THE FERNS OF NOVA SCOTIA

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Abstract

This paper summarizes our knowledge of the ferns of Nova Scotia. The work of previous botanists in the area is mentioned; and the general distribution of the ferns is discussed. A total of 43 species, 7 additional varieties and 12 forms are mentioned as occuring in the province. Keys are given for the various groups; and each species, variety or form is briefly described and its habitat, range and abundance noted.

Introduction

The ferns, because of their beauty and limited number, invariably first attract the attention of the botanist, and probably no other group of vascular plants in our flora is quite so well known. Nevertheless they still present many difficulties to the student in respect to their distribution, variability and taxonomy; and the published records relating to the ferns of this province are scattered through many publications and botanical journals. It is the aim of this article to present in brief form our knowledge of these plants.

One of the first amateurs who studied the ferns was the Rev. E. H. Ball, who records most of the common forms from Guysborough, Rawdon, and Mahone Bay. His records, (Ball 1876) together with those of Prof. How of King's College, Windsor, Principal A. H. MacKay of Pictou Academy, and Dr. Lawson and Dr. Lindsay of Halifax, form the basis for the ferns in A. W. H. Lindsay's "Catalogue of the Flora of Nova Scotia" published in the "Proceedings" of this Institute in 1876.

Dr. George Lawson extended his studies to cover the ferns of Canada, and his "Fern Flora of Canada" was long used in the schools as an appendix to the botany book. His variety *Mackayii* of the common Fragile Fern was first published in this work, and several other common varieties bear his name.

Other collectors who were active around 1900 were the Dominion Botanist, J. Macoun, who made numerous trips to the province, and C. B. Robinson of Pictou.

During the last thirty years the local botanists have been almost entirely inactive. Fortunately, however, our knowledge of the flora of the extreme northern and southern parts of the province has been enriched by two detailed studies by outside specialists. The vegetation of Northern Cape Breton was studied in detail by Dr. G. E. Nichols of Yale University, who spent four summers in this district. During the summers of 1920 and 1921 an expedition from Gray Herbarium of Harvard University, headed by Prof. M. L. Fernald, worked in the southwestern part of the province from Digby around to Queens County. Both of these parties published numerous observations on the ferns, which have been of great value in making up the habitat and proper distribution of the various forms.

Nova Scotia is not rich in ferns; a total of 43 species, 7 additional varieties, and 12 forms are listed in this paper. Several species, mentioned below, may be expected yet in the province, and minor forms or varieties are doubtless present.

Geologically and climatically the province consists of two main divisions. The south and southwestern part of the province, comprising roughly a region south of a line from Digby to Musquodoboit Harbour with much of Richmond and Cape Breton Counties, has a higher precipitation, and the land is relatively low and flat and heavily glaciated. Consequently the soil is thin, acid, and poorly-drained; innumerable lakes, bogs and streams occur, and the forest is mainly coniferous. The northern part of the province from Annapolis to Cumberland and northern Cape Breton has much more diverse topography and better soils, and originally was covered with a hardwood forest. Here occur limestone and gypsum outcrops, rich intervales and deep rocky ravines.

The ferns may be divided, roughly, into four groups according to their distribution. The southern half of the province contains mainly the ferns of barrens, swamps or of

mixed woods that grow anywhere in poor soil throughout the whole province, such as *Athyrium angustum, Dryopteris cristata, Pteridium, Dryopteris spinulosa* var. *intermedia, Polypodium* and *Polystichum acrostichoides.* An occasional one such as *Dryopteris Bootii,* and *Botrychium dissectum* and its forma *obliquum* become gradually rarer eastward.

The northern part of the province, however, with its richer soils and woodlands possesses numerous ferns that are extremely rare or entirely absent in the southern region. *Botrychium virginianum* and *Pteretis nodulosa* are found in rich intervales or woods throughout the region. *Crytopteris bulbifera* and *Adiantum pedatum* are found about the occasional outcrops of gypsum and limestone in woods and ravines. Along the Bay of Fundy, in the Cobequids, and in the hardwood areas of Inverness and Victoria Counties the richer woodlands are characterized by *Polystichum Braunii* and *Dryopteris spinulosa* var. *americana.* The ravines, cliffs, and talus slopes may possess *Woodsia ilvensis, Cystopteris fragilis, Asplenium Trichomanes,* and in the more northern part, *Dryopteris fragrans* var. *remotiuscula.*

In addition to these plants with a general distribution depending mainly on soil and climate, two other groups of ferns occur whose distribution seems to depend somewhat on geographical history.

In southwestern Nova Scotia three ferns occur which seem related to the Coastal Plain element of our flora. *Woodwardia areolata* is restricted to the river-systems of the Tusket, Clyde and Roseway Rivers, and is not found elsewhere east of Massachusetts. *Woodwardia virginica* is common in the southwestern counties, scattered eastward to Halifax, with an extension northward to the ponds around the Minas Basin. *Schizaea pusilla* in the bogs and sphagnous hollows forms a connecting link between the pine barrens of New Jersey and the unglaciated tablelands of Cape Breton and Newfoundland.

At the opposite end of the province are found a number of plants which are distributed around the Gulf of St. Lawrence, and elsewhere only in limestone regions about the Great Lakes, or common westward in the Rocky Mountains. The three

ferns best characterizing this group have not been found on the mainland and are: *Dryopteris filix-mas*, a fern also common in eastern Europe; *Polystichum lonchitis*, whose distribution is contrasted with that of *Woodwardia areolata* in Map 2; and *Cystopteris fragilis* var. *laurentiana*.

The keys to the genera and species are all dichotomous so that two choices are always present. Each of the pair of statements, which may be widely separated, are indicated by the same letter; and another letter at the end of the statement indicates to what pair next to proceed.

The scientific names used are in agreement with the latest International Rules of Botanical Nomenclature. No attempt has been made to give all the synonyms, but a short history of the name is usually given so that its relation to other names may be seen. A conservative attitude has been adopted towards the splitting of the genera and the creation of new species. In many cases, where the fern is frequently found under a different category, the alternate name is given. Names of the authorities are abbreviated as in Broun, *Index to North American Ferns* (1938), and all references to the synonymy and the history of the naming of each fern up to the year 1938 can be found in this index.

Of the ferns and fern allies which belong to the group known as the *Pteridophytes*, only the true ferns have been considered. The following synopsis gives the four families which are found in the province.

FAMILIES OF FERNS

Polypodiaceae—

Large herbaceous plants with the fronds coiled in the bud; sporangia borne on the back of slightly modified vegetative fronds, or on the inside of tube or berry-like structures formed by the inrolled or coiled parts of the frond, long-stalked, with a ring of thickened cells, the annulus, arching over the top and tearing it open transversely at maturity, usually covered by an indusium.

Schizaeaceae—

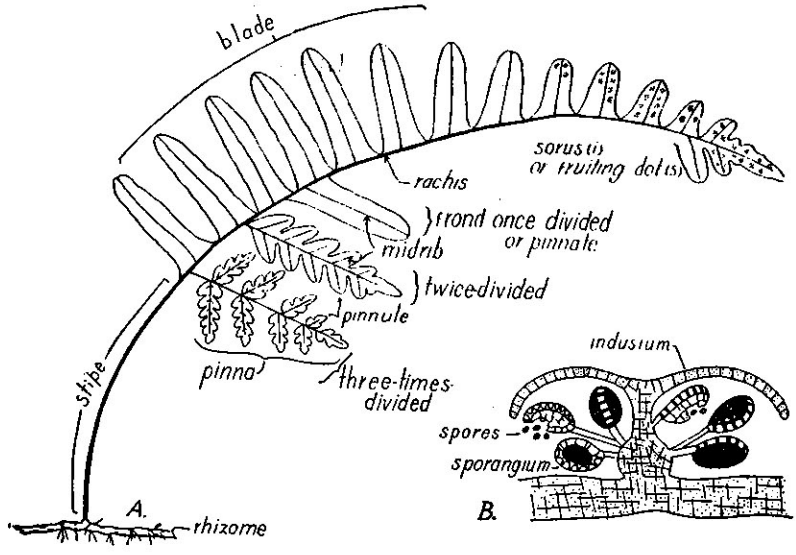
Small twining or tufted plants, our representative 3-7 cm. high; sporangia borne in double rows along the pinnae, with a transverse ring at the apex, and opening vertically by a longitudinal slit.

Osmundaceae—

Large plants with stout creeping rootstocks; sporangia borne on completely fertile fronds or parts of the frond, short-stalked, without an indusium, and without an annulus or only a trace of one, opening by a longitudinal slit.

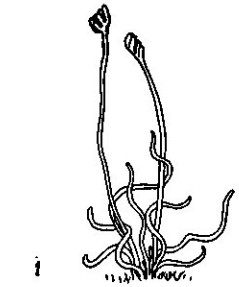
Ophioglossaceae—

Rather fleshy plants with fleshy roots; leaves folded in the bud; sporangia borne on a specialized branch arising from the base of the sterile blade, without an indusium or annulus, and sessile or nearly so.



A. Diagram to show the different parts of a fern, and the types of pinnae found in different plants; B. a section down through a single sorus (*Dryopteris* or *Polystichum*), much enlarged.

KEY TO THE COMMON FERNS AND FERN GENERA OF NOVA SCOTIA



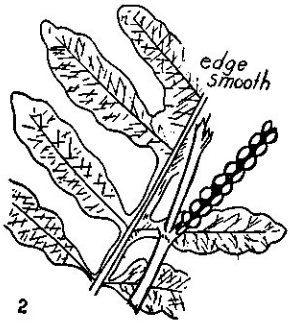
a. Plants with the sporangia on fronds or pinnae that are very different from the sterile green ones, b.

b. Modified fruiting pinnae and sterile pinnae only on separate fronds, c.

c. Sterile fronds simple or once-divided only, d.

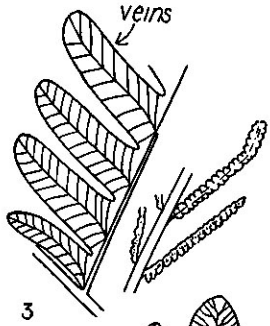
d. Sterile fronds thread-like; fertile fronds one-sided, 4-7 cm. high; rare.

Schizaea (p. 107)



d. Sterile fronds 3-6 dm. high, not divided to the midrib, and with a smooth margin; fertile fronds with sporangia enclosed in bead-like rolled pinnae.

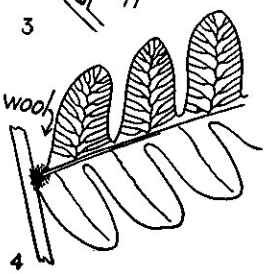
Onoclea (p. 99)



c. Sterile fronds twice-divided, 3-9 dm. high; growing in large clumps, e.

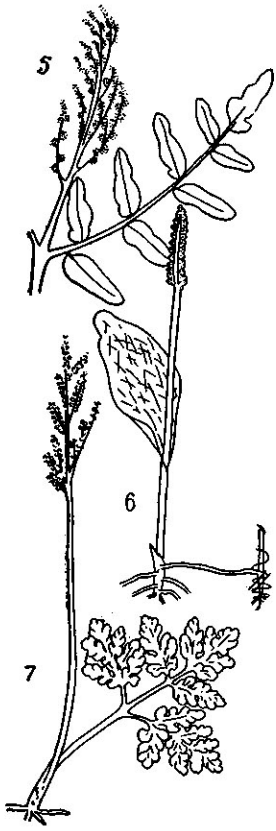
e. Sterile fronds with veins of pinnules not forked; fertile fronds plume-like, with the sporangia in long rolled pinnae.

Pteretis (p. 100)



e. Sterile fronds with veins of the pinnules forked; each pinna with a tuft of rusty wool at its base; woolly-brown fertile fronds appearing in early summer and soon disappearing.

Osmunda cinnamomea (p. 110)



b. Modified fruiting pinnae occurring on the same frond as the sterile pinnae, f.

f. Fronds 5-15 dm. high, in large clumps from stout woody rhizomes, g.

g. Fruiting pinnae only in the middle of the frond; pinnules as in O. cinnamomea but without the wool at the base.

Osmunda Claytoniana (p. 111)

g. Fruiting pinnae at the top of the frond; pinnules large and separated at the base.

