THE FERNS

OF GREAT BRITAIN AND IRELAND.

NATURE-PRINTED.
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BY

THOMAS MOORE, F.L.S.

EDITED BY

JOHN LINDLEY, Ph.D. F.R.S.

NATURE-PRINTED

BY

HENRY BRADBURY.

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PREFACE.

Everybody who has attempted to ascertain the name of a plant by comparing it with
more descriptions, is aware of the difficulty of effecting the object unless he is more
familiar with the technical language of science than those commonly are who,
although admires of delicate texture, beautiful colour, or graceful form, do not
profess to be skilful Botanists. Even with the aid of drawings, investigation often
leads to no satisfactory result, in consequence of the inability of art to represent
faithfully the minute peculiarities by which natural objects are often best distinguished. If
this is so with plants in general it is most especially true of Ferns, the complicated forms
and tender organisation of which baffles the most skilful and patient artist, who can only give at
the best an imperfect sketch of what he supposes to be their more important features. And
herein lies the great defect of all pictorial representations. The draughtsman can do no more than
delineate a part of what he sees; and whether he sees correctly what he delineates will at all times be
a matter of doubt, especially where, as in natural history, minute accuracy is indispensable. But if
minute accuracy is of more vital importance in one than another case of plants, it is most especially so
among Ferns, in the distinctions of which the forms of indentations, general outline, the exact manner
in which repeated subdivision is effected, and most especially the distribution of veins scarcely visible
to the naked eye, play the most important part. To express such facts with the necessary accuracy, the
art of a Talbot or a Dagorne was insufficient, nor could they be represented pictorially until
Nature-Printing was brought to its present state of perfection.

Attempts were long since made to obtain Botanical portraits by printing from the plants
themselves, flattened and otherwise prepared for the purpose. By this means impressions of leaves
were produced with some success, and even of small branches. Rare as the process was, and imperfect
the result, it was nevertheless found that the figures thus procured were far more characteristic than
any which artists could produce, as was to be expected, indeed, from the absolute accuracy of the
representations as far as they went. No one who had ever seen a Rose-leaf could fail to recognise its
impression, or was likely to mistake it for that of an Ash-tree; and the more the impression was
studied, the more did the truth of all its details carry conviction to the mind. The fault of the method
consisted in its limited application, and its incompleteness.

The process of the Imperial Printing Office at Vienna, to which the name of Nature-Printing has
been happily applied, and to which the Work now offered to the public owes its origin, is a great
improvement upon the old method, insomuch as it represents not only the general form with absolute
accuracy, but also surface, hairs, veins, and other minutiae of superficial structure by which plants are
known irrespective of the hidden details of their internal organisation. Moreover, an exact copy in
copper of the part to be represented being employed by the printer, instead of so fragile an object as
the plant itself, we obtain the means of multiplying copies to the same extent as in copperplate
engraving; and hence the method becomes suitable for purposes of publication. The Germans have
already availed themselves of the art, and with considerable success. Von Hufner has published
a specimen of the Cryptogamous plants of the Valley of Arpaech,* some of the figures in which are
admirable representations of nature; and other works are announced as having made their appearance,
or being in preparation, in the Austrian dominions.

It is in eminence of such continental efforts that the present Work has been prepared, with the view of showing by unmistakable evidence what differences really exist among the Ferns which grow wild in Great Britain and Ireland. These beautiful plants have of late years attracted so much attention, and are now so universally cultivated, that it has become most desirable to establish upon solid grounds the true value of their characteristic marks—a result which it is hopeless to expect from mere descriptions or imperfect engravings. It is true that Nature-Printing has its defects as well as its advantages: it can only represent what lies upon the surface, and not the whole even of that. But, on the other hand, its accuracy is perfect as far as it goes; and in the case of British Ferns it goes far enough for all practical purposes. If it fails to represent the forms of sort, then, or inclusion, we must never forget that such organs are not practically employed in the first-sight recognition of a Fern, although they are subjects of inquiry in the cabinet. The practiced eye knows at a glance that a Fern is *Adiantum Caperata*; nor by looking to the underside of its leaves, and ascertaining the form of its Schmidt or sinus, and the place occupied by the sort, but by its general manner of growth, the ramification of its stipes, and the form of its leaves, all which Nature-Printing does show with marvelling truth. The minute structures to which Botanists resort for the distinction of genera, and to which Nature-Printing cannot be applied, are sufficiently pointed out by description alone; and, among the subjects of the present Work at least, are in no need of delineation. It is not, indeed, too much to say that in many other plants besides Ferns a knowledge of the incommunicable parts of fruitation might be dispensed with if it were possible accurately to represent by figures, or to describe by words, the real forms and condition of the larger organs. But, when compared with the result of Nature-Printing, botanical drawings are often little more than indifferent diagrams. It is related of the late John Gough of Kendal, that, having become totally blind from small-pox when two years old, he so cultivated his other senses as to recognise by touch, smell, or taste, almost every plant within twenty miles of his native place. It is believed that good Nature-Printing will convey to the eye the same class of positive impressions as those which were conveyed to the mind of Gough by other organs.

The text of the present Work is supplied by Mr. Thomas Moore, whose little *Handbook of British Ferns* is generally admitted to be our best book on the subject. To a perfect acquaintance with this part of our native Flora, Mr. Moore has shown that he adds correct views of nomenclature, and knows how to avoid those errors of judgment which have induced inexperienced authors to convert the terminology of Ferns into a systematic chaos. This is not the place to discuss the soundness of the principles upon which the modern genera of Ferns have been proposed. It may be, however, conceded that the distribution of veins, and the position of sort with respect to them, are characters of equal importance with the form, or absence or presence of an indusium, or the direction in which it separates from the epidermis, or the other peculiarities on which the founders of Pteridology once exclusively relied. But in the application of any such characters to the distinction of genera, something more is required than a mere perception of facts; it is no less necessary that the Botanist should possess a power of combining and generalising, as well as of observing, and that he should consult his judgment as well as his eyesight. When this is neglected the value of characters is misunderstood, every species becomes a genus, and natural history is resolved into its elements; isolated unconnected facts take the place of skilful combinations, and what should be the perfection of arrangement becomes a surroge of disorder.

It is believed that the present Work will be free from faults of this kind, and that the Author, while he avails himself of all circumstances which can assist in the distinction of what requires to be distinguished, will continue to preserve the nomenclature of our Ferns upon a rational and solid basis.

The duty of the writer of these remarks extends little beyond a general supervision of the Work as it passes through the press. The labour and honour of this the first English attempt at applying Nature-Printing to Botanical Science rest with Mr. Henry Bradbury, under whose direction the plates are prepared, and Mr. Thomas Moore, who selects the specimens to be figured, and is responsible for the letter-press.

*Anns* Lond. March 20, 1855

JOHN LINDELEY.
AUTHOR’S PREFACE.

The peculiarities of the process by which the illustrations to the Ferns of Great Britain and Ireland have been produced, being adverted to in another page, it is unnecessary here to allude to them, further than to point out the fidelity with which the outline of the specimens is reproduced; and also how admirably the peculiarities of the vascular structure—which is of real importance in the classification of this family—are represented by Nature-printing. The process itself has been described by Mr. Henry Bridgury in a lecture delivered before the Royal Institution.

