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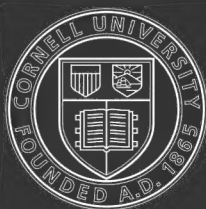
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THE
FERNS OF GREAT BRITAIN,

AND

THEIR ALLIES

THE CLUB-MOSSES, PEPPERWORTS, AND HORSETAILS.

BY ANNE PRATT,

AUTHOR OF "OUR NATIVE SONGSTERS," "WILD FLOWERS," ETC.

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LIST OF BRITISH FERNS

AND THEIR ALLIES.

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The Artist wishes it to be understood that he has purchased from Mr. J. E. SOWERBY permission to copy from the Work lately published by him, entitled "The Ferns of Great Britain illustrated," certain details of the Plates, including the figure of the rare plant *Gymnogramma leptophylla*.

THE

FERNS OF GREAT BRITAIN.

ONE may often observe that persons who are fond of nature, and who have yet never studied Botany systematically, are desirous of commencing that study with Ferns. Their extreme elegance of form, the small number of the British species, the apparent simplicity of their structure, and the comparative ease with which they may be preserved and formed into a good collection, all tempt the learner to "begin at the beginning," and to proceed afterwards to what he would consider as the more complicated part of Botany. Yet the study of the Ferns really requires more attention, and even offers more difficulties, than that of most orders of the Flowering Plants. The scientific descriptions, founded often on more minute distinctions, are less obvious; and in some few cases, even among our British Ferns, it is hardly possible to decide whether a plant should be regarded as a species or a variety, while their classification cannot be considered as even yet fully settled. There are, however, few things which are worth knowing that can be known without patient attention, and we rejoice in

finding this bestowed on the study of these beautiful plants. It is pleasant to see the rambler in the country searching through green lane or by dripping well for the feathery fern, or wandering over the open moor with his handful of

“Heath-bells dark, and bracken green.”

It is pleasant to see the graceful sprays of these plants made the objects of care and culture, and to mark them while waving over fern banks and fern walls, which have been reared for the purpose of adapting soils and situations, light and shadow, so as would best suit the ferns taken from various wild spots. Means are thus afforded for their study to those who have leisure, while the common garden rock is often, also, adorned by the fronds of some of the more hardy kinds; and some of the most rare and delicate may be found in the greenhouse, or even in the dwelling-rooms of the city, forming an ever-verdant miniature forest in the glass cases of Mr. Ward's invention. Even the Herbarium, with its dried specimens, gives a far better idea of the usual condition of the fern than it does of flowering plants. Leaves and blossoms may, by great care, be preserved so as to retain somewhat of their elegant form, and a little of their natural beauty of colour. The poet could remember with joy the teachings of one who showed him

“How to make sweet pictures of dried flowers,
Cull'd in the lanes when glow'd the sultry hours;
Then press'd and dried, and all on lawn dis-spread,
To look as infants do that smile when dead.”

But the fern spread out on the page scarcely gives us

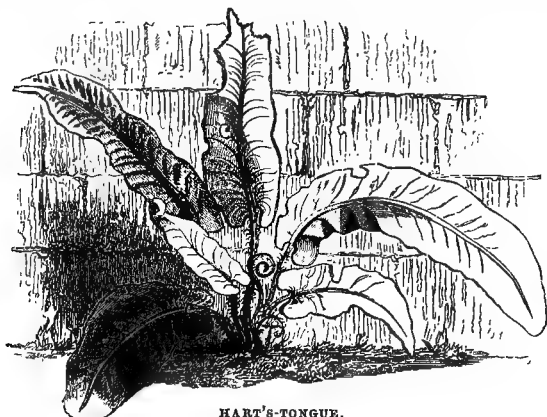
even an image of death ; its green is so living, its form so perfect, that we could fancy it had just been gathered in all its pride of beauty from shadowy woodland or rocky glen.

A popular description of a fern might be, "A large leaf or branch of leaves, bearing no flowers." Yet that leaf-like spray differs from a leaf in several particulars of structure ; the most marked of which is, that it represents the leaf and fruit conjoined, bearing its fructification, in most cases, on its under surface. The word *frond*, therefore, applied to the green expansion of a fern, though it originated in the idea that the leaf of a fern was composed of a branch and a leaf, is not altogether an unnecessary distinction. The frond consists of two parts ; the leafy portion and the stalk. The stalk is often called the *rachis*, but, strictly speaking, it is composed of two parts. That part which bears the green leaf is the rachis ; and the lower portion of the stalk, destitute of the green expansion, is the *stipes*. When the frond is so divided, that, besides the principal stalk, another set of stalks runs through the green divisions, each of these last is a *secondary rachis* ; the term *primary rachis* referring to the main stalk.

The lower part of the stalk, the stipes, is in some of our ferns naked ; but it is more often beset with chaffy scales, usually thin, and frequently of a pale brown colour. Sometimes these are few in number, and found only at the base ; but occasionally they are continued along the rachis, becoming smaller as they are higher on the stalks. The young fronds of several of the large and common ferns may be seen, in May, looking very

singular and beautiful on the green bank, coiled up and covered with large scales; and these scales afford too, by their mode of growth, an assistance to the botanist in the determination of species. The true stem of the fern generally lies along the surface of the ground, and below it, and from its resemblance to a root is termed the *rhizoma*. The stems and fronds of ferns have neither true wood nor bark, but are strengthened by bundles of tubes and fibres, which are embedded in cellular structure. The harder part is external, and the centre is either hollow, or more commonly filled with a soft pulpy matter; so that the stem of a tree fern very much resembles that of a palm in this respect, as well as in the cylindrical form which it often assumes.

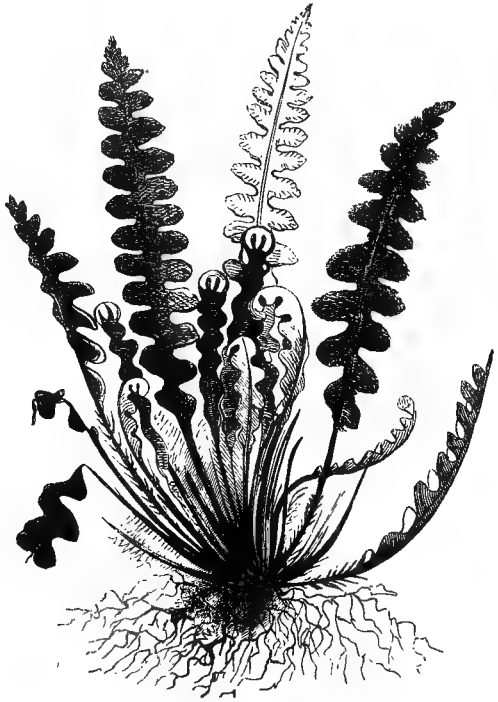
The green expansion of a frond differs in various families. In some it is delicate and almost transparent—a mere green film; in other cases it is tough and leathery, or thin, crisp, and brittle. Now we find it of bright grass-green, or it is of a dull olive, or of deep dark or brownish, or greyish-green hue. The difference of the



HART'S-TONGUE.

form, which is often so elegant and delicate in outline, gives to the ferns their grand attraction. Sometimes the frond is like a long narrow leaf, with waved edges, as in the Hart's-tongue; but by far the greater number of our native ferns have their fronds divided into numerous branches and segments.

The most simple form of division is the pinnatifid. In this the edge of the frond is cut into deep segments, nearly but not quite down to the rachis, as in the Scaly Spleenwort. When the frond is divided quite down to the rachis, leaving small portions of the rachis between each green leafy part, it is called *pinnate*, each little leaflet being called a *pinna*.



SCALY SPLEENWORT.

This may be seen in the Sea Spleenwort. When these pinnæ are again divided, in the same manner as in the Lady Fern, the frond is said to be *twice-pinnate*, and the series of little leaf-like divisions are termed *pinnules*; but when



SEA SPLEENWORT.



LADY FERN.

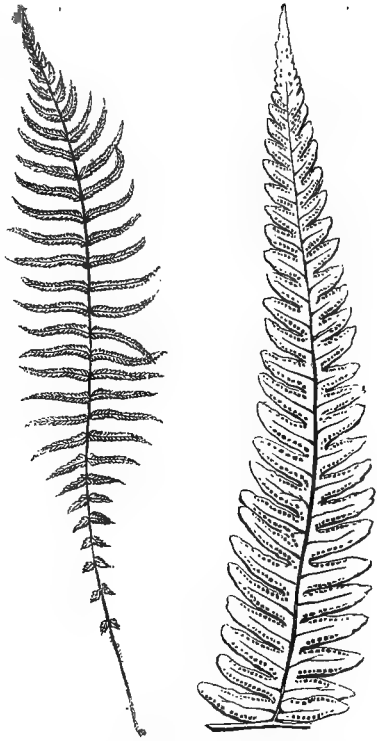
the pinnae are not cut down quite to the rib, and are only lobed, they are termed *pinnatifid*, as in the Mountain Fern. Several foreign Ferns are thrice-pinnate; but we have no British Ferns with fronds of this nature, except some very luxuriant states of the Bracken, and one or two other species. Fronds which are thrice-pinnate are called *decompound*.

The peculiar scroll-like form which the fronds of Ferns exhibit while yet unfolded, must have been observed by all who notice our hedgebanks during spring; for they may often be seen there with the blue-bells, and anemones, and primrose clumps. In Compound Ferns, like the Common

Brake, the divisions are also each rolled into this form, and exhibit, therefore, a number of pale green curves, resembling the shepherd's crook. This mode of unfolding is termed *circinate*. Many exotic ferns unfold in a different manner; and two of our wild genera, the Moonwort and Adder's-tongue, are without the circinate arrangement of their young fronds.

The mode in which the fronds are traversed by veins is termed their

venation, and it is usually so unlike the veining of an ordinary leaf as to be at once characteristic of a fern; so that even when these plants are without their reproductive brown clusters, one may always recognise the green frond as that of a fern. By holding up a young fern leaf to the light, it is easily perceived that the veins in most cases have a forked character; that is, they branch off in pairs. Occasionally, indeed, one vein may be seen running straight from the midrib to the margin, without branching; yet, in almost all instances, the vein becomes forked almost immediately on leaving the mid-



MOUNTAIN FERN.

rib. The mode of veining, in different families of Ferns, affords a characteristic distinction, to which more or less importance is attached by different botanists. It is on some spot among these veins that the capsules or seed-vessels are placed; and that particular point is termed the *receptacle*, its position with regard to the veins affording a good means of determining genera and species.

Every one who has gathered, from wall or hedgebank, during autumn, any of our native Ferns, has seen on the back, or more rarely on the margin, a number of powdery patches, often of a deep rich rust-brown colour, or occasionally, as in the Common Polypody, bright orange. They are sometimes circular, as in this Polypody; or they lie along the leaf in oblong patches, between the



ADDER'S-TONGUE.

midrib and the margin, as in the Hart's-tongue; or they run together into a mass, and cover the whole back of the frond, as in the fern called the Wall-rue; or they form a ridge along the edge of the leaf, as in the Maiden-hair. More rarely they cluster closely, till all the segments of the leaf are contracted and curled up round the masses of fructification, and then they have an altogether different appearance, and resemble a kind of inflorescence. Our beautiful tall plant, called Flowering Fern, not unfrequent in moist woods, and the little Adder's-

tongue found on pasture-lands, are instances of this form of fructification.

The small patches on the backs of fern-leaves are the *sori*, or clusters of capsules. These capsules are sometimes termed *spore-cases*, or *sporangia*, or *thecæ*, and they contain the *spores*, which are analogous in their uses to the seeds of flowering-plants, though differing from them in their origin as well as structure. They are a mass of cellular substance, without cotyledons; and instead of sending a shoot up into the air and radical fibres downwards, as the seeds of flowering plants do, they germinate indifferently from any part of the surface. The capsules, as seen under a microscope, are beautiful objects, resembling little hollow spheres of crystal, tinged with a delicate brown hue, and are discovered in most cases to consist of one cell, and to be surrounded by a jointed elastic ring, and to be supported below on an exquisitely slender stalk. When the spores are fully matured, the elastic nature of this ring causes various quick movements, by which the spores or fern-seeds, which look like fine dust, are jerked from the capsule. In some plants, as in the Flowering Fern, the Moonwort, and the Adder's-tongue, the seed-cases are destitute of the elastic ring, and are two-valved.

These clusters of spore-cases are sometimes formed outside the skin of the leaf, and are without covering; but in most of our native ferns, especially during their early growth, they are covered by a thin membrane called the *indusium*. If we examine a young fern, we see first a number of little pale-coloured stripes appearing at equal distances upon some of the veins. In a short

time the outer thin skin or cuticle of the leaf above these stripes separates a little from the green part; then it becomes raised by their growth, the raised part assuming the form of the little heap of capsules beneath; till finally these burst through the skin, and separate it into two equal parts, one edge of which remains adhering to the leaf. This thin skin is the indusium. This frequently disappears before the seeds are ripened. Though usually of the same form as the cluster, it is not always so, but in some few of our native species, as in the Filmy Ferns, it is cup-shaped, and it is then often called an involucre. The spores of ferns are very numerous, exceedingly minute, and of an oval form.

The frond of the fern arises from the rhizoma or root-stock, which may be generally described as a creeping underground or horizontal stem, though in some exotic species it rises erect, and emerging from the earth, resembles the shaggy trunk of a palm. The rhizoma of our native ferns is usually covered with shaggy scales or hairs, which sometimes, as in the Common Brake, are so fine and numerous, that they form a surface of velvety down. Sometimes this rhizoma sends out so many shoots, that they form a firm network beneath the surface of the soil; but more often this portion of the fern occupies little space in the ground. Some root-stocks of ferns are of a deep, rich, red-brown hue. A very common species in our conservatories, the Hare's-foot Fern (*Davallia Canariensis*)—which, as its name implies, has been introduced from that region of beautiful plants, the Canary Islands—has dark shaggy masses of root-stock about the base of its frond, which terminate in a

thickened extremity, and, being densely clothed with brown hair, instantly remind us of the leg and foot of the animal to which its name alludes. The true roots of ferns are the fibres which descend from the rootstock. Our native species of Fern are between forty and fifty in number; the Horse-tails and Club-mosses being fern-like plants, and not true ferns, though they are commonly called jointed or leafless ferns. None of our ferns in their ordinary state attain more than six feet in height, and we rarely find any, except the Common Brake or the Flowering Fern, nearly so high. When growing in large numbers, they are sometimes conspicuous on the landscape; but nowhere in Britain do they give, as in tropical climates, its characteristic feature to the scenery, or assume the dimensions of trees. Herbaceous ferns belong chiefly to temperate and colder countries; but, in the warmer regions, shrubby ferns cover the ground, forming, like our Common Brake, an under-growth in woods; while the herbaceous species are found chiefly growing upon trees, where, clinging sometimes to the topmost boughs, or investing the rugged trunks with their green sprays, they display a luxuriance and beauty unknown to the British fern. Tree ferns, too, of exquisite grace and beauty, grow in the tropical forest. Whether, however, of humble growth, or rising to the height of twenty or thirty feet; whether herbaceous or arborescent in habit, they have all so much similarity of general appearance, that they are readily known to be ferns, even by those who have never studied the botanic description of plants. Colonel Mundy, when referring to some of the tree-ferns of Australia, more than twenty

feet high, remarks, "One might almost fancy that the tall and dense forests around it had drawn up the well-known shrub, or rather weed, of our English deer-parks, into a higher order of the vegetable family. When I left England some of my friends were fern-mad, and were nursing little microscopic varieties with vast anxiety and expense. Would that I could place them for a minute beneath the patulous umbrella of this magnificent species of Cryptogamia!" On the forks of some of the old timber trees in this region, grew also the Stag's-horn Fern (*Acrosticum alpicorne*), as large as the largest cabbage, the frond exactly resembling the palmated antlers of the moose and reindeer. This luxurious growth extends to a variety of other herbaceous and shrubby species, which hang upon the stems and branches of trees, or rise as an undergrowth to the towering ferns from whose tops spring large fronds, often eight or ten feet long, thrice-pinnated, and so graceful and light that the smallest breeze sets them in tremulous motion. The works of Baron Humboldt abound in descriptions of the ferns in the forests of South America; and every writer on New Zealand tells of the ferns of that island. Humboldt remarks that the arborescent ferns produce the densest of shade in the American forests, by reason of their number and luxuriant growth. He describes some of the old trunks of these ferns as having a metallic lustre, owing to a carbonaceous powder with which they are covered, and he adds that no other plant exhibits this phenomenon. This traveller brought away some of the powder from the old trunks of the *Aspidium* and *Meniscium*. In the time of Linnæus four species only of

tree-ferns were known, but a large number have been described by later botanists; and more than three thousand species of ferns, comprising the arborescent and herbaceous forms, have been enumerated. The tree-ferns greatly resemble palm-trees in appearance, and the stems of both are so much alike, that fossil specimens have frequently been described as ferns, but which on further investigation have proved to belong to the Palm tribe.

The conditions under which ferns flourish differ somewhat in different genera; but heat, moisture, and shade are necessary for the luxuriant development of the greater number. They are more numerous in islands than on continents, the arborescent species being almost confined to the torrid zone: the shrubby species generally also preferring a climate of intense heat, and the herbaceous species grow in temperate climes, and are found more rarely in the colder countries, while the northern part of the globe seems quite destitute of any species of this elegant family of plants. As regards the ferns of this kingdom, some grow in almost every county; while some, peculiar to mountainous districts, delighting in limestone soils, or thriving only on the basaltic trap, are necessarily local or rare. Very few of our native species will bear the sea air, yet this is needed for the luxuriance of that beautiful plant of the sea-caves and cliffs, the Sea Spleenwort; while the Wall Rue and Black Spleenwort grace the ruined building or barren rock. The Northern Hard Fern is unhurt by its exposure to the sun and wind of the heath; and the *Lastrea Thelypteris* is our only Marsh Fern. Most of our ferns luxuriate in a shady spot, on a vegetable

mould formed of the falling leaves of many winters, or they wave unseen over the stones of quarries, or among rocks; but their number has doubtless been greatly lessened by the increase of agriculture during past centuries. Not one British fern grows in water.

The terms employed in the description of Ferns are few. A *linear leaf*, or *leaflet*, is one of which the two sides are parallel, like the leaf of the grass: the term *decurrent* signifies that the leafy portion runs down the side of the stalk, and gradually merges into it. The *margin* is sometimes serrated or notched like the edge of a saw; a *fertile frond* is one bearing the fructification; a *barren frond*, one from which that fructification is absent. In some ferns, as in the Northern Hard Fern, the barren and fertile fronds are differently formed.

TABLE OF THE ORDERS AND GENERA OF THE BRITISH FERNS, AND FERN-LIKE PLANTS.

ORDER I. FILICES.—TRUE FERNS.

This Order consists of flowerless leafy plants, their leaves or fronds, with some few exceptions, gradually unfolding in a scroll-like manner, and bearing their seeds or spores in capsules on the backs or margins of the fronds. These capsules are either one-celled and stalked, with an elastic ring; or are without stalk or ring.

* *Capsules with a vertical elastic marginal ring, which bursts irregularly.*

SUB-ORDER I.—POLYPODIACEÆ.

1. POLYPÓDIUM (Polypody).—*Capsules* seated on the back of the frond in circular clusters, without an indusium; *veins* in the British species, simple or forked. Name, from the Greek *poly*, many; and *pous*, a foot; either from the shape of the frond, or from its numerous roots.

2. GYMNOGRÁMMA.—*Capsules* seated on the back of the frond, in linear clusters, without an indusium; *veins* in the British species, simple or forked. Name, from the Greek *gymnos*, naked; and *gramma*, a line or letter; from the fancied resemblance of the forked veins to alphabetical letters.

3. ALLOSÓRUS (Rock-brake).—*Capsules* on the back of the frond, the edges of its lobes rolling under, and forming an indusium. *Fronde*s of two forms: the barren frond leaf-like; the fertile contracted, and bearing the fructification at its margin. Name, from the Greek *allos*, various, and *soros*, a mass.

4. WOÓDSIA.—*Capsules* at the back of the frond, covered by a roundish or kidney-shaped indusium, attached beneath the clusters, and cut at the edges into many thread-like segments. Name in memory of Joseph Woods, Esq. Author of “The Tourist’s Flora,” &c.

5. LASTRÉA.—*Clusters* at the back of the frond, nearly circular, covered by a kidney-shaped indusium, attached at the notched side; *veins* distinct after leaving the

mid-rib, not uniting with the adjoining lobe. Name from M. De Lastre, of Chatelleraut.

6. POLÝSTICHUM.—*Clusters* seated at the back of the frond, covered by a circular indusium, attached at its centre. Name from the Greek, *poly*, many; and *stichos*, a row; from the regular lines formed by the clusters of fructification.

7. CYSTÓPTERIS (Bladder Fern).—*Clusters* of fructification roundish; *indusium* hooded, and attached by its broad base. Name from the Greek, *kystos*, a bladder; and *ptéris*, a fern; in allusion to its hollow indusium.

8. ATHÝRIUM.—*Clusters* at the back of the frond, covered with a kidney-shaped or crescent-shaped indusium, attached along the upper side of the lateral veins, opening towards the mid-vein, its margin fringed with slender hair-like segments. Name from the Greek, *athyros*, open; because the indusium stands out separated from the frond, and is at length turned back open from it.

9. ASPLÉNÍUM (Spleenwort).—*Clusters* at the back of the frond, oblong or linear, attached along the upper or inner side of the veins; *indusium* opening toward the mid-vein, or inwardly. Name from the Greek *asplénon*, given by the ancients to some fern which they believed to affect the spleen.

10. SCOLOPÉNDRIUM (Hart's-tongue).—*Clusters* on the back of the frond, long, narrow, straight, and in pairs; *indusium* double; the two portions opening towards each other. Name from *Scolopendra*, a centipede, from a fancied similarity between the lines of fructification and the feet of that animal.

11. CÉTERACH.—*Clusters* of capsules at the back of the frond, placed on netted veins, and lying among thick masses of dark brown chaffy scales, which cover the whole back of the frond; *indusium* obsolete. Name supposed to be the *Chetherak* of the Arabian physicians.

12. BLÉCHNUM (Hard Fern).—*Fructification* at the back of the frond, in two narrow lines, one on each side the mid-rib, and covered each by a continuous indusium. Name from the Greek, *blechnon*, a name for a fern.

13. PTÉRIS (Brake).—*Fructification* seated at the back of the frond, or rather in a line at its margin; the *indusium* formed of the reflexed edge of the frond, which dilates into a membrane. Name in Greek, *ptéris*, a fern, from *pteron*, a plume or feather.

14. ADIÁNTUM (Maiden Hair).—*Fructification* at the back of the frond, in roundish or oblong clusters, covered by distinct portions of the reflexed membrane-like margin of the frond, opening towards the mid-rib. Name in Greek denoting *unwettered*, from the peculiar tendency of the fronds to throw off water.

* * *Capsules opening irregularly, having a horizontal or oblique ring, and enclosed in a 2-valved, membrane-like involucre, terminating a vein at the margin of the frond.*

15. TRICHÓMANES (Bristle Fern).—*Fructification* on the margins of the frond, the clusters having a cup-shaped indusium or involucre of the same texture as the frond, and terminating a vein. Name from the Greek, signifying hair and excess, from its bristle-like receptacles.

16. HYMENOPHYLLUM (Filmy Fern).—*Fructification* on the margin of the fern; the clusters seated within a 2-valved involucre, which is an expansion of the frond. Name from the Greek, *hymen*, a membrane; and *phyllon*, a leaf.

SUB-ORDER II.—OSMUNDACEÆ.

Ferns having the young fronds rolled up in a scroll-like manner, the capsules clustered on the margin of a transformed frond, and forming a panicle, without an indusium; destitute of a ring, and opening vertically by two valves.

17. OSMUNDA (Flowering Fern).—*Capsules* clustered into a branched panicle, terminating the frond. Name apparently given from the Saxon words *os*, house, and *mund*, peace.

SUB-ORDER III.—OPHIOGLOSSACEÆ.

Ferns having their unfolded fronds straight and not coiled, capsules arranged on a separate branch of the frond, without a ring or indusium, coriaceous, and opaque in texture.

18. BOTRYCHIUM (Moonwort).—*Capsules* roundish, sessile, clustered at the margin, and on one side of a pinnated stalk. Name from the Greek, *botrys*, a bunch of grapes, from the appearance of the clusters.

19. OPHIOGLOSSUM (Adder's-tongue). — *Capsules* 1-celled, 2-valved, forming a compact two-ranked spike. Name from the Greek, *ophis*, a serpent; and *glossa*, a tongue, from the resemblance of the fructification to the tongue of a serpent.

ORDER II. LYCOPODIACEÆ.—CLUB-MOSSES.

This Order consists of flowerless evergreen plants, with simple, veinless, usually taper-pointed leaves, with their seed-capsules seated in the angle formed by the leaf and the stem, or raised in spikes at the top of the stem. The capsules are destitute of a ring, and are 2 or 3-valved.

1. LYCOPÓDIUM (Club-moss).—*Capsules* 1-celled, 2-valved, containing a fine powdery substance ; or 3-valved, enclosing a few large grains or seeds ; *stems* rigid, clothed with short leaves. Name from *lycos*, a wolf, and *pous*, a foot, from a fancied resemblance of the branches to the paw of an animal.

ORDER III. MARSILACEÆ.—PEPPERWORTS.

These are flowerless plants, bearing capsules without a ring, either enclosed within the swollen base of the leaves, or rising from the root-stock of the plant, and containing seeds or sporules of two sorts, attached to thread-like receptacles.

1. ISOÉTES (Quill-wort).—*Capsules* surrounded by the bases of the hollow leaves, containing two sorts of spores, some larger than the pollen-like dust which accompanies them. Name from *isos*, equal or alike, and *etos*, the year, because evergreen.

2. PILULÁRIA (Pill-wort).—*Capsules* globular, 4-celled, each cell containing two different kinds of bodies. Name *pilula*, a little pill, which its fructification resembles.

ORDER IV. EQUISETACEÆ.—HORSETAILS.

These are leafless, flowerless, sometimes aquatic plants, with a hollow, subterranean, creeping stem, and hollow stems marked with lines, and sheathed at the bases of the joints. The fructification is produced in terminal spikes or catkins, either placed on the stem of the branched frond, or on a separate simple frond of earlier growth.

1. EQUISÉTUM (Horse-tail).—*Stems* jointed and tubular, fertile ones mostly unbranched and succulent; barren *stems* with whorled branches; *fructification* in a catkin. Name from *equus*, a horse, and *seta*, a hair, because some of the barren fronds resemble the tail of a horse.

1. POLYPODIUM (Polypody).

1. *P. vulgáre* (Common Polypody).—*Fronde*s deeply pinnatifid; the *segments* oblong, and tapering or rounded at the end, the upper ones generally smaller. This is one of the commonest of our Ferns, and one which is of easy recognition. It is abundant on all parts of our island, now hanging down from the gnarled branch or sturdy trunk of the old oak, now growing in large clumps on the hedgebank, and forming a good foreground for the artist's sketch; while sometimes it may be seen waving its bright green leaves above the cottage



1 COMMON POLYPODY
Polypodium vulgare

2 C. P.
 Var *cambriticum*

3 C. P.
 Var *hibernicum*

thatch, or on stone wall or rugged rock. The frond varies from a few inches to a foot and a half in length, and attains its full expansion earlier than most of our native Ferns, being usually developed by the month of May. If in a sheltered spot, it retains its verdure till December, but on an exposed situation, it is easily destroyed by frosts. The leaves have a faint and rather disagreeable odour, and, if tasted, leave a rough and unpleasant feeling on the tongue. Several foreign species of Polypody are, however, aromatic, and the fronds of some are used by the natives of the Sandwich Islands to give a perfume to the cocoa-nut oil with which they anoint themselves. The roots of our common species are very numerous, forming entangled masses, and the horizontal underground stems are entirely covered, when young, with pale brown scales, which disappear as the plant becomes older. The slender stalk of the frond rises from this brown creeping stem, and is usually clothed rather more than half-way down with the leafy portion. This is lanceolate, and divided into lobes, almost to its midrib. The lobes are usually oblong, and rounded at the end, but in some specimens they taper to a point. The margin is generally entire, but is sometimes slightly serrated. A mid-vein winds through each lobe, and lateral veins are produced alternately from it. The same alternate disposition is to be seen in the veins arising from these, which are generally four in number, and it is usually on the lowest of these branches that the large, round, bright orange-coloured clusters are seated; the remaining veins, which are barren, have little club-shaped extremities. The fructification is very

conspicuous, and is usually placed at the upper part of the frond.

This plant, like the Common Brake and several other of our native Ferns, contains a large proportion of carbonate of potash, which in former days was used by glass-manufacturers. The fern was also formerly praised for its medicinal virtues, and the mucilaginous liquid obtained by boiling its fronds had much repute among herbalists as a remedy for pulmonary affections. When boiled with liquorice, it is a very good medicine for cold and cough ; but it requires boiling for a long time, till the decoction becomes slightly bitter. Michael Drayton, who calls it the "jagged polypodium," elsewhere describes it the "rheum-purging polypody." In Paris this and the mucilage obtained from the leaves of the Lime-tree are deemed, and not without reason, very useful in colds ; but, except in villages, the plant is scarcely used in this country. Mr. Newman remarks that he has seen women collecting it in Herefordshire, as a specific against hooping-cough. He says that it is gathered in October and November when full of seed, the barren fronds being rejected. It is hung up in the cottage to dry, and, when required for use, is slowly boiled with raw sugar. The people who were gathering it called it by its old names of Golden-locks and Maiden's-hair. We have known it to be gathered for a similar purpose in Kent, where it was called Golden Polypody and Golden Maiden-hair, doubtless from its bright orange-coloured masses of fructification. In this case, however, it was deemed of great importance that the plant should be gathered from the oak, and not from the shady hedge-

bank or other tree. Several species of Polypody are used for medicines in other countries, as the *P. Calaguala*, the root of which has an oily and disagreeable taste, but which in America is highly valued for its alterative properties. The various species, of which there are immense numbers, adorn the tropical lands of the Western Hemisphere, where they attain great luxuriance; and our Common Polypody, which is found all over Europe, grows in many parts of Asia and America, either this or a very similar species being one of the commonest ferns in many of the woods and hedges of North America. Dr. Joseph Hooker says that in Calcutta the Hindoos boil the young tops of a polypodium with their shrimp-curries. In some countries the plants of this genus are much larger than the British species. Mr. Bennett, in his account of the South Sea Islands, mentions among other ferns, a species of Polypody which he found at Mahiatea, growing in abundance on a high mound built of coral stones. He says that the natives called it *Atua-buua*, or Pig's-god, and believed it to exercise a watchful care over the well-being of these animals.

Several little variations occur in the form of our Common Polypody, the lobes being more or less cleft, or acute, or serrated. One of the most important is that termed *Cambricum*, the Welsh Polypody, in which the lobes become broader, and are again irregularly lobed and toothed. This is always barren. The variety *Hibernicum*, or Irish Polypody, has a broader twice or thrice-pinnate frond, and is fertile. It is an exceedingly handsome form of the fern. The French

call this fern *Le Polypode*; the Germans, *Der Tüpfelfarren*. It is the *Boomvaren* of the Dutch, the *Polepodio* of the Spaniard and Italian, and is known in Russia by the name of *Osokor*.

2. *P. Phegopteris* (Beech Fern).—*Fronds* pinnate, the pinnæ united at the base and pinnatifid, the lowest pair turned downwards, and all the rest upwards; *fructification* marginal. This very beautiful plant is called, also, Sun Fern and Mountain Fern. It has a preference for mountainous localities, where it often occurs at a great elevation, and it grows also in shady rocky woods. Though a local plant, it is often abundant on particular spots. It is more frequent in Scotland than in England, and is rare in Ireland. It is found in the northern, western, and southern counties of England, but is unknown in the midland and some of the eastern counties. It flourishes particularly near waterfalls; by the Falls of Lodore, celebrated both for their picturesque beauty, and for the singular rhymes which Southey composed on their rushing waters, this fern is one of the most graceful and lovely objects, springing up from among the rich green mosses which surround it, and its pale green hairy fronds sometimes glistening with drops of the spray dashed from the fall. It is a common fern in Cumberland, growing on the very summits of some of the mountains. It has no just claim to its common name of Beech Fern; for, though found in moist, wooded places, it does not hang from the branches of that noble tree, but its brown root-stocks creep over the damp rock, or among the scattered leaves. The frond rises in May, and may be found in fructification



РАІЕ МОГНАІІН ПОСІРІДЬ
Aspidium plieopteris

throughout the summer and autumn. It varies in height from six inches to about a foot, the stalk being generally about twice as long as the leafy part, and slightly scaly at the base. Its roots are black, wiry, hair-like fibres. The frond is very distinct in its outline, being triangular, and tapering at the upper part into a long point. The lower part is pinnate, the pinnæ being narrow, cut nearly to the midrib, and very acute at the point. They are usually in pairs, the lowest pair being at some distance from the others, and turning backwards towards the ground. They are united to the stem by their midrib only; but the other pinnæ, which all point forwards, are united to the stem by their whole width, and are also connected with each other in a pinnatifid manner. This turning backwards of the lower pinnæ gives so peculiar a character to this fern, that those who have once seen it rarely find any difficulty in recognising any further specimens which they may meet with.