Osmunda regalis (p. 108)

f. Fronds rarely over 5 dm. high, usually growing singly from soft, delicate rhizomes, h.

h. Sterile portion ovate with a smooth margin and netted veins; fertile part a simple spike, arising from the base of the blade.

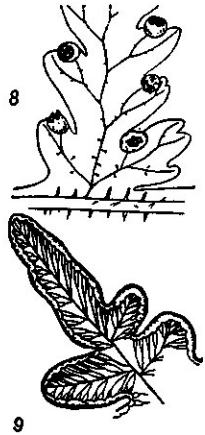
Ophioglossum (p. 111)

h. Sterile portion more or less divided, often 3-parted, with forking veins; fertile part paniculate, often almost separate from the leafy part.

Botrychium (p. 112)

a. Plants with the sporangia on the underside of slightly or not at all modified divisions of the frond, i.

i. Sporangia protected by an indusium consisting of, or associated with the inrolled margin of the frond. (This is obscure in the case of the next) j.



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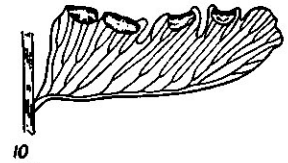
j. Frond soft-hairy; indusium cup-like and very small, attached beneath the sporangia; very common.

Dennstaedtia (p. 83)

j. Frond smooth; fruiting sori covered by the inrolled margin, k.

k. Frond large, with 3 main divisions; sporangia in a continuous line. Our common bracken.

Pteridium (p. 74)



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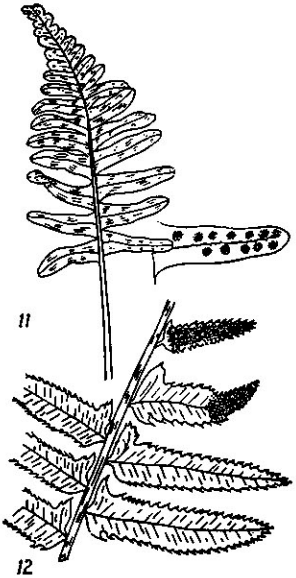
k. Frond repeatedly forking; each separate group of sporangia protected by an inturned lobe of the margin.

Adiantum (p. 75)



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i. Sporangia not protected by an indusium; or else covered by one which is not associated with the edge of the frond, l.

l. Fruiting dots or sori rounded, m.

m. Fronds once-divided only; evergreen, n.

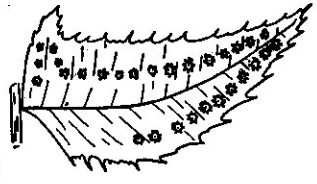
n. Edge of the pinnae not toothed.

Polypodium (p. 74)

n. Edge of the pinnae toothed, o.

o. Fruiting pinnae smaller than the sterile ones; sori very crowded.

Polystichum acrostichoides (p. 84)



13

o. Fruiting pinnae not smaller than the sterile ones; sori separated.

Polystichum Lonchitis (p. 86)

m. Frond twice or more divided, p.

p. Sori not protected by an indusium; ripe forms may be mistakenly placed here but the following two are quite distinct, q.

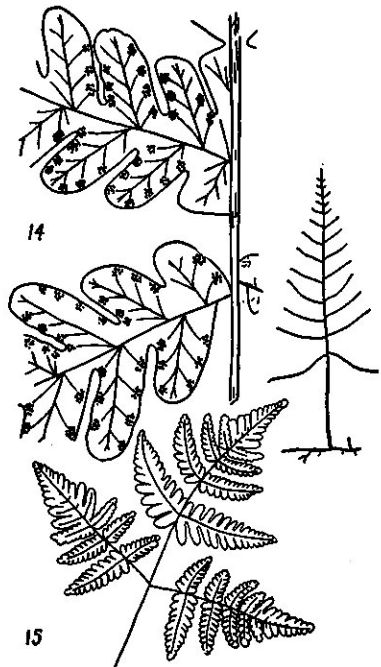
q. Frond hairy, thin; pinnae joined by a wing along the rachis; the lower two being reflexed.

Dryopteris Phegopteris (p. 91)

q. Frond smooth, divided into three nearly equal divisions.

Dryopteris disjuncta (p. 91)

p. Sori protected by an indusium, r.



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15

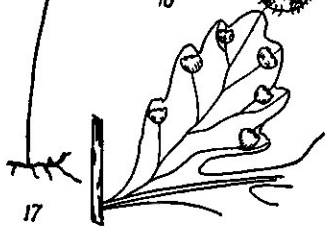
r. Fronds small, 5-15 cm. long, covered with rusty chaff; stipe jointed near the base; indusium attached beneath the sorus and evanescent.

16

Woodsia ilvensis (p. 104)

r. Fronds not as above, s.

s. Frond very thin and delicate; indusium attached at the base and delicate; damp woods and moist cliffs only.



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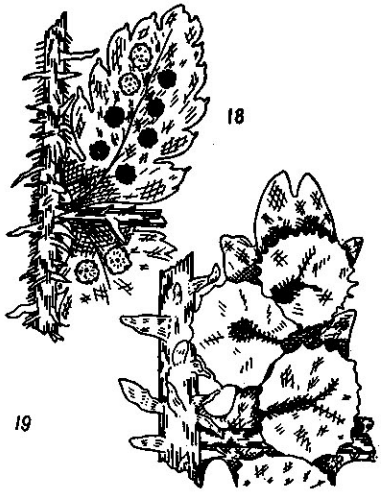
Cystopteris (p. 101)



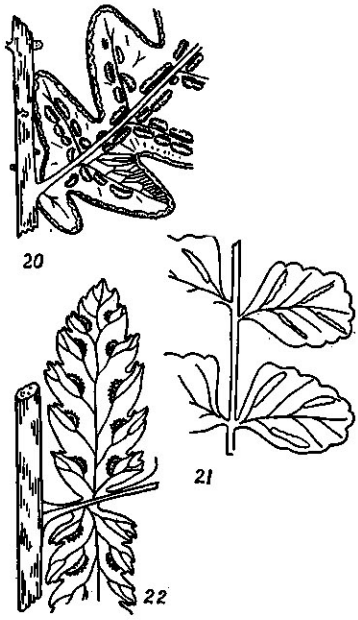
s. Fronds larger and coarser; indusium round, attached at the centre or at a notch, t.

t. Indusium attached at the centre; frond thick and chaffy; rich woods, Blomidon northward.

Polystichum Braunii (p. 85)

t. Indusium attached at the notch, round or kidney shaped; fronds various.

Dryopteris (p. 86)



l. Fruiting dots and indusia oblong or linear, u.

u. Sori and indusia parallel to the rachis and mid-rib of the pinnae.

Woodwardia (p. 76)

u. Sori and indusia not parallel to the rachis and mid-rib of the pinnae, v.

v. Fronds 5-15 cm. long, once - divided, with rounded pinnae; cliffs, rare.

Asplenium (p. 79)

v. Fronds 30 - 100 cm. long, twice - divided; common.

Athyrium (p. 80)

POLYPODIACEAE Fern Family

POLYPODIUM (Tourn.) L.

Rootstocks covered with brownish scales, creeping, with the stipes jointed plainly to it; fronds deeply lobed only; sori round, arranged on the back of the lobes, without an indusium.

Rock Polypody

P. virginianum L. Fig. 11.

Linnaeus recognized an European *Polypodium vulgare* and an American *P. virginianum.* The American plant was long known under the European name but the distinctness of the two plants is now coming to be accepted. The differences were treated in detail by Fernald. Fernald, M. L. *Polypodium virginianum* and *P. vulgare.* Rhodora. 24:125-142. 1922.

Frond 1-3 dm. long; blade about as long as the stipe, 3-5 cm. wide, and tapering to the tip, deeply divided with the lobes very shallowly toothed; veins forking with the ends projecting on the upper surface and clearly visible.

The Polypody is one of our most common and best known ferns. It is recognized by its thick dark-evergreen fronds with the smooth-edged undivided pinnae. It is common throughout the province on damp rocky cliffs, boulders, wooded banks and ledges, occasionally growing directly on the soil but preferring a rocky substratum with leaf mold shallowly over it.

Newfoundland to Alberta south to Georgia and Arkansas.

PTERIDIUM Scop.

Rootstock extensively creeping and branched; fronds ovate, or in our east-American form large and three-parted with the three divisions much divided; sporangia continuous around the edge of the divisions, protected by the inrolled margin and a delicate, inner inconspicuous indusium.

Bracken

P. aquilinum (L.) Kuhn var. *latiusculum* (Desv.) Underw. Fig. 9.

The European plant was named *Pteris aquilina* by Linnaeus. Because it has a delicate inner indusium, and differs in the complicated structure of the stipe and the presence of hairs instead of scales on the rootstock, it was separated off as *Pteridium* by Kuhn and the American variety was later named var. *latiusculum*. [*P. latiusculum* (Desv.) Hieron]. Tryon, R. M., Jr., Revision of the Genus *Pteridium*. Rhodora. 43: 1-31, 37-67. 1941.

Frond 3-15 dm. long; blade 2-8 dm. long, broadly triangular, and usually three times divided; pinnules deeply lobed with oblong rounded divisions.

The large nearly horizontal, triangular fronds of the Bracken and its wide distribution make it one of the best known ferns in the world. It is common throughout the province in pastures, barrens, waste land and burnt-over areas; and, since it spreads rapidly by its long root-stocks, colonies can often be seen invading pastures or along the edge of deserted fields. Found on rather light soil, and often associated with wire birch and sweet fern.

Scattered plants are often found in which the blade is ovate instead of ternate, the segments of the frond are minutely hairy around the margin and more densely so beneath the margin and mid-rib, and the sterile indusium is ciliate. This form is intermediate between var. *latiusculum* and var. *pubescens* and has not yet been satisfactorily interpreted. Tryon states that "There is considerable evidence that they are merely the results of adverse growing conditions such as burning, pasturing, and extremes of exposure and soil sterility".

Newfoundland to Alberta south to Georgia and Arkansas.

ADIANTUM (Tourn.)L.

Rootstock wiry, much branched and creeping; sporangia borne on the under side of the upper lobes of the pinnules;

inturned lobes papery and reflexed to form a protective indusium over the sori.

Maidenhair Fern

A. pedatum L. Fig. 10.

Named by Linnaeus on material sent to him from Canada and Virginia.

Frond 2-6 dm. high; stipe smooth and shining, purplish-brown; blade horizontal, 2-4 dm. wide, with the rachis several times forking and the lower branches recurved, round or semi-circular in outline; pinnules oblong to fan-shaped, short stalked, smooth on the lower margin, and cleft along the upper edge with the recurved fertile lobes.

The Maidenhair Fern although seldom found, is one of the best known ferns of the province. It is exceedingly rare, and is found only in very rich woods or about gypsum or limestone areas. I have seen collections from Yarmouth Co.; Canaan, Kings Co.; Clarksville and Scotch Village in Hants Co.; and East Mountain in Colchester Co. It was early reported from Newport and Upper Musquodoboit, and Professor Harlow of the Agricultural College, Truro, tells me that he has seen it near a limestone quarry in northern Cape Breton.

