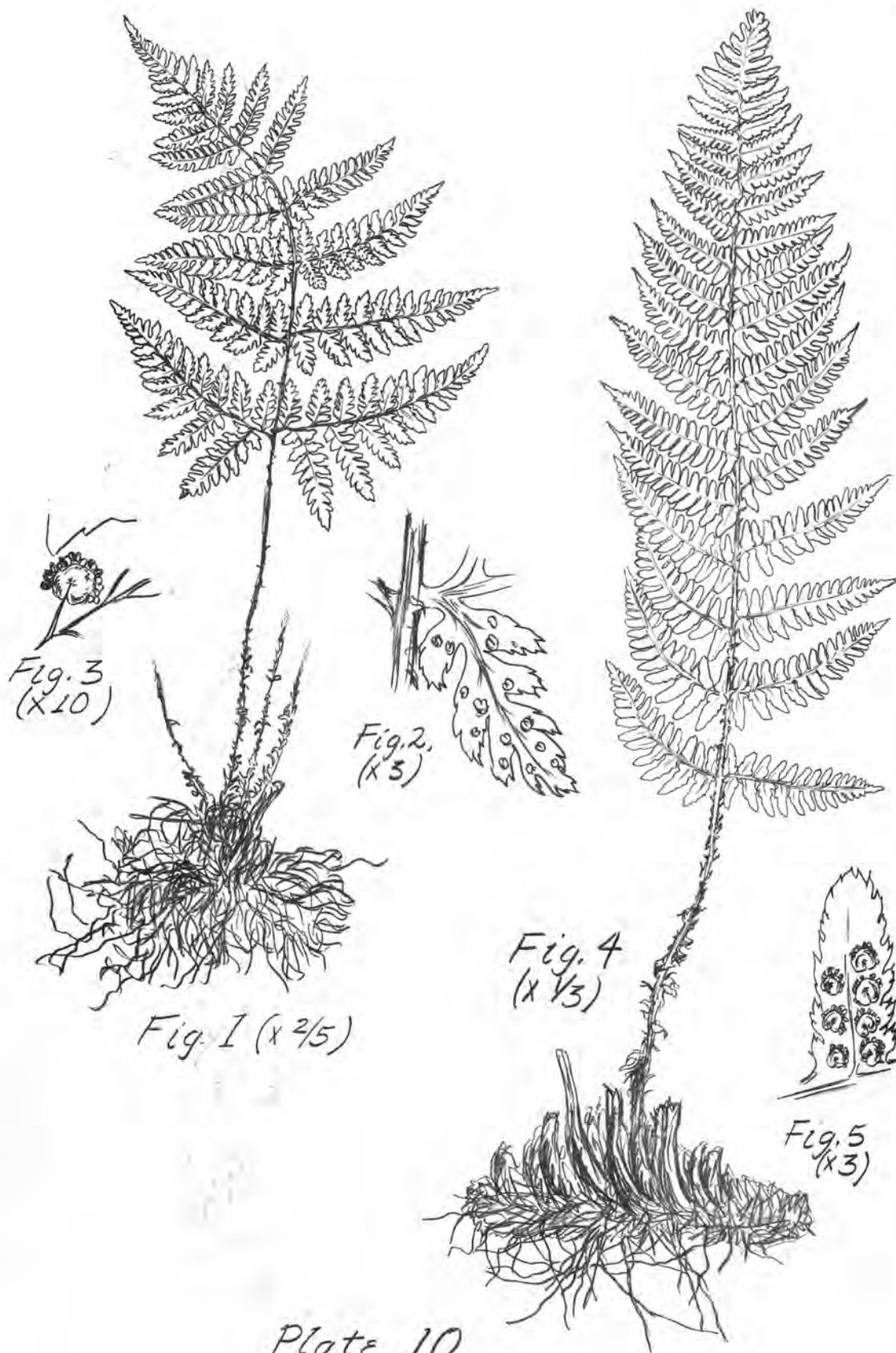


Plate 10

basal ones semi-cordate, overlying the main rachis; margins biserrate to pinnately incised; teeth spinelike, often cartilaginous; veinlets excurrent in the teeth; sori close, large, occupying lower 3/4 of pinnae, round; indusia firm, fleshy, convex, reniform, attached at the deep, narrow sinus, margins glandulose, indusium not reflexed at maturity; leaf tissue subcoriaceous, paler below, evergreen. Rocky ravines, woods, partially shaded slopes, and old basaltic outcrops; Upper Sonoran and Transition Zones. Santa Catalina Island, southern California north to western Oregon and lower Columbia Gorge, Washington, British Columbia, Alaska. Type locality, California. Oregon: Rogue, Umpqua and Willamette Valleys and valleys of their tributaries; rather uncommon.

5. Dryopteris filix-mas (L.) Schott. Male-fern. Plate 9, fig. 4, 5, 6, 7 & 8.

Polypodium filix-mas L. Sp. Pl. 2:1090. 1753.

Polystichum filix-mas (L.) Roth, Röm. Arch. 2(1):38. 1799.

Aspidium filix-mas (L.) Sw. Schrad. Journ. 1800(2):38. 1801.

Nephrodium filix-mas (L.) Richard in Marthe, Cat. Hort. Jard. Méd. Paris. 120. 1801.

Tectaria filix-mas (L.) Cav. Descr. 251. 1802.

Dryopteris filix-mas (L.) Schott, Gen. Fil. pl. 9. 1834.

Lastrea filix-mas (L.) Presl, Tent. Pter. 76, 1836.

Lophodium filix-mas (L.) Newm. Phytol. 4:256. 1851.

Rhizomes stout, woody, erect or decumbent, very chaffy; scales fulvous, thin, large, linear-lanceolate, hair-pointed; fronds in close crown; 30-120 cm long; stipes short (to about 1/3 length of the blade),

stout, stramineous, base dark, scaly; blades 2-pinnate, 25-100 cm long, 10-30 cm wide, oblong-lanceolate, short acuminate, narrowed toward the base; pinnae short-stalked, alternate to subopposite, narrowly deltoid-lanceolate, tapering from broad base, attenuate, basal pinnae short, broad, subdeltoid; pinnules slightly oblique, close, mostly oblong, rounded-obtuse, joined, slightly decurrent, larger basal ones sessile; margins serrate, teeth oblique, curved, weak, blunt; sori confined to basal half of pinnule, large; indusia thin, pale brown, rather persistent, reniform, glabrous; leaf tissue thin, slightly paler and scaly beneath. Rocky woods; Hudsonian and Canadian Zones. Newfoundland to British Columbia, south to Vermont, South Dakota, New Mexico, Arizona, Nevada, Oregon, San Bernardino Mts., California; Mexico, Peru, Europe, Algeria, Asia Minor, temperate and subtropical Asia, Himalaya Mts., Java, Madagascar. Type locality, European. Oregon: very rare:(South Canyon Birch Creek, Blue Mts. 1908, W. C. Cusick, ascribed to Athyrium filix-femina). D. filix-mas has often been confused with A. filix-femina and D. arguta in our area. Specimens thought to be D. filix-mas should be carefully checked.

6. Dryopteris dilatata (Hoffm.) A. Gray. Spreading Wood-fern.
Plate 10, fig. 1, 2 & 3.

Polypodium aristatum Vill. Hist. Pl. Dauph. 3:844. 1789, not
Forst. Prod. 82. 1786, (which equals Polystichum aristatum)

(Forst.) Presl).

Polypodium dilatatum Hoffm. Deutsch. Fl. 2:7. 1795.

Polystichum dilatatum (Hoffm.) Schum. Enum. Pl. Saell. 2:24. 1803.

Aspidium dilatatum (Hoffm.) J. E. Sm. Fl. Brit. 3:1125. 1804.

Nephrodium dilatatum (Hoffm.) Desv. Prod. 261. 1827.

Lastrea dilatata (Hoffm.) Presl, Tent. Pter. 77, 1836.

Aspidium spinulosum (Müll.) Sw., var. dilatatum (Hoffm.) Link, Fil. Sp. Hort. Bot. Berol. 106. 1841.

Aspidium tanacetifolia Rupr. Dist. Crypt. Vasc. Ross. 37. 1845.

Dryopteris dilatata (Hoffm.) A. Gray, Manual 631. 1848.

Lastrea dilatata (Hoffm.) Presl, var. tanacetifolia (Rupr.)

Lawson, Edinb. New Phil. Journ. 19:275. 1864.

Lastrea spinulosa (Müll.) Presl, var. dilatata (Hoffm.) Lawson, Fern Flora Can. 240. 1889.

Dryopteris spinulosa (Müll.) Ktze., var. dilatata (Hoffm.)

Underw. Our Nat. Ferns, ed. 6. 116. 1893.

Aspidium spinulosum (Müll.) Sw., ssp. dilatatum (incorrectly attributed to Roeper by) Gelert, in Ostenfeld, Fl. Arctica, 6. 1902.

Filix spinulosa (Müll.) Farwell, var. dilatata (Hoffm.) Farwell,

Rep. Mich. Acad. Sci. 6:209. 1904.

Thelypteris dilatata (Hoffm.) House, N. Y. State Mus. Bull. 233-234:69. 1922.

Thelypteris spinulosa (Müll.) Nieuwland, var. dilatata (Hoffm.)

St. John and Warren, Prelim. List Pl. Kaniksu For. 1:1. 1925.

Rhizomes stout, woody, creeping or ascending, chaffy; scales light brown, thin, lanceolate; fronds several, spreading, borne in a crown, 25-100 cm long; stipe about as long as blade, stout, clothed with brownish, often dark-centered scales; blade nearly or quite 3-pinnate, 15-90 cm long, 10-40 cm wide, triangular-ovate or broadly oblong, acuminate; pinnae short-stalked, opposite to subopposite, the basal ones broadly ovate-triangular, asymmetrical (the lower portion larger) upper pinnae lanceolate to oblong; pinnules lanceolate to oblong, acute, larger ones not decurrent, pinnate or pinnately

divided, the segments obliquely pinnatifid or toothed; teeth mucronate, straight or incurved; sori rather small, subterminal, round; indusia thin, sub-persistent, reniform, glabrous or sparsely glandular. Juvenile plants resembling adults in the long stipe and triangular blade from the time they are a few centimeters high. Deep and rocky woods and stream banks; Canadian and Humid Transition Zones. Alaska to Newfoundland, south to California, Montana, and New England, in the mountains to North Carolina and Tennessee; Greenland, Eurasia. Type locality: Germany. Oregon: In northwestern part from west slopes of Cascades to the coast and then southward; common in the Coast Range.

4. POLYSTICHUM

Polystichum Roth, Röm. Arch. 2(1):106. 1799

Coarse, large to rather small ferns of ledges and rocky woods, rhizomes stout, woody, mostly erect to decumbent, copiously paleaceous; fronds several to many, rigidly ascending or recurved, borne usually in a crown; blades similar or subdimorphic, simple to 3-pinnate-pinnatifid, more or less paleaceous; the segments of harsh texture, usually auricled, usually with serrate margins, the teeth sharp pointed or spinulose; veins free; sori round, dorsal to submarginal; indusia round, centrally peltate (fig. 11a46)(fig. 21124)(Pl. 11, fig. 2), persistent or falling very early, or sometimes absent. About

225 species, mostly boreal and temperate. Type species: Polypodium lonchitis L.

A. Blades 1-pinnate only

B. Base of blade long-attenuate; stipe very short; margins with spinulose, spreading teeth 1. P. lonchitis

BB. Base of blade truncate or cordate; stipe about 1/4 to 1/2 length of blade; margins serrate with incurved teeth
 2. P. munitum

AA. Blades pinnate-pinnatifid to 2-pinnate

C. Pinnules 8 or more distinct pairs per pinna; pinnae elongate-deltoid 5. P. andersonii

CC. Pinnules 5 or fewer distinct pairs per pinna; pinnae ovate-deltoid

D. Teeth pointed, deep or shallow, incurved; pinnae divided once or twice near the base, then merely pinnatifid or incised; pinnae somewhat imbricated
 4. P. scopulinum

DD. Teeth blunt, very numerous; pinnae divided into several pairs of pinnules, both pinnules and pinnae densely imbricated 3. P. lemmonii

1. Polystichum lonchitis (L.) Roth. Holly-fern. Pl. 11, fig. 8, 9, 10 & 11.

Polypodium lonchitis L. Sp. Pl. 2:1088. 1753.

Polystichum lonchitis (L.) Roth, Röm. Arch. 2(1):106. 1799.

Aspidium lonchitis (L.) Sw. Schrad. Journ. 1800(2):30. 1801.

Hypopeltis lonchitis (L.) Todaro, Syn. Pl. Acot. Vasc. Sic. 32. 1866.

Dryopteris lonchitis (L.) O. Ktze. Rev. Gen. 2:813. 1891.

Aetopteron lonchitis (L.) House, Am. Fern J. 10:88. 1920.

Rhizome large, woody, erect or decumbent, densely covered with old, black stipe bases; fronds several, rigidly ascending in a close crown, 15-60 cm long; stipes*very short, 1-6 cm long, thick, stramineous, densely paleaceous with thin, rusty brown, mostly large, ovate scales; blades once pinnate, 12-55 cm long, 2-7 cm wide, linear-oblongate, acuminate at both ends; rachis very stout, deciduously paleaceous; pinnae numerous, close, the basal ones deltoid, much reduced, symmetrical, middle and upper pinnae oblong-lanceolate, falcate, acute, base auriculate above, cuneate below; margins unevenly serrate-dentate, teeth spinulose, conspicuously spreading; sori large, contiguous, usually in 2 rows, nearly medial; indusia large, entire; leaf tissue evergreen, subcoriaceous, fibrillose and lighter beneath. Rocky shaded slopes and crevices of cliffs; Boreal Region, Alaska to Nova Scotia, southern Ontario, Michigan, Montana, in the mountains to Utah, Colorado, northern California; Greenland, Europe, arctic and temperate Asia, Himalaya Mts. Type

PLATE 11

Figure 1, 2, 3 & 4. Polystichum munitum var. munitum

- Figure 1. Habit
- Figure 2. Centrally peltate indusium
- Figure 3. Juvenile frond
- Figure 4. Marginal teeth

Figure 5, 6 & 7. P. munitum var. imbricans

- Figure 5. Upper portion of blade
- Figure 6. Pinna of large specimen
- Figure 7. Pinna of specimen from dry environment, for comparison with the pinnae of P. lonchitis

Figure 8, 9, 10 & 11. P. lonchitis

- Figure 8. Habit
- Figure 9. Dorsal surface, showing sorus positions
- Figure 10. Pinna showing spreading marginal teeth
- Figure 11. Pinna, larger specimen, showing characteristic shape and teeth

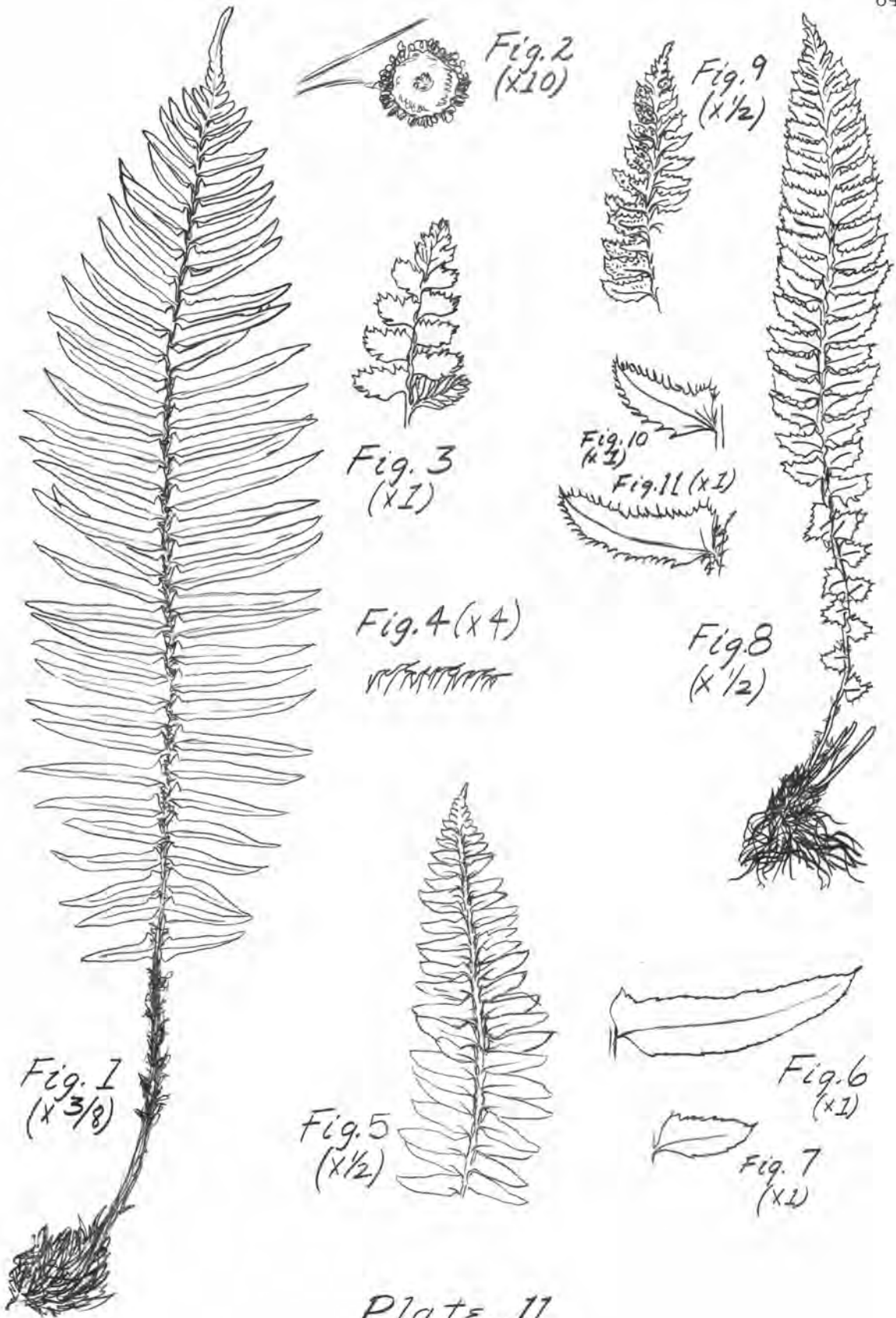


Plate II

locality: European. Oregon: Columbia Gorge near the Cascade Mts.; high Cascade Mts.; Siskiyou Mts.; Wallowa Mts.; Steens Mts. Juvenile specimens of P. munitum (Pl. 11, fig. 3) have been mistaken for this species, due to the more shortened pinnae with more spreading veins. Plants of P. munitum growing in severe conditions (Pl. 11, fig. 5 & 7) approach P. lonchitis in the same way, but with more coriaceous leaf tissue than in the juveniles. The stipe length and characters of the basal pinnae distinguish them.