The lobes of the pinnæ have each a slender vein running up the middle, from which, lateral veins, chiefly unbranched, issue alternately, and extend to the margin, each bearing a cluster of capsules at its extremity, so that the fructification is nearly marginal. The clusters are circular, and of a brownish hue. The young fronds unfold their coils very early, and these often droop backwards before fully expanding. It is a very delicate plant, perishing when placed in culture where it is not protected from the sun, and dying away with the earliest frosts. Many writers dispute its claim to be one of the Polypodies; and it has been by various botanists united with the genus *Polystichum*, or that

of *Lastréa*, or it is sometimes termed *Gymnocárpium Phegópteris*.

3. *P. Dryópteris* (Oak Fern).—*Fronde*s with three branches, the divisions pinnate, the pinnæ cut into segments nearly to the midrib, blunt, the uppermost entire; *clusters of capsules* nearly marginal. This very elegant species is sometimes called, also, Pale Mountain Polypody, or it is known by the very characteristic name of Tender Three-branched Polypody. The triple fronds are a marked character of the plant, and it is slender in form, thin, smooth, and fragile in texture. The height of the frond is from four to six inches, and its colour is of a brighter green than that of almost any other British fern, though it loses this brightness if placed in a spot exposed to the sun. Its mode of unfolding the young fronds is very remarkable. In March and April these emerge from the soil, exactly resembling, as Mr. Newman has said, three little balls on wires. These folded scrolls daily uncoil to the air and shaded light, till, by the end of June, not only are the three graceful branches developed, but the dark-brown masses of seed-cases are crowding upon their under surfaces. Like many another plant, however, which rapidly attains perfection, it is somewhat short-lived, not surviving the earliest frosts. The stalk is very slender, about twice the length of the leafy part of the frond, of dark purplish colour, very brittle, with a few scales at its base. The three branches of the frond are triangular, each having a short stalk, and the three uniting in an angular manner with the common stalk of the frond. They spread loosely, and are moved by the slightest wind, the middle branch



TENDER THREE BRANCHED POLYPODY
Polypodium arvense

being the largest. Each branch is pinnate at the base, and pinnatifid at the upper part: the pinnæ are also pinnate at the base, and pinnatifid and gradually tapering at the top, the edges near the point being undivided, the pinnules and lobes oblong and obtuse. The pair of pinnules at the base of each pinna, close to the main stalk of the frond, are so nearly of a size, and so placed, that when the pinnæ are exactly opposite, they stand in the form of a cross; the two nearest the summit of the branch being smaller than the two opposite, and more nearly on a line with the rachis. There is an angular bend in this fern, just at the point of the rachis where the side branches rise.

A mid-vein winds through each lobe or pinnule, and the lateral veins are usually alternate and without branches. Each terminates at the margin, and the clusters of fructification, which are circular and of pale brown, are placed at its extremity. Sometimes the clusters are densely crowded; in other specimens they are scattered and remote. A large number of the fronds are barren, and the fertile ones are generally taller than those without fructification.

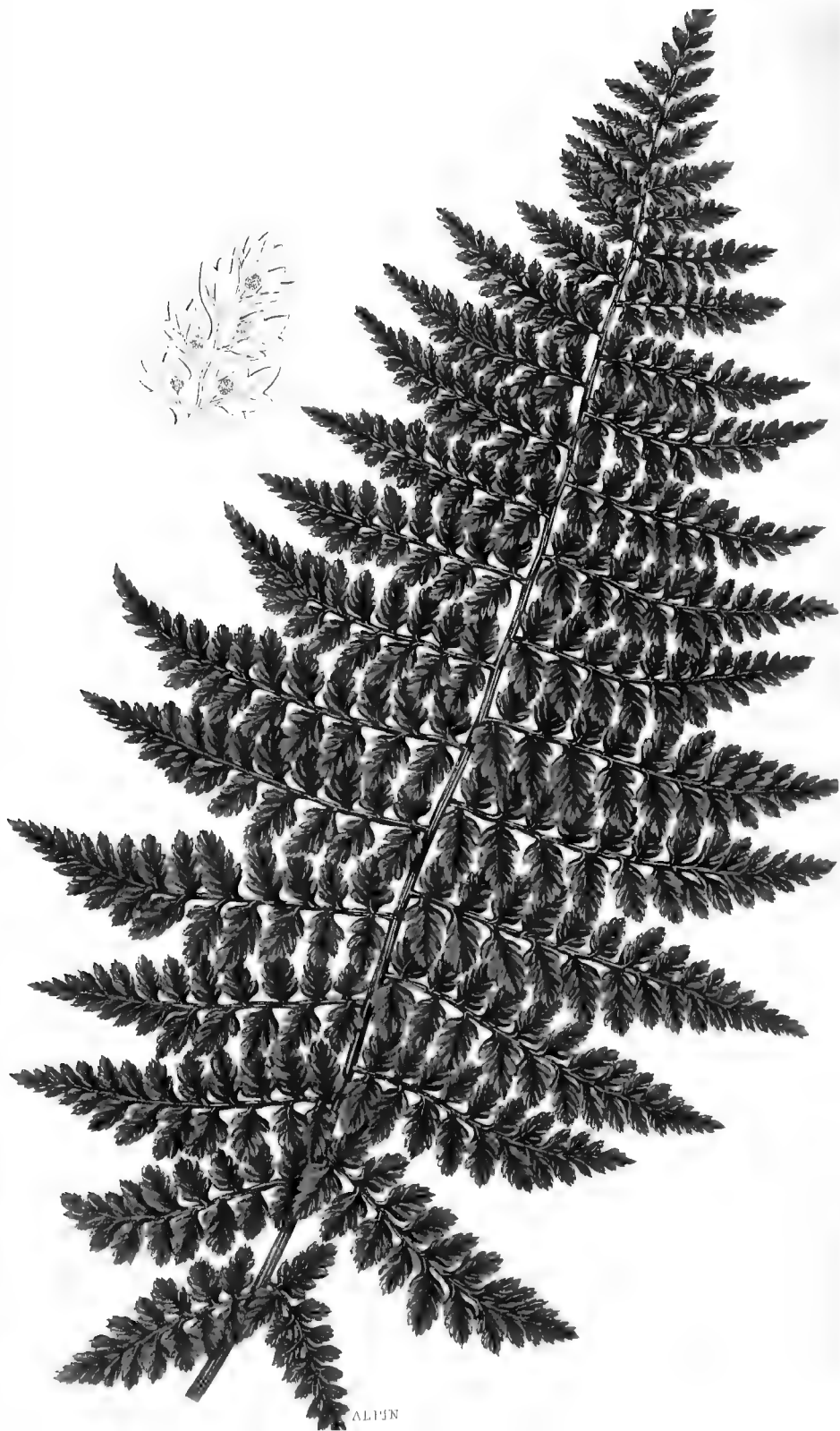
The Three-branched Polypody is not unfrequent in moist woods, and in stony, barren, mountainous places both in England and Wales. It is common in Scotland, and is very generally distributed, being found in every country of Europe. Its underground stem is slender, black, wiry, and creeping to a great distance. This fern is by some writers included in the genus *Polystichum* or *Lastrea*, and is also by Mr. Newman termed *Gymnocarpium Dryopteris*. The dried specimen of the Herbarium,

though preserving well the outline of this fern, gives no idea of its attitude while living. This is gently drooping, not only the whole leafy portion bending down, but the lobes curving down also.

4. *P. calcáreum* (Limestone Polypody).—*Fronds* triangular, somewhat three-branched, lower branches pinnate, the pinnæ pinnatifid, blunt, the uppermost nearly entire; *fructification* marginal. This plant is also known as Smith's Polypody, or Rigid Three-branched Polypody. Notwithstanding, however, its latter name, it is far less distinctly three-branched than the last species, and is very different from it in its habit. The lower branches are much smaller in proportion to the middle one, and all are erect and rigid. It has not either, in any great degree, the angular bend in the stalk of the frond which so well characterises the Oak Fern, though it in some specimens slightly shares this peculiarity. It is also a more rigid firm plant, of a darker, duller green; its stalk is more scaly at the lower part, and green instead of purple; its clusters of fructification usually more densely crowded; it has also a marked distinction in the mealy appearance presented by the surface, owing to numerous stalked glands which crowd over every part of it. The fronds are from six inches to a foot high, nearly triangular, the base shorter than the sides. The stalk is of about the same length as the leafy part; but the side branches are not only shorter, but are more slender than the middle one. The lower branches are pinnate, and the pinnæ are cut down nearly to the midrib; the upper branch is pinnate, with its lower pinnæ again pinnate, and the upper ones pinnatifid, as are also those of the



RIGID THREE BRANCHED POLYPODY.
Polypodium calcareum



lower branches, and the upper part of the frond. A distinct winding mid-vein may be seen in each pinnule or lobe, whence issue lateral veins either simple or slightly branched, near the termination of which, towards the margin, are placed the round clusters of fructification, which in the autumn run into a crowded mass, and form a marginal series. The underground stem of this fern is dark-brown and creeping, and its fibrous roots tough. Freshly gathered specimens exhibit a degree of downiness on the frond. It is a rare fern, growing among the loose stones of the limestone regions. It does not thrive so well as several of the species in gardens near towns, but sometimes in country gardens it grows well, requiring lime to be mixed with the soil. It seldom grows very abundantly, though it is very plentiful on the rocks of Buxton, about Matlock Baths, and the Cheddar cliffs, for it seems never to grow wild except in limestone districts. Some authors term it *Lastréa Robertiána*, *Polypódium Robertiánum*, or *Gymnocárpium Robertiánum*.

5. *P. alpestre* (Alpine Polypody).—*Fronde*s lanceolate, twice pinnate; *pinnules* linear-lanceolate, pinnatifid, with blunt sharply-serrated lobes. This fern has but recently been added to the list of our British species. It has long been known as a native of Switzerland, as well as of several countries at the north and in the middle of Europe. It was first discovered in Britain in 1841, by Mr. Watson, on the mountains near Dalwhinnie, and at Great Corrie of Ben Alder, Inverness-shire. It was not, however, until 1844, when this botanist again saw this fern in Canlochen Glen in Forfarshire, that its claim

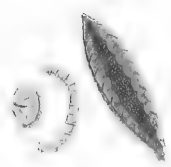
as a British plant was fully recognised by botanists, and it was proved to be the fern known by Continental writers as *Aspidium alpestre*, or *Aspidium Rhæticum*. It is so like the Lady Fern (*Athyrium Filix-fœmina*) in its outline and general appearance, that it has doubtless often been overlooked, and believed to be an alpine variety of that plant; for it has since been found to be a not unfrequent fern on mountains in the north of this kingdom. Some writers consider that this fern has at an early period of its growth an indusium over its circular clusters, and this may have induced the Continental botanists to class it with *Aspidium*. Mr. Newman constitutes it a new genus, and calls it *Pseudathyrium*; while a very elegant form of the fern, termed by him *P. flexile*, may eventually prove to be a distinct species, or it may be but a variety of this plant.

This alpine Polypody is a very graceful fern, the fronds growing in circular clumps from the crown of a creeping rhizome, and being a foot or a foot and a half high. These fronds are lanceolate, twice-pinnate, narrowed to the base, as much so as at the upper part of the frond, and the leafy portion extends almost to the base of the scaly stalk. The pinnæ are lanceolate and tapering; the pinnules lanceolate, acute, and deeply pinnatifid, with serrated segments. The clusters of fructification are small and circular, and are generally placed on the depressed spots between the lobes of the pinnule, and thus form two distinct lines on each side of the midrib, and parallel to it; but sometimes they are more numerous, and in maturity form one mass.



2

1



1 FINL. LEAVED GYMNOGRAMMA
Gymnogramma leptophylla
2 PARSLEY FERN
Allo-orus crispus

2. GYMNOGRÁMMA (Gymnogramma).

1. *G. leptophýlla* (Fine-leaved Gymnogramma).—*Fronde*s egg-shaped, twice-pinnate; *pinnæ* roundish, wedge-shaped, three-lobed, the lobes cut and toothed, blunt. This pretty fragile little fern is a biennial plant, very well known in the countries at the South of Europe, and a native of the Atlantic Islands, as well as of Jersey. In the latter island it is not an uncommon plant on grassy hedgebanks, and by the side of rivulets. For some years past its growth in Jersey has led some botanists to enumerate it among British ferns, but it appears also to grow in some spots of the United Kingdom. A correspondent of the *Gardener's Chronicle* for January, 1853, sent for inspection to Professor Lindley a specimen of this fern found in Britain, and, as he observes, entirely new to this country. The writer avoided giving the locality, doubtless from the apprehension that if he did so, some botanists might visit the spot, and entirely eradicate the fern, in order to increase the stores of their own Fernery or Herbarium. He remarks: "This morning I examined the place where it was gathered last year, and found that it is coming up plentifully again. It is growing in a clay soil, on a bank at the foot of a hill, and is much overshadowed with ivy and larger ferns. *Asplénium lanceolátum* grows plentifully all round it, and the bank is in that part covered with a small round lichen. The situation is very damp and much sheltered, and the fern is scattered over a surface of two or three yards; but I can find no trace of it on any other part of the bank, and I have never met with

it on any other part of the island. The place where it grows is unfrequented, and I do not think it is possible it should be anything but wild.”

This fern requires a sandy loam or other light soil when cultivated, and must be kept in shadow and in a moist atmosphere. At the latter end of summer its fronds arise from the seed sown in spring, and are very small and usually barren; but, early in the following year, some taller fronds gradually develop themselves, and these are, when fully grown, about three or four inches high, and extremely delicate in texture. They are twice or thrice pinnate; the pinnæ and pinnules alternate or opposite; the end pinnules bluntly wedge-shaped or rounded, about three-lobed, the lobes terminating with two blunt teeth. The pinnule has a mid-vein, from which issues a forked vein, on which the cluster of fructification is placed, a part of the cluster occupying each branch of the vein, so that the cluster itself is forked; after a time, however, the fructification forms a mass over the whole under surface of the pinnules.

3. ALLOSÓRUS (Rock-brake).

1. *A. crispus* (Curled Rock-brake, Mountain Parsley, or Rock Parsley).—Barren *fronds*, twice or thrice pinnate; *segments* wedge-shaped, linear, oblong; *segments of the fertile frond* oblong. Many persons visiting the lakes at the north of England bring back with them a few fronds of this elegant little fern; and it is so beautiful in outline, and often renders the rocks so richly

tinted by its green fronds; that it tempts even those who are not botanists to gather it. Southey, who describes it as the Stone Fir or Mountain Parsley, says it is the "most beautiful of all our wild plants, resembling the richest point-lace in its fine filaments and exquisite indentations." We have sometimes, while looking at it, recalled the words of Milton :

" For not to use alone did Providence
 Abound, but large example gave to man
 Of grace, and ornament, and splendour rich,
 Suited abundantly to every taste,
 In bird, beast, fish, winged and creeping thing,
 In herb and flower."

Graceful it is, and delightful to the eye of the lover of nature; though neither singing bird, nor brightly tinted insect, nor useful cattle, can find nourishment in its luxuriance.

The favourite place of growth of the Rock Parsley is among the rugged masses of stones and broken rocks which lie at the base or on the slopes of mountains, in the north of England. We look for it in vain in the southern counties; but it often occurs in Wales. At first sight its crisped sprays might be taken for a tuft of the leaves of Common Parsley, and it is as bright and green as that herb in early summer. Here and there some patches of the plant gather in abundance and beauty on the slate mountains of Cumberland, relieving their dark tint by the verdant fronds; and many an enthusiastic botanist, who has visited the slate and trap rocks of Snowdon, has hailed this lovely fern with rapture, as he beheld it covering their rugged surfaces in wild profusion.

Both the barren and fertile fronds of the Rock Parsley are twice or thrice pinnate, but the nearly wedge-shaped segments of the barren frond are often cleft at the end. These fronds are more numerous than the fertile ones, and generally of a much lower growth, and of a brighter, more yellowish green. The fertile frond is nearly triangular, from six to twelve inches high, and the segments are oblong, oval, or linear in form. The divisions of this frond have a winding mid-vein, producing lateral ones either forked or simple, which extend nearly to the margin, and bear at their extremities the round clusters of seed-cases. These are destitute of a true indusium, but are concealed by the margins of the leaflet, which are rolled under, and which become quite thin and white. In the early stage of their growth we may see the circular form of the clusters, as they are then distinct; but they afterwards mingle into two continuous lines of bright-brown fructification.

The stalk of the frond is smooth, pale green, slender, very brittle, and usually longer than the leafy part; and the delicate green fronds rise in great number from the horizontal stem, forming a dense mass, and holding very fast to their rocky soils by their black, tough, numerous fibres. They rise in May and June; but he who should visit their localities during winter, would see no remains of the verdant hue with which they clothed the rocks in spring. This Rock-brake is termed by some botanists *Cryptogramma crispa*, or *Pteris crispa*, and is the *Osmunda crispa* of Linnæus. It grows freely in cultivation, but requires shade, as too much sunshine renders its green hue less vivid.



OPHIOGLOSSUM WOODII,
Wood's-ore-plant

ADIANTUM FLAVUM W.,
Woods-ore-plant

4. WOODSIA (Woodsia).

1. *W. Ilvénsis* (Oblong Woodsia, or Ray's Woodsia). — *Fronde* lanceolate or oblong, pinnate, hairy beneath. The only two species which we possess in this country of this genus of Ferns, are both very rare plants. They have some peculiarities which readily distinguish them from any other species. Their indusia, instead of covering the clusters of spore-cases, as in other genera, are attached beneath them, enclosing them while young, but tearing as they grow older into numerous little chaffy segments, which look like tufts of slender hairs placed around the clusters. This species grows on the most elevated and bleak mountainous places, among the fissures of rocks. It has been found on Clogwynn-y-Garnedd, Snowdon, and Llynn-y-cwn, on Glyder Vawr, Wales; on the Clova mountains, Scotland, as well as in Durham, where Mr. Backhouse found it growing at the base of some basaltic rocks on the Durham side of the river Tees, about 200 yards below Cauldron Snout. It is said also to have been found formerly in Westmoreland, where a single frond was gathered from the old walls of Crosby Ravensworth Church; but these walls have now been taken down. The fronds of this species are about two or three inches high, and are covered on both sides with shining hairs, which are, however, on the upper surface invisible to the naked eye. The clusters of seed-cases lie among these, on the under-surface, and are almost hidden by them. A few chaffy scales are scattered on the stalk, and this has a joint at a short distance from its base, at about three-

quarters of an inch from the point at which it joins the rhizome—a character belonging to all the species of *Woodsia*. The rhizome is tufted, and the roots black and wiry.

This fern is of a dull green colour, and dies down to the ground at the approach of winter. The frond is lanceolate in form, and pinnate. The pinnæ, which are usually in pairs, are oblong, with obtuse ends, and a deeply-lobed margin, sometimes cut down almost to the mid-vein. The mid-vein of the segments of the pinnæ is not very distinct; and the lateral veins, which are either simple or branched, issue from it towards the margin, near to which the clusters of seed-cases are seated. This fern is often not more than an inch high, and very rarely more than three inches. It has been termed *Achrósti-cum ilvéense*, and is now by some writers called *Polypódium ilvéense*, or *Polypódium arvónicum*.

2. *W. alpína* (Round-leaved or Alpine *Woodsia*).—*Fronds* pinnate; the *pinnæ* pinnatifid, hairy beneath; *clusters of spore-cases* solitary at first, afterwards mingling in one mass. This little fern grows in tufts; its fronds never more than two or three inches in height, and more commonly about an inch high. It is a very rare species, found in fissures of Alpine rocks, mostly in places rarely visited. It has been seen on Snowdon and Ben Lawers, and also in the Glen of the Dole, Clova, and other places of the eastern Highlands. Its stalk is very slender and smooth, only that a few small scattered hairs and scales may be seen upon it at an early period of its growth. The frond is long, narrow, almost linear, and pinnate. The pinnæ are perfectly



distinct, and sometimes distant from each other, obtusely triangular, and lobed, and they are usually alternate on each side of the rachis; those at the lower part of the frond being generally farther from each other than the higher leaflets. The upper surface is nearly smooth, but a few minute hairs are scattered along the margin and under-surface. The veining is not a very marked feature of the species. There is no distinct mid-vein, but small veins branch into each lobe, not quite reaching the margin of the leaflet. At the extremity of these veins are placed the clusters of capsules, which soon form a crowded mass. The frond is of a brownish green colour; the roots black, wiry, and branched; and the underground stem very large in proportion to the frond. Many botanists consider that this species and the last should be united, as they doubt if there is any difference between them which is not caused by variations of situation and circumstances of growth. This fern is called also by various botanists *Acróstichum alpinum*, *Acróstichum hyperboreum*, *Polypódium hyperbóreum*, or *Woodsia hyperbórea*.

5. LASTRÉA (Lastrea).

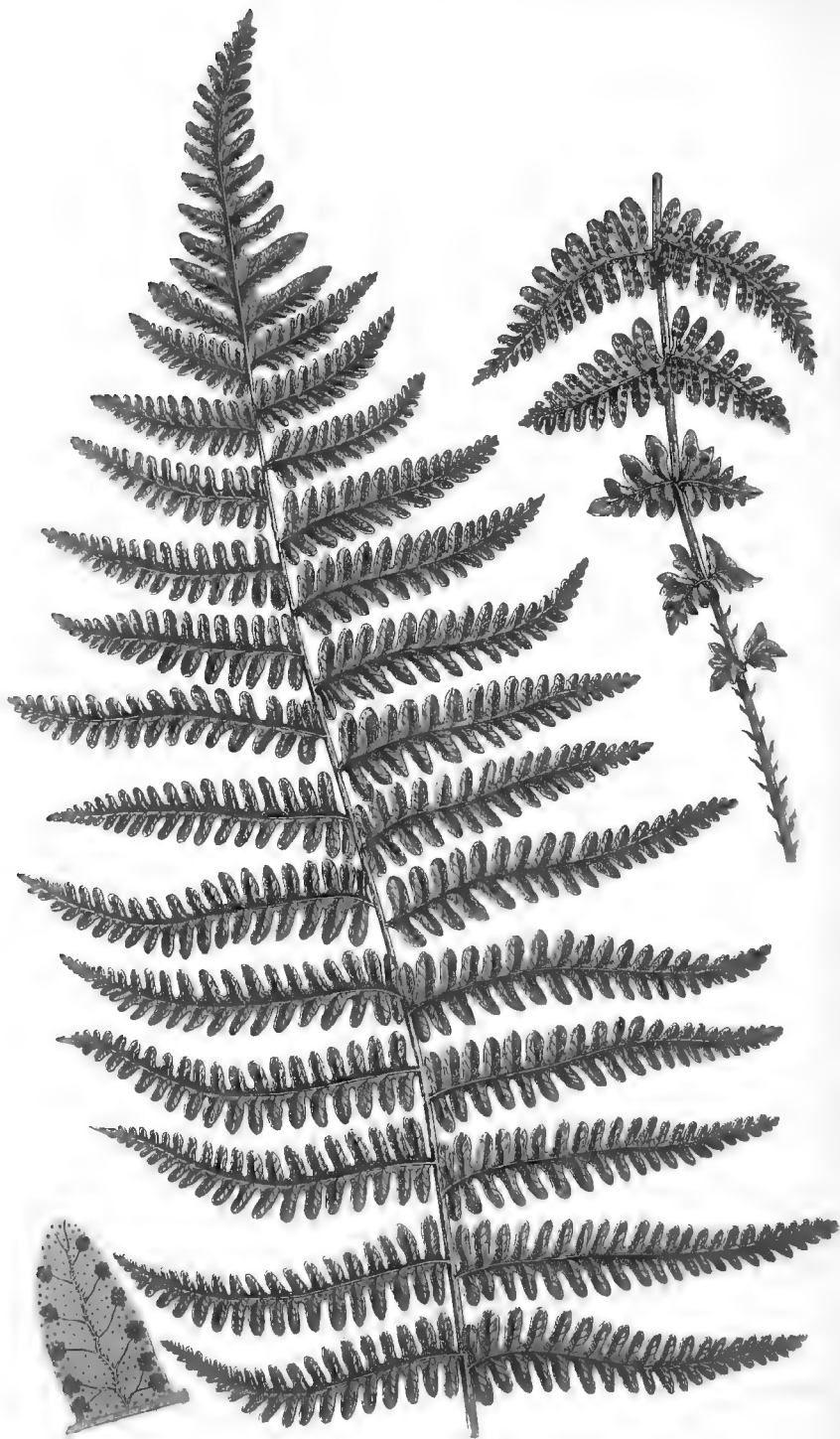
1. *L. Thelypteris* (Marsh Fern).—*Fronde* pinnate; *pinnæ* pinnatifid; *clusters* marginal, near together, at length mingling into a mass. Several of the most conspicuous of our native ferns belong to the genus *Lastrea*, some of them almost rivalling the Common Brake in size. It was formerly comprised in the genus *Aspidium*, and its chief distinction consists in the kidney-shaped

indusium which is attached to the frond at its notched part. The Marsh Fern is not one of the largest of the *Lastreas*, for its barren frond rarely attains more than a foot in height; and the fertile frond is but an inch or two higher, although under cultivation it is sometimes more than twice as high as when wild. This fern delights in moist boggy lands, occasionally growing in great abundance among the Heather, and Sundews, and Asphodels, and other bog plants; but, like some of its floral companions, it is somewhat local, and many a boggy heath of England is destitute of its fronds, while both in Scotland and Ireland it is a less common plant than in England. In Wales it occurs in numerous localities. It is a native of every country in Europe, and is believed to grow in Africa, and both in North and South America. It was at one time thought to be a frequent fern in Scotland, the Heath *Lastrea* having been mistaken for it. Dr. George Johnston, commenting, about twenty years since, on this species, says that it had only lately been discovered to be a Northumbrian plant; and adds that it was not a little curious that this fern, which was thought to be so abundant in Scotland, should not be found at all in Berwickshire, and is so rare in the north of England as to have escaped the notice of the many acute naturalists who have botanised there, until the late date of 1832-3, when Mr. Embleton drew it from its lurking-place in Learmouth bogs, on the very verge of the kingdom. It has since been found at several spots near the lakes of Cumberland, at Hamersham bog in Westmoreland, at Potterie Carr, Askham bog, Heslington fields, Buttercrambe near York,

and in several other spots in Yorkshire. This fern was probably more general and abundant in our island at a period when lands were less drained and brought into culture. It is known to have disappeared from Allesley in Warwickshire. The Rev. W. T. Bree, in the true spirit of a botanist, regrets its absence from spots in which, in his earlier day, he had been accustomed to gather it. Writing from Allesley he remarks: "A pit in this parish formerly abounded with the Marsh Fern; the entire surface was so completely scummed over (if I may use the expression) with a thick blanket of the matted roots of the fern, interspersed with Bog-moss, Marsh Cinquefoil, &c., that no water was visible; and, more properly speaking, the spot should not be called a pit, but a shaking bog. Some years ago the field was brought to the hammer, and purchased by an industrious hard-working man, who, at no small expense of labour, drained the bog and converted it into profitable ground. Of course there was an end of the Marsh Fern in that situation; nor do I know, at this moment, any other habitat where it is to be found." This botanist also expresses his regret when, on revisiting a charming boggy meadow on the skirts of Chemsley Wood, near Coleshill, abounding with the rare Butterworts, Sundews, Grass of Parnassus, Cranberries, Cotton Grass, and the orchideous plant termed Helleborine—a spot which, as he says, was "one of Nature's own botanical gardens,"—he found it converted into a potato ground. This writer says that he had been delighted with the spot in his youth, and had spent many an hour in exploring its natural treasures. He adds, "It is not

only to the cultivation of waste lands, and to agricultural improvements, that the extermination of some of our rarer plants is owing; it may be attributed also, in some part at least, to the rapacity of botanists, who, in some cases, too greedily pluck up, root and branch, every specimen of a rare plant they can meet with." It is owing to a rapacity of this kind that the lovely Flowering Fern, once attaining such luxuriance and beauty in the Isle of Madeira, has been entirely eradicated. Visitors to that island, if they make a prolonged stay, are almost sure to covet the possession of some of the beautiful ferns so abundant there; and as ferns are preserved with little trouble, many collections from the island are brought into this country, till at length this fern has disappeared from the stations which it once ornamented. It has now been planted there again, and it is to be hoped will not be torn up so eagerly by future collectors.

The Marsh Fern, though a pretty plant, is one of the least ornamental of a genus producing several ferns of peculiar grace. It has a slender stalk, arising from a black underground stem, which creeps to a great extent in the soft soil, and sends forth a large number of tough fibrous roots. The frond is lanceolate in form, and pinnate; the pinnæ are usually opposite, and cut into lobes nearly to the mid-rib; the lobes are entire, numerous, and rounded at the end, those of the fertile frond having their margins curled backwards so as to give them the appearance of being narrower and more pointed. The colour of this fern is a pale green, and its texture somewhat thin and delicate; but the fertile



MOUNTAIN FERN
Lycopodium obscurum

frond has a much more vigorous appearance than the barren one. The latter appears in May, and the fertile frond in July.

Each lobe of the Marsh Fern has a somewhat winding mid-vein, from which the side veins branch alternately, and the clusters of fructification are seated on both branches, half-way between the mid-vein and the margin. The clusters are abundant, and in an early stage of the plant the thin, white, membrane-like indusium may be seen; but as the capsules increase in size it disappears. The fronds of this species are not so tufted as some others, but spring up, at intervals, from the long slender underground stem. The plant is classed by various writers in the genus *Polypodium* *Acróstichum* or *Polýstichum*; but it always retains its specific name of *Thelypteris*. Mr. Newman terms it *Hemestheum Thelypteris*.

2. *L. Oreópteris* (Heath Fern, or Sweet Mountain Fern).—*Fronds* tufted, pinnate; *pinnæ* pinnatifid; *fructification* marginal. This species resembles the last in so many of its characters that it has often been mistaken for it; but when growing, it has a very different aspect on the landscape. Its fronds, instead of rising here and there at distances from each other, spring up in almost circular tufts, and are usually two or three feet high; the stalk is very short, and covered with pale brown scales, while in the Marsh Fern it is smooth. As its familiar name would indicate, this fern grows on exposed and mountainous places, on heaths and dry pastures, and is found, though less frequently, on open or wooded lowland districts. On some waste lands, as those of

Hampstead Heath, and the heather-clad spots about Tunbridge Wells, its handsome coronals of green rise up in May, and, as summer advances, overshadow the Harebells and Tormentillas, and remain green till winter has swept all blossoms save the daisy from the green-sward. On the hill sides of the north of England, and in the Highlands of Scotland, it is even more frequent than the common Bracken, and it is plentiful on the hilly districts of Wales, but it is rare in Ireland. Mr. Newman remarks of the fronds,—“Immediately they begin to unroll they exhibit the pinnæ placed at right angles with the main stem, and are not convolute as in the allied ferns—a character worthy of particular notice, because unusual among our ferns.” The fronds, which are annual, are erect, and in their outline lanceolate and pinnate, remarkably narrowed downwards from about the middle, so that the lower part is quite as tapering as the upper. The stipes is very short, the leafy portion of the frond continuing almost to its base. The pinnæ are generally opposite, and are narrow, pointed, and pinnatifid, and attached only by the mid-rib to the main stem. The fructification is very abundant, forming a line close to the margin; and this plant differs from the Marsh Fern in not having the edges of the lobes turned back. Over every portion of the under-surface lie numerous small, round, glossy, bright yellow glands, which give the young fronds a golden tinge, and form a marked feature of this fern. If we handle or bruise the frond, these diffuse a pleasant odour, similar, however, to that which is possessed in a less degree by several other ferns. Some writers have, on account of



this fragrance, believed this to be the species designated by Linnæus *Polypodium frágrans*. The mid-vein is very perceptible in the blunt lobes of the pinnæ. It is slightly winding and alternately branched, some of the branches being simple, others forked, and the clusters of fructification are placed at their extremities. The scales are so numerous at the lower part of the stipes as to remind one of the pale brown shaggy mane of an animal, and they are more or less continued to the upper part. The underground stem is scaly, and the roots numerous and tough.

