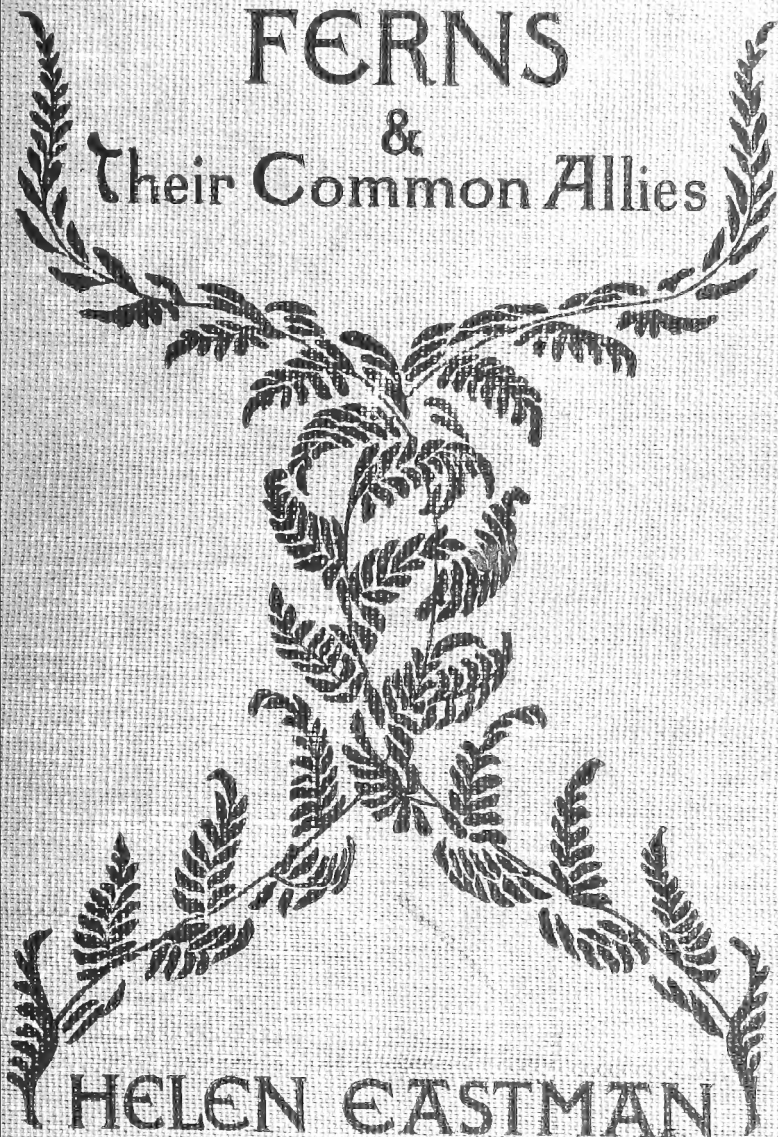


NEW ENGLAND FERNS

&
Their Common Allies



HELEN EASTMAN

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NEW ENGLAND FERNS AND
THEIR COMMON ALLIES



BULBLET BLADDER FERN

NEW ENGLAND FERNS
AND
THEIR COMMON ALLIES

AN EASY METHOD OF
DETERMINING THE SPECIES

BY
HELEN EASTMAN

ILLUSTRATED



BOSTON AND NEW YORK
HOUGHTON, MIFFLIN AND COMPANY
The Riverside Press, Cambridge

1904

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PREFACE

THE study of ferns has been considered very difficult ; indeed, almost too puzzling for the person of average ability to undertake. Hence many lovers of nature remain unacquainted with these beautiful plant forms, so far as knowing their names, habits, and haunts is concerned. It is surprising how the difficulties vanish when one is thoroughly intent on overcoming them ; and the task is a fascinating one.

In recent years there has been a manifest and growing desire on the part of many to gain some knowledge of the subject. With the increase of interest, arises a demand for an illustrated field-book that shall be concise, inexpensive, and adapted to the needs of the beginner. It is with a view to supplying this demand that the following pages have been prepared.

No minutely detailed description has been given of any of the plants, but sufficient will be found, with the aid of the illustrations, to enable one easily to identify the different species.

Whenever two species resemble each other,

the distinguishing points of difference have been clearly noted, and if these are carefully studied, any difficulty in determining them will be obviated.

In the Fern Family much confusion is apt to arise from laying too much stress on the indusium as a means of identification, since it must be found in a certain stage of development to be of value in determining the species. Just when it is properly mature, the beginner is not likely to know, and not a few students have become discouraged at the outset by this method of identification which is made prominent in nearly all botanical works.

Hence I have endeavored to set forth other points of difference which are more stable, and come more easily under the observation of the amateur, while the indusium has been described for those who depend upon it.

The Fern Family has been treated first, it being considered the most important of the four families represented. The remaining three families follow in order, according to the beauty of their forms.

Only a few of the more common species of the Club-Moss and Horsetail Families have been included. These are so often found during fern-hunts that one naturally desires to know something about them.

The order of arrangement of the species has been made to suit the plates, which in a work of this kind must necessarily be limited in number. Sometimes two species which do not come in the usual botanical order have been grouped on the same plate.

While the present work is limited in its treatment, it is hoped that by its aid many who have hitherto looked upon our ferns and evergreens with simply an admiring eye, may be able to recognize their different forms by name, learn their favorite haunts and the manner and time of fruiting, and thus become somewhat familiar with these common and beautiful plant forms which play such a conspicuous part in completing the attractions of natural scenery.

With the exception of a few of the illustrations, the photographs for the plates have been produced by an *entirely original* process by Wilbur Eastman and the author.

Gray's nomenclature has been used as being the one most popular, but Britton and Brown's has been included in parentheses when it differs.

While the author has had access to modern fern literature, the book is not a mere compilation, but comprises the results of years of personal observation and study of the distinguishing characteristics of the species.

The writer is indebted to Mr. G. E. Davenport for material furnished, and for a number of timely suggestions.

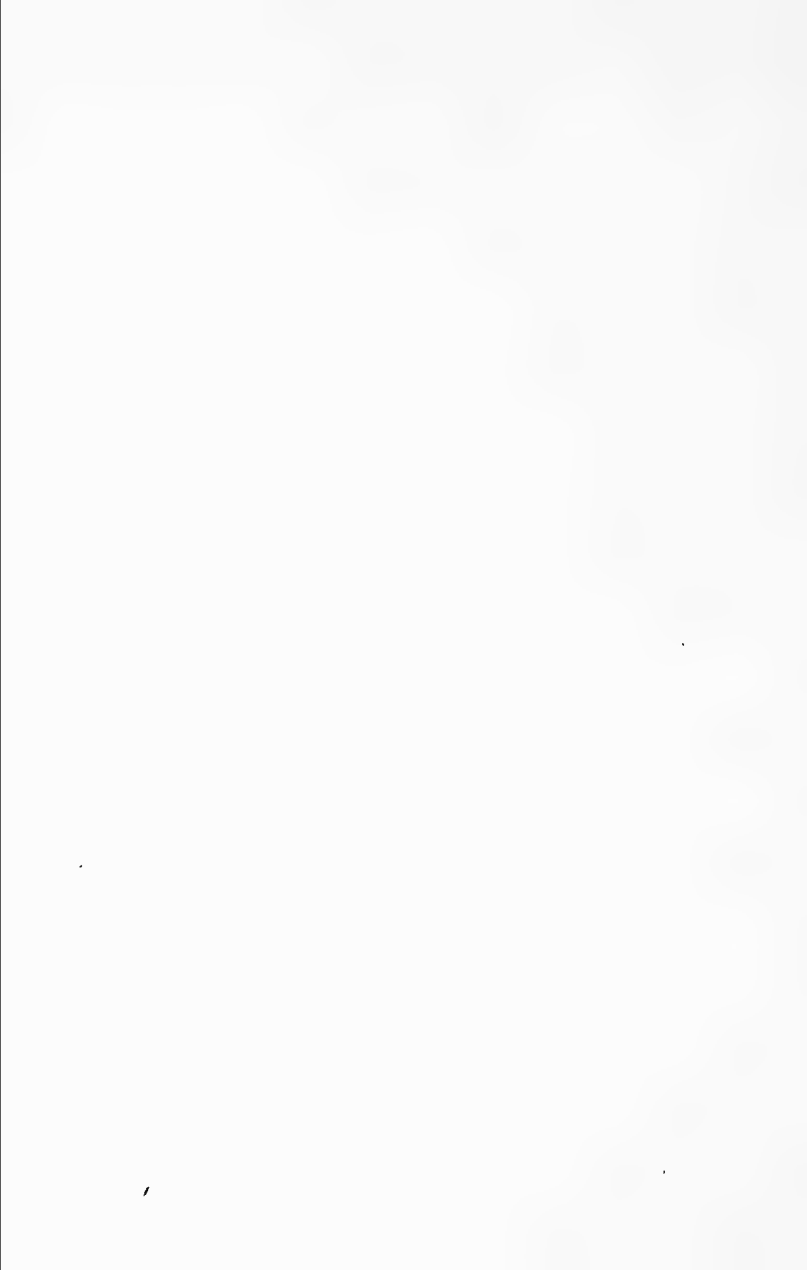
HELEN EASTMAN.

WELLS RIVER, VT.

April, 1904.

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FRUITING SEASONS OF THE SEVERAL SPECIES.

IT will be noticed that more species fruit in July than in any other month. A few early fruiting species mature very rapidly, hence great watchfulness is necessary if one wishes to find the fruit at its best.

APRIL, MAY.

Field Horsetail.
Sedge-like Horsetail.

MAY.

Interrupted Fern.
Wood Horsetail.

MAY, JUNE.

Cinnamon Fern.
Little Grape Fern.

JUNE.

Rusty Woodsia.

JUNE, JULY.

Adder's-Tongue.
Fragile Bladder Fern.
Lance-leaved Grape Fern.

Matricary Grape Fern.
Moonwort.
Royal Fern.
Scouring-Rush.
Rattlesnake Fern.

JULY.

Blunt-lobed Woodsia.
Boott's Shield Fern.
Broad Beech Fern.
Bulblet Bladder Fern.
Clinton's Wood Fern.
Common Club-Moss.
Common Polypody.
Crested Marginal Fern.
Crested Shield Fern.
Ebony Spleenwort.
Festoon Ground Pine.
Fragrant Shield Fern.
Goldie's Fern.
Hairy Dicksonia.
Long Beech Fern.
Maidenhair Spleenwort.
Mountain Spleenwort.
New York Fern.
Northern Woodsia.
Oak Fern.
Pinnatifid Spleenwort.
Pipes.
Smooth Woodsia.
Spinulose Wood Fern.

Stiff Club-Moss.
Tree Club-Moss.
Walking Fern.
Wall Rue Spleenwort.

JULY, AUGUST.

Christmas Fern.
Green Spleenwort.
Lady Fern.
Maidenhair.
Purple Cliff Brake.
Sensitive Fern.
Slender Cliff Brake.
Virginia Chain Fern.

JULY TO SEPTEMBER.

Silvery Spleenwort.

AUGUST.

Braun's Holly Fern.
Common Brake.
Fir Club-Moss.
Marginal Wood Fern.
Marsh Fern.
Ostrich Fern.
Scott's Spleenwort.
Swamp Evergreen.

AUGUST, SEPTEMBER.

Dodge's Fern.
Net-veined Chain Fern.

SEPTEMBER.

Climbing Fern.
Narrow-leaved Spleenwort.

SEPTEMBER, OCTOBER.

Common Grape Fern.
Dissected Grape Fern.

PREFERRED HABITATS OF THE
SEVERAL SPECIES.

Dry rocks and cliffs, with more or less shade.

Common Polypody.
Fragrant Shield Fern. (High altitudes.)
Pinnatifid Spleenwort.
Rusty Woodsia.

Moist cliffs, with shade.

Fragile Bladder Fern.
Green Spleenwort. (High altitudes.)
Mountain Spleenwort.
Northern Woodsia. (High altitudes.)
Smooth Woodsia. (High altitudes.)

Dry calcareous rocks and cliffs, with more or less shade.

Purple Cliff Brake.
Scott's Spleenwort.
Walking Fern.
Wall Rue Spleenwort.

Moist calcareous rocks and cliffs.

Bulblet Bladder Fern.
Maidenhair Spleenwort.
Slender Cliff Brake.

Moist thickets, marshes and swamps.

Boott's Shield Fern.
Cinnamon Fern.
Climbing Fern.
Clinton's Wood Fern.
Crested Marginal Fern.
Crested Shield Fern.
Dodge's Fern.
Net-veined Chain Fern.
New York Fern.
Royal Fern.
Virginia Chain Fern.

Moist open situations.

Adder's-Tongue.
Dissected Grape Fern.
Interrupted Fern.
Little Grape Fern.
Marsh Fern.
Ostrich Fern.

Moist low ground and along streams.

Scouring-Rush.
Sensitive Fern.

Moist gravelly or sandy soil.

Field Horsetail.

Rich woods, more or less moist.

Braun's Holly Fern. (2000 feet altitude.)

Broad Beech Fern.

Christmas Fern.

Club-Mosses.

Common Grape Fern.

Goldie's Fern.

Lance-leaved Grape Fern.

Long Beech Fern.

Maidenhair.

Matricary Grape Fern.

Narrow-leaved Spleenwort.

Rattlesnake Fern.

Sedge-like Horsetail.

Silvery Spleenwort.