2. Polystichum munitum (Kaulf.) Presl.

Besides the typical variety and its forms, a second well-marked variety exists in Oregon. The two are distinguished as follows:

Upper pinnae very close and overlapping (imbricated)
 2b. P. m. var. imbricans
 Upper pinnae not imbricated 2a. P. m. var. munitum

2a. Polystichum munitum (Kaulf.) Presl, var. munitum, Sword-fern, Pl. 11, fig. 1, 2, 3 & 4.

Aspidium munitum Kaulf. Enum. Fil. 236. 1824.

Nephrodium plumula Presl, Rel. Haenk. 1:33. 1825.

Polystichum munitum (Kaulf.) Presl, Tent. Pter. 83. 1836.

Dryopteris munita (Kaulf.) Ktze. Rev. Gen. 2:831. 1891.

Aetopteron munitum (Kaulf.) House, Am. Fern J. 10:89. 1920.

Aspidium munitum Kaulf., var. inciso-serratum D. C. Eat. Ferns N. Am. 1:188. 1878.

P. munitum (Kaulf.) Presl, var. inciso-serratum (D. C. Eat.)
Underwood, Our Nat. Ferns, ed. 6. 116. 1900.

Rhizome stout, woody, ascending, covered with old stipe bases; fronds several to many, rigidly ascending in a crown, 30-140 cm long; stipe 5-60 cm long, stout, densely paleaceous (including the rachis); scales large, bright glossy brown, often dark-centered, ascending, ovate to oblong-acuminate with many small, ciliate scales interspersed; blades 1-pinnate, linear-lanceolate, short-acuminate, 25-100 cm long, 5-25 cm wide; pinnae very many, spreading, auriculate at base above, cuneate below, linear-attenuate; margins sharply biserrate to incised (Pl. 11, fig. 4) teeth incurved, rigid, spinulose; sori large, close, in a medial to submarginal row, or sometimes in several crowded rows; indusia papillose-dentate to long-ciliate; leaf tissue evergreen, coriaceous, often very chaffy beneath. Plants named var. inciso-serratum D. C. Eat. represent particularly luxuriant forms found in favorable habitats throughout the range of the species. Their pinnae are thick, scaly, deeply serrate to incised, with undulate margins, and are copiously fertile. Damp wooded slopes; Humid Transition Zone. Alaska to northwestern Montana, northern Idaho, to extreme southern California. Type locality, California. Oregon: very common in western part of state to high Cascade Mts. Replaced in the high Cascades and eastern Oregon by var. imbricans. Juvenile plants (Pl. 11, fig. 3) have occasionally been

confused with P. lonchitis (see note under that species for distinguishing characters).

- 2b. Polystichum munitum (Kaulf.) Presl, var. imbricans (D. C. Eat.)
Maxon, Imbricated Sword-fern. Pl. 11, fig. 5, 6 & 7.

Aspidium munitum Kaulf., var. imbricans D. C. Eat. Ferns
N. Am. 1:188. pl. 25. 1878.

P. munitum (Kaulf.) Presl, var. imbricans (D. C. Eat.)
Maxon, Fern Bull. 8:30. 1900.

Differing from the other varieties in the following characteristics: fronds rather small, 30-50 cm long, stipe with conspicuous tuft of glossy, castaneous, lance-attenuate scales, nearly naked above; blades linear, rachis stout, naked with age; pinnae crowded, obliquely imbricate, acute, mucronate; indusia rather thick, never ciliate. Dry, open rocky slopes; mainly Canadian Zone, Vancouver Island and eastern Washington to southern California. Type locality Plumas County, California. Oregon: replaces the typical variety in the high Cascade Mts. and in eastern Oregon; not common. A fairly well marked ecological and geographical subspecies, connected with the typical variety by numerous intermediate specimens.

3. Polystichum lemmonii Underw. Shasta-fern. Lemmon's Shield-fern. Pl. 12, fig. 4, 5, 6 & 7.

Aspidium mohrioides Bory, Mém. Soc. Linn. Paris 4:597.
1828. Dup. Voy. Bot. 1:267. pl. 35, fig. 1. 1828.

Applied to our plants by D. C. Eaton.

Polystichum lemmonii Underw. Our Nat. Ferns, 6th ed.

PLATE 12

- Figure 1, 2 & 3. Polystichum scopulinum
- Figure 1. Habit
- Figure 2. Pinna with sori
- Figure 3. Indusia and marginal teeth
- Figure 4, 5, 6 & 7. P. lemmonii
- Figure 4. Habit
- Figure 5. Upper portion of blade (dorsal surface)
 showing dense imbrication of pinnae
 and pinnules
- Figure 6. Basal pinna
- Figure 7. Basal pinna, enlarged, showing scales of the
 rachis and the tiny, shallow marginal
 teeth
- Figure 8, 9 & 10. P. andersonii
- Figure 8. Basal portion of blade
- Figure 9. Pinna
- Figure 10. Pinnule, with immature sorus, scales, veinlet
 pattern



Fig. 1
(x 1/2)



Fig. 3
(x 2)



Fig. 2
(x 1)



Fig. 6
(x 1)



Fig. 7 (x 5)



Fig. 10
(x 5)



Fig. 9
(x 1)

Fig. 8
(x 5/9)



Fig. 8
(x 5/9)



Fig. 5
(x 1 7/10)



Fig. 4
(x 3/5)

Plate 12

116. 1900.

Aetopteron lemmonii (Underw.) House, Am. Fern J. 10:88.
1920.

Polystichum mohrioides (Bory) Presl, var. lemmonii
(Underw.) Fernald, Rhodora 26:92. 1924.

Rhizome stout, tufted, ascending, thickly covered with old stipe bases; fronds ascending, 10-40 cm long; stipes 3-15 cm long, stramineous from a very paleaceous, brownish base; scales fulvous, mostly large, lanceolate to ovate, acuminate; blades essentially 2-pinnate, narrowly lance-oblong, acutish, 3-28 cm long, 1.5-5.0 cm wide; rachis very stout; pinnae numerous, usually imbricate, the upper ones very much so (lower ones more distant), deltoid oblong to deltoid-ovate, obtuse; pinna segments several pairs (pinnae divided nearly to tip), close, spreading, ovate to obliquely oval or obovate, obtuse, basal ones deeply lobed; margins crenulate-dentate, teeth blunt, shallow; sori large, thin, bullate, erose-dentate; leaf tissue somewhat fleshy, veins prominent when dry. Moist granitic soil, often on serpentine, among loose rocks; Canadian and Hudsonian Zones. Siskiyou Mts., Siskiyou and Trinity Counties, California; Wenatchee Mts., Washington; ascribed to Alaska. Type locality: vicinity of Mt. Shasta, California. Oregon: Siskiyou Mts.; very rare. I have not found a specific locality listed where it has been collected in Oregon.

4. Polystichum scopulinum (D. C. Eat.) Maxon. Eaton's Shield-fern. Pl. 12, fig. 1, 2 & 3.

Aspidium aculeatum (L.) Sw., var. scopulinum D. C. Eat.
Ferns N. Am. 2:125. pl. 62, fig. 8. 1880.

Polystichum scopulinum (D. C. Eat.) Maxon, Fern Bull.
8:29. 1900.

P. aculeatum (L.) Schott, var. scopulinum (D. C. Eat.)
Gilbert, List N. Am. Pterid. 20. 1901.

P. lonchitis (L.) Roth, var. scopulinum (D. C. Eat.) M. E.
Jones, Bull. U. Montana Biol. Ser. 15:7. 1910.

Aetopteron scopulinum (D. C. Eat.) House, Am. Fern J.
10:89. 1920.

P. mohrioides (Bory) Presl, var. scopulinum (D. C. Eat.)
Fernald, Rhodora 26:89. 1924.

Rhizome stout, erect or decumbent, copiously paleaceous;
scales light castaneous to fulvous, linear to ovate-oblong, attenuate;
fronds 6-10, erect, 15-40 cm long; stipes stout, 3-14 cm long,
grooved, stramineous, densely paleaceous at base, deciduously so
above, including rachis; blades pinnate-pinnatifid, 12-30 cm long,
2.5-6.0 cm wide, linear to narrowly oblong-lanceolate, acuminate;
pinnae numerous, asymmetrical, deltoid-ovate to deltoid-oblong,
pinnately lobed or divided near the base, less deeply so toward the
obtuse to acutish, mucronate apex, lower pinnae somewhat distant,
upper ones more or less imbricate; segments oblique, ovate, pointed;
margins and apices of segments toothed, teeth oblique, pungent; sori
numerous, large, close, inframedial in 2 confluent rows; indusia
ample, thin, erose-dentate; leaf tissue coriaceous, deciduously fibril-
lose-paleaceous beneath. Dry cliffs and rock crevices; Hudsonian

and Canadian Zones. Central Washington to eastern Idaho, south to Utah and southern California and in Gaspé County, Quebec. Type locality: Upper Teton Canyon, Idaho. Oregon: high Cascade Mts.; Warner Mts.; Wallowa Mts.; Elkhorn (Blue) Mts. (Anthony Lakes); rare.

5. Polystichum andersonii Hopkins. Anderson's Shield-fern. Pl. 12, fig. 8, 9 & 10.

Polystichum andersonii Hopkins, Am. Fern 3:116. pl. 9.
1913.

P. jenningsii Hopkins, Ann. Carnegie Mus. 11:362. pl. 37.
1917.

Rhizome stout, decumbent; scales large, thin, pale castaneous, linear to ovate; fronds ascending, in a close crown, 40-110 cm long; stipes short, 5-25 cm long, grooved, paleaceous; blades nearly 2-pinnate, 35-85 cm long, 8-20 cm wide at middle, narrowly lance-oblong to lance-elliptic, long-acuminate; rachis grooved, paleaceous; bulblets often forming below the tip of the blade; pinnae numerous, slightly ascending, deltoid-linear (basal segments enlarged), minutely paleaceous beneath, nearly glabrous above, less deeply pinnatifid near the attenuate tip; pinnules (segments) oblique, elliptical, mostly decurrent, serrate on the outer margin (inner margin nearly entire); teeth long awned; sori 2-6 pairs per segment, large, nearly medial; indusia erose-dentate, teeth gland-tipped. Moist,

wooded talus slopes, usually in alder thickets; Transition Zone. Southern British Columbia to Glacier National Park, Montana, Mt. Rainier region of Washington, very rare in the Mt. Hood region of Oregon. Type locality: Elk River, Strathcona Park, Vancouver Island, British Columbia.

5. ATHYRIUM

Athyrium Roth, Röm. Arch. 2(1):105. 1799; Tent. Fl. Germ. 3:58. 1800.

Medium-sized to large erect ferns, usually in moist, shaded habitats; rhizomes creeping, often slender, or oblique and densely tufted (both Oregon species); scales membranous, cells thin-walled; fronds usually large, erect-spreading; stipes long or, in Oregon species, nearly wanting; blades ample, usually elongate, 1- to 3-pinnate; segments subentire to incised or pinnatifid, membranous to herbaceous; veins free; sori dorsal, attached at one side of the veinlet (lateral -- fig. 11b46, 21126), narrowly oblong, or commonly crossing the vein and recurved, becoming lunate, reniform, or (rarely) round; indusia shaped like the sori, attached along inner side, subentire to fringed, delicate, sometimes minute and hidden, rarely absent. About 150 species, mainly tropical, six occurring in North America. Type species: Polypodium filix-femina L.

Tips of pinnules obtuse, bases broad somewhat decurrent, segments not narrowed; indusia visible, reflexed at maturity, fragments persistent even in very mature sori; blades 2- to 3-pinnate. . .

. 1. A. filix-femina

Tips of pinnules acute, bases cuneate; segments narrowed, leafy tissue a narrow band along the veinlets ("skeleton-like"); indusia microscopic, not visible; blade essentially 3-pinnate

. 2. A. americanum

1. Athyrium filix-femina (L.) Roth. Lady-fern. Pl. 13, fig. 3, 4, 5 & 6.

Polypodium filix-femina L. Sp. Pl. 2:1090. 1753.

Athyrium filix-femina (L.) Roth, Röm. Mag. 2(1):106. 1799.

Aspidium filix-femina (L.) Sw. Schrad. Journ. 1800(2):41. 1801.

Tectaria filix-femina (L.) Cav. Anal. Cienc. 4:100. 1801.

Nephrodium filix-femina (L.) Michx. Fl. Bor. Am. 2:268. 1803.

Asplenium filix-femina (L.) Bernh. Schrad. Neu. Journ. 1(2):26, 48. pl. 2, fig. 7. 1806.

Cyathea filix-femina (L.) Bertol. Amoen. Ital. 429. 1819.

Cystopteris filix-femina (L.) Coss. and Germ. Fl. Paris. 676. 1845.

Athyrium filix-femina (L.) Roth,

♂Athyrum (filix-femina) sitchense Rupr. Dist. Crypt. Vasc. Ross, 41. 1845.

γ Athyrium (filix-femina) cyclosorum Rupr. loc. cit.

Athyrium filix-femina (L.) Roth, var. sitchense Rupr. ex Moore, Ind. Fil. 183. 1860.

Athyrium filix-femina (L.) Roth, var. cyclosorum Rupr. ex Moore, loc. cit.

Lastrea filix-femina (L.) Colomb, Compte Rendus 107:1013. 1888.

For a discussion of the varieties of this species, see Butters, (9).

PLATE 13

- Figure 1 & 2. Athyrium americanum
- Figure 1. Habit
- Figure 2. Pinnule with sori
- Figure 3, 4, 5 & 6. A. filix-femina
- Figure 3. Habit
- Figure 4. Pinnules
- Figure 5. Pinnule with sori and indusia, showing veinlet
 pattern
- Figure 6. Sori and indusia
- 6a. Immature sori with indusia in place, showing
 fringed margins
- 6b. Mature sorus with indusium thrust back,
 appearing as a remnant



Plate 13

Rhizome stout, short-creeping or ascending, covered with persistent stipe bases, paleaceous; scales large, papery, brown, ovate-lanceolate, acutish; fronds numerous, erect, arching, forming close crown, 20-200 cm long; stipe $1/3$ length of blade or less, almost wanting in some juvenile leaves, stout but fragile, stramineous or greenish, base dark with a few brown scales; blade pinnate-pinnatifid to 3-pinnate, elliptical; pinnae subopposite to alternate, spreading to oblique, linear-deltoid, upper ones close, lower ones distant; pinnales oblong-ovate, blunt to acute-tipped, sessile to decurrent or joined, shallowly to deeply lobed or nearly pinnate; margins serrate with incurved, acute-tipped teeth, sometimes biserrate; sori few to numerous, small (1 mm or less), oval to nearly round; indusia thin, membranous, margin fringed (fig. 5 & 6a), reflexed at maturity, vestiges persisting even in fully mature sori (fig. 6b); leaf tissue membranous to sub-coriaceous in some mountain forms, glabrous. The larger specimens have been ascribed to var. sitchense, but the species in our area is variable as to pinnation, fertility, angle of attachment of pinnae, size, etc. Forests, moist thickets, open or brushy slopes, open swales, and along streams; Transition and Canadian Zones. Alaska to southern California and Rocky Mts. to Nevada and New Mexico, Mexico, Peru, Argentina, the Atlantic islands, Europe, north Africa, western Asia and northern India, Java. Oregon: Common and locally abundant throughout western Oregon to

eastern Cascade Mts.; less common in northeastern mountains,
Steens Mts.

2. Athyrium americanum (Butters) Maxon. Alpine Lady-fern.
Pl. 13, fig. 1 & 2.

A. alpestre (Hoppe) Rylands in Moore, var. americanum
Butters, Rhodora 19:204. 1917.

A. americanum (Butters) Maxon, Am. Fern J. 8:120. 1918.

Phegopteris alpestris (Hoppe) Mett., var. americana Jepson,
Manual of Fl. Calif. 29. 1925.

Phegopteris rhaetica Pérard, var. americanum (Butters)
Farwell, Am. Midl. Nat. 12:294. 1931.

Rhizome stout, short, ascending, branched, forming massive,
rounded tufts, covered with old stipe bases; scales numerous, light
brown, thin, ovate, acuminate; fronds few to many, close, 20-90
cm long; stipe short (to 1/3 length of blade), fragile, stramineous,
base dark, sheathed with dark scales, a few pale, ovate scales above;
blade 2-pinnate-pinnatifid (appearing 3-pinnate), 18-65 cm long, 4-
25 cm wide, linear-lanceolate, basal pinnae reduced, distant;
pinnae subopposite to alternate, oblique, deltoid-linear, acuminate,
close; pinnules oblique at base, cuneate, appearing stalked, narrowly
deltoid, ovate, or lance-oblong, deeply pinnatifid; segments narrow,
somewhat decurrent, incised; teeth several, uneven to biserrate,
incurved; veins ending in marginal teeth, pinnules with distinct mid-
rib; sori numerous, round, small (to 1 mm), borne on segments of
the pinnules whose lobes are sometimes partially reflexed over them;

indusia microscopic, never visible in even partly developed sori; leaf tissue delicate, glabrous. Some forms of A. filix-femina resemble this species in being 3-pinnate and having pinnae very oblique to the rachis; however, the key characters distinguish them. This is an uncommon plant and specimens suspected of being A. americanum should be carefully checked, especially for the presence of indusium fragments. Moist rocky ravines and open rock slides, meadows, or alluvial thickets; Arctic-Alpine Zone, Alaska to Colorado, Nevada and the southern Sierra Nevada, California; Gaspé County, Quebec. Type locality: Rogers Pass, British Columbia. Oregon: High Cascade Mts.; Wallowa Mts.; Gearhart Mt. (Lake County); reported to be locally abundant, but otherwise uncommon.