This fern grows throughout Europe, and is called by various writers *Aspidium Oreóptersis*, *Polypodium Oreóptersis*, *Polypodium montánum*, *Polystichum montánum* or *Lastréa montána*.

3. *L. rígida* (Rigid Fern).—*Fronde*s twice-pinnate; *pinnules* narrow, slightly pinnatifid; *lobes* serrated, without spinous points to the teeth; *indusium* permanent, fringed with glands. Notwithstanding the rigid nature of this species, which renders its green fronds less graceful in attitude than some which bow more readily to the winds, yet it is one of the most elegantly formed of the genus, and it is clearly marked by the beautiful divisions of its frond. It grows erect, rising from a thick underground stem; the frond is annual, appearing in May, and dying as soon as the early frosts commence. It is usually one or two feet high, and in various specimens assumes one of two forms. In the one it is almost triangular; in the other lanceolate. It is twice pinnate, with narrow crowded pinnæ, and pinnules which are blunt and oblong, and cut again

into broad rounded serrated lobes, without spinous tips. The stalk is short, very full of scales ; and, like the last species, this has a pleasant fragrance, arising from the minute stalked glands which are scattered over it, though the odour is very different from that of the Mountain Fern. The mid-vein of the pinnules of the Rigid Fern is waved ; branched veins issuing alternately from it, each becoming forked almost immediately, on leaving the mid-vein. The lower branch divides again, each of the lesser branches running into a segment of the lobe. The upper branch—that is, the branch nearest the top of the frond—bears the circular clusters of fructification about half-way between the mid-vein and the margin, thus forming in an early stage two lines, one on each side of the mid-vein and parallel with it. The clusters are crowded, and gradually mingle into one mass, each being covered by its lead-coloured kidney-shaped indusium, attached by a short stalk, and which is present at every stage of the plant. This fern grows at some elevation on the limestone mountains of the north of England, and seems almost entirely confined to their neighbourhood. At Ingleborough in Yorkshire, it is frequent ; and on some of the Lancashire hills it grows in thick, compact masses in wonderful profusion. Mr. Pinder, in writing to Mr. Newman, says—“ I met with *Lastrea rigida* in great profusion along the whole of the great scar limestone district, at intervals between Arnside Knot, where it is comparatively scarce, and Ingleborough, being most abundant on Hutton Roof crags and Farlton Knot, where it grows in the deep fissures of the natural platform, and occasionally high in



the cleft of the rocks it is generally much shattered by the winds or cropped by sheep, which seem to be fond of it." It has been found in abundance in the fissures of limestone rocks near Settle in Yorkshire, at an elevation of 1,550 feet.

This fern is very similar to the Male Fern, but it differs essentially in not having the lower pinnæ gradually diminished. It is sometimes termed *Aspidium rigidum* or *Lophodium rigidum*.

4. *L. Filix-más* (Male-Fern).—*Fronde*s tufted, twice-pinnate; *pinnæ* linear-lanceolate; *pinnules* oblong, blunt, and serrated; *clusters of fructification* near the central vein. This fern possesses the great charm of commonness. We find it in green lane, on open heath, and beneath the shadowy boughs of the woodland. Like the daisy, it stands connected with the pleasing reminiscences of early days, when we gathered its plume-like fronds to form a stay to the more fragile nosegay of wild flowers, which we bound against its firmer green leaf. We may see the handsome fronds of the Male Fern in almost all our country walks in summer, and often do they vary the more barren landscape of winter. It would be likely enough to be one of the ferns to which Robert Nicols alludes:—

“ An ell-lang wee thing, there I ran
 Wi' the ither neebor bairns,
 To pu' the hazel's shinin' nuts
 An' to wander 'mang the ferns :
 An' to feast on the bramble berries brown,
 An' gather the glossy slaes
 By the burnie's side ; an' aye sinsyne
 I hae loved sweet Orde' Braes.”

The tall fronds of the Male Fern, two or three feet in

height, are of a delicate, somewhat pale green, and grow in circular clumps. In April the young leaves are very pretty, curled round into circles and protected from early rains and winds by the shaggy scales, which, in their more advanced stage, clothe the lower part of the stalk in abundance, gradually lessening in size and number towards the higher portion of the frond. Their green sprays are fully open by the time that the Hawthorn tree is decked with its snowy wreaths of May flowers; but if the spring has been cold, many a young shoot was nipped by the winds, though, as several survive, and many new ones make their appearance later, the midsummer sun shines on their luxuriance, while their masses of fructification of rich rust-brown colour lie on their under-surfaces. The fronds are generally about ten or twelve in a circle, and most are fertile; though in some clumps of the plant all prove barren, and then they are of a fuller green tint, and often taller and broader than the fertile leaves: in no case, however, is the Male Fern of a deep dark-green hue. The frond is broadly lanceolate, but slightly narrowed downward, and may be described as twice-pinnate, though the upper portion of the frond is pinnatifid, and, in the pinnæ, those pinnules only which are nearest the main stem are quite distinct from each other. All the pinnæ are slender and tapering, the pinnules of a bluntly oblong form, and serrated at the edge; and all, except the lowest ones, united to each other at the base. The mid-vein of each pinnule is slightly winding, having alternate lateral veins, either simple or forked, or dividing into three branches at different parts of the

pinnule. On the branch which is towards the topmost part of the pinnule the fructification is placed in circular clusters, and these form a line down each side of the mid-vein, even with it, but a little distant from it. The clusters long retain the indusium, which is distinctly visible. It is kidney-shaped, lead-coloured, and attached to the vein just at the point where the stalks of the capsules are situated.

This species, like others of its kindred, has been included by various writers in the genus *Polypodium*, *Aspidium* or *Polystichum*, but it has always retained its specific name of *Filix-más*. It was very early called Male Fern in this and several of the continental countries; and Gerarde described it by that name, which was probably given because its habit is more robust than that of the graceful Lady Fern. The Italians call this plant *Feli Maschia*, and the Spaniards term it *Polypodio Helecho Masculino*. In France it is called *Fougère*. It grows throughout Europe, and is of old renown, not alone for some supposed medicinal virtues, but because connected with various superstitious practices. Gerarde, who praises the plant for its efficacy in several maladies, quoting also from Dioscorides, adds that the "root hereof is reported to be good for them that have ill spleenes; and being stamped with swine's grease, and applied, it is a remedy against the pricking of the reed." An old notion prevailed that this fern had an antipathy to the Reed, just as Ivy was fancied to have an antipathy to the Vine. Tragus said that the Male Fern and the Reed would not grow together, and that where one grew the other was sure to be absent. Later herbalists tell also

how the roots of this and the Lady Fern boiled in oil, made "very profitable ointments to heal wounds." The green leaves were recommended to be eaten as a cure for some disorders; and an old writer says, referring to this plant: "Fern being burned, the smoke thereof driveth away serpents, gnats, and other noisome creatures, which in fenny countries do, in the night time, trouble and molest people lying in their beds with their faces uncovered." The use of this plant as a medicine was at one time patronised by the French Government, and this fern is said to be still used in Switzerland as a remedy for disease. The astringent roots are employed in the preparation of leather. The young scroll-like fronds were formerly called Lucky Hands, or St. John's Hands, and believed, in days of darkness, to protect the possessor from all the ills of magic, the evil eye, or witchcraft. The old German name of the fern, *Johannis wurtzel*, reminds us of the usages common not alone in continental countries, but also in our own land. Not only was the yellow St. John's Wort dedicated to St. John the Baptist, and burnt on the Midsummer Eve, in the fires raised in honour of the saint, but the delicate fern was duly gathered then, and sold to the credulous, who wore it about their persons, and mingled it in the water drunk by their cows. In Norway this plant is used as fodder for horses and cattle, and, when dried, it makes a good litter for these animals. The plant grows in shady places throughout Europe, and seems to have been used medicinally by Theophrastus and Galen.

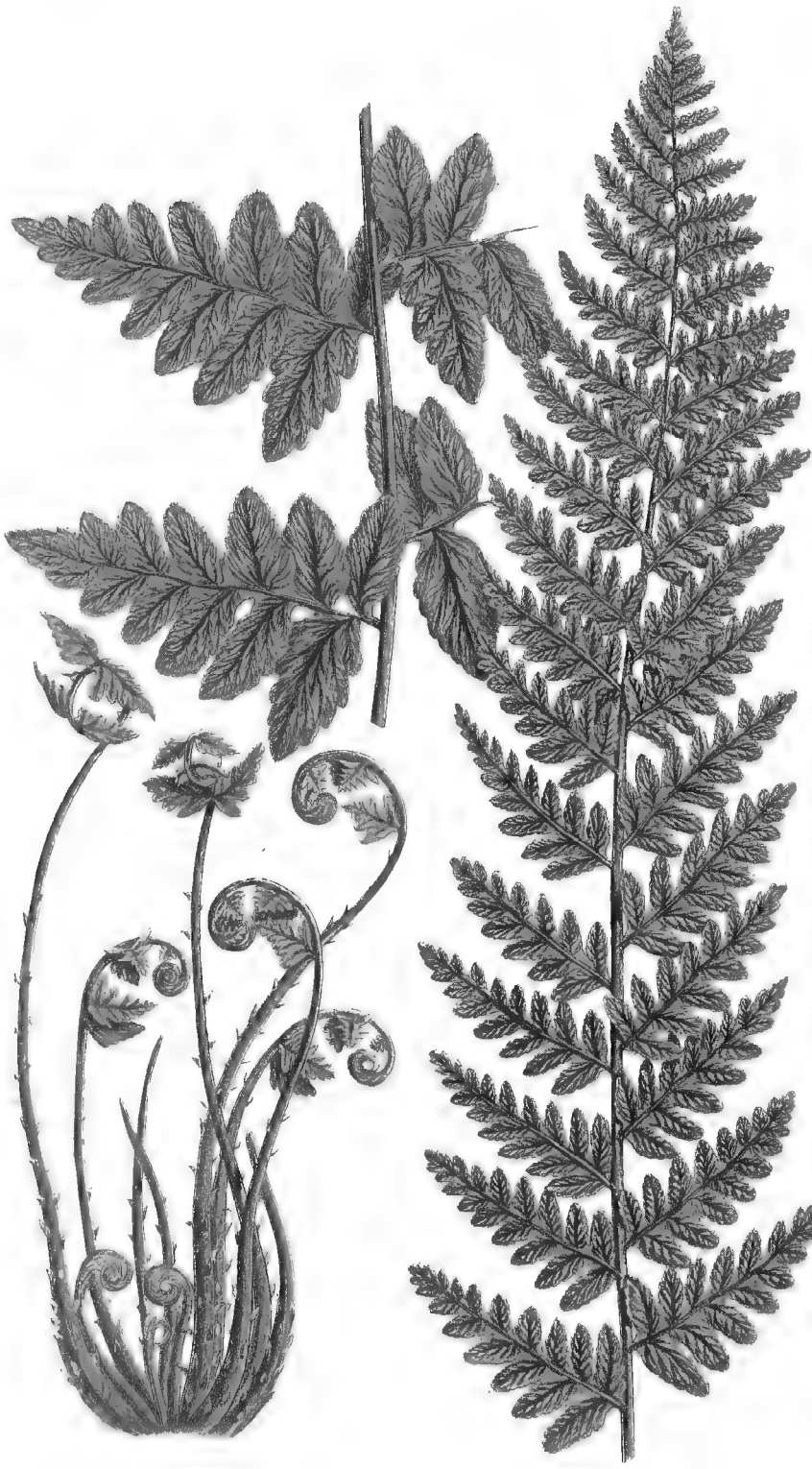
The underground stem of this fern forms a turfy or tufted head about the thickness of the finger, black and

scaly, and the dark brown fibrous roots are very strong and tough. The stipes and rachis are sometimes smooth and yellow, or densely clothed with pale purple scales. A handsome variety, very similar to the common form of the Male Fern, but larger, often attains the height of four, or even five feet. It is by some writers called *L. incisa*. Its pinnules are longer and more pointed, and their edges more deeply cut, the lateral branches of veins more numerous, and the clusters extending over a larger part of the pinnule. A stunted variety, about a foot high, in which the pinnules become rounded lobes, and the fructification is diminished so as to form a line only on each side of the mid-vein of the pinnæ, is called *L. abbreviata*. The former variety is not unfrequent; the latter is found rarely, in woods and on banks in Cumberland and Yorkshire. A very singular form of this fern is sometimes seen, in which the points of the pinnæ spread out into a kind of fringe, so that the top of the frond looks like a tassel. A similar change occurs also in the Lady Fern, but is unknown to any other of our British species. A remarkable variety termed *Borreri* was discovered by Mr. Borrer, in Devonshire, and seems not uncommon. It has a narrow lanceolate frond of a golden yellow colour, and bright yellow scales on the rachis.

5. *L. Fæniseeii* (Triangular Prickly-toothed, or Recurved Fern).—*Frond* curved, triangular, twice pinnate; *pinnules* pinnate, or deeply pinnatifid; *indusium* jagged at the edge. This is a beautiful and well-marked fern, having its frond very minutely divided. Its peculiarity consists in having the margins of its segments all curled

upwards, rendering their upper surface concave, and not like those of several other ferns, rolled beneath. It rises in circular clumps, and its fronds droop most gracefully, forming concave arches. They are about one or two feet in length. This fern grows in warm shady woods, sometimes close by the stream or waterfall, at others, at a little distance from it. Occasionally we find it on exposed rocks, but it is not so luxuriant there as in the recesses of the greenwood. It has, when bruised, a very pleasant odour, and is sometimes called Hay-scented Fern. Its triangular frond, broadest at the base, is twice pinnate; the lower pair of branches being not only longer, but broader than the rest, and very distinctly stalked. The pinnules on the lower side of the pinnæ are longer than those of the upper. The pinnules are of oblong egg-shaped form, the lowest often much lobed, and the lobes mostly running close together, so as to form a wing, though they are sometimes shortly stalked. Their margins are serrated, and have spinous points. The stalk is about half the length of the frond, and thickly beset with small, torn, pale-brown scales.

The pinnules have a winding mid-vein, from which issue two alternate branches, and these send off branches of lesser veins, the lowest of these on the side towards the point of the pinnules being the receptacle, or spot on which the clusters of fructification are placed. These extend almost all over the under surface of the frond, forming two lines along each pinnule or lobe. The clusters are circular, and partially covered by the indusium, which is kidney-shaped, often of a lead colour,



with the margin uneven or jagged, and set round about with small glands without stalks. The whole plant is covered with minute glandular bodies, giving it a peculiar fragrance. The frond is of beautiful rich green hue, and its woody stalk is of dark purple colour. This fern is the *Lastræa recurva*, or the *Nethródium Fæniseeii* of botanists, and is also by some regarded as a variety of *L. dilatata* or *L. spinulosa*. It is abundant in Ireland and the western counties of England, and found more or less throughout the kingdom.

6. *L. cristata* (Crested Fern).—*Fronde*s lanceolate and pinnate; *pinnæ* deeply pinnatifid; *segments* acutely and doubly serrate. This fern is found among the ling and heaths of boggy lands, and is much sought for on account of its rarity, though it is less attractive in appearance than many other species. It occurs but in four counties of England, and is found at Bawsey Heath, near Lynn; at Fritton, and Dersingham, and Edgefield, in Norfolk; on Woolston Moss, near Warrington, Lancashire; on Oxton Bogs, Nottinghamshire; on Wybunbury Bog in Cheshire; and a few other similar localities. It has a thick underground stem, branching in various directions, from which, in May, the narrow fronds rise, always in most remarkably erect form, narrowing towards the upper part, though being rounded and not pointed at the top. The frond is about two feet high, the stalk being rather more than a third of the length of the whole frond, and having towards its base a few chaffy bluntly egg-shaped scales, which are always of pale brown colour. The *pinnæ* of the frond are narrow and triangular in their outline, those at the

base being the broadest, the upper ones becoming gradually narrower, but all of the same general shape. They are deeply pinnatifid, each segment attached by the whole of its base, and connected by a widening of its base to the segment behind it. When the frond attains a greater luxuriance, the pinnæ become longer, and their pinnules more remote, and the margins of the lobes of the pinnæ have rounded notches.

The mid-vein of the lobes is winding, the lateral branches being again divided into several branches, that nearest the upper end of the lobe bearing the circular clusters of fructification, which are thus seated about half-way between the mid-vein and the margin, and generally found only on the upper part of the frond. A flat kidney-shaped indusium covers the clusters, and its margins, though uneven, are not torn. The fructification is matured in August and September, soon after which the fronds perish by the frost.

A fern which is so nearly allied in some points to this species, and in others to the characters of *Lastræa spinulosa*, that it might be regarded as a variety of either, is sometimes termed *Lastræa uliginosa*. It grows on the boggy heath, and is occasionally the companion of the two species which it resembles, but it is a rare plant. It is similar to the Crested Fern while young, in the form of its half-developed fronds, though when fully grown it looks more like *L. spinulosa*. It has two kinds of frond. The fertile fronds are nearly erect, and form somewhat circular clumps about two or three feet high. The barren fronds are narrower, not so erect, and taper at the summit into a very long narrow form; the pinnæ, too,



NARROW PRICKLY TOOTHED FERN

Lastrea spinulosa

are narrow and tapering, with oblong-pointed pinnules, rather deeply notched at their margins, each serrature being tipped with a fine hardened point.

The mid-vein of the pinnules is somewhat winding, with side-veins branching from it; the lowest branch on the side towards the apex of the pinnule bearing a cluster; the clusters forming two lines down each pinna.

7. *L. spinulosa* (Narrow Prickly-toothed or Crested Fern).—*Fronde*s linear, nearly erect, lanceolate, twice pinnate; *pinnules* pinnatifid; *indusium* persistent. This fern is not unfrequent in well-wooded districts, growing beneath the green shadow of the trees, or in spots rendered damp by the streams which wander through the wood. It is about three feet in height, nearly erect, and narrow. It is twice pinnate; the pinnules nearest the stalk being larger than the upper ones, and thus giving a tapering form to the pinnæ. The pinnules are oblong, somewhat narrowing upwards, their edges deeply cut, and the lobes serrated with spiny points. It is, however, only the lowest pinnules on the lowest pinnæ which are thus lobed, those towards the top of each pinna, as well as those nearest the base of the pinnæ at the upper part of the frond, being scarcely lobed, or not lobed at all, though still serrated and spinous. A few broad, roundish, almost transparent scales clothe the stipes. The veining is very similar in all these allied ferns. A slightly winding mid-vein runs through the less divided pinnules, giving off branched veins. The clusters of spore-cases are placed upon the smaller veins, which issue from these branches about half-way between the rib and the margin, generally

forming two lines on each pinnule. The same mode of veining is found in the more divided pinnules, the smaller veins being more numerous. Kidney-shaped indusia, with uncut margins, cover the clusters. This species is by many writers considered but a variety of the following. It is also the *Aspidium spinulosum* or *Lophodium spinosum* of other writers.

8. *L. dilatata* (Broad Prickly-toothed or Crested Fern).—*Fronde*s arched, lanceolate or triangular, twice pinnate; *pinnules* pinnate or pinnatifid; *indusium* kidney-shaped. This pretty fern, which is one of the most compound of our native species, is usually about two or three feet in height. Its luxuriance, however, depends greatly on the spots on which it grows, and it sometimes attains the height of five feet, becoming under these circumstances more branched, and acquiring a deeper green hue. Several species of *Lastræa* grow upright, or nearly so, but the fronds of this fern fall into graceful arch-like forms. The outline of a well grown and luxuriant plant is egg-shaped and lanceolate, varying to a narrow lanceolate figure, and in young or half-starved specimens becoming short and broadly triangular. The stalk, which is much thicker at the base than in the upper part, is clothed with long pointed scales, which are in the middle of dark brown colour, but are clear and paler at the margins. The twice pinnated frond has narrow pinnæ; the pinnules at their base being often so deeply divided as to be again pinnate; while the others are pinnatifid, except at the upper parts, where they are merely toothed. The margins of all are serrated and spinous.



BROAD PRICKLY TOOTHED FERN,
Gastrea dilatata

The mode of veining is similar to that of *L. spinulosa*, and the fronds produce a large number of clusters of fructification, which, at first sight, seem to be irregularly scattered. They do not lie in such precise rows as on some other species, but they form two lines crosswise the pinnæ on the larger lobes, and lengthwise on the less divided portions. The indusia are more or less fringed at the edges with stalked glands.

The short triangular form of this fern is not uncommon on exposed places; it is generally of a darker green, often tinged with brown, and the fronds are convex, or even drooping. A variety found on the hills of Westmoreland, Yorkshire, and Lancashire, differs so much from the ordinary condition, that some writers describe it as a distinct species, under the name of *L. collina*. The frond is egg-shaped, very long, and tapering; the pinnules egg-shaped, blunt, and with a broad attachment at the base. They are serrated and spiny, though less so than in the ordinary condition of the plant. In another form, the surface of the frond is covered with glands, and the scales of the stipes are broader.

This Broad Prickly-toothed Fern is a very common plant throughout the kingdom. Its rhizome is often conspicuous above the ground, as it does not creep nor send out branches, but becomes a strong firm base, rising erect like a stem, sometimes half a foot or a foot above the surface of the ground. This fern is found mostly on wooded or bushy spots, where it is sheltered from the strong sunlight:—

“The feathery Fern! the feathery Fern!
It groweth wild, and it groweth free,

By the rippling brook, and the wimpling burn,
 And the tall and stately forest tree ;
 When the merle and the mavis sweetly sing,
 And the blue jay makes the woods to ring,
 And the pheasant flies on whirring wing,
 Beneath a verdurous canopy.

“The feathery Fern ! the feathery Fern !
 An emerald sea it waveth wide,
 And seems to flash, and gleam, and burn,
 Like the gentle flow of a golden tide ;
 On bushy slope or in leafy glade,
 Amid the twilight depth of shade,
 By interlacing branches made,
 And trunks with lichens glorified.”

This plant is the *Lophódium multiflórum* of some botanists.

6. POLÝSTICHUM (Polystichum).

1. *P. Lonchítis* (Rough Alpine Fern, or Holly Fern).—
*Fronde*s rigid, simply pinnate, pinnæ not lobed, serrated, spinous, eared at the base. The plants of this genus are nearly allied to those of *Lastrea*, yet they are truly distinct, a most marked feature of difference being in the form of the indusium which covers the seed-clusters. This is circular, and not kidney-shaped, and is attached by a small stalk at the centre. The Polystichums, too, are more rigid in texture than the Lastreas, and more spinous.

We have not many ferns growing on high mountains exposed to the bleak winds ; yet the Holly Fern, like the plant from which it takes its name, thrives well on alpine heights, and, indeed, is found only in such situations.



HOLLY FERN,
Polystichum acrostichum

Very beautiful specimens are gathered from the Clova Mountains, where this evergreen plant presents a beautiful appearance as it springs out from the rocky crevices ; and it is extensively distributed on the Scottish mountains, as well as in the north and west of Ireland. A few rocky hilly places at the north of England are named as its localities, as Falcon Clints, Teesdale ; Mazebeck Scar, Durham ; and Langcliffe, near Settle ; Giggleswick, and some other places in Yorkshire. It grows on Snowdon, on heights which the traveller hesitates to climb, thriving even on the loftiest summits of the mountain. It is, however, among the shady clefts of the broken masses of rock, at a less elevation, that this fern attains its greatest luxuriance. In some damp and shady spots among these acclivities it is sometimes a foot and a half high, though in ordinary cases the plants are not more than half a foot in height. The stalk of the frond is very short, and the dark glossy green leafy part is mostly leathery, firm, rigid, and erect, and sufficiently prickly to remind us of the Holly, but it is occasionally thinner and less upright in growth. The young fronds appear early in spring, among the yet verdant fronds of the former year. They rise in a tuft from the extremity of a scaly rhizome, and their outline is narrow, linear, and tapering at the upper part. They are pinnate, with short crowded overlapping twisted pinnæ, which are somewhat crescent-shaped ; the upper side having at the base an ear-shaped projection, while the lower side has the appearance of having had a piece cut out. The veins are twice or thrice branched, reaching nearly to the margin, without uniting with others. The

indusium is a membrane-like scale, and the clusters of fructification form a continuous line on each side of the midrib, and even with it. They are often very numerous on the upper pinnæ.

The Holly Fern is very difficult of cultivation. It is called by some writers *Aspidium Lonchitis*, and by others, *Polypodium Lonchitis*.

2. *P. aculeatum* (Common Prickly Fern). — *Fronde*s rigid, linear, or lanceolate, twice pinnate; *pinnules* acute, running down the stem. This is quite a common fern, one which is found almost throughout the kingdom on hedgebanks and shady places, its dark green and handsome fronds contrasting with the brighter tinted Hart's-tongue Fern, or the feathery grasses beside it. It grows also in woods, but is seldom seen on the open heath, or alpine hill. It is a conspicuous plant, its fronds growing in circular clumps, and often two feet long. They are at first nearly upright, but when fully grown, they spread out like a coronal from a thick tufted stem. They are lanceolate in form, and when luxuriant are broad, but their outline varies much in different situations, and often even in plants of the same tuft. The texture is rigid, the stalk usually short, and thickly clothed with membranous scales of a rust colour. In April and May the fronds are some of the prettiest of the green things of the hedgerow, their pale green scrolls drooping downwards in most elegant forms. By midsummer these are fully developed, while, by the middle of August, the upper part of the fronds is usually profusely crowded with dark masses of fructification, and neither summer's sun nor winter's frost



COMMON POLKA-DOT FERN

Adiantum punctatum



10. *Adiantum trichomanes* L.
11. *Adiantum trichomanes* L.

seems to tinge their full dark green hue with a tint of decay. They are twice pinnate, their pinnæ alternate, and again divided into pinnules, which run down closely together, gradually merging into the rachis; or they taper to a crescent-shaped base, and are attached to the rachis by the point of the crescent, the upper base being thus extended into an ear-shaped lobe, and the lower base shaped as if an arched piece had been cut out of it. In young plants the pinnæ are serrated or pinnatifid, or with one or more pinnules distinct. The pinnules have a long spine at their points, and smaller spines down the margin, and a few of the lowest are often slightly stalked. The veins are branched alternately, not uniting, but free to the margin. The clusters of fructification form a line on each side of the midrib of the pinnules, and on the larger pinnules on each side of the mid-vein of the ear-shaped lobes.

A variety of this fern, called *P. lobatum*, was, until recently, regarded as a distinct species. It is characterised by the more narrow outline of the frond, and by being simply pinnate, its pinnæ lobed or pinnatifid; it is also of more rigid texture.

3. *P. anguláre* (Willdenow's Fern, Angular-lobed Prickly Fern, or Soft Prickly Shield Fern).—*Fronde*s lax, drooping, lanceolate, twice pinnate; *pinnules* distinctly stalked, bluntish. This beautiful plant, gracefully waving to every summer wind, is one of the most elegant of our ferns, and happily may be numbered among the common plants of our woods and hedges, though it is not so general as the last species. It has a very vigorous appearance, is of a deep green hue, and

most of the fronds retain their greenness even in winter. The stalk, which is about one-fourth of the length of the frond, is covered with a thick mass of scales of a rust-red colour. The young unfolded plants are, in spring, quite clothed with them, and in the older plants they extend more or less throughout the rachis. Large circular clumps of this fern attract the eye by their beauty of form and attitude, as well as by their large size; for they are occasionally four or five feet in height, though more frequently about two. They have not the rigid aspect of the last species, but are softer and bending. The form of the frond is lanceolate and twice pinnate, the pinnæ being very numerous, long, and tapering in form, distinct, and often distant from each other. The pinnules are flat, somewhat crescent-shaped, sometimes blunt and sometimes acutely pointed, some of the lower pinnules having deep lobes so as to be pinnatifid. They are distinctly stalked, and serrated at the margins, a little spine surmounting each serrature. The under surface of the frond is of a delicate sea-green colour, with small, brown, chaffy scales about it. The upper surface is of a deeper hue, but not of a full green tint. The pinnules taper to a broad angled base, and are attached to the rachis of the pinnæ by a short and slender stalk. A very elegant variety, called *P. subtripinnatum*, has its pinnules at the base very deeply lobed; and a form termed *P. angustatum* has all its pinnules narrow and acute.



1011. C. B. MUMFORD, D. D. SC. *Cystopteris fragilis*

2. D. B. L. VAR. C. 11

7. *CYSTÓPTERIS* (Bladder-fern).

1. *C. frágilis* (Brittle Bladder-fern).—*Fronde* lanceolate, twice pinnate; *pinnae* lanceolate; *pinnules* oblong, rather narrowed below, deeply pinnatifid; *segments* sharply toothed or serrated. This fern, like all the other species of the genus, is fragile and delicate in texture, their membrane-like nature readily distinguishing the Bladder-ferns from most of our native plants. The beautiful little species called Brittle Bladder-fern varies very much in form and in some of its distinctive features, always, however, retaining its fragile nature. Its fronds, which are from five or six inches to a foot high, grow in tufts. The stalk is erect, slender, glossy, of a purplish black colour, with a few scales at its base. The variable fronds may be generally described as lanceolate and twice pinnate, having in most specimens their pinnules pinnatifid. Owing to their thin texture the veining is very apparent. From a somewhat winding mid-vein a lateral branch runs into each of the lobes; this again branches into smaller veins, almost every one of these bearing a cluster of capsules at about the middle of its length. The cluster, which is of roundish form, has a loose white membranaceous indusium, attached by its broad base at one side only, beneath the cluster. It soon tears into jagged segments, curling under at the part which is jagged, and finally disappears altogether. The roundish form of the indusium in the genera *Lastréa*, *Polýstichum*, and the Bladder-ferns, led earlier botanists to include them all in the *Aspídium*, or Shield-fern genus. In *Cystópteris*, however, the indu-

sium is hooded, and not round and flat, and it is also sufficiently like a bladder to have given this name to the plants. The clusters of capsules are at first distinct, but they increase very rapidly, in some cases finally crowding into a mass.

This fern is very widely distributed throughout the United Kingdom, preferring moist rocky places and walls in mountainous districts, and attaining the greatest luxuriance on limestone soils. It forms most beautiful patches of somewhat pale green verdure, springing from rocky crevices, its numerous fronds growing in tufts from its rhizome, and its black and wiry roots penetrating into the clefts. This plant has received much attention from botanists, as it has several forms or varieties, which are however intimately connected. That termed *C. angustata*, which is the most distinct, is, however, by some writers on ferns, considered as a variety of *C. dentata*. The frond in this variety is oblong-lanceolate, twice pinnate; the pinnules linear lanceolate, more or less forming a wing, acutely pinnatifid or toothed. It is rather longer than the ordinary form, and tapers more towards the point of the frond, and also towards the points of the pinnæ. The Brittle Bladder-fern has been termed *Cýstea frágilis*, *Cyathéa frágilis*, or *Polypódium frágile*.

2. *C. dentata* (Toothed Bladder-fern).—*Fronds* oblong-lanceolate, twice pinnate; *pinnules* egg-shaped, obtuse, bluntly toothed. This plant is so similar to the Brittle Bladder-fern that some writers describe it merely as a variety of that plant, but Mr. Babington and several of our recent writers on Ferns consider it a distinct



1 TOOTHED BLADDER FERN.
Cystopteris dentata.

2 DOUGLASS' F.
C. Douglasii.

species. It is a smaller plant, its pinnæ being more horizontal in form, and all its parts more blunt. Its veining is similar, but the fructification is at the termination and not near the middle of the secondary vein, and is thus more distinctly marginal. The clusters are at first separate, but as they ripen they run into a mass, and form a brown ridge on the under surface of the pinnules. This constitutes a very marked difference between this and the Brittle Bladder-fern. The smooth slender rachis is almost always of a brownish purple colour.

This Toothed Bladder-fern is not uncommon in the North of England, as about Settle, in Yorkshire, at Cauldron Snout, Durham, and various other localities. It is found, too, near Matlock Baths, on the Cheddar Cliffs, at Tunbridge Wells, and numerous other spots throughout the kingdom where the soil is rocky, though it is probably often overlooked and mistaken for *Cystopteris fragilis*.

A most marked variety of this fern, termed *Dickiana*, has a very compact frond, and is a very beautiful plant, of a deep green colour, and almost transparent texture. The general outline is nearly egg-shaped, but terminating in a point, and the pinnæ are egg-shaped and lanceolate, overlapping each other, the pinnules running closely together so as to form a wing. They are broad and blunt, with a few shallow marginal notches, and the fructification is also marginal. Dr. Dickie discovered this remarkable variety in 1846. He found it growing in a sea-cave near Aberdeen. No other native locality of this plant is recorded, but it is

well known to the cultivator of Ferns, retaining its peculiarities in the greenhouse or closed case. Its height varies from about four to six inches. The *Cystóptervis dentáta*, besides being often described as a variety of *C. frágilis*, is also called by different botanists *Cyathéa dentáta*, or *Cystea dentáta*.