There is, however, one feature of the accompanying text, on which some explanation may be desirable, in order that its object and intention may not be misapprehended. It has been attempted to record, and to give some account of the multitude of variations of the comparatively few species of Ferns inhabiting these islands, which, even in so limited a geographical area as that of Great Britain and Ireland, have been met with by diligent explorers within the very few years which have elapsed since the love of Ferns has become so widely diffused as it now is. It will be apparent, from the subordinate position assigned to them, that no botanical importance is claimed for most of the forms thus enumerated; but the object of recording them has been two-fold.

In the first place they have been specially noticed for the purpose of affording aid to those Fern-admirers, including not a few of the gender sex and of high estate, who derive such agreeable recreation as that afforded by Natural History studies, in seeking and finding, in collecting, and in cultivating, the species of Ferns, profuse of varied forms, and which for the most part have to be sought amidst enchanting rural scenery, where both mind and body derive benefit from the pursuit. Such students of Nature have a right to whatever assistance they may draw from records like the present; and it is for their special benefit that the varieties we have had occasion to notice have been mentioned under distinctive names.

We believe, however, that the long series of variations enumerated have a botanical significance; and it is this, in the second place, which has led us to notice them with some particularity. They are not indeed, in many instances, objects which the general botanist can attempt to keep separate under distinct names even as varieties; those only which are most prominently placed having this importance claimed for them. But they are undoubtedly links in the chain of evidence which may direct him to the conclusion that species have a wider range of form, even within narrow geographical limits, than many botanists are willing to admit. They may also teach him that the variations of different plants of admitted specific rank, often serve to connect the individuals into a series so extended, that species themselves thus become things of doubtful import, and of uncertain limit. This lesson, again surely leads to the conclusion that species are mere groups of individuals associated by the Naturalist for his own convenience and that of others, just as genera are groups of the so-called species collected together with the same end in view. The fact that such closely allied series of forms which would ordinarily be referable to several species admitted to be distinct but which for this very reason cannot be absolutely defined, and the total failure of all attempts to explain practically what a species is, point forcibly, if not irresistibly, to the conclusion that Nature acknowledges only individuals, and that a species is a thing of man’s contrivance, and hence has only an artificial value.

Apart from this consideration, another obtrudes itself. Admitting the existence of species, whether
natural or artificial in character; then, if in a small area like that of Great Britain, so many varieties often marked, and usually constant in character occur, the variations must become much more numerous and marked, if the species is spread, as often happens, over widely separated and extensive portions of the globe. If may safely be concluded from this further view of the subject, that an infinity of species, founded on slight differences and often on the mere fact of geographical separation, are thus thrown open to doubt, or at once reduced to mere local variations. Many apparently genuine species also, thus become broken down and amalgamated by the discovery of connecting varieties; it may be, at their antipodes. The number of apparently good species so-called which thus become disturbed by the occurrence of intermediates in distant latitudes, and under varied climatal conditions, by which means tolerably exact definitions become unattainable; and the impossibility of believing in such an excessive natural diffusion and variation of specific vegetable types from any intelligible centre of creation, which in that case would be a necessary assumption—and all such conjectures as to origin are mere assumptions and an affronting of being wise above that which is written,—become a serious obstacle in the way of continuing to hold faith in the very exigence of species, except when viewed in the light already indicated, namely, as artificial collective groups of individuals associated for convenience.

One object of enumerating the varieties of British Ferns then, has been to prove, that so-called species do vary very much in our limited area; and hence to draw the inference, sufficiently supported indeed by facts, that they vary much more when a wider range is taken into account; such a conclusion being clearly unfavourable to the multiplication of species. It is to be remembered that the variations here spoken of, though sometimes slight, are nevertheless often marked, and for the most part constant and appreciable; by no means frequently ranging as mere monstrosities, but even then for the most part permanent, and renewable from the spore—this latter fact probably affording incidental proof that spores themselves are in reality buds, and not at all analogous to seeds, and suggesting that the spore may after all have nothing to do with fructification in the usual sense.

It only remains here to acknowledge the much assistance which has been afforded us in the progress of our labours; all of which it is hoped has been duly recorded. Our thanks are however especially due to Sir W. J. Hooker, for the facilities afforded by ready access to his valuable Herbarium in tracing the geographical range of the species; to Dr. Lindley, for his careful supervision; and to Mr. G. B. Wollaston, for his valuable notes on varieties.

Cumbria, July 14th, 1866.
SYNOPTICAL TABLE OF THE PLATES.

POLYPODIACEÆ.—Ferns with circinate vernation; their spore-cases girt with a jointed ring, and breaking by an irregular fissure.

POLYPODII.—Dorsal—fruited Ferns; their spore-cases girt with a jointed ring, and hurled by an irregular lissure.

POLYPODIES—Dorsal—fruited Ferns; their spore-cases roundish, naked, without indusium.

GRAMMITHÈRES.—Dorsal—fruited Ferns; their spore-cases roundish, indusiate, covered by a scale, dorsal on the veins.

ASPERIES.—Dorsal—fruited Ferns; their spore-cases linear, naked, lateral on the veins.

ASPATICÆ.—Dorsal—fruited Ferns; their spore-cases linear, indusiate, lateral on the veins.

BLECHOOE.—Dorsal—fruited Ferns; their spore-cases linear bisporis, lateral on the veins.

BLOCHÈRES.—Dorsal—fruited Ferns; their spore-cases linear, bisporis, indusiate, linear bisporis; scales free.

PTEOIDEÆ.—Dorsal—fruited Ferns; their spore-cases linear, indusiate, lateral on the veins.

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SYNOPTICAL TABLE OF THE PLATES.

WOODSIACE.-Round-fruited Ferns; ovules bivalve, or semi-bivalve, i.e., with a scale affixed beneath the ovum.

<table>
<thead>
<tr>
<th>Item</th>
<th>Plate</th>
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<tbody>
<tr>
<td>Laminae ovate, hastate, i.e., offered patently, and inflated over the stem.</td>
<td>XXXI. b</td>
</tr>
<tr>
<td>Cystopteris fragilis, and varieties</td>
<td>XXXI. a</td>
</tr>
<tr>
<td>Cystopteris regia</td>
<td>XXXI. c</td>
</tr>
<tr>
<td>Laminae oblonga, with capillary papillose marginal scales.</td>
<td>XXXII. a</td>
</tr>
<tr>
<td>Woodsiace planis</td>
<td>XXXII. b</td>
</tr>
</tbody>
</table>

HYMENOPTERILACE.-Marginal-fruited Ferns; ovule indecorate, in free receptacles.

<table>
<thead>
<tr>
<th>Item</th>
<th>Plate</th>
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</thead>
<tbody>
<tr>
<td>Stems within entire unrolled laminae, ovule plane, concoidal annular.</td>
<td>XXXIII. a</td>
</tr>
<tr>
<td>Tradescantia radicans, and variety</td>
<td>XXXIII. b</td>
</tr>
<tr>
<td>Stems within fruited laminae, ovule included.</td>
<td>XXXIII. c</td>
</tr>
<tr>
<td>Hymenophyllum tenuifolium</td>
<td>XXXIII. d</td>
</tr>
<tr>
<td>Hymenophyllum unicostatum</td>
<td>XXXIII. e</td>
</tr>
</tbody>
</table>

OSMUNDACE.-Ferns with euneate vernation; their spore-cases without a jointed ring, two-valved.

<table>
<thead>
<tr>
<th>Item</th>
<th>Plate</th>
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<tbody>
<tr>
<td>Osmunda regalis</td>
<td>XXXIV. a</td>
</tr>
</tbody>
</table>

OPHIOGLOSSACE.-Ferns with plicate vernation; their spore-cases without a jointed ring, two-valved.