6. ASPLENIUM

Asplenium L. Sp. Pl. 2:1078. 1753.

Small to large ferns of forests or rocky ledges; rhizomes creeping to erect; scales rigid with thick dark cell walls; fronds in a rosette or erect-spreading, usually monomorphic; blades simple, 1- to 4-pinnate, or several times pinnatifid, glabrous, variously pubescent; rachis dark and lustrous to green and succulent; pinnae or segments articulate or not, entire to variously incised or cleft; sori oblong to narrowly linear, borne upon free, usually oblique, ultimate veins, below the tip; indusia always present, attached along the vein

at the lower side of the sorus (lateral -- fig. 1I46b, 2I126), oblong to narrowly linear, usually membranous, often concealed by sporangia at maturity. About 650 species, mostly tropical and subtropical in both hemispheres; about 22 species occurring in the United States, mostly in Florida and Appalachian region. Type species: Asplenium trichomanes L.

- Rachis dark, brownish to blackish 1. A. trichomanes
 Rachis green (yellowish in dried material), brown color restricted to
 lower portion of stipe 2. A. viride

PLATE 14

- Figure 1 & 2. Struthiopteris spicant
- Figure 1. Habit
- 1a. Sterile frond
- 1b. Fertile frond
- Figure 2. Fertile pinna with indusium running its whole length, facing inward
- Figure 3 & 4. Asplenium trichomanes
- Figure 3. Habit
- Figure 4. Pinna with sori, showing indusium shape and position, shallowly crenate margin
- Figure 5 & 6. A. viride
- Figure 5. Pinnae, dorsal view with sori and indusia, ventral view, showing venation
- Figure 6. Frond, showing distribution of dark color on stipe

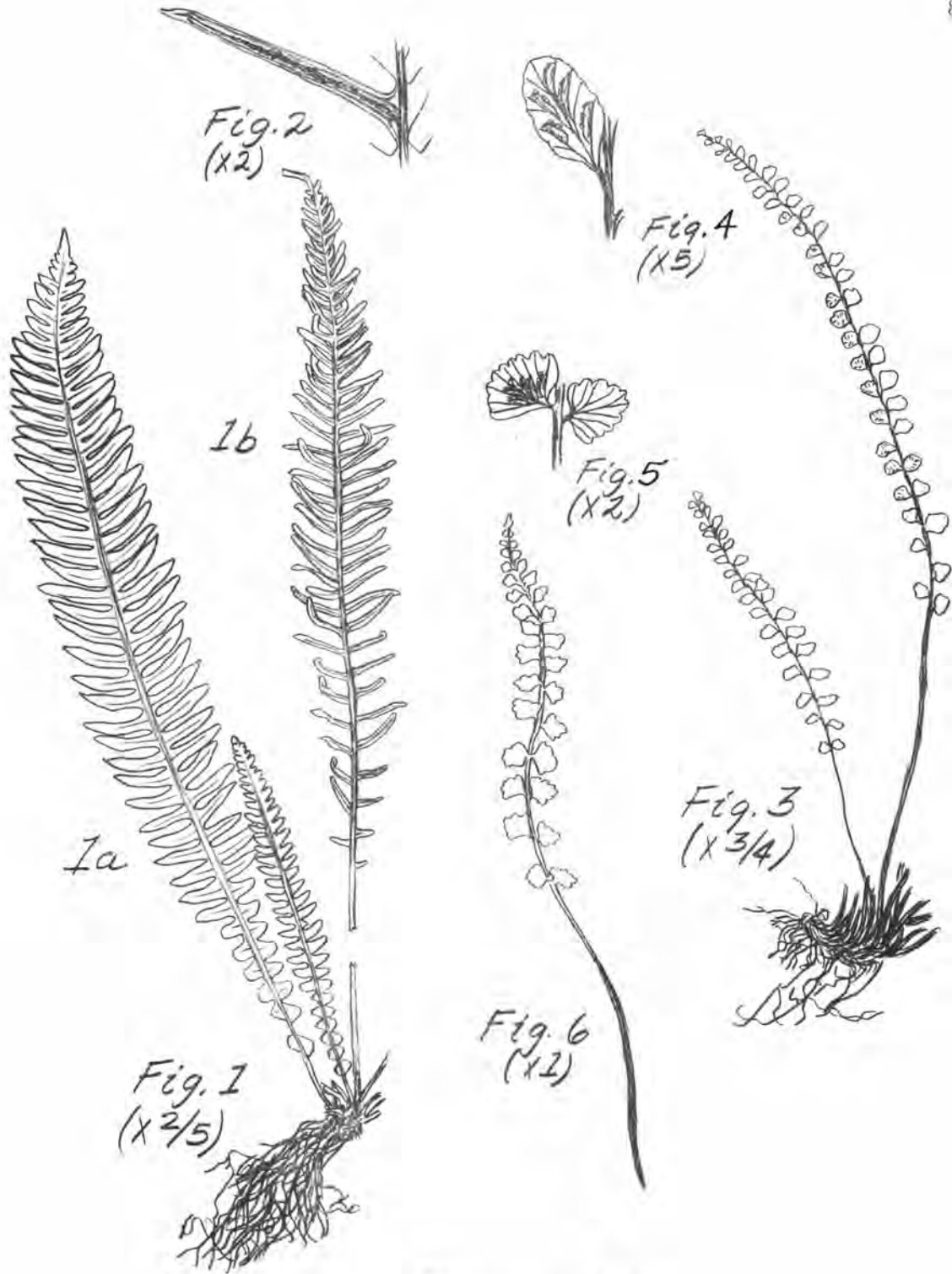


Plate 14

1. Asplenium trichomanes L. Maidenhair Spleenwort. Pl. 14, fig.
A. trichomanes L. Sp. Pl. 2:1082 1753.
A. trichomanoides Houtt. Pfl. Syst. 13(1):145. 1786
Trichomanes crenatum Gilib. Exerc. Phytol. 2:556. 1792.
Phyllitis rotundifolia Moench, Method. 724. 1794.
A. melanocaulon Willd. Enum. 1072. 1809.
A. densum Brack. Expl. Exp. 16:151. pl. 20, f. 3. 1854.

Rhizome short, 1-2 cm long, 5-10 mm diameter, erect or decumbent, paleaceous at exposed apex; scales to 4.5 mm long, papery, dark brown, linear-attenuate with narrow dark brown median stripe; fronds numerous, tufted, wide spreading, 5-26 cm long; stipe much shorter than blade, castaneous to dark purplish brown, glabrous, lustrous, rather stout, persistent; blades 1-pinnate, 4-21 cm long, 5-15 mm wide, linear, attenuate at both ends; rachis dark, like the stipe; pinnae stalked, opposite to alternate, close above, distant below, upper ones ovate to broadly oblong from a cuneate base, mostly asymmetrical, lower ones roundish to deltoid or fan-shaped margins shallowly crenate; veinlets once-forked, free; sori medial, linear-oblong, 3 to 5 pairs; indusia ample, subentire, lunate; leaf tissue evergreen. Crevices of cliffs or shaded rock slides, usually limestone; Transition and Canadian Zones, Alaska and Hudson's Bay to Nova Scotia, south in the mountains to Oregon, Mexican border states, Alabama, Georgia, and widespread in northern and southern temperate regions and in the mountains in the tropics. Type locality: European. Oregon: Coast and Cascade Mts.; Columbia Gorge; not common.

2. Asplenium viride Hudson. Green Spleenwort. Pl. 14, fig. 5 & 6.

Asplenium trichomanes ramosum L. Sp. Pl. 2:1082. 1753

(see 31, p. 1082) and (10, p. 136, 137).

A. viride Hudson, Fl. Angl. 385. 1762

Rhizome short-creeping, tufted; scales brown with dark basal stripe, linear-attenuate; fronds numerous, tufted, laxly ascending, 3-20 cm long; stipe short or about as long as blade, weak, reddish-brown below, greenish above, including rachis, slightly fibrillose; blades 1-pinnate, 2-14 cm long, 0.5-1.5 cm wide, narrowly linear-lanceolate to linear-oblong, not attenuated below; pinnae short-stalked, rhombate to rhombate-oblong or unequally ovate, obtuse, cuneate at base, opposite to alternate, close, the lower ones distant and rounded deltoid; margins crenate to crenately lobed; veins free, basal ones forked, other simple; sori 2 to 4 pairs per pinna, remote from margins, oval, soon confluent, hiding the indusia; indusia lunate; leaf tissue glabrous, not evergreen. Crevices of shaded cliffs at high altitudes; Hudsonian Zone. Alaska to Newfoundland, south in mountains to Oregon, Wyoming, Vermont; in Europe, Himalaya Mts. Type locality, European. Oregon: Wallowa Mts., Head of Imnaha River, 1908, W. C. Cusick; rare.

7. STRUTHIOPTERIS

Struthiopteris Scopoli, Fl. Carn. 168. 1760.

Blechnum L. Sp. Pl. 2:1077. 1753, in part.

Struthiopteris Scopoli, 1760.

Lomaria Willd. Ges. Naturf. Freund. Berl. Mag. 3:160. 1809.

Terrestrial or epiphytic, mainly forest ferns of various habit; rhizomes "woody" (no true wood is formed in the ferns), vine-like, short-creeping, (or erect in a few tropical species); fronds cespitose or obliquely imbricated, dimorphic; blades often narrow, pinnatifid or 1-pinnate, sterile ones spreading or ascending, numerous, fertile ones few, long-stiped; segments linear, entire; sori linear and elongate, parallel to the midrib, borne just inside margin upon a continuous receptacle joining the few short, otherwise free veins, which run obliquely from the midrib; indusium intramarginal (Pl. 14, fig. 2), facing the midrib and meeting it, often reflexed at maturity, entire to lacerate, the numerous sporangia covering the lower surface of the segment. Struthiopteris (Lomaria) was separated from Blechnum on the basis of the dimorphic fronds, a division which is not universally recognized. About 150 species, mainly temperate, 25 occurring in tropical North America; only one in the United States; type species:

Osmunda spicant L.

One species in Oregon 1. S. spicant

1. Struthiopteris spicant (L.) Weis. Deer-fern. Pl. 14, fig. 1 & 2.

Osmunda spicant L. Sp. Pl. 2:1066. 1753.

Struthiopteris spicant (L.) Weis, Pl. Cr. Gott. 287. 1770.

Acrostichum spicant (L.) Willd. Fl. Berol. Prod. 289. 1787.

Onoclea spicant (L.) Hoffm. Deutschl. Fl. 2:11. 1795.

Blechnum spicant (L.) Roth in Usteri, Neue Annal. Vol. 2, pt. 10, 46. 1794. See discussion by Maxon (33).

Osmunda borealis Salisb. Prod. 402. 1796.

- Asplenium spicant (L.) Bernh. Schrad. Journ. 1:309. 1799.
B. boreale (Salisb.) Sw. Schrad. Journ. 1800(2):75. 1801.
Lomaria spicant (L.) Desv. Ges. Naturf. Freund. Berl. Mag. 5:325. 1811.
L. crenata Presl, Rel. Haenk. 1:51. 1825.
L. borealis (Salisb.) Link, Hort. Berol. 2:80. 1833.
B. doodioides Hook. Fl. Bor. Am. 2:263. 1840.
Spicanta borealis (Salisb.) Presl, Epim. 114. 1849.
Struthiopteris doodioides (Hook.) Trev. Atti. Ist. Veneto 3. 14:571. 1869.
Struthiopteris spicant (L.) Weis, var. crenata (Presl) J. K. Henry, Fl. So. British Columbia 3. 1915.
Lonchitis-aspera spicant (L.) Farwell, Am. Midl. Nat. 12:277. 1931.

Rhizome woody, short creeping, 5-10 cm long, 1-2 cm thick; scales castaneus, linear, 0.5-1.0 cm long; fronds dimorphic; sterile fronds numerous, in a crown, rigid, spreading or ascending, 15-100 cm long, evergreen, paler beneath, with stipes 2-30 cm long, yellowish brown to castaneous, blades pinnate, 13-80 cm long, 2-9 cm wide, linear-elliptical, base long-attenuate, pinnae horizontal, basal ones distant, broad, upper ones linear to linear-oblong, rounded at the apex, tip acute, sub-falcate, base dilatate, margins entire or crenulate; fertile fronds few, central, erect, 35-150 cm long, stipe long, castaneous, blades similar in outline to sterile ones, pinnate, with many small basal segments, pinnae distant, mostly very narrowly linear from dilatate base; sori and indusia as for the genus.

Damp, mostly coniferous forests; Humid Transition Zone. Alaska to California, and in the mountains south, to Santa Cruz Peninsula, California; also in Europe, central Asia, Japan. Type locality: European. Oregon: from the coast up the west slopes of the Cascade

Mts. ; fairly common.

8. WOODWARDIA

Woodwardia J. E. Smith, Mem. Acad. Sci. Turin. 5:411. 1793.
Pl. 15.

Coarse, mostly large ferns of low shady habitats; rhizome short-creeping to erect; fronds monomorphic, several to many, in a crown, rigidly ascending or laxly recurved; blades, 1-pinnate, the pinnae lobed or coarsely pinnatifid; sori (fig. 2I 131, Pl. 15, fig. 2) oblong to linear, straight or slightly curved, borne singly on the outer horizontal veins of a continuous series of elongate areoles lying next to the midribs of the segments, sunken, facing inward and occupying the areole; indusia ample, elongate, arched, at first completely covering the sporangia, firm, persistent, later reflexed (Pl. 15, fig. 2a); veins arising from the fertile areoles branched, either wholly free and excurrent to the margins of the segment or partly joined basally to form 1 or 2 more or less incomplete rows of oblique sterile areoles. Four or five species of North America and Eurasia, one in the United States. Type species: Blechnum radicans L.

One species in Oregon 1. W. fimbriata

1. Woodwardia fimbriata J. E. Sm. Giant Chain-fern. Pl. 15.

Woodwardia radicans (L.) J. E. Sm. Mém. Acad. Sci. Turin 5:412. 1793. Oregon plants ascribed to this species by authors other than J. E. Sm.

W. fimbriata J. E. Sm. ex Rees, Cycl. 38. No. 6. 1818; Alston, Phil. Journ. Sci. 50:181. pl. 1, f. 4. 1932.

W. spinulosa Mart. and Gal. Mém. Acad. Brux. 15:64. 1842, of authors other than Mart. and Gal.

W. chamissoi Brack. in Wilkes, U. S. Explor. Exped. 16:138. 1854.

W. radicans J. E. Sm., var. americana Hook. Sp. Fil. 3:67. 1860.

W. paradoxa Wright, Gard. Chron. 3. 41:98. 1907.

Rhizome stout, woody, oblique; scales bright castaneous, lance-attenuate, thin, glossy, 1-3 cm long; fronds several to many, suberect, in a crown, 38-300 cm long; stipes short, stout, light brown to stramineous from a brown base; blades 1-pinnate, the pinnae very deeply pinnatifid, 20-50 cm wide, linear-oblong to oblong-ovate or oblanceolate, short acuminate, narrow at base; pinnae linear-oblong to ovate, long-acuminate, close or imbricate, veins resinous-glandular; segments narrowly triangular to linear-attenuate, subfalcate, decurrent, with distinct midribs; segments undulate-crenate or shallowly lobed; margins serrate-spinulose, excurrent veins oblique, 1-to 2-forked, free or partly joined basally; leaf tissue firm, dark to gray-green, paler beneath. Deep forests along moist shady banks and mountain streams from near sea level to above 1500 m; Upper Sonoran and Transition Zones. Western British Columbia

PLATE 15

Figure 1 & 2. Woodwardia fimbriata

Figure 1. Blade, upper portion

Figure 2. "Pinnule" (or secondary segment, as the sinus does not extend to the rachilla), showing venation, margin, sori and sorus position, and indusia

Figure 2a. Indusium



Fig. 1
(x 2/5)

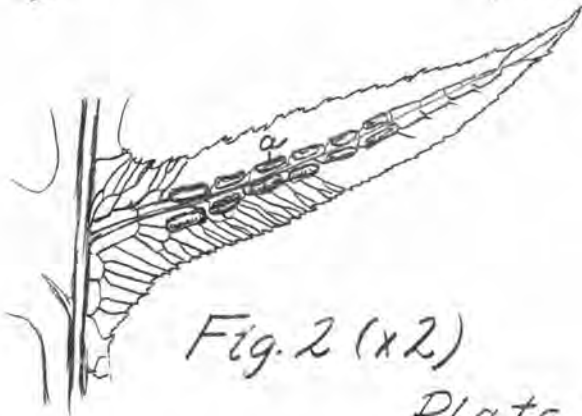


Fig. 2 (x 2)

Plate 15

to southern California and Arizona, northeastern Nevada.

Oregon: Douglas, Coos, Curry, Josephine, ? Jackson counties, fairly common in its area.

9. PITYROGRAMMA

Pityrogramma Link, Handbuch Gewächse 3:19. 1833; Domin, Publ. Univ. Charles No. 88. 1928.

Ceropteris Link, Fil. Sp. 141. 1841.