3. *Cystóptervis montána* (Mountain Bladder-fern, or Wilson's Fern).—*Fronde*s triangular, thrice pinnate; *pinnules* of lower pinnæ pinnate; *lobes* pinnatifid, with linear notched segments. This fern, which is of very elegant form, is the rarest of all our British species. It is very distinct from the preceding, and its small triangular very compound fronds are from four to six inches high. It has a slender creeping scaly underground stem, with dark wiry roots. The stalk is about twice as long as the leafy portion of the frond, the pinnæ are opposite to each other, and the lower pair are much longer than the others; these gradually diminish in size towards the upper part of the frond. This plant is exceedingly frail and delicate, almost transparent in texture, and it is one of the most compound of our British Ferns. The lower part of the frond is thrice, and the upper part twice pinnate, and it has the peculiarity of having the lower side of the lower pinnæ broader than the uppermost side, and some of the upper branches sometimes exhibit this inequality. The lower pinnæ are divided on the lower side into pinnules, which are egg-shaped or lanceolate in form, and these are again divided into pinnules, which are egg-shaped or oblong and notched, the pinnules on the upper side being of the same form as the secondary pinnules of the lower side.



2

MOUNTAIN BLADDER FERN.
C. TORREYI (L.) COLE

PLATE 100

In the next pair of branches the lower pinnules are similar to the secondary pinnules of the lower branches, and after that the parts gradually lessen towards the upper portion of the frond.

The mid-vein of the pinnules is somewhat winding, giving out alternately lateral veins, each of which ends in the part of the margin between two notches; at the back of each side vein is placed the roundish capsule cluster, covered by the concave indusium with its jagged edge. The clusters of fructification are very numerous and distinct.

This Bladder-fern is a common plant on many rough and stony grounds of other countries, its geographical range being extensive. It was found on Ben Lawers, in 1836, by Mr. Wilson, when with Sir W. J. Hooker and Professor Graham he visited that spot, and it has since been found in several places on the mountains of Perthshire and Forfarshire, but nowhere in great abundance. It is by some writers termed *Polypodium montanum*, *Aspidium montanum*, or *Cyathia montana*.

4. *C. alpina* (Alpine Bladder-fern, or Lacinated Bladder-fern).—*Fronde*s lanceolate, twice pinnate; *pinnules* deeply pinnatifid, partly cloven, and slightly toothed at the end. This plant, which is a doubtful native, is the loveliest of this exquisitely beautiful genus. It formerly grew in abundance on an old wall at Low Layton, in Essex, whence however it is almost if not quite exterminated, as the wall was some years ago repaired, though a few specimens of the plant have since been found near the old spot. Sir Wm. Hooker and Dr. Arnott, who examined specimens of the Layton Fern, pronounce

it to be identical with the Continental species. Its fronds, which are very numerous, grow in tufts. They are usually about four or five inches high, but are sometimes twice that height, appearing in May, but, like their equally delicate congeners, dying away with the earliest frosts of autumn. The lanceolate frond is twice pinnate, and the pinnules are often so deeply pinnatifid as to be almost distinct. The branches, which are nearly opposite, with a winged rachis, are egg-shaped, and divided into bluntly egg-shaped pinnules, these pinnules being again cut down almost to the mid-vein into short blunt lobes, which are partly cloven, and slightly toothed at the end. The mid-vein of the pinnules is distinct and nearly straight, with a side vein, either simple or divided, issuing into each lobe, one branch extending to the point of each marginal serrature. Numerous rounded clusters of capsules lie near the margin, covered with their hooded indusia.

This fern has been called *Cystopteris régia*, *Cyathéa régia*, or *Cyathéa incisa*, *Cýstea régia*, *Polypódium alpinum*, *P. trifidum*, or *Aspidium régium*.

8. ATHÝRIUM.

1. *Athýrium Fílix fémína* (The Lady Fern).—*Frond* lanceolate, twice pinnate; *pinnules* deeply cut or pinnatifid; *lobes* sharply toothed. This fern, whose graceful attitude and elegant outline won for it its distinctive name, is indeed the loveliest of all our larger ferns. It grows abundantly in many sheltered and moist woods, attaining there its greatest luxuriance, and its somewhat pale green fronds arising in such places to the height of



LADY FERN.
Athyrium Filix-foemina

three or four feet. It may often be seen, too, gracing spots of another character, for the slopes of grassy hills are not without its clumps, and sometimes it bows to the wind which bends also the blue-bells as it rushes over the heathland laden with the fragrance of the wild thyme.

Walter Scott, alluding to this plant in *Waverley*, mentions its love for the moist shady woodlands :—

“ Where the copsewood is the greenest,
Where the fountain glistens sheenest,
Where the morning dew lies longest,
There the Lady Fern grows strongest.”

Calder Campbell, too, in some lines which he has written for this volume, well describes such a spot as the Lady Fern delights to haunt :—

“ If you would see the Lady Fern
In all her graceful power,
Go look for her where the woodlarks learn
Love-songs in a summer bower ;
Where not far off, nor yet close by,
A merry stream trips on,
Just near enow for an old man’s eye
To watch the waters run,
And leap o’er many a cluster white
Of Crowfoots o’er them spread ;
While Hart’s-tongues glint with a green more bright
Where the Brackens make their bed :
Ferns all—and lovely all—yet each
Yielding in charms to her
Whose natural graces Art might teach
High lessons to confer.
“ Go look for the Pimpernel by day,
For *Silene’s* flowers by night ;* ”

* *Silene nutans*, the Nottingham Catchfly, and *Silene noctiflora*, the Night-flowering Catchfly, expand only at night-time.

For the first loves to bask in the sunny ray,
 And the last woos the moon's soft light :
 But day or night, the Lady Fern
 May catch and charm your eyes,
 When the sun to gold her emeralds turn,
 Or the moon lends her silver dyes.
 But seek her not in early May,
 For a Sibyl then she looks,
 With wrinkled fronds that seem to say,
 'Shut up are my wizard books !'
 Then search for her in the Summer woods,
 Where rills keep moist the ground,
 Where Foxgloves from their spotted hoods
 Shake pilfering insects round ;
 Where up, and clambering all about,
 The Traveller's Joy flings forth
 Its snowy awns, that in and out
 Like feathers strew the earth :
 Fair are the tufts of Meadow-sweet
 That haply blossom nigh ;
 Fair are the whorls of violet
 Prunella shows hard by ;
 But nor by burn, in wood, or vale,
 Grows anything so fair
 As the plummy crest of emerald pale,
 That waves in the wind and soughs in the gale,
 Of the Lady Fern, when the sunbeams turn
 To gold her delicate hair !"

The Lady Fern is very generally distributed throughout England, and is still more common in Ireland, where it abounds on almost all the bogs. The light and arrowy fronds arise in circular tufts from the rhizome. This is very large, extending itself some inches above the surface of the earth, and forming a base to the slender fronds. During early spring, when we wander into the woods for violets and primrose

buds, we see numbers of little undeveloped fronds coiled up and thickly covered with their light brown scales, peeping from among the decayed leaves, which will soon be swept all away by the spring breezes. By the end of April, when the primrose needs no longer to be searched for, these little scrolls are unfolding too, and then they hang down, forming the figure of the shepherd's crook, a dozen or more of the young fronds often in one clump. They live throughout the summer, towering above the hedge or woodland flowers, but they cannot bear the frost. There are several varieties of the Lady Fern. In the common form the lanceolate frond has a stalk usually about a third of its whole length, and is scaly at the base. It is twice pinnate, the pinnæ being lanceolate and generally tapering. These are always again pinnate, the bases of these pinnules being sometimes connected by a narrow wing. The pinnules are lobed, often so deeply cut as to be pinnatifid, and the lobes are sharply toothed. The veining of this fern is very distinct. A mid-vein winds through each pinnule, alternate smaller veins arising from it, and these being again branched in an alternate direction. On the lowest branch, on the side nearest the top of the pinnule, about midway between the mid-vein and the margin, is the oblong slightly curving cluster of capsules, covered by the indusium of the same form. Both the cluster and its covering, on the maturity of the capsules, contract at the ends and swell in the middle, thus becoming more curved, and assuming a more roundish form than in an earlier stage; the indusium also is then kidney-shaped. On one side

the indusium is attached to the side of the vein on which it is seated; while on the other side, that which is towards the mid-vein, it becomes free, and is torn at the edge into thread-like segments. The fructification is so abundant, that Sir J. E. Smith has remarked of this fern, "that if a single plant were uninterrupted in its possible increase for twenty years, it would cover an extent equal to the surface of the whole globe." In Ireland, where it is common on all the bogs, this fern is used for packing fruit, as we in England use the common Brake. It is sometimes used also by fishermen, for Mr. Newman remarks of the plant, "On landing at Warren Point, near Newry, I was rather surprised to see what quantities of it were employed in packing the herrings there exhibited for sale."

This is a most variable fern, and some of its many varieties are regarded by botanists as permanent, and so distinct as to deserve to be classed as species. The variety *A. latifolium* is one of these. It is a much less delicate plant than the ordinary form. Its frond is lanceolate, somewhat oblong; its pinnules are broad, leafy, and set more closely together, lobed and deeply toothed at the edges, with the curved clusters of capsules lying near the hollow between two lobes. It has been found near Keswick, in Cumberland. It is probable that it only acquires its peculiarities from the situation in which it grows.

The variety termed *A. convéxum* is very distinct. It has more slender fronds than any other form of the Lady Fern, and its pinnæ and pinnules are smaller. The narrow lanceolate frond is erect, and rarely more than



LANCEOLATE SPIKENWORT.

two feet high; the pinnæ are taper, pointed, and the very narrow pinnules end in a sharp point. Their edges, which are somewhat bluntly toothed, are rolled under so as almost to hide the serratures.

The variety *A. molle* has a short stalk, with broad and short scales. The frond rarely exceeds a foot in height, and is usually erect, and of a bright green colour. Its outline is egg-shaped and lanceolate. It is pinnate, having its lower pair of pinnæ short and turning downwards. The pinnules are flat and toothed, and connected at their base to the midrib by a narrow wing. The clusters of fructification are distinct.

Other forms are produced by culture, some of which are very singular. Thus the variety *multifidum* has the tips of the frond and of the branches cut into numerous segments so as to form a tassel. This, too, is the case with a dwarf variety termed *crispum*, which, with its tasselled fronds, looks in the closed case like a clump of parsley. This form was first found on Orah Hill, Antrim, Ireland, and has since been gathered from Braemar, in Scotland. The Lady Fern was formerly called *Polypodium Filix-fœmina*, and later botanists have termed it either *Aspidium*, or *Asplenium Filix-fœmina*.

9. ASPLENIUM (Spleenwort).

1. *A. lanceolatum* (Green Lanceolate Spleenwort).—*Fronde*s lanceolate, twice pinnate; *pinnæ* egg-shaped and lanceolate; *pinnules* toothed or lobed; *clusters of fructification* nearly marginal. This is one of the most elegant of our British ferns, and one of the few which

thrive best near the sea. Though not exclusively confined to the sea-coast, it is far more frequent there than on inland soils, and at Penzance, in Cornwall, is one of the most common plants, springing out of every wall, and being as general on the hedge-bank as the primrose. It is abundant at St. Michael's Mount, but nowhere in England grows to so large a size as among the damp rocks of the Lizard Point. It is also luxuriant at Torquay, in Devonshire. Sometimes this fern, like other plants which frequent the sea-coast, flourishes on high mountains, and the botanist has welcomed its green fronds on the heights of Snowdon. Some summers since, it grew in profusion on the high rocks at a short distance from Tunbridge Wells; but as that neighbourhood has, by its rare plants, attracted the attention of many botanists, and as fern lovers are sometimes not so considerate for others as they should be, it became less abundant, and perhaps may be by this time altogether eradicated by the heedless waste with which it was gathered. It is a plant of but local occurrence, even on the sea-coast, growing only on the southern and western coasts of England and Wales, but it is plentiful in the Channel Islands. Its long black wiry roots penetrate far into the fissures of rocks. The young fronds appear in May, are matured by August, and remain green through the winter. The underground stem is brown, tufted, and densely clothed with a mass of bristle-like scales. Similar scales are scattered here and there on the stalk of the frond, which is black at the base. In the most luxuriant specimens the frond attains the height of a foot and a half, but its average



BLACK SPLEENWORT,
Adiantum nigrum

2 SMOOTH ROCK

size is from six to eight inches. The outline is lanceolate; the stalk about a third of its length. It is very similar to that of the species yet to be described, the Black Spleenwort, but its outline differs in this respect. The form of the Black Spleenwort is always triangular and broadest at the base; but that of the Green Lanceolate species is truly lance-shaped, tapering from near the middle towards the base. The frond is twice-pinnate; the pinnæ are generally, but not always, opposite, and egg-shaped and lanceolate in form. The pinnules are usually inversely egg-shaped, and have the margins serrated with deep teeth; the larger pinnules being cut into toothed lobes.

The pinnules of this fern have a winding mid-vein, the lateral veins are branched, one of the smaller of these branched veins extending to each serrature of the margin, and the fructification being placed near the extremity, but not in a very regular manner. Each cluster of capsules is at first long and narrow, and covered with a linear white indusium. This soon disappears, and the clusters crowd ultimately into roundish masses.

2. *A. Adiantum-nigrum* (Black Spleenwort).—*Fronde*s triangular, twice or thrice pinnate, *pinnæ* and *pinnules* triangular, and sharply-toothed. This is a frequent and ornamental fern, gracing the time-stained walls of many an old church or ruin, or hanging down its graceful sprays over rocks, or on the hedgebank of the dry but shady lane. It varies somewhat in form under different circumstances; it has generally a very elongated triangular outline, the lowest pair of pinnæ being larger

than the others. When growing in dry and open places, it is smaller and more blunt in all its parts than when among the bushes of the shadowed lane. It is among the latest of our Ferns in unfolding its fronds, which are often not open till the middle of June. They are at first quite erect, forming little tufts, but they gradually lengthen and curve gracefully downwards, retaining their elegance of shape, and even their green hue and fructification, through the winter. The stalk is brown and glossy, about a third of the length of the frond, and has upon it small bristle-like scales, which are also to be found on the rachis. This frond has its branches also of a triangular form, pinnate, and the pinnæ alternate, drawn out usually at the top into a long point; each pair gradually lessening from the base towards the top of the frond. The pinnules, too, are triangular and alternate, the lower being deeply-lobed and serrated at the margin.

The fronds of the Black Spleenwort are not crisp and brittle like those of many ferns, but have a tough and leathery texture, and are much veined. The winding mid-vein of each pinnule is very distinct, and from it issue veins which are either simple or forked; one of these lesser veins extending to each point of the serrated margin, and bearing the cluster of capsules. The same mode of veining is apparent also in the ultimate divisions of the frond, as well as in the larger lobes, and these bear the clusters near the point at which they unite with the mid-vein, so that the clusters are placed near the centre of every pinnule or lobe. In an early state the clusters are distinct, and are long and narrow; but as

they mature, they form one dark-brown thick mass, almost covering the whole of the under-surface of the frond. The indusium is present only in an early stage of their growth; it is white, and has an undivided margin.

When this fern varies into a much more blunt form, it constitutes the variety called by botanists *obtusum*; while sometimes, especially when growing in very shady places, it assumes a more slender and tapering shape, and is called *acutum*; both these forms are rare in this country, though on the Continent they seem well known, and are considered so permanent that they are described as species.

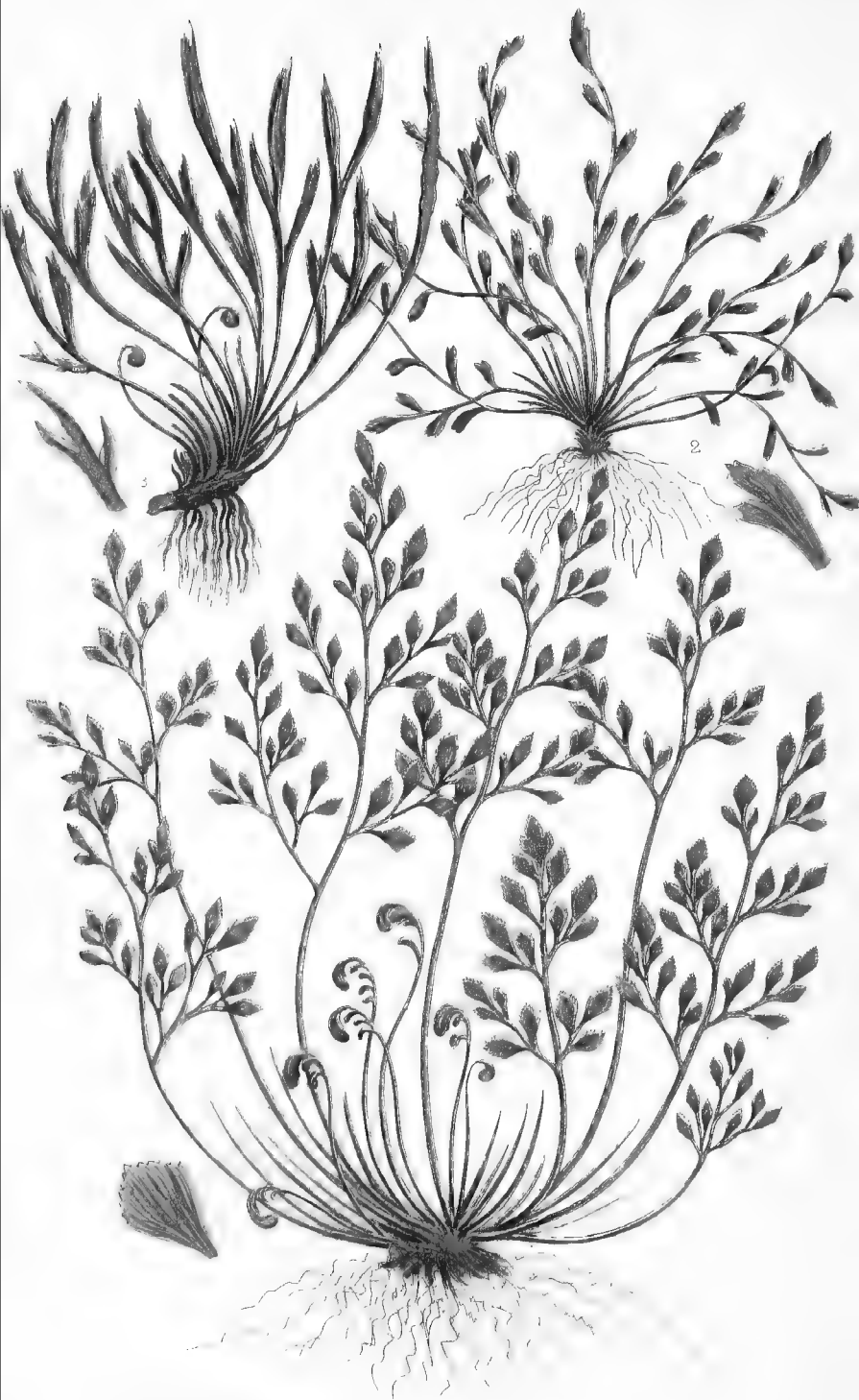
The French call the Spleenwort *Doradille*; the Germans, *Streifenfarren*; the Dutch, *Miltkruid*; the Italians and Spaniards, *Asplenio*. It is a common plant on rockwork in gardens, and very well adapted to it; but its fronds do not become large unless it grows in shade. It does not thrive so well in the closed case as in the open air.

3. *A. fontánium* (Smooth Rock Spleenwort).—*Frond* linear-lanceolate, twice pinnate; *pinnæ* oblong, somewhat egg-shaped; *pinnules* wedge-shaped and toothed. This is a very rare fern, mentioned by our older botanists as occurring on places on which it is no longer to be found. It was described by Hudson as growing near Wybourn, in Westmoreland. It also formerly grew on the walls of Amersham Church, in Buckinghamshire. It has of late years been found at Matlock, in Derbyshire, on a very old wall at Tooting, also on a rock at Stonehaven, and very recently by the Rev. W. H. Hawker, growing in some quantity on a very old wall

near Petersfield, in Hampshire. It has been regarded as a doubtful native, or as probably extinct, but is very likely to be found in other places now that so much attention is given to ferns by our ablest botanists. It is not unfrequent in continental countries, in rocky places. This Spleenwort is a very distinct and handsome little fern, its thick rigid fronds growing in small tufts to the height of three or four inches. The upper surface of the frond is deep green, but the under part is of a pale whitish green, and it retains its colour throughout the winter. The outline of the frond is narrow lanceolate, the stalk very short, and scaly at the base. It is twice pinnate, the pinnæ being oblong egg-shaped, and the pinnules inversely egg-shaped, somewhat wedge-shaped, tapering towards the base, and toothed at the margin. Both the principal stalk of the frond, and the partial stalk of each branch, have a narrow leafy wing throughout their length. This forms a distinctive feature of the fern.

The texture of the fern is too substantial to allow the veining to be very apparent. The chief vein of each pinnule sends out a vein towards each lobe or serrature, and in the larger pinnules some of these lateral veins become forked, a vein running into each lobe or notch. An oblong cluster of capsules is seated on two or more of these veins, and covered with an indusium of a similar form, waved and indented at the edge. The clusters are rarely distinct, but generally form a brown mass on the under-surface of the pinnules.

This fern is described by various botanists as *Aspidium*, *Athyrium*, or *Polypodium*; retaining, however, in each case its specific name of *fontánium*.



1. *Adiantum*
platyneuron (L.) Presl

2

Adiantum
platyneuron

1

4. *A. Rúta-murária* (Wall-rue Spleenwort, or White Maiden Hair).—*Fronds* twice pinnate; *pinnules* lobed, or bluntly-toothed. This is a plant often seen and easily recognised. It is a common fern in Scotland, Wales, and Ireland, and is generally distributed throughout England, though less common in the eastern counties than elsewhere. Its native haunt seems to be the rocky hill, where its little fronds cluster above the fissures of the stone; but the wind scatters its dust-like seeds, and they find a congenial soil on the stone pinnacle or tower of the ancient church, or on broken archway or brick wall, where we may often find them with their companions the green Pellitory, or the golden Wall-flower. The plant seems to love the haunts of man, for it is far less frequently found on the wild rock than on the walls which his hands have reared. It grows, however, in luxuriance on the fissures of the rocks about the Peak in Derbyshire, and is abundant on the craggy hills of Arthur's Seat, in Edinburgh. Its fronds, which are thick and leathery, appear in May and June, and by September are thickened by the dark-brown mass of fructification beneath. The form of the plant would at once recal to memory that of the Common Garden Rue. The frond is usually triangular, the stalk of a dark purplish brown colour, slender, and glossy; the leafy part occupying rather more than half its length. The fronds are most commonly three or four inches long, but, when most luxuriant, attain the length of half a foot. They are twice pinnate, the pinnules being alternate and pinnate, of a roundish egg-shaped form, bluntly wedge-shaped, and on short stalks, and the

colour is either dark deep green, or sometimes of a sea-green tint. When growing on exposed spots, they are covered with sea-green powder. Some of the larger fronds are again divided, and their pinnules cut down nearly to the mid-vein, the lobes having the usual form of the pinnules. Little tufts of this plant, however, may be found in which the fronds are pinnate only, with pinnatifid pinnæ. The pinnules of this fern are like little leaves, each on a stalk, and with the upper margin irregularly toothed.

There is no mid-vein in the pinnules of this fern, but the veins radiate from the stalk towards the margin in a fan-shaped direction, and on them are borne the narrow lines of the clusters of fructification; these are at first covered by a membranous indusium, the free margin of which is jagged and uneven. As the capsules increase in size, the indusium turns back and finally disappears.

This fern is sometimes called *Scotopéndrium*, or *Amésium Rúta-murária*; and one of its old English names, White Maiden Hair, was probably given because of the light-coloured powder sometimes seen on its fronds. It was of old renown among the herbalists as a cure for coughs, and affords a slight degree of mucilage.

5. *A. Germánicum* (Alternate-leaved Spleenwort). — *Fronde*s simply and alternately pinnate; *pinnules* narrow, wedge-shaped. This is one of the rarest of British ferns, and is found on rocks in a few places in Scotland and the north of England. It was formerly considered but a variety of the Wall-rue, but its characteristics seem quite distinct and permanent. The frond, which

is about three or four inches high, and of a bright green colour, is long and narrow, and pinnated with distinct, alternate, wedge-shaped pinnæ. The upper pinnæ are slightly lobed, becoming more lobed towards the base; their upper ends are in every case toothed or notched.

The fronds grow in tufts, are thick and tough in texture, and have no distinct mid-vein; but a vein from the base of each pinna, or lobe, branches off two or three times as it reaches the broader parts, the veins forming a fan-like figure, being in the larger pinnæ seven or eight in number, and four in the smaller ones. Two or three lines of fructification are on each pinna, and are covered by an arched indusium, the margin free and slightly waved, but not torn; the clusters finally run into one thick mass. This plant is, by some writers, called *Asplénium alternifólium*, or *Amésium Germánicum*.

6. *A. septentrionále* (Forked Spleenwort). — *Fronds* 2 or 3-cleft; *segments* linear; *margin* sharply-toothed. This is a rare fern in this country, though occurring in a few localities in abundance, as among the fissures of the rocks of Arthur's Seat, Edinburgh. It grows, too, on some mountains at the north of the kingdom, as at Ambleside, where it is found among the rocky clefts; but Mr. Newman says, that he has seen it in greater luxuriance at Llanrwst, near the mouth of the Conway, than in any other place. This plant grows in tufts, and, notwithstanding the diminutive size of the individual fronds, occasionally thus forms large masses. Mr. Newman says, "At Llanrwst, the tufts of this fern were very large; one of them was so heavy, that after

shaking out all the loose earth, I found it a very inconvenient load to carry, even the single mile which I had to convey it. This tuft, consisting, I suppose, but of one rhizoma, had upwards of three hundred perfectly vigorous fronds, besides at least an equal number of decaying ones, the relics of the previous year." The fronds are usually two, three or four inches in length, slender and forked, so as to resemble the horns of a stag; easily distinguished by their shape from any other fern, reminding one of the leaves of that common plant, the Buck's-horn Plantain (*Plantágo coronopus*). The veins are few and little branched, one running into each lobe. The clusters of capsules lie in lines, in a very crowded manner, on each side of the vein. They are, at first, covered by a linear-shaped indusium, which bursts open as the capsules mature, and then gradually disappears. The whole under-surface of the frond is finally covered with the brown mass of fructification.

This fern has by various writers been called *Scolopéndrium septentrionále*, *Amésium septentrionále*, or *Acróstichum septentrionále*. The beautiful Elk's-horn Fern, of which we read so much in the works of travellers in Australia, is the *Acróstichum alcicorne*. This Stag's-horn Fern grows on the timber-trees of the forest to a great size, resembling in its shape the palmated antlers of the moose and rein-deer. Mr. Backhouse describes it as sometimes growing on decomposing sandstone rocks, forming protuberant girdles around trees, from which hang the most beautiful flowers of convolvuli.

7. *A. marínium* (Sea Spleenwort).—*Fronds* pinnate; *pinnæ* oblong and blunt, stalked, unequal and wedge-



1. SEA SP. OF NW. CO.

2. GARDEN.

shaped at the base. This beautiful fern grows out from the sides, or hangs its numerous sprays down from the summits, of sea-caves, rocks, or cliffs. Its deep rich tufts of evergreen fronds attain, when most luxuriant, the length of a foot and a half, but it varies greatly in size. It is abundant on maritime rocks in the south-west of England, and is plentiful in the Channel Islands, as well as on the coasts of France and Spain. The specimen from which our illustration was made was gathered from the rocks, on the sea-shore under the Hoe at Plymouth. In Cornwall this fern is often a beautiful object. It grows, though very rarely, on inland situations, on walls and rocks. The frond unfolds in July, bearing its fructification in September and October. Its form is linear, simply pinnate; its pinnæ are stalked and serrated, and connected at the base by a narrow wing, extending along the rachis. The pinnæ are not always alike in shape, some being oblong, others egg-shaped; they are unequal at the base, the side nearest the upper part of the frond being much developed, while the lower portion looks as if a piece had been cut off. The margins have either rounded or pointed serratures. The general appearance of this handsome fern is so unlike any other British plant, that it is easily distinguished. Its upper surface is of a deep glossy green, its under surface is paler. In the hothouse it attains much greater luxuriance than in its wild state.

The Sea Spleenwort has long been used medicinally. It is somewhat mucilaginous, and was formerly considered a good application to burns. Like all the species des-

tined to grow on rocks, it has tough wiry stems, which penetrate into clefts, and hold the plant so firmly there that it is difficult of eradication. The rhizome is short, and the fronds often grow from it in tufts. The veining may be usually readily seen. Each pinna has a mid-vein, which gives off lateral veins, these again sending off others. The clusters of capsules lie on that side of the lateral veins which is nearest the upper part of the pinnule, forming bright rust-coloured lines, often of an oblong form. These are covered by an indusium, which bursts open as they ripen.

A Sea Spleenwort, called *Asplénium diforme*, very much resembling our native species, is found on the rocky coasts of New Holland. Mr. Backhouse remarks of this plant:—"It becomes more narrow when growing further from the sea, and the leaves become more divided, and are separated into such narrow segments, that the lines of fructification are thrown upon their margins; it then becomes *Cænópterus odontitis*, but every possible gradation is to be met with between this state and that in which it grows on rocks washed by the sea."

8. *A. víride* (Green Spleenwort).—*Fronds* linear, pinnate; *pinnæ* alternate, roundish, egg-shaped, wedge-shaped at the base, bluntly serrated. This very pretty little fern varies much in size, according to the situation on which it grows. It is so like the Common Wall Spleenwort that it might at first be mistaken for it, but it may be distinguished by the colour of its slender rachis, which is green, while the stalk of the Wall Spleenwort is throughout of a purplish-black, and by the rounded notches on the margins of its leaf-like



1. COMMON WALL SPLENWORT
Asplenium trichomanes

2. DITTO

pinnules. This fern is very frequent in the Highlands of Scotland, growing on moist rocks, into whose crevices it sends its wiry fibres. Its hue is brighter and of a lighter green than the other British species of the genus. Though the upper part of its stalk is yellowish green, yet it gradually deepens in hue towards the lower parts, becoming at its base of a purplish brown. The stipes is about a third of the length of the whole frond, and the plant grows in tufts. The simply pinnate leafy part is from two or three inches to a foot long, narrow, and the small roundish egg-shaped pinnæ rather tapering towards the base, and attached to the rachis by the narrow part, which becomes gradually narrower. The veining of the fern is distinct. A number of lateral veins arise alternately from the mid-vein, and are either simple or forked. The capsule clusters lie on the side nearest the top of the pinna; they are oblong, and covered at first by oblong membranous indusia, jagged or notched, which soon fall. The fructification then forms a dark brown mass all over the middle of the under side of the fern, concealing the mid-vein. This fern, which is found on the mountainous districts of England, Wales, and Ireland, occurs in similar moist rocky places throughout Europe. Linnæus termed it the Branching *Trichomanes*, because its fronds have a tendency to divide into a branched form.

9. *A. Trichomanes* (Common Wall Spleenwort). — *Frond* linear, pinnate; *pinnæ* roundish, egg-shaped, stalked, wedge-shaped below. This is one of our most common ferns; and it is a graceful plant when growing, as it often does, in large quantity. Now and then we

find its deep green sprays making a light tracery over some sloping hedgebank, on which the sunshine is not interrupted by overshadowing boughs. More often, however, the old church tower or stone wall is enlivened by its clumps of slender fronds, or they give to the ruin a touch of verdure ; and throughout the year we may gather it from some shady rock, its evergreen fronds, when in a thriving condition, becoming a foot in length. The stalk is throughout the frond of a purplish glossy black. The frond is dull green, its small pinnæ are of equal size, very numerous, and in some cases quite distinct, in others closely crowding on each other. They are of a roundish oblong shape, and are attached by a short stalk, wedge-shaped below, and formed as if a piece had been cut off. The pinnæ are jointed at the main stalk of the frond, and when old, fall off and leave it naked, numbers of the black glossy hair-like stalks mingling with the green fronds. A mid-vein in the pinna gives rise on each side to forked veins ; and the linear cluster of capsules is placed just within the margin of the pinna, on that vein of the fork which is nearest its upper part. These clusters are, when young, covered by a thin indusium, with its margin free and notched ; but as they ripen, they sometimes run into one mass, covering with their dark brown hue almost all the under surface of the pinna, though more frequently lying in two distinct portions, and leaving the midrib uncovered.