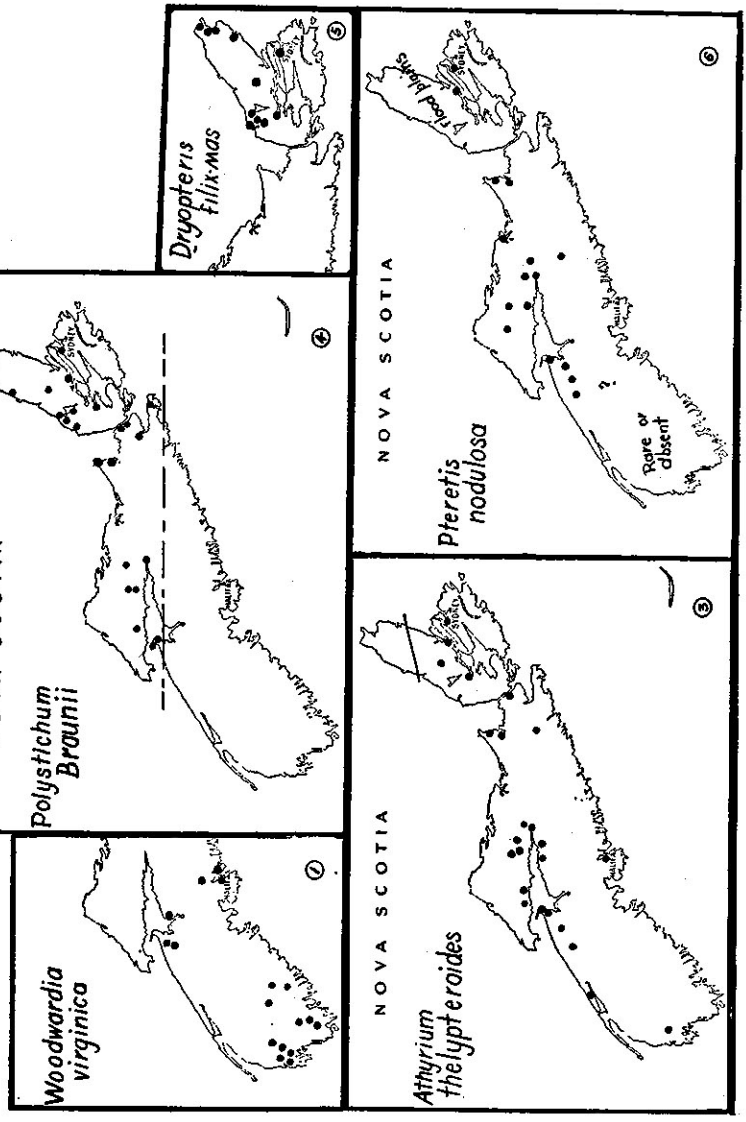
Nova Scotia to Minnesota south to Georgia, Louisiana and Oklahoma; eastern Asia.

WOODWARDIA J. Sm.

Rootstock stout and widely creeping; fronds all alike, or with the fertile much narrowed; sori oblong to linear, borne on the back and parallel to the midrib of the pinnae or of the pinnules. Plants of wet habitats or swamps.

The following two species are here placed in the genus *Woodwardia*. Owing to slight differences, however, they are often separated and each placed in a genus of its own.

a. Frond twice-pinnate, both the fertile and the sterile one alike. (See Fig. 20) 1. *W. virginica*


Woodwardia virginica
NOVA SCOTIA
Polystichum Braunii
Dryopteris filix-mas
Athyrium thelypteroides
Pteretis nodulosa
Rare or absent

a. Frond pinnate only, with the fertile frond much narrowed and more erect. 2. *W. areolata*

Chain Fern

1. *W. virginica* (L.) J. Sm. Fig. 20 Map 1.

This fern was named *Blechnum virginicum* by Linnaeus in 1771 and J. E. Smith placed it in the genus *Woodwardia* in 1793. Presl founded the new genus *Anchistea* for it in 1851 and if the plant is considered sufficiently distinct the name is consequently *Anchistea virginica* (L.) Presl.

Fronds 6-10 dm. high, 15-20 cm. wide; stipe 2-4 dm. long, smooth and black at the base; blade twice-pinnate with the pinnules smooth-edged, and the veins forming a single row of areoles near their base; sori oblong, arranged in rows on either side of the mid-rib of the pinnules near the apex of the frond.

The Chain Fern is very distinctive when fruiting, and it may be easily distinguished from the *Osmundas* and *Pteretis* in the sterile state by the anastomosing veins. It is characteristic of swampy woods, boggy shores, swamps, and cobbly lake-shores in Yarmouth, Shelburne and Queens Counties. From there it is scattered eastward to Halifax and up to Kings County. It is reported from P. E. I. but the northeastern limits of its range in N. S. seem to be at the Northwest Arm and Waverley in Halifax County, and at Cheverie, Lily Lake in Centreville, and the ice-pond at Kentville around the Minas Basin. It is common at the side of the paved road along the first muddy pond on the Bedford-Waverley Road.

A coastal plain plant ranging from Florida to Texas, northward to Long Island and Nova Scotia and rarer inland to Ontario and Michigan.

Dwarf Chain Fern

2. *Woodwardia areolata* (L.) Moore. Map 2.

Linnaeus named this fern *Acrostichum areolatum* with specimens from Maryland and Virginia and Moore placed it in the genus *Woodwardia* in 1857. Presl founded the genus

Lorinseria at the same time that he separated the preceeding and this plant is frequently called *Lorinseria areolata* (L.) Presl.

Rootstock slender and creeping; sterile fronds spreading, 3-6 dm. long, 10-15 cm. wide; stipe about as long as the blade; blade deeply lobed with the lobes acutely tipped, and their margin very finely serrate, and with the veins freely anastomosing; fertile frond erect and surpassing the sterile, with the lobes but 3-5 mm. wide and with a double row of indusia on the lower side.

The Dwarf Chain-fern may be confused with the Sensitive Fern, but it is easily distinguished by the finely-toothed margin of the sterile blades and by the very different fertile fronds.

It is found only in Yarmouth and Shelburne Counties, where it is rather local. It is especially well-developed along the upper limits of the Clyde and Roseway river systems where it is found in swamps, wet woods, and the margins of bogs.

Florida to Texas and northward along the coast to Massachusetts and Nova Scotia, rare inland to Missouri and Michigan.

ASPLENIUM L.

Our native species are small ferns, with the blade once-divided, with rounded pinnae; sori linear and straight, with the indusium attached along one edge.

Key to Species

a. Rachis shining-purplish; fronds wiry and stiffer.

1. *A. Trichomanes*

a. Rachis greenish; fronds thinner, more delicate.

2. *A. viride*

Maidenhair Spleenwort

1. *A. Trichomanes* L. Fig. 21.

Named by Linnaeus from European material and the wide-spread American plant shows no essential differences.

Frond 8-20 cm. long, 0.6-1 cm. wide; stipe short, both it and the rachis dark shining-purplish; blade once-divided; pinnae orbicular, mostly opposite, and shallowly toothed, each with 2-8 linear sori on the lower side.

A pretty and very distinctive fern. Rare; found on damp shaded cliffs near running water. Specimens are present from Melanson, Kings Co.; Moose River, Cumberland Co.; and Hartley's Waterfall on the Strait of Canso. It was earlier reported from the Look-Off, Kings Co., near Halifax, Canso and Gold River (near Chester). Common, Big Intervale, C.B.

Nova Scotia to Alaska south to Georgia and Arizona; Europe and Asia.

Green Spleenwort

2. *A. viride* Huds.

Named by Hudson in 1762. The European and American plant are the same.

Fertile and sterile fronds alike, growing in tufts, 8-12 cm. long, 1-2 cm. wide; stipe brownish at the base, to green above; rachis green; blade linear-lanceolate and once divided; pinnae ovate, mostly opposite and toothed.

The Green Spleenwort and the Maidenhair Spleenwort are much alike, although the former is a more delicate fern with thinner fronds. They both grow in similar locations on damp cliffs and both are among the rarer ferns of the province. MacKay (1906) states that this fern was collected at the falls, Moose River, Cumberland County about 1890; and at River Deny's Cave, Cape Breton, by Robinson in 1902. I have not seen specimens from these locations, but Mr. Weatherby tells me that there is a good specimen in the Gray Herbarium collected by Macoun at Big Intervale, Cape Breton, July 22, 1898.

Newfoundland and Nova Scotia west to Wisconsin and northwestward to Alaska.

ATHYRIUM Roth

Rootstocks short and stout; fronds large and twice-divided, with forked veins; sori linear-oblong, often curved,

borne along a small vein at an angle to the main vein of the pinnule; indusium attached along one side.

Key to Species and Forms

a. Sori and indusia straight and silvery when immature; pinnules rounded at the tip or with rounded blunt teeth, b.

b. Pinnules with straight sides and rounded tip; margin undulate or but slightly toothed.

1. *A. thelypteroides*

b. Pinnules with curved sides and slightly pointed tips; margin more coarsely toothed.

2. *A. thelypteroides* forma *acrostichoides*

a. Sori and indusia often curved and not silvery; pinnules pointed at the tip with irregular sharp teeth, c.

c. Fronds of two kinds, the fertile thicker, more leathery in texture; sori at maturity running together and covering the lower surface of the fronds, d.

d. Longest pinnae of the fertile frond 5-12 cm. long; pinnules 4-12 mm. long, with the sori mostly straight; pinnules of the sterile frond oblong and rounded, and but slightly toothed or lobed.

3. *A. angustum*

d. Longest pinnae of the fertile frond 1-2 dm. long; pinnules 12-15 mm. long, with the sori often horse-shoe shaped; pinnules of the sterile frond oblong-lanceolate, somewhat pointed, and strongly toothed or lobed.

4. *A. angustum* var. *elatius*

c. Fronds all alike, the fertile ones almost membranaceous; sori separate at maturity; pinnules as in Fig. 22

5. *A. angustum* var. *rubellum*

Silvery Spleenwort

1. *A. thelypteroides* (Michx.) Desv. Map 3.

First named *Asplenium acrostichoides* by Schwartz in 1801 and two years later *Asplenium thelypteroides* by Michaux The present combination was made by Desvaux in 1827. The name *Athyrium acrostichoides*, which was first given it in 1899, is not legitimate because another plant had been given this name long before. Some botanists consider this fern more

closely related to the tropical genus *Diplazium* than to *Athyrium*; the name is then *D. thelypteroides* (Michx.) Presl.

Frond 4-7 dm. long; 12-20 cm. wide; stipe and rachis smooth to finely chaffy; blade lanceolate, twice-divided, broadest near the base and tapering to a long tip, usually minutely chaffy on both sides.

The Silvery Spleenwort is best recognized by the silvery sheen of the straight indusia and the sterile fronds have characteristic long tapering pinnae and oblong blunt pinnules. It is common in rich woods, very rare in the southwestern counties, scattered through the Annapolis Valley, common in Colchester and Cumberland Counties, and in rich or calcareous woods from there to northern Cape Breton.

Nova Scotia to Minnesota south to Missouri and Georgia.

2. Forma *acrostichoides* (Sw.) Gilbert is a luxuriant form characteristic of richer locations. Characteristic specimens were collected from a rich run on the side of Cape Blomidon and some of the plants from the Cobequids are more luxuriant and toothed than usual.

Lady Fern

3. *A. angustum* (Willd.) Presl.

Linnaeus named the Lady Fern of Europe *Polypodium Filix-femina*. Material from Canada was named *Aspidium angustum* by Willdenow in 1810 and his species was transferred to *Athyrium* by Presl in 1825. Until recently our plant was referred to the European name but it is now considered distinct. The varieties were revised by Butters in 1917. Butters, F. K., The Genus *Athyrium* and the North American Ferns allied to *A. Filix-femina*, Rhodora. 19:170-207. 1917.

The typical form of the species has fronds 3-8 dm. long and 8-20 cm. wide, with the fertile fronds more contracted and leathery in texture than the sterile; stipe smooth or almost so; blade lanceolate, widest above the base; pinnae widest at the base and tapering to a slender tip; pinnules only shallowly toothed with the sori at maturity covering the lower surface.

This is less common than var. *rubellum* but is scattered through the province. It is really a sun form and may be found in open moist situations, in pastures and along roadsides.

Nova Scotia to Manitoba south to Iowa and Pennsylvania.

4. Var. *elatius* (Link) Butters.

This variety is a larger form with more finely divided fronds and longer pinnae. The pinnules are 12-25 mm. long, sharply and deeply toothed, much more pointed at the ends, and with the sori rather round and running together at maturity. It seems to prefer rich moist soil, and when growing in partial shade is difficult to distinguish from large forms of var. *rubellum.*

Fernald (1921, 1922) has reported it from Lunenburg and Yarmouth Counties and typical material was also seen from Colchester and Guysboro.

Nova Scotia to Maine and Maryland west to Wisconsin.

5. Var. *rubellum* (Gilbert) Butters. Fig. 22.

This is our common variety, and it is frequent throughout the province along roadsides, in pastures, moist thickets, swamps and open woods. Typical var. *rubellum* is distinguished from the other varieties by having the fertile and sterile fronds alike, and the sori widely separated even at maturity. Since, however, the three forms grade into each other, a proportion of the specimens will be difficult to identify exactly.