Small to medium-sized ferns of dry banks and rock ledges; rhizomes short-creeping to oblique, covered with dark, rigid, linear-lanceolate scales; fronds erect to drooping, clustered, monomorphic, not jointed to the rhizome; stipes dark, glossy, firm; blades 1- to 3-pinnate, linear to deltoid-pentagonal, covered with a white or yellow powder beneath, sometimes glandular above, usually without scales; sori following the course of the veins, usually confluent, without indusia (Pl. 19, fig. 6). About 15 species, mostly tropical, only one in the United States. Type species: Acrostichum chrysophyllum Sw.

One species in Oregon, 1. P. triangularis

1. Pityrogramma triangularis (Kaulf.) Maxon. Gold-back fern, Pl. 19, fig. 4, 5 & 6.

Gymnogramma triangulare Kaulf. Enum. Fil. 73. 1824.

Neurogramme triangulare (Kaulf.) Diels in Engl. and Prantl, Nat. Pfl. 4:264. 1899.

Gymnopteris triangularis (Kaulf.) Underw. Our Nat. Ferns 6th ed. 84. 1900.

Ceropteris triangularis (Kaulf.) Underw. Bull. Torrey Club 29:630. 1902.

Pityrogramma triangularis (Kaulf.) Maxon, Contrib. U. S.
Nat. Herbar. 17:173. 1913; Domin, Publ. Fac. Sci.
Univ. Charles 88(5):16. 1929.

Rhizome stout, short-creeping or ascending; scales brownish, often black-carinate, rigid, attenuate; fronds numerous, clustered, erect, 7-40 cm long; stipes about twice as long as blades, stout, wiry, dark brown, polished; blades 2-pinnate-pinnatifid, subternate, deltoid-pentagonal, 2-18 cm long, 1.5-16.0 cm wide; pinnae opposite, basal ones largest, spreading, deltoid, asymmetrical, lower basal segments extended, usually pinnatifid, other pinnae oblong, pinnately lobed or incised; segments rounded-obtuse, decurrent; margins crenate, tending to be revolute; sori, as for the genus; leaf tissue coriaceous, yellow-powdery beneath (the powder rarely white or absent), upper surface glabrous, dark dull green. Open rocky slopes at bases of ledges and boulders, usually old lava outcrops and rocky shaded slopes; Upper Sonoran and Transition Zones. Alaska, British Columbia (Vancouver Island) to Nevada and southern California, Lower California. Type locality: San Francisco Bay region, California. Oregon: river valleys in western Oregon between Coast Range and Cascade Mts., coastal below Yachats (Lane County); Columbia Gorge.

10. PELLAEA

Pellaea Link, Fil. Sp. 48, 49. 1841 (Sept.) [Nomen conservandum (27, p. 231)].

Allosorus Bernh. Schrad. Neu. Journ. 1(2):5:36. 1806, in part.
Cassebeera Kaulf. Enum. Fil. 216. 1824, in part (Cassebeeria
of some authors).

Platyloma J. Sm. Journ. Bot. 4:160. 1841 (Aug.) [Nomen
rejiciendum (27, p. 231)]

Pellaea Link, 1841 (Sept.).

Rather small, rigid, rock-inhabiting ferns; rhizomes stout and nodose or slender and wide-creeping; fronds erect, nearly naked, glabrous, monomorphic; blades 1- to 4-pinnate; rachis usually dark, lustrous; segments oval to linear, minute to large, more or less jointed; veins free, branched, not thickened at the tips, ending in the leaf tissue; sori terminal and subterminal, or decurrent on the veins, becoming laterally confluent in a broad intramarginal line at maturity, nearly concealed (or, rarely, not concealed) by the widely reflexed or revolute, continuous, indusium-like margin. About 80 species, mostly temperate, 16 occur in the United States, 8 on the Pacific Coast. Type species: Pteris atropurpurea L.

A. Blades 1-pinnate

B. Pinnae, at least the lower ones, unequally 2-lobed. . . .

. 1. P. breweri

BB. Pinnae all oval, entire. 2. P. bridgesii

AA. Blades at least 2-pinnate

C. Pinnules oval; blades deltoid, 3-pinnate
 3. P. andromedaefolia

CC. Pinnules narrow, linear; blades oblong, 2-pinnate
 4. P. brachyptera

1. Pellaea breweri D. C. Eat. Brewer's Cliff-brake. Pl. 16, fig. 5,
 6 & 7.

Pellaea breweri D. C. Eat. Proc. Amer. Acad. 6:555. 1865.
Allosorus breweri (D. C. Eat.) O. Ktze. Rev. Gen. 2:806.
 1891.

Rhizome massive, ascending or decumbent, tufted, covered with erect, crowded old stipe bases; scales densely tufted, light castaneous to dark cinnamon-colored, almost capillary, thin, lax, twisted, 0.7-1.0 cm long; fronds few to many, crowded, erect from arcuate base, 6-21 cm long; stipes about equalling the blades, stout, transversely corrugate, readily fracturing (Pl. fig. 7) bright brown, glossy; blades 1-pinnate, 3-16 cm long, 1.5-3.5 cm wide, linear to linear-oblong, acute; pinnae mostly opposite, 6-12 pairs, mostly 2-parted, the upper lobe larger (fig. 6); lobes and simple pinnae ovate or deltoid-ovate to oblong-lanceolate, acute, cuneate to subcordate at the base, flat; veins usually visible; sporangia terminal and subterminal, confluent, nearly concealed by thin, whitish, broadly reflexed margin; leaf tissue membranous, subglaucous. Open rocky slopes and clefts of rocks, usually granite; Transition and Canadian

PLATE 16

- Figure 1 & 2. Pellaea brachyptera
- Figure 1. Habit
- Figure 2. Pinna (lying against the rachis), dorsal view, showing linear pinnules, revolute margins, touching along the midrib
- Figure 3 & 4. P. andromedaefolia
- Figure 3. Habit
- Figure 4. Pinnule, dorsal view, showing marginal sorus position and revolute margins
- Figure 5, 6 & 7. P. breweri
- Figure 5. Habit
- Figure 6. Two-lobed pinna, dorsal view showing sorus position and revolute margins
- Figure 7. Stipe, lower portion, showing transverse striations where fracturing will occur
- Figure 8 & 9. P. bridgesii
- Figure 8. Habit
- Figure 9. Pinnae
- Figure 9a. Dorsal view showing sori not covered by narrow, reflexed margin
- Figure 9b. Ventral view showing corrugate margins

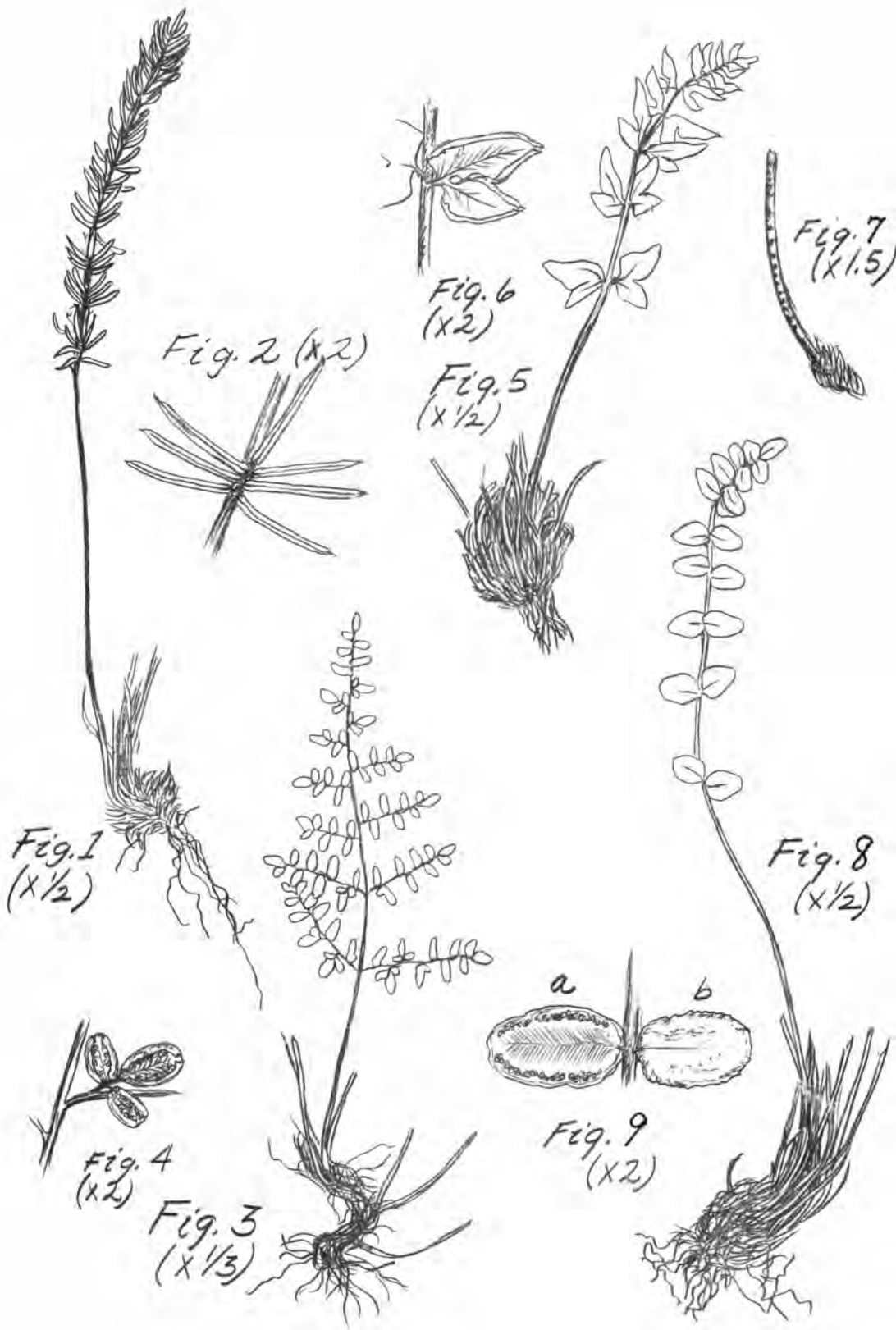


Plate 16

Zones. Central Washington to Sierra Nevada of California, east to Utah, western Wyoming, Idaho. Type locality: Sierra Nevada, California. Oregon: at high altitudes: Wallowa Mts.; Pueblo Mts. (Harney County); Warner Mts. (Lake County); Mt. Ruth (Grant County); rather rare.

2. Pellaea bridgesii Hook. Bridges' Cliff-brake. Pl. 16, fig. 8 & 9.

Pellaea bridgesii Hook. Sp. Fil. 2:238. 1858; 3: pl. 142 B.
1860.

Platyloma bridgesii (Hook.) J. Sm. Hist. Fil. 165. 1875.

Allosorus bridgesii (Hook.) Luers. Fl. Hawaii Is. 290. 1876.

Rhizome often massive, short creeping, divisions short, close; scales tufted, brown, linear, attenuate, thick, with a blackish stripe, 0.5-0.7 cm long; fronds numerous, tufted, 8-35 cm long; stipes about as long as blades, persistent, rather stout and inflated, castaneous, lustrous; blades 1-pinnate, 4-14 cm long, 1.0-2.5 cm wide, linear-oblong; pinnae mostly opposite, sessile, 5 to 16 pairs and a terminal pinna, fertile pinnae broadly oval to cordate to oblong, falcate; sterile pinnae nearly circular, flat; sporangia decurrent in a broad intramarginal band, not at all concealed by narrow, whitish, cartilaginous, reflexed, wrinkled or plain margins (Pl. 16, fig. 9a); leaf tissue coriaceous, grayish green, glaucous. Rocky granite slopes and crevices of cliffs; Canadian Zone. Higher Sierra Nevada, California, from Nevada Co. south to Tulare Co.; Boise National Forest, Idaho, into Oregon. Type locality, Sierra Nevada,

California. Oregon: Wallowa Mts., into Idaho; very rare.

3. Pellaea andromedaefolia (Kaulf.) Fée. Coffee-fern, Pl. 16, fig. 3 & 4

Pteris andromedaefolia Kaulf. Enum. Fil. 188. 1824.

Allosorus andromedaefolia (Kaulf.) Kunze, Linn. 9.:56. 1834.

Platyloma andromedaefolia (Kaulf.) J. Sm. Journ. Bot. 4:160.
1841.

Pellaea andromedaefolia (Kaulf.) Fée, Gen. 129. 1850-52.

Crypteris divaricata Nutt. in Hook. Sp. Fil. 2:149. 1858.

Crypteris pubescens Nutt. in Hook. loc. cit.

Nothochlaena andromedaefolia (Kaulf.) Keys. Pol. Cyath.

Herbar. Bung. 29. 1873 (properly spelled Notholaena).

Pellaea rafaensis Moxley, Am. Fern J. 5:107. 1915.

Cassebeera andromedaefolia (Kaulf.) Farwell, Am. Midl. Nat.
12:280. 1931.

Rhizome slender, wide-creeping; scales imbricate, rich brown, narrow, tapering to a hair point, 1.5-3.5 mm long; fronds distichous, 5-10 mm apart, erect, 15-75 cm long; stipe as long or longer than blade, stiff, flesh-colored, glaucous; blades 2- to 4- (usually 3-) pinnate, 10-40 cm long, 5-20 cm wide, deltoid-ovate to deltoid-lanceolate, long-acuminate; rachis glabrous or glandular pubescent; pinnae subopposite to alternate, elongate-deltoid to deltoid-ovate, distant, large lower pinnae often asymmetrical; pinnales distant, stalked, larger ones pinnate; segments distant, oval or elliptical, 3-17 mm long, short stalked; sterile pinnales flat, fertile ones with margins widely revolute, corrugate at tips of spreading veins; sporangia partially concealed by margins; leaf tissue rigid, dull green to reddish-purple above, pale or yellow-green beneath. Dry stony habitats; mostly Upper Sonoran Zone. Southwestern

Oregon, middle northern California, south to Lower California.

Oregon: Roseburg area, 1887, T. J. Howell; Jasper (Lane County), 1934, F. P. Sipe; very rare.

4. Pellaea brachyptera (Moore) Baker. Sierra Cliff-brake. Pl. 16, fig. 1 & 2.

Platyloma brachypterum Moore, Gard. Chron. 141. 1873.

Platyloma bellum Moore, op. cit. 213.

Pellaea brachyptera (Moore) Baker in Hook. and Baker, Syn. Fil. 2d ed. 477. 1874.

Pellaea bella (Moore) Baker in Hook. and Baker, op. cit. 474.

Pellaea ornithopus Hook., var. brachyptera (Moore) D. C.

Eat. in Wheeler, Rept. U. S. Geograph. Surv. 6:322. 1879.

Allosorus brachypterus (Moore) O. Ktze. Rev. Gen. 2:806. 1891.

A. bellus (Moore) O. Ktze. loc. cit.

Rhizome woody, horizontal, thick, nodose; scales tufted, bright brown in mass, with narrow dark brown stripe, thin, pale margin, acicular, 5-8 mm long; fronds several, tufted, 10-40 cm long; stipe as long as blade or longer, purplish-brown, stout, lustrous; blades 2-pinnate, narrowly linear-oblong, 5-19 cm long, 1.5-4.0 cm wide; pinnae numerous, very oblique, opposite, mostly broader than long, lower 2 or 3 pairs distant, other close to imbricated, rachillae usually shorter than segments; pinnules narrowly linear, sessile, straight or falcate, rigidly short-mucronate, 3-11 per pinna, close, spreading, simple, 6-17 mm long; margins revolute to the middle; sporangia concealed; leaf tissue rigid, dull or grayish green, subglaucous. Dry rocky slopes in the mountains; Transition

Zone. Sierra Nevada of California, north to southwestern Oregon.
 Type: a cultivated plant from California. Oregon: Siskiyou Mts. of Douglas and Jackson Counties; also reported from the Steens Mts., Harney County.

11. CHEILANTHES

Cheilanthes Sw. Syn. Fil. 126. 1806 [Nomen conservandum (27, p. 230)].

Allosorus Bernh. Schrad. Neu. Journ. 1(2):36. 1805 (Nov.) [Nomen rejiciendum (27, p. 230)].

Small, rock-inhabiting, xerophilous ferns; foliage glandular-pubescent, tomentose, paleaceous, or (rarely) powdery or naked; fronds monomorphic, blades 1- to 4-pinnate or 1-pinnate and variously pinnatifid; segments commonly minute, often beadlike; sori borne at the enlarged tips of the veins, solitary on minute lobes, or numerous and confluent in a narrow line; indusia formed of the revolute or recurved, thin, more or less modified margin of the lobes or segments (fig. 11d46), or, in several species, margin pouchlike and giving rise to a membranous indusium. About 130 species of temperate and tropical regions, about 25 in the United States, 11 of these on the Pacific Coast.

A. Pinnules glabrous, lanceolate; indusia conspicuous; blade 3-pinnate 1. C. siliquosa

- AA. Pinnules densely hairy or scaly beneath
- B. Blade 2-pinnate only, pinnule bases occasionally 1- or 2-lobed 2. C. gracillima
- BB. Blade 3- to 4-pinnate
- C. Segments with fine hairs beneath (tomentose). 3. C. feei
- CC. Segments with flat, imbricated scales 4. C. intertexta

1. Cheilanthes siliquosa Maxon. Indian's Dream. Oregon Cliff-brake. Pl. 17, fig. 8, 9 & 10.

Onychium densum Brack. Expl. Exp. 16:120. pl. 13, f. 2. 1854.

Pellaea densa (Brack.) Hook. Sp. Fil. 2:150. pl. 125B. 1858.

Allosorus densus (Brack.) O. Ktze. Rev. Gen. 2:806. 1891.

Cryptogramme densa (Brack.) Diels in Engl. and Prantl, Nat. Pfl. 1, 4:280. 1899.

Cheilanthes siliquosa Maxon, Am. Fern J. 8:116. 1918.

Cheilanthes densa (Brack.) St. John, Am. Fern J. 19:14. 1929, not C. densa Fée, Gen. 156. 1850-52 (which equals Notholaena hirsuta (Poir.) Desv.).