This fern is not subject to many varieties, except that it differs greatly in the length of its fronds according to the place of its growth. A form, however, termed



F. DALL'S TOUCHER - SPLEENWORT - *Adiantum*
F. DALL'S TOUCHER

incisum, has its pinnæ cut into narrow notched segments almost to the midrib. This fern is common, not only throughout this kingdom, but throughout Europe. A tea and syrup made of its fronds have long been used as a remedy in pulmonary affections. It is by some writers called *A. melanocaulon*.

10. SCOLOPÉNDRIUM (Hart's-tongue).

1. *S. vulgäre* (Common Hart's-tongue).—*Fronde* oblong, strap-shaped, simple; *base* heart-shaped. To those accustomed to wander about our green lanes and fields, no fern will less require a minute description than this. Its general features are known not alone to the botanist, but to every observer of plants, and it varies under any circumstances, too little from its ordinary form to make it difficult of recognition. Its clumps of long, slender, bright green leaves, with a surface so glossy that the rain-drop runs off them, gather on sunny hedgebanks in almost every rural district of our land, and are still more often to be found on the moist and shady sides of woods, among the long grasses, or coarse herbage, or the tall stems of wild flowers. The clumps are circular, the fronds spreading out from the centre, and gracefully curving downwards. In May, when the hedges are full of blue-bells, and anemones, and rosy cranesbills, the young fronds may be seen daily uncoiling somewhat further, till all traces of their scroll-like form are lost, save a little curl at the tip of the frond, which in a few days is levelled too, and the pale green colour of the young frond gradually assumes its richer verdure. In June and July the Hart's-tongue fern is very bright

and beautiful, of a delicate and tender green, quivering before the rough winds, but of too firm a texture to be stirred by a light summer's breeze. The frond is long and narrow, tapering and acute at its upper end, and again gradually lowering at the base, when it becomes very distinctly heart-shaped. Its margin is entire and waved, the leafy portion being placed on a short and shaggy stalk, which is of a purplish brown colour at the base. While the frond is young, it has a downy or cottony substance on its under side, and often also on each side of the midrib on its upper surface. The length of a full-grown frond is from six inches to a foot and a half. It grows very luxuriantly on stone walls, at the borders of streams, or the sides of wells, and is sometimes found in mines or caverns. Sir J. E. Smith says of its fronds, "In the now open vault by the great hall in Conway Castle, I have gathered them upwards of three feet long, and nearly five inches wide." Sir W. J. Hooker found them in the moat at Kenilworth Castle more than two feet long. A very stout and strong midrib runs through the leafy part, from which forked veins arise, the smaller veins being parallel to each other, and running towards the margin, but ending just within it. Oblong clusters of fructification, some long and some short, lie in the direction of the veins, at short intervals, on the upper part of the leaf, occupying about two-thirds of its length. They are placed in oblique parallel lines on each side of the mid-vein, and when seen in their ripened state seem to be single. If these are examined when young, they may however be seen to be composed of two distinct patches, facing each other, and divided

by a small line, which is finally hidden by their uniting into one mass. Each of the lines consists of a complete cluster, and when joined together this is called a twin-sorus. This twin-sorus is always placed between two bundles of veins, and covered by the thin white membrane-like indusium of the same form as the clusters. In an early stage, the indusia, touching each other, seem like one only; then they separate slightly, the distinction between them becoming daily more apparent till they finally become widely separated and fall off. This plant was considered of some medicinal use by our forefathers, and was included in what were termed the five "capillary herbs." The Golden or Common Polypody, the Common Maidenhair, the Common Spleenwort, the Wall-rue, and Hart's-tongue, formed this group, which was in early days held in great esteem.

The Hart's-tongue offers a great number of varieties, especially when cultivated, as it so often is, on rock-work. A very elegant and common variety, termed *crispum*, is so waved and curled at the margin, that it becomes a leafy frill on each side of the midrib; it is often of a much paler green than the common form of the Hart's-tongue. Another well-known variety is that termed *polyschides*, in which the frond is narrow, linear, deeply and irregularly cut at the margin into roundish lobes. A third variety, *lobatum*, has its fronds strap-shaped below, widening at the upper part, and there cut into two or more acute lobes; and a very beautiful variety, *multifidum*, has its fronds strap-shaped below, spread out at the upper part, and cut into crowded, more or less blunt, and wavy lobes. A fourth

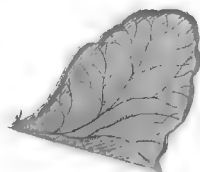
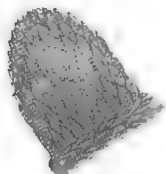
variety is very remarkable, and has been found on a wall near Taunton; it is termed *lacerátum*, and has its broad fronds deeply lobed or pinnatifid.

Some forms of this fern are found, when under culture, to be viviparous; that is, buds arise upon the stem, which separate spontaneously from the plant itself, and become young ferns. A variety of *Polýstichum anguláre* has been for some time known as viviparous, but from recent observations it would seem that the same peculiarity is observable in several of the British ferns, though it remains yet unproved whether this phenomenon will be found to be permanent. A writer in the "Gardener's Chronicle" for November, 1854, says, "I possess two forms of *Scolopéndrium vulgare*, *Polýstichum lobatum*, *Lastrea fœniscii*, and *Lastrea Filix-mas*, all of which have either produced a viviparous plant, or are gradually developing bulbillæ." He adds, that he could name other persons who have observed similar instances of reproduction in ferns.

The Hart's-tongue is called by various writers, *Phyllites Scolopéndrium*, *Asplénium Scolopéndrium*, or *Scolopéndrium Phyllitides*.

11. CÉTERACH (Scaly Spleenwort).

1. *C. officinárum* (Common Ceterach, or Scaly Spleenwort).—*Fronds* linear-lanceolate, pinnatifid, covered beneath with chaffy scales; *segments* blunt. This fern is readily distinguished from any other British plant. It varies very little in form, and the whole of its under surface is thickly clothed with brown scales. The fronds are from two or three to six inches long, very



SCALY SPLINWORT
Ceterach of Houttuyn

thick, tough, and leathery, the upper surface of a dark green hue, slightly downy, and having a brown edge, in consequence of the projection beyond the margin of the scales which are beneath. The outline is long, narrow, very deeply divided into rounded lobes, which are often again notched or cut into segments, and they stand in an oblique position towards the midrib. The whole of the under side is of rich brown colour from the dense mass of scales, and the short stalk is also scaly.

The thick texture of the fern renders the veining indistinct,^a and it can only be seen in the young fronds which appear in May. A vein enters from the lower corner of the lobe, winding towards the top; the lateral veins branch in an alternate direction; and these are again forked towards their summits, crossing each other somewhere near the margin. The sori lie along the sides of these forked veins in a very regular manner, being at first quite hidden by the scales, but afterwards standing up distinctly from them, though, being brown and chaffy like the scales, the two are easily confounded except by a close observer.

The short tough roots of this fern insinuate themselves effectually into the crevices of walls, and the tufts of Scaly Spleenwort are not uncommon on ruins and ancient castles and churches, as well as on rocky places, especially in limestone districts, in England and Ireland; but the plant is rare in Scotland, though found in the neighbourhoods of Perth, Paisley, and Glasgow, as well as in some other localities of that country. The old Arabian writers said much in praise of its worth in complaints of the liver and spleen, and our herbalists

eulogize its efficacy as an outward application to wounds. It appears to be the true Spleenwort of the ancients, and the plant to which they attributed so great an effect in disorders of the spleen. The Cretan swine, when feeding upon it, were said to lose that organ altogether, and it was believed that, when taken to excess, the same injury was experienced by the human constitution. It has of late years been recommended as a good medicine in cases of jaundice. The fern is evergreen, and it grows to a much larger size in warmer regions than in our country. It seems, however, to be the same plant, owing its luxuriance to the climate. The author has seen a specimen of the Scaly Spleenwort brought from Madeira, in which some fronds of the tuft were fourteen inches long, though our native fronds are usually about three or four inches in length. The synonyms of this fern are, *Grámmitis Céterach*, *Scolopéndrium Céterach*, or *Notolepeum Céterach*.

12. BLÉCHNUM (Hard Fern).

1. *B. boreále* (Northern Hard Fern).—*Barren fronds* pinnatifid, with broad blunt segments; *fertile fronds* pinnate, with narrow acute segments. Our only native species of this fern grows in handsome clumps, attracting the notice of the lovers of plants by the marked difference between the barren and fertile fronds which spring from the same roots. It is by no means a rare fern; and many a rambler, intent on forming a wild nosegay, gathers its bright green leaves to mingle with his branch of ling, or heath flowers, “or bonnie broom.” Cowper had, perhaps, admired this among



HARD FERN
Blechnum boreale

the ferns which grew on such spots as he describes in his rambles :—

“ The common overgrown with fern, and rough
With prickly gorse, that shapeless and deformed,
And dangerous to the touch, has yet its bloom,
And decks itself with ornaments of gold.”

But though this beautiful fern luxuriates especially on moist boggy lands, it is not confined to such localities ; it grows also in woods and on banks, particularly such as are rendered moist by streams or pools, and where the soil is of sand or gravel. Though occurring in most counties of the kingdom, yet it is somewhat local in its haunts, and not always to be found where we should soonest have looked for it. It is a fern readily distinguished, the barren fronds spreading more around the spot whence they arise, sometimes being quite prostrate on the ground, and having the pinnæ much closer together than in the taller erect fertile fronds, which are cut into so many slender divisions as to resemble the teeth of a comb ; the barren ones having their segments only cut nearly to the midrib, while the fertile ones are distinctly pinnate. The former are about half, or rather more than half the height of the fertile leaves, and have short scaly stalks. The fertile fronds, which are about a foot or a foot and a half high, have a dark brown stalk nearly half their length, with long pointed scales upon its surface, and are at once distinguished by their upright growth.

Both kinds of fronds are bright green, and their veining is similar, except that in the fertile frond a long vein runs down each side of the midrib, and on this are

placed the lines of fructification. Forked veins run almost to the margin on each side of the mid-vein, which are club-shaped at the extremity. When young the clusters of capsules are distinct, but they afterwards crowd into one linear mass. At an early stage they are covered by an indusium, which soon bursts open at the side nearest the mid-vein. Though growing on open heaths, the plant always seems finest when found under the shadow of bushes. This fern has been called *Blechnum spicant*, *Lomária spicant*, *Osmúnda spicant*, *Asplénium spicant*, *Acróstichum spicant*, and *Osmúnda boreális*.

The clumps of *Blechnum* are so handsome, among the wild flowers and grasses of summer, that we should be sorry to miss them, though they cannot be turned to any economical uses, nor will cattle eat of their crisp leaves. The plant was by old writers called Rough Spleenwort. Gerarde says, "There be empiricks or blind practitioners of this age, who teach that with this hearbe not only the hardnesse and swelling of the spleene, but all infirmities of the liver also, may be effectually and in a very short time removed, insomuch that the sodden liver of a beast is restored to his former constitution againe, that is, made like unto a raw liver, if it bee boyled againe with this hearbe. But this is to be reckoned among the old wives' fables, and that also which Dioscorides telleth of, touching the gathering of Spleenwort by night, and other most vaine things which are found scattered here and there in old books, from which most of the later writers do not abstaine, who many times fill up their pages with lies and frivolous



stories, and by so doing do not a little deceive young students." The Spleenwort of Dioscorides was, however, apparently the Ceterach.

A species of Hard Fern (*B. cartilagineum*), which grows abundantly in New South Wales, is much eaten by the natives. Its thick tough underground stem is, after roasting, placed on a layer of wood, and beaten so as to break the woody fibre. In this state the natives eat it without removing the charred substance. It is described as resembling in flavour a waxy potato, but as more gelatinous in substance.

13. PTÉRIS (Brake).

1. *P. aquilina* (Common Brake).—*Fronde*s three-parted; *branches* twice pinnate; *pinnules* linear-lanceolate, the lower ones often pinnatifid or cut. The Brake or Bracken is the most common of all our ferns; and one well known to every one accustomed to the country. Though less elegant and graceful than some of our smaller species, yet it well deserves the epithet of feathery, when it attains a large size, and bows gracefully before the autumnal gale. Like many other ferns, it is not luxuriant on chalky soils, but is abundant on those which are stony or sandy; sometimes half filling the copse by its plentiful growth, often forming picturesque clumps on the heath land, where

“Heath-bell dark and bracken green”

are among the most frequent plants. On the winter hedge large masses of the dead fronds may often be seen hanging about the boughs, and of one uniform

pale brown colour, contrasting with the green leaves of Polypody on the trunk of the tree, or with clumps of Hart's-tongue, among whose bright green fronds we may see the occasional tint of brown which tells of the touch of winter. The tall branches of the Brake, too, bordering the park, form an excellent covert for game, and the deer are fond of lying among them :—

“The wild buck bells from ferny brake.”

The fronds, though often not more than a foot high, attain great luxuriance in some places, and become taller than any other of our native ferns. They are sometimes ten or twelve feet in height, and their texture is crisp and brittle. In the north of England, and in various parts of Scotland, this fern is used for many domestic and economical purposes. In Scotland, country women may often be seen coming away from the heath laden with its young branches, which serve as food for swine; and the peasant cuts it down in large quantities, and placing it in heaps to dry in the sun, and to be wetted by the rains, uses it when thus prepared for manure on his land; or he cuts up some of the fresh fronds and mingles them with hay as food for his horses. A writer in the “Magazine of Natural History” says, that in many of the open mountainous parts of Wales, where it grows abundantly, the Brake is cut down in summer, and “after being well dried, is burned by the cottagers in large heaps for the sake of the alkali contained in the ashes. When sufficiently burned, enough water is sprinkled on them to make them adhere together; they are then rolled into round balls, about two inches or

two inches and a half in diameter. These balls are thoroughly dried, and carried about the neighbourhood for sale in the markets, and they are also frequently kept by shopkeepers to supply their customers." They serve the purpose of economising the use of soap. They are, before being used, thrown into the fire, and when thoroughly heated are placed in water, which thus becomes a strong ley. The ancients are supposed to have used both the fronds and stems of the Brake in diet drinks, and medicines for many disorders have, at various times, been made in our country from this fern. It is very astringent, and has been recommended for dressing and preparing kid and chamois leather; while both in this and other lands the ashes, from the alkali which they contain, were found serviceable in the manufacture of soap and glass, until discoveries in chemistry suggested the use of other materials for the purpose. This very astringency seems to render the Brake unsuitable for the food of man, though some writers think that nutriment would be afforded by its large rhizome. This is often ground to powder, and mixed with the flour in bread eaten in some parts of Normandy; but, perhaps, like the admixture of pine bark with the flour, used in some countries in the north of Europe, it adds rather to the quantity than to the nutritious quality of the bread. The rootstock of this brake, however, as we are informed by Humboldt, serves the inhabitants of Palma and Gomera, in the Canary Islands, for food. They grind it, he says, to powder, and mix it with a small quantity of barley meal. This composition is termed *gofio*; and the author adds,

that the use of so homely a diet is a proof of the extreme poverty of the people of these islands. This naturalist saw both the Brake and our common Northern Hard Fern growing in the Canaries in great luxuriance, though never attaining either the size or stateliness of the arborescent ferns of Equinoctial America. Tree ferns frequently afford food to the natives of the lands in which they are found. Dr. Joseph Hooker, in his recent "Himalayan Journal," says that ferns are more commonly used for food than is supposed. He tells us that both in Sikkim and Nepal the watery tubers of an *Aspidium* are eaten. So, also, the pulp of one tree fern affords food, but only in times of scarcity, as does that of another species in New Zealand, *Cyathea medullaria*. Their pith is composed of a coarse sago, that is to say, of cellular tissue with starch granules. The Esculent Brake (*Pteris esculenta*), a fern very similar to our Bracken, is a very troublesome plant to the agriculturist, in his attempt to clear the land in New Zealand; and Polack calls it "the interminable fern-root." The rootstock is much used by the natives as food, as it is also in the Society Isles and in Australia, where it is the most extensively diffused edible root. In the latter country this plant is called *Tara* by the aborigines, a name which in the southern hemisphere is given to several roots which are eaten, and also to rice. Mr. Backhouse shared, with some of the natives of Australia, the meal made of the inner portion of the upper parts of a tree fern. He says that it was too astringent to be agreeable to his palate, and little improved by cooking, but that it was something like a Swedish turnip in substance.

Our common Brake is one of the most frequent ferns in many parts of the United States of America. Sir Charles Lyell saw it in abundance on the mountains of New Hampshire, where the Maples with their crimson foliage, and the boughs of the Spruce fir, and the rich flowers of the Kalmia waved in their glory above the moist ground which was covered with the green Bracken ; and it is in that land, as in ours, used for packing fruit. The author of these pages has often seen this fern employed for making a bright fire on the hearth, or has helped, during childhood, to gather it from the hedges of the cherry orchards of Kent, that the cherry-pickers might bind it over their baskets of fruit, its large fronds keeping the glossy cherries cool and fresh for the London markets. As a packing material for apples it is excellent, for it preserves their freshness better than any other substance, without imparting either the slightest colour or flavour. Both this plant and the Male fern have been used in brewing. Professor Burnett observes that from the analysis of the latter, made by Morin, it is probable that they would form one of the best substitutes for hops, as they contain both gallic acid and tannin, which are absent from most of the bitter plants that have been applied to this purpose, and which have failed from being unable to precipitate the glutinous mucilage which renders beer made without hops so liable to turn sour.

This plant was in all probability the especial *fearn* of our Saxon ancestors ; for although in the sixteenth century several of the commoner ferns were well known and described, yet this is by far the most frequent and

most conspicuous plant of the tribe in all parts of this kingdom. To its abundance in several places, doubtless, we owe the old names of various towns and villages; as Fearnham or Farnham; Farnhurst; Farnborough; Farnworth, and Farningham. To this fern, too, probably the old proverbs and poems refer. Several of the latter were collected from the secluded villages of our country by John Ray, but the rustic wisdom which they may be supposed to contain is not always apparent to modern readers. There was a homely proverb once in common use:—

“ When the fern is as high as a spoon,
 You may sleep an hour at noon ;
 When the fern is as high as a ladle,
 You may sleep as long as you’re able ;
 When the fern begins to look red,
 Then milk is good with brown bread.”

The name of Brake, as well as the Scottish one of Bracken, is a very old one for this fern. In the old Anglo-Latin dictionary published by the Camden Society, we find “ Brakane or Brakanbuske,” described as “ferne or brakans.” The Editor, Mr. Albert Way, observes that Ray gives the word “brakes” as generally used in his day; and he adds, that it is generally retained in Norfolk and Suffolk. It is probably pretty general in most counties of the kingdom; it is certainly the common name of the plant in Kent, and the fern is also usually called Brake in North America. Mr. Way observes in a note:—“In the Household Book of the Earl of Northumberland, 1511, it appears that water of Braks was stilled yearly for domestic purposes.” In other old writers we find it called “forne.” Thus, in

the Diary of Henry Machyn, Merchant Taylor of London, written in 1552, we read of a man who was placed in the "pelere" for "selling potts of straberries, the whych the pott was not alff fulle but fylled with forne."

The portion of the stem of the Brake just below the surface of the earth is often dug up by country children, and cut across, in order that they may see a figure represented by the bundles of tubes and fibres which lie among its cellular mass. Dark brown or black markings may be observed among the whitish substance. In some counties, as in parts of Kent, these marks are fancied to represent the letters J C; a fancy which originated, doubtless, in those superstitious times when, little as men knew of the open page of Nature, they knew less still of the written page of God's word, and when they imagined that Nature pointed to truths taught only by revelation. In other places the markings are supposed to show the figure of an oak, and to have first grown there in memory of the tree which gave shelter to King Charles during his flight. An old tradition is yet told that James, the unfortunate Duke of Monmouth, after the battle of Sedgemoor, concealed himself for some time successfully beneath the Bracken boughs. One day, however, emerging in some degree from his retreat, he sate down, and amused himself by cutting some of the stems of the fern under which he had slept on the past night. Some peasants who noticed him were surprised to see a man clad in homely garb like their own, with delicate white fingers, on one of which glittered the diamond of a ring; and when, soon after, the reward was offered for the apprehension

of Monmouth, they recalled the circumstance and sought for him where he lay concealed beneath the withered heap of fern. No wonder that imagination could readily trace in the heart of the fern some semblance which could identify the plant with the remembrance of the two fugitive princes, the father and son, whose fates were so different. The oak-tree is still believed to be portrayed there; and the author, during childhood, shared in a belief very general in the neighbourhood of her home. In Germany, this figure is commonly called the Prussian Double Eagle; and older, probably, than any other tradition is the received opinion, that the marks in the fern stem represent an eagle, and gave to the plant one of its common names, the Eagle fern. This idea is casually alluded to in one of the Colloquies of Erasmus, when one of the speakers observes of the Toadstone, or *Crepaudine*:—"Perhaps they imagine the likeness of a toad; as on cutting the root of fern we imagine an eagle."

In the thick shady woods in which our Brake luxuriates, its root-stems creep many feet below the surface of the soil. They are as thick as the finger, and covered with a beautiful soft velvety down. The young fronds, which appear in May, are curled and drooping, of a delicate whitish green, and very tender, having both that starch-like odour and flavour peculiar to ferns. By September their bright green is touched with golden hue, which finally yields to the brown tint colouring the crisp fronds as they rustle in the winter winds.

The outline of the frond of this fern is somewhat triangular, and it is either twice or thrice pinnate. The

greater number of fronds are thrice pinnate, having several pair of pinnæ, with twice pinnate branches. In some cases all the pinnules are entire; in others they are pinnatifid. The stalk is usually rather more than half the length of the frond; it is green, and while young, somewhat downy, but as the fern grows older it becomes very hard and rigid, and has so many angles upon it, that many a wanderer in the woods has suffered from grasping it too hastily. In places where the fronds do not attain any luxuriance, they are more decidedly triangular; they have then the appearance of being three-branched, because the other pairs of pinnæ, so usual on the finer specimens, are not in this case developed.

The fronds of the Brake are almost all fertile; yet, let us gather the plant at what season we may, no fructification is to be seen on its under surface until we search for it; not that the capsules are not abundant, for, during Autumn, they cluster in profusion on almost every plant, but they are hidden under the margin. In this plant the margin of the fern forms the indusium. It is thickened into a rim, beneath which lies a row of capsules, which run all round the edge of the fern. If our fathers had known this fern only, we should not have wondered at the idea which some, at least, seem to have had, that ferns bore no seed. Pliny says, "Of fern be two kinds, and they bear neither flower nor seed." The general opinion some centuries later, however, was, that the fern-seed was visible only on St. John's Eve, just at the precise moment at which the Saint was born:—

“ But on St. John’s mysterious night,
 Sacred to many a wizard spell,
 The hour when first to human sight
 Confest, the mystic fern-seed fell.”

The superstitious belief that he who could at that hour get some of the fern-seed became invisible, is frequently alluded to by our old poets. Shakspeare makes one of his personages say—

“ We have the receipt of fern-seed ; we walk invisible ?”

Fletcher says—

“ ——— Had you Gyges’ ring,
 Or the herb that gives you invisibility ?”

And one in Ben Jonson thus refers to it :—

“ I had no medicine, Sir, to walk invisible ;
 No fern-seed in my pocket.”

Yet the seeds of ferns are very numerous, and myriads are borne on the slightest summer breeze, like a thin vapour, and sent forth to fertilize our beautiful earth. Professor Lindley observes of the Hart’s-tongue, which is but a small fern, that a little computation will show its means of dissemination to be prodigious. Each of its clusters, he tells us, consists of 3,000 to 6,000 capsules. Taking 4,500 as the average number, then each leaf has about 80 clusters, which makes 360,000 capsules per leaf ; the capsules themselves contain about 50 spores or seeds, so that a single leaf of Hart’s-tongue may give birth to no fewer than 18,000,000 of young plants.

Thus numerous and beautiful, too, in themselves, are the seeds of ferns, enclosed within the elastic rings

of their tiny cases, which are seen by the aid of a microscope to be covered over with markings so varied and so delicate, that the line of the finest pencil can scarcely represent them. The finger of God has traced them there, and left them to tell to us of His power and skill.

Each pinnule of the Brake has a mid-vein, whence issue side-veins, which are either opposite or alternate. These are twice forked before reaching the margin, where they unite with a vein which runs round the edge, and forms the receptacle for the clusters of capsules. The indusium consists of a white membranous fringed expansion of the thin skin of the upper surface, which rolls under so as to cover the fructification seated on the marginal vein. Beneath this line of capsules is another bleached and fringed membrane, very similar to the first, which is also apparently an expansion of the skin of the under surface.

The following lines were written for this volume by Mary Isabella Tomkins :—

THE BRACKEN.

As a coming screen grows the Bracken green,
 Up springeth it fair and free,
 Where in many a fold, grotesque and old,
 Twineth the hawthorn tree ;
 A covert meet from the noontide heat,
 For should you steal anear,
 You may chance discern, 'neath the spreading fern,
 The antlers of the deer.

It boasteth a name of mystic fame,
 For who findeth its magic seed

A witching and weirdly gift may claim
 To help him at his need :
 Unseen, unknown, he may pass alone
 Who owneth the fern-seed spell ;
 Like the viewless blast, he sweepeth past,
 And walks invisible !

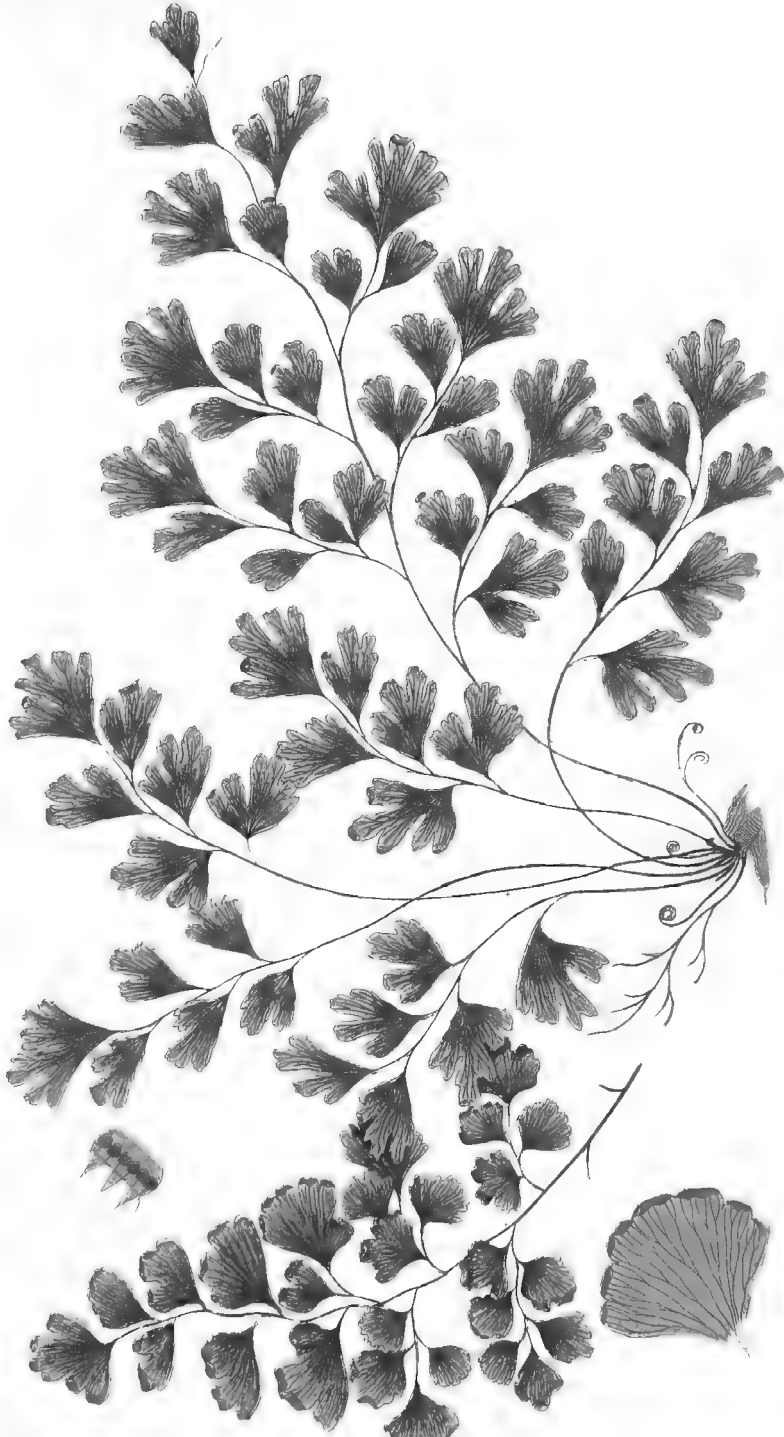
Have ye to learn, how the Eagle fern
 Doth in its heart enshrine
 An oak-tree like that which the hunter Hearne
 Haunted in days " lang syne ?"
 An oak-tree small is repeated all
 Complete in branch and root,
 Like the tree whereunto King Charles did flee,
 When press'd by hot pursuit.

To his son its shade gave but traitor aid
 When, striving to lie conceal'd,
 On foot he fled, in fear and dread,
 From Sedgemoor's fatal field ;
 In doublet mean was a peasant seen,
 Wearing a priceless ring—
 He whom the voice of the people's choice
 So late had hail'd their king.

Oh, Eagle fern ! when I thee discern,
 When thy wither'd leaf I meet,
 In places the careless foot might spurn,
 The crowded mart or street,
 Thou takest me back to thy birth-place fair,
 Where thou waviest in thy pride,
 And the form of the hare and the deer's close lair
 Doth 'mid thy stems abide.

14. ADIANTUM (Maiden-hair).

1. *A. Capillus-Veneris* (True Maiden-hair).—*Fronde* irregular ; *pinnules* stalked, lobed, roundish, wedge-shaped, alternate ; *barren lobes* serrated ; *fertile lobes*



MADONIA
L. G. C. D. 1

terminated by a linear oblong cluster of fructification. Our only British species of this genus is easily known from all other native ferns by its fan-shaped leaflets, but the characteristics of the genus are to be found in the veining and the marginal fructification. The plant is called True Maiden-hair, to distinguish it from some other ferns which share with it its familiar name. It is one of the loveliest of our native plants, and in its wild state is among the most rare; but it is familiarly known to fern-lovers, because it is one of the most frequent ferns grown in closed glass cases, where it attains great perfection, and where it is often the companion of another species brought from Madeira, which, though having larger fronds, is not more elegant. The main stalk of our Maiden-hair is seldom thicker than a packthread, and the little stalks which support the thin fan-shaped pinnules are so slight and elastic, so black and hair-like, as to have gained for the fern its specific name. Its slender creeping rhizome is shaggy, with black hair-like scales, and the base of the stipes is of a rich red-brown colour. The fronds, which grow in lax tufts, make their appearance about May, and are matured by June; they are usually about six or seven, but sometimes twelve inches in height. They are either twice or thrice pinnate. The pinnæ, or branches, diverge alternately from the stalks; the little leaf-like pinnules are also alternate, and each is placed on a separate stalk. The form of the leaflets, though varying much in different situations, is yet more or less fan-shaped, the terminal one being often wedge-shaped. The margin is lobed, the barren lobes are serrated, but the edges of

the fertile lobes are turned under, and thus form a membrane-like indusium to the clusters of fructification. The stalk is usually about half the length of the frond, and is glossy black, or deep purple. The veins in all the pinnules are two-branched or forked from the base, the branches extending in straight lines to the margins, where in the barren fronds they end in the marginal notches. In the fertile fronds, however, they extend into the indusium, and become the receptacle for the clusters.

The bright cheerful evergreen tint, the elegant form and lightly waving attitudes of this fern, render it very attractive; and when growing against the sides of the sea-rock or other moist place in any abundance, no fern exceeds it in beauty. Sir William Hooker remarks, that this most delicate plant is very abundant in the south of Europe, where he has seen it lining the inside of wells, as it does the basin of the fountain at Vaucluse, with a tapestry of the tenderest green. It grows sometimes even on rocks washed occasionally by the spray. It is not a Scottish fern, but occurs on the south and west coasts of Ireland in great luxuriance. It is also plentiful in some spots in Wales, but the only English counties in which it is to be found are those of Cornwall and Devonshire. Mr. N. B. Ward sent specimens of the Maiden-hair to Mr. Newman from the neighbourhood of Ilfracombe, where he found it growing in great beauty on the face of the crevices of a rock in White Pebble Bay, in a dense mass, which commenced at the height of about twenty-five feet, and descended to within about five feet of the level of the sea. It prefers a per-

pendicular surface. It is a native of almost all tropical lands. Few ferns would be more graceful adornments to the sides of streams and pools, were it not so easily injured by the frost in exposed situations; though in the Wardian case its greenness is to be seen as well in the depth of winter as in the summer. The surface of the frond is always so smooth that water runs from it. Pliny had observed this, for he says, "In vain you plunge the *Adiantum* in water; it always remains dry."