<table>
<thead>
<tr>
<th>Item</th>
<th>Plate</th>
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<tbody>
<tr>
<td>Stems collected into broadened parataxa on a separate branch of the stem.</td>
<td>XXXIV. b</td>
</tr>
<tr>
<td>Ophioglossum Erythraea</td>
<td>XXXIV. c</td>
</tr>
<tr>
<td>Stems collected into a linear spike on a separate branch of the stem.</td>
<td>XXXIV. d</td>
</tr>
<tr>
<td>Ophioglossum lineare</td>
<td>XXXIV. e</td>
</tr>
<tr>
<td>Ophioglossum tenuissimum</td>
<td>XXXIV. f</td>
</tr>
</tbody>
</table>
Plates I. II. III.

THE COMMON POLYPODY (Polypodium vulgare).

POLYPODIUM, Linnæus.

Clumps of Spore-cases circular, without covers, growing from the back of the veins, terminal, or nearly so. Veins dissected at their extremities, their branches (ovules) simple, forked or rarely pinnate.

P. vulgare. fronds deeply pinnatifid, linear-oblong or ovate-oblong acuminate; the lobes linear-oblong, bluntish or acute, obscurely serrate.


Polypodium sternatum, Henden, Memoirs, Mem. di piante, 96.

Polypodium lizards, Williams, Flora Britannica, 1822 (Plate 3) and of gardens.

Polypodium vestigial, of gardens (3) of Linnaeus, which speaks under Polypodium vestigial, a figure of Mission and of Thomas, the former apparently representing a small state of Polypodium vulgaris, the latter Polypodium vestigial. These are in specimen in the Linnaean Herbarium.


Polypodium intermedium, Linnæus and Arnett, Botany of Stanley's Voyage, 1852.

Polypodium vulgare, Aitken, Appendices to Natural History of British Flora, 1843, vol. 2; History of British Flora, 87.

For, HERBACEUS: fronds pinnatifid and fertile above, bipinnatifid below; lobes distinct, linear, acute, serrate.


For CHERUM, fronds borne, bipinnatifid throughout; lobes crowded, linear or linear-linearoblong, acuminate, serrate.


EXPLANATION OF THE PLATES.


HABITAT.—Common on rocks, banks, old walls, and into stumps throughout Mount Britain and Ireland, occurring from the coast level in the west of England, to an elevation of about 2300 feet in the Highlands of Scotland.

GEOGRAPHICAL DISTRIBUTION.—This common English Fern appears to be as abundant in Europe, growing from the northern limits throughout central and western Europe to Scandinavia, Italy, and Cufa. (M. Bucu to the Mediterranean side, and to Spain and Portugal on the Atlantic side); whence it extends into Africa by the Azores, Madeira, and the Canary Isles, occurring along the northern shores of the Continent, as in Alpes, and again extending in South Africa, in the country of the hordes. In Asia, it is found in China, and enters extending to East Indies, and westernmost over the mountains of Asia into Siberia (H. Keltner), but appears wanting on the opposite side of the Continent, there being no certain information of its occurrence either in China or India. In North-west America it is widely dispersed, being found at Fort Monterey, Alaska, and the Shire Isles (H. Macckey); through California (H. Bundor and Linneius—the Polypodium intermedium, Brongniart and Arnett,—Menne and Guadait—polypodium xenorhizans, A. Brown, on the other. Polypodium intermedium from California is somewhat larger and broader, and has the axis serrated, and the vein serrate; though very rarely, occurring near the margin, but this occurs in no slight and insignificant degree, as in by accident, and the other features afforded to 225 and with in other forms of P. vulgare, so that we can scarcely believe the two to be distinct.
THE COMMON POLYPODY

Rhizome creeping, tortuous, branched, as thick as a swan's quill or one's little finger, densely clothed with furrowed scales on a deciduous cuticle, and bearing fibres on the under side. Scales lanceolate, very much acuminate, crowded, at length deciduous, leaving the surface of the rhizome smooth and greenish. Fibres brown, tomentose, densely muttered over the surface to which the rhizome is fixed.

Stipes variable, often nearly or quite as long as the frond, sometimes much shorter, as well as the rhizome; slightly grooved in front, naked, at the base articulated with the rhizome.

Vernation circinate.

Frond from two to eighteen inches long, lateral to the rhizome, subcoriaceous, of a somewhat shining green, paler beneath; varying in outline from triangular-ovate when small, to ovate-oblong and linear-oblong, the latter being the fully developed condition of the species in its normal state; very deeply pinnatifid, usually more or less drooping. *Lobes or segments linear-oblong, parallel, flat, bluish or abruptly acute, obscurely serrate, more distant and sometimes divided into shorter at the base, shorter and more crowded or confluent near the apex, which sometimes terminates abruptly, but is usually concolorful.*

Vernation in each lobe consisting of a prominent tortuous midrib, which is alternately branched; the branches (veins) are again branched, producing from three to five alternate branchlets (ramules) of which the lowest anterior one rarely more) borne a row of tiny, indusium.

Fructification on the back of the frond, usually confined to its upper part, the row originating at the apex of the velum, at first a naked depressed scarcely visible spot, and from the earliest period at which it becomes visible quite destitute of any membranous cover, or indusium. *Spore-cases circular, rarely somewhat oblong, quite exposed, arranged in a linear series on each side the midrib; at first distinct, often crowded and finally confluent. Spore-cases yellow or orange of various shades, becoming tawny, numerous, globose, with a slender stalk of elongated cells. Spores yellow, muriculate or corugate, oblong or kidney-shaped.*

Duration. The rhizome is perennial. The fronds are produced about the end of May, and are persistent through the winter and until after new fronds are produced, so that the plant is evergreen unless the fronds are destroyed or damaged by severe frost. Other fronds are produced later in the summer.

This common plant is the type of the Linnaean genus Polypodium. There are certainly no grounds other than the fancies of name-makers by reason of which that genus should be abolished, although there may be reasons for its reduction by divesting it of ill-assigned species. We cannot therefore concur with those writers who adopting the name used for sectional distinction by Rane and Pears, would call this plant *Cryptopodium vulgaris,* and thus altogether ignore Linnaeus's *Polypodium.* Whatever additional names the introduction of modern systems of classification may render necessary, it is clearly not permissible that the names of type species of Linnaeus's *Polypodium* be mutilated or so perverted. Those who are easily led either to make or to adopt changes of this nature, should remember that names are not the ultimate objects of botanical investigation.

The common Polypody differs essentially from all the other British Polypodides, in the character of having its fronds articulated with the rhizome—that is, attached in such a manner that they separate spontaneously as they approach decay. Its texture, too, is softer and firmer than that of the native species which are allied to it by their fructification. In its normal form, it is, moreover, less divided than they. The small spores produced on walls, and in other dry exposed places, are erect and rigid; but in situations where it grows with more vigour, the plant becomes drooping and picturesque in character.
THE COMMON POLYPODY.

This Fern is easily cultivated, if light porous soil is used, and the rhizomes are kept on the surface of the soil. When unnaturally planted deeply, or in stiff retentive soil, it dwindles and often eventually perishes. Mr. Newman, apparently founding his opinion on the circumstance of its being frequently met with growing on pollard trees, considers it to be of parasitical habit. This circumstance would, however, give it only an epiphytal not a parasitical character; but as it is frequently found, fully as vigorous, growing among porous earth and on sandstone, these are all probably more accidental conditions, the essential ones being constant moisture more or less in quantity, perfect drainage, and moderate shade. It even exists in health naturally with little or none of some of these conditions about it, as many an old wall bears evidence. It increases readily by dividing the branching rhizome.