Spinulose Wood Fern.

Wood Horsetail.

Stony soil, with more or less shade.

Hairy Dicksonia. (Light soil.)

Marginal Shield Fern. (Rich soil.)

Shaded, rocky banks.

Blunt-lobed Woodsia.

Ebony Spleenwort. (Prefers limestone soil.)

Shallow water.

Pipes.

Woods, pastures, and waste land.

Common Brake.

Lady Fern.

Moonwort.

HINTS TO THE BEGINNER

1. Remember that the plates are made on a reduced scale and always consult the text with reference to size of the species.

2. Consult the glossary when in doubt as to the meaning of terms.

3. Be careful to note the distinguishing points of difference, and remember that size and position of fruit-dots frequently aid in the identification of the fern.

4. Note also that the *veining*, *margin*, and *form* of the *pinnæ*, the *form* of the *entire frond* or of the *tip* only, and the *color*, *length*, and *surface* of the *stipe* and *rachis*, sometimes assist in determining the species of ferns.

5. Compare the specimen carefully with the text and illustration. Note its manner of growth and habitat.

6. It is well to bear in mind the fact that a young fern is sometimes lighter in color, finer in texture, and that the *pinnæ* are often not so fully developed as in mature fronds.

7. May we add the caution that if any species is found not known to be common, care be taken *not to uproot* any part of it?

FILICES

FERN FAMILY



COMMON POLYPODY. *a.* Fertile frond
WALKING FERN. *b.* Fertile frond. *c.* Sterile frond. *d.* Sterile frond
showing young plant at the tip

FERN FAMILY

POLYPODIUM. Polypody.

THE name is from the Greek *polus*, many, and *pous*, foot, referring to the branching rootstock.

COMMON POLYPODY.

Polypodium vulgare.

Fruond evergreen, somewhat leathery in texture, smooth, and deeply pinnatifid; the divisions obtuse, alternate, obscurely toothed, extending nearly to the rachis and broadening to meet each other there. The midveins make a deep impression on the upper surface of the lobes.

The ferns grow from four to ten inches high, in tangled groups, springing from a creeping, branched rootstock. They are found on dry, shady rocks and cliffs, and sometimes in woods.

The Polypody is one of our most common species. Other names for it are Rock and Snake Fern.

The fruit-dots are naked, round, and very large, arranged in a row each side of the midvein,

midway between it and the margin. They are found on the upper half or more of the frond, and mature in July.

CAMPTOSORUS. Walking Leaf.

The name is from the Greek *kamptos*, bent, and *soros*, a heap, for fruit-dot, referring to the form of the fruit.

WALKING FERN.

Camptosorus rhizophyllus.

Frond from four to twelve inches long, ever-green, heart-shaped or hastate at the base, entire, tapering to a very long, slender point, which, when coming in contact with the soil, takes root and forms a new plant. Its manner of growth suggests steps, whence its common names of Walking Fern or Walking Leaf.

This fern was formerly given as an *Asplenium*, and Pinnatifid Spleenwort was considered a variety.

It grows in tufts on dry, shaded rocks, preferably limestone. In texture it is somewhat leathery. It is an odd and rare fern, although it might be called locally common in a few sections, especially in southern and western New England.

The fruit-dots are oblong, very large, and irregularly scattered on the under surface of the



OAK FERN. *a.* Fertile frond
LONG BEECH FERN. *b.* Fertile frond

frond, more plentifully at the base. The outer ones are often in pairs so that the indusia open face to face, finally becoming confluent and forming crooked lines. Time of maturity, July.

PHEGOPTERIS. Beech Fern.

The name is from the Greek *phegos*, an oak or beech tree, and *pteris*, a fern.

The Beech ferns were formerly classed in the genus *Polypodium*.

OAK FERN.

Phegopteris Dryopteris.

Frond ternate, broadly triangular, from three to five inches wide, the three primary divisions stalked, pinnate, also triangular. The segments are oblong, obtuse, sometimes toothed, and on the lower side of the lateral divisions they are longer than on the upper side. The branches are drooping. The stipe is very long and slender, darker, and slightly chaffy at the base.

This is a very delicate fern, from a few inches to one foot in height, growing in moist, rocky woods. It is quite common in northern New England, but occurs less frequently in the southern part.

The fruit-dots are naked, round, and small, near the margin. They mature in July.

LONG BEECH FERN.

Phegopteris polypodioides (*P. phegopteris*).

Fronde twice pinnatifid, triangular, but longer than it is broad, pale green and downy-hairy, especially beneath. The pinnæ are divided into obtuse, oblong, entire segments, the basal ones united to the winged rachis, with the lowest pair sometimes shorter and usually deflexed or bending forward, giving the fern a peculiarly graceful appearance.

The fronds grow from five to ten inches high, on long stipes, from a creeping rootstock, and are often found in beds.

We may look for this fern in moist, shady places, frequently with the others of this genus, of which it is the most common, especially in the north.

The fruit-dots are naked, small and near the margin; they mature in July.

BROAD BEECH FERN.

Phegopteris hexagonoptera.

Fronde twice pinnatifid, triangular, usually broader than it is long, and slightly downy-hairy; the pinnæ are sessile, and form an angled wing along the rachis. The upper pinnæ are oblong, obtuse, entire or toothed, — the lowest



BROAD BEECH FERN

pair very large and long, broadest in the middle and pinnately lobed, the segments serrate.

While similar in form to the Long Beech Fern, there are points of difference which cannot fail to distinguish it. It is more *broadly triangular*,—often from five to ten inches broad,—and grows *more erect* than the Long Beech Fern. It is also *darker* in color, *thinner* in texture, and the lowest pinnæ are broader, much *elongated*, and are *not often deflexed*.

It grows in similar situations with the others of this group, viz., moist, shaded places, but it prefers open woods. It is a common fern in southern New England, but is found only occasionally in the north.

The fruit-dots are naked, round, small, and not exclusively near the margin, although mostly so. They mature in July.

ASPIDIUM. Shield Fern. Wood Fern.

The name is from the Greek *aspidion*, a small shield, referring to the form of the indusium. This is kidney-shaped or circular, fixed either at the sinus or centrally.

Another nomenclature which is rapidly gaining in favor, includes under **NEPHRODIUM** all species with *kidney-shaped indusia*, and under **POLYSTICHUM** all species with *free veins* and *circular indusia* fixed centrally.

The favorite habitat of several species of this genus is woods. A number of the species are evergreen and include some of our most beautiful ferns.

MARSH FERN.

Aspidium Thelypteris (*Dryopteris Thelypteris*).

Fronde pinnate, the pinnæ horizontal or at right angles to the rachis, and deeply cut into segments which are oblong, obtuse, and entire, or occasionally coarsely toothed, with the veins mostly forked.

This is a fern of delicate texture, found abundantly in moist, open places, often growing two feet or more high. It is sometimes called the Meadow Fern.

It bears some resemblance to both the New York and Dodge's Ferns, — see the description of these ferns for the distinguishing points of difference. Two features we will mention here which may aid in its identification. The stipe is smooth and *unusually long*, and the pinnæ are *broadest next to the rachis*.

The young fronds are often sweet-scented, — sometimes when fresh and under a hot sun, but more often while drying after being picked.

The fertile fronds are sometimes paler when young than the sterile, but grow darker with age, and when fruited the pinnæ recurve or



MARSH FERN. *a.* Pinna from an occasional form



NEW YORK FERN

twist out of a horizontal position, the tips often bending downward.

The fruit-dots are small, and soon become confluent near the margin, which is strongly reflexed. They mature in August. The indusium is delicate, kidney-shaped, and fixed by its sinus.

NEW YORK FERN.

Aspidium Noveboracense (*Dryopteris Noveboracensis*).

Fronde pinnate, the pinnæ deeply cut into narrow, oblong, obtuse, and entire segments, — the lower pairs of pinnæ gradually becoming shorter, often reducing to mere lobes. It is slightly hairy on the under surface following the veining, which is simple.

It is very noticeable for its oval outline, the frond *tapering both ways* from the middle. This alone serves to distinguish it from the Marsh and Dodge's Ferns, to which in some other points it is similar. It is also a paler shade of green and more delicate than the former fern, and its manner of growth is much more graceful.

It is said to prefer swamps and moist thickets, although we have seen it, apparently at its best, in somewhat dry, shady situations. It grows from one to two feet high, and is quite common, frequently being found in large beds.

The fruit-dots are distinct and near the margin, which is not revolute. They mature in

July. The indusium is minute, kidney-shaped, with glandular margin, and is fixed by its sinus.

DODGE'S FERN (MASSACHUSETTS FERN).

Aspidium simulatum (Dryopteris simulata).

Fronde pinnate, the pinnæ deeply cut into oblong, obtuse, entire, or slightly toothed lobes.

The fern is delicate in texture and downy-hairy in all its parts, especially along the midveins. The margin of the lobes has a few coarser hairs. The stipe is slightly chaffy at the base.

It bears some resemblance to the New York Fern, but can be identified readily by its form, which is a *trifle narrower* at the *base* than in the middle. In this and many other respects it is very similar to the Marsh Fern. But two points will aid in its determination. The pinnæ are usually *broadest* in the *middle*, and the *veins* are *simple*.

The fronds grow singly or sometimes in clusters, and are from one to nearly three feet high.

This fern prefers cool, woodland swamps. It is rare in northern New England, and not common in the southern part.

The sterile fronds appear first, much shorter, but similar in form to the fertile ones which come up late in the season.

The fruit-dots are distinct, larger than in the



DODGE'S FERN. *a*. Tip of frond, showing a few fruit dots
SPINULOSE WOOD FERN. *b*. Small frond



ASPIDIUM SPINULOSUM var. intermedium

preceding two species, and near the margin, which is sometimes reflexed when the fern grows in the sun. The fruit is brown when mature, late in August or in September. The indusium is kidney-shaped, finely glandular, withering, and persistent.

SPINULOSE WOOD FERN. >

Aspidium spinulosum (*Dryopteris spinulosa*).

Fronde twice pinnate, the pinnæ oblique to the rachis, the lower pairs broadly triangular. The pinnules are set obliquely to the midrib, and connected by a very narrow wing. They are oblong, acute, incised or deeply cut into spiny-toothed lobes. The stipe is rather long and somewhat chaffy.

This fern prefers moist, rich woods, and is found only occasionally. It grows from one to two and one half feet high. The fronds have a somewhat stiff appearance, perhaps owing to their erect manner of growth.

The fruit-dots are small and midway between the midvein and margin. They mature in July.

The indusium is smooth, round-kidney-shaped, and fixed by its sinus.

Var. *intermedium* (Var. *intermedia*).

Fronde from two to three pinnate, the pinnæ oblong-lanceolate, obtuse, spreading; pin-

nules crowded, pinnately parted, spiny-toothed at the apex. The lowest pinnæ are unequally triangular-ovate in form, the pinnules being considerably longer on the lower side than those on the upper side. The stipe is slightly chaffy.

The fronds are from one to two and one half feet long, and are evergreen, lying flat during the winter.

This is a beautiful, feathery fern, abounding in woods throughout our range, being much more common than the type form.

The fruit-dots are round and small; they mature in July. The indusium is glandular.

Var. *dilatatum* (Var. *dilatata*).

This is a form found principally in mountain woods. The frond is tripinnate, the lowest pair of pinnæ triangular in form, the pinnules on the lower side being *conspicuously elongated*. It can be distinguished from var. *intermedium* by its *broadly ovate* outline.

The indusium is smooth and naked.

PURDIE'S CONCORD NEPHRODIUM.

Aspidium spinulosum Concordianum (*Dryopteris spinulosa Concordiana*).

This is a fern discovered in a rich woodland swamp in Concord, Massachusetts, in 1902, by



FERTILE PINNÆ OF ASPIDIUMS

a. Marsh Fern. *b.* New York Fern. *c.* Goldie's Fern. *d.* Crested Shield Fern



POOTT'S SHIELD FERN. Tip of frond

H. A. Purdie, and described by G. E. Davenport in "Rhodora," February, 1904.

It is much more finely divided than var. *intermedium*, with the general outline of var. *dilatatum*. The fronds are tripinnate throughout, the pinnæ somewhat triangular, with long, tapering tips.

The frond gradually narrows to a point from below the middle. The pinnules on the lower side of the basal pinnæ are longer than those on the upper, being sometimes two inches in length.

The ultimate segments are narrow, often stalked, and deeply cut into oblique divisions. The stipe is channeled in front and is very scaly, especially at the base. The main rachis and also the secondary rachides or midribs of the pinnæ are chaffy and scaly throughout.

The fern grows to the height of nearly three feet. The fruit-dots do not appear on the apex of the frond.

The indusia are minutely glandular.

BOOTT'S SHIELD FERN.

Aspidium Boottii (*Dryopteris Boottii*).

Frond nearly twice pinnate, the lowest pinnæ triangular-ovate, the upper, longer and narrower; pinnules broadly-oblong, obtuse, the lower pinnatifid, the upper spiny-toothed. The stipe is chaffy, especially at the base.

This fern was formerly considered a variety of the Spinulose Wood Fern, and somewhat resembles var. *intermedium*, but it can be determined by the form of the frond, which *narrows* somewhat at the *base*, also by the pinnules, which are *less deeply cut*.

It is noticeable for the erect growth of the fronds, which are from one to two and one half feet high.

It is found in wet thickets and about ponds frequently.

The sterile fronds are usually smaller than the fertile ones, and are evergreen.