Cryptogramma crispa (L.) R. Br., var. castanea Farwell, Am. Midl. Nat. 12:287. 1931.

Rhizome much-branched, divisions oblique, cespitose; scales acicular, thick, brownish, lustrous; fronds many, crowded, erect, 5-30 cm long; stipes 3-5 times length of blade, stout, stiff, wiry, brown to castaneous, lustrous; blades 3-pinnate, 1-8 cm long, broadly ovate to deltoid-oblong to subpentagonal, usually fertile, but completely sterile blades present, differing slightly from fertile

PLATE 17

Figure 1, 2 & 3. Cheilanthes gracillima

Figure 1. Habit

Figure 2. Pinna, dorsal surface, showing tomentum

Figure 3. Pinna, ventral (upper) surface, showing the lobed basal pinnules

Figure 4 & 5. C. intertexta

Figure 4. Habit

Figure 5. Pinnule, ventral view, showing scales protruding from the underside, and the beadlike segments

Figure 6 & 7. C. feei

Figure 6. Rhizome, stipe, part of rachis, pinna (not the basal one)

Figure 7. Pinnule, showing tomentum on dorsal surface and on rachilla

Figure 8, 9 & 10. C. siliquosa

Figure 8. Habit

Figure 8a. Sterile frond

Figure 8b. Fertile frond

Figure 9. Sterile segments

Figure 10. Fertile segments (dorsal surface)

Figure 10a. Indusium

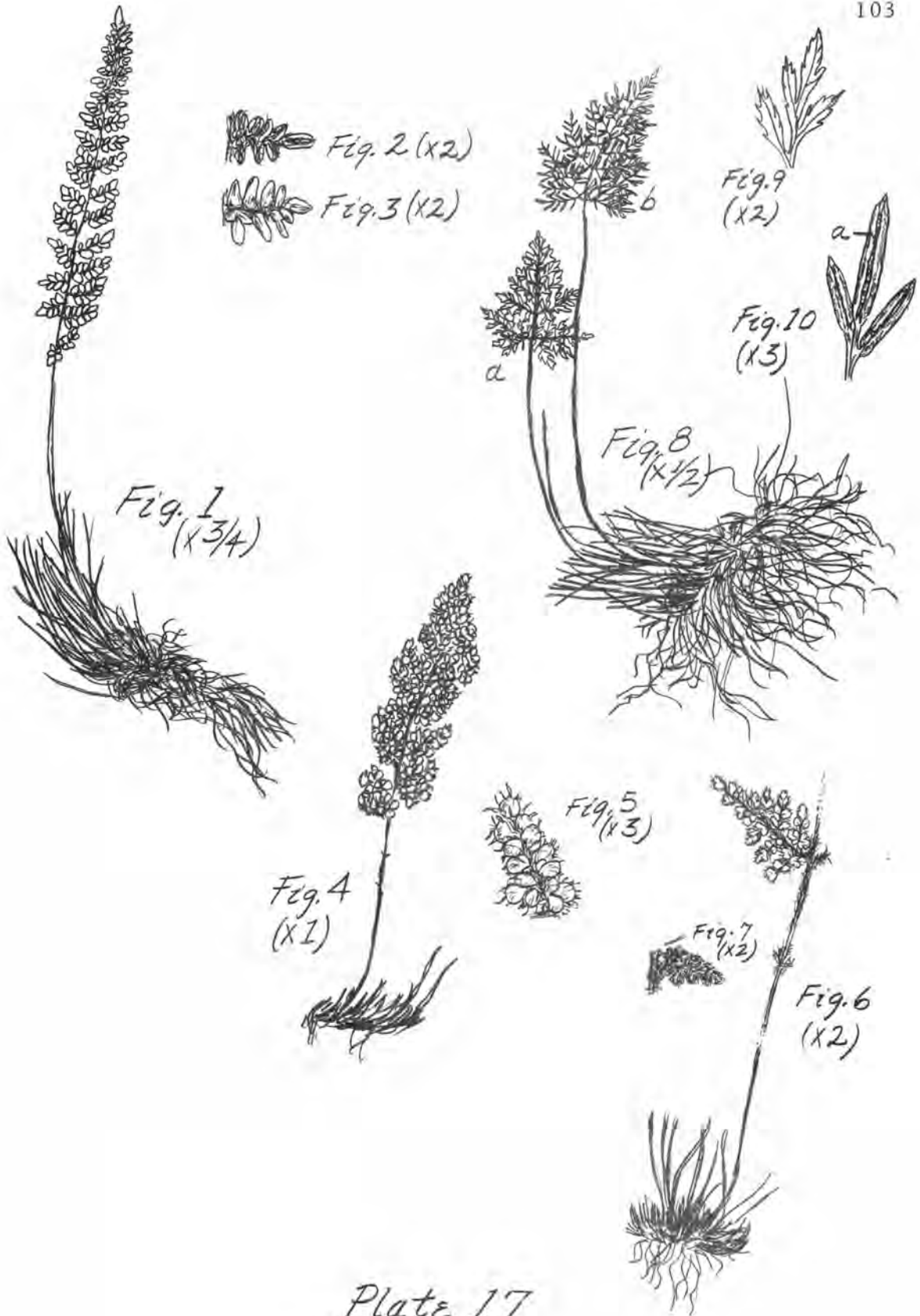


Plate 17

(Pl. 17, fig. 8a, 8b); pinnae few, close, oblique, subopposite, basal ones triangular, asymmetrical; pinnules narrowly linear, mucronate, margins revolute; sterile pinnules broader, serrate; sori many, crowded, appearing continuous on the margins; indusium arising from margin, continuous, delicate, membranous, erose-denticulate (Pl. 17, fig. 10a) leaf tissue coarse. Crevices of cliffs and rock outcrops, bases of large boulders, high altitudes or (less commonly) to sea-level; Canadian and Transitions Zones. San Luis Obispo and Tulare Counties, California, north in the mountains to Vancouver Island, east to northern Montana, Wyoming, Utah; also Gaspé County, Quebec, and Grey County, Ontario, and in Costa Rica. Type locality: Rogue River region, Oregon. Oregon: most common in Siskiyou Mt. area; also in Columbia Gorge; Cascade Mts.; on the coast (Lincoln County); Union County; not common. Note: some authors do not put this species into Cheilanthes, but retain it in Onychium. See Munz and Keck (31, p. 31, 37).

2. Cheilanthes gracillima D. C. Eat. Lace-fern. Pl. 17, fig. 1, 2 & 3.

Cheilanthes gracillima D. C. Eat. in Torrey, Bot. Rep. U. S. and Mex. Bound. Surv. 2(1):234. 1859.

Myriopteris gracillima (D. C. Eat.) J. Sm. Hist. Fil. 280. 1875.

Allosorus gracillimus (D. C. Eat.) Farwell, Am. Midl. Nat. 12:285. 1831.

Rhizome tufted with numerous, short, close branches, densely paleaceous; scales light brown in mass, acicular to linear-lanceolate, long attenuate, 2-3 mm long; fronds very numerous, erect, 5-25 cm long; stipe, about as long as the blade to twice its length, wiry, stiff, persistent, dark brown to nearly black, few basal scales; blade 2-pinnate (occasionally a few pinnules divided at the base), linear to oblong-lanceolate, acuminate; pinnae short stalked, alternate, distant to close, oblique, oblong; rachises paleaceous with linear, attenuate scales from broader, ciliate bases; pinnules oval to ovate, oblique, terminal pinnules largest, 1-3 mm long, sometimes lower pinnules with one or two pairs of basal lobes; margins entire, revolute; segments densely tomentose below (Pl. 17, fig. 2) scales cinnamon to creamy-white; sporangia numerous, marginal, covered by margin, confluent at maturity; leaf tissue dull dark green with coarse, beaded surface, a few elongate, light colored scales on upper side. Rock crevices and ledges, mostly shale, granite, or serpentine, in dry situations; Canadian and Arid Transition Zones, Vancouver Island to western Montana, south in the mountains to Nevada, Mariposa and Marin Counties, California and in Guatemala. Type locality: Cascade Mountains, Oregon. Oregon: higher Cascade Mts.; Siskiyou Mts.; Warner Mts. (Lake County); Blue Mts.; Wallowa Mts.; fairly common.

3. Cheilanthes feei Moore. Slender Lip-fern. Pl. 17, fig. 6 & 7.

Cheilanthes vestita Hook. Fl. Bor. Am. 2:264. 1840, not Sw.
Syn. Fil. 128, 338. 1806 (which equals C. lanosa (Michx.)
Watt).

Myriopteris gracilis Fée, Gen. 150. pl. 29, f. 6. 1850-52.

Cheilanthes feei Moore, Ind. Fil. 38. 1857.

Cheilanthes gracilis (Fée) Riehl in Mett. Cheil. 43. 1859, not
Kaulf. Enum. 1824 (which equals Cryptogramma stelleri
(Gmel.) Prantl).

Cheilanthes lanuginosa Nutt. in Hook. Sp. Fil. 2:99. 1852, not
Mart. and Gal. 1842 (which equals C. lendigera (Cav.)
Sw.).

C. lanosa Moore, Ind. Fil. 245. 1861, not Watt, 1874 (based
on Nephrodium lanosa Michx. 1803.)

Myriopteris lanuginosa (Nutt.) J. Sm. Hist. Fil. 280. 1875.

Fronds 8-25 cm long; stipe about half as long as or equalling the blade, slender, dark brown, deciduously pilose; blade 3-pinnate, 5-13 cm long, 1.5-4.0 cm wide, linear-oblong to ovate to deltoid ovate, acuminate; pinnae short-stalked, spreading, deltoid to ovate to oblong, subopposite to alternate; vesture a dense, pale tomentum; pinnules oval to roundish, thinly villous above with lax, flexuous, whitish hairs, densely and coarsely tomentose beneath (pl. 17, fig. 7), rachises similarly clothed; larger pinnules crenately lobed; margins slightly crenate, narrowly recurved; sori partially covered by the margin; leaf tissue delicate, grayish green. Ledges and rock crevices; Upper Sonoran and Transition Zones, Illinois and southern Minnesota west to British Columbia, Washington (Almota), southern California and Mexican border region from central Texas westward. Type locality: Hillsboro, Missouri. Not known from Oregon; however

it has been found along the Snake River in Nez Perce County, Idaho, and may be discovered in adjacent Oregon,

4. Cheilanthes intertexta Maxon. Coastal Lip-fern. Pl. 17, fig. 4 & 5.

C. covillei Maxon, ssp. intertexta Maxon, Proc. Biol. Soc. Wash. 31:149. 1918.

C. intertexta Maxon in Abrams, Illus. Fl. Pacific St. 1:28. 1923.

Rhizomes very short-creeping, branched, nodose, paleaceous; scales dark brown to blackish, rigid, linear to lanceolate, long-attenuate; fronds numerous, 5-10 cm long, tufted; stipe a little less than the length of blade, brown to dark purple, with small, linear, pale, ascending scales; blades 3-pinnate, ovate to ovate-deltoid, segments tiny, beadlike, oval to round, with a few whitish, stellate, subpersistent scales above, thickly covered beneath (and on the rachises) with numerous, bright-castaneous to cinnamomeous, imbricate scales (fig. 5) larger ones (as on the rachises) mostly deltoid-lanceolate, long attenuate, denticulate, long-ciliate at the bases, underlaid by successively smaller and more copiously long-ciliate scales, ultimate ones often reduced to tangled cilia; sporangia borne within the deeply recurved, crenate margin; leaf tissue spongy, dull, dark green. Rock crevices, Upper Sonoran Zone. Siskiyou Mts. of Oregon, south to Sonoma County, California, Virginia City, Nevada; very rare in Oregon.

12. CRYPTOGRAMMA

Cryptogramma R. Br. after Richards in Franklin, Narr. Journ.
767. 1823.

Small, mainly alpine or boreal ferns of rocky habitats; fronds dimorphic in most species numerous and densely clustered upon stout ascending rhizomes; stipes pale, not articulate; blades glabrous, 2- to 3-pinnate, herbaceous, sterile ones foliaceous with numerous, crowded, rather small, flat, obtuse segments, the fertile on long stalks with fewer, narrower, copiously soriferous segments; sori marginal or submarginal, in a continuous line at the free ends of the forked veins, confluent; indusia continuous, formed of the broadly revolute or reflexed, modified margins of the segments. Five species, 2 in North America, one in Chile, 2 in Eurasia; type species, C. acrostichoides R. Br.

One species in Oregon 1. C. acrostichoides

1. Cryptogramma acrostichoides R. Br. American Parsley-fern.
Pl. 7, fig. 5, 6, 7, 8 & 9.

Cryptogramma acrostichoides R. Br. after Richards in
Franklin, Narr. Journ. 754, 767. 1823.

Allosorus acrostichoides (R. Br.) Spreng. Syst. 4:66. 1827.

Gymnogramma acrostichoides (R. Br.) Presl, Tent. Pter.
219. 1836.

A. foveolatus Rupr. Dist. Crypt. Russ. Reich. 3:46. 1845

A. sitchensis Rupr. op. cit. 47.

Phorolobus acrostichoides (R. Br.) Fée, Gen. 131. 1850-52.

C. crispa (L.) R. Br., f. americana Hook, Sp. Fil. 2:130.
1858.

C. crispa (L.) R. Br., var. acrostichoides Hook. and Baker,
Syn. Fil. 1865-68.

- A. crispus (L.) Bernh., var. acrostichoides (R. Br.) Milde,
Fil. Eur. Atl. 24:1867.
- C. crispa (L.) R. Br., var. acrostichoides (R. Br.) C. B.
Clarke, Trans. Linn. Soc. Ser. 2, 1:460. 1880.
- C. crispa (L.) R. Br., var. acrostichoides (R. Br.) Lawson,
Fern Fl. Can. 236. 1889.
- C. crispa (L.) R. Br., var. acrostichoides (R. Br.) Hook. and
Baker, f. foveolata (Rupr.) Gilbert, List N. Am. Pter.
16. 1901.
- C. acrostichoides foveolata (Rupr.) Gilbert, op. cit. 36.
- C. crispa (L.) R. Br., ssp. acrostichoides (R. Br.) Hultén,
Fl. Alaska and Yukon 1:40. 1941.

For a discussion on the relationship of C. acrostichoides and C. crispa, see Fernald (20).

Rhizome short-creeping or ascending, in massive tufts, chaffy; scales lance-ovate, attenuate, thin, clustered, rusty to dark brown; fronds demorphic, very numerous, clustered, 9-30 cm long, fertile ones erect, sterile ones somewhat spreading; stipe as long as blade to about twice its length, that of sterile frond shorter, green, rather slender, of fertile frond longer, stramineous, stout, with a few thin scales toward the base; blades of fertile fronds 4-14 cm long, 2-pinnate, of sterile fronds 2- to 3-pinnate, 3-12 cm long, ovate to ovate-lanceolate; rachises flattened with greenish margins; pinnae few, glabrous, crowded at tip, ovate to oblong to obovate; pinnules of fertile fronds linear-oblong, 4-21 mm long, 2 mm wide, margins revolute, nearly meeting, pushed back when spores mature; Pinnules of sterile fronds obtuse, decurrent, occasionally partially fertile with a few small sori, margins incised or dentate, the teeth shallow;

veinlets ending in expansions near margins, corresponding to the teeth but not terminating in them; sporangia confluent, hidden by margin (Pl. 7, fig. 9). Cliffs and mossy rock slides; mostly Canadian and Hudsonian Zones. Alaska to Labrador, southward in high mountains to southern California, Nevada, Utah, northern New Mexico, and northern shores of Lake Huron. Type locality: Nootka Sound. Oregon: high Cascade Mts.; Wallowa Mts., Blue Mts.; Siskiyou Mts.; northern Coast Range; Columbia Gorge; near coast in Clatsop County; fairly common.

13. ADIANTUM

Adiantum [Tourn.] L. Sp. Pl. 1094. 1753.

Ferns of moist, rocky woods and ravines; rhizomes thick and suberect to slender and wide-creeping, paleaceous; fronds distichous or in several ranks, rigidly ascending to drooping; stipes firm, dark, usually lustrous; blades simple, 1- to 3-pinnate or decomposed, usually with dark, polished rachises, extremely variable in degree of fertility; pinnules glabrous or variously pubescent, sessile or stalked, often articulate, readily deciduous in many species; sori appearing marginal, sporangia borne along and sometimes between ends of free forking veins, on the underside of sharply reflexed indusiform marginal lobes of pinnules or segments (Pl. 21129, Pl. 18, fig. 1.).