There are in this species many deviations from the typical form which has been already described; but they are rather of importance to the horticultural enthusiast than to the botanist; except in so far as the latter may regard them as evidences of the manner in which, and the extent to which, common species are known to vary, and may hence learn to appreciate rightly the less familiar differences which are found to exist amongst exotic species. It is, however, chiefly for the information of the more numerous class of Fern cultivators, most of whom take an interest in these variations, that they will be enumerated hereinafter under distinguishing appellations.

That form of the Common Polypody which differs in the least degree, albeit constantly, from the normal state, has the ends of its lobes gradually tapering off to a narrow point, instead of being nearly equal in width to the end, and there more or less blunt. A somewhat more diverse form has the points of the lobes acute as in the last, but their margins are at the same time deeply notched, the notches forming a series of coarse double serratures. This state has sometimes a tendency to bifurcation at the tips of the lobes, and what is more remarkable, the notches are not unusually decidedly oblong, in which respect it deviates from the generic type. Another slightly varying form has the ends of some or all of the lobes divided, with the divisions divaricate, so that the lobes become more or less manifestly two-forked. Occasionally more than two points are developed to each lobe, and we have thus an indication of the nature of the tassel'd apices which are common in some other species of Ferns.

Sometimes the fronds acquire breadth rather than length, assuming a broad oblong or ovate-oblong outline; and this is occasionally accompanied by various degrees of marginal division in the primary lobes, showing a transition towards the more highly developed bipinnatifid varieties, minutirtis and cornucopia. The most simple condition of this abbreviated and widened form, in which the apices are usually acute and the margins finely serrated, and which is almost or quite identical with the North American plant called P. regaleatum, and nearly so with the Madeira plant called P. cornucopia in gardens, is apparently not common in this country, but has been communicated from near Hereford by Dr. Allen. It is when deeply crenato-lobate, that this type of variation approaches the more highly developed or compound forms above alluded to; this, too, sometimes varies with oblong sort.

The Irish Polypody—P. versutum similacrum—(see Plate II.), of which type there appears to be some slight variations, and which, moreover, is not confined to Ireland—has the fronds irregularly bipinnatifid, in this respect approaching the Welsh Polypody; but the latter is more regularly and universally bipinnatifid, and in, likewise, always broader, whilst the former is more or less fertile. The fronds are from a foot to a foot and a half long, elongate-ovate, pinnatifid, in the lower part almost pinnate. The primary lobes are narrow and deeply serrate at the base and apex, deeply pinnatifid about the middle; the secondary lobes or lobules are linear, acute or bluntnish, serrate, longest at the lower part of the frond, becoming shorter upwards. Along these lobules the veins from the principal midvein extend, and become branched, the branches dividing into from two to three venules; in the other parts, the veins are arranged similarly to those in luxuriant examples of the normal form. The upper half of the frond is fertile, and in this fertile portion the lobes are scarcely subdivided, the uppermost ones being merely serrate or crenate-serrate; the development of the lobules, and of the sort, are conse-
THE COMMON POLYPODY.

quently not generally coincident on the same parts. It should also be mentioned, that occasionally, and apparently when the vogue of the plant has received some check, the entire fronds, instead of the upper portion, only, are only eremato-serrate, in which state it agrees with the variety stonemat of Mr. Francis, though not with the one so named by Willdenow. Our plant was found many years since in Ireland, in woods near the Dargle in the county of Wicklow, and about the lakes of Killarney, where it has also been lately found in several stations by Dr. Alchian. In some one of its modifications it has also been found at Postwick, in Norfolk (Hb. Hooker); at Saltwood Castle, in Kent (Hb. Gray); on the mounds of Berry Pomeroy Castle, in Devon; at Tintern Abbey, and Chepstow Castle, in Monmouth (Hb. Howard); at Aberglaslyburn, in Carnarvonshire (Hb. Alliöös); and elsewhere. It grows, moreover, in Germany, at Chats, in Portugal; and we believe the P. austrole of Fée, which is not with in Sardinia, Corsica, and Teneriffe, to be a form of this variety. Its most beautifully developed state is that from the Dargle, and the above description is made from a remarkably fine specimen of that form, communicated by Mrs. Delves.

The Welsh Polyfrad—P. vulgaris cambricum—(see Plate III.) is, like the last, an extremely elegant plant, but it is almost always sterile. The fronds are regularly bipinnatidifoid throughout; their outline ovate or ovate-oblong. The lobes are crowded, narrow at the base, and acuminate at the apex, the intervening portion being much widened, and the whole margin, except the very base and apex, divided into narrow linear or linear-lanceolate, acute or acuminate, serrate, crowded lobules. This form, which is chiefly known as a garden plant, does not, we believe, ever produce fructification under cultivation, and it is very rare indeed, that it is produced in the wild plant. It has been found at Monpeller, though originally in Wales—hence the name. Mr. E. J. Lowe has communicated it from a wood near Macclesfield, in Cheshire. Mr. E. T. Bennett has favoured us with specimens from the neighborhood of Ross, in Herefordsire, which are almost identical in structure with the Welsh plant; and others quite similar, gathered at the same time, are stated by him to be sparcingly fructified.

For the following enumeration of the various forms above mentioned, with some other abnormal ones which are more or less constant, we have to express our thanks to Mr. G. B. Wollaston—whose name is well known among these familiar with British Ferns as that of one who collects with mediul the numerous variations which occur among our native species, and cultivates them with remarkable success. These abnormal forms belong to two types of development: one, in which the narrow elongate outline of the normal form is more or less preserved; the other, in which a tendency to develop breadth rather than length, results in a form of broad outline comparatively short. To the first of these groups belong the varieties numbered below from 1 to 11 inclusive; and the remaining numbers, 12 to 17 inclusive, are referable to the second.

"Of Polylophium colpae there are no less than seventeen varieties sufficiently distinct from each other to bear different names; but at the same time, and particularly in a state of cultivation, these in many instances merge into each other, and connect, by a series of links, the normal with the most compound form. The constancy of these varieties under cultivation varies considerably according to the mode of treatment, and depends much upon whether they are kept under glass or in the open air. The only one, however, that is constant under all circumstances is the variety ebulium. They may be described as follows:—

1. ovatum has the ends of the lobes narrowed gradually to a point, and is without serrations. It is in its most marked condition not a common, but is a very elegant form, with fronds nearly of the normal outline; it varies by becoming less tapering, and slightly serrate, approaching towards the acute-lobed normal form.

2. bifidum has the lobes generally bifid or two-cleft, but sometimes multifid; this occurs mostly on the lower third of the frond, sometimes reaching to two-thirds, and occasionally, but very rarely, nearly to the apex. The fronds are otherwise normal. It is not unfrequent.

3. versatum is a more fully developed form of the foregoing, and is often united in the cachis, which is again divided, and is furnished with lobes also bifid or multifid. It is very rare.
A. Polypodium vulgare semilanceatum. B. P. vulgare serratum.
A. Polypodium vulgare cambricum. B. F. vulgare crenatum.
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4. _interceptum_, as its name implies, has the lobes interrupted or irregular, sometimes two, three, or four entirely wanting; they are also irregularly bifid or multifid, or curiously incised; the outline of the frond is linear-lanceolate, i.e. normal. This variety is rare.