The fruit-dots are large ; they mature in July. The indusium is minutely glandular, round-kidney-shaped, and fixed by its sinus.

MARGINAL SHIELD FERN.

Aspidium marginale (Dryopteris marginalis).

Frond twice pinnate, the pinnæ lanceolate, broadest a little above the base. The pinnules are oblong-scythe-shaped, obtuse or pointed, entire, crenately toothed, or occasionally deeply cut, the upper ones becoming confluent at the tip. The stipe and rachis are channeled, and, in large fronds, the midribs of the pinnæ. The stipe is very chaffy.

This is a well-preserved evergreen fern, and is sometimes called the Evergreen Wood Fern.



a. MARGINAL SHIELD FERN
b. FORMA DAVENPORTII. Tip of frond



CRESTED SHIELD FERN

The fronds lie on the ground during the winter. It grows everywhere, especially in hilly and rocky places, varying greatly in height from a few inches to two feet, according to its location.

There is a great contrast in the color of the young and old fronds, the young ones being a light, delicate green, the mature ones rather dark blue-green, smooth, and somewhat leathery in texture, with conspicuous veining.

The fruit-dots are large, round, and close to the margin, whence the common name of the fern. They mature in August. The indusium is smooth, fixed by its sinus, and persistent.

We illustrate *forma Davenportii* which is crested and variable.

CRESTED SHIELD FERN.

Aspidium cristatum (*Dryopteris cristata*).

Fronde lance-shaped or linear-oblong in outline, narrowing slightly at the base. It is nearly twice pinnate, the pinnæ deeply cut into obtuse, oblong, finely serrate, or toothed divisions. The lower pairs of the pinnæ are broadest at the base and somewhat triangular in form. Sometimes a few of the lowest lobes near the rachis extend nearly to the secondary rachis or mid-vein.

The veins make a deep impression on the

upper surfaces of the pinnæ, which are quite heavy in texture. The stipe is chaffy.

Its habitat is swamps, where it is found rather common, growing from one to two feet high.

The sterile fronds lie close to the ground and are broader and shorter than the fertile ones. They also have shorter stipes and are evergreen.

The fruit-dots are large, half-way between the midrib and margin; they mature in July. The thin indusia are smooth, naked, and round-kidney-shaped, the sinus shallow.

CLINTON'S WOOD FERN.

Aspidium cristatum Clintonianum (*Dryopteris cristata Clintoniana*).

This is a larger fern than the typical form, being from two to three feet high. Frond nearly twice pinnate; pinnæ deeply pinnatifid, the divisions linear-oblong, obtuse, obscurely serrate, or the lowest ones sometimes pinnately lobed. The stipe is chaffy, with bright brown scales.

It is usually found with the type in swampy woods, but is not termed common. It is a showy fern, and is often mistaken for Goldie's Fern, but may be distinguished by the pinnæ being *broadest at the base*, also by the color, which is *lighter green*.



CRESTED MARGINAL FERN. Tip of frond. *a*. Fertile pinna

The fruit-dots are round, large, and near the midrib; they mature in July. The indusium is thin, smooth, and fixed by a shallow sinus.

CRESTED MARGINAL FERN.

Aspidium cristatum × *marginale* (*Dryopteris cristata* × *marginalis*).

Fronde pinnate, the pinnæ variable; the lower one-third having the appearance of *A. cristatum*, with stalked, triangular-ovate, *obtusè* pinnæ, cut into a few very obtuse, serrate divisions, which next to the rachis nearly reach the midrib, and are pinnatifid with toothed lobes; the upper two-thirds resembling *A. marginale*, with pinnæ short-stalked, long, pointed, cut into oblong, obtuse, slightly curved, entire or finely serrate divisions, those near the rachis cut almost to the midrib and again pinnatifid with toothed lobes. The veining is quite conspicuously depressed. The stipe is long, channeled, and both that and the rachis are usually scaly or chaffy.

The fronds are somewhat leathery in texture. They are from one foot to two and one half feet high, and from four to eight or nine inches broad in the middle, tapering both ways, although not narrowing fully down at the base. The sterile fronds are smaller than the fertile.

This fern is found in the borders of swamps. It seems to occur rarely in northern New Eng-

land, possibly because it is not recognized, and it is not a common species in the southern part, being found only occasionally.

The Crested Marginal Fern is a hybrid between *A. marginale* and *A. cristatum*, bearing strong resemblance to the latter. It can be distinguished by its fronds growing *in crowns*, the *very broad* upper two-thirds of the fronds, and by the *tapering* pinnæ.

From the Marginal Shield Fern it can readily be determined by the *short, obtuse, triangular pinnæ* of the lower one-third of the frond.

The fruit-dots are rather large, nearer the margin than the midvein. The indusia are smooth, and convex before mature, in August.

FRAGRANT SHIELD FERN.

Aspidium fragrans (*Dryopteris fragrans*).

Frond nearly twice pinnate, the pinnæ deeply parted into crowded, oblong, obtuse, toothed or nearly entire lobes or segments. The stipe and rachis are chaffy.

The fronds are lanceolate in form, slightly narrowed at the base. They grow in a crown, and are small, being from four to twelve inches high. They are fragrant, whence the name.

This fern grows in the mountains of northern New England, on dry rocks and cliffs near falling water.



GOLDIE'S FERN. Tip of frond

The fruit-dots are round and large, nearly covering the under surfaces of the pinnæ at maturity in July. The thin indusia are imbricated and persistent, with margin ragged and slightly glandular, the sinus narrow.

GOLDIE'S FERN.

Aspidium Goldianum (Dryopteris Goldieana).

Fronde broadly ovate, pinnate, the pinnæ from six to nine inches long, pinnately parted into about twenty pairs of slightly scythe-shaped segments, which are serrate with appressed teeth.

The pinnæ are *broadest in the middle*, one distinguishing difference between this and Clinton's Wood Fern. The fronds are also *very broad*, and rather *suddenly narrowed* at the tip, another distinction from Clinton's Wood Fern.

They grow in a circle from the rootstock and are dark blue-green in color. The stipe is long, chaffy at the base.

This is the tallest of our wood ferns, — from two to four feet high, — and on account of the demand by florists it is fast becoming rare here in New England. It never has been common, not having been found in many localities favorable to its growth.

Its preferred habitat is rich, moist woods. Gray calls it a "stately fern," and it certainly is well termed. The fertile frond is narrower than

the sterile, with round fruit-dots near the midvein which mature in July. The indusium is large, smooth, and persistent, fixed by a narrow sinus, the sides of which often overlap, thus causing the indusium to appear round and entire.

PITTSFORD SHIELD FERN.

Aspidium Pittsfordense (*Dryopteris Pittsfordensis*).

This fern is a new species discovered by Margaret Slosson in Pittsford, Vermont, in 1895, and described by her in "Rhodora" of April, 1904.

It was found growing by the roadside near *Aspidium marginale* and a form of *Aspidium spinulosum* and is thought to be a hybrid between them.

The frond is bipinnate or sometimes tripinnate below. Pinnæ mostly ovate with long tapering tips ; the lowest pair much the broadest and triangular in form. The pinnules are set obliquely to the midrib, connected by a narrow wing, and on the lower side of the secondary rachis or midrib are much longer than those on the upper side. They are oblong, deeply cut into lobes which are irregularly spiny-toothed. The veins are forked.

The stipe is scaly, densely so at the base, becoming chaffy along the main rachis and somewhat so on the midribs of the pinnæ. Both stipe and rachis are grooved.



PITTSFORD SHIELD FERN. Tip of frond



CHRISTMAS FERN

a. Small frond. *b.* Tip of fertile frond. *c.* Portion showing pinnæ of var. *incisum*

The fern grows from one and one half to two or more feet in height. It is somewhat leathery in texture.

It resembles the Spinulose Wood Fern, but is darker, or *blue-green* in color, and the outline of both fronds and pinnæ is *more pointed*.

The fruit-dots are near the margin, kidney-shaped, and covered with leathery indusia.

CHRISTMAS FERN.

Aspidium acrostichoides (*Polystichum acrostichoides*).

Fronde pinnate, the pinnæ somewhat scythe-shaped, half-halberd-shaped at the base, serrulate with appressed teeth. It is from six inches to two feet high, thick, evergreen, and shining. The stipes are chaffy. The mature fronds are rather dark green in color and somewhat leathery in texture, with pinnæ from one to two inches long, short-stalked, and usually alternate.

This is a common fern, especially northward, growing in woods, on hillsides, and in ravines. It is much used for decorations at Christmas time, whence its common name.

The fertile fronds are taller than the sterile, the fruiting pinnæ, which are at the top and include about one third of the frond, being contracted and smaller than the others.

The fruit-dots are round, generally in two rows near the midrib, and become confluent.

They mature in July and August. The indusia are circular and entire, fixed by the depressed centre, and persistent.

Var. *incisum* (*Schweinitzii*).

This fern is so much like the typical form, growing also in similar situations, that to the untrained eye it would scarcely be distinguished unless closely examined. It is found only occasionally, and can always be readily determined by the deeply incised pinnæ.

Its manner of fruiting is also somewhat different from the type. Instead of the fruit being wholly confined to the pinnæ at the upper portion of the frond, a few fruit-dots may be found on the tips of the lower pinnæ, becoming less as the base is neared. They mature at the same time as in the type, — in July and August.

Another variety of the Christmas Fern, *crispum*, in which the pinnæ are ruffled, is also occasionally found.

BRAUN'S HOLLY FERN.

Aspidium aculeatum Braunii (*Polystichum Braunii*).

Frond twice pinnate, with many pairs of oblong-lanceolate pinnæ; pinnules oblong, obtuse, short-stalked, sharply toothed, one-sided, and nearly rectangular at the base. The pinnæ are



BRAUN'S HOLLY FERN. Tip of frond



VIRGINIA CHAIN FERN. Tip of frond

covered with long and soft hairs, and are chaffy on the under side ; the stipe and rachis also are very chaffy.

The frond is oblong-lanceolate in form, tapering both ways from the middle, the lower pinnæ being gradually reduced in size.

This fern was first discovered on Mt. Mansfield, Vermont, by Pursh in 1807. It is considered by some to be a distinct species.

It may be termed rare, as it is seldom if ever found below 2000 feet altitude, growing in deep, moist woods in northern New England. The fronds are from one to two and one half feet long, and grow in crowns.

The fruit-dots are round and near the mid-vein ; they mature in August. The indusium is circular and entire, fixed by the depressed centre.

WOODWARDIA. Chain Fern.

This genus was named for Thomas J. Woodward, an English botanist.

The chain-like rows of the fruit dots give rise to the English title.

VIRGINIA CHAIN FERN.

Woodwardia Virginica.

Frond pinnate, the pinnæ deeply cut into oblong, obscurely serrulate segments. The veins

form a row of meshes along the midribs both of the pinnæ and segments, the outer ones being free.

This is a large, broad fern, from two to three feet high, bearing some resemblance to the Osmundas, especially to the Cinnamon Fern. But in the Virginia Chain Fern the fronds grow *singly*, — *not* in *crowns*, — from a creeping root-stock six or eight feet in length. The *pinnæ* are also *farther apart* than in the Osmundas, and *narrowed* a bit next to the rachis.

It is sometimes called the Bog Fern. Its habitat is low places and swamps, often in water, usually near the coast, but occasionally it is found along the border of inland ponds.

The fertile and sterile fronds are very similar in form and rather heavy in texture, pale green and somewhat glossy, with smooth, long, dark stipes.

The fruit-dots are oblong, arranged in a chain-like row along the midribs both of the pinnæ and lobes. They become confluent and very heavy when mature in July and August.

The indusium is somewhat leathery, fixed by its outer margin to a veinlet, and opening on the side next to the midrib.



NET-VEINED CHAIN FERN



NET-VEINED CHAIN FERN. *a.* Fertile frond
ROYAL FERN. *b.* Fertile tip of frond

NET-VEINED CHAIN FERN.

Woodwardia angustifolia (*W. areolata*).

The sterile fronds of this fern, which are the first to appear, are pinnatifid, with lanceolate divisions united by a broad wing, which becomes narrower at the base of the frond. The veining is a beautiful system of net-work.

It grows in tufts from a creeping rootstock, and is found in swamps and wet woods usually near the coast. It is a rare fern north of Massachusetts.

The sterile fronds are one foot or more high, and at first glance resemble the sterile fronds of the Sensitive Fern. While both alike are pinnatifid, the divisions in this are *minutely toothed*, and it cannot be confused with the Sensitive Fern if this difference is noted. Especially will any doubt be dispelled when the fertile fronds are seen. These appear in June, later than the sterile fronds, and are quite unlike them. They are several inches taller, with long, heavy stipes, both the stipe and rachis black and shining. The fronds are nearly pinnate, with widely separate, narrowly linear divisions, just wide enough to bear a single row of long, chain-like fruit-dots each side of the secondary midribs. These mature in August and September.

The indusia are the same as in the preceding species.

OSMUNDA. Flowering Fern.

The name is from *Osmunder*, a Saxon name for the divinity Thor.

The *Osmundas* are a group of ferns all of which are of large proportions. They produce but one crop of ferns each year unless disturbed, fruit very early, and are all among our most common species. They are frequently mis-called "brakes."

None of the species of this genus have any indusia.

ROYAL FERN.

Osmunda regalis.