Newfoundland to Manitoba south to Colorado and Virginia.

DENNSTAEDTIA Bernh.

Rootstocks creeping; veins forked; sori small, with the sporangia protected by a cup-like indusium joined to an inturned toothlet of the pinnule.

Hay-Scented Fern

D. punctilobula (Michx.) Moore. Fig. 8.

Michaux discovered this fern in Canada and named it *Nephrodium punctilobulum* in 1803. Later it was transferred

to a tropical genus as *Dicksonia punctilobula* (Michx.) Gray and this genus was split finally, leaving the tree-like forms under *Dicksonia* and the herbaceous forms in *Dennstaedtia.*

Frond 3-8 dm. long, 8-15 cm. wide; stipe smooth; blade lanceolate, widest at the base, twice-divided, minutely hairy and glandular; pinnae lanceolate; pinnules oblong, doubly toothed, with small inconspicuous sori attached near the base of the upper margin of each lobe.

The Hay-scented Fern is best recognized by the thin finely-cut, glandular-hairy fronds. The rootstock creeps and branches extensively so that this fern usually grows in large matted clumps. It is found mostly on dry hillsides and slopes, especially about hummocks and rock piles, and is characteristic of our upland pastures and hillsides throughout the province. Frequent also in open or dryish woods, roadsides, and rarely in swamps. Unpalatable to animals, and often becoming a weed in sterile pasture-land.

Nova Scotia to Minnesota south to Georgia.

POLYSTICHUM Roth

This genus comprises in eastern America three species which are large and evergreen, with stout rootstocks, round sori and round indusia attached at the centre.

Christmas Fern

P. acrostichoides (Michx.) Schott. Fig. 12.

This fern was first named *Nephrodium achrostichoides* by Michaux in 1803 and was placed in the genus *Polystichum* by Schott in 1834.

Frond 3-7 dm. long, 8-15 cm. wide; stipe covered with chaffy scales; blade leathery and evergreen, lanceolate, pinnate only; pinnae also lanceolate in outline, auricled on the upper side at the base, and spiny-toothed; sori crowded on much smaller pinnae near the tip of the blade.

The Christmas Fern is one of the commoner ferns in moist woods, on wooded banks, and thickets throughout the whole province.

Nova Scotia to Ontario and Wisconsin south to Texas and Florida.

Forma *incisum* (A. Gray) Gilbert is a form with the pinnae deeply toothed. This seems to be a common, luxuriant form found in rich soil; and often forms grading between this and the typical form can be found in the same woods.

Braun's Holly Fern

P. Braunii (Spenner) Fee, var. *Purshii* Fernald. Fig. 18. Map 4.

The European fern was first described as *Aspidium Braunii* by Spenner in 1825, and placed in the genus *Polystichum* by Fee in 1852. The American plant, long considered identical, was separated by Fernald. Fernald, M. L., The eastern American variety of *Polystichum Braunii*. Rhodora 30:28-30. 1928.

Fronds in circular clumps, 3-10 dm. long, 8-15 cm. wide; stipe very chaffy; blade rather leathery, widely lanceolate, tapering at both ends, twice pinnate, and chaffy beneath and on the rachis.

The Holly Fern is one of our most beautiful ferns, very graceful when found in the woods, and easily recognized when seen. It is typical only of our richest hardwood areas. Common on Cape Split and about the sides of Cape Blomidon; Victoria Park, Truro; Moose River, Folleigh Lake, and Earltown, Colchester Co.; Pirate Cove, Guysboro Co.; and common from Whycocomagh and Mabou northward in Cape Breton.

Robinson (1904) says of it "Local on the mainland 'it' here becomes abundant in the hill district and in the north becomes a splendid plant often exceeding four feet in height". Nichols (1918) lists it as characteristic of the deciduous climax forest, sandy flood plains, and especially of ravines in northern Cape Breton.

Newfoundland to northern Wisconsin, southward into the uplands of New England and New York, northeastern Pennsylvania; also in Alaska.

Holly Fern

P. Lonchitis (L.) Roth. Fig. 13. Map 2.

Described as *Polypodium lonchitis* by Linnaeus in 1753, and placed in the present genus by Roth in 1799.

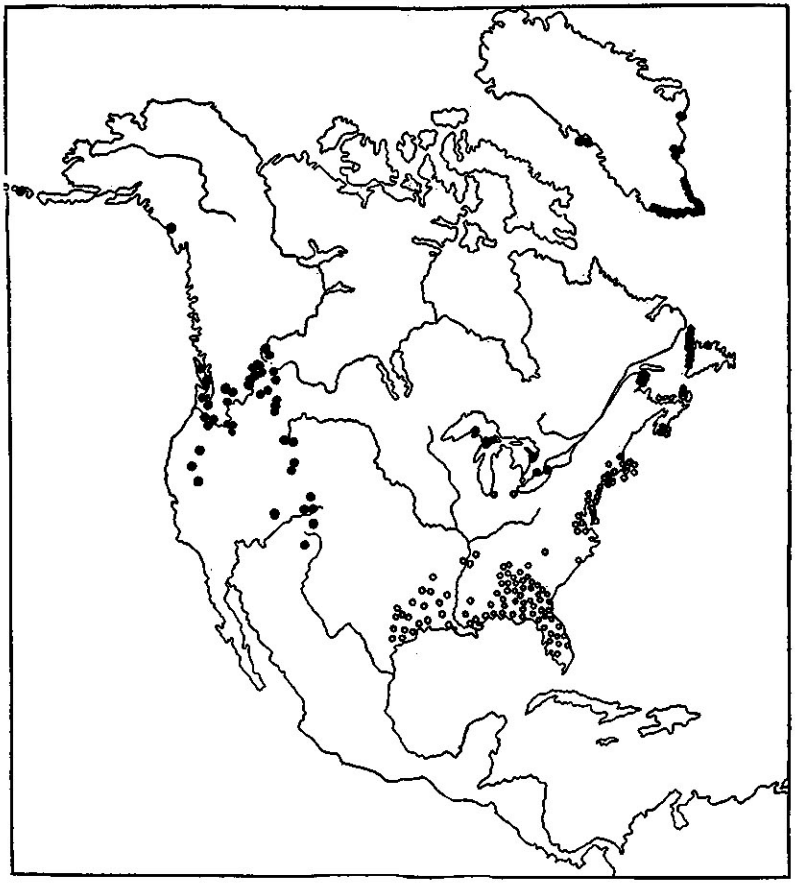
Fronds in clumps, from stout rootstocks; stipe short with scattered broad scales; blades 2-6 dm. long, 4-6 cm. wide, tapering at each end and rather scythe-shaped, but once-divided with the pinnae auricled on the upper side near the base and sharply toothed; sori in two rows on the backs of the upper not-reduced pinnae.

This is one of the rarest ferns in eastern Canada. It is a northern plant which occurs on the rock-talus slopes at the base of shaded cliffs, usually on limestone. Known in the province only on Cape Breton Island. In considerable abundance at Aspy Bay (Macoun 1883-90); River Deny's Cave, and along the roadside near the top of Glencoe Mountain (Robinson 1904).

This is an excellent example of a group of "relic" species which have a peculiar disrupted eastern range and which indicate a relationship to the Rocky Mountain flora. The range in eastern America is on limestone, as in Cape Breton, Newfoundland and the Niagara Peninsula; or else in the very richest woods, as on the Keweenaw Peninsula in Michigan.

DRYOPTERIS Adans.

The ferns here included have at different times been placed in such genera as *Aspidium*, *Lastrea*, *Phegopteris*, *Thelypteris*, and *Dryopteris*. At the present time the genus is often divided into the three genera: *Thelypteris*, *Phegopteris*, and *Dryopteris*. However, since the first and third have intergrading species in the tropics, and the status of the second has not yet been finally settled, all are placed in the same group



Map 2. Range of *Polystichum Lonchitis* (dots), and *Woodwardia areolata* (circles) to show the distribution of a northern plant found only in northern Cape Breton, and a coastal plain plant occurring in southwestern N. S. Data from maps published by Fernald in Rhodora. 37: 207. 1935 and 33: 55. 1931.

with the alternate names given for those who wish to keep the three sections in separate genera.

Key to Species

a. Indusium absent or present; fronds thin, not evergreen, with its smallest divisions obscurely toothed or with a smooth margin, and the veins simple or only once-divided; stipe nearly smooth, b.

b. Frond lanceolate in outline; pinnae not stalked, c.

c. Indusium present, d.

d. Blade with the lower pinnae as long as the middle one, e.

e. Veins of the sterile fronds mostly forked.

1. *D. Thelypteris*

e. Veins of the sterile fronds mostly simple or unforked.

2. *D. simulata*

d. Blade with the lower pinnae gradually decreasing in size.

3. *D. noveboracensis*

c. Indusium absent

4. *D. Phegopteris*

b. Frond triangular in outline with three almost equal divisions; lower pinnae stalked.

5. *D. disjuncta*

a. Indusium always present; fronds thicker, often evergreen, with the divisions toothed or variously cut; veins twice-forked or more; stipe more or less chaffy or with numerous scales, f.

f. Fronds small, up to 25 cm. long and 5 cm. wide; resinous, with the teeth of the pinnules blunt.

6. *D. fragrans* var. *remotiuscula*

f. Fronds much larger and not resinous, g.

g. Scales at the base of the stipe numerous and linear, h.

h. Sori near the margin; pinnules not sharply toothed at their tip.

7. *D. marginalis*

h. Sori not on the margin; pinnules minutely and sharply toothed, especially at the tip.

8. *D. filix-mas*

g. Scales at the base of the stipe ovate or oblong, i.

i. Frond bi-pinnate; or partly tri-pinnate near the base. j.

j. Indusium glabrous or smooth.

Fronds 3-5 dm. long, 6-10 cm. wide; stipe nearly as long as the blade; blade narrowly lanceolate, twice-divided, with the veins of the sterile fronds mostly unbranched; fertile fronds narrower and longer, the pinnae often folded along the midrib, and with the edge of the pinnules inrolled.

This fern is very like the Marsh Fern in appearance, but it is narrower in outline and is best distinguished by the simple veins. In habitat it is also intermediate between the last and the next, for it grows in situations too shady for the Marsh Fern and too wet for the New York Fern.

In Nova Scotia it is found in swales and wet thickets, knolls in peaty barrens and in sphagnous spruce bogs, local and somewhat general from Yarmouth County eastward to Lunenburg County; and at Mount Uniacke in Hants.

This is a coastal plain species ranging from southwestern Nova Scotia to Alabama, and sporadically inland to Prince Edward Island, southernmost Quebec, New York and West Virginia.

New York Fern

3. *Dryopteris noveboracensis* (L.) A. Gray. (*Thelypteris noveboracensis* (L.) Nieuwl.)

Fronds 4-8 dm. long, 8-15 cm. wide; stipe short; blade thin, lanceolate, and long-tapering at each end, nearly twice-divided; pinnae longest in the middle of the frond, the lowest being mere auricles; pinnules oblong, slightly pointed, flat, and with simple veins; sori small, numerous and separate.

The New York Fern is easily recognized by the thin light-colored fronds which taper to the base, and by the unbranched veins. It is common throughout the province, being usually abundant in dry, shady woodlands and along shady roadsides and fences, but seldom persisting in open sunlight or in wet meadows like the Marsh Fern.

Newfoundland to Minnesota south to Georgia and Arkansas.

Long Beech Fern

4. *Dryopteris Phegopteris* (L.) C. Chr. Fig. 14.

Linnaeus first described this species and later it was separated off into a new genus and became *Phegopteris phegopteris*. Since a duplicate name was not desirable it was given the name *P. polypodioides* Fee. It was first placed in *Dryopteris* by Christensen in 1905.

Frond 2-5 dm. long, 8-15 cm. wide; stipe as long or longer than the blade; blade triangular, finely hairy and chaffy, especially on the rachis and veins beneath, nearly twice-divided; pinnae widest at the middle, all but the lowermost pair connected to the others by a wing along the rachis, the lowermost deflexed; pinnules oblong, wavy-margined, with the naked sori separate near the edge.

This fern is distinguished by its short triangular blade, deflexed lower pinnae, and naked sori. It is common throughout the province in rich cool woods, on shaded hillsides, and especially on damp or dripping cliffs and in ravines near running water.