5. _serratum_ is a form allied to the last named, but very distinct; the lobes are beautifully sinuose or waved, rarely divided at the apex as in _interceptum_, but irregularly lobate; the lobes sharply serrate. It is a rare form, and under culture for some years, has proved permanent. The fronds are of the usual outline.

6. _lobatum_ : in this variety the lobes are of different lengths, and simply but irregularly notched, and somewhat crisped or reflexed.

7. _marginatum_; this form of variation is occasional but rare in _Polypodium_, though frequent in _Selaginella_. Its peculiarity consists in the splitting of the epidermis on the margins of the lobes, and in its recurving, generally on the under side of the frond, towards the midrib; the lobes themselves are irregularly serrate. Otherwise the fronds are normal.

8. _serratilobatum_ is a rare variety, having the teeth of the lobes minutely serrate; it has been generally met with growing on the trunks of trees. The plant is rather dwarf in habit, with fronds of the normal outline, and has for some years proved constant under cultivation. [It was found in Devonshire by Mr. Wollaston.]

9. _multifidum_ is generally like the normal form, or the variety _serratum_, except that the apex of the frond is bifid or multifid.

10. _serratum_; the peculiarity of this variety consists in the lobes not being simply decurrent, but forming a broad wing to the rachis; and the first lobes next the rachis on the upper margin (not, as is more usual, the lower) are greatly enlarged, forming a kind of ear, from which it takes its name. The outline of the fronds is normal.

11. _serratum_; the lobes in the most typical state of this form are sharply and deeply serrate or even bicuspidate along their margins, and the apices are acute. It is a common form of the species, with fronds nearly of the usual outline, and with a tendency in the sort to become oblong. It varies, however, with the fronds rather broader, and the teeth rounded and sometimes partially enlarged into lobes, thus connecting this form with the variety _cresatum_.

12. _decumbentifolium_; this form has fronds less coriaceous than usual, of a broad oblong outline, abrupt from the uppermost lobes being scarcely shorter, and caducate at the apex; all the lobes are ascending, and distantly sharp-toothed. It was found near Hereford. Analogous forms occur in Portugal, and North America.

13. _coriaceum_; this is allied to the last mentioned, but the fronds, which vary in size, are even rather than oblong; they are more coriaceous, with the lobes more obscurely toothed or crumpled; the lowermost lobes are horizontal, and the upper ones decrease in size. It seems to be common in Madeira and the Azores; and has been gathered by Dr. Allchin at Ballavaghan, in the west of Ireland.

14. _cresatum_; this is usually a large form, approaching _scandens_ by its broad or ovate fronds, and often, lobed segments. It varies considerably; in some instances approaching _serratum_; in other instances having the lobes more or less deeply and unequally crenate or crenato-lanceolate; and sometimes having the sort oblong. The notches of the lobes are rounded, not acute, as in _serratum_; and the lobes themselves are in some states of it beautifully waved or undulated. It is not common, but is found in Kent, in Surrey, and in Wales; the most marked examples being those from Saltwood found by Mr. Gray, and those from Conway found by Dr. Allchin. The finest undulated form is a garden plant of obscure history, but one nearly identical and which will probably become quite so under cultivation was found by Dr. Allchin at Meurice, in Ireland.

15. _frondosum_; this is generally a more compound form, approaching _scandens_; the lobes being deeply serrated or lobed, and the lobes minutely serrated; but in some instances, as its name implies, the development of the frond is, from some unknown cause, arrested, so that it becomes truncate, or cut

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3. **commonly**: used in a sense denoting the ordinary or usual; opposed to **uncommon**. 4. **interceptum**: from _intercere_, to interrupt. 5. **serratum**: from _serrare_, to cut, to shatter. 6. **marginatum**: from _marginare_, to form a margin. 7. **serratilobatum**: from _serrare_, to cut, to shatter, and _lobare_, to divide. 8. **serratilobatum**: from _serrare_, to cut, to shatter, and _lobare_, to divide. 9. **multifidum**: from _multus_, much, and _fido_, to divide. 10. **serratum**: from _serrare_, to cut, to shatter. 11. **serratum**: from _serrare_, to cut, to shatter. 12. **decumbentifolium**: from _de_ (of), _cumbent_ (lying down), and _folium_, leaf. 13. **coriaceum**: from _corium_, skin, and _aceo_, to become. 14. **cresatum**: from _cresere_, to grow. 15. **frondosum**: from _frondes_, fronds.
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sheet, the leafy portion partially wanting, and its place supplied by the midvein, or other minor veins, which project and form various points. The fronds are frequently much less, though very irregularly developed, but the projecting vein or veins seem constant. It was found in Ireland, by Dr. Allegre.

16. complex, this is the most compounded of all the fertile forms of this species, and is permanent under cultivation. The fronds are elongate-ovate, very beautifully and symmetrically divided, the primary lobes being themselves lobed, and, in some instances, the lobules again divided or serrated. It is known generally as the "Dargle" Fern. Sometimes the fronds are merely serrated, and they occur in various degrees of development. The name seems to have been given by Link, in allusion to the lobed condition of the lower half of the frond.

17. complex, this is by far the most beautiful of all known varieties of Polypodium; it is also the most compounded, under all conditions uniformly loose, and permanent under cultivation. The primary lobes are crowded, overlapping, and somewhat crisped; they are deeply pinnatifid, and the lobules are again lobed, the lobules being toothed. The whole frond is oblong, or crano-oblong, with the lower two or three pairs of lobes scarcely smaller than those on the middle portion of the frond, which gives squareness or angularity to the base. A detached lobe itself forms a fair miniature of a frond of the variety varioidea.

TWO DIAGRAMS EXPLANATORY OF THE TERMS EMPLOYED IN DESCRIBING FERNS.

Diagram of simple frond, showing a, hypostome base, and b, acute type of leaflet; a, note, b, pinnate, c, serrate, d, pinnatifid, e, lobed pinnatifid, f, deeply serrate, g, dissected, h, entire, i, smooth, j, veined, k, ovate, l, ovate-oblong, m, ovate-oblong, n, ovate-oblong, o, ovate-oblong, p, ovate-oblong, q, ovate-oblong, r, ovate-oblong, s, ovate-oblong, t, ovate-oblong, u, ovate-oblong.

Diagram of compound frond, showing a, hypostome base, and b, acute type of leaflet; a, note, b, pinnatifid, c, pinnatifid, d, pinnatifid, e, pinnatifid, f, pinnatifid, g, pinnatifid, h, pinnatifid, i, pinnatifid, j, pinnatifid, k, pinnatifid, l, pinnatifid, m, pinnatifid, n, pinnatifid, o, pinnatifid, p, pinnatifid, q, pinnatifid, r, pinnatifid, s, pinnatifid, t, pinnatifid, u, pinnatifid, v, pinnatifid, w, pinnatifid, x, pinnatifid, y, pinnatifid, z, pinnatifid.
THE MOUNTAIN POLYPODY, OR BEECH FERN
(POLYPODIUM PHEGOPTERIS).

POLYPODIUM, Linn.

Clusters of Sycamores circular, without covers, growing from the back of the veins, terminal, or nearly so. Veins disunited at their extremities, their branches (semedes) simple, forked or rarely paniculate.