Fronde twice pinnate ; pinnæ distant, opposite, each with several pairs of alternate pinnules, with an odd one at the end. These pinnules are an inch or more in length, entire, varying in form from oblong-oval to lance-oblong, finely toothed, and sessile or nearly so. The stipe and rachis are smooth and shining.

The fronds grow in crowns, in swamps, wet woods and fields, and sometimes form hedges on the borders of ponds and lakes. They are pale green, very smooth and delicate, and from two to five feet high.



a. ROYAL FERN. *b.* Portion showing pinnæ



CINNAMON FERN. *a.* Tip of sterile frond. *b.* Tip of fertile frond

This species is scarcely fern-like in appearance. The fresh fronds are especially beautiful in the spring when they have a pinkish tint.

The fertile fronds grow in the middle of the crown of sterile ones, and are similar in form excepting at their summit, where the fruit forms in a flower-like panicle. It is from this resemblance to a flower that it sometimes receives the name of Flowering Fern. The fertile portion is at first a yellowish green, becoming a rich brown after maturity in June and July. Unlike the other species of this genus, the fertile portion persists many weeks.

This is the only fern of this genus that is found in Europe.

CINNAMON FERN.

Osmunda cinnamomea.

Sterile fronds pinnate, the pinnae deeply cut into broadly oblong, obtuse, entire lobes. A bit of cinnamon-colored wool is often found at the base of each pinna. This and the absence of the deeply channeled stipe of the Ostrich Fern are sufficient to distinguish it, when not in fruit, from the latter, which it resembles.

A glance at the tips of all of the large ferns which bear resemblance to each other is often of service in determining the species, as the

difference in form is frequently more marked at the tips than elsewhere. Compare the illustrations.

The Cinnamon Fern grows in swamps or wet places, in large bunches, and is very common. The sterile fronds appear a trifle later than the fertile ones, and grow taller, sometimes from three to five feet high. They are clothed with rusty wool when young. Occasional *forms* occur with the type.

The fertile fronds are few, from one to two feet high, erect, and in the centre of the crown at maturity. They are twice pinnate, contracted, and covered with sporangia which are at first a bright green, but later become cinnamon-colored and soon wither, leaving the sterile fronds to mature later. The fertile fronds usually mature in May or early in June.

The pinnæ of the sterile fronds of the Cinnamon Fern wither with the early frosts and fall from the rachides, leaving the crown of naked stems to stand somewhat erect during the winter, unless lodged by the weight of snow.

INTERRUPTED FERN.

Osmunda Claytoniana.

Sterile fronds pinnate ; pinnæ deeply pinnatifid, with broad, oblong, obtuse, and entire lobes, which are more blunt than those of the Cinna-



INTERRUPTED FERN. Portion of fertile frond



INTERRUPTED FERN. Tip of frond



INTERRUPTED FERN



OSTRICH FERN. Tip of frond

mon Fern to which it bears some resemblance. It is sometimes called Clayton's Fern. When young the fronds are covered with woolly hairs, but they soon become smooth.

This is a common species, growing in crowns in low ground, often by the roadside, and preferring stony soil.

It fruits as the fronds unfold. The fertile fronds are the taller, — from two to four feet high, appearing in the middle of the crown at maturity, and surrounded by the shorter and gracefully drooping sterile fronds.

The fertile fronds are similar in form to the sterile ones above and below the centre, where they are interrupted by from two to five pairs of contracted fertile pinnæ which are entirely pinnate. These are at first greenish but soon become dark brown, withering and falling off by midsummer. The fruit matures rapidly in May.

The pinnæ of both sterile and fertile fronds wither with the early frosts and fall from the rachides as in the Cinnamon Fern.

ONOCLEA.

The name is from the Greek *onos*, a vessel, and *kleio*, to close, alluding to the berry-like fertile frond.

OSTRICH FERN.

Onoclea Struthiopteris.

By some this fern is restored to its original place under *Struthiopteris Germanica*. The sterile fronds, which are the first to appear, are pinnate, the pinnæ linear-lanceolate, deeply cut into narrow, acute, slightly scythe-shaped lobes, with free veining. The middle pinnæ are often eight inches long, the lowest ones mere lobes. The basal segments of the pinnæ — those next to the rachis — are elongated and meet the ones on the opposite side of the rachis, thus clasping it in a peculiar manner. The stipe and rachis are somewhat angular and very heavy. The fronds grow in a crown, the rootstock being raised several inches above the surface of the ground.

This, and some of the *Osmundas*, are the tallest of our New England ferns, sometimes reaching the height of five feet or more, although commonly not more than three feet high.

The Ostrich Fern is found in low, moist ground, frequently along streams. It is not a common species anywhere in New England, especially in the southern part.

Those who are puzzled by any resemblance to the Cinnamon Fern can identify it easily, in



OSTRICH FERN. *a*. Tip of fertile frond
SENSITIVE FERN. *b*. Fertile frond

the absence of fertile fronds, by the form of its sterile frond which *tapers both ways* from the middle ; by the smooth, *heavy stipe* and *rachis*, *deeply channeled* in front ; the *channeled mid-veins* of the pinnæ ; and by the *suddenly contracted* tip of the frond. Its manner of growth is also different from that of the Cinnamon Fern. In the early season it is quite *erect*, while the fronds of the Cinnamon Fern are more spreading and gracefully drooping.

Underground stolons spread from the root-stock, which in due time bear fronds. One root-stock of the Ostrich Fern coming under the author's observation, during twenty years, increased in this manner to fifty plants.

The fertile fronds are few, erect, closely grouped, very rigid and heavy, and appear in the middle of the crown of sterile fronds in July. They are from one foot to one and one half feet high, light green at first, but become very dark green or brownish in color. These fronds are pinnate, the necklace-shaped, contracted pinnæ at first concealing the spore-cases. The fruit matures in August, but the spores do not escape until the following spring. The indusium is very delicate and hood-like.

The fertile fronds remain erect during the winter, in spite of any weight of snow, and often may be found the second summer quite regular

in form. The sterile fronds wither with the autumn frosts.

SENSITIVE FERN.

Onoclea sensibilis.

The sterile fronds are pinnatifid, often broadly triangular, with few, oblong-lanceolate divisions, — the lower ones nearly reaching the midrib, the upper ones less deeply cut, and all more or less wavy-toothed. The veins form a series of meshes.

This is one of our most common species, growing in moist places in fields, by the roadside, and along streams, — in fact everywhere in low, moist land. It is too coarse to be called beautiful, and yet when found along streams by our roadsides, it adds variety to the scene, and has a charm all its own, with its peculiar form and delicate color.

When found in exposed places it is usually only a few inches high, but in somewhat shady locations it often grows very rank, sometimes nearly two feet in height. The stipe is long.

The fronds are scattering, pale green, smooth, delicate in texture although somewhat thick, and sensitive to early frosts. Possibly its common name originated from this latter characteristic. It certainly is well named, for it is

really *sensitive*, withering very quickly when picked.

In some sections of New England this fern is wrongly called the "Polypod," or "Polypod brake," although it bears no resemblance to that species. There is quite a similarity in form to the Net-veined Chain Fern, but the divisions in the sterile frond of the Sensitive Fern are *not minutely toothed* as in the Net-veined Chain Fern, hence can be identified readily before the fertile fronds appear. These are usually few, and do not appear until June.

They are twice pinnate and much contracted. The pinnules are so rolled as to become berry-shaped and inclose the fruit, which matures in July and August. The indusium is hood-shaped and very delicate.

The fertile fronds bear some resemblance to the fruit of the Grape Ferns — *Botrychium* — but are heavier. They remain erect during the winter and frequently persist a year or two.

Forma obtusilobata is an intermediate form between the fertile and non-fertile fronds. It is found occasionally with the type.

DICKSONIA.

This genus was named for James Dickson, an English botanist, 1738–1822.

HAIRY DICKSONIA.

Dicksonia pilosiuscula (*D. punctilobula*).

Frond bipinnate; pinnæ lanceolate, tapering to a fine point. The pinnules are cut into oblong and obtuse, cut-toothed lobes. The stipe is channeled and of a chestnut color, and both stipe and rachis are hairy.

This is one of our most beautiful species, and because of its finely cut foliage it may be thought by the novice to resemble the Spinulose Wood Fern, var. *intermedium*. It can be distinguished by its *long tapering form*, — the pinnæ, which are from three to four or five inches long at the base, gradually decreasing in length to the tip; by its thin, *delicate texture*; the *pale yellowish-green* color of its fronds, and their *downy-hairiness*.

When found in its favorite haunt, — light, stony soil on somewhat shaded hillsides, — its fronds grow in graceful, slightly drooping curves, and it would scarcely be recognized as the same species when growing in less favored situations, with fronds stiffer and more erect, and bearing a sort of starved aspect in general.

It is a common fern, especially in southern New England, growing from one to two and one half feet high, often in large beds.



a. HAIRY DICKSONIA. *b.* Fertile pinna. *c.* SENSITIVE FERN

The fronds are sweet-scented when crushed or while drying, and often emit a delicious fragrance in the field. They are sensitive to early frosts, and frequently bleach nearly white in autumn.

Other names for it seem to abound. It is known as the Boulder Fern, Fine-haired Mountain Fern, Hay-scented Fern, and Sweet-grass Fern.

The fertile and sterile fronds are similar in form. The fruit-dots are small, each on a recurved toothlet, usually one at the upper margin of each lobe. They mature in July. The indusium is cup-shaped and open at the top.

Var. cristata.

This is a local form discovered in Massachusetts. It grows with the type, and is noticeable for the forking of the apex of the frond which is sometimes crested. The same peculiarity frequently occurs in the pinnae.

CYSTOPTERIS. Bladder Fern.

The name is from the Greek *kustis*, a bladder, and *pterus*, a fern, alluding to the inflated indusia. This group was formerly classed in the genus *ASPIDIUM*.

BULBLET BLADDER FERN.

Cystopteris bulbifera.

Fronde twice pinnate, the pinnæ lanceolate-oblong and at right angles to the rachis. The pinnules are somewhat crowded, oblong, obtuse, toothed or pinnatifid. Small bulblets are often borne underneath the pinnæ and rachis, which, when coming in contact with the soil, produce new plants. It is from this characteristic that the fern receives its common name.

The frond is widest at the base, the basal or lowest pinnæ being from one to four or five inches long, and gradually shortening to the tip of the fern.

This is a very narrow, vine-like (though *not twining*), graceful species, found in wet, shaded ravines, but more commonly choosing calcareous cliffs near falling water. While not rare it may be so termed in some localities. It grows from one to three feet long, the stipe short and smooth.

The sterile fronds are shorter and broader than the fertile ones, but otherwise similar.

The fruit-dots are round, and mature in July. The indusium is hood-like, attached by a broad base on the inner side, opening early at the other side, and is somewhat ragged.



FRAGILE BLADDER FERN. *a.* Fertile frond
BULBLET BLADDER FERN. *b.* Tip of fertile frond



FRAGILE BLADDER FERN. Rare forms

FRAGILE BLADDER FERN.

Cystopteris fragilis.

Fronde bi-tripinnate, the pinnæ and pinnules irregularly cut-toothed or pinnatifid and usually decurrent along the winged rachis. The pinnæ are rather remote and the pinnules vary considerably in their form and cutting.

This fern grows from six to twelve or fifteen inches high, and is found on moist, shaded cliffs and in rocky woods, common.

It strongly resembles Blunt-lobed Woodsia but may be distinguished by the less triangular form of its pinnæ, by the long, bare stipes, and a certain gracefulness of growth peculiar to itself. The stipes of young fronds are somewhat hairy-chaffy.

Other names for it are the Brittle Bladder Fern and Common Bladder Fern.

Its fronds are among the earliest to appear in the spring. By the middle of summer they frequently wither and disappear, and fresh fronds often spring up in August.

Nearly all of the fronds are fertile. The fruit-dots are numerous, round and large, near the margin of the pinnules, and sometimes, becoming quite heavy, give the fronds a somewhat coarse appearance which is wholly lacking before the fruit matures.

It is when thus heavily weighted with fruit that we find the most close resemblance to *Woodsia obtusa*.

The indusia are pointed at the free end, and in this as well as in the preceding species, wither so early that the fruit-dots appear naked at maturity in June and July.

PTERIS. Brake.

The name is from the Greek *ptēris*, a fern, from *pteron*, a wing, referring to the pinnate or feather-like fronds.

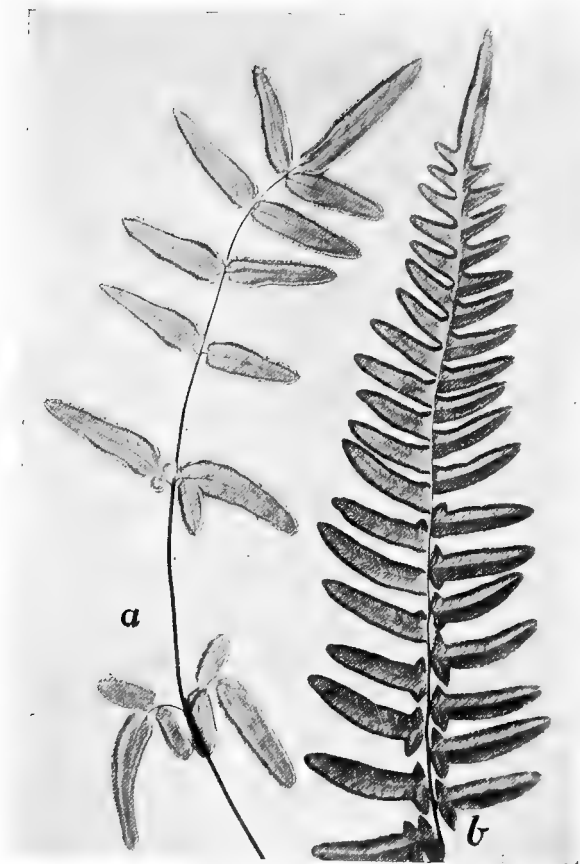
COMMON BRAKE.