Newfoundland to Alaska south to the Gulf States.

SECTION GYMNOCARPIUM

Oak Fern

5. *Dryopteris disjuncta* (Rupr.) Morton. Fig. 15.

The Oak Fern was originally described as *Polypodium Dryopteris* by Linnaeus and has been variously known as *Phegopteris Dryopteris* (L.) Fee, *Thelypteris Dryopteris* (L.) Slosson, and *Dryopteris Dryopteris* (L.) Christ. In order to avoid the double name, Christensen, 1905, proposed the name *Dryopteris Linnaeana* which was generally accepted; but the above earlier name has since been found. The relationship and proper position of the Oak Fern is as yet obscure. Morton C. V. On the Name of the Oak Fern. Rhodora 43: 216-219. 1941.

Frond 1.5-4 dm. long; stipe 2-4 times the length of the blade; blade thin and green, not glandular, twice-pinnate,

triangular and with three main divisions, the lower two pinnae being stalked and much larger than the others.

This fern is quite distinctive with its small, smooth, bright-green ternate blade. It is common in rocky or dryish hardwoods throughout the whole province.

Newfoundland to Alaska south to New Mexico and Virginia.

Dryopteris disjuncta (Rupr.) Morton, forma *erecta* (Lawson); n. comb. *Polypodium Dryopteris* var. *erectum* Lawson, in Edinburgh New Phil. Journ. 19: 109 (repr. 10). 1864.

Forma *erecta* is a tall stout form which grows in rich shady places; frond rigid and erect; stipe very stout and not glandular; lower pinnae little larger than the upper ones. Lawson (1889) says that this form grows around the shores of Bedford Basin and the Basin of Minas, and also in beech woods at Collin's Bay, near Kingston, Ontario.

D. Robertiana (Hoffm). C. Chr. is a very similar appearing fern which differs in having the fronds glandular and the pinnae sessile so that the frond does not appear to be three-parted. This has been collected in the Maritimes only in New Brunswick, but it is to be expected on the limestones and gypsums in northern Cape Breton.

SECTION EUDRYOPTERIS

Fragrant Fern

6. *Dryopteris fragrans* (L.) Schott, var. *remotiuscula* Komarov. Fig. 19.

The species is essentially an arctic plant. The southern plant, which may be an adaptation to more favourable conditions, was named var. *Hookeriana* by Fernald while these ferns were temporarily in the genus *Thelypteris*. This variety name was later found to be preceded by the above, based on Eurasian material in 1911.

Frond 4-25 cm. long, 2-4 cm. wide, glandular, and sparingly chaffy, the dead fronds coiled and resinous; stipe very short; frond twice-pinnate, lanceolate; pinnae separate, widest near

the base and rounded at the tip; pinnules oval to oblong, with blunt teeth, each with one or two sori with very large brown indusia.

The Fragrant Fern is quite distinct from any other fern, and is recognized by its resinous fragrant fronds, small size, and large indusia. It is likewise one of the rarer ferns of the province and for many years was known only as very rare and inaccessible on the cliffs at Hartley's Waterfall, on the Strait of Canso. Nichols (1918) listed it as one of the plants especially characteristic of cliff crevices along streams in northern Cape Breton, growing with *Polypodium*, *Cystopteris fragilis*, and *Woodsia ilvensis*. It is also found on the rocky cliffs of Moose River, near Parrsboro, associated with the same ferns.

Newfoundland to New York west to central Minnesota and in Eastern Asia.

Marginal Shield Fern

7. *Dryopteris marginalis* (L.) A. Gray. Fig. 23, 24.

Described from Canadian material by Linnaeus in 1753.

Frond 3-6 dm. long, 10-15 cm. wide; stipe chaffy, very densely so at the base, with golden linear scales; blade leathery and evergreen, twice-pinnate, lanceolate and widest near the base, nearly smooth and of a bluish-green color; pinnae tapering to a long tip; pinnules oblong or longer, with shallow rounded teeth and compact round sori at the margin.

The Marginal Shield Fern is known by its leathery blade of a characteristic color, by the marginal sori and by its linear basal scales on the stipe. Common in rocky woods and shady slopes throughout the centre and eastern part of the province, and characteristic of the hardwood forests in Cape Breton. Apparently rare in the south-western counties, and seen only near Argyle, Yarmouth County, by the Gray Herbarium Expedition to N. S. (Fernald 1921).

Nova Scotia to Minnesota south to Alabama and Oklahoma, British Columbia.

Forma *Traillae* (Lawson) Gruber. (Weatherby, C. A. Lawson's Type Specimens. Amer. Fern J. 31:2:59-62. 1941) This luxuriant form of the Marginal Fern, which has usually been given the name forma *tripinnatifidum* Clute, was found

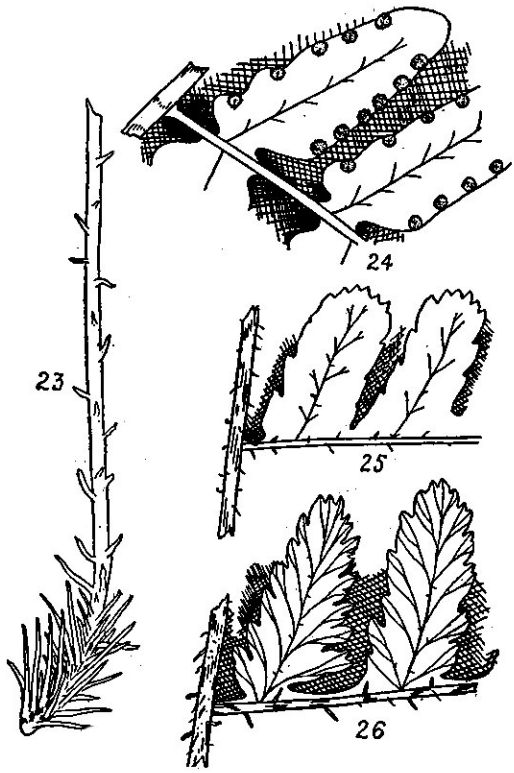


Fig. 23. Base of stipe of *D. marginalis* or *D. filix-mas*. Fig. 24. Pinnules of *Dryopteris marginalis*. Fig. 25. Pinnules of *D. filix-mas*. Fig .26. Pinnules of *D. filix-mas*, forma *incisa*.

near gypsum at Antigonish Harbour, and it is abundant on wooded gypsum near Newport, Hants Co. The pinnules are deeply toothed, and are more narrowly obtuse, or acute on their ends. In the above situations it seemed distinct from the

smaller and less-toothed typical form of the species. It is a luxuriant form found throughout the range of the species.

Male Fern

8. *Dryopteris filix-mas* (L.) Schott. Figs. 23, 25. Map 5.

Named from European material; the American plant shows no essential differences.

Fronds 4-6 dm. long, 12-25 cm. wide; stipe very chaffy below with the scales brown and linear; blade firm, lanceolate, widest some distance above the base, finely chaffy beneath and on the rachis, twice-divided; pinnae tapering from the base to apex, deeply cut into oblong pinnules which are finely toothed on the sides and more prominently on the squarish tips; sori near the midrib and usually confined to the basal part of the pinnules.

The Male Fern resembles several other ferns, but the dense linear scales at the base of the stipe, and the small teeth of the pinnules without a bristle tip will distinguish it. Until now it has been found in the province only on Cape Breton Island where it is found in rich woods and ravines around Mabou, Lake Ainslie and Whycocomagh. Northward it becomes more common until around Cape North and Bay St. Lawrence it is frequently seen growing in thickets and along roadsides; and it is recorded by Nichols (1918) as here characteristic of the hardwood climax forest.

Newfoundland to Vermont and northern Michigan; British Columbia to California and Texas; Greenland, Iceland, and northern Eurasia.

Forma *incisa* (Moore) Hayek (Fig. 26) is an European form found in Newfoundland and Nova Scotia. It is characterized by the pinnules tapering somewhat to the rounded or even slightly pointed tip, and being evenly and rather coarsely toothed throughout. This seems to be a luxuriant form of the species and is common near Cape North. This fern is rather variable both in this province and in Newfoundland and Clute

(1938) states that over sixty forms have been named in Great Britain.

Crested Fern

9. *Dryopteris cristata* (L.) A. Gray.

Fertile fronds 4-8 dm. long, 8-10 cm. wide; stipe smooth with a few ovate scales near the base; blade lanceolate, firm in texture, twice-divided, widest near the apex and tapering slightly to a square base, giving it a crested appearance; pinnae lanceolate, to triangular at the base; pinnules oblong, finely toothed, with the large indusia midway between the margin and the midrib; sterile fronds differ in being ever-green, more ovate in outline, shorter, and usually less toothed.

The Crested Fern is recognized by the triangular pinnae, and by the tall erect fertile fronds. It is characteristic of well-drained swamps, swales, and boggy ground, usually in shady situations but persisting for some time in open sunlight. Common throughout the whole province.

Newfoundland to Idaho, south to Virginia; Europe.

Boott's Shield Fern

10. X *Dryopteris Boottii* (Tuckerm.) Underw.

First discovered in Massachusetts and named *Aspidium Boottii*, it was transferred to *Dryopteris* by Underwood fifty years later.

Fronds very similar to those of *D. cristata*, but wider and often larger; blade more divided, with the lower pinnae having the pinnules deeply cut or pinnatified; usually glandular; indusium glandular.

This fern is a hybrid of *D. cristata* and *D. spinulosa* var. *intermedia* and has the characters of both parents in varying proportions. Both of the parents are common throughout the province, and the hybrid, which in this case may produce viable spores to some extent, is known at present to be frequent in swampy woods of Yarmouth Co.; found at various stations

in Shelburne and Lunenburg Cos.; and scattered to Halifax, Colchester, and Guysboro.

Nova Scotia to Virginia west to Minnesota.

Spinulose Shield Fern

Key to Varieties

a. The upper and lower inside pinnules of the basal pinnae nearly opposite, rarely more than 4 mm. apart, b.

b. Pinnae tending to be set obliquely to the rachis and ascending, the basal pinnae triangular, with the inner pinnule on the lower side as long or longer than the one adjacent to it; scales of the stipe light brown, c.

c. Indusium and frond smooth.

11. *D. spinulosa* (Typical).

c. Indusium and often the frond glandular.

12. var. *fructuosa*

b. Pinnae tending to be set at right angles to the rachis; the basal ones more lanceolate and tapering to a long tip, with the inner pinnules on the lower side usually much shorter than the one adjacent to it; scales of the stipe with a dark centre.

13. var. *intermedia*

a. The lower inside pinnule of the basal pinnae 5-20 mm. farther from the rachis than the inner one on the upper side, usually longer than the second upper one; blade wide and triangular; indusium glabrous, or with rarely a few marginal glands.

14. var. *americana*

11. *Dryopteris spinulosa* (O. F. Müller) Watt.

An European plant first named *Polypodium spinulosum* by Müller and transferred to *Dryopteris* in 1867.

Frond 4-7 dm. long, 10 to 20 cm. wide; blade smooth, lanceolate, twice-divided, with the pinnules further toothed or divided; pinnae widest at the base, lanceolate to triangular and set obliquely on the rachis; pinnules with bristle-tipped teeth; indusium smooth.

This fern and its varieties are the most finely divided of the genus, and may be further separated from other similar species by the bristle or spine-tipped teeth. The typical form

is scattered in swamps, wet thickets and rich alluvial soil at least through the centre of the province. It generally has a thicker, less finely cut, and darker green blade than var. *intermedia.*

Newfoundland to Idaho south to Virginia and Missouri; Greenland, Europe and Asia.

12. *D. spinulosa* var. *fructuosa*(Gilbert) Trudell. (*D. intermedia* var. *fructuosa* (Gilbert) Wherry).

Similar in appearance to *D. spinulosa* but with the indusia and fronds glandular. It is thought to be a hybrid between *D. spinulosa* and var. *intermedia* and may thus possess characters intermediate between the two with considerable variability. The forms which most nearly approach *D. spinulosa* are the only ones easily identified. Often found growing with the above, Shelburne, Kings and Cumberland Counties, and probably wherever the parents occur.

13. *D. spinulosa* var. *intermedia* (Muhl.) Underw.