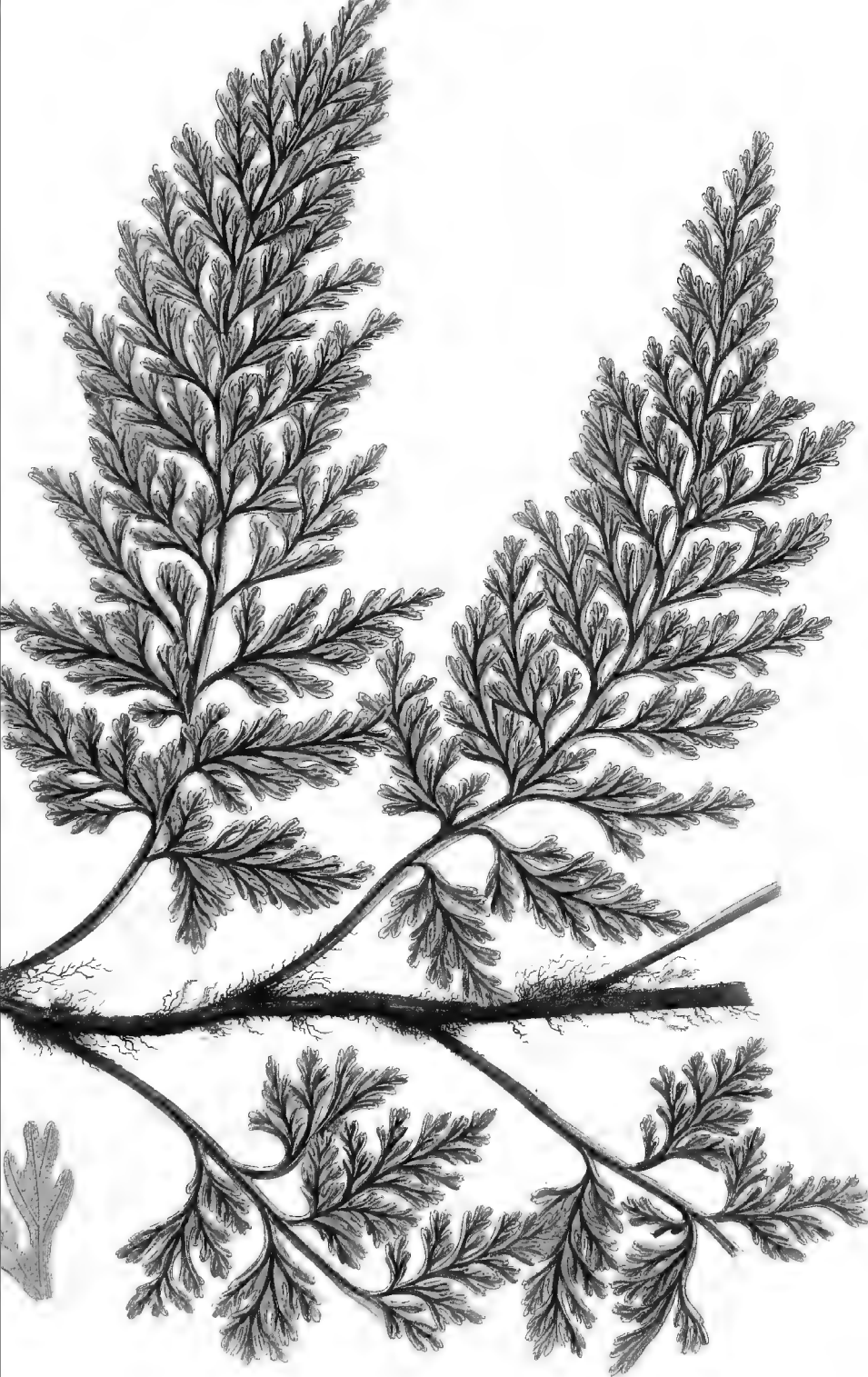
The fronds of this fern have, from earliest times, been used in this country as a remedy in pulmonary complaints. They yield, when boiling water is poured on them, some degree of mucilage, and emit at the same time a slight odour. That ancient writing known as the Arundel MS. says of this plant—"It mundifyeth the lunges, and the breste, and caccheth out wykede materes in hem." While from the same authority we learn that "Margery perles wastyn and fordon and cacchen out of the body wykede humours." The Maiden-hair seems to have been universally regarded as a cure for cough and difficulty of breathing; and Kalm relates that the American Indians have used it from time immemorial for this purpose. John Ray cites it as a cure for innumerable maladies; and later herbalists praised the decoction of the Maiden-hair, not as a remedy only for cough and other pectoral complaints, but as also a cure for jaundice, swollen joints, and many other diseases; and affirmed, that it "stayeth the falling or shedding of the hair, and causeth it to grow thick, fair, and well-coloured;" though, in the preparation of the plant for this purpose, the herb termed Smallage, which is our

Wild Celery, was added, and both were boiled in oil and wine.

The Canadian species of Maiden-hair (*Adiantum pedatum*) was introduced into this kingdom by John Tradescant. It grows in Canada in such profusion, that when the French were in possession of that country they were accustomed to send over large quantities of the plant to France merely as a package for goods, and hence the druggists of Paris used this fern extensively instead of the true Maiden-hair. Both plants possess some astringency, and in France are still taken for coughs; but the chief use of Maiden-hair in our times is in the preparation of Capillaire, which is made by boiling the fern into a syrup with sugar, and flavouring it with orange-flowers. The French term our native species *Capillaire de Montpellier*; but they also call it *Adianthe*; while the Dutch and Germans term it *Venus-haar*, and the Spaniards and Italians, *Adianto*. It is a safer plant to use in decoction than the Canadian species, as that has some emetic properties, if taken in any quantity. Our beautiful plant grows in great abundance in the South Isles of Arran, off the coast of Galway, covering the rocks with its light green fronds; and the people of these isles use it as a substitute for tea. In India, a pretty species, *A. melanococcum*, is much prized as a tonic medicine.

15. TRICHÓMANES (Bristle Fern).

1. *T. radicans* (Rooting Bristle Fern).—*Fronde*s three or four times pinnatifid, segments alternate, linear, entire or two-cleft, obtuse; *involucre*s solitary in the axils



POPPAR BE SILL. 416
FIGURE 1

of the upper segments. This is an exceedingly beautiful fern, both in its form and in the delicate transparency of its texture. It is unknown in any European countries except Ireland, though it formerly grew at Belbank in Yorkshire; but in warmer climates, the species, or one closely allied to it, is of frequent occurrence. Specimens from Madeira are to be found in the herbariums of most persons who have visited that island, more luxuriant perhaps but not more beautiful than those found at Killarney. Humboldt remarks, that every traveller mentions the elegant *Trichomanes* which covers the walls and roofs of the antique houses and chapels at Teneriffe, which, he says, in their deserted condition offer great treasures to the botanist. He adds, that the ferns are nourished by the fogs which abound in the neighbourhood. Mr. Backhouse saw a beautiful *Trichomanes* covering the dark sides of rocks in Norfolk Island. Our Bristle Fern delights in shade and moisture. It is found in several stations in Ireland; the Turk waterfall near Killarney being one often visited by botanists, who have recorded the enthusiastic delight with which they have looked on the hundreds of delicate fronds which form green masses there. It was formerly seen by Mr. Newman very near the waterfall, but the guide of the place has sold so many pieces of this rare treasure to visitors, that the plant is almost exterminated at that spot. It occurs, however, in several other localities, forming by its masses a rich verdant drapery to the wet rock, for it is only in places constantly moist that it can be found, the slightest exposure to drought withering its frail frond. It was in a mossy nook near

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Killarney, made greener by trickling waters, that a friend, who termed the nook the "Birth-place of the ferns," and saw its matted fronds drooping among rocks, wrote for our volume the following lines :—

Beside a waterfall, where silvery mist,
 Even in summer, makes the noontide dim,
 Where clear brown shallow waters curl and twist
 Round moss-grown rocks tree-clasped by rootlets slim,
 Seated on stones that cumber sore the stream,
 Listening the tiny torrent's whirl and dash,
 I love to dream a wildering noon-tide dream,
 Bright, swift, and changeful as the waters' flash.

Mark ye the ferns that clothe these dripping rocks,
 The crosier-headed ferns, most fresh and rare ;
 Their hair-like stalks, though trembling 'neath the shocks
 Of falling spray-drops, rooted firmly there.
 What quaint varieties ! the leaflets glow
 With a metallic lustre all their own,
 And velvet mosses, fostered by the flow,
 Gain a luxuriance elsewhere all unknown.

Through the light quivering beech-trees, sunshine falls
 Filtering athwart the beauty of the glen ;
 And to his mate the twittering wood-bird calls
 With a sweet startled note—then hush'd again :—
 We from our perilous stand launch boldly forth
 Ventures of rose-leaves on the streamlet's breast,
 We block each tiny rapid's foaming wrath,
 Making new waterfalls at our behest.

It was owing to the occasional dryness of the atmosphere, that, until the introduction of Mr. Ward's closed cases, this fern withstood all attempts of the cultivator to rear it. If we take up any work on ferns, written a few years since, we find the author commenting on the absolute impossibility of domesticating the Bristle Fern,

as an ornamental plant; though in the glass cases it is now often to be seen, producing larger fronds than in its native locality, and by its green beauty delighting the eye of the dweller in the smoky town, or cheering the heart saddened by long sickness and absence from the scenes of Nature. In Mr. Ward's interesting work on the growth of plants in closed cases—a little book honourable alike to the thoughtful intellect and kind heart of its writer—this gentleman says, that when making the experiments which led to his plan of glass cases, he was induced to commence with this, the most lovely of our cellular plants, in consequence of its being the most intractable under ordinary culture; of its being in fact, as he says, the “opprobrium hortulanorum.” “Loddiges,” says Mr. Ward, “who had it repeatedly, never could keep it alive; and Baron Fischer, the superintendent of the botanic establishment of the Emperor of Russia, when he saw the plant growing in one of my cases, took off his hat, made a low bow to it, and said, ‘You have been my master all the days of my life!’” On some rock-work in Mr. Ward's fern-house, this plant produced fronds fifteen inches in height, by seven or eight in breadth, one-fourth larger than uncultivated specimens, either from Killarney or elsewhere.

The small portion of *Trichomanes* represented in the plate, is part of a very interesting specimen given to Mr. Dickes by Mr. N. B. Ward. The latter gentleman, in a letter to the Author, says of it, “Some years since, when I had the pleasure of visiting Killarney with Dr. Harvey, we determined to find out, if possible, another locality for *Trichómanes radicans*; and to this end directed

the driver to convey us to some portion of the shores of the lake into which one of the mountain streamlets was continually discharging; well knowing, that in the course of such a rill from the mountain-top, there would occur many places suited to the growth of this moisture-loving plant. We were landed accordingly on the south side of the lake, amid a mass of *Osmunda*, and after making our way up the stream a few hundred yards, surrounded by masses of rocks confusedly hurled, and coated with fine *Hymenophyllum*, and various mosses and liverwort, Dr. Harvey, who was in advance, called out, 'Eureka—Eureka!' I hastened onwards, and saw a sight which might have repaid a much more lengthened and laborious search. In the inside of a natural cave, about five feet square, formed by four large masses of limestone, the *Trichomanes* was growing in its native beauty. One specimen, with a creeping rhizome three or four feet in length, and containing forty-eight perfect fronds, we divided, and my portion is now in the hands of your artist. The mouth of the cave faced the north, so that not a ray of solar light ever reached the plant within; and to this cause I attribute the total absence of fructification on any one of the specimens."

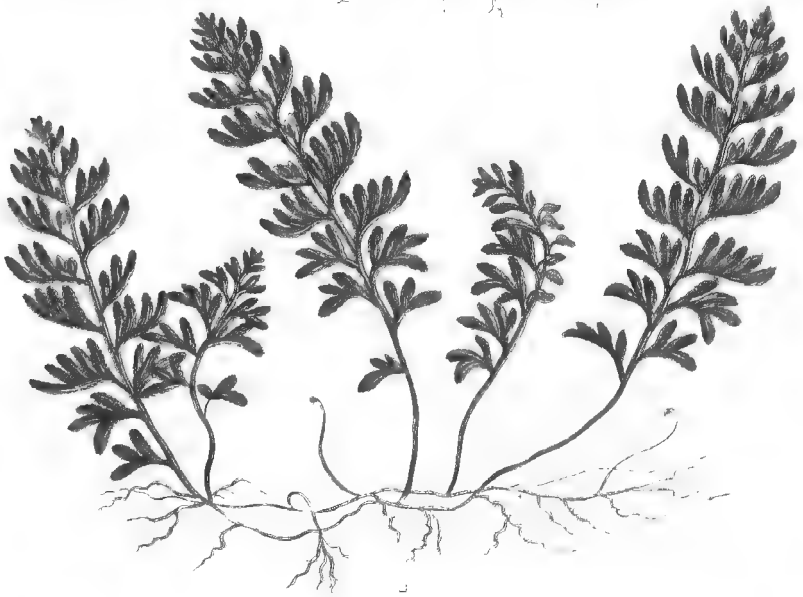
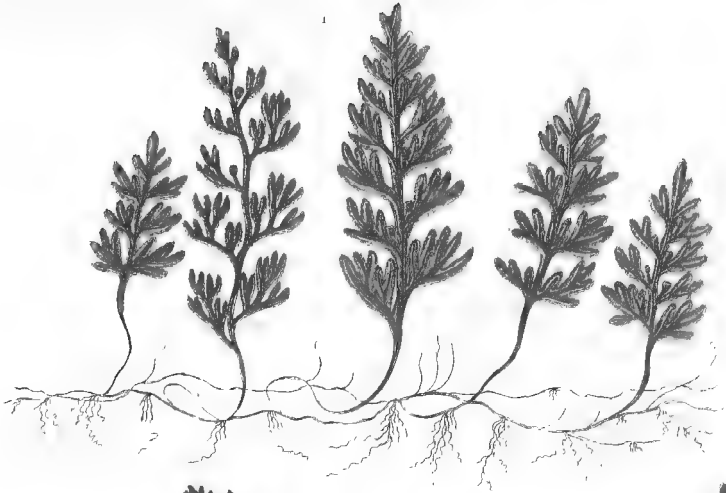
The Bristle Fern has a slender creeping horizontal stem, which winds and branches so as to form a network over the rock, and is covered with black down. This woolly substance has been found by Mr. Andrews, when viewed under a lens of high power, to consist of articulated bristles, analogous to the scales on the stems of other ferns. The whole frond is so pellucid, the veins so prominent, and the green part so like a

membranous wing around the veins, that it has more the appearance of a sea-weed than a fern. The frond is between lanceolate and triangular in form, the divisions being so much waved as to give it a crisped appearance. It is three or four times pinnatifid, and the slender segments of which it is composed are either entire or two-cleft at the apex, and a strongly-marked and stout vein runs up the centre. Indeed the veins are so prominent and rigid, that they seem the most conspicuous part of the fern, and the frond might very well be said to consist of a number of firm veins, three or four times branched, and edged by a thin green membrane-like wing. Some of the terminations of the veins are surrounded by the green part, which forms a little cup in which lie the capsules of fructification. The involucre, as this is usually called, most commonly projects beyond the margin of the frond, but it sometimes lies within it, and the bristle is often four or five times the length of the cup, though in many cases scarcely exceeding it in length. The fronds are from three inches to a foot long, and mostly droop over the sides of the rocks. Though appearing in May, they are not matured till about November, nor do they attain their whole size or bear their fructification until the third year of their growth. Now that it is discovered to thrive so well in the closed cases, this plant is a favourite subject of the cultivator's care. It requires a pure and constantly humid atmosphere, shade and warmth, and these conditions can all be given by the glass case. It may be grown also in an earthen pot standing in water and covered with a bell-glass. A variety of this fern, of

broader lanceolate, somewhat egg-shaped form, has been termed *Andrewsii*, after its discoverer. The Bristle Fern is by various writers called *Trichómanes brevisétum*, *speciósium*, or *alátum*; and also *Hymenophýllum alátum*.

16. HYMENOPHÝLLUM (Filmy Fern).

1. *H. Tunbridgense* (Tunbridge Filmy Fern).—*Fronde* pinnate; *pinnæ* pinnatifid, forming a wing on each side of the rachis; the *segments* serrated and spinous. This delicate, flaccid, membrane-like fern, grows in matted tufts, looking rather like a withered than a living plant, on account of its olive-brown tint, though when really dried in the herbarium it retains much elasticity. The slender, delicate Filmy Ferns are the smallest of our native species, and are somewhat like delicate mosses. The veins are so strongly marked, that, as in *Trichomanes*, they seem to form the fronds; the filmy cellular portion surrounding them like a wing. Their length is from one to three inches, they grow almost erect, and their outline is lanceolate, or somewhat egg-shaped. They are flat, and their *pinnæ* once or twice pinnatifid, their branches mostly on the upper side, though sometimes alternately on each side of the pinna. The clusters of capsules are formed round the axis of a vein, which runs beyond the margin of the frond; this vein, or receptacle, being enclosed in a kind of cup forming the involucre. This consists of two compressed valves, which are nearly round, and are swollen slightly at the base, and have a notched and spinous upper margin; and it is by this two-valved involucre that this genus is distinguished from the nearly allied Bristle-Ferns.



HENKELIUSI THUNBERGII
 Hymenophyllum Thunbergii
 WILSONI F. L. ...

This fern is not peculiar to Tunbridge Wells, though found on several moist rocks in that neighbourhood; and having been first discovered there, the plant is known by the trivial name *Tunbridgense*, not alone in this kingdom, but on several parts of the Continent. It is not a rare fern, as it grows amongst moss in damp and shady places, especially in mountainous or rocky districts in several parts of this country, as in Tilgate forest, Sussex; on Dartmoor, in Devonshire; in many parts of Cornwall; in several localities of Cumberland, Westmoreland, and Lancashire. It is also of frequent occurrence in Wales and Ireland, and in the latter country is sometimes very luxuriant.

2. *H. unilátérale* (Wilson's Filmy Fern or Scottish Filmy Fern).—*Fronde* pinnate; *pinnæ* curving backwards; *segments* linear, entire or two-cleft. This is a small film-like fern, growing on wet rocks in various parts of England and Wales, and very abundant in the Highlands of Scotland, as well as in many parts of Ireland. Though it grows, like the Tunbridge Fern, in matted fronds, and the two plants are often found on the same rock, yet it is a very distinct species. The fronds are much more rigid, of a brownish green tint, somewhat drooping in attitude, and the *pinnæ* turning back in a direction contrary to that of the fructification. They are about two or three inches long; their outline is linear-lanceolate and pinnate. The rachis is somewhat arched, and the *pinnæ* are convex above, all turning one way, so that the fronds are more or less one-sided. The wedge-shaped *pinnæ* are cut into slender, blunt, pinnatifid segments, having a serrated and slightly spinous

edge. The rigid veins are twice branched, and have a narrow leafy wing; but the main stalk of the fern is not winged, or scarcely so. The free ends of the veins are surrounded by the clusters of capsules, which are placed within a cup-shaped, brown, rigid involucre, the valves of which are convex throughout, touching only by their edges, which are quite entire.

SUB-ORDER II.—OSMUNDACEÆ.

17. OSMÚNDA.

1. *O. regális* (Osmund Royal or Flowering Fern).—*Fronde*s twice pinnate; *pinnules* oblong, nearly entire, the lower base somewhat ear-shaped; *clusters* in terminal panicles. This stately fern, which is also sometimes called King Fern, and Regal Fern, is so different in its appearance from our other British species, that the botanist only would know it to be a fern unless the veining of its leafy frond were examined. It is the most conspicuous of all our wild species, and well deserves its regal name, which, however, it appears to have owed to other circumstances than its stately form. Its name *Osmunda* is of Saxon origin, and perhaps was given in honour of some one who in old times bore the name of Osmund. Osmunda was one of the titles of Thor, the Celtic Thunderer. Some believe the word itself to have signified domestic peace, from *os*, house, and *mund*, peace; however, the word *mund* was evidently sometimes an adjunct signifying strength and power, and formed part of many a name in the olden time, as in Sigismund and Edmund. It is in all probability the



FLOWERING FERN.
Osmunda regalis

origin of the old word used by the herbalists, who relate of several plants that they mudyfye the system, apparently meaning that they give strength. Gerarde, when describing the stem of this fern, which on being cut through shows a whitish centre, calls this portion of the plant the "Heart of Osmund the Waterman;" a waterman of this name having, according to tradition, dwelt at Loch Tyne, and on one occasion, when bravely defending some of his family from the cruel Danes, sheltered them among the tall branches of this magnificent plant, which is more like a shrubby or tree fern than any other of our native species.

The Flowering Fern is distributed more or less throughout the kingdom, occurring on bog lands, on the wet margins of woods, or on the hedge-bank watered by a stream. It is rarely to be found in the eastern part of England and Scotland, though occasionally gratifying the lover of ferns by its unexpected appearance there. So abundant, however, is it, and so luxuriant in its growth, in many places in Devonshire and Cornwall, as well as about Connaught, in Ireland, that its masses form a marked feature of the scenery. It grows well, too, on the bogs of Lancashire; and sometimes its towering fronds enliven even the dreary sea-coast, where they thrive well on spots only just beyond the reach of the wave at high tide. It generally rises to the height of four or five feet, but tufts of its fronds, growing on the bank of the Clyde, have been measured by botanists, and were found to be eleven feet high. Generally its tall stalk rises erect, and its panicles overtop the flowers which grow beside them; but sometimes this

handsome plant acquires a drooping habit. Mr. Newman, referring to it, says: "I noticed a beautiful instance at Killarney, where it completely fringes the river between the lakes, and certainly forms a most prominent feature in that lovely but neglected portion of that far-famed scenery. So altered is the usual character of this fern, that its long fronds arch gracefully over, and dip their masses of seed in the crystal water; while the saucy coots, from beneath the canopy it affords them, gaze fearlessly on the visitors who are continually passing by." This fern is not difficult of culture, and growing in a large pot of earth kept in water, and placed in the shade, it makes a lovely ornament among the myrtles, and hydrangeas, and rhododendrons, which so often grace the hall of a house. It also thrives well on the margin of pieces of water, or on rock-work near them. It is common to most European countries. The Germans call it *Traubenfarrn*; the Dutch, *Trosvaren*; the Italians and Spaniards, *Osmunda*; and the French, *Osmonde*. In Madeira, it was formerly a most luxuriant and plentiful fern.

The young fronds of the *Osmunda* are usually about ten or twelve in number, but they are sometimes fewer. Their large leaf-sprays are thin and crisp, and of a bright sea-green colour, usually assuming a deeper green as the plant grows older. The stalk, which is at first reddish brown, afterwards becomes green, and contrasts well with the rich rust-brown spikes of fructification. These shrub-like fronds are, however, annual, and some of them are barren. They are lanceolate and twice pinnate, the pinnæ being either lanceolate, or lanceolate and egg-

shaped, and the pinnules are oblong and nearly egg-shaped. They are also somewhat ear-shaped at the base. They are rounded at the upper part, and the margins are serrated. The pinnæ at the upper portion of the fertile frond are so densely covered with the brown clusters of capsules, as to look something like spikes of flowers; and they so contract the green leafy portion, that they leave only a green edge, and the mid-vein clear. Lower down on the frond we often see a pinnule or two thus contracted, and partly or wholly covered with the fructification; and we may, during the earlier growth of the plant, trace the gradual contraction of the leafy part of the frond through all the stages, till it is converted into this panicle. This is often, when matured, two or three feet in length, and branched so as to be a yard wide.

The barren fronds are leafy throughout, but differ in no other respects from the fertile ones. In their most luxuriant state, the fronds of this handsome plant are sometimes nearly two yards across.

In the barren fronds we may easily perceive the mid-vein of each pinnule with twice or thrice forked veins issuing from it to the margin. In the fertile fronds the clusters of capsules are seated on these veins, which are just sufficiently developed to form a receptacle. The capsules are nearly globular, stalked and two-valved.

This plant, which appears in May, is matured by August, but is destroyed by the early winter frosts. It was formerly in much repute for its medicinal properties, but it is now little used, though its stem is astringent and somewhat tonic. An old writer, who calls it also the

Water Fern, says: "This hath all the virtues mentioned in other ferns, and is much more effectual than they, both for inward and outward griefs, and is accounted good in wounds, bruises, or the like. The decoction to be drunk, or boiled into an ointment of oil as a balsam or balm, and so it is singular good against bruises, and bones broken or out of joint." The root, when boiled, is very slimy, and is used in the north of Europe for stiffening linen.

SUB-ORDER III.—OPHIOGLOSSACEÆ.

18. BOTRYCHIUM (Moonwort).

1. *B. Lunária* (Common Moonwort).—*Fronde* pinnate; *pinnæ* crescent-shaped, or fan-shaped. It is on the dry open moor, amongst heather and heath-bells, that we must look for the Moonwort, which, though not a common plant, is more or less distributed throughout the United Kingdom. In England it seems to occur most frequently in the counties of Staffordshire, Surrey, and Yorkshire; generally on old pasture lands or heathy places; but it has occasionally been gathered in a wood. Like the Flowering Fern, its habit differs much from that of ferns in general, and it is well named Moonwort, from the usually crescent-shaped leafy *pinnæ*. Doubtless this form induced the old alchemists and professors of magic to value it so highly, for moon-shaped plants, or parts of plants, were readily believed to indicate some wondrous potency. And several old poets refer to it:—



1. MOONWORT
Botrychium lunaria

2. COMMON ADDERS TONGUE
Ophioglossum vulgatum

“ And I ha’ been plucking plants among
 Hemlock, henbane, adder’s tongue ;
 Nightshade, moonwort, Ibbard’s-bane,
 And twice by the dogs was like to be ta’en.”

Many of our oldest writers on plants had most firm assurance of strange powers possessed by this fern : thus Coles remarks—“ It is said, yea, and believed by many, that Moonwort will open the locks wherewith dwelling-houses are made fast, if it be put into the keyhole ; as, also, that it will loosen the locks, fetters, and shoes from those horses’ feet that goe on the places where it groweth ; and of this opinion was Master Culpeper, who, though he railed against superstition in others, yet had enough of it himselfe, as may appear by his story of the Earl of Essex his horses, which being drawne up in a body, many of them lost their shoes upon White Down in Devonshire, near Tiverton, because Moonwort grows upon the heaths.” Withers, writing in 1622, says—

“ There is an herb, some say, whose vertue’s such
 It in the pasture, only with a touch,
 Unshoes the new-shod steed.”

There were herbalists, however, even in those credulous times, who denounced this belief ; as did Turner, who published his “ British Physician ” in 1687, and who says, that the plant is neither smith, farrier, nor picklock ; yet even he prizes the fern for its medicinal virtues, and declares himself confident that it is the Moon’s herb. Gerarde mentions the use of this fern by the alchemists, who, he says, called it Martagon. It appears to have entered into some of those compositions over which so many men spent their nights and days in

fruitless labour and frequent disappointment. It may be, however, that now and then, as the German chemist Glauber in his ardent pursuit of alchemy discovered the sulphate of soda, since called Glauber's salts, so some unexpected good resulted from their labours. Gerarde, who calls the notions prevalent in his time of the magical powers of the Moonwort "drowsie dreams and illusions," yet held the general opinion of its medical efficacy, and its use as an application to wounds. A large succulent species of Moonwort, which is abundant in many of the southern United States of America, the *B. Virginicum*, is boiled and eaten in Nepal, and abundantly in New Zealand. Dr. Joseph Hooker, who saw it in the former country, says of this fern, that its distribution is most remarkable, it being found very rarely indeed in Europe, and in Norway only; while it abounds not only in that part of America, but also in the Andes of Mexico, in the Himalaya Mountains, Australia, and New Zealand. In Virginia it is called the Rattlesnake fern, because that venomous reptile shelters itself beneath the covert formed by its fronds, which would therefore serve to him who wanders near as an indication of the danger lurking unseen.

The frond of our common Moonwort rises very early in spring, and would not, in its young condition, suggest the idea that it was a fern. It seems at first but an upright simple stem, about an inch high, but this is in fact a bud, enclosing the frond within it; the lower part or rachis of the frond, thus covered up, is thicker than the upper part, and the two branches of the young frond face each other, the fertile being clasped by the barren

one, while the whole is closely wrapped in scale-like sheaths. The plant, when in June it has become fully developed, is from three to eight, or more rarely ten inches in height, of a dull yellowish green colour, the lower part or stipes being succulent and hollow, and having at its base the remains of the scale-like sheath which once invested it. About half-way up it divides into two branches. The leafy branch is pinnate, and from three to eight pairs of crescent or fan-shaped leaflets are closely crowded upon it, their outer margin indented with slightly-rounded notches. The veins radiate towards the margin, one vein extending into each notch. The fertile branch of the fern is erect and branched, the branches being generally about the same in number as the pinnules on the leafy branch; these side pinnæ are again divided into lesser branches, on which the fructification grows. This forms a spike distinct from the leafy expansion, and is not, as in *Osmúnda*, a contraction of the green part, nor are the clusters or capsules crowded, like those of that fern, into a mass; but though nearly touching each other, they are separate, and arranged in single rows along the branches of the spike. The capsules are globular in form, without stalks, smooth, composed of two concave valves, and are at first yellow and afterwards brown. The fern varies in different situations, and in one form the pinnæ are pinnatifid; but it is at all times so distinct from any other British fern that it is never difficult of recognition. It is known throughout Europe and Northern Asia. It is sometimes called *Osmúnda Lunária*, or *Lunária mīnor*.

19. OPHIOGLÓSSUM (Adder's-tongue).

1. *O. vulgátum* (Common Adder's-tongue).—*Barren frond* egg-shaped, blunt; *fertile frond* club-shaped. This is a common plant, abundant in many parts of England, and easily known from any other fern. One who was not a botanist would describe its full-grown frond as being a green leaf, sending up from its base a stalk bearing a spike. If we look for this plant in May, we may find the bud underground: this was formed in the previous autumn, and on being opened, it may be seen to enclose not only the leaf and spike for the next year, but also the rudiment of the leaf for the year after. The plant, when seen in the middle of the month of June, at which time it is fully developed, is erect, with a long smooth succulent stem, of a pale green colour, a leaf of a deeper green tint, not with forked veins like most ferns, but with veins forming a net-work, while from the inner part of the leaf rises the stalk, which varies from about an inch to three inches in length. The spike on this stalk tapers towards the summit, and is formed of two lines of crowded capsules imbedded in its substance, and occupying its two opposite sides. The capsules, which are globose, are filled with a fine dust, like the pollen of flowers. When fully ripened they discharge their contents, and if the soil is moist the plant becomes so plentiful in the pastures in the course of a few summers as to injure it greatly. Though local in distribution, yet in parks and clayey pastures we might sometimes gather a basket full of plants in the course of a few hours. It is no marvel that our fore-

fathers called it Adder's-tongue, or Adder's-spear, for, like the reptile after which it was named, it was believed to have great power for evil, and not only to destroy the grass among which it grew, but to injure the cattle which fed upon it. The plant was, however, prized as a remedial agent by the old herbalists. Gerarde said of it, that it would, when boiled in olive oil, afford "a most excellent greene oyle, or rather a balsam for greene wounds, comparable to oyle of St. John's wort, if it doth not far surpasse it; whose beauty is such that very many artists thought the same to be mixed with verdigrease." No doubt many of the vegetable remedies for wounds were rendered serviceable by the oil with which the juices were so frequently mingled. A preparation, called the "green oil of Charity," is in some counties still deemed a panacea; and Adder's-spear ointment, made of our fern, mingled with plantain and other herbs, is in much use in villages, and its green leaves are yet laid on wounds to heal them, serving doubtless to cool the inflammation, and also to unite the edges of a wound inflicted by a sharp instrument. Culpepper praises the juice of the leaves mingled with the distilled water of Horse-tail, as a "singular remedy" for internal wounds. Large quantities of the plant are gathered in some villages of Kent, Sussex, and Surrey, and prepared according to the old prescriptions. The barren frond of the Adder's-tongue is often forked, or even deeply lobed at the extremity, and sometimes two or three spikes of fructification may be seen on one plant; but, excepting in luxuriance of growth, the fern exhibits little variation. The French call the plant

Langue de serpent ; the Germans term it *Natterzünglein* ; and it is also the *Adderstong* of the Dutch ; the *Lingua serpentina* of the Italians ; and the *Läketunga* of the Swedes.