Pteris aquilina.

Fronde ternate, at the summit of an erect, brownish stipe from one to four or five feet high. It is triangular in form, and from one to three feet wide, consisting of three primary, stalked divisions, which are also triangular and twice pinnate. The upper pinnules are undivided; the lower ones are variable, being more or less cut into oblong, obtuse lobes.

The Common Brake being ternate and so large cannot be confused with any other species. It is very common in woods, pastures, and waste ground.

The name "brake" is apt to be applied in



PURPLE CLIFF BRAKE. *a.* Fertile frond
COMMON BRAKE. *b.* Fertile pinnule

general to all of our larger species; hence this fern being large receives its true name, while the others suffer. It is also sometimes known as the Eagle Fern.

The fronds grow singly from a creeping root-stock which is often twenty feet or more in length. They are leathery in texture, very dull green and of coarse appearance when mature and growing in exposed situations; they would scarcely be recognized as the same species, excepting by the form, when found in the shade, where the color is fresh and the texture more delicate. New fronds are produced all summer.

The fruit is borne in a continuous line along the margins of the pinnules which are reflexed to form an indusium. It matures in August.

PELLÆA. Cliff Brake.

The name is from the Greek *pellos*, dusky, referring to the stipe. This group was formerly classed with the genus *PTERIS*.

PURPLE CLIFF BRAKE.

Pellæa atropurpurea.

The fronds are quite irregular in form, sometimes simply pinnate, or twice pinnate below, the upper pinnæ long, narrow, and entire, the lower often consisting of from one to three

pairs of pinnules with a large terminal one. The pinnules are occasionally eared. There are chaffy hairs on the midribs and on the wiry, dark purple stipe and rachis.

The fronds are clustered, leathery in texture, of a grayish or blue-green color, and they may remain evergreen in southern New England. They are from six inches to one and one half feet long, growing preferably on limestone cliffs and around inaccessible places in general.

This fern can be termed rare, at least in northern New England. It is sometimes called the Winter Brake.

The fertile fronds are narrower and taller than the sterile ones, also fewer in number. The fruit is borne in an apparently continuous row near the margins of the pinnules, which are incurved or reflexed to form a general indusium. The fruit is bright brown when mature in July and August.

SLENDER CLIFF BRAKE.

Pellaea gracilis (*P. Stelleri*).

Frond smooth and pinnate, but with few pinnæ; the lower ones short-stalked and cut into from three to five broad, blunt, crenate or incised pinnules. The stipe is straw-colored or brownish, polished, and slightly chaffy at the base.

This is a very delicate, slender, and rare little



SLENDER CLIFF BRAKE. *a.* Sterile frond. *b.* Fertile fronds



CLIMBING FERN, showing fertile and sterile pinnules

fern from three to six inches high, and is found at its best on shaded, moist, calcareous rocks and cliffs.

The fertile fronds are more plentiful than the sterile ones, and much more slender. They are twice pinnate, with narrow divisions. The fruit is at first dot-like on the margin of the pinnules, becoming confluent laterally, forming a marginal line with the edge of the pinnules reflexed to form an indusium. It matures in July and August.

LYGODIUM. Climbing Fern.

The name is from the Greek *lygodes*, flexible, referring to the climbing stems.

CLIMBING FERN.

Lygodium palmatum.

This species is well named as the fronds are slender and twining, from one to three feet long, bearing petioled and round-heart-shaped, palmately lobed pinnules in alternate pairs. The stipe and rachis are slender, smooth, and wiry. The texture is thinly herbaceous, and the fern with its curious leaflets and twining nature bears little resemblance to the family. It is the only fern with climbing stem found in the United States.

Its habitat is low, moist thickets and open woods, only in southern New England. The Climbing Fern has been so much sought for decorative purposes that the species has become extinct or nearly so in many sections where it was formerly found. We understand that a law for its protection was passed years ago in Connecticut. It is sometimes known as the "Hartford" Fern.

The fertile pinnules form a terminal panicle, suddenly contracted, and several times forked. These pinnules have much the same form as the larger, sterile ones. The fruit-dots are solitary or in pairs, covered by large, imbricated, scale-like indusia which are fixed by a broad base to short oblique veinlets, and open vertically. The fruit matures in September.

The sterile portion is evergreen.

ADIANTUM. Maidenhair.

The name is from the Greek *a*, without, and *diainein*, to wet, referring to the smooth foliage which sheds water so readily.

MAIDENHAIR.

Adiantum pedatum.

Fronde forked at the summit of the slender, upright, dark purplish, shining stipe, which is



MAIDENHAIR

MAIDENHAIR



from eight to fourteen inches in height. Each recurved branch bears on the upper side at regular intervals, from six to ten slender, pinnate, upright divisions, giving the frond a wide crescent or somewhat circular form. The central pinnæ are from five to nine inches long, the outer ones gradually decreasing in size. The pinnules are short-stalked, alternate, and one-sided; that is, the veins all proceed from the extreme lower edge of each pinnule, the upper edge being slightly cleft. The stipes when quite young are hairy, but soon become smooth.

This is a species of peculiar form and beauty, and one of the few ferns which is familiarly recognized by its proper name. It is much used for decorative purposes, and the time may not be far distant when it will become rare in many sections.

Maidenhair grows in rich, rocky woods, and although somewhat retiring in habit, is found abundantly in not a few localities. It produces fronds all summer, most of which are fertile.

The fruit-dots are oblong, and found on the under side of the summit of the lobes, — the margin of which is reflexed to form an indusium. They mature in July and August.

This and the Bulblet Bladder Fern were the first of our ferns to be taken to England.

WOODSIA.

This genus was named for Joseph Woods, an English botanist.

RUSTY WOODSIA.*Woodsia Ilvensis.*

Fronde pinnate, the pinnæ rather crowded, and cut into oblong, obtuse, obscurely toothed segments. It grows from three to six inches high, with a jointed stipe at the base, an inch or more from the root. It is at this joint that the frond separates when it withers.

The fern is somewhat heavy in texture, smoothish and green above, — woolly or chaffy beneath, the hairs gray at first, but becoming rusty brown in color, whence its common name. Another name it bears is Hairy Woodsia.

The stipe and rachis are channeled. The former is rich brown in color, often shading into the rachis. Both are hairy-chaffy.

Rusty Woodsia is not considered by some a common species, and our experience harmonizes with this view. Perhaps it can be termed frequent.

It grows in tufts, in exposed situations, on rocks preferably, or in dry woods, in places too dry for almost any other species to exist. When found in moist places, as it occasionally may be,



NORTHERN WOODSIA. *a*. Small fronds
SMOOTH WOODSIA. *b*. Small fronds
RUSTY WOODSIA. *c*. Fertile frond. *d*. Sterile frond

the fronds seem fresher and more delicate, and the pinnæ are more fully developed, scarcely appearing like the same species.

The fruit-dots are large, near the margin, and mature in June, often becoming confluent. The indusium is minute, and fastened underneath the fruit-dot. Its margin is divided into hair-like segments, which are inflexed over the fruit. It is inconspicuous and withers early.

SMOOTH WOODSIA.

Woodsia glabella.

Frond from two to five inches high, pinnate, the pinnæ roundish-ovate, with few, slightly toothed lobes,—often not more than three. The stipe is jointed near the base.

This is a very delicate, rare little fern growing in tufts on moist, mossy rocks in the mountains of northern New England. It closely resembles another one of the same genus, *W. hyperborea*. But in this, the stipe is *dark* only at the *extreme base*, where it also may be slightly chaffy; the *rachis* is *green*, and the frond is *smooth* and *delicate* in texture.

The fruit-dots are large and few, near the margin of the lobes; they mature in July. The indusium is minute and membranous, with segments inflexed over the fruit-dots.

NORTHERN WOODSIA.

Woodsia hyperborea (*W. alpina*).

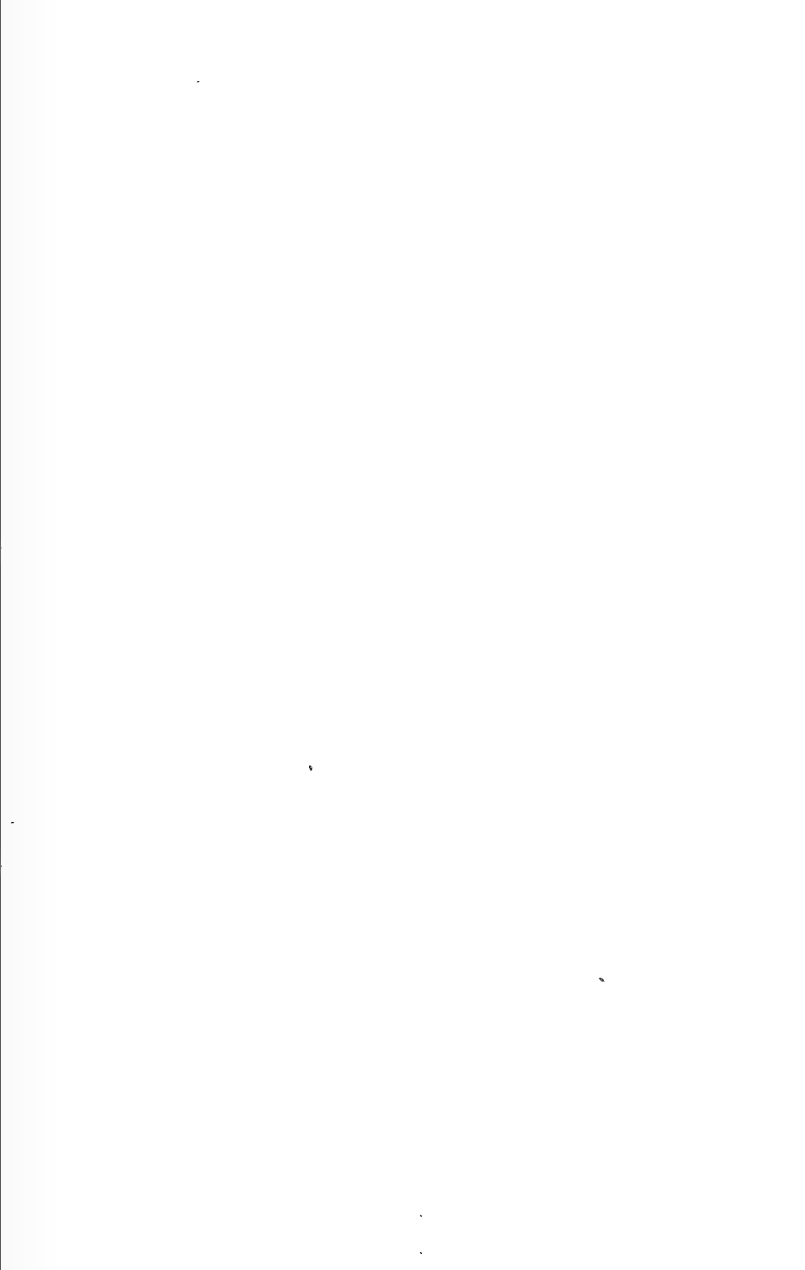
Fronde from two to six inches high, pinnate; pinnæ triangular-ovate, obtuse, the lower ones deeply cut into few, broad, and nearly entire lobes. In this, as in the preceding two species, the stipe is jointed.

This is another small and rare species of this genus, growing in tufts on moist cliffs and rocks in the mountains of Vermont and Maine. Other names for it are Alpine Woodsia and Flower-cup Fern.

It bears such a striking resemblance to Smooth Woodsia that it may be very difficult for the novice to distinguish between them.

In Northern Woodsia, perhaps the most noticeable point of difference is the *color* of the *stipe* and *rachis*, which commences with a *rich, dark brown* at the base of the stipe, *gradually shading* to a *light color* at the upper end of the rachis. Both the stipe and rachis are slightly chaffy-hairy. The under surface of the frond is also slightly hairy.

The fruit-dots are large and somewhat scattered; they mature in July. The indusium is the same as in *W. Ilvensis*.





a. BLUNT-LOBED WOODSIA. *b.* Fertile pinna
c. EBONY SPLEENWORT. Tip of frond.
d. Var. Hortonæ

BLUNT-LOBED WOODSIA.*Woodsia obtusa.*

Fronde nearly twice pinnate, the pinnæ rather remote when mature, and cut into oblong, obtuse, crenately-toothed segments. The segments of the lower pinnæ near the rachis are pinnatifid with toothed lobes. The fronds are broadly lanceolate in form, slightly narrowed at the base, and minutely hairy, with stipe and rachis slightly chaffy.

This is the largest fern of this genus, being from six to twelve inches high. It grows on shaded, rocky banks and cliffs, and while not exactly rare here in New England, it is by no means a common species. Another name for it is Obtuse Woodsia. It is found at its best in early summer. When growing in the sun the fronds thicken and become yellow.

Blunt-lobed Woodsia is sometimes confused with the Fragile Bladder Fern, but may be determined by the *short stipe*, the *triangular form* of the pinnæ, and the *bluntness* of the pinnæ and their divisions, — also by its minute *hairiness*.