Many botanists separate this fern as a species, *D. intermedia* (Muhl.) A. Gray and include var. *fructuosa* under it.

The fronds are generally more finely divided, the lower pinnae are not so triangular, and the blade is lighter green in color.

This is our commonest variety and it is common throughout the whole province in woods, on rocky slopes, and hummocks in swamps.

Newfoundland to Wisconsin south to North Carolina and Missouri.

14. *D. spinulosa* var. *americana* (Fisch.) Fernald.

This is the American variety parallel to var. *dilatata* of Europe with which it was first connected. (*Aspidium spinulosum* var. *dilatatum* f. *anadenium* Robinson of Gray's Manual). It is sometimes set off as a separate species, *D. campyloptera* (Kunze) Clarkson. This name was suggested as a substitute name by Kunze when he published Fischer's description of the variety.

Similar to the above varieties but with the blade larger and more triangular. It is a more northern variety and is typical only of our colder and richer woods. It is luxuriant in rich woods along the Bay of Fundy and around Minas Basin, with fronds six to twelve dm. high; scattered in rich woods and slopes from Shelburne to Cape Breton; and common along the Cobequids and in northern Cape Breton. Miss Perry (1931) states that both this and var. *intermedia* are common on St. Paul Is. (northern Cape Breton); and about as abundant as the two varieties was a form transitional between the two.

Labrador to British Columbia south to Wisconsin and along the mountains to North Carolina and Tennessee.

ONOCLEA L.

Rootstock slender and creeping; fronds of two kinds, the sterile herbaceous with the pinnae more or less lobed, and the veins forming a network; the fertile indurated, with the sori borne inside the berry-like rolled pinnules.

Sensitive Fern

O. sensibilis L. Fig. 2.

Sterile fronds 3-8 dm. long, 15-30 cm. wide, with the blade nearly triangular and the rachis broadly winged; fertile fronds shorter, the fertile part 1 to 2 dm. long, with the branches rigidly erect, persisting over the winter.

Easily identified by the coarse blades and netted-veined pinnae. The fertile fronds may be seen in most wet places and low areas after the other vegetation has been withered by the frost.

Common throughout in wet mucky soil, around streams, pools, ditches, in woodland or in open fields.

Newfoundland to Saskatchewan south to Florida and Texas.

O. sensibilis f. *obtusilobata* (Schkuhr) Gilbert.

This form is produced when the early sterile fronds are injured in some way. It is intermediate between the normal

sterile and fertile fronds, and often appears like a much stunted deeply-lobed form. Commonly seen in the Annapolis Valley along roadsides or at the edge of fields where the early fronds were mown.

PTERETIS Raf.

Rootstock stout and ascending; fronds of two kinds, the sterile large and green, arranged in a circle and the fertile indurated with the pinnae and pinnules rolled, and the sori borne inside the tube-like pinnae.

Ostrich Fern

P. nodulosa (Michx.) Nieuwl. Fig. 3. Map 6.

Botanists have long debated whether to put *Pteretis* and *Onoclea* in the same genus. This fern has had the following names successively applied to it: *Osmunda Struthiopteris*, *Onoclea Struthiopteris*, *Struthiopteris Germanica*, *Struthiopteris pennsylvanica*, *Matteuccia Struthiopteris*, and *Matteuccia nodulosa*. Our American plant was named *Onoclea nodulosa* by Michaux and finally given *Pteretis nodulosa* by Nieuwland in 1916.

Sterile frond 6-12 dm. long, 15-25 cm. wide, blade widest above the middle, with the pinnae abruptly shortened at the tip and gradually tapering to the base, rachis smooth on the sides and back and slightly pubescent on the groove in front; fertile frond up to 30 cm. long and 5 cm. wide, persisting over winter.

This fern is very similar in general appearance to the Cinnamon Fern, but differs in the blunt top of the frond, the tapering base, the unforked veins, and the absence of rusty wool.

Found in rich, deep soil, low ground and along streams; common in the Annapolis Valley and Colchester and Pictou Counties; about limestone and gypsum outcrops in Cape Breton; and reported by Nichols (1918) as characteristic of the higher parts of the flood plains in northern Cape Breton.

Not mentioned by Fernald from southwestern N. S. and it is presumably absent from the more acid regions of the province.

Newfoundland to Alaska, south to Virginia and Missouri.

CYSTOPTERIS Bernh.

Fronds thin, lanceolate, and twice-divided, from short rootstocks; veins forked; sori roundish; indusium thin and evanescent, attached at the base of the sorus and arching over the sporangia.

Key to Species and Varieties

a. Frond lanceolate, and usually long-attenuate, often bearing bulblets beneath, veins of the pinnules ending mostly in a notch, Fig. 27.

1. *C. bulbifera*

a. Frond lanceolate only; veins of the pinnules ending mostly in a tooth or on the un-notched margin, Fig. 28, b.

b. Pinnules, at least the basal, varying from nearly orbicular to triangular, rounded to the base; indusium up to 1 mm. long, and more or less cleft at the apex, c.

c. Indusium without glands; fronds small, up to 3 dm. long.

2. *C. fragilis* (Typical).

c. Indusium glandular on the back; fronds large, 3.8-4.8 dm. long.

3. var. *laurentianum.*

b. Pinnules of the frond oblong to nearly lanceolate, evenly wedge-shaped at the base; indusium short, about 0.5 mm. long and shallowly or not at all toothed at the apex.

4. var. *Mackayii*

Bulblet Fern

1. *C. bulbifera* (L.) Bernh. Fig. 27. Map 7.

Plants sent from Canada were named *Polypodium bulbiferum* by Linnaeus and they were included by Bernhardi in his new genus *Cystopteris* in 1806.

Fronds 2-6 dm. long, 6-10 cm. wide; stipe smooth; blade lanceolate, widest at the base and tapering to a long attenuate tip, twice-divided; pinnae widest at the base; pinnules oblong,

rounded at the end and bluntly double-toothed; sori small and round, situated on a vein, and with a short, blunt indusium.

The Bulblet Fern is recognized by its thin, long tapering fronds and by tiny bulblets on the lower side of the mature plants. Smaller plants may be distinguished by the toothing and the veining of the pinnules. This fern is only found in the province in rich or calcareous areas. Kings County: Moore's

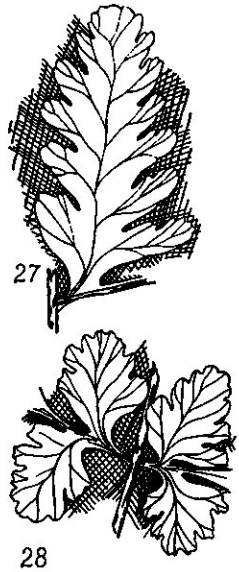


Fig. 27. Pinnule of *Cystopteris bulbifera*. Fig. 28. Basal pinnules of *Cystopteris fragilis* (typical).

Falls, south of Kentville; Hants County: common on gypsum outcrops near Brooklyn, St. Croix, and along Five Mile River; Guysboro County: shaded cliffs at Hartley's Waterfall on the Strait of Canso; and common and often luxuriant in rich shady ravines near limestone in Cape Breton.

Plants growing on dryish gypsum cliffs in Hants County fruit abundantly and bear bulblets without producing the long

attenuate tips. These short blunt fronds with more horizontal pinnae seem to approach the shape of forma *horizontalis* (Lawson) Clute, a form which may only be a response to the dryish and unfavourable environment.

Newfoundland to Manitoba south to Georgia and Arizona.

Fragile Fern

2. *C. fragilis* (L.) Bernh. Fig. 28. Map 8.

Weatherby, C. A. A new North American Variety of *Cystopteris fragilis.* Rhodora 28: 129-131. 1926.

Weatherby, C. A., A New Variety of *Cystopteris fragilis* and some old ones. Rhodora. 37:373-378. 1935.

Frond 1-3 dm. long, 3-6 cm. wide; stipe smooth; blade lanceolate, slightly broader above the base; twice-divided; pinnae nearly triangular; largest pinnules near the rachis oblong to triangular and rounded at the base; sori small and separate, covered by an oblong indusium which is more or less deeply lobed at the tip.

The Fragile Fern is rather common on shaded and rocky cliffs, and in rich moist woods throughout the northern part of the province; Nichols (1918) lists it as characteristic of shady cliff crevices in northern C. B. Nova Scotia is the region where the range of the northern *C. fragilis* overlaps that of the more southern var. *Mackayii.* Intermediate forms thus occur, so that it is often difficult to name the collections correctly. The typical form occurs at least in Cape Breton and along the Bay of Fundy at Blomidon and Baxter's Harbour while most of the inland and woodland specimens apparently belong to the variety.

Newfoundland to Alaska south to northern New England, Pennsylvania, Missouri, Texas and southern California.

Forma *cristata* (Lowe) Weatherby. The Fragile Fern is rather variable in its outline and various forms have been described by European botanists which probably also apply correctly to the American forms. This one seems the best marked, and Macoun and Burgess (p. 213, 1884) state—"A

very peculiar form found at Whycocomagh, N. S. . . . has the ends of the fronds as well as most of the pinnae and some of the pinnules forked or showing a tendency thereto."

3. Var. *laurentiana* Weatherby.

This variety is a larger, more erect and coarser plant, the fronds being 3.8-4.8 dm. high, with their blades 19-34 cm. wide; indusium, and frequently the rachis of the pinnae beneath, minutely glandular.

It is at once distinguished by its glandular indusia. Var. *laurentiana* is one of a number of relic plants found in Newfoundland, Gaspe, the Magdalens, in northern Cape Breton and sparingly westward on the Bruce Peninsula, Ontario, and Wisconsin. It almost always grown in calcareous locations and the two following collections made by Nichols were mentioned by Weatherby (1926): dolomite ledges west of Dingwall; moist sink holes in plaster, South Ingonish.

4. Var. *Mackayii* Lawson. Fig. 17. Map 8.

Pinnules tapering or wedge-shaped at the base, rounded at the tip and only slightly toothed, or narrower and more deeply toothed; indusium blunt and up to 0.5 mm. long. Shaded ledges, damp cliffs, and occasionally in rich woods, Digby Neck and northern Queens Co. to Cape Breton; frequent but never abundant in its habitat.

Nova Scotia and southern Quebec to Minnesota south to North Carolina.

WOODSIA R. Br.

Rootstock small; veins forked; sori small and round; indusium composed of several jagged lobes or thread-like divisions, attached beneath the sporangia and curving over them.

Key to the Species

a. Stipe plainly jointed near the base; lobes of the indusia linear and hair-like; frond chaffy or smooth but not glandular, b.

b. Frond chaffy throughout; blade oblong-lanceolate.

1. *W. ilvensis*

b. Frond smooth; blade linear and delicate.
2. *W. glabella*

a. Stipe not jointed; lobes of the indusium of a few broad segments; frond often glandular.
3. *W. obtusa*

Rusty Woodsia

1. *W. ilvensis* (L.) R. Br. Fig. 16. Map 9.

Linnaeus named an European fern *Acrostichum ilvense* in 1753 and Robert Brown placed it in his new genus *Woodsia* in 1810. The American plant appears to be the same.

Frond 5-15 cm. long; stipe reddish, sparingly chaffy, jointed near the base; blade widely lanceolate, widest above the base, more or less chaffy, twice-divided; pinnae ovate-triangular, blunt, deeply divided into rounded pinnules; sori numerous, nearly covering the lower surface of the pinnules; indusia difficult to distinguish from the chaff of the blade, of many thread-like divisions.

The Rusty Woodsia is best distinguished by its small chaffy blade, and jointed stipes. It is local, but often abundant where found; on basaltic cliffs, slaty ledges, talus slopes, and rocky ravines from Digby Neck to Truro; and reported by Nichols (1918) as characteristic of cliff associations in northern Cape Breton. Labrador to Alaska southward to British Columbia, Iowa and North Carolina.