P. Phegopteris; fronds ovate-triangular, acuminate, planate below; fronds lanceolate, the lower pair distinct, scurfy, usually detached, planate; lobes linear-oblong, blunt; upper plane confluent.

EXPLANATION OF THE PLATE.

PLATE IV.—POLYPODIUM PHEGOPTERIS; SKELETON, M.S. BROWN.

HABITAT—This species is rather widely dispersed, and not difficultly found throughout Great Britain, occurring most abundantly in the north of England and in Scotland, inhabiting shady bauld places, and rossly various which are more or less marshy. In the south-eastern parts of England it appears to be wanting, but it is found rather plentifully both in Wales and in the western counties. It occurs plentifully in Wales, and is also met with in the Hebrides, and Orkney, Scotland, and the Isles of Man. In Ireland it is rare, occurring principally in the northern and western provinces. In elevation it extends from the most level in the west of England, to upwards of 1000 feet in the western highlands.

GEOGRAPHICAL DISTRIBUTION.—This Fern is scattered evenly throughout Europe, extending from Ireland and the Scandinavias northwards through the British Isles and continental Europe, to Spain and Italy. In bith it is recorded from Umbria and Greece, and also as extending along the coast of the Atlas (10. Ridgway). Again: In Africa, it is also scattered as representing; while in America, where it is sometimes known under the name of P. canadense, it is met with from Greenland and Labrador on the eastern side, to Prince Wilson's Sound on the western, extending northwards to the Rocky Mountains, in Canada, and to the southern United States (10. Ridgway).

Polypodium creeping extensively, branched, tough, slender, about the thickness of a straw, dark-brown, pilose and slightly scaly while young, the older portions denuded both of scales and hairs. Scales lanceolate, golden-brown, intermixed with other cobwebby hair-like ones. Fertile numerous, much branched, dark-brown, invested with golden-brown cobwebby deciduous pubescence.

Stipes as long as, or more frequently longer, and often much longer than the frond, erect, brittle, pale-green, furnished near the base with a few lanceolate acuminate pale-brown scales which are soon deciduous, and on the upper part with a few scattered subulate scales; the whole length clothed with minute reversed hairs; distant and lateral on the rachis.

Fertile creeping; the fronds rolled up separately towards the rachis, which is then rolled from the point downwards.

Fronds from four to eighteen or twenty inches in length, including the stipes adherent to the rachis, membranaceous, of a dull pale-green, hairy, ovate-triangular, much acuminate, planate below, the apex of the frond planate. Fronds deeply planate, linear-acuminate, nearly or quite opposite;
THE MOUNTAIN POLYPODY.

the lower pair lanceolate, deflected, sessile, but attached only by their midrib; distant from the upper plane, which are sessile and broadly attached, and, except occasionally the second pair, confluent, so that the united bases of the opposite pairs form by the direction of their two basal lobules a cruciform figure; all the upper plane have their points directed towards the apex of the frond. Lobules oblong-obtuse, entire, or slightly crenato-dentate, directed towards the apex of the plane.

Variation of the lobes consisting of a flexuous sublinear, from which proceed alternate or sometimes opposite veins; these veins extend to the margin of the lobule and are either simple, or become once forked about half-way their length, the simple veins, or when divided, the anterior of the conules, bending a forms at a short distance from the edge of the lobule.

Fructification on the back of the frond, scattered almost equally over the whole surface. Sorv., or clusters of spore-cases, circular, small, quite distinct of covering, arranged in a series near the margin of the lobules, and often becoming confluent in lines. Where the fructification is but partially developed, only one or two of the lowest veins are fertile, in which case the marginal series of sorv. is not very manifest. Spore-cases small, numerous, pale-brown. Spores ovate, smooth.

Duration. The rhizome is perennial. The fronds are annual; produced about May, and destroyed by the early frosts of autumn.

This Form is readily known from its congener by its outline, which is ovato-triangular with an elongated narrowed point; by the pinnato-pinnatifid mode in which its fronds are divided; by its hairiness; and by the direction of its plane.

The fronds in this species become lateral and distant on the underground rhizome, in consequence of its rigid elongation; and they are adherent, that is to say, their edges are not furnished with any natural points of spontaneous separation. The character of an underground complex seems principally relied on by Mr. Newman in establishing his genus Gymnostomum, which consists of the present species, together with P. Bryopteris and P. Roberstonii. More peculiarity of habit, however, are insufficient to mark out generic groups; and cannot be permitted to override the characters afforded by the organs of fructification. In the present case, there is in the characters of the fructification so close a similarity, amounting almost to identity, with those of typical Polypodium, that the separation of these species in we think, unwarranted. In fact, the only differential character of any importance, afforded by the fructification, is that of the medial, not terminal, position of the sorv. on the veins. M. Fée had already founded his genus Dryopteris, agreeing with Fred's section of the same name, mainly on this character, which however, not being constant, must be held to be insufficient.

In cultivation the Mountain Polyody requires an abundant supply of water; and at the same time, in order that this supply may not stagnate about its roots, very perfect drainage should be provided. This is best done by using broad shallow pots, and filling up about two-thirds of their depth with coarse rubble materials, to allow of the percolation of the water, which, moreover, should not be too continuously kept in contact about the bottoms of the pots. Turfy peat, with turf-mould and sand, forms a good compost. The plants are hardly enough to endure cold, but the beauty of the fronds can only be secured by keeping them, at least during the growing season, in some place of shelter, of which none can be more congenial to the plants than a cold frame or its equivalent.

The Mountain Polyody is not liable to much variation. Mr. Wellaston admits only one abnormal form, more or less permanent, which he calls multisellus. The frond in this abnormal form is of the usual outline, but frequently some of the pinnae or pinnales are bidentate or multifid, and occasionally the apex of the frond is similarly divided. It also generally happens that where dichotomous division takes place, the approximate portions are at the same time deperforated.
THE SMOOTH THREE-BRANCHED POLYPODIUM, 
or OAK FERN (POLYPODIUM DRYOPTERIS).

POLYPODIUM, Linnæus.

Clusters of fronds-curls circular without covers, growing from the base of the stem, terminal, or nearly so. Veins dismissed at their extremities, their branches (carnes) simple, forked or rarely pinnate.

P. Dryopteris; fronds pinnate-lobed, ternate, smooth, membranaceous; branches pinnate; pinnae deeply pinnatifid (sometimes pinnate at the base); lobules (or pinnae) oblong, obtuse, crenate or pinnatifid-crenate; stipes glabrous.

EXPLANATION OF THE PLATE.

Plate V.—Polypodiaceæ. from Ashleworth, Wenscombe, Miss S. Bower.

PALAEOGRAPHICAL DISTRIBUTION. The distribution of this Fern in Europe in general. It is found at North Cape the extreme northern point, in England Hondeval and Bæna, in Germany Hungary and Ostria, in Great Britain, France, Switzerland, Italy, Spain and Gibraltar, on both sides of Africa, and the coast of South America. In the New World it is as widely dispersed as in Europe, occurring in Labrador and Greenland on the northwestern side, at Nootka, and along the Atlantic coast from Maine to Virginia, as well as in the United States, and in the Carolinas (W. Carolina).

Rhizome creeping extensively, branched, tough, slender, about the thinness of a straw, dark-brown, almost black, the younger portions scaly. Stipes like those of the stipes, pale Semi-transparent brown, lanceolate. Fibres dark-brown, branched, apparently without pubescence.