PLATE 18

- Figure 1. Sorus position in Adiantum (diagrammatic)
- Figure 1a. False indusium
- Figure 1b. Dorsal surface of segment
- Figure 1c. Ventral surface of segment
- Figure 2, 3, 4 & 5. Adiantum pedatum var. aleuticum
- Figure 2. Habit
- Figure 3. Juvenile plant
- Figure 4. Ultimate segment showing venation, marginal lobes, teeth of sterile segment
- Figure 5. Fertile segment showing sori
- Figure 6, 7, 8 & 9. A. jordanii
- Figure 6. Habit
- Figure 7. Sterile ultimate segment showing venation, marginal lobes, and teeth
- Figure 8. Sterile segment with teeth
- Figure 9. Fertile segment, with sori

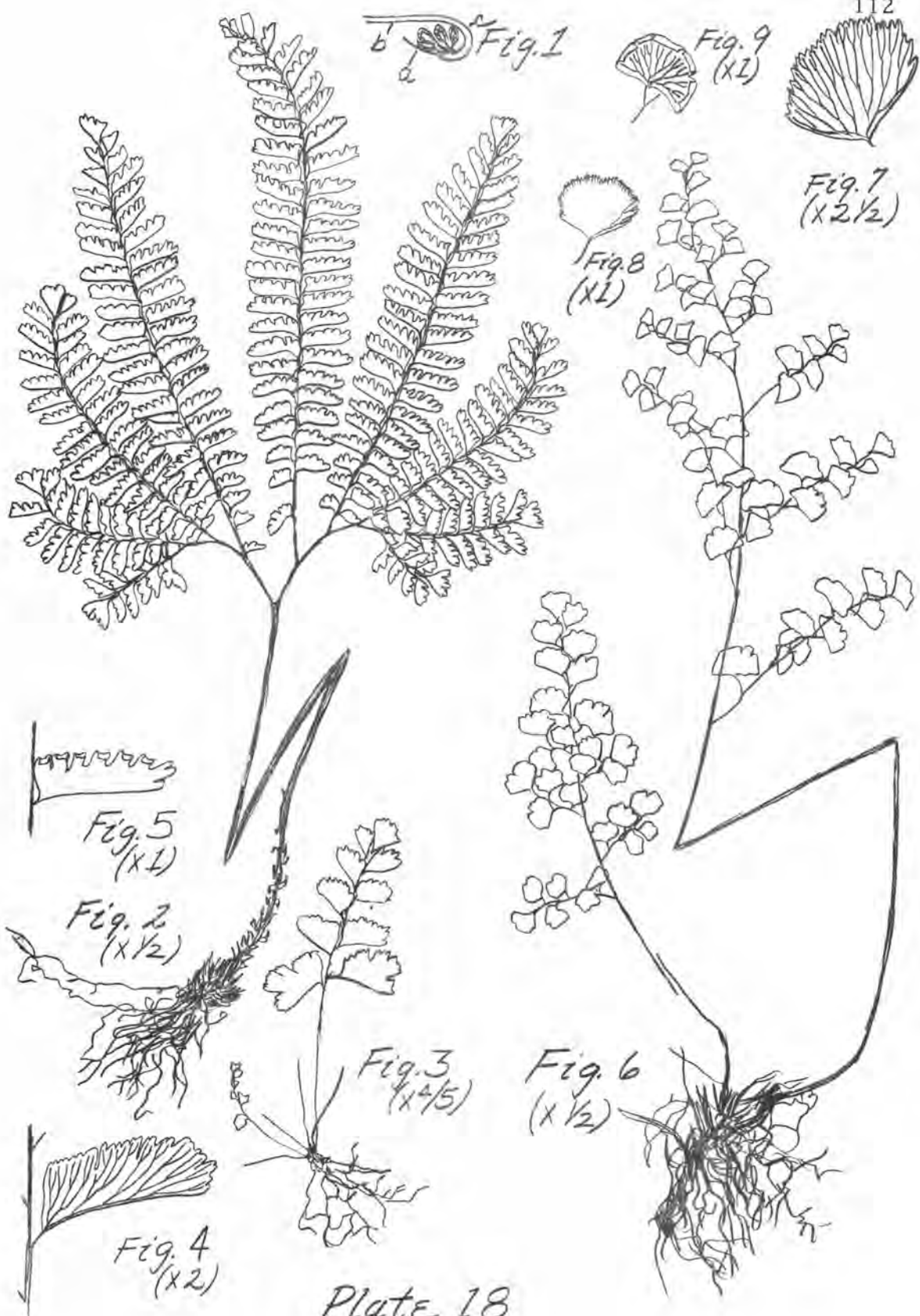


Fig. 1

Fig. 9 (x1)

Fig. 7 (x2 1/2)

Fig. 8 (x1)

Fig. 5 (x1)

Fig. 2 (x1/2)

Fig. 3 (x4/5)

Fig. 6 (x1/2)

Fig. 4 (x2)

Plate 18

About 200 species, largely tropical American; six species in the United States. Type species A. capillus-veneris L.

Veinlets arising from a vein along the lower edge of the segment, ultimate segments asymmetrical; stipe branching once dichotomously, secondary branches arising from the outer side of the two main branches (this character absent in juvenile plants).

..... 1. A. pedatum

Veinlets branching dichotomously from the base of the segment; segments nearly symmetrical; stipe continuous with rachis, not branched 2. A. jordani

1. Adiantum pedatum L., var. aleuticum Rupr. Western Maidenhair-fern. Pl. 18, fig. 2, 3, 4 & 5.

Synonyms for the species as a whole:

A. pedatum L. Sp. Pl. 2:1095. 1753.

A. boreale Presl, Tent. Pter. 158. 1836.

Applying only to var. aleuticum:

A. pedatum L., var. aleuticum Rupr. Beitr. Pfl. Russ. Reich. 3:49. 1845.

A. pedatum L., var. rangiferinum Burgess, Proc. Roy. Soc. Can. 4(4):11. 1887.

A. pedatum L., f. aleuticum (Rupr.) Clute, Our Ferns 298, 383. 1938.

Rhizome thick, short-creeping, densely paleaceous; scales rather small, papery, rich brown, lance-oblong to deltoid ovate, acuminate; fronds several, close, erect, 7-100 cm long; stipes about twice as long as blade, dark brown to black, stout, wiry, a few

basal scales; blades reniform-circular, 2.5-40.0 cm long, 4-50 cm wide, branched once into two equal portions; pinnae arising from outer side of branches, linear, pinnate, longest ones in the middle; pinnules close, spreading to oblique, short-stalked, oblong to deltoid-oblong, asymmetrical, alternate, lower edges entire, upper ones deeply and unequally cleft into truncate lobes; margins of sterile lobes with blunt, shallow teeth, terminating the veinlets; veins arising from the main vein of the lower edge, forking 2-3 times (pl. 18, fig. 4); sori solitary on the lobes, linear to oblong-lunate; leaf tissue membranous, rather papery. Extremely variable in size, segment, shape, lobing, and branching, within the basic pattern. Juvenile fronds (Pl. 18, fig. 3) less than 10 cm high do not show dichotomous branching, are once-pinnate, and have been confused with A. capillus-veneris L., which is not known from Oregon. Shaded cliffs, rocky stream margins, and rich, rocky or swampy woods; Canadian and Humid Transition Zones. Alaska to mountains of southern California, Rocky Mts. to Utah; in Gaspé region, Quebec. Type locality: Aleutian Islands, Alaska; apparently passing gradually into the common typical variety of eastern North America, some specimens being indistinguishable from var. pedatum. Oregon: Common from the Cascades westward to the coast for the length of the state, also in the Blue Mts. and Willowa Mts.

2. Adiantum jordanii Müll. California Maidenhair-fern. Pl. 18, fig. 6, 7, 8 & 9.

A. emarginatum Hook. Sp. Fil. 2:39. pl. 75 a. 1851, not Bory, in Willd. 1810 (which equals A. capillus-veneris L.).

A. jordanii Müll. Bot. Zeit. 26. pl. 1, f. 1. 1864.

Rhizome slender, creeping; scales large, rigid, oblique, dark brown, lance-attenuate; fronds several, close, mostly erect, 20-55 cm long; stipes about as long as blades, dark brown to black, slender, wiry; blades 2-(rarely 3-) pinnate below, once-pinnate above, ovate to deltoid-ovate (base asymmetrical), 12-30 cm long, 8-15 cm broad; pinnae long-stalked, spreading to oblique, alternate, linear-oblong; pinnules long-stalked, 5-30 mm broad, broadly obovate to semicircular, base cuneate, outer edge shallowly lobed; margins of sterile pinnules sharply denticulate; teeth short, whitish; veins dichotomous from the base (Pl. 18, fig. 7), numerous, forking 3-4 times, free; sori 2-5 per pinnule, linear to slightly incurved; leaf tissue membranous. Rocky canyons; Transition Zone. Coast Ranges of California, San Diego north to southwestern Oregon, rare in Sierra Nevada of central California. Type locality: Ukiah, California. Oregon: Siskiyou Mts. north to Umpqua River region, Douglas County; rather uncommon.

14. PTERIDIUM

Pteridium Gled. in Scop. Fl. Carn. 169. 1760 [Nomen conservandum, (27, p. 231)].

Cincinnatiensis Gled. Syst. Pl. 296. 1764 [Nomen rejiciendum, (27, p. 231)].

Eupteris Newm. Phytol. 2:278. 1845 [Nomen rejiciendum, (27, p. 231)].

Coarse ferns of open or partially shaded habitats, in acid soil; rhizomes slender, woody, freely branched, wide-creeping, subterranean; fronds stout, erect to reclining, up to 5 m long, borne singly; stipes stout, with feltlike covering at base, not jointed to the rhizome; blades large, triangular or deltoid-ovate to elongate, pinnately decomposed; ultimate segments entire, toothed, or lobed; sori marginal, linear, continuous, arising from a transverse vein-like receptacle connecting the ends of the forked free veins; indusium double (fig. 2I130), the outer one prominent (Pl. 19, fig. 3a), formed by the reflexed membranous margins of the segments, the inner obscure, delicate, usually minute, borne upon the receptacle, nearly concealed by the sporangia, facing outward.

One to 8 widely distributed species (or subspecies according to some authors), 4 or 5 in North America; type species; Pteris aquilina L.

One species, represented by one variety in Oregon..1. P. aquilinum

PLATE 19

Figure 1, 2 & 3. Pteridium aquilinum var. lanuginosum

Figure 1. Habit, ventral surface

Figure 2. Blade apex, dorsal surface showing reflexed margins

Figure 3. Ultimate segments with sori, showing venation

Figure 3a. Indusium

Figure 4, 5 & 6. Pityrogramma triangularis

Page 91

Figure 4. Habit

Figure 5. Pinna, dorsal surface with veins, showing pattern of yellow powder in young leaf

Figure 6. Portion of pinna showing sori, sporangia confluent on veinlets, and margins reflexed.



Fig. 1 (x4/9)

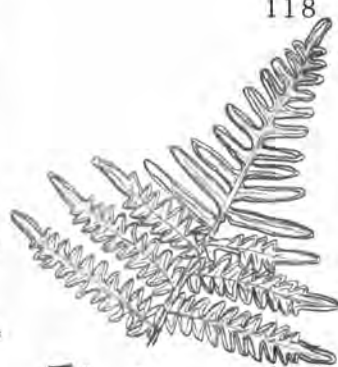


Fig. 2 (x4/9)



Fig. 3 (x2)



Fig. 5 (x1/2)

Fig. 6 (x2)



Fig. 4 (x1/2)



Plate 19

1. Pteridium aquilinum (L.) Kuhn, var. lanuginosum (Bong.)
Fernald, Western Bracken. Western Brake-fern. Pl. 19,
fig. 1, 2 & 3.

Synonyms applying to the species as a whole:

- Pteris aquilina L. Sp. Pl. 2:1075. 1753.
Asplenium aquilinum (L.) Bernh. Schrad. Journ. 1799(1):310.
1800.
Allosorus aquilinus (L.) Presl, Tent. Pter. 153. 1836.
Eupteris aquilina (L.) Newm. Phytol. 2:278. 1845.
Paesia aquilina (L.) Keys. Pol. Cyath. Herbar. Bung. 22. 1873.
Cincinnatiella aquilinum (L.) Trev. Atti. Soc. It. Sc. Not. 17.
1874.
Ornithopteris aquilina (L.) J. Sm. Hist. Fil. 298. 1875.
Pteridium aquilinum (L.) Kuhn, Deck. Reisen 3(3):11. 1879.
Filix-foemina aquilina (L.) Farwell, Am. Midl. Nat. 12:290.
1931.

Synonyms of var. lanuginosum only:

- Pteris lanuginosa Spr. Nova Acta 10:231, pl. 16, f. 1-2. 1821,
not Bory ex Willd. 1810 (which equals P. aquilina, var.
capense), an illegitimate name.
Pteris aquilina L., var. lanuginosa Bong. Mém. Acad. St.
Petersb. 6(2):176. 1832 (based on P. lanuginosa Spr.).
Pteris aquilina L., var. pubescens Kunze, Linnaea 13:142.
1839.
Pteris feei Schffn. ex Fée, Mém. 8:73. 1857.
Pteridium aquilinum (L.) Kuhn, var. pubescens (Kunze) Underw.
Our Nat. Ferns, 6th ed. 91. 1900.
Pteris aquilina L., var. pubescens (Underw.) Clute, Fern
Bull. 15:124. 1907.
Filix-foemina aquilina (L.) Farwell, var. lanuginosa (Bong.)
Farwell, Am. Midl. Nat. 12:290. 1931.
Pteridium aquilinum (L.) Kuhn, var. lanuginosum (Bong.)
Fernald, Rhodora 37:274. 1935.
Pteridium aquilinum (L.) Kuhn, var. feei (Schffn. ex Fée)
Maxon ex Yuncker, Field Museum Publ. Bot. 17:308.
1938.
Pteridium feei (Schffn. ex Fée) Faull. Contrib. Arnold Arbor.
11:87. 1938.

According to Fernald (19, p. 247): "When Underwood published Pteridium aquilinum var. pubescens in 1900, he was working under one of the so-called American rules which rejected a name if it repeated one ever used under the genus in any category. Consequently, since there had been a Pteris lanuginosa Bory (1810), Underwood rejected Bongard's varietal name (1832). Under the International Rules the latter must be retained." (See 27, Art. 72, p. 52.)

Fronds erect; stipes stramineous from a dark base, 15-100 cm long; blades about as long as stipe, 3-pinnate, large, oblique, subternate; pinnules or segments variable, linear-oblong and entire to deltoid oblong and pinnatifid, often dilatate at base; margins entire, revolute; sori as for the genus; indusia narrow, villous, but not truly ciliate; leaf tissue rigid, pubescent or silky-tomentose beneath with pale yellow hairs, slightly hairy or glabrous above. Extremely variable in height and in nearly all technical characters, these mostly correlated with habitat. This is probably the most widespread species of vascular plant in the world. Moist woods and thickets, open fields, burns, rocky canyons; Boreal and Austral Regions. Alaska to Montana and Michigan, south to Utah, Mexico. Type locality: not definitely stated. Oregon: throughout the state, most common in western counties; weedy in some areas.

15. POLYPODIUM

Polypodium [Tourn.] L. Sp. Pl. 2:1082.

Species of various habitats, commonly epiphytic; rhizomes

PLATE 20

- Figure 1. Polypodium scouleri, habit, dorsal surface
- Figure 1a. Scale
- Figure 1b. Venation pattern, with formation of areoles by reticulating veinlets
- Figure 1c. Sori
- Figure 2, 3 & 4. P. vulgare var. occidentale
- Figure 2. Habit
- Figure 3. Pinna from different plant, showing variation
- Figure 4. Portion of pinna with sori, venation
- Figure 5 & 6. P. vulgare var. columbianum
- Figure 5. Frond
- Figure 6. Pinnae with sori

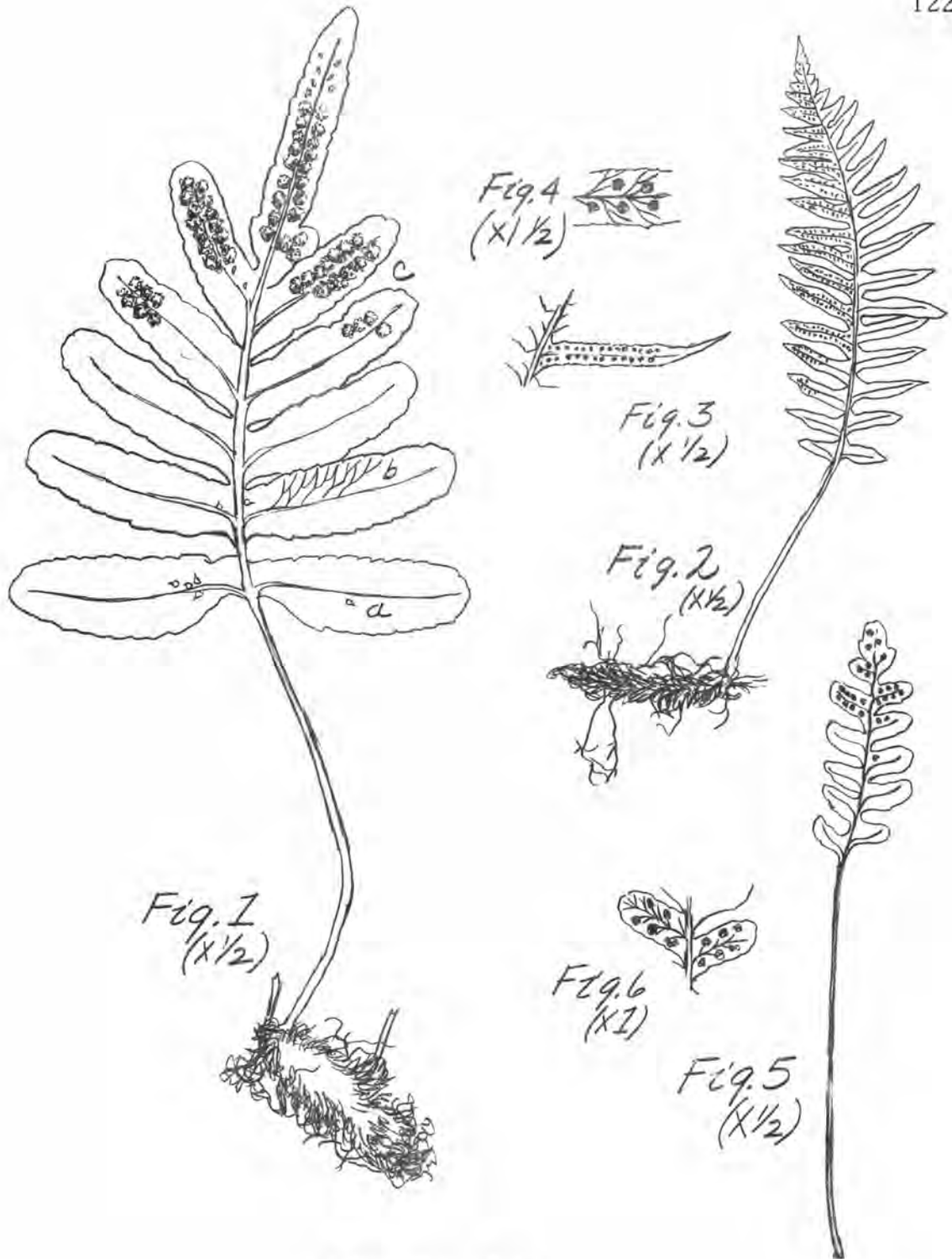


Plate 20

usually slender, creeping; frond monomorphic or subdimorphic, usually articulate to knob-like prominences of the rhizome; blade simple, pinnatifid, or 1- to 3-pinnate, glabrous to pubescent or paleaceous; veins free or variously reticulate; sori round to elliptical, relatively large, dorsal or sometimes terminal, always without indusia. Conservatively, about 50 species, mostly of tropical and subtropical regions, several occurring in the United State. Type species: Polypodium vulgare L.