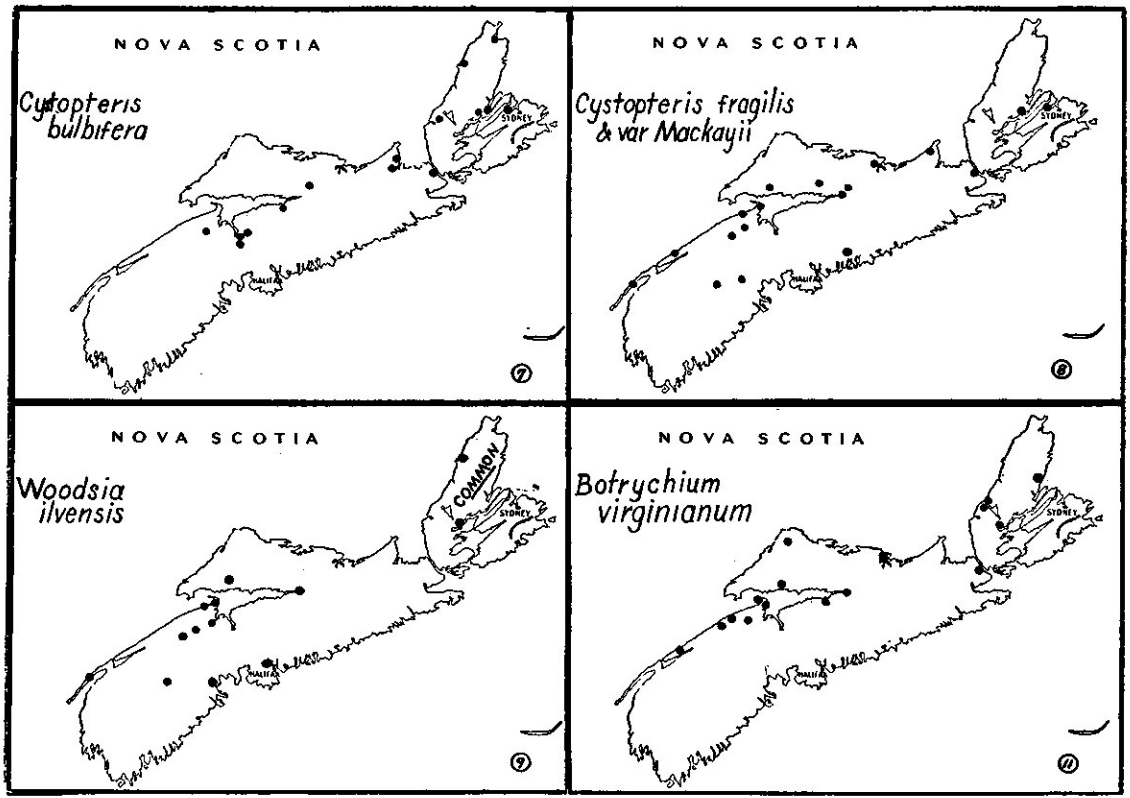
Smooth Woodsia

2. *W. glabella* R. Br.

Frond rather similar to that of *W. ilvensis* but entirely smooth; 4-16 cm. long; blade delicate and linear; pinnae 3-9 mm. long, roundish-ovate, rather obtuse.

The Smooth Woodsia has been recorded but once for the province. (Robinson 1904). Two plants were found near the summit of a hill, 1300 feet high, near Cheticamp.

Newfoundland to Alaska south to North Carolina and New York; Europe and Asia.


NOVA SCOTIA
Cystopteris bulbifera
STOREY
HALIFAX
7
NOVA SCOTIA
Cystopteris fragilis & var Mackayii
STOREY
HALIFAX
8
NOVA SCOTIA
Woodsia ilvensis
COMMON
STOREY
HALIFAX
9
NOVA SCOTIA
Botrychium virginianum
STOREY
HALIFAX
11

Blunt-Lobed Woodsia

3. *W. obtusa* (Spreng.) Torr.

Frond 2-3 dm. long, 3-10 cm. wide; stipe with scattered small scales; blade lanceolate, glandular, twice-divided with oblong rounded pinnules; indusium of several spreading jagged lobes.

This fern resembles *Cystopteris fragilis* closely in appearance and habitat, but may be distinguished by the scales or chaff on the stipe, and by the glandular blades.

Lindsay's Catalogue (1876) lists it from Windsor Falls, but the specimens on which this record is based are depauperate plants of *Dryopteris marginalis*. Macoun (1883-1890) records it "In the gorge through which Dr. Hamilton's road winds up to the summit of the North Mountain near Canning". This is now called the Deep Hollow Road north of Sheffield Mills. The second record seems to be the basis for the inclusion of Nova Scotia in the range of this fern in all recent manuals, as no recent collections are known.

Nova Scotia to Minnesota, south to Florida and Texas; British Columbia to Alaska.

SCHIZAEACEAE Curly Grass Family

SCHIZAEA J. Sm.

Small ferns with linear sterile fronds, and fertile ones with a very small blade; sporangia borne in double rows along the pinnae, with a transverse ring at the apex, and opening vertically by a longitudinal slit.

Curly-Grass Fern

S. pusilla Pursh. Fig. 1. Map 10.

Discovered in New Jersey and named by Pursh in 1814.

Sterile fronds linear and variously coiled, 1-3 cm. long; fertile fronds 3-7 cm. high, smooth; blade 2-5 mm. long, consisting of 2-5 pairs of pinnae folded together along the rachis, protecting the sporangia within.

The Curly-grass Fern is so different that it could not be mistaken for any other fern; it is so rare and insignificant that few people in the province have ever seen it growing. It was first found on the shores of Grand Lake, Halifax County, by Miss Elizabeth Knight (later Mrs. Brittain) of New York in 1879, and she was never able to find it at that place again. (Lawson, p. 249, 1889). In 1905 Nichols found it in northern Cape Breton; and later (Nichols 1918) reported it as characteristic of swamps in the highlands. In 1921-22 Professor Fernald and other members of the Gray Herbarium Expedition to Nova Scotia found it at various places from Digby Neck around to Queens County and also rediscovered it around the shores of Grand Lake.

This fern seems to be most abundant in bogs at the southern ends of Long and Brier Islands, Digby County, usually growing within a few yards of the sea. Specific locations for the plant will be found in Rhodora. 23:186. 1921 and Rhodora. 24:159. 1922. It is usually found in spagnous bogs, peaty borders of lakes, sphagnous hollows in barrens, and in wet grassy depressions.

Newfoundland, Nova Scotia and southern New Jersey; also the Bruce Peninsula, Ontario.

OSMUNDACEAE Flowering Fern Family

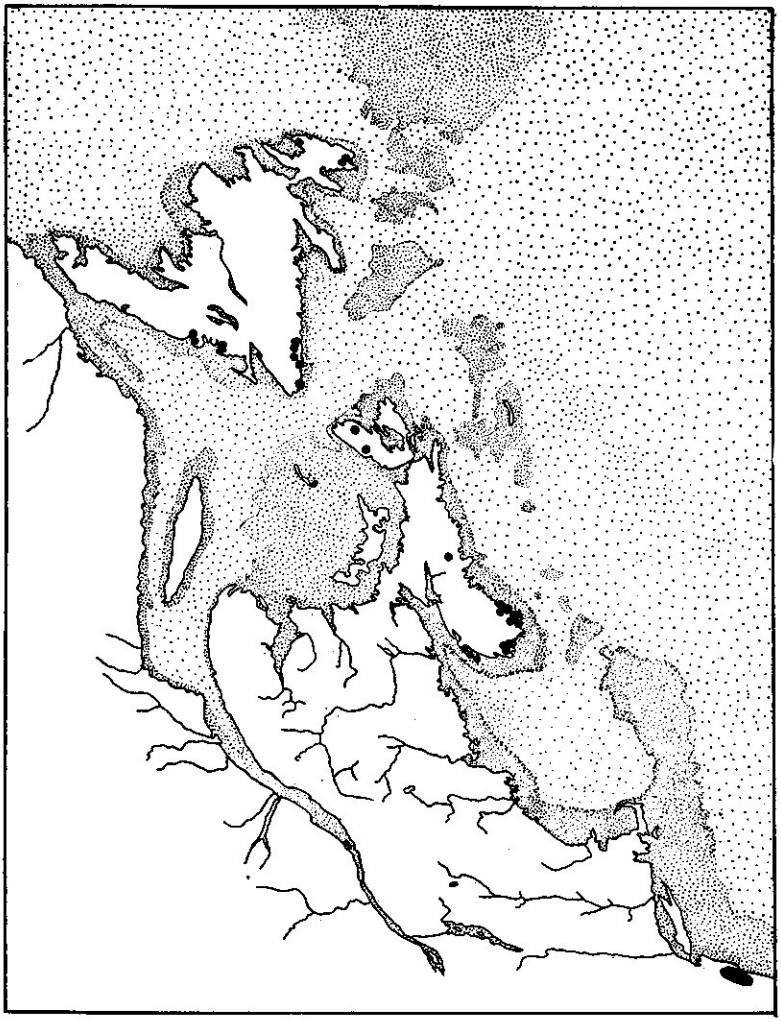
OSMUNDA (Tourn.) L.

Large plants with stout creeping rootstocks; fronds growing in clumps, with the veins of the pinnules forked; sporangia borne on completely fertile fronds or parts of the frond. Our forms consist of the following three species which are keyed out in the main key, pg. 69-70.

Royal Fern

O. regalis L. var. *spectabilis* (Willd.) A. Gray. Fig. 5.

Linnaeus included both the European and the American forms under *O. regalis.* In 1810 Willdenow separated off the



Map 10. Range of *Schizaea pusilla*. Data from a map published by Fernald in Rhodora. 35: 86. 1933.

American forms as *O. spectabilis* and Gray in 1856 reduced this to varietal rank.

Frond smooth, 5-15 dm. high, 12-25 cm. wide; blade twice-divided with oblong-oval to lance-oblong finely toothed pinnules; fertile portion at the apex of the fronds with the pinnules appearing like fine linear masses of sporangia.

The Royal Fern deserves its name because of the tall, stately fronds. It is recognized by its large pinnules and terminal fertile portion. Common in wet places, usually along streams next to running water, but often also on the shores of lakes, in marshes and wet woods. Common throughout the province.

Newfoundland to Saskatchewan south to Florida, Texas and into South America.

Cinnamon Fern

O. cinnamomea L. Fig. 4.

Named by Linnaeus from American material.

Sterile fronds 4-12 dm. high, 12-20 cm. wide, blade twice-divided, with the rachis bearing a tuft of wool at the base of each pinnae; pinnules smooth edged and slightly pointed; fertile fronds 3-6 dm. high and 2-3 cm. wide, very brown and woolly, consisting of masses of sporangia on the modified pinnae.

The Cinnamon Fern is one of our commonest ferns. The unrolling crosiers in early spring are known as fiddle-heads; and later the circular crown of green fronds with the numerous spike-like rusty fertile ones in the centre are very conspicuous. Common in swamps, bogs, wet pastures, low fields, and roadsides everywhere; often a weed in poorly-drained areas, with stout rootstocks and extremely difficult to plow through when land is broken up.

Newfoundland to Minnesota south to Florida and New Mexico.

O. cinnamomea f. *frondosa* (Torr. and A. Gray) Britton.

This form has fronds intermediate between the fertile and the sterile ones. Often the pinnae may be crisped and

toothed with some sporangia; or the lower part of the frond may be sterile and the top fertile. Not uncommon. Lindsay (1876) reported it from Windsor and specimens were seen from Halifax and Colchester Counties. Range of the species.

A form was collected west of Kentville with the pinnules tapering to a longer acute tip instead of a rounded one, and with traces of rusty wooly around their margins.

Interrupted Fern

O. Claytoniana L.

Clayton collected this fern in Virginia, and Linnaeus named it in his honor.

Fronds 6-12 dm. high, 12-25 cm. wide; blade twice-pinnate, the lower surface with rusty hairs at first but later smooth and green; fertile portion consisting of 1-5 pairs of smaller modified pinnae in the middle of the frond, which soon disappear and leave an open space; sterile pinnae as in Fig. 4; fronds easily distinguished from the fronds of *O. cinnamomea* by the absence of the tufts of brownish wool at the base of the pinnules, and by the gaps in the fronds.

Scattered but not nearly so common as the last, generally in moist thickets, margins of swamps, usually not often in open sunlight. Throughout the province.

Newfoundland to Manitoba south to Georgia.

OPHIOGLOSSACEAE Adder's Tongue Family

OPHIOGLOSSUM (Tourn.) L.