Stipes very much longer than the fronds, frequently twice or thrice their length, erect, slender, bristle tinged with purple, and furnished near the base with a few scattered pale-brown lanceolate deciduous scales, otherwise smooth and glabrous; lateral on the rhizome, and somewhat distant. Basal.—A small, quite smooth; that of the central branch deflexed, of the lateral branches spreading.

Veinlets.—A small, quite smooth; that of the central branch deflexed, of the lateral branches spreading.

EXPLANATION OF THE PLATE.

PLATE V.—Polypondium Dryopteris. from Ashleworth, Wenscombe, Miss S. Bower.
THE SMOOTH THREE-BRANCHED POLYPODY.

Branches and those of the two basal pinnules of the lower branches, which latter diverge so as to represent two separate angles. The fronds are ternate, that is, they consist of three nearly equal portions or branches, as indicated by the vernation. Branches pinnate or subpinnate, differing from each other chiefly in this, that while the upper or central one has its sides nearly equal, the two lateral ones have the plane on their lower side larger, sometimes twice as large as those on the upper side, so that they are obliquely triangular. Please opposite, variable in outline from cuneate to linear-oblong, acute, usually pinnate at the base, pinnatifid above, and acute as well as nearly entire at the apex; those of the central branch more decidedly pinnate than those of the lateral ones. Pinnules or lobes oblong to oblong-linear, cuneate or crenato-lunate, smaller and less divided towards the apex.

Variations of the more compound, that is the crenato-lunate pinnules, consisting of a flexuose midrib with alternate ones, one to each lobe, there vein pinnato-ternately branched, the venules extending to the margin. The veins of the ensate pinnules have lower branches or venules. The first anterior vein bears a sessa some distance below its termination.

Fruitation on the back of the frond, and spread over its whole surface. Sorae small, circular, consisting of numerous crowded sporocarps quite uncovered, arranged in a linear often crowded series, along each side of the pinnules near to but distinctly within the margin, the sorus being seated some distance below the apex of the venules. Sometimes the fronds are less abundantly fructified, and the sorl appear distant and scattered. Spores-case small, dark-brown, roundish-elliptical, attached by a slender pedicel. Sporae ovate, roundish, or oblong, with a granulated surface.

Duration. The rhizome is perennial. The fronds are annual, produced about April, and in succession through the summer, and perishing early in autumn.

The nearest affinity of this species is with \textit{P. Robertianum}, from which some botanists do not think it to differ. It can, however, hardly be supposed that those who have been tolerably good examples of both would hesitate to admit their distinctness. \textit{P. Dryopteris} differs from \textit{P. Robertianum} in having a loosely spreading habit; while the fronds of the latter are rigid and erect, with stronger stalks and ribs, and a less membranaceous texture; it differs further in having ternate or three-branched fronds, which is not strictly the case with the latter, although by a misapplication of terms it is sometimes so described. \textit{P. Dryopteris} is decidedly three-branched, as its vernation, compared to three little balls on slender wires, certifies; whilst in \textit{P. Robertianum}, as Mr. Newman well states, the three corresponding portions of the frond never assume this appearance, but, on the contrary, every pinnule is rolled up into a little globe, the pinnule rolled in on the rachis, and the entire frond upon its rachis, so that the frond is of the ordinary pinnate structure. Of less botanical importance, perhaps, but equally or still more clearly available as distinguishing characteristics, are, the perfect smoothness of \textit{P. Dryopteris}, compared with the glandular pubescence of \textit{P. Robertianum}, most readily seen on the stipes and rachis, but equally occurring over the whole plant. These peculiarities, which are perfectly constant in a state of cultivation, mark the plants as abundantly distinct.

Most writers describe a cruciform figure as being formed by the basal pinnules of the opposite sessile plane in \textit{P. Dryopteris}; and it is sometimes figured, as in Mr. Newman's work, in a very marked manner. Some approach to this arrangement is indeed at times observable, but in numerous states of specimens we have never seen it in any marked degree; and when it does occur, two of the four pinnules (the upper pair) are smaller, and nearly parallel, while the lower and larger ones are divergent.

This species is a moisture-loving plant, although, as in most other instances, the moisture must not be stagnant. It is also peculiar a shade-loving Fern; for, though very hardy, and capable of existing under considerable exposure, yet the delicate fronds are damaged and disfigured unless both shade and shelter of some kind is afforded it. It is a good plant for a shady out-door rockery, and also grows readily in pots. It increases with facility by division of the rhizome.
THE LIMESTONE POLYPODY (POLYPODIUM ROBERTIANUM).

POLYPODIUM, Linnæus.

Clusters of Sphenocepu circular, without covers, growing from the back of the veins, terminal, or nearly so. Prime dissected at their extremities, their branches (rachises) simple, forked or rarely pinnate.

P. ROBERTIANUM: fronds erect, rigid, glandulose, pentangular, deltoid, subalternate; lower branches (or pinnae) bispinulate, stalked, their pinnules (or lobules) along obtuse, crinate or nearly entire; the rest sessile; stipes glabrous.


Stipes longer than the frond, often twice as long, stoutish, succulent when young, becoming stiff and erect, abundantly seamy above the base, and with a few scattered deciduous scales upwards when young, minutely glandulose, pale yellow-green, dulled by the glandulosity of the surface; lateral to the rhizome, distinct, adherent. Rachis glandulose, the part forming a stalk to the lower pinna more slender, and distinctly smaller, than that between the first and second pairs of pinnae.

Veinæ circinate; the pinnules rolled up separately into little globules, the pinnæ then rolled each separate forwards towards the main rachis, which is next itself rolled up.

Frondæ six to eighteen inches in height, including the stipes, which is usually more than half, sometimes two-thirds at least, of the length; erect, of a firm herbaceous texture, deep dull greyish-green, glandulose, deltoidly-pentangular, but with the pentagons less manifest than in $P. Depuytleri$, in consequence of the less comparative length of the stalks of the lower pinna. The fronds are not truly ternate, though the larger size of the lower pinna gives them a subternate appearance; they are

EXPLANATION OF THE PLATE.

PLATE VI.—POLYPODIUM ROBERTIANUM; FROM LINDEN, TRANSLATED, W. H. POUND.

HABITAT.—This species is not known to occur in Ireland, so that it is not local in the southern counties of England, but it is found plentifully in various other parts of England, from Somersetshire to the northward, in Dorset, in the county in the Somerset district it becomes in about 500 feet above the sea, and in the north reaches to 600 feet or upwards. It also occurs plentifully near Monteith Hyperb and at other places in Wales. The rhizomes of Glascowilla seem to be its localities. It occurs below exclusively as exposed rocky limestone tracts.

GEOGRAPHICAL DISTRIBUTION.—The plant appears to be not with a maximum part of Europe, as, for example, in Norway, in England, in France, in Switzerland, in various parts of Germany, and in Hungary. In Asia, it has been gathered by Mrs. Hecker at Thessal; in the Euxinian montane at an elevation of 4000 feet (Miss. Harker). It is North America is covers both in the Calculated State (Miss. Lyman), and in Canada.

THE LIMESTONE POLYPODY.

Bipinnate, with the lowest pair of pinnae sometimes subpinnate on the posterior side, which is the most developed.

Pinnae variable, opposite below, the lower pair largest, obliquely triangular, stalked, often bipinnate; the next pair stalked or needle, pinnate-sinistrifid; the upper ones all needle, pinnate or pinnatifid, becoming gradually less divided towards the apex. Pinnae of the lower pair larger on the posterior side, those of the other pinnae nearly equal, those of each succeeding pair resembling the smaller ones of the pair next below them. Pinnae or lobules oblong obtuse, entire or crenated.