The fertile and sterile fronds are similar in form, those fertile being in the middle of the crown or tuft. The fruit-dots are round, large, on or below the minutely toothed lobes, and become confluent. They mature in July. The

indusium is conspicuous and at first incloses the fruit, but finally splits into ragged lobes wider than in the other species.

ASPLENIUM. Spleenwort.

The name is from the Greek *a*, without, and *splen*, spleen, referring to the supposed action on the spleen.

A nomenclature differing from that given at the head of the text, places the species *fili-fœmina* and *thelypteroides* under the genus **ATHYRIUM**.

The indusia in this genus are fastened by one edge to the inner side of the fertile vein when in a single row, and on both sides when in double rows.

Several species of this group are small, ever-green, and choose rocky locations.

EBONY SPLEENWORT.

Asplenium ebeneum (*A. platyneuron*).

Fronde pinnate, the pinnæ sessile, finely serrate, usually alternate, oblong, dilated at the base, auricled on the upper side, and sometimes, in the fertile frond, on the lower side also.

The pinnæ of the sterile fronds are crowded, and often overlap each other, especially in the middle of the fronds. The stipe and rachis are a rich brown color, wiry and shining.

This is an evergreen fern of narrow form, being from one to two inches wide, and from six to eighteen inches high. It grows in rocky, open woods, and can scarcely be termed common throughout New England, although it is abundant in some localities. It prefers limestone soil.

The fertile fronds are much the taller, and grow quite erect, while the sterile ones lie flat on the ground.

The fruit-dots are in oblique lines each side of the midvein, nearer the latter than the margin, and often become confluent. They mature in July, and remain on the frond during the winter. The indusium is silvery until maturity, opening towards the midrib.

Var. *incisum* (*serratum*).

This is a form with deeply incised pinnæ, and is found occasionally growing with the type.

Var. *Hortonæ*.

This fern is another more distinct form discovered by Mrs. Horton in Brattleboro, Vermont, in 1900. The pinnæ in this are deeply cut into oblique lobes which are coarsely serrate. The dark, glossy stipe and rachis of this fern, and its mode of growth, are similar to those of the type. The fronds are plume-like

in appearance and lighter green than in the species.

This fern was again found at Pittsford, Vermont, in 1903.

PINNATIFID SPLEENWORT.

Asplenium pinnatifidum.

Fronde from two to six inches long, pinnatifid, or sometimes pinnate below, tapering to a long, slender point above, the few lobes at the base roundish-ovate.

It was formerly thought to be a variety of the Walking Fern, the latter then being given as an *Asplenium*.

It grows in tufts on rocks and cliffs, and the fronds are evergreen. The stipe is dark and polished, the rachis green.

Pinnatifid Spleenwort has only recently been accorded a place among New England ferns through its discovery in Connecticut.

The fruit-dots are large, irregular, often double, and sometimes curved; they mature in July. The indusium is straight or curved.

MAIDENHAIR SPLEENWORT.

Asplenium Trichomanes.

Fronde pinnate, with from fifteen to thirty pairs of unequal-sided, sometimes finely crenate

pinnæ, which are nearly opposite, and attached to the rachis by a small point. The pinnæ become nearly equal-sided and roundish as the base of the frond is reached.

The fronds are often one half inch or more wide and from three to eight inches long. They grow in tufts on moist, shady rocks, preferring limestone. But the fern may be found in dry situations. It will establish itself in clefts and niches of slate cliffs, where there is hardly an apparent foothold for it to grow. The fronds remain green through the winter, until the new growth in the spring, when the pinnæ fall from the rachides. The stipe and rachis are thread-like, dark purple-brown, and polished.

Another name by which this fern is known is Dwarf Spleenwort. We do not find it to be a common species, although it cannot be termed rare.

The fruit-dots are large, linear-oblong at first, but become nearly round, with from three to six on each side of the midrib. They mature in July, and remain on the frond during the winter. The indusium is delicate.

GREEN SPLEENWORT.

Asplenium viride.

Frond from two to ten inches long, pale green, pinnate. The pinnæ are roundish-ovate,

short-stalked and crenately toothed, from ten to twenty each side of the rachis.

This fern was discovered by Pringle on Mt. Mansfield, Vermont, and so far as we can learn, it is still confined to the mountains of Vermont.

Green Spleenwort usually is found in almost inaccessible places on shaded cliffs. The fronds grow in tufts and are evergreen.

It resembles Maidenhair Spleenwort, but one point alone serves for identification. In this the *rachis* is *green*, passing into a brownish stipe at the base, while in Maidenhair Spleenwort the stipe and rachis are *dark* and *glossy*.

The fruit-dots are large and oblong; they mature in July. The indusium is curved or straight.

MOUNTAIN SPLEENWORT.

Asplenium montanum.

Fronde from two to five or six inches long, broad at the base, pinnate. The lower pinnæ are cleft into several cut-toothed lobes, the upper gradually becoming simpler. The stipe is brown at the base, flat and green above.

The fronds are somewhat leathery in texture, bluish-green in color, and evergreen.



a. GREEN SPLEENWORT. *b.* WALL RUE SPLEENWORT
c. MAIDENHAIR SPLEENWORT
d. MOUNTAIN SPLEENWORT
e. PINNATIFID SPLEENWORT. Small fronds

Mountain Spleenwort is a real cliff fern, preferring moist, shaded crevices and niches on rocks in perilous situations. It is found only rarely in southern New England.

Most of the fronds are fertile. The fruit-dots are linear, short, and few, and at length become confluent, concealing the thin and narrow indusia at maturity in July.

WALL RUE SPLEENWORT.

Asplenium Ruta-muraria.

Fronde twice or thrice pinnate at the base, simply pinnate above, the pinnæ long-stalked, alternate; the divisions few, small, distant, stalked, wedged-shaped at the base, obtuse and sharply toothed at the apex.

The fronds are triangular-ovate in form, somewhat leathery in texture, and are evergreen. The veins are forking.

This fern bears some resemblance to Mountain Spleenwort, but may be distinguished by its *triangular form*, and by the peculiar *wedge-shaped form* of its *stalked* divisions.

Wall Rue Spleenwort is found in dry, rocky situations, preferring limestone cliffs. It grows in clusters, with long, flat, and smooth stipes, — the entire length of the fern being from two to six inches. It is not exactly rare, but occurs only occasionally.

The fruit-dots are few, large, and soon become confluent, nearly covering the entire pinule when mature in July. The indusium is membranous and delicate.

SCOTT'S SPLEENWORT.

Asplenium ebenoides.

Fronde pinnatifid, or often pinnate below, the divisions lanceolate from a broad base, very irregular both in form and length, the lower ones usually a trifle shorter.

The fronds are from four to nine inches long and are broadly lanceolate in outline, tapering to a long, slender point.

The stipes are dark and glossy, sometimes slightly shading into the rachis, especially on the under side.

Scott's Spleenwort is now known to be a hybrid between Ebony Spleenwort, *A. ebenum* and the Walking Fern, *Camptosorus rhizophyllus*. It bears no marked resemblance to either fern, so it is not difficult to determine.

It is usually found growing with these two ferns, on cliffs, preferring limestone. It is exceedingly rare here in New England.

The fruit-dots are arranged in oblique lines, slightly curved, several on each lobe. The indusium is narrow, and reflexed when mature in August.



NARROW-LEAVED SPLEENWORT

a. Portion showing pinnæ of sterile frond. *b.* Tip of fertile frond



SILVERY SPLEENWORT. Fertile pinna

NARROW-LEAVED SPLEENWORT.

Asplenium angustifolium.

Fronde simply pinnate; pinnæ from three to four inches long, stalked, alternate, entire or minutely toothed, tapering to a point.

This fern is found in rich, moist woods only occasionally. It is sometimes known as Swamp Spleenwort. The fronds are unusually delicate, pale green and smooth, growing from one to two feet high, in tufts.

The fertile fronds are few, in the middle of the cluster, taller and with longer stipes than the sterile, and with narrower, shorter pinnæ.

The fruit-dots are linear, in rows of from twenty to forty, diverging from the midvein, and parallel with the veins. They at length become confluent and conceal the slightly convex indusia; time of maturity, September.

SILVERY SPLEENWORT.

Asplenium thelypteroides (*A. acrostichoides*).

Fronde pinnate; pinnæ from three to five inches long, deeply cut into blunt, obscurely toothed segments. The stipe is slightly chaffy. The fronds are grouped together, although not growing exactly in crowns. They are very thin and delicate in texture for such large ferns. We

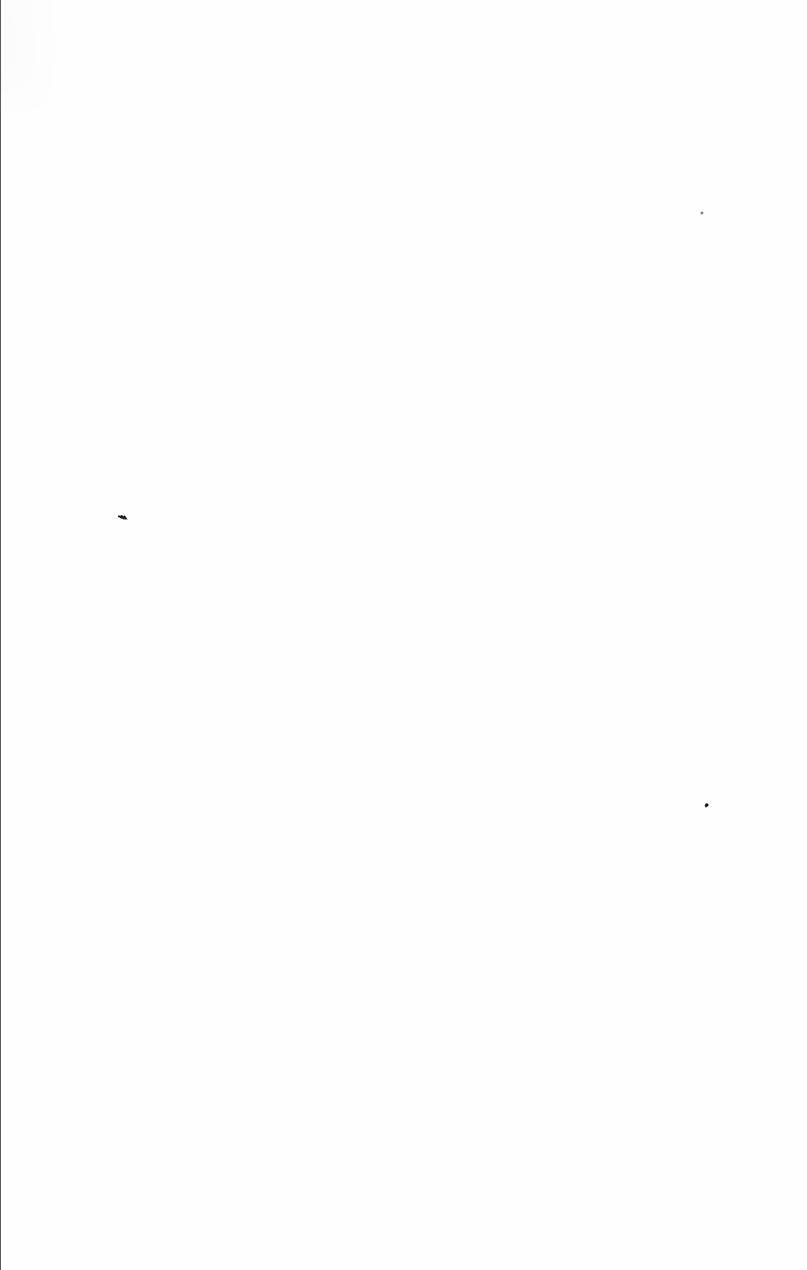
discovered the surface to be velvety-hairy long before finding an author who mentioned it as a distinguishing characteristic.

The fronds taper both ways from the middle, — the only fern of this group with such form, although some varieties of the Lady Fern are a little narrower at the base than in the middle of the frond.

This fern grows from one and one half to three feet high, and is found in rich, moist woods, or along the shady banks of streams. It is wanting in many localities, and yet, strictly speaking, it is not rare.

Silvery Spleenwort might often be mistaken for the New York Fern, so close is the resemblance in form. Usually it is larger than the latter, and the segments or lobes are wider. If examined closely for the *fine hairs* and the *minutely toothed lobes* it can readily be identified. Certainly no confusion can arise when it is found in fruit. This is beautifully arranged in long, opposite rows, from three to six in number, each side of the midvein, slightly curved outward, and set obliquely to it.

The fern receives its common name from the shining, silvery indusia which cover the fruit-dots. These are sometimes double and persist for a long time. The fruit can be found in good condition from July to September.





LADY FERN. *a.* Fertile pinna

LADY FERN.

Asplenium filix-fœmina.

Fronde twice pinnate, broadly lanceolate; pinnæ lanceolate, from two to six inches long; pinnules oblong, more or less incised or serrate, and united to the secondary rachis by a narrow wing.

It grows in moist woods or by the roadside, — in fact it is found almost everywhere. Many native *varieties* of this fern occur, and a large number have been generated by sowing varieties of spores together.

The fronds are from one to three feet long, with brownish stipes. They are quite delicate in the early part of the season, but when heavily loaded with fruit become coarse in appearance.

The fertile and sterile fronds are similar in outline. The fruit-dots are short and variously curved, becoming at length confluent and giving the frond a dark hue. They mature in July and August. The indusium is delicate, straight, or sometimes curved in horse-shoe form.