Rootstock fleshy with slender fleshy roots; frond with an ovate sterile blade; the sporangia in two ranks on the edges of a simple spike, opening by a longitudinal slit.

Adder's Tongue

O. vulgatum L. var. *pseudopodum* (Blake) Farwell. Fig. 6.

Named from European material by Linnaeus in 1753. Smaller variations of the plant in North America were once

erroneously referred to the European variety *minus* Moore, and in more acid soils a form occurs with more narrowed leaves which has been named *O. arenarium* E. G. Britton. Fernald (p. 187, 1921) states that in the sterile meadows of Digby and Yarmouth Counties plants varying from the large forms to the smallest extremes can be found in different portions of the same colony.

The American plants have recently been divided into three varieties with our Nova Scotian plants referred to the above. (Fernald, M. L. Rhodora. 41:494-499. 1939).

Frond 5-25 cm. high; stipe succulent, hollow; bearing a sessile leaf-like blade, 3-8 cm. long, 1-4 cm. wide; fertile part appearing like a continuation of the stipe with a spike at the top 2-4 cm. long.

The Adder's Tongue is quite different from any other fern and is recognized by its ovate blade and unbranched spike. It is frequent in Yarmouth and Digby Counties where it is found on damp sandy and cobbly beaches of lakes or in sterile meadows and has been collected near Halifax, Truro and Amherst. It is difficult to distinguish from the surroundings, and is probably often overlooked.

Nova Scotia and Prince Edward Island to Washington south to Mexico, Indiana and Delaware.

Botrychium Sw.

Rootstock short with clustered, fleshy roots; fronds composed of a fertile and a sterile portion; the sterile blade ternately or pinnately divided; the fertile part more or less branched with the divisions bearing a double row of sessile naked sporangia; sporangia large, and splitting into two valves at maturity.

Key to Species

a. Sterile blade small, oblong to triangular, attached near the middle or top of the plant, b.

b. Sterile blade oblong or ovate, with a short stalk, c.

c. Sterile blade once-divided, with three or more pairs of fan or spoon-shaped pinnae.

1. *B. Lunaria*

c. Sterile blade variously cut, with pinnae of different shapes; if the pinnae fan- or spoon-shaped the plants very small with not more than two pairs of pinnae present, d.

d. Sterile blade simple with the sides at the base curving inward, or once-divided with fan-shaped pinnae, or twice-divided with the pinnules smooth-margined.

2. *B. simplex*

d. Sterile blade usually larger and more divided; if undivided with the sides at the base curving outward, if once-divided with the pinnae ovate, and if twice-divided with the pinnules toothed.

3. *B. matricariaefolium*

b. Sterile blade triangular; sessile with acute lobes.

4. *lanceolatum* var. *angustisegmentum*

a. Sterile blades large, triangular, finely divided, e.

e. Sterile blade stalked, joined to the fertile portion near the base of the plant, f.

f. Chief terminal divisions usually elongate, more than twice as long as broad; often deeply dissected, g.

g. Segments finely and deeply dissected.

5. *B. dissectum*

g. Segments with a smooth margin or lobed at the base, finely serrate.

6. *B. dissectum* forma *obliquum*

f. Chief terminal divisions mostly ovate to oblong, not elongate.

7. *B. multifidum.*

e. Sterile blade not stalked, thin, and finely divided, attached near the middle or upper part of the plant.

8. *B. virginianum.*

Moonwort

1. *B. Lunaria* (L.) Sw.

Described by Linnaeus and placed in the genus *Botrychium* by Schwartz in 1801. The following variety was described as a species by Victorin from Gaspe material in 1927 and was later reduced to varietal rank by Dole.

The species is rather fleshy, 8-18 cm. high; sterile blade oblong, borne in the middle of the plant, once-divided with 2-8 pairs of fan-shaped smooth-edged segments; fertile portion shortly branched; spores 25-35 mm. in diameter.

Var. *minganense* (Victorin) Dole differs by having the blade lighter-green in color, by its habits of growing in clumps, and by the more spoon-shaped pinnae with usually incised edges; spores 30-40 micron in diameter.

Typical *B. Lunaria* is a plant of worldwide distribution which in America is boreal in its range and usually occurs on limestone or other calcareous rocks. It has not yet been found in Nova Scotia, but it occurs from Newfoundland to Alaska south to Maine, northern Michigan, and along the Rocky Mountains. The variety *minganense* is reported from New Campbellton, C. B. (Clausen 1938).

Small Grape Fern

2. *B. simplex* Hitchc.

A circumboreal species first named by Hitchcock on material from Massachusetts.

Fronds small, 4-15 cm. or rarely higher; sterile blade long-stalked, inserted usually toward the middle or base of the plant, varying from an ovate simple outline to a larger more-divided one, with crowded irregular pinnae; spores 35-50 micron in diameter.

The Small Grape Fern is distinguished mainly by its small size and smooth-edged divisions of the blade. In appearance the plants are sometimes similar to forms of *B. matricariaefolium* and then the larger size of the spores alone will separate them. Clausen (1938) reports it as common in Maine, and from Cumberland, Lunenburg and Yarmouth Counties in Nova Scotia, with no mention of New Brunswick or Prince Edward Island. The Cumberland record is probably the same as Lawson's (1889) and Macoun's (1883-1890) record for Truemanville; and that for Yarmouth County based on Fernald's

(p. 187, 1921) collection: "Rare: a small colony of extremely dwarf plants, sandy and gravelly beach of Cedar Lake".

Newfoundland to New Jersey and Pennsylvania west to British Columbia and California. Europe and Asia.

Matricary Grape Fern

3. *B. matricariaefolium* A. Br.

The name of the European plant was first suggested by A. Braun, and published in 1843. The American plant has often been considered a separate species and named *B. neglectum* Wood. The differences between the plants are at present considered insignificant. It has also been known as *B. ramosum* (Roth) Aschers.

Fronds 1-2.5 dm. high; the sterile blade oblong to ovate, varying from merely lobed to twice-divided, 1-4 cm. long, short-stalked, the lobes oblong-ovate and with rounded teeth; spores 25-35 mm. in diameter.

The Matricary Grape Fern is separated from the Small Grape Fern by its more lobed blades and smaller spores. It is very similar in size and appearance to the next, but is separated from it by the blade being slightly stalked and by having its lobes rounded instead of pointed. It is usually found in rich humus soil in hardwoods. Clausen (1938) reports it from Annapolis, Cumberland, Kings and Inverness Counties; and these records refer to the following: "Rare, a solitary plant in mixed woods, southern slope of the North Mountain, Middleton", Fernald (1921); "Pictou, Truemanville, Blomidon", Lawson (1889); "Other species commonly encountered on bleak exposed headlands are *Botrychium ramosum* etc.," Nichols (1918).

Newfoundland to Alberta south to Maryland and Ohio; northern Eurasia.

Lance-Leaved Grape Fern

4. *B. lanceolatum* (S. G. Gmel.) Angstrom. var. *angustisegmentum*, Pease and Moore.

Discovered in Russia and named *Osmunda lanceolata* by Gmelin and later transferred to *Botrychium.* This is essentially an European and boreal plant. In 1906 Pease and Moore pointed out the differences of the southern variety, which is sometimes regarded as a separate species, *B. angustisegmentum* (Pease and Moore) Fernald.

Plant 1-3 dm. high; sterile blade near the top of the plant, 2-5 cm. long, broadly traingular, not stalked, once-divided, the pinnae with narrow sharp teeth; fertile part with spreading branches; spores 25-35 micron in diameter.

The Lance-leaved Grape Fern is distinguished by its unstalked triangular blade with the sharp-pointed lobes. It is apparently rare in the province. Lawson (1889) reported it from Truemanville; Clausen (1938) from Cumberland and Inverness Counties; and there is a specimen in the herbarium at the Agricultural College from a rich wooded hillside, Moose River, Cumberland County.

Usually growing in rich hardwood soil, Newfoundland to Wisconsin south to Pennsylvania and West Virginia.

Cut-Leaved Grape Fern

5. *B. dissectum* Spreng.

This fern was discovered in Virginia and sent to Sprengel who named it in 1804. The following variety, long considered a separate species, was named *B. obliquum* in 1810. Fernald, (p. 151, 1921), states that along "the railroad southeast beyond Yarmouth . . . *Botrychium dissectum* and var. *obliquum* were very abundant and here, as elsewhere in Nova Scotia and the eastern states, show such a connecting series as clearly to indicate that they are mere forms of the same plant, and since *B. dissectum* Spreng. has a priority of six years over *B. obliquum* Muhl. it is necessary to call the latter *B. dissectum*, forma *obliquum.*"

Plants rather slender, 1-3 dm. high; sterile blade long-stalked, joined to the fertile part near its base and about two-thirds its height, triangular, twice to three times divided,

with the long segments deeply cut into numerous linear lobes.

The finely-dissected blade of this fern separate it from the other grape ferns. Frequent or common in sandy or gravelly, either open or turfy soils of Digby, Yarmouth and Shelburne Counties; older records are from Mount Uniacke, New Germany and Halifax.

Nova Scotia to Minnesota south to Florida and Missouri.

6. Forma *obliquum* (Muhl.) Fernald.

Similar to *B. dissectum* and of very similar range, but with the segments smooth or lobed at the base and merely finely toothed; terminal divisions oblong-lanceolate, much narrower than in *B. multifidum.*

Frequent to common in the southwestern counties, growing with the typical form. It becomes much rarer eastward to Kingston, Kings County; Halfway River, Cumberland County; and Folleigh Lake, Colchester County.

Leathery Grape Fern

7. *B. multifidum* (S. G. Gmel.) Rupr. Fig. 7.

Gmelin named a Russian plant *Osmunda multifida*, and Ruprecht in 1859 placed it in the genus *Botrychium.* In Gray's Manual this plant is mistakenly associated with *B. ternatum* (Thunb.) Sw. of Europe as var. *rutaefolium* (A. Br.) D. C. Eaton; and in Britton and Brown the name *B. matricariae* (Schrank) Speng. is used.

Frond 1.5-3 dm. high; sterile blade long-stalked, connected near the base of the plant, leathery in texture, triangular, 4-14 cm. wide, twice to three times divided with the divisions crowded and ovate to oblong, sometimes lobed or bluntly toothed; fertile portion stout, twice the height of the sterile portion. and much branched.

The Leathery Grape Fern is very variable in size and texture in the province, and large luxurient forms approach var. *intermedium* (D. C. Eaton) Farwell. (*B. silaefolium* Presl.). However, since the blade is rather thick with crowded

segments, I am treating them all as variations of typical *B multifidum*. This fern is found in moist woods, grassy pastures and sandy hillsides from Digby County to Cape Breton, and is apparently rare or absent from the southwestern counties. Clausen (1938) reports it from Inverness, Colchester, Cumberland, Kings and Digby Counties. In Kings and Colchester it is frequently seen in pastures and hillsides and it is probably the commonest member of the family throughout most of the province.

Newfoundland to Alberta south to New York; northern Europe and Asia.

Rattlesnake Fern

8. *B. virginianum* (L.) Sw. Map 11.

Although this species occurs in Europe and Asia, Linnaeus first described and named plants from Virginia. The species was placed in Botrychium in 1801.

Four varieties were described by Butters, and the Nova Scotian specimens listed were placed in var. *intermedium* Butters. However, since most students of the *Botrychia* have difficulty in separating these forms, they merge var. *intermedium* with the typical form and unite var. *laurentianum* with the fourth as var. *europaeum* Angstrom. Butters F.K. *Botrychium virginianum* and its American Varieties. Rhodora. 19:207-216. 1917.

Plant usually growing singly, 4-6 dm. high; sterile blade triangular, of three main divisions, sessile, attached half-way up the plant and almost horizontal, 15-30 cm. wide, and finely divided; fertile portion slender with numerous slender erect branches.

This fern is the most graceful and distinctive of the genus. It is frequent, but never abundant in rich shady woods from Annapolis to northern Cape Breton. Nova Scotia to British Columbia south to Florida and California.

Var. *europaeum* Angstrom has a less dissected, comparatively thick and firm-textured sterile blade and generally

larger sporangia. This seems to be more of a northern form of the plant known from Labrador and Newfoundland south to northern New Brunswick, northern Maine and westward; also in northern Europe.

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