2. *O. lusitánicum* (Lesser Adder's-tongue).—*Barren frond* linear, or linear-lanceolate ; *fertile frond* club-shaped. This is a little plant very much resembling the Common Adder's-tongue in miniature, having the spike produced from among its bright green tiny leaves in the same manner, but not exceeding altogether two or three inches in height. It has long been known to botanists as a native of Southern Europe, but it was only discovered recently to be wild in Guernsey. Mr. George Wolsey found it among the short herbage of some rocks not far from Petit Bot Bay, on the south coast of the island. It has since been found in Guernsey growing wild in meadows, its fronds being in perfection in the latter part of January.

ORDER II.—LYCOPODIACEÆ. CLUB-MOSSES.

1. LYCOPÓDIUM (Club-moss).

1. *L. clavátum* (Common Club-moss, Stag's-horn-moss, Fox-tail, Wolf's-claw).—*Leaves* scattered, linear, curved inwards, hair pointed ; *spikes* stalked, two or three together ; *scales* egg-shaped, somewhat triangular, serrated. This Club-moss is the commonest of all the



1 COMMON CLUB MOSS.
Lycopodium clavatum
 2 INTERRUPTED C. M.
L. complanatum
 3 SAVIN LEAVED C. M.
L. atratum

4 MARSH C. M.
L. inundatum
 5 LESSER ALPINE C. M.
L. selaginoides
 6 FIR C. M.
L. selago

species. It occurs in abundance on moors and bogs, and on most of the mountains in the North of England, Wales, and Scotland. It is found in similar places in many of the northern parts of Europe and Asia, and from Canada to Pennsylvania in America. It is a fine looking plant, having stems creeping some feet in length, and bearing many branches, which are at first a little raised from the ground, but which soon become prostrate. It is sometimes very luxuriant, and Mr. Newman mentions having frequently found plants on a hill near Farnham, in Surrey, measuring ten or twelve yards in circumference. Its stems are attached to the soil at every part where they touch it by scattered yellowish roots, and its branches cross each other, so as to form a large green net-work over the soil; hence the Swedes call the plant *Matte-grass*. These roots and matted branches are of much use in binding down the loose earth on hill-sides, and on the surface of mountains, as this is continually liable to crumble from the action of the atmosphere.

The stiff wiry branches and stems of the Stag's-horn are thickly surrounded with small narrow leaves of a lanceolate form, flat and smooth, but with slightly-toothed edges. The thread-like point, which terminates each little leaf, gives a greyish tint to the otherwise bright green hue of the plant. The upright stalks, on which the spikes are placed, are destitute of leaves, but have some small leaf-like scales irregularly disposed in whorls around them, and pressed close to their surface; they are pointed, but have not the hair-like points of the leaves. The spikes of fructification, which are usually

more than an inch long, are placed each on a partial stalk about twice its length, one or two, or sometimes three, of these terminating the main stalk. They are formed of a number of triangular, egg-shaped, leaf-like bracts, or involucre. The capsules are placed in the angle formed by the bract and the stem. Each is two-valved, kidney-shaped, of a pale yellow colour, and filled with sulphur-coloured powder, single particles of which are too small to be seen by the naked eye. After these dust-like seeds have escaped, the bracts all turn downwards, and thus greatly alter the appearance of the spike.

Though this is the largest of our native *Lycopodiums*, yet in some other lands, as in the humid regions of the tropics, and in the United States of America, other species form a very conspicuous part of the herbage, not always creeping along the soil like large mosses, but standing erect, like miniature trees. Even these, however, are small in comparison with the club-mosses of older ages; for the geologist finds in the coal strata large species of similar plants, the *Lepidodendrons*, the numerous kinds of which must have formed an essential part of the vegetation of the forests of remote epochs. They have, with the ferns and horse-tails, contributed more than any other plants to furnish those beds of coal which form so important a material of our comfort, and which have supplied the immense means for the diffusion of knowledge, science, and manufacture, by means of the steam-ship, the steam-engine, and the printing-press.

Those ancient plants, the *Lepidodendrons*, have stems

of the same essential structure as those of our Club-mosses, are branched in the same way, and have similar leaves and fructification. While, however, our *Lycopodiums* are so moss-like that the older botanists described them as mosses, the fossil *Lepidodendrons* must have attained the height of trees, and had thick bases to their stems as large as the trunks of our oaks or firs. Leaves some inches long grew on their stems and branches, and under their shadow were developed those large ferns and horsetails, which are so abundant in the coal-measures, that ferns seem at one time to have formed more than three-fifths of the earth's vegetation. Doubtless they aided by their living growth the purification of the atmosphere, and how much we owe to their decomposed substance no pen can describe. If these gigantic plants are not exactly identical with the modern *Lycopodiaceæ*, yet they are so nearly so, that little difference can be discovered by those who have most patiently and skilfully investigated the plants of the coal strata.

Our native club-mosses have no very great beauty to recommend them to our notice, save the green tint which they give to the hill-side or mountain-slope, or dripping rock or waterfall. They are a peculiarly Alpine tribe of plants, *L. inundatum* being the only species frequent in the low lands of the south-east of England. The stems of all are clothed with leaves densely crowded upon them, like the tiles on a roof; an arrangement which the botanist terms imbricated. The fructification is placed in the axils of the leaves or bracts, that is, in the angles between these and the stems; and it generally grows in a cone at the top of the stem. It consists of

kidney-shaped capsules, which have from one to three valves. Two distinct substances lie inclosed in the capsules of some species. One kind is a small dust-like powder, composed of smooth grains; and the other consists of three or four globular-shaped fleshy bodies, many times as large as the powder. The powder is produced by all the species of club-moss; but the larger fleshy bodies occur but in a few, and are not found in the Stag's-horn.

The club-mosses are called in Italy *Licopodia*, and in Holland *Wolfsklaw*, and the Germans call the plant *Kolbenmos*. In Sweden, wreaths of our common species are commonly worn on festive occasions by the peasantry, and Anna Howitt, when describing the May festival at Starnberg, in Germany, says, "People arrived even faster and faster: there were parties in carriages with servants and gentlemen; there were parties on foot, the gentlemen with wreaths of Ivy or Stag's-horn moss twisted round their straw or felt hats, with gentians, cowslip, or primula flowers stuck into their button-holes." Wordsworth alludes to a similar mode of using the moss in the north of England.

"Or with that plant which in our dale
 We call Stag's horn or Fox's tail,
 Their rusty hats they trim;
 And thus, as happy as the day,
 Those shepherds wear the time away."

Mr. Matthew Arnold, too, refers to the plant:—

"Under the glittering hollies Iseult stands
 Watching her children play; their little hands
 Are busy gathering spars of quartz, and streams
 Of stag's-horn for their hats. Anon with screams

Of mad delight, they drop their spoils and bound
Among the holly clumps and broken ground,
Racing full speed, and startling in the rush
The fell-fares and the speckled missel-thrush
Out of their glossy covert. But when now
Their cheeks were flushed, and over each hot brow
Under the feathered hats of the sweet pair
In blinding masses showered the golden hair,
Then Iseult called them to her."

Very pretty ornaments were, in former days, made of the club-moss for summer stoves, and English ladies seem to have worn it occasionally as a head-dress. Gerarde says, "Some have made hatbands, girdles, and also bands to tie such things as they have before gathered, for the which purpose it most fitly serveth." His description of the plant is very graphic: "Some pieces thereof are six or eight feet long, consisting, as it were, of many hairy leaves, set upon a tough string, very close couched, and compact together; from which are also sent forth certaine other branches, like the first; in sundrie places there be sent downe fine little strings, which serve instead of roots, wherewith it is fastened to the upper part of the earth, and taketh hold likewise upon such things as grow next unto it. There spring also from the branches bare and naked stalks, on which grow certaine eares, as it were, like the catkins or blowings of the hasell-tree, in shape like a little club, or the reed-mace, saving that it is much lesser, and of a yellowish-white colour, very much resembling the clawe of a wolfe; whereof it hath its name." He adds, however, that the "knobby catkins are altogether barren, and bring forth neither seede nor flowre."

The astringent properties of this Club-moss were greatly praised by the herbalists, and the plant was used for a variety of disorders. John Ray mentions that a decoction of the club-moss was taken in that dreadful disease, the *Plica Polonica*, hence the plant had the old name of *Plicaria*; but it is little used medicinally now, except by the people of the Orkney Islands, who administer it in some diseases of their cattle. The powdery dust or pollen is of a very inflammable nature, and was formerly called vegetable sulphur, and collected for fireworks, and to represent lightning at theatres. It flashes when thrown into a flame, and it was brought in large quantities into this country from Sweden and Germany, until some preparation of rosin superseded its use in representations of this kind. It seems almost impossible to moisten this powder with water, for, when laid on the surface of liquid in a basin, the finger may be plunged to the bottom of the vessel without being wetted. This substance has also been used for ameliorating wines. Several of the species of the Club-moss might remind one of a miniature tree; and Mr. Fortune relates, in his "Wanderings in China," an amusing anecdote referring to a curious dwarf species which he found on the hills of Hong Kong. He dug up this plant, and carried it with him into the town. The Chinese to whom he showed it was quite in a rapture of delight at its appearance, and all the servants and coolies on the spot gathered round the basket to admire this curious little plant. As Mr. Fortune had never seen them express so much admiration except on one occasion, when he had shown them a cactus called Old Man,

he naturally inquired into the cause of their satisfaction at the appearance of the *Lycopodium*. They replied in Canton English, "Oh! he too muchin handsome; he grow only a leete and a leete every year, and suppose he be one hundred year oula, he only so high," holding up their hands an inch or two higher than the club-moss. "This little plant," says Mr. Fortune, "is very pretty, and naturally takes the form of a dwarf tree in miniature, which was doubtless the reason of its being so much a favourite with the Chinese, who think that a tree attains its greatest beauty when its growth is stunted by their ingenuity."

2. *L. annótinum* (Interrupted Club-moss).—*Leaves* scattered, tipped with a spine, and edged with small serratures; *spikes* without stalks, terminal; *scales* roundish, with a tapering point, membranous and jagged. This plant is so local in growth that it is little known in England, though found in Charnwood Forest in Leicestershire, at Rumworth Moss in Lancashire, Teesdale in Durham, Bowfell in Cumberland, and Langdale in Westmoreland. It grows also on Glyder Vawr on Snowdon, though when seen in 1836, by Mr. Wilson, it had become reduced to a solitary root, and was without fructification. In some districts of Scotland it is very abundant, as it is in many mountainous regions, especially in the north of Europe, growing on wild open places, at a great elevation, or in pine woods; it is also plentiful in some parts of North America. Mr. Watson describes it as pretty frequent between 500 and 850 yards on the mountains of Clova and the west of Aberdeenshire; but adds, "I have never seen it above 900 yards, or below 500."

This Club-moss receives its specific name from the somewhat jointed or interrupted appearance of its branches, which arises from the leaves being at intervals smaller and less spreading. The creeping stem sends out, here and there, several upright branches, from one to four inches long. The length of these is increased every year, and the points of these annual growths are very visible, giving to the stem its interrupted appearance. These upright branches are often again divided, and the spike is usually on the sixth or seventh joint of the branch when fertile, but some branches are barren. This is a large species, sometimes growing even to the height of a foot from the ground, and its narrow leaves, which spread out on all sides of the stems, are arranged in five rows, which, however, are not very distinctly marked. The little saw-edged and stiffly-pointed leaves are without stalks; they are of a yellowish green colour, and have each a distinct mid-rib. On the older parts of the stem the leaves not only spread more than on those newly grown, but they sometimes turn downwards.

The spike of fructification is at the top of the leafy branch, without a partial stalk, and about an inch long. It is oblong, and the bracts or scales upon it are nearly round, with a long narrow point, and a jagged membranous margin. When the seeds are matured and burst from their capsules, these scale-like leaves turn downwards.

3. *L. alpinum* (Savin-leaved Club-moss). — *Leaves* overlapping each other, in four rows, acute, keeled, entire; *spikes* terminal; *branches* erect and clustered.

This is a pretty evergreen species, of a much brighter tint than any other of our Club-mosses. It grows in great abundance on the grassy slopes in the hilly and mountainous districts of Scotland, large tracts of ground being rendered of a rich green by its trailing stems. It occurs in England on the mountains of Yorkshire and Cumberland, and grows in a few Welsh localities. It is found at the elevation of a thousand yards on Carnedd David in Carnarvonshire; and on all the northern mountainous regions of Europe, as in Lapland, Sweden, Norway, Russia, Germany, and Switzerland, it is a common plant, as it also is on the high lands of Canada. Its English name was given from the resemblance of its branches, with the leaves pressed closely around them, to those of the Savine (*Juniperus Sabina*). The roots are very strong and wiry, and are formed of branched, downy, stout fibres. The stem creeps close to the surface of the ground, and bears, at irregular intervals, several upright branches, which are repeatedly divided in a forked manner, forming a close tuft, level at the top, and somewhat fan-shaped. The creeping stem, which is sometimes four feet long, has few leaves; but the smaller branches of the erect stems have small leaves pressed closely round them. These are lanceolate and pointed, the edges without serratures, and they are somewhat boat-shaped, being hollowed out in front where they fit the stem. The leaves overlap each other, and are in four rows, the branches having a somewhat square form. Those branches bearing the spikes of fructification are rather longer than the barren ones, and twice forked. The scales are membranaceous, flat,

broad at the base, tapering upwards and pointed, and placed very closely together. Between each scale and the stem lies a pale yellow, kidney-shaped capsule, filled with minute, yellowish spores. When these are dispersed the scales turn downwards, and the spike bends down into a semicircular form. This plant is said by Sir W. J. Hooker to be used in several countries to dye woollen cloths of a yellow colour. In Ireland, cloth is commonly dyed by boiling it with the *Lycopodium*, and with the leaves of the Bog Whortleberry. The flavour of this Savin-leaved moss is bitter and somewhat aromatic.

4. *L. inundatum* (Marsh Club-moss).—*Stem* creeping ; *branches* simple ; *leaves* and *scales* linear, acute, curved upwards ; *spikes* solitary. Though this plant is rare in the midland and northern counties of England, it is by no means so in the south. It may often be seen on moist heathy moors, especially where the surface has been pared for turf-growing, amid gorse and broom, not usually forming a mossy tract of wide extent, but occurring here and there, in patches, all over the bog. It is not so conspicuous a plant as to be noticed by many except botanists. Its habit is prostrate ; the stem, which is two or three inches long, being closely pressed to the surface of the soil, and attached to it by a few short, but stout, tough, and branched fibres. The branches are simple, the barren ones lying along the ground ; the fertile ones upright. All parts of the plant are thickly covered with narrow leaves, without serratures, but acutely pointed ; those leaves which are on the barren stems curving upwards. This plant, during

the period of its growth, lengthens at the point, the other end gradually decaying. The winter, which stops the growth, does not arrest the decay, so that little is left of the stem to produce the next year's foliage, while the withered remains of summer look like a number of black marks or lines among the short grass of the heath in spring, resembling a plant which has been scorched and blackened by fire. The green portion of the club-moss is very small at this season, for many plants perish wholly in the winter, and it is only the vigorous ones which may now be seen putting forth their new leaves. The spikes of fructification are produced in autumn, each being at the top of a footstalk rather longer than itself, and nearly of the same thickness; and, as well as the spike, being surrounded by green linear scales rather larger at the base, and sometimes having one or two minute teeth at the sides. The capsules lie between the scales and the stem; they are of a pale yellowish-green, and filled with yellow dust-like powder.

5. *L. selaginoides* (Prickly Club-moss, or Mountain Moss).—*Stems* procumbent; *leaves* lanceolate, acute; *spikes* solitary; *scales* egg-shaped. This plant is not in any degree prickly in the true sense of the word, and, indeed, its smaller degree of rigidity renders it less so to the touch than most of the species. Its stem is creeping, two or three inches long, very weak and slender, lying close to the ground, and repeatedly branched. The whole plant is covered with lanceolate delicate leaves, their margins beset with small spiny teeth. The fertile branches differ from the winding barren ones in their erect growth, the barren ones being quite trailing.

The former have also their leaves longer and more pressed to the stalk, and the terminal spike of fructification is about an inch long. This is thickly covered with scales, pressed close to its surface, and having their edges jagged with spiny teeth. This is the only British species bearing both the kinds of fructification alluded to in the description of the genus. The lower scales have the pale yellow capsules seated at their base, containing three or four large grains, equal in size to the seeds of many flowering plants; and the capsules of the upper ones contain the dust-like powder which forms the seed of the Lycopodiums in general. The spike is annual, decaying immediately after the dispersion of its contents, and both kinds of fructification appear to be true seeds of the plant.

6. *L. Selágo* (Fir Club-moss,—Upright Fir-moss).—*Stem* erect, with forked branches; *leaves* in eight rows; *fructification* axillary. This is among our most generally distributed Club-mosses, and is more frequent in this kingdom than any species except the common Club-moss. It often grows on the summits of lofty mountains, as on Snowdon, and on the “dark brow of the mighty Helvellyn;” yet it is a common plant too on the heathy lands of lower districts. It is a moss of old repute among the Highlanders, Selágo being the ancient name of some succulent plant, and derived, according to De Theis, from the Celtic *sel*, sight, and *jach*, salutary, because useful in complaints of the eyes. From the same root, *sel*, was formed *Selma*, the name of Fingal’s Hall, which corresponds to the modern name Belle-vue. The plant is still used in the Highlands, where it is

made into an irritating ointment, which is rubbed on the eyelids with good effect in some diseases of the eye, and an infusion of this Club-moss is considered by the Highlanders a valuable medicine for several disorders; but it should be used with caution, for its properties are powerful, and too large a dose causes giddiness, and even convulsions, while it is sufficiently caustic to serve as a blister to the skin. It is also used in Skye, and some other places, instead of alum, to fix the dye; and Linnæus mentions that it is employed by the Swedes to destroy vermin.

The Fir Club-moss is not difficult of recognition, even to the unpractised botanist. It usually grows, at first, in a much more erect position than any other native species, though, after a time, it becomes in some measure trailing. Its fructification, too, differs from that of the others, not being arranged in terminal catkin-like spikes, but being produced in the axils of the leaves along the upper branches of the stem. The stems are from three to six inches in height; the plant attaining occasionally, in sheltered situations, a still greater size. One stem only issues from the root, and this is branched two or three times in a forked manner, till it forms a cluster, which is flat at the top, and has from six to ten alternate divisions. The branches are very tough and rigid, their thickly crowded leaves overlapping each other. These little lanceolate leaves are acute and glossy, smooth on the edges, very stiff, and of a rich green colour.

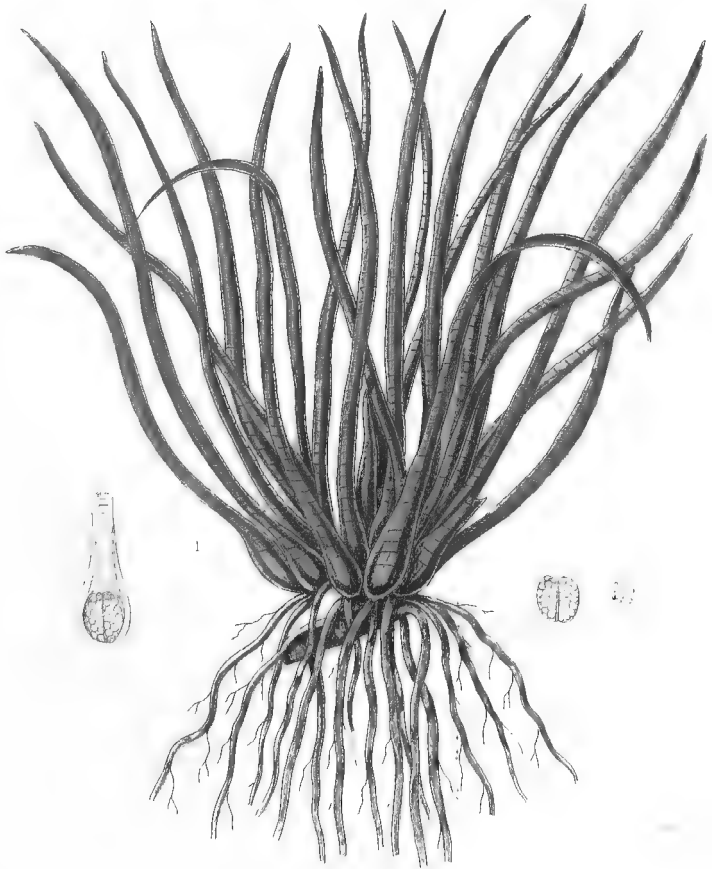
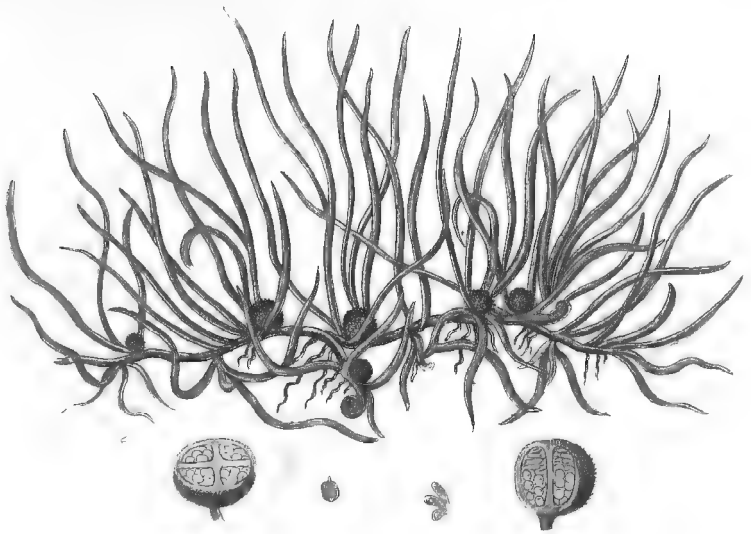
The capsules of fructification are rather large, kidney-shaped, two-valved, and filled with pale yellow minute

dust-like seeds. The plant likewise forms buds, and seems chiefly propagated by their means. These curious little stalked buds consist of three or four egg-shaped leaves of different sizes, placed in the axils of the leaves, chiefly towards the summits of the branches.

ORDER III. MARSILACEÆ.—PEPPERWORTS.

1. ISOÉTES (Quillwort).

1. *I. lacustris* (European Quillwort or Merlin's Grass). —*Leaves* awl-shaped, bluntly four-sided, with four-jointed tubes. The Quillworts are aquatic plants, and our only native species of the genus is abundant at the bottoms of lakes and ponds in some hilly districts. The plant renders such a spot very beautiful, as, when seen through the crystal waters, it looks like a meadow of the richest green hue, and, as it is perennial, it adorns them at all times of the year. It occurs in lakes, reservoirs of water, and on marshes and other inundated places in the north of England and Wales, and is frequent in some of the Scottish lakes. Mr. Knapp, remarking on the soil of the Highlands, says that a considerable portion of it is formed chiefly by the granite of rocks, the felspar, quartz and mica having been disintegrated by the elements, and mingled with a little vegetable earth; and that the roots of plants and the lower leaves are generally sprinkled with glittering specks of mica. "So general," says this writer, "is the diffusion of this micaceous earth through Scotland, that we have found the



1 EUROPEAN QUILLWORT
Isoetes lacustris
 CIGLING HILL WORT
Isoetes macrospora

roots of *Isoetes lacustris*, dugged up from the bottom of Loch Lomond, partaking of this tribute from the mountains, though in an inferior degree to a truly Alpine plant.”

The Quillwort occurs in the marshy lands and waters of several parts of Europe, and seems more abundant in Sweden and Denmark than elsewhere. In France the plant is called *L'Isote des étangs*; and in Germany *Der Brachsemfarrn*. Mr. Gardner, when in Brazil, collected from a marsh by the side of a river specimens of a Quillwort which appeared to be identical with the British species, and adds, “The sight of this plant recalled pleasing recollections of long past times, and I could not refrain from indulging in a lengthened train of reflection, which ended by comparing it with myself—a stranger in a strange land—and associated with still stranger companions.” The Quillwort occurs also in the northern parts of North America.

To those unacquainted with the plant, its long quill-like leaves would seem, when growing in the water, to be those of some kind of grass, which by its ready growth was quite filling up the pool. It abounds in some of the lakes of Denbighshire, and in those of Llanberis; and at Rydal and the other Westmoreland lakes, and in waters near Coxwold in Yorkshire, as well as at Prestwick Carr in Northumberland, it has long been known and admired for the beauty and greenness which it gives to the still waters.

At the base of the long awl-shaped leaves of this singular plant is a roundish tuber, which is brown and spongy on the outside, but is, within, white and firm.

From these tubers descend a number of long, tubular, somewhat pellucid roots, which are sometimes forked at their extremities. Some botanists have eaten these tubers when young, and consider them to be perfectly innocuous, though having an earthy flavour. The leaves, which arise from the crown of the tuber, are of a somewhat olive-green colour, very brittle, and from four to seven inches long; they are dilated at the base, and clasp around the inner leaves, and their margin is membranaceous. The upper part of the leaf is nearly round, and formed of four hollow tubes, separated from each other by the transverse partitions, which give to the plant its jointed appearance. They taper at the upper part into a sharp point. It is within these broad bases of the leaves, that the fructification lies concealed. The capsules are round and hard. Some of them contain roundish bodies or seeds, which finally open into three triangular valves. The other set of capsules contains extremely minute pollen-like grains, which, however, have, though so much smaller, the same form and character as the larger seeds.

There are two forms of this Quillwort found in our waters; one having leaves slender, erect, and densely tufted, the other having them thicker, shorter, and more spreading: but whether these are distinct species, or whether their variation is referable to some accidental circumstance in the conditions of their growth, seems uncertain.

The Quillwort cannot always be easily gathered by botanists, though in some ponds fish root it up, and leave portions of it at the edge of the water. They are

said to feed upon the plant. It is also most eagerly devoured by cattle when placed within their reach, and is believed to be very nutritious food for them.

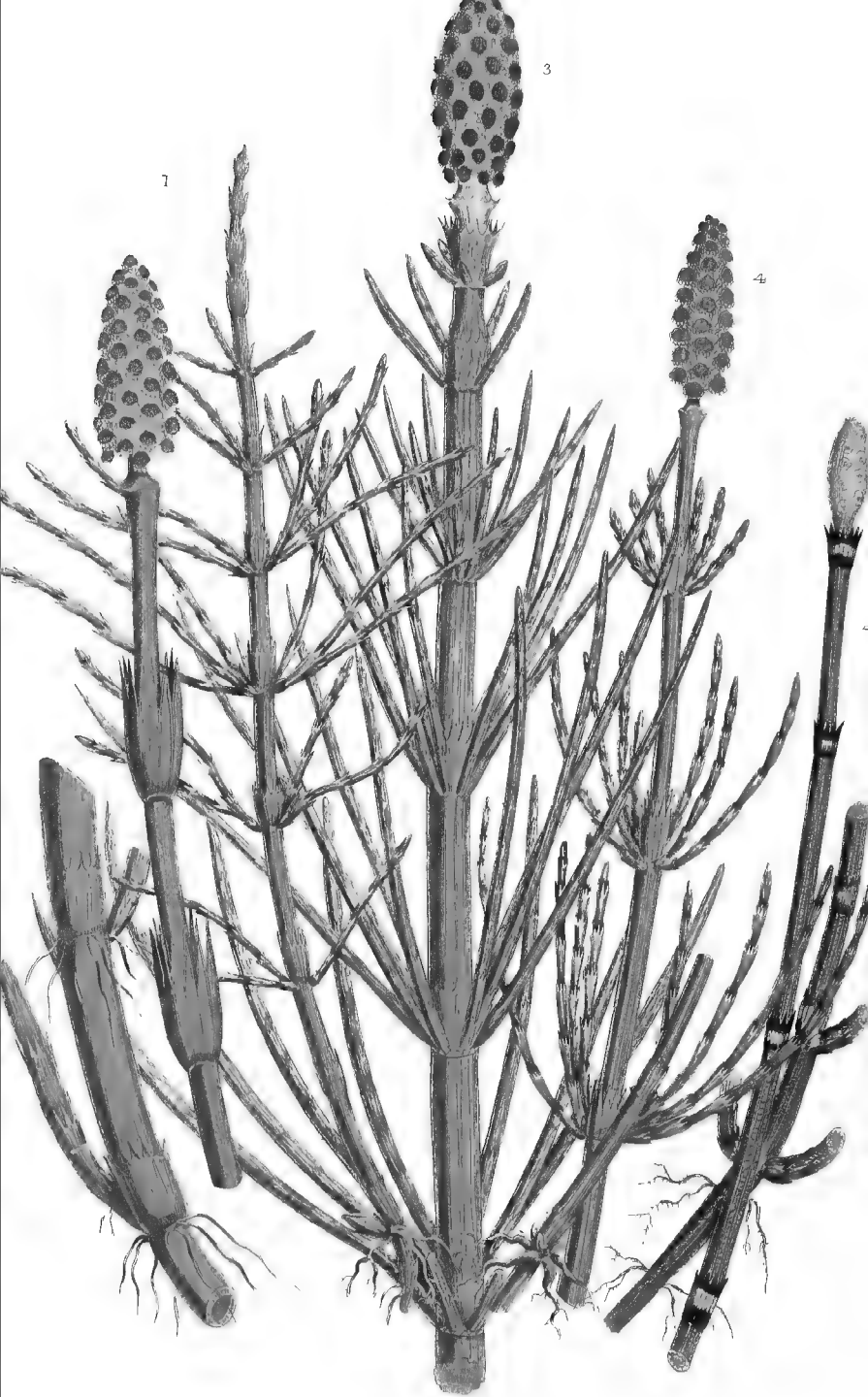
2. PILULÁRIA (Pillwort).

1. *P. globulífera* (Creeping Pillwort or Pepper Grass).—*Leaves* thread-like; *stem* creeping; *capsules* slightly stalked, roundish, and hairy. This plant winds along the grass of wet meadows, or in the mud at the margins of lakes or pools, making little show on the moist lands when inundated with the winter's rains, but lying during summer more or less exposed to view. It is, however, easily overlooked, and was long unnoticed by several of our most eminent botanists, though it grew in abundance in the neighbourhoods in which they resided. The Rev. W. T. Bree found it at Coleshill Pool, in Warwickshire, in so great plenty, that he says he has seen it covering the shore to a great extent; yet Mr. Purton remarked, some years since, "This must be the rarest of our indigenous plants, as it is not mentioned in the Cambridge, Oxford, or Bedford Floras; nor is it noticed as a Warwickshire plant in that accurate and laborious work, Dr. Withering's 'Arrangement.'" It is now known to be not uncommon. It grows on the marshes near Penzance in Cornwall; about Polwhele, Devonshire; at Maiden Down in Somersetshire; near Warminster in Wiltshire; on Esher Common; at Roehampton, Surrey, and a large number of well-known localities; being distributed here and there over most parts of the kingdom. It is also familiar to botanists throughout the

greater part of Europe. It is called in France, *La Pilu-laire*; and in Germany, *Pillenfarren*. It is the *Pilularia* of the Italians and Spaniards; and the *Pillenkruid* of the Dutch.

This plant is never found in deep water, but forms verdant masses on places occasionally overflowed. Its long entangling stem is hollow, and not larger than a stout thread; and its younger portion is invested with small scale-like hairs. It is occasionally branched; and issuing from it at intervals of half an inch or more are small tufts of slender roots, which descend into the soft soil. Three or four fibres are in each tuft, and immediately above each set of fibres rises, from the upper part of the stem, a tuft of from two to six thread-like leaves. These leaves are hollow, bristle-like, about two inches long, and bright green. They are divided into cells, and, when young, are rolled up like the leafy ferns: they unroll gradually, at first hanging down like a shepherd's crook, but by degrees they become erect.

The capsules containing the spores are placed on short stalks just at the base of the leaves, in the angle formed by the leaf and stem. They are about the size of a peppercorn, and closely covered with jointed hairs of a light brown colour. They consist of four cells, and, when quite ripe, they split open from the upper part into quarters, which still remain on the little stalk. The spores are placed along the centre of the valves, forming four rows; and the lower part is occupied by granular bodies, and the upper by pollen-like powder. The larger grains are believed to be perfected spores, and the smaller to be spores in their imperfect condition.



1. CORN HORSETAIL
Equisetum arvense
 BOUCHÉ &
 P. GUYOT

3. SMOOTH NARED E
Equisetum limosum

4. MARSH E

ORDER IV. EQUISETACEÆ.—HORSETAILS.