OPHIOGLOSSACEÆ

ADDER'S-TONGUE FAMILY

ADDER'S-TONGUE FAMILY

BOTRYCHIUM. Grape Fern. Moonwort.

THE name is derived from the Greek, *botrus*, a bunch of grapes, alluding to the clustered sporangia.

The Grape Ferns usually produce but *one frond* each season. They were formerly classed in the Fern Family, but are now separated on account of the different nature of the fruit.

MOONWORT.

Botrychium Lunaria.

The sterile portion is nearly sessile, borne near the middle of the common stalk, which is from two to twelve inches high. It is one or two inches long, narrow in form, very fleshy, and pinnately parted into from two to eight pairs of fan-shaped, very obtuse, crenate, incised, or sometimes nearly entire lobes. These are distant, or may overlap each other. The veins are much forked.

Moonwort grows mostly in dry fields and pastures and is very rare.

The fertile portion is from two to three pinnate, and is mature in June or July.

TERNATE GRAPE FERN.

Botrychium ternatum.

There is no species over which there has arisen so much discussion as this. Whether it shall be considered as including a large number of varieties, or whether it has an unvarying standard, and some of the so-called *varieties* are distinct *species*, is an open question.

The plants are from four to fifteen inches high and more or less fleshy.

The sterile portion is long-stalked from near the base of the short common stem. It is broadly triangular, ternate, and variously decomposed, with stalked divisions. The ultimate segments vary much in form.

The fertile portion is long-stalked, and from two to three pinnate, with double rows of naked sporangia.

Adhering to Gray, we give the following varieties, which frequently pass into each other.

COMMON GRAPE FERN.

Botrychium ternatum obliquum (*B. obliquum*).

Plant from four to twelve inches high but more commonly small. The sterile portion is long-stalked from near the base of the common stem, fleshy, slightly hairy, broadly triangular in form, and ternate; the three primary



a. COMMON GRAPE FERN with fertile portion
b. DISSECTED GRAPE FERN with fertile portion



BOTRYCHIUM TERNATUM sub-var. intermedium with fertile portion

divisions stalked and pinnately decomposed, — the ultimate segments obliquely lanceolate and minutely toothed.

It grows in shady pastures and open woods, and is rather common, although it and other small forms of this genus have a way of eluding one's search for them.

The Common Grape Fern can be found readily after a very light snow has fallen in the fall, as the bronzed fronds, which remain evergreen, stand erect against the light background. Our first knowledge of its being evergreen was when a frond was thus discovered at Christmas time.

The sterile portion does not usually appear until July. When young this is folded in a peculiar manner, but it spreads more with age, sometimes not until after fruiting.

The fertile portion is taller and still later than the sterile, stands erect, and is often thrice pinnate, with double rows of distinct, naked sporangia. We have seen plants bearing three separate stalks, with compound fruit clusters on each, but such form is not common. It matures in September and October.

DISSECTED GRAPE FERN.

Botrychium ternatum dissectum (*B. dissectum*).

Plant somewhat fleshy and from three to six inches high. The sterile portion is triangular

in form and ternate, the three primary divisions stalked and pinnately decomposed, being cut into many narrow lobes.

It is frequently found growing with the Common Grape Fern in shady places, although preferring more open situations, and it is more common near the coast. The sterile frond appears in July and is said to be ever-green.

Both sterile and fertile portions are long-stalked, the fertile the longer. At the summit of the taller stalk is a branching fruit-cluster similar to that of the Common Grape Fern, but less compound. It matures in September and October.

Botrychium ternatum, sub-var. *intermedium* (*Botrychium obliquum intermedium*).

The sterile portion is very broadly triangular and similar to var. *obliquum*, but often larger and more fleshy. The ultimate segments are divided somewhat more, are shorter and less pointed, with minutely toothed margins.

It is found frequently, growing in old pastures and thickets.

The fertile portion is also similar to that of *obliquum*, being quite compound.



BOTRYCHIUM TERNATUM RUTÆFOLIUM. *a.* Fertile portion.

b. Sterile portion

c. LITTLE GRAPE FERN with fertile portion

d. MATRICARY GRAPE FERN with fertile portion

Botrychium ternatum rutæfolium (*Botrychium matricariæ*).

The sterile portion is small, but bears much resemblance to var. *obliquum*. The ultimate segments are few, ovate and somewhat heart-shaped.

This is rarely found ; it grows in old fields.

The fertile portion is similar to that of the preceding varieties.

LITTLE GRAPE FERN.

Botrychium simplex.

Plant from two to five inches high, the sterile portion short-stalked from near the middle of the common stem. The sterile portion is simple, or pinnately parted into three or more roundish lobes. It is fleshy in texture, and rather thick. This is a rare little fern, growing in moist, hilly pastures and open woods.

The fertile portion is taller than the sterile, and is once or twice pinnate, with double rows of sessile, distinct, naked sporangia which mature in May or June.

MATRICARY GRAPE FERN.

Botrychium matricariæfolium.

This fern is also termed *B. neglectum*.

The sterile portion is sessile or nearly so, placed above the middle of the common stalk.

It is from one to two inches in length, usually fleshy, ovate or somewhat triangular in form, deeply cut into obtuse divisions which vary much in form ; sometimes rounded and entire, incised, or deeply cut into narrow, toothed segments.

The entire plant is from three to ten or twelve inches high. It grows in rich, moist, grassy woods, and swamps, and is found only occasionally. It is sometimes known as Meriden Moonwort.

The fertile portion is two or three pinnate, often much branched, bearing rows of sessile, distinct sporangia which mature in June and July.

B. tenebrosum is a very small form which is rather rare, or possibly overlooked, being only from one to two inches high. It is found in moist, mossy places.

The fertile portion is simpler than that of the type.

LANCE-LEAVED GRAPE FERN.

Botrychium lanceolatum.

The sterile portion is sessile near the summit of the common stalk, which is from three to nine inches high. It is in three primary divisions, or broadly triangular in form. The divisions are deeply cut into acute, lanceolate, oblique lobes, which are incised or toothed.



a. RATTLESNAKE FERN, with fertile portion
b. ADDER'S-TONGUE, with fertile portion

This fern grows in moist hollows in meadows or woods, and sometimes in swamps.

It is rare in northern New England and occurs only occasionally in the southern part.

The fertile portion is short-stalked, from two to three pinnate, and matures in June or July.

RATTLESNAKE FERN.

Botrychium Virginianum.

This fern is the largest and most common one of this genus. The sterile portion is broadly triangular and ternate, the three primary divisions short-stalked, once or twice pinnate, then pinnatifid; the pinnules narrow, oblong and cut-toothed toward the apex.

It is pale green and thinly herbaceous, wilting very quickly when picked. Another name for it is Virginia Grape Fern.

It grows in rich woods, preferring shade. The stem or scape is from eight inches to one and one half feet high, bearing the sessile, sterile portion about half-way up, with the smaller compound fruit-cluster at the summit. The fruit matures rapidly, in June or July, more often in June. It withers by midsummer.

Forma gracilis is a reduced form of the Rattlesnake Fern, considered by some to be an immature state of that fern.

OPHIOGLOSSUM. Adder's-Tongue.

The name is from the Greek, *ophis*, a serpent, and *glossa*, tongue.

ADDER'S-TONGUE.

Ophioglossum vulgatum.

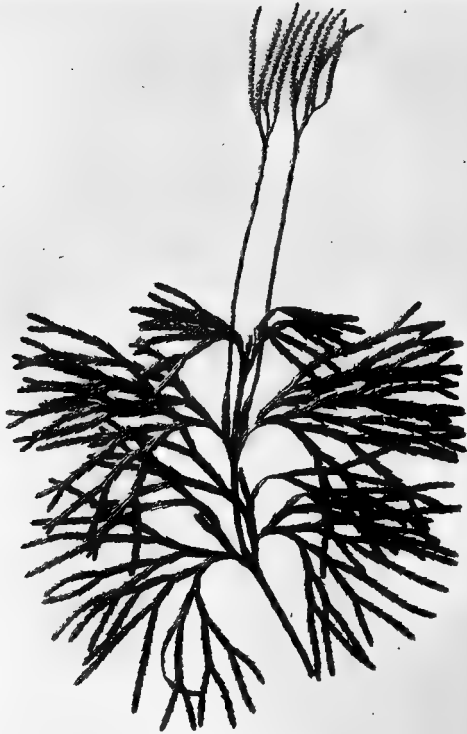
This is the only fern of this genus found in New England. It occasionally bears two fronds the same season. The scape is from two to twelve inches high. The sterile portion is entire, rather fleshy, ovate in form, and from one to three inches long, near the middle of the stem. The veins form a fine net-work.

It grows in bogs and pastures and sometimes in moist fields. There seems to be no favorite haunt for the plant clearly settled in the minds of our best botanists. One says dry places, another wet. We incline to the latter view, or at least think it prefers moist land. It is found only occasionally.

The fertile portion, which is at the summit of the scape, consists of two rows of straw-colored, united sporangia on the edges of the simple spike. This is from one half to one inch or more in length; the fruit becomes mature in June and July.

LYCOPODIACEÆ

CLUB-MOSS FAMILY



FESTOON GROUND PINE with fertile portion

CLUB-MOSS FAMILY

LYCOPODIUM. Club-Moss.

THE name is from the Greek, *lucos*, wolf, and *pous*, foot.

All the plants of this genus are evergreen. Several of the trailing species are extensively used for holiday decorations. The yellow powder — minute spores — from the fertile spikes of some species is inflammable. It is sometimes called vegetable brimstone, and is used in the manufacture of fireworks. It is also valuable in medicine.

STIFF CLUB-MOSS.

Lycopodium annotinum.

Stems prostrate and creeping, with many upright branches from five to eight inches high, forked in pairs.

The leaves are equal, spreading, in five ranks, minutely serrulate, pointed and rigid.

It grows in cold woods, and is common in northern New England, but is found only occasionally in the southern portion. It is sometimes known as Interrupted Club-Moss.

The fertile branches are terminated by a

single, sessile, scaly spike about an inch in length, which matures in July.

FESTOON GROUND PINE.

Lycopodium complanatum.

Stem trailing, sometimes underground. Branches erect and fan-like, being numerous and forked above. The branchlets are crowded and flattened. The leaves are small, four-ranked, imbricated-appressed, — the side rows with tips somewhat spreading, the intermediate rows wholly appressed and smaller.

It grows in woods and thickets and is found common.

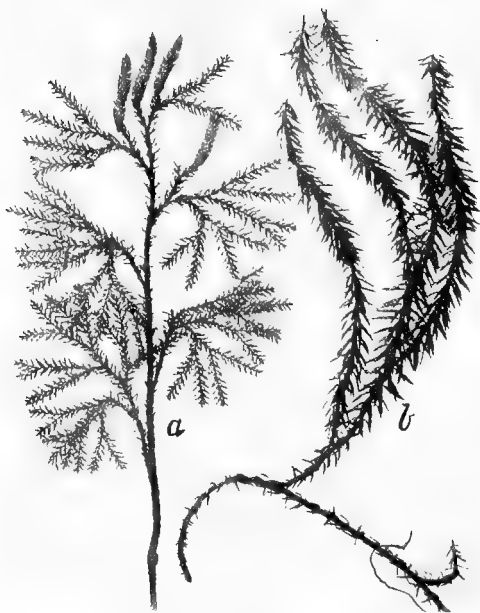
The fertile peduncle is slender, bearing from two to four cylindrical, scaly spikes not more than an inch in length. These mature in July.

TREE CLUB-MOSS.

Lycopodium obscurum dendroideum.

Stems erect, from six to nine inches high, scattered, and from a rootstock creeping underground. Branches many, spreading, and fan-like. Leaves linear-lanceolate, from four to six ranked, acute and entire.

This plant grows in moist woods and is common. It is distinguished by its tree-like form, whence its name. Another title it sometimes bears is Ground Pine.



a. TREE CLUB-MOSS with fertile portion
b. STIFF CLUB-MOSS



a. SWAMP EVERGREEN

b. FIR CLUB-MOSS

The fertile spikes are sessile, scaly, one inch long, solitary, and several on each plant. They mature in July.

SWAMP EVERGREEN.

Lycopodium lucidulum.

Stems ascending, from five to ten inches long, and two or three times forked, usually below the middle.

The leaves are minutely toothed, pointed, spreading or often deflexed, and in eight rows. They are arranged in alternate series of longer and shorter lengths, and are somewhat larger than is common to this genus.

It is sometimes called Shining Club-Moss, presumably because of its glossy, dark green leaves. Swamp Evergreen grows in cold, damp woods, and although it can be found usually in its favorite haunt, it is not so common as some others of this group.

The spore-cases are borne in the axils of the leaves near the summit of the stem. They can be found in good condition from August until October, and frequently persist a year or two.

FIR CLUB-MOSS.

Lycopodium Selago.

Stems erect, forked by pairs, forming a level-topped cluster from three to six inches high.

The leaves are about eight-ranked, rigid, dark green, glossy, entire or sometimes slightly toothed, ascending, pointed and somewhat crowded.

Fir Club-Moss is usually found only in high altitudes, and can be termed rare.

It somewhat resembles Swamp Evergreen; but in Fir Club-Moss, the *forking* of the stems *near the top*, and the *level-topped clusters*, together with its smaller size, may aid in determining the species. Its leaves also are more nearly uniform in size.