Veination of the lower posterior pinnae consisting of a stout midrib, with a flexuous vein running up the centre of each lobule; this is alternately branched, the venulae extending to the margin, simple, or very commonly forked; the venulae if simple, and the anterior costa if divided, bearing a score near the margin. Or, the vein extending up the lobule may be regarded as an indusium; its branches, sometimes simple and serrulate, veins, and the branches of these, of which the posterior is fertile, venules.

Fruitification on the back of the frond, scattered over its whole surface. So small, circular, consisting of numerous crowded spore-cases, entirely without indusia, arranged in a linear submarginal series along each side of the lobules; or about the sinus, in a series between the midrib and margin, when the lobules are but slightly developed; often more or less confluent. Spore-cases pale-brown, roundish-obovate, small, numerous. Spores ovate, or oblong maroniaceous.

Duration. The rhizome is perennial. The fronds are annual, the earlier ones growing up about May, and the latest perishing in autumn.

We advisedly retain this species, as well as those represented on Plates IV. and V. in the genus Polypodium, from a persuasion of the inconvenience and impropriety, may the folly—of needlessly multiplying genera. Characterised among the amabile Ferns by free veins and naked sorts, the genus Polypodium, thereby relieved of a host of species having pedunculated veins, is perfectly intelligible, and though extensive is not unwieldy. Mr. Newman would separate from it the three plants above referred to, under the name of Gymnoscepus, which group, so far as any intelligible characters have been assigned to it, would be distinguished by having a slender black underground stipe—a feature which is assuredly not of generic value. Peel had indeed as we have already remarked, proposed at a much earlier date a nearly correspondent group as a section of Polypodium; and M. Fée had adopted this group under the name of Plagiopodium as a genus, in his admirable Genera Pteridium, distinguishing it by a character which would be of far more importance than the nature of the rhizome, if constant, namely, that of having acaul sorts, or, in other words, the receptacle of the sort seated below the apex of the frond. Unfortunately, however, in this very genus, there are species which produce, at the same time, both acaule and terminal sorts, so that the character is not distinctive. The three species referred to possess, however, in common, a peculiarity of some importance, their fronds being adherent to, or not articulated with, the creeping rhizome.

The chief differences between P. Robertianum and P. Deppeanum have been already pointed out, under the latter species. The most important of these is the pinnae rather than ternate mode of division of its fronds; and this combined with the distinctive features afforded by its stouter, erect, and rigid habit, the glabrousness of its entire surface, and its constancy both in the wild and cultivated state, leaves no reasonable ground to doubt its permanent distinctness from its near ally.

This is a hardy growing plant under cultivation, provided its roots are well drained, and the soil in which it is planted is kept rather drier than usual with Ferns. This latter point may be effected, both by withholding excess of water, and by adding porous material to the compost. Limestone or old mortar are congenial additions. It bears exposure to sun also better than the majority of Ferns. The creeping rhizome affords a ready means of propagation.
THE ALPINE POLYPODY (POLYPodium ALPENSTRE)

POLYPodium, Linn. eus.

Clusters of sparse-stem circular, without covers, growing from the back of the veins, terminal or nearly so. Feves dissected at their extremities, their branches (coleoids) simple, forked or rarely planate.

**P. Alpens tre**: fronds lanceolate, herbaceous, sub-erect, bipinnate; pinnae narrow lanceolate from a broad base, spreading or ascending; pinnae ovate-oblong, or subobtusely ovate-lanceolate; pinnae wide; segments oblong, bluntish, serrate; stipules short; secondary rachis narrowly winged; (rarely sparsely squarrosely indumented).


**HABITAT**—This plant has been in use, so far as it relates to the United Kingdom, found only in the Highlands of Scotland, and since it was cultivated elsewhere in England, and North of England, so we have been corroborated by Dr. J. d'Uz., of Edinburgh, it is one of the most abundant of forage, accorded perhaps only by frequency by Eastern Scotland, in the Cultivation, consisting of about 2000 feet above the sea, and perhaps lower, and associated with Alpinias in Scotland; consisting of about 2000 feet above the sea. As a rule, in those mountains, it grows in company with Alpinias, at 2000 to 3000 feet elevation, usually at from 3000 to 4000 feet, the latter disappearing, and the former becoming abundant. In the Highlands, it is probably sieved throughout the Highlands, and may even reach further southward, on the high mountains southward and the North of England. On the high mountains, it is found in exposed places, the fronds are very commonly changed either by wind, spring frost, or by winds, and it is only in the most sheltered situations that perfect optimates can be obtained. This variety fronds have been only found in Glen Proven, Clun, Forfarshire, by M. d'Uz., etc.

**GEOGRAPHICAL DISTRIBUTION**—In Europe, this species is found in Norway, Sweden, and Lapland; in Russia, both in Europe on the west, and in Asia Minor on the east; in the Alps of Switzerland, and in Germany. The variety found in the Cabins. A scarcely distinguishable plant, perhaps identical, was collected by Rambly at Stina, in North West America (W. H. Franchet).

Covers short, erect or decumbent, consisting of the persistent crowded bases of the fronds attached around a central axis, the whole forming a stout roundish mass, frequently twisted.
THE ALPINE POLYPODY.

Sporae, short, from about one-sixth to one-fourth of the entire length of the frond, stout, swollen near the base, clothed sparingly with ovato-lanceolate pale-brown scales; terminal and adherent to the caudex. Rachis stout, rounded below, channelled in front; the rachis of the pinnule furnished with a very narrow leafy wing on both sides, connecting the pinnules.

Fernation distinct.

Frons from one to three feet and upwards in height, erect or ascending, herbaceous, dark dull green, lanceolate, the base narrowed to about the same degree as the point; pinnate, or bipinnate. In fronds, of which the leafy portion measures about twenty inches in length, the greatest breadth is about six and a half inches. Plane broadly linear or lanceolate from a broad base, tapering to a narrow point, numerous, crowded above, more distant below, spreading or somewhat ascending. Pinnules ovato-oblong, sometimes ovato-lanceolate, or oblong-acute, acute, with a narrow attachment at the base, but connected by a narrow membranous wing which, borders the rachis; they are deeply plumose, and in the most vigorous fronds so much so, and the segments so far distant from each other, as to appear again pinnate. Segmente oblong obtuse, sharply serrate, especially at the apex and on the anterior margin. The subpinnate fronds have the segments doubly toothed.

Fremation of the pinnule consisting of a slightly flexuous midrib from which branch a series of alternate pinnate veins. veins of the segments also flexuous, with simple alternate rami, one of which is directed to the point of each marginal tooth; the lowest anterior venule, which is directed towards the lowest anterior tooth, is usually soriferous, and when this only is so, the sorit form a series on each side the midrib. But, at a short distance from it, and just above the sinus of the segments on their anterior margin; sometimes, however, some of the other venules are also fertile, and the sorit are then placed near the margin of the segments. In the subpinnate fronds, which have the segments more or less doubly toothed, the venules are occasionally forked, the anterior veinlet, or sometimes both, bearing a sorit; in these examples the儒, three or four on each side the segment, form tolerably distinct sub-marginal lines. The sorit are in all cases attached near to, but below, the apex of the vein, which reaches to the margin.

Fructification on