Leaf tissue thin or membranous; veins all free. 1. P. vulgare

Leaf tissue very stiff, leathery; veins joining in their upper parts to form a series of areoles. 2. P. scolieri

1. Polypodium vulgare L.

P. vulgare L. Sp. Pl. 2:1085. 1753.

Ctenopteris vulgaris (L.) Newm. Phytol. 2:274. 1846.

Two varieties are recognized in Oregon:

Pinnae tapering from base or middle 1a. P. v., var. occidentale

Pinnae widest beyond the middle, or not tapering and rounded at the

apex. 1b. P. v., var. columbianum

1a. Polypodium vulgare L., var. occidentale Hook. Licorice-fern. Pl. 20, figs. 2, 3 & 4.

P. vulgare L., var. occidentale Hook. Fl. Bor. Am. 2:258. 1840.

P. falcatum Kellogg, Proc. Calif. Acad. 1:20. 1854, not L. f. 1781.

P. glycyrrhiza D. C. Eat. Am. J. Sci. 2(22):138. 1856.

P. vulgare L., var. glycyrrhiza (D. C. Eat.) Hook. and Bak. Syn. Fil. 334. 1865-68.

P. occidentale (Hook.) Maxon, Fern. Bull. 12:102. 1904.
P. vulgare L. ssp. occidentale (Hook.) Hultén, Fl. Alaska
 Yukon 1:44. 1941.

Rhizome creeping, 3-5 mm thick, paleaceous; scales thin, rusty brown, oblong-ovate, long acuminate, 5-9 mm long; fronds mostly distant, 20-70 cm. long; stipes usually much shorter than blade, firm, naked, stramineous or light green, rarely dark; blades once-pinnate, 15-50 cm long, 4-17 cm wide, usually lanceolate, abruptly attenuate; pinnae alternate, linear-attenuate to oblong-linear, tapering from the dilatate bases, often falcate, basal segments distant with rounded sinuses, tips attenuate to rather acute; margins unevenly serrate; veins oblique to spreading, free, mostly 3-forked; sori roundish oval, inframedial, not extending to the ends of the segments; leaf tissue thin. On shaded ledges, rocks, old logs, mossy trunks of deciduous trees; Humid Transition Zone. Alaska to San Mateo County, California, mainly near the coast. Type locality: southwestern Oregon. Oregon: from the western slopes of the Cascade Mts. to the Coast; fairly common; replaced farther east by var. columbianum.

The two varieties are connected by an almost complete series of intergrading forms. Plants of var. occidentale vary greatly under different conditions of moisture and substrate.

1b. Polypodium vulgare L., var. columbianum Gilbert. Western Polypody. Pl. 20, fig. 5 & 6.

- P. hesperium Maxon, Proc. Biol. Soc. Wash. 13:200. 1900.
P. vulgare L., var. columbianum Gilbert, List of N. Am.
 Pter. 19, 38. 1901.
P. prolongilobum Clute, Fern Bull. 18:97. 1910.
P. vulgare L., var. hesperium (Maxon) Nels. and Macbr. Bot.
 Gaz. 61:30. 1916.
P. amorphum Suksdorf, Werdenda 1:16. 1927.

Rhizome creeping, firm, densely paleaceous; scales pale to dark castaneous, ovate, long-acuminate, 3-5 mm long; fronds rather close, ascending, 10-24 cm long; stipes nearly equalling the blades, occasionally longer, stramineous, naked; blades 1-pinnate, deltoid-oblong to linear-oblong, usually long-acuminate, 7-18 cm long; pinnae alternate, spreading, narrowly oblong to oval, elliptical, or subspatulate, usually rounded-obtuse; margins crenate to obscurely crenate-serrulate, sometimes irregularly lobed; veins forking twice; sori broadly oval, medial; leaf tissue membranous, light to yellowish green or subglaucous. Cliffs and rocky slopes; Canadian Zone. Yukon to South Dakota, northern New Mexico, Arizona, southern California and Lower California. Type locality: Coyote Canyon, Lake Chelan, Washington. Oregon: Columbia Gorge; Blue Mts.; higher Cascade Mts.; uncommon to rare.

2. Polypodium scouleri Hook. and Grev. Coast Polypody, Leather-leaf Polypody. Pl. 20, fig. 1.

- P. scouleri Hook. and Grev. Icon. Fil. 1. Pl. 56. 1829.
P. pachyphyllum D. C. Eat., Am. J. Sci. 2(22):138. 1856.
Gonophlebium scouleri (Hook. and Grev.) J. Sm. Hist. Fil. 91,
 1875.

P. carnosum Kellogg, Proc. Calif. Acad. 2:88. f. 24. 1861,
not Mett. Pol. 124 n. 249. 1857, (which equals Cyclo-
phorus adnascens (Sw.) Desv.).

P. vulgare L., var. scouleri (Hook. and Grev.) Christ, Beitr.
Crypt. Schweiz I. heft. 2:53. 1900.

Rhizome thick, creeping, woody, laxly paleaceous, naked with
age, glaucous; scales dark, large, attenuate from a deltoid-ovate
base; fronds few, arising singly, 15-70 cm long; stipes somewhat
shorter than blade, stout, rigid, greenish to stramineous, naked;
blades 1-pinnate, 10-40 cm long, deltoid ovate; pinnae subopposite to
alternate, spreading, linear-oblong, obtuse, 7-20 mm broad, decur-
rent (upper ones joined); midribs elevated, deciduously scaly beneath
with dark, broad, rather large, scattered scales (Pl. 20, fig. 1a);
margins of pinnae cartilaginous, crenulate-serrate; veins joined in a
single series of areoles (fig. 1b); sori very large, round, crowded
against midrib, mostly confined to upper segments (fig. 1c); leaf
tissue very rigidly coriaceous, dull yellowish green. In forks of old,
mossy tree trunks, cliffs, and rock slopes along the coast, and in
mossy sand at the edges of coastal dunes; Humid Transition Zone.
Santa Cruz County, California to Vancouver Island, also on Guadalupe
Island, Lower California. Type locality: Columbia River region.
Oregon: fairly common all along the coast and coastal rivers and
inlets, rare inland (W. C. Cusick, "Willamette").

3. MARSILEACEAE

Perennial, herbaceous plants rooting in mud; rhizomes slender, creeping; leaves long-petioled; blades palmately 2- or 4-foliolate or simple and filiform; sori borne within bony, ovoid to globose, several celled, peduncled sporocarps, these arising from the rhizome near bases of leaf-stalks or more or less consolidated with them; plants heterosporous; vernation circinate,

Three genera, our two, and the monotypic Regnellidium (with 2-foliolate blades) of South America.

Leaves compound, 4-foliolate, clover-like 1. Marsilea
 Leaves simple, threadlike or grasslike 2. Pilularia

1. MARSILEA

Marsilea L. Sp. Pl. 2:1099. 1753.

Zalusianskya Necker, Acta Theod. 3:303; O. Ktze. Rev. Gen. 2:823. 1891.

Plants of shallow ponds, ditches, and marshy shores; leaves solitary or tufted; blades palmately compound (fig. 2B74), 4-foliolate; peduncles erect; sporocarps ovoid, with 2 teeth near the base, 2-celled vertically, with many transverse partitions, dehiscent into 2 valves and emitting a mucilaginous band of tissue which bears the sori at intervals within membranous envelopes; sori including both megasporangia and microsporangia, the former few, with solitary

PLATE 21

Figure 1, 2 & 3. Marsilea vestita

Figure 1. Habit

Figure 2. Blade, showing venation

Figure 3. Sporocarp, with teeth, pubescence, attachment

Figure 4. Pilularia americana, habit

Figure 4a. Sporocarp

Figure 5 & 6. Azolla filiculoides

Figure 5. Habit

Figure 5a. Upper lobe of leaf

Figure 5b. Lower lobe of leaf

Figure 6. Habit, natural size

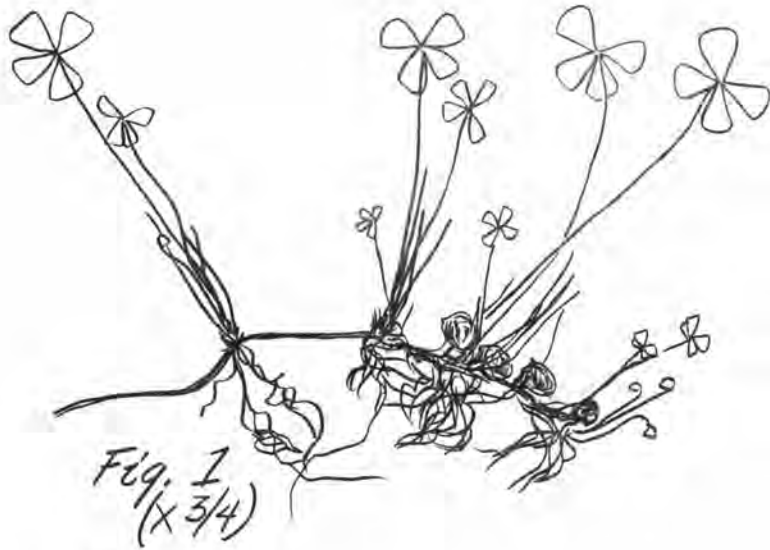


Fig. 2
(x2)

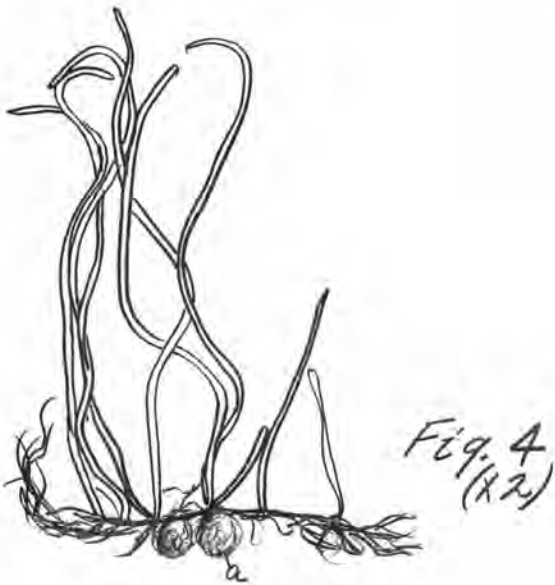


Plate 21

megaspores, the latter many with numerous microspores. Genus of wide distribution, about 65 species, mostly Old World; several in the United States, mostly the southern part.

One species in Oregon 1. M. vestita

1. Marsilea vestita Hook. and Grev. Clover-fern. Hairy Pepperwort. Pl. 21, fig. 1, 2 & 3.

M. vestita Hook. and Grev. Icon. Fil. pl. 159. 1828.

M. mucronata A. Br. Am. J. Sci. 2(3):55. 1847, applied to western plants by authors other than A. Br.

M. picta Fée, Mém. 9:47. 1857.

Zalusianskya vestita (Hook. and Grev.) O. Ktze. Rev. Gen. 2:823. 1891.

M. oligospora Gooding, Bot. Gaz. 33:66, 1902. For a discussion of this synonym, see Stason (40).

Note: There is some confusion in recent literature over the correct name of this plant. Mason (31) ascribes the western plants to M. mucronata A. Br., and lists M. vestita Hook. and Grev. as a synonym, but does not state his reason for this. Marsilea mucronata is recognized as a species separate from M. vestita by Fernald (23), which differs from the interpretation of Robinson and Fernald (22). The type locality of M. mucronata is "Devils Lake, in the Sioux Territory between the Missouri and Mississippi Rivers" (7). The plants of the eastern part of the country are thus assigned to this species. The type locality of M. vestita is the Columbia River region, so this name takes priority for the western plants. If the western and eastern plants are not considered to be separate species, then M. vestita is the correct name for the single resulting species, and M. mucronata becomes a synonym for it, and would be the correct name only if M. vestita were found to be illegitimate. After seeing the original articles for both species, I can find no reason to reject Hooker and Greville's name, Marsilea vestita.

Rhizome wide-creeping, internodes short to very long, nodes with varying amounts of reddish-brown to yellowish, silky hairs, densely tufted to absent; leaves few to many per node, ascending,

4-20 cm long; petioles slender, pubescent; blades 1-3 cm across; leaflets pubescent, 0.5-1.5 cm long, one-half to same width, cuneate, entire, spreading or folding together; peduncles free from petiole, short; sporocarps (Pl. 21, fig. 3) solitary, 4-8 mm long, 3-6 mm broad, densely pubescent, upper tooth rather long, acute, usually curved, lower tooth short, blunt; sori 9-11 in each valve; hairs of all parts somewhat deciduous. Variable as to fertility, number of leaves per node, length of internodes and petioles, amount of pubescence, and distinctiveness of upper tooth of sporocarp. Edges of ponds, ditches, rivers, in mud and sand; Upper and Lower Sonoran Zones. British Columbia to southern California, east to South Dakota, Kansas, Oklahoma, Texas; Mexico. Type locality: Columbia River region. Oregon: Columbia River; Willamette Valley; the southern counties across the state; Baker County.

2. PILULARIA

Pilularia L. Sp. Pl. 2:1100. 1753.

Calamistrum (L.) O. Ktze. Rev. Gen. 2:822. 1891.

Very small, inconspicuous plants of muddy habitats; rhizomes long-creeping, nodes bearing 1 or several filiform leaves; peduncles short, descending; sporocarps globose, axillary, longitudinally 2- to 4-chambered, dehiscing by as many valves, at the apex; chambers (sori) with parietal cushions bearing megasporangia below and

microsporangia above, the former with solitary megaspores, the latter with numerous microspores. Widely distributed genus, 6 species, one in North America. Type species: Pilularia globulifera L.

One species in Oregon 1. P. americana

1. Pilularia americana A. Br. American Pillwort. American Pilularia. Pl. 21, fig. 4.

P. americana A. Br. Monats. Akad. Berl. 1863:435. 1864.
Calamistrum americanum (A. Br.) O. Ktze. Rev. Gen. 2:822.
1891.

Rhizomes filiform, rooting beneath nodes; leaves solitary or not, 2-4 cm long; sporocarps 2 mm in diameter, attached laterally to short descending peduncle, 2- to 4-(usually 3-) chambered; megasporangia 10-17 per chamber (sorus), not constricted in the middle; leaves light green. Clayey depressions and desiccating pools; mainly Upper Sonoran Zone. Central Oregon to southern California, Mexico; also Arkansas. Type locality: Fort Smith, Arkansas. Oregon: Crook County; probably more widespread than presently indicated, as it is very difficult to distinguish it from the grasses among which it grows.

4. SALVINIACEAE

Small aquatic or floating plants, with more or less elongated, sometimes branching axes; heterosporous; sporocarps soft and thin-walled, borne 2 or more on a common stalk, 1-chambered, having a central, often branched, receptacle, bearing either megasporangia, each containing a solitary megaspore, or microsporangia containing numerous microspores. Two widespread genera, Salvinia and Azolla, about 16 species, mostly tropical.

One genus in Oregon 1. Azolla

1. AZOLLA

Azolla Lamarck, Encyc. 1:343. 1783.

Plants mosslike, reddish or green; stems pinnately branched, covered with minute, imbricate, 2-lobed leaves, emitting rootlets beneath; sporocarps borne in pairs beneath the stem, of two kinds: smaller one ovoid or acorn-shaped, megasporangiate; larger one globose, with basal placentae, bearing many stalked microsporangia which contain masses (massulae) of microspores. About 5 species of wide distribution. Type species: A. filiculoides Lamarck.

One species in Oregon 1. A. filiculoides

1. Azolla filiculoides Lamarck. Duckweed-fern. Pl. 21, fig. 5 & 6.

A. filiculoides Lamarck, Encyc. 1:343. 1783.

A. magellanica Willd. Sp. Pl. 5th ed. 541. 1810.

A. squamosa Molina, Saggio Nat. Chile, 2d ed. 125. 1810.

? A. bonariensis Bertol. Misc. Bot. 21, in Rend. Sci. Bologna
1859-1860: 64. pl. 5, fig. 2a, 2b. 1860.

For a discussion of the nomenclature, see Svens on (41).

Plants rounded-deltoid to elongate, 1.0-2.5 cm long and broad; roots solitary, to 8 cm long, coiled at tip; branches mostly 2-pinnate, often separating and giving rise to new plants; leaves green or reddish, deeply 2-lobed (this character not readily distinguishable without a microscope), upper lobe rather thick papillate-hairy above, with a large cavity in the basal part, usually (if not always) containing filaments of the blue-green alga, Anabaena, as a symbiont; lower lobe larger, floating, one cell thick except in middle; sporocarps subglobose, formed from the ventral lobes of lowest leaves on the branches; megasporangia globose with raised, irregularly hexagonal markings; massulae bearing rigid, linear, non-septate flat processes with anchor-like tips (glochidia). Free-floating in sluggish water and still pools, where the plants may form rather large mats under some conditions or may remain small and separate. Washington to southern California and Arizona, Mexico southward, nearly throughout South America. Type locality: Straits of Magellan. Oregon: mostly west of Cascade Mts., in river valleys.

GLOSSARY

NOTE: In figure citations, the first number is the plate, the following letter is the figure group from the Picture Glossary, and the second number is the specific figure. In references to figures on plates other than 1 and 2, the citation is Pl. X, fig. x.

Acicular. Needle-shaped. fig. 2A65.