1. EQUISETUM (Horsetail).

1. *E. arvense* (Cornfield Horsetail).—*Barren stems* with few furrows, slightly rough; *branches* rough, with three or four simple angles; *fertile stem* unbranched, with few loose distant sheaths. This is by far the commonest of our native Horsetails, some of which are known to all who observe the plants which grow wild. These plants are commonly called Jointed Ferns, or Leafless Ferns, though they have not a very obvious affinity with the leafy species commonly recognised as ferns. They are destitute of any green expansions; they are jointed at regular intervals, the joints or knots being solid, and surrounded by membranaceous toothed sheaths, while the portions between the joints are hollow. Their branches are rigid and whorled, and the fructification placed in cone-like heads made of scales, to the lower face of which the seed-cases are attached in a row round the margin.

The stem is chiefly composed of cellular matter, but towards the outer portion there is a layer of woody fibre. The cuticle, or thin skin, which covers the Horsetails, is in all the species regularly and beautifully decked with particles of flint, arranged in lines and other forms, often not the five-hundredth part of an inch in diameter. These particles were discovered by Dr. Brewster to lie, in the greater number of cases, in simple straight lines; but others are grouped into oval forms like the beads of

a necklace, and connected together by a minute chain of particles.

The Horsetails are readily distinguished by their leafless stems and the hollow angular channelled branches which are in most cases whorled around them. The different species are not, however, always very readily discriminated, several of these being very similar, and the structure of the sheaths around the joints, and the ridges on the surface of the stems, often form the chief features of their distinction.

The Corn-field Horsetail is not, like most of the species, peculiar to marshy soils, but springs up everywhere, and is not only an annoyance to the farmer, who finds it difficult of eradication from his corn or pasture lands, but is also often a troublesome intruder into the garden. Most of us have amused ourselves in childhood by giving a sudden pull to the stem or branch, and thus separating it into small portions, leaving the sheath in which each portion was enveloped disclosed to view, and needing no microscope by which to discover its little sharp membranous teeth. This species has a long creeping root-stem, which is hollow, very much branched, and jointed like the stem which rises above the ground; and it throws out at each joint a whorl of tough fibrous roots. It has two kinds of fronds, the one fertile, and without branches; the other barren, and surrounded by the green whorls of rigid branches.

The fertile stem rises above ground in March, and is matured by April or May, at which season the barren stems may often be seen lately emerged from the earth, arrayed in the most delicate green colour, and very brittle.

When the fertile stem has attained maturity, it is, when growing on soils suitable to it, about eight or ten inches high, but it is more frequently about half that height. It is hollow, succulent, pale brown, without furrows, and divided at intervals into joints; the length of the spaces between the joints is very variable, the joints at the lower part of the stem being usually closer together than at the upper. The sheaths are yellowish at the base, and have about ten dark brown or black slender teeth, with very sharp points. The upper sheaths are longer than the lower ones, and the black teeth are often tipped with white, and have a white clear margin.

The cone-like fructification is at the top of the stem, and is about an inch long, tapering upwards, terminating in a blunt point, and standing on a distinct foot-stalk about half its length. It is of a pale, or sometimes of a reddish brown colour. The capsules are attached to round scales, and arranged in whorls around it. The number of scales varies, but they are not so numerous in this species as in some others. In May, when the catkin is matured, and sheds its numerous fine green spores, these, like the spores of other species, are, by the aid of the microscope, seen to be surrounded by delicate threads, which uncoil with such curious movements, that when looking at them we can scarcely persuade ourselves that the motion is purely mechanical, and is not the result of animal life. The oblong capsules, when ripe, open by two valves, and discharge their powder-like spores or seeds.

The barren frond of this *Equisetum* is a very different looking plant, and is handsomer than the fertile one.

When first it rises, it seems merely a hollow pointed stem, for its branches are not then seen. It is, however, when fully grown, two, or two and a half feet high, and has whorls of long, green, rigid, and four-angled branches, either half way down, or throughout its whole length, and two or more fronds rising from the same part of the creeping stem. In shady situations, as when overtopped by the rising corn, these deep green branches become very long and scattered; but in the drooping attitude which they assume, and in the close growth of ordinary specimens, they are thick enough to remind us of the tail of a horse, and in some cases they are again branched. The stem is slightly marked with about ten or a dozen furrows, and both stem and branches are rough with the minute particles of flint with which they are coated. The sheaths are furrowed, and their wedge-shaped teeth have often a white thin line round the margin.

This rigid plant is a very unwelcome intruder on the pasture land, as cattle, except when pressed by hunger, leave it untouched, and when eaten it is said in some instances to have proved very injurious, though sheep and horses seem to eat it with impunity. It sometimes runs all over the land, and is most difficult of extirpation. It is equally common in other parts of Europe, as well as in Asia and North America. It is in France called *Prêle*; and this, or some very similar species, is the *Kannenkraut* of the Germans. The Dutch call some Common Horse-tail *Akkerig paardestaart*; and these plants are the *Equiseto* of the Italians and Spaniards, while several of the species are commonly known in

Cochin-China by the name of *Mahoang*, and are called *Chwostch* by the Russians. The Horsetails are found in every latitude from the equator to the poles, abounding in the tropical parts of America and Asia, and at the Cape of Good Hope, but becoming rare as we advance towards the polar circles.

Our native species were, by the old writers, termed Shave-grasses, and as this Corn Horsetail has much of the roughness given by the particles of flint, and as it is the most frequent species, it is probably the plant sold in Queen Elizabeth's time by the "Herbe-women of Chepeside," under the names of Shave-grass and Pewterwort, or *Vitraria*, though it would doubtless have been considered inferior to the *E. hyemále*, which Gerarde calls "the small and naked Shave-grass, wherewith fletchers and combe-makers doe rub and polish their worke." It was very serviceable in the kitchens of olden times, and was doubtless used for cleaning the wooden spoons and platters; the "breen" of our forefathers, as well as the "garnish" of pewter. Although in early days the tables of the opulent were served with silver, yet in humbler households wooden articles were commonly used at the daily meals, until the fifteenth and sixteenth century, when pewter came into general use among the higher classes; though not until the beginning of the eighteenth century were the articles made from it sufficiently cheap to admit of their being seen at any save the rich man's table. Harrison, referring to this in 1580, says that in some places "beyond the sea, a garnish of good flat pewter of an ordinarie making is esteemed almost so pretious as the like num-

ber of vessels that are made of silver, and in maner no less desired amongst the great Estates, whose workmen are nothing so skilful in that trade as ours ;” and the prices which he gives of the various articles prove their great costliness. The Shave-grasses served for cleaning either kind of ware, and this Corn Horsetail is still used by the dairy-maids in Yorkshire for cleansing wooden milk-pails ; while the larger and less frequent plant, the Rough Horsetail, has long been known to our polishers of marble and other similar substances, and, under the name of Dutch Rush, has been imported in large quantities from Holland for their use.

2. *E. hyemále* (Rough Horsetail, Shave-grass, Dutch Rush).—*Stem* erect, rough, strongly marked with lines ; *sheaths* short, pressed close to the stem ; *teeth* falling off. This species has not, like the last, two distinct kinds of frond, those which bear the catkins being exactly, in all other respects, like those which are barren. It has none of the whorled tail-like branches around the main stem, though now and then a single branch is produced from the base of one of its sheaths. Its roots are strong and black, and its creeping underground stem extends to a great distance, and is jointed and branched by the whorled fibrous roots. The main stem of the frond is usually erect, two or three feet high, hollow, tapering towards the summit, and marked with from fourteen to twenty ridges. These ridges render the stem so rough to the touch that they are like a file, and their crystals of flint display, under the microscope, the most exquisitely beautiful arrangement. They abound both in the inner and outer cuticle, and form a complete framework

to the plant. By some chemical process, the silica may be wholly freed from the vegetable portion, and the entire form of the stem and branches of the Horsetails preserved in beautiful clear crystal; and when the vegetable remains are washed after the process they are found to be quite free from a single particle of flint. The sheaths of this species clasp the stem quite closely, and are marked, though less strongly, with the same number of ridges. Black membranous bristle-shaped teeth, equal also in number to the ridges, terminate the sheath, soon disappearing, and leaving its margin indented with roundish notches, though the teeth of the sheath just beneath the cone remain. The teeth, which are at first pale green, become afterwards black; they are pale in the middle, and have a deep black ring both at the top and base of the sheath.

The catkin of this plant is small, and of a dark colour, and usually terminates the deep green stem; or, if placed at the side, is never at any great distance from its summit. The scales, which are from forty to fifty in number, are marked with two or three lines.

This is not a common species, and is apparently very local in those counties in which it occurs, while it is almost unknown in the midland and southern parts of England. It has been found at Hawthorndean, Durham; in the neighbourhood of Newcastle; in Cumberland and Westmoreland; near Scarborough, in Yorkshire, and several other northern localities; also in South Kent, and in several places in Ireland, Wales, and Scotland. It is common in many moist lands and woods in some continental countries, as in Germany

and Switzerland. In Holland it grows in plenty, and attains great luxuriance on the numerous embankments and by the sides of canals; and the large quantity of the plant brought annually to the London market has led many botanists to think that its culture along our sandy coasts would be of value in a commercial point of view, and that at the same time it would form a firm soil at the margin of the waters. Mr. Francis, who observes that on such places it would grow rapidly and luxuriantly, and would yield a considerable profit, adds, "The Dutch are well acquainted with the value of its long and matted roots in restraining the wasting effects of the ocean, which would soon undermine their dykes, were it not for the *Equisétum hyemále* which is planted upon them." Either this, or some other species, was also highly commended for medicinal virtues, and the expressed juice put into the nostrils, and applied at the same time on the neck, was said to stop the bleeding of the nose. The fresh juice is also used externally as a remedy for wounds.

3. *E. limósum* (Water Horse-tail, or Smooth Naked Horse-tail).—*Stem* erect, smooth, naked, or branched; *sheaths* shut, closely pressed to the stem; *teeth* numerous. Many lovers of stream-sides, of the music of rippling waters, and the beauty of wild flowers, have seen this plant fringing the stream, and mingling with its Forget-me-nots, Willow herbs, and Golden-flag flowers. It is not unfrequent, and is found occasionally in running streams, but is more often to be seen in pools and ditches, its stems standing up in the water or around it, sometimes a yard high. The stem of the Smooth

Horse-tail is marked with distinct ribs, but they are not so raised as to render it harsh to the touch, and their flinty coat is thinner, and formed of more delicate particles than that of some other species. Some of the stems are quite without branches; others have, about the middle, irregular whorls of branches; sometimes there is about half a whorl here and there; in other cases there is a single branch; so that the plant exhibits the most irregular and scattered mode of branching; but the branches are never long and spreading like those of the Corn Horse-tail, nor are they ever rough. The presence of the catkin on the fertile stem forms the only difference between it and the barren one. This is terminal on the main stem, or more frequently on some of the uppermost branches, and it is bluntly egg-shaped. The scales, which are more than a hundred in number, are black, and the capsules are pale coloured. The numerously toothed sheaths are very short.

This plant is so much less flinty in its nature than either of the other species, that it is better fitted for fodder for cattle in this country, though it does not seem to be relished by them while in a green state; but Linnæus says, that in Sweden it is cut up for their food, and that the rein-deer feed on it when dried, though they will not eat common hay. Mr. Knapp, who, in his "Journal of a Naturalist," remarks that it is a favourite food of the common water-rat, adds: "A large stagnant piece of water in an inland county, with which I was intimately acquainted, and which I very frequently visited for many years of my life, was one summer suddenly infested with an astonishing number of the short-tailed water-rat, none

of which had previously existed there. Its vegetation was the common products of such places, excepting that the larger portion of it was densely covered with its usual crop, the Smooth Horse-tail. This constituted the food of these creatures, and the noise made by their champing it we could distinctly hear in the evening at many yards' distance."

4. *E. Mackáyi* (Mackay's Rough Horse-tail, or Long-stemmed Horse-tail).—*Stem* simple, or very slightly branched, rough; *sheaths* close; *teeth* slender, not falling off. This plant, which occurs in mountain glens in Scotland, and in the north of Ireland, is a slender and almost unbranched species, the fertile and barren fronds being alike, save that the former bears a cone. The stems of the fronds arise from a branched rhizome, and are erect, and from two to four feet high. When they happen to be branched the branches are few, and are chiefly on the lower part of one or two of the side stems. The stem is deeply furrowed, having a double row of raised points along the edges, and the furrows vary from eight to fourteen in number. The sheaths, which clasp the stems very closely, are, like them, marked with lines, and terminate with the same number of teeth. These are very narrow, awl-shaped, black, with thin white margins. The black oblong catkin has a little point at the top, and its scales are about thirty in number.

This plant was first discovered in 1833 by two botanists, Dr. Mackay and Mr. Whitla, in Colin Glen, near Belfast. It has since been found in the Den of Airly, in Forfarshire; and on the banks of the Dee, in

Aberdeenshire; as well as at Calton Glen, in Antrim; and Ballyharrigan Glen, Londonderry.

5. *E. palústre* (Marsh Horse-tail).—*Stem* erect, with numerous branches, rough; *sheaths* long and loose; *teeth* long and few. This is a very common species, growing often in great abundance near standing water, and covering places where water has been drained, or growing among the wild flowers of the bog, and reminding us of Clare's lines:—

“Here Horse-tail round the water's edge
 In bushy tufts is spread,
 With rush and cutting leaves of sedge
 That children learn to dread;
 Its leaves like razors, mingling there,
 Oft make the youngster turn,
 Leaving his rushes in despair,
 A wounded hand to mourn.”

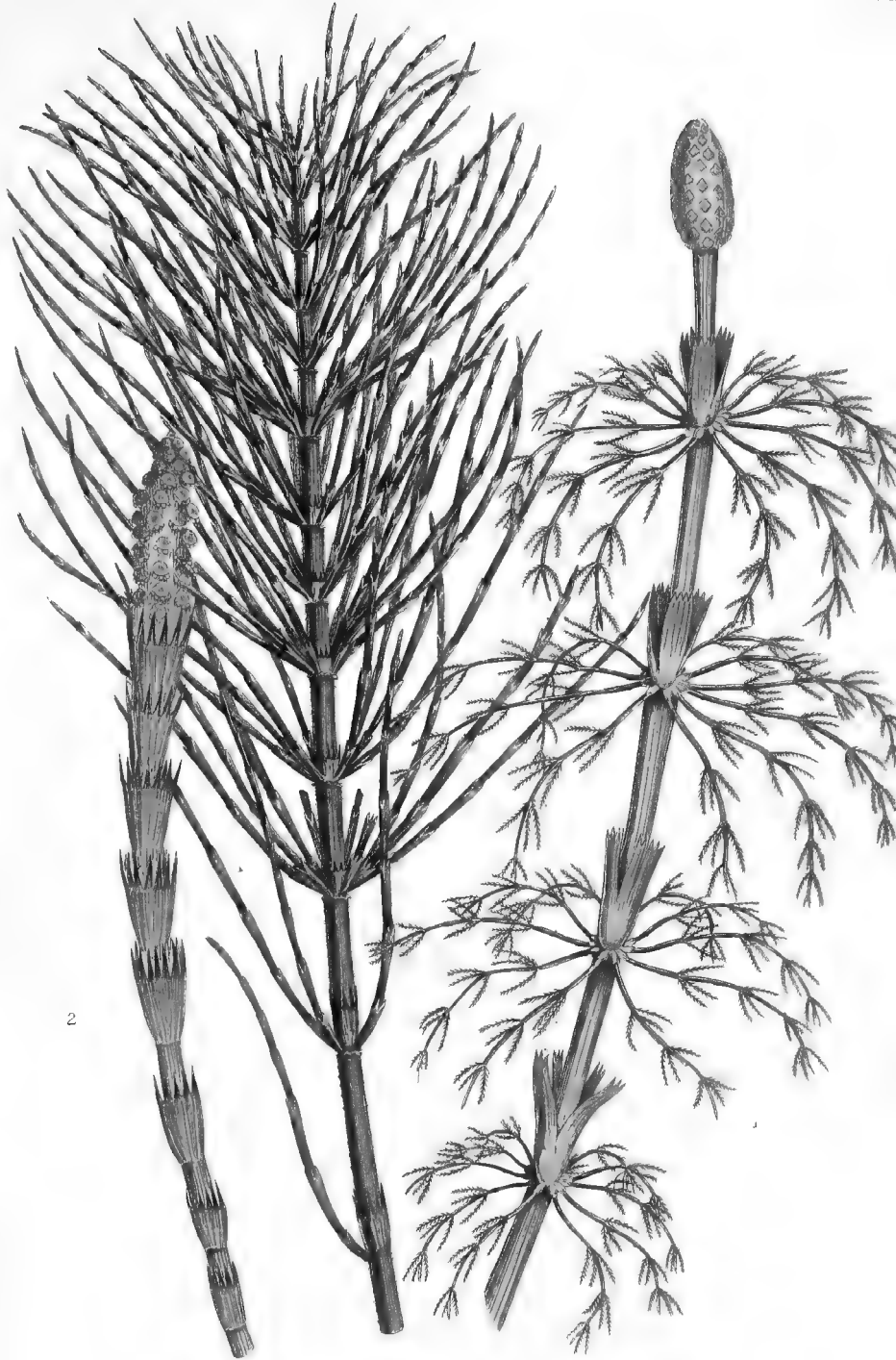
The creeping underground stem of this species is nearly as large as the stem of the frond, black, and smooth, and has tufts of black fibres descending from it. The main stem of the frond is perfectly erect, about fifteen inches high, with prominent ribs and deep furrows, about eight in number, rough to the touch, though less so than in some of the species, and whorled throughout, except at the base, with numerous branches. The joints are invested with nearly cylindrical sheaths, which, being much larger than the stem, loosely clasp it, some of the upper ones being nearly twice as large as the stem itself. The number of marginal teeth on the sheath is the same as that of the ribs on the stem. They are light coloured, with black or light brown tips, and membranous margins. The fertile and barren

stems are alike, their branches greatly varying in length in different circumstances. The cone of fructification is slender, about an inch long, and standing on a foot-stalk. The whorls of scales are, at an early period, crowded into a black mass, but after a while are quite separated, showing the white capsules attached to the margin. In June, when these catkins are fully ripened, they become of a brown colour, and, after discharging the spores, wither away; but the bright green whorls of rigid branches remain green till late in the autumn.

There are some singular varieties of this plant, which, however, appear to be dependent on soil and situation, and not to become permanent. One form has been termed *polystachion*. Instead of the one cone usually placed, in the ordinary form of the Horse-tail, on the central stem, several of the branches of the two upper whorls terminate in cones, which are usually darker coloured than the commoner cone, more compact in form, and appearing later in the season.

Another, and rarer variety, called *nudum*, is very much smaller than the ordinary plant, scarcely more than three or four inches high, having the lower part of the stem prostrate, and the branches only about the base of its stem. It is apparently but a dwarfed condition of the plant, caused by want of nutriment. The form termed *alpinum* is very similar, and both are probably the result of growth on a soil less favourable to luxuriance, or of having been cropped by animals.

6. *E. sylvaticum* (Wood Horse-tail). — *Stem* erect, branches compound, bending downwards; *sheaths* loose;



2

1. BRANCHED WOOD HORSETAIL, *Equisetum sylvaticum*
 2. BLUNT TOPPED II *E. umbrosum*

catkin blunt. This pretty species differs so much from our other Horse-tails, that it is readily distinguished even at a glance. Its pale green fronds remind one of a miniature Indian palm, and it is by far the most elegant and graceful of our native species. In wet shady places in the north of this kingdom the plant is not unfrequent, and it must be described rather as local than rare in this country. In Germany and Holland it is very common; it grows, too, in Prussia and Switzerland, as well as in North America and Northern Asia. It is found at a greater altitude than any other species, though it never reaches higher than from 1,800 to 2,400 feet. It is plentiful in the Highlands of Scotland, and in the north of Ireland, and also in several parts of Yorkshire, and other northern counties; and is found occasionally in some southern localities, as on Apse Heath, Isle of Wight, and occasionally in Kent, Sussex, Devonshire, and other counties. Mr. Newman mentions that it grows in the Hampstead and Highgate woods, and says that it is remarkable that it was seen there as long since as the time of Lobel. He adds, "In Scotland I observed it growing with peculiar luxuriance in the vicinity of Loch Tyne, in a little fir-wood on a hill-side. The fructification had entirely disappeared, and each stem had attained its full development, and every pendulous branch its full length and elegance. Altogether I could have fancied it a magic scene, created by the fairies for their especial use and pleasure. It was a forest in miniature, and a forest of surpassing beauty. It is impossible to give an idea of such a scene either by language or illustration."

The brown creeping stem of the Wood Horse-tail is branched, and is tufted with fibrous roots. This plant has two kinds of fronds; they have both erect stems; and both, when fully grown, are surrounded by compound branches, though these are fewer on the fertile than on the barren stem. The fertile stems are at first quite without branches, but these soon develop themselves, and are generally from six to eight in number. The stem is from half-a-foot to two feet in height, of a dull faded looking green colour, succulent, and having about twelve slender ridges, with corresponding furrows. It is not so rough nor so firm as in most of the species, on account of the extreme minuteness of the flinty particles in the cuticle. The margins of the sheaths are cut into three or four lobes, and the sheaths are large and loose; the lower half are pale green, and the lobes of a bright brown colour, and they are marked with the same number of ribs as the stem. The whorled branches are slender, about two inches long, curving downwards; and a marked feature of this species is, that these branches have other branches growing at their joints. These secondary branches are from half-an-inch to an inch long. The cone, which is matured in April, is long, somewhat tapering, and of a pale brown colour, standing on a slender stalk longer than itself. The scales are more than eighty in number, and when ripened disperse a great number of pale greenish-coloured spores. The cone dies away long before the stem or branches have begun to wither, but it is rarely seen, for this species does not often bear fruit.

The barren stems, which are of a much less succulent

nature than the fertile ones, are taller and more slender, and bear more branches; their sheaths, too, though similar, are smaller, and fit the stem more closely, and their ribs are more strongly marked. The compound branches are often crowded on the stem, the side branches being about four inches long, and bearing at every joint a whorl of branches about half that length. Sometimes these are again branched, and drooping down in whorl beyond whorl, the frond becomes exceedingly elegant, narrowing upwards to a slender point, which droops too with the weight of depending branchlets. The terminal branches are 3-ribbed, and somewhat triangular in form, and each joint is terminated by three long pointed teeth of the same colour as itself.

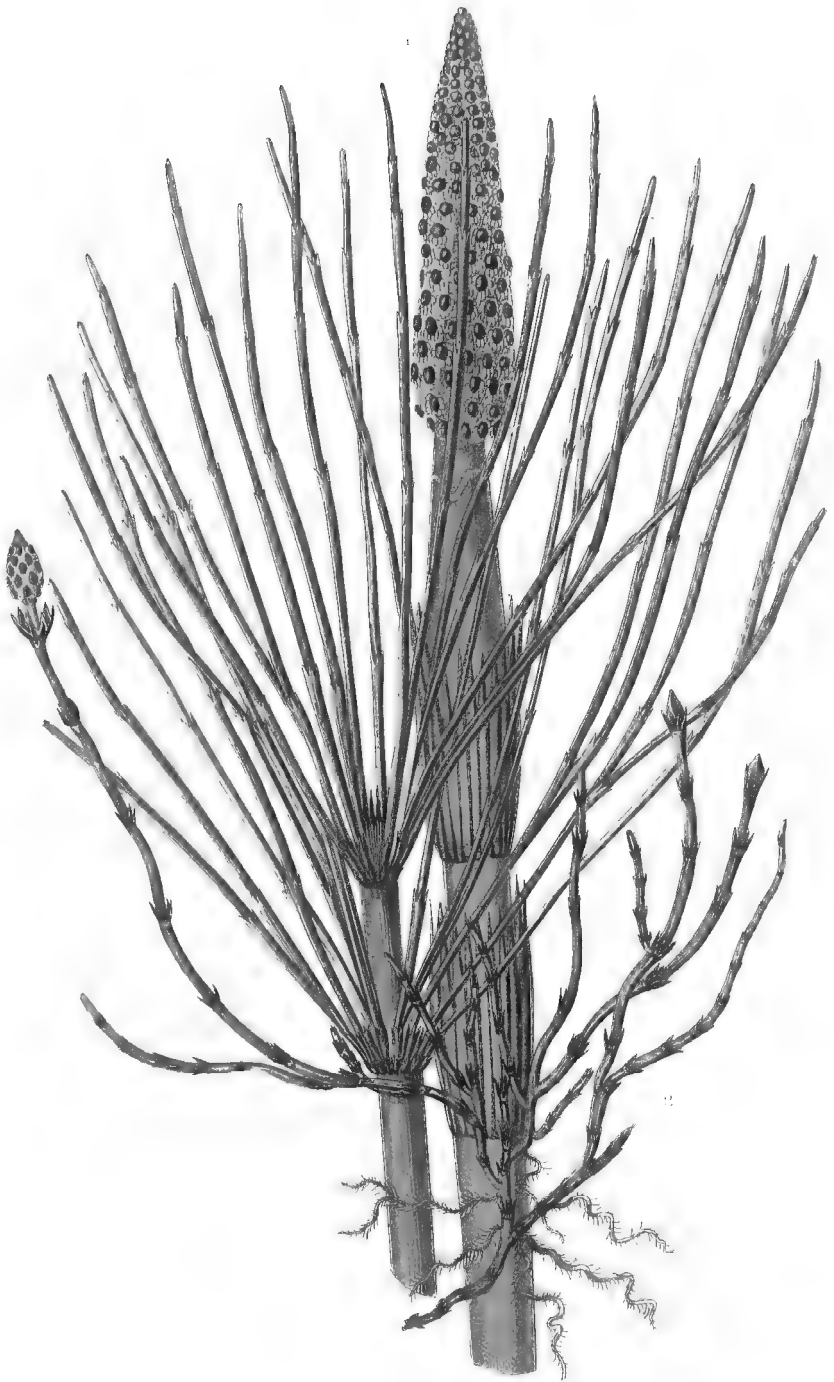
7. *E. umbrósum* (Shady Horse-tail, or Blunt-topped Horse-tail).—*Barren stem* very rough, particularly above, branches simple; *fertile stem* either unbranched, or with simple branches and larger sheaths. This species has not hitherto been found in many places in this kingdom, though it occurs in some parts of Yorkshire, and about the Westmoreland Lakes; at Wynch Bridge, Teesdale, Durham; near Warkworth, in Northumberland; near Mere Clough, Manchester; as well as in several Scottish habitats; and in the mountain glens of Antrim, in Ireland. It was first discovered in the latter locality by Mr. T. Drummond, and hence this plant was formerly termed *E. Drummondii*, but it has since been ascertained to be the species called by Willdenow, *E. umbrósum*. It seems probable that this Horse-tail will be found to be plentiful in woods in the north of this kingdom.

This species has three kinds of stem ; one bearing fructification only, a second bearing both fruit and branches, and a third with branches only. The fertile stems are rigid, about six inches high, of a pale sea-green hue, and with large, loose, and remarkably white sheaths, having a brown rim at the base of the teeth. These are long, narrow, and sharp, and are pale brown with white edges. The oval catkin, composed of forty or fifty scales, is at the top of the stem, and of a light brown colour ; at first seated on the topmost sheath, but shortly rising on a footstalk. It is matured in April.

The branched fertile stems have sheaths midway in size between those of the two other kinds of frond. Whorls of branches are produced at the uppermost joints. The cone, which is terminal on the stem, is smaller than in the ordinary form of the fertile frond, while the number of branches is fewer than in the barren stem.

The barren stem is erect, and from eighteen to twenty inches in height ; it is very rough, and has about twenty sharp ridges. A few joints at the base are without branches, the joints on the higher part of the stem producing whorls of from ten to sixteen drooping branches, which gradually spread so as to form larger circles. The sheaths are smaller than those of the fertile stem, clasping it more tightly, and have teeth similar in colour, but shorter, fewer, and less prickly. The slender branches are about four inches long, 3- or 4-ribbed, and their loose sheaths terminate in three or four short, sharply-pointed teeth, tipped with pale brown.

8. *E. Telmatéia* (Great Horsetail, Great Water Horse-



1 GR. AT. WATER HORSE TAIL
Equisetum telmateia
 2 VARRICATED HORSE TAIL
E. varicosum

tail, or Great Mud Horsetail).—*Barren stems* erect, with thirty to forty branches in each whorl; *fertile stems* with loose sheaths. This is the largest of our British Horsetails. It is a very graceful plant, and when growing in any quantity, it might remind one of those pictures of Oriental palm-groves familiar to all readers of Eastern travel. It is the barren stem of this Horsetail which is so handsome, growing erect to a height of six or seven feet, decked from its summit nearly to its base with spreading whorls of delicate green branches; and few would see a luxuriant specimen on the stream-side without admiring its grace. On the stouter part of this tall stem the whorls consist of from thirty to forty branches, which are again branched. The whorls on the upper part are very numerous, and the branches six or eight inches long; but towards the base the whorls are more distant, and the branches shorter. The stems, which are pale green, are at their thickest part of the size of a stout walking-stick, gradually tapering upwards, and becoming very slender at the top. Their smooth surface is delicately marked with numerous lines, which, running on into the sheaths, become there more distinct. The sheaths are about half an inch long, the lower part green, the upper encircled by a dark brown ring, and they fit the stem closely. The teeth are slender, dark brown with white edges, and often growing in twos or threes together. The branches have frequently at their second joints from two to five secondary branches; and their sheaths terminate in four or five teeth, each of which extends into a slender black bristle with two

toothed ribs, a character which is very useful in determining the species.

The fertile stems of this species are much shorter than the barren ones, rarely exceeding a foot in height. They are succulent, reddish-white, smooth, and unbranched, with large, loose, funnel-shaped sheaths, the lower ones smaller than the upper. These sheaths, which are pale green at the lower, and dark brown at the higher part, are distinctly marked with lines, and have from thirty to forty long slender teeth. The catkins are two or three inches long, and have an immense number of scales arranged in whorls around them, the lower scales forming distinct rings.

This is not an uncommon, though a somewhat local plant; and notwithstanding its name of Water Horsetail, grows quite as often, or more so, on sandy or clayey moist soils, as on the borders of rivers or ponds, nor is it frequently, if ever, to be seen growing in the water. Its underground stem creeps far in the moist earth, where its black wiry roots increase rapidly, and are very abundant.

When this Horsetail grows in large masses, as it sometimes does in the neighbourhood of London, a third kind of stem is occasionally to be found in August, smaller and shorter than the ordinary stem, its sheaths less spreading, and its cone smaller. This is a dwarfed form of the plant, owing to the spot on which it occurs being not sufficiently moist for its luxuriant growth.

9. *E. variegatum* (Variegated Rough Horsetail).—*Stems* trailing or erect; *sheaths* black at the top; *teeth* few, white, not falling off. This is one of the plants of

the sea-shore, and one which, if it occurs in any quantity, proves valuable in binding down the loose sands. Its underground stem creeps a long way just beneath the surface of the soil, and its root is formed of numerous whorls of fibres. It sometimes grows inland, on the banks of lakes, rivers, and in ditches, and under such circumstances becomes more luxuriant than on the sea-sands.

In this species the fertile and barren stems are alike; they are scarcely if at all branched, except at the base, but they have numerous branches just at the surface of the soil, or on the underground stem just below it. Occasionally the erect stems have a branch, very similar to the stem itself, arising from a joint here and there. The stems, which are about a foot high, are grooved, having from four to ten strong ridges. The sheaths, which are ribbed like the stems, are green below and black above, and their margins are fringed with black teeth of the same number as the ridges on the stem. These teeth have thin white edges and bristle-points.

The catkins are borne at the summit of some of these stems, and are small, black, and pointed, sometimes seated on the uppermost sheath, sometimes elevated on a short footstalk; they have very few scales.

One variety of this plant is by some writers considered a distinct species, and is called *E. arenarium*. It is small, slender, and trailing, and the stem has about six furrows. The *E. Wilsóni* of some writers appears to be but another form of *E. variegatum*; it is much stouter, taller, and more erect in habit, being sometimes

three feet high. The stems are usually without branches, but are sometimes slightly branched. They have about ten ridges, but are not very rough. The sheaths, which are scarcely larger than the stem, are green, with a black rim at the margin. The teeth are short and blunt, black, and edged with white, and the cone is small, black, and pointed.

The *E. variegatum* is abundant on sand hills, on parts of the Cheshire coast, at Wardrew in Northumberland, and elsewhere. It is found chiefly in the north, and several localities in Scotland, Wales, and Ireland are recorded as places of its growth.

THE END.