The leaves of this and *L. lucidulum* often bear gemmæ, or buds, by which the plants are propagated.

The spore-cases are borne in the axils of the ordinary leaves; they mature from August to October.

COMMON CLUB-MOSS.

Lycopodium clavatum.

Stems creeping on the surface of the ground; branches similar, ascending, short, and crowded with linear-awl-shaped, incurved or spreading light green leaves, which are tipped with a fine bristle.

This species grows in dry, shaded pastures and woods, and is very common. It is sometimes called Running Pine.

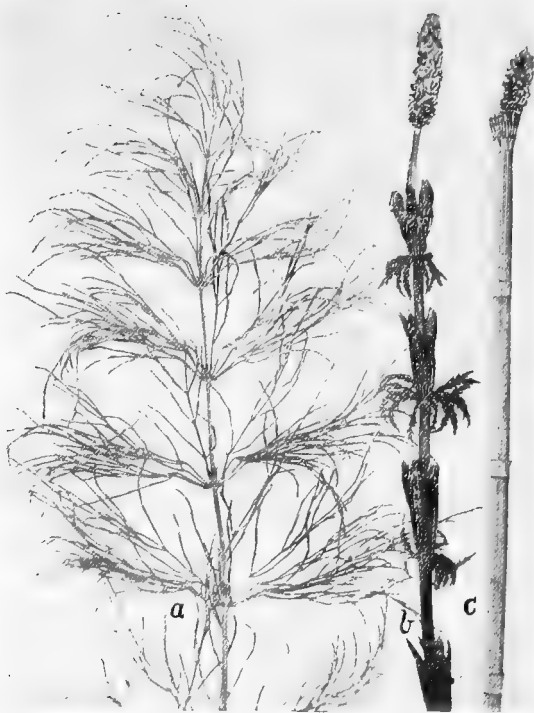


COMMON CLUB-MOSS with fertile portion

The fertile branches are terminated by a slender, minutely leafy peduncle from four to six inches long, bearing two or three linear parallel, erect, cylindrical, scaly spikes. These mature in July.

EQUISETACEÆ

HORSETAIL FAMILY



WOOD HORSETAIL. *a*. Sterile stem. *b*. Fertile stem
c. SCOURING-RUSH. Tip of fertile stem

HORSETAIL FAMILY

EQUISETUM. Horsetail.

THE name is from the Latin, *equus*, horse, and *seta*, bristle.

These are Rush-like plants with grooved stems, usually hollow, jointed, and bearing, instead of leaves at the joints, a sheath, which is divided into teeth corresponding to the number of ridges in the stem.

The spore-cases. adhere to the under side of the shield-shaped scales of the spike.

WOOD HORSETAIL.

Equisetum sylvaticum.

The sterile stems are usually twelve-furrowed, with compound, rough, deflexed branches.

The fertile stems appear first, with four or five whorls of short branches at the base of the sheaths, which are loose, about one or two inches apart and cleft into several reddish teeth. The spike at the summit is oval-cylindric in form and one inch long. It withers soon after maturity in May, leaving the stems to produce whorls of herbaceous branches similar to the sterile. The sterile stems are taller and more

slender than the fertile stems, with the whorls more numerous.

It grows in moist, shady places, and is common in northern New England.

SCOURING-RUSH.

Equisetum hyemale.

Stems all simple, hollow, grooved, and from one to three feet high. Sheaths short, the teeth blackish and soon disappearing.

This species is common in northern New England, growing in wet places and along the banks of streams. It was formerly used for polishing wood and metal, its roughness being due to the silex in its composition. The stems are evergreen.

The fertile spike at the summit is ovoid and matures in June and July.

FIELD HORSETAIL.

Equisetum arvense.

The fertile stems appear first. They are from four to ten inches high, a light, delicate brown in color, soft, with large, distant, coarsely toothed, inflated sheaths; they terminate in a spike one inch long. These stems soon wither and are followed by the taller, herbaceous, green, sterile stems which produce whorls of upright branches. These are sometimes simple, but



FIELD HORSETAIL. *a.* Sterile stem. *b.* Fertile stem
PIPES. *c.* Middle of stem. *d.* Tip of fertile stem



SEDGE-LIKE HORSETAIL

often produce at each joint a whorl of ascending, four-angled branches, few in number.

Field Horsetail is found along railways, also in moist, gravelly or sandy soil, and is frequently a companion of the Sensitive Fern, wrongly called the "Polypod." Various other names for it are in use, such as Meadow Pine, Foxtail, Jointed Rush, and Colt's Tail. It is poisonous to horses, producing a fatal malady if its use is long continued.

The fruit matures in April and May.

PIPES.

Equisetum limosum (*E. fluviatile*).

The stems are all similar, slightly furrowed, and usually produce after fruiting from two to six whorls of slender, ascending branches near the middle. These are very irregular in length. The sheaths are close and finely toothed.

The plant grows from two to three feet high, in shallow water, and is sometimes called Swamp Horsetail.

The fertile spikes are small, oblong-ovoid; they mature in July.

SEDGE-LIKE HORSETAIL.

Equisetum scirpoides.

The stems are numerous, all being simple, slender, flexuous, thread-like and curving. They

have no central air-cavity, are mostly six-grooved, and from three to six inches high, growing in tufts.

This species does not fruit freely, but can be identified readily by the sheaths, which are only three in number, short, somewhat loose and persistent.

It is not a common plant, being found in rich, moist woods only occasionally in northern New England, and rarely in the southern part. The stems are evergreen, dark blue-green in color.

The fertile spikes are small and ovoid in form; they mature in April and May, earlier than is commonly supposed.

KEY TO THE
GENERA OF FERNS

KEY TO THE GENERA OF FERNS

- I. FERTILE AND STERILE FRONDS SIMILAR. SPORANGIA ON THE UNDER SIDE OF THE FRONDS, VARIOUSLY CLUSTERED IN DOTS, LINES, OR ALONG THE MARGIN.

With indusium.

† Sporangia *marginal*, or near the margin. Indusium formed of the *reflexed margin* of the lobes or pinnules, and opening inwardly.

Fruit-dots oblong, at the end of the veins, on the lobes formed by the cleft *upper margin* of the pinnule. Fronds wide crescent-shaped, delicate. Stipe and rachis dark, wiry and shining. *Adiantum*, p. 80.

Sporangia in a continuous, slender line on the *margin*. Fronds large, triangular in outline, ternate. Stipe brownish, heavy. *Pteris*, p. 72.

Fruit-dots on the upper side of the veins, distinct at first, but becoming confluent form an apparently continuous *marginal* line. Fertile fronds with narrower divisions than the sterile. Stipe and rachis in one species dark and glossy. Fronds smooth, rock-loving. *Pellaea*, p. 75.

†† Fruit-dots *oblong* or *linear*. Indusium attached by one side, in single or double rows. When the rows are double the indusia open face to face.

Fruit-dots on one side or rarely on both sides of *oblique veinlets*. Fronds variously divided. Several species are small, evergreen, and rock-loving. *Asplenium*, p. 92.

148 KEY TO THE GENERA OF FERNS

Fruit-dots irregularly scattered on the netted veins; those nearest the midrib *single*, the outer ones often *in pairs* which are sometimes *joined* at the *ends*, thus forming crooked lines. Fronds entire, tapering to a long, slender point.

Camptosorus, p. 4.

††† Fruit-dots *round* or *roundish*, borne on the back or rarely at the end of the veins. Indusium of various forms.

Indusium *circular* or *round-kidney-shaped*, and fixed either centrally or by the sinus, opening all around the margin. Fronds variously divided, and in several species evergreen.

Aspidium, p. 11.

Indusium inflated or *hood-shaped*, delicate, and attached by a broad base partly under the fruit-dot on the inner side. It is early reflexed and withered. Fronds in one species very long and narrow, producing bulblets on the under side of rachis.

Cystopteris, p. 67.

Indusium *star-shaped*, fixed under the fruit-dots and either open, or early cleft into ragged lobes or slender inflexed filaments. It is inconspicuous in most species. Fronds small, rock-loving.

Woodsia, p. 84.

Indusium *cup-shaped*, membranous, open at the top, and attached by its outer edge to a reflexed toothlet which forms one side of it. Fronds large, delicate, tapering and finely divided.

Dicksonia, p. 63.

Without indusium.

† Fruit-dots round.

Fruit-dots *large*, in a row each side of the midvein, midway between it and the margin. Fronds small, evergreen.

Polypodium, p. 3.

Fruit-dots *small, near the margin*. Fronds delicate, triangular in outline; in one species, ternate.

Phegopteris, p. 7.

2. FERTILE FRONDS DIFFERING IN FORM FROM THE STERILE, OR SOMETIMES ONLY PARTLY FERTILE.

With indusium.

Fruit-dots *oblong or linear*, in chain-like double rows *parallel* with the midribs. Indusium fixed by its outer margin and opening on the inner side. *Veins* more or less *netted*. In one species the fertile frond is unlike the sterile.

Woodwardia, p. 43.

Sporangia ovate, in double rows on paniced, *contracted* pinnules at the *summit* of the frond. Indusia thin, imbricated, scale-like, and fixed to short, oblique veinlets. Sterile pinnules evergreen, palmate, in alternate pairs on a twining, wire-like stem.

Lygodium, p. 79.

Without indusium.

Sporangia *paniced*. The fertile fronds vary in the different species. In one, the *entire frond* is fertile: in others, the *middle* portion of the frond, or the *tip* is fertile. The fertile pinnæ or fronds are very much contracted, bearing the green sporangia on the margins of the minute divisions. Fronds large and clustered.

Osmunda, p. 48.

3. ENTIRE FRONDS FERTILE AND WHOLLY UNLIKE THE STERILE ONES.

With indusium.

Sporangia inclosed in berry-like divisions of the fertile fronds which are twice pinnate, much contracted, and very different from the sterile ones. Indusium very delicate and obscure. Sterile fronds sometimes very large.

Onoclea, p. 57.

Without indusium.

Sporangia *distinct*, borne in pinnate or compound spikes or panicles. Sterile portion *solitary*, variously divided, often ternate and fleshy. Veins free.

Botrychium, p. 111.

Sporangia leathery, *united* in two rows on the edges of a simple spike. Sterile portion *solitary, entire*; veins netted.

Ophioglossum, p. 124.

GLOSSARY

GLOSSARY

- Apex** (Plural, Apices). The tip or pointed end of a leaf or frond.
- Appressed.** Pressed flat or closely against.
- Auricle.** An ear-shaped lobe at the base.
- Axil.** The angle between a leaf or branch and the stem.
- Bi-.** A Latin prefix, two or twice. Thus a leaf is bipinnate when the leaflets of a pinnate frond are again pinnate.
- Bulblet.** A small bulb borne on the stem and capable of developing a new plant.
- Compound.** Composed of several similar parts united into one whole.
- Confluent.** Running into one another.
- Crenate.** The margin notched with rounded teeth.
- Decomound.** More than once compound.
- Decurrent.** The basal lobe of a leaf growing to the stem below the point of insertion.
- Deflexed.** Bent abruptly downward.
- Halberd-shaped.** The same as Hastate.
- Hastate.** Hollowed out at the base and sides like an arrow-head, with lobes spreading.
- Imbricate.** Placed one over another ; overlapping.
- Incised.** The margin cut sharply, irregularly, and more or less deeply.
- Indusium** (Plural, Indusia). The covering of the fruit-dot in ferns.
- Lanceolate.** Lance-shaped, broadest near the base and tapering to a point.
- Midrib.** The main rib or vein of a segment, pinnule, pinna, or frond.
- Midvein.** The same as Midrib.

- Oblong.** From two to four times as long as it is broad, and with sides nearly parallel.
- Obtuse.** Blunt or rounded at the end.
- Ovate.** Egg-shaped.
- Palmate.** Having lobes radiating like the fingers of the hand.
- Panicle.** An irregularly branching cluster of stems bearing fruit.
- Peduncle.** That part of the stem on which the fruit is supported.
- Persistent.** Remaining for a long time.
- Petiole.** The footstalk of a leaf.
- Pinna (Plural, Pinnæ).** One of the divisions extending to the midvein of a pinnate frond.
- Pinnate.** Having the frond cut into lobes extending fully to the midvein or rachis.
- Pinnatifid.** Having the frond cut into lobes extending halfway or more to the midvein.
- Pinnule.** A secondary pinna; in a bipinnate frond, the smaller divisions extending to the secondary midvein.
- Rachis (Plural, Rachides).** The stem of a fern beginning with the leafy portion.
- Reflexed.** Curved backward and downward.
- Revolute.** The margins rolled backward or outward.
- Scape.** A naked stem.
- Segment.** One of the divisions of a bipinnatifid frond.
- Serrate.** Having the margin sharply cut into teeth pointing forward.
- Serrulate.** Similar to serrate, only with finer teeth.
- Sessile.** Connected to the stem without footstalk.
- Sinus.** A cleft or rounded curve between two lobes.
- Spike.** The tip of a peduncle bearing a close or sessile cluster of fruit.
- Sporangium (Plural, Sporangia).** The case inclosing the spores.
- Spore.** The fruit of cryptogams, corresponding to a seed.
- Stipe.** The stem of a fern from the ground up to the leafy portion.

Stolon. A runner with a disposition to root.

Ternate. Consisting of three nearly equal divisions.

Tuft. A cluster closely grouped.

Whorl. A circle of leaves round the stem.

Winged. Margined or bordered.

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