Acuminate. Said of an acute apex whose sides are somewhat concave and taper to a protracted point. fig. 2C78.

Acute. Sharp, ending in a point, the sides of the tapered apex essentially straight or slightly convex. fig. 2C77.

Alternate. Arrangement of leaves or other parts placed singly at different heights on the axis or stem. fig. 1E25.

Anastomosing. Uniting or fusing; reticulating. fig. 1H39.

Annulus. In some ferns, a vertical ring of thick-walled cells around the sporangium which shrinks at maturity and causes the sporangium to release its spores. fig. 1J49.

Apex (plural: apices). Point farthest from base of blade or attachment. (Shapes: fig. 2C.)

Apical. Pertaining to the apex.

Apiculate. Terminated by a short, sharp, flexible point. fig. 2C80.

Appressed. Closely or flatly pressed against.

Aquatic. Living in water or a very wet area.

Arctic-Alpine Zone. Area above timberline on high mountains.

Arcuate. Curved or bowed.

Areole. Open space formed by anastomosing veins. fig. 1H40.

Articulate. Jointed; provided with nodes or joints or places where separation naturally take place.

Ascending. Rising up; growing diagonally upward, usually at 45 degrees or more from the horizontal.

Attenuate. Showing a long, gradual taper. fig. 2C79.

Auricle. Ear-shaped part or appendage, as the projections at the base of some leaflets. fig. 2D79.

Austral Region. Composed of Transition, Upper and Lower Sonoran Zones.

Awn. Bristle-like part or appendage.

Axil. Point immediately above attachment of leaf or branch.

Axillary. In an axil.

Axis. Main or central line of development of any plant or organ; main stem. fig. 1A10, 1G30.

Basal. At or near the base.

Base. Point of attachment. (Shapes, fig. 2D.)

Biserrate. Teeth in pairs; a larger tooth itself toothed. fig. 2E101.

Blade. Expanded part of a leaf. fig. 1A2; sterile portion of leaf in

Ophioglossaceae. Pl. 3, 4, 5.

Boreal Region. Composed of Arctic (Arctic-Alpine), Hudsonian and Canadian Zones.

Bud. Growing point surrounded by rudiments of leaves.

Bulblet. Small bulb-like body or detachable bud, borne on fronds.

Bullate. Blistered or puckered.

Caducous. Falling off early or prematurely.

Canadian Zone. Lower portion of subalpine forests, below the Hudsonian Zone; also, the narrow coastal strip from Alaska to northern California dominated by Picea sitchensis.

Capillary. Hairlike; very slender.

Carinate. Keeled; provided with a projecting central longitudinal line or ridge on the dorsal or under surface.

Cartilaginous. Tough and hard but elastic.

Castaneous. Chestnut brown.

Cespitose (caespitose). Growing in tufts, little dense clumps; matted.

Chaffy. Having thin, dry scales; like a thin, dry scale.

Cilia. Long hairs on margins of leaves or parts. fig. 2H123.

Ciliate. Fringed with hairs; bearing hairs on the margins. fig 2H123.

Cinnamomeous. Cinnamon colored.

Circinate. Coiled from the apex downward, the apex nearest the center of the coil. fig. 1A6.

Coherent. Descriptive of two or more similar parts or organs of the same series touching one another more or less adhesively but not fused.

Compound leaf. Leaf of two or more leaflets; the leaf tissue divided to a midrib or rachis. fig. 2B69.

Confluent. Merging or blending together.

Contiguous. Touching without fusion; used irrespective of whether the parts are like or unlike.

Cordate. Heartshaped; with a sinus and rounded lobes at the base.

Coriaceous. Leathery in texture.

Cormose. Corm-like; with a solid bulblike subterranean stem or rhizome.

Creeping. Lying prostrate on the ground and taking root.

Crenate. Shallowly round-toothed or obtusely toothed; scalloped. fig. 2E95.

Crenulate. Diminutive of crenate; finely scalloped. fig. 2E96.

Crown. More or less modified stem base from which roots and aerial branches are produced; a rosette of erect leaves.

Cuneate. Wedge-shaped, gradually narrowed at base; triangular with narrow end at point of attachment. fig. 2E90.

Deciduous. Becoming detached after a definite period, usually soon after completion of normal functioning.

- Decomound. Two to several times compound, that is, with the leaf-axis or rachis repeatedly branched. fig. 1B 14 to 19.
- Decumbent. Base of stem resting on the ground for some distance, the rest turned upward.
- Decurrent. With blade of leaflet continued down the rachis as a flange or wing below the point of attachment. fig. 2D86.
- Deflexed. Turned backward, toward the base. fig. 1D24.
- Dehiscence. Process of opening the sporangium. fig. 1J52.
- Dehiscent. Opening normally for the discharge of spores.
- Deltoid. Triangular with the attachment at the middle of the base. fig. 2A66.
- Dentate. With sharp, spreading, rather coarse indentations or teeth that are perpendicular to the margin. fig. 2E97.
- Denticulate. Minutely or finely dentate. fig. 2E98.
- Dichotomous. Repeatedly forking into two equal branches; forked in one or more pairs. fig. 1F28.
- Dilatate. Broadened out. fig. 2D85.
- Dimorphic. With two forms; specifically, with fertile and sterile leaves which are of different structure.
- Distichous. Two-ranked, with leaves on opposite sides of an axis and in the same plane.
- Distinct. Completely separate.

Dorsal. Back; relating to the back or outer surface of a leaf or organ; the lower side of a leaf; away from the axis. fig. 1G33.

Elliptic. Oval in outline, being narrowed to the ends and widest at or about the middle. fig. 2A61.

Elongate. Lengthened, stretched out.

Entire. With a continuous margin, may or may not be hairy or ciliate; not in any way indented; whole. fig. 2E93.

Epiphyte. Plant growing upon another plant or on some material other than soil, as rocks or wood.

Erose. Said of a margin when appearing eroded or gnawed or of a jaggedness too small to be fringed or too irregular to be toothed. fig. 2E104.

Evanescent. Soon disappearing.

Evergreen. Remaining green in its dormant season; properly applied to plants and not to leaves, but due to persistence of leaves.

Excurent. Extending beyond the margin or tip, as a vein developing into a mucro or awn. fig. 1H38.

Falcate. Sickle-shaped. fig 2A54.

Fertile. Producing sporangia and spores.

Fibrillose. Splitting into fine fibers.

Filiform. Threadlike; long and very slender.

Foliaceous. Leaflike; composed of leaf tissue.

Foliolate. Pertaining to the number of leaflets, as "4-foliolate".

Free. Unattached to other parts or structures; or, in veins, not anastomosing or forming a network. fig. 1H41.

FronD. Leaf of a fern. fig. 1A1.

Fulvous. Yellowish brown.

Gametophyte. The generation which bears the sex organs; in ferns, the prothallus; it is haploid.

Glabrous. Not hairy.

Glandular. Having or bearing secretory organs or glands. fig 2H120.

Glaucous. Covered with a bloom, or whitish substance that can be rubbed off.

Globose. Spherical.

Habit. General aspect or appearance of the plant.

Habitat. Particular environment in which a plant grows.

Herb. Plant naturally dying to the ground, without persistent stem above ground.

Herbaceous. Not woody; also, of leaf texture, soft but fairly opaque, not fleshy or stiff.

Heterosporous. Producing two kinds of spores, megaspores and microspores, in its life cycle.

Homosporous. Producing only one kind of spore in its life cycle.

Hudsonian Zone. Uppermost timber zone extending from timberline to 2,000 or 3,000 ft. below it.

Imbricate. Overlapping, as shingles on a roof.

Incised. Cut; slashed irregularly, more or less deeply and sharply; an intermediate condition between toothed and lobed. fig. 2B71, 2E102.

Indusiform. Indusium-like in appearance or function.

Indusium. Epithelial outgrowth that, when present, covers the sporangia in a sorus. fig. 1I46, fig. 2I.

Inferior. Beneath, lower than, below some other organ; indusia, fig. 1Ic, 2I127, 2I128.

Inflexed. Turned in, toward the midrib or axis.

Inframarginal. Close to the margin. fig. 2G112.

Inframedial. Below the middle or the median line. fig. 2G110.

Internode. Part of stem axis between 2 nodes.

Juvenile. A young plant, recently started from a zygote (a "seedling"), as opposed to new growth from an older plant.

Lacerate. Irregularly cleft or cut; torn.

Laciniate. Slashed into narrow or pointed lobes.

Lamina (plural; laminae). The leaf tissue; the flat, expanded portion of the leaf. fig. 1H44.

Lanceolate. Lance-shaped; much longer than broad, widening above the base and tapering to the apex. fig. 2A62.

Lateral. On or at the side.

Lax. Loose, the opposite of congested.

Linear. Relatively long and narrow, the sides nearly parallel.

fig. 2A64.

Lobe. Prominence set off by a more or less deep indentation (fig. 2F);

a portion of a pinnatifid leaf, usually rounded, fig. 2B71, 2E103.

Lunate. Crescent-shaped. fig. 2A57.

Medial. Pertaining to the longitudinal axis or middle.

Median. The longitudinal middle.

Megasporangium. Sporangium containing only megaspores.

Megaspore. The larger of 2 kinds of spores produced by hetero-
sporous plants; on germination, it gives rise to the female gameto-
phyte.

Membranous. Of parchmentlike texture, translucent.

Microsporangium. Sporangium containing only microspores.

Microspore. The smaller of 2 kinds of spores produced by hetero-
sporous plants; on germination, it gives rise to the male gameto-
phyte.

Midrib. Main vein of a leaf or leaflike part, a continuation of the
petiole. fig. 1B43.

Midvein. Same as midrib, but used of smaller segments.

Monomorphic. In only one type or shape; leaves which are all similar
in shape whether they are fertile or sterile.

Mucro. A short, sharp, abrupt spur or spiny tip.

Mucronate. Terminated abruptly by a distinct and obvious mucro.

Naked. Without scales or hairs.

Node. Joint where leaf is borne or may be borne; point of attachment of leaves and branches.

Nodose. Having knotlike prominences; knobby, knotty, especially at the nodes, but usage not restricted to this region.

Oblique. Slanting (of the attachment of parts to an axis (fig. 1D22); sides unequal (of bases) fig. 2D91.

Oblong. Longer than broad, and with the sides nearly or quite parallel for most of their length. fig. 2A63.

Obovate. Terminal half broader than the basal; reverse of ovate. fig. 2A60.

Obtuse. Blunt, rounded. fig. 2C76.

Opposite. Two parts attached on opposing sides of an axis. fig. 1E27.

Oval. Rounded, but longer than broad, widest in the middle. fig. 2A58.

Ovate. Outline egg-shaped; broader below the middle. fig. 2A59.

Palea. A thin scale. fig. 2H117, 2H118.

Paleaceous. Covered with thin scales.

Palmately compound. All leaflets arising at tip of petiole. fig. 2B74.

Panicle. A fruiting (sporulating) structure in which the branches of the primary axis are elongated, simple, and with pedicelled sporangia; used of the sporophylls of Botrichium. (Borrowed from

- inflorescence terminology of the flowering plants).
- Pappilate. Bearing minute, pimplelike protuberances.
- Peduncle. Stalk of the sporocarp in Marsileaceae.
- Peltate. Attached to its stalk inside the margin. fig. 2A53.
- Persistent. Remaining attached; not falling off.
- Petiole. Leaf stalk; called a stipe in ferns; fig. 1A3.
- Petiolule. The stalks of the secondary or tertiary segments of the compound frond. fig. 1H35.
- Pinna. A primary division of a leaflet or pinnate leaf. fig. 1A7.
- Pinnate. Feather-formed; with the leaflets of a compound leaf placed on either side of the rachis; divided pinnately. fig. 1F29.
- Pinnatifid. Cleft or parted in a pinnate way, but not divided to the rachis or midrib. fig. 2B70.
- Pinnule. A secondary pinna or leaflet on a pinnately decompound leaf. fig. 1A8.
- Placenta. A part in the sporocarp where the sporangia are attached in Azolla.
- Prothallus. The gametophyte plant in ferns and other pteridophytes; a simple, usually flattened structure bearing sexual organs.
- Puberulent. Minutely pubescent; the hairs soft, straight, erect, scarcely visible to the unaided eye.
- Pubescent. Covered with short, soft hairs; downy.

Pungent. Ending in a stiff, short point or tip.

Rachilla. Diminutive of rachis; secondary or tertiary (etc.) axis or rachis. fig. 1A11, 1A12.

Rachis (plural:rachises). Axis bearing leaflets; an extension of the stipe of a fern frond. fig. 1AB.

Ranks. Vertical rows; leaves that are 2-ranked are in 2 vertical rows and may be opposite or distichous.

Receptacle. An expanded portion of the stem or leaf tissue or veinlet, bearing sporangia.

Reflexed. Abruptly recurved; bent downward or backward. fig. 1D24.

Remote. Distant from each other.

Reniform. Kidney-shaped. fig. 2A56.

Reticulate. Netted; anastomosing. fig. 1H39.

Revolute. Rolled backwards; with the margin rolled toward the lower (dorsal) side.

Rhizome. Underground stem; rootstalk; distinguished from roots by presence of nodes, buds, or scalelike leaves. All Oregon ferns have this type of stem. fig. 1A4.

Rhombic. Diamond-shaped. fig. 2A68.

Rosulate. In rosettes, an arrangement of leaves radiating from a crown or center and usually at or close to the earth.

Scale. Name given to small, mostly dry, flat epidermal outgrowths. fig. 2H117, 2H118.

- Segment. One of the parts of a leaf, pinna, or pinnule; general term for a division of the leaf of whatever order.
- Septate. Partitioned; divided by partitions (as septate hairs). fig. 2H119.
- Serrate. Said of a margin when saw-toothed with teeth pointing forward. fig. 2E99.
- Serrulate. Minutely serrate. fig. 2E100.
- Sessile. Not stalked; sitting. fig. 2D83.
- Simple. Said of a leaf or leaflet when not compound, but may be entire or lobed.
- Sinus. Space or recess between 2 lobes or divisions of a leaf or other expanded organ. fig. 2F105.
- Solitary. Borne singly or alone.
- Sorus (plural:sori). The so-called "fruit-dots", clusters of sporangia, of ferns, on the dorsal (under-) surface. fig. 2G.
- Spatulate. Spoon-shaped.
- Spike. Unbranched, elongated, simple "fruiting" (sporulating) structure with sessile sporangia; used for the sporophyll of Ophioglossum.
- Spine. Strong and sharp-pointed, woody appendage.
- Spinulose. With small spines or spinelike protuberances.

Sporangium (plural:sporangia). A spore case; a sac or body bearing spores; in most ferns it is composed of a stalk (sporangiphore), annulus, and capsule. fig. 1J.

Spore. A simple, haploid reproductive body, usually composed of a single detached cell containing a nucleated mass of protoplasm but no embryo, and capable of developing directly into a gametophyte plant.

Sporocarp. A receptacle containing sporangia in Marsiliaceae (Pl. 21, fig. 3, 4a) and Salviniaceae.

Sporophyll. A sporangium-bearing leaf or major leaf segment (as in Ophioglossaceae).

Sporophyte. The diploid, usually structurally complex, dominant phase in the life cycle of vascular plants; it produces spores.

Spreading. Standing outward horizontally. fig. 1D23.

Stellate. Starlike; stellate hairs have radiating branches: hairs, fig. 2H122; indusia, fig. 2I128.

Sterile. Lacking functional reproductive organs.

Stipe. Stalk or petiole of a fern leaf. fig. 1A3.

Stramineous. Straw-colored.

Sub-. As a prefix, usually signifying somewhat, slightly, or rather.

Subtending. Standing below or close to.

Subterranean. Underground.

Succulent. Juicy; fleshy; soft and thickened in texture.

Supra-. Above.

Terete. Circular in transverse section; may refer to section of either a cylindrical or conical object.

Terminal. At the tip, apex or distal end. fig. 1A13.

Terminal segment. The segment at the apical end of a decomposed blade, pinna, pinnule, etc. fig. 1A13.

Ternate. Divided into three primary segments of nearly equal size. fig. 1C.

Terrestrial. Growing in soil on the ground; a land plant as opposed to an aquatic or epiphytic one.

Tertiary segment. A division of a pinnule. fig. 1A9.

Tomentose. With tomentum; densely woolly or pubescent; with matted, soft, wool-like hairiness. fig. 2H114.

Tomentum. Soft, woolly hairs.

Transition Zone, Arid. Drier coniferous forests (yellow pine) and bunch-grass plains of eastern Oregon.

Transition Zone, Humid. Moist coniferous forests of the lower altitudes, dominated by redwoods in the south and douglas fir farther north; the western portion of Oregon.

Transverse. Extending at right angles to the long axis.

Truncate. Appearing as if cut off at the end; base or apex nearly or quite straight across. fig. 2D89.

Ultimate segment. That portion of the leaf which is not again divided, though it may be entire or somewhat lobed or toothed; may be either terminal or lateral. fig. 1A9.

Undulate. Wavy (up and down, not in and out), as in some leaf margins. fig. 2E94.

Upper Sonoran Zone. Dry, semidesert area dominated by sagebrush or chapparral and oak; the "cool-desert".

Valve. A separable part of a sporocarp; the units or pieces into which a sporocarp splits or divides on dehiscing.

Vein. Strand of supporting and conducting tissue in a leaf.

Veinlet. The ultimate vein branches in the ultimate segments of leaf tissue. fig. 1H42.

Venation. Arrangement or disposition of veins or veinlets. fig 1H39 to 41.

Ventral. Front; relating to the inner face of part of an organ nearest the axis, usually the upper side of a fern leaf. fig. 1G32.

Vernation. The manner of folding of leaves in the bud.

Vesture. Anything on or arising from the surface causing it to be other than glabrous; scales or hairs. fig. 2H.

Villous. Provided with long, soft, unmatted hairs; shaggy. fig. 2H115.

Xerophilous. "Dryness-loving"; plants living in a dry, arid environment; xerophytic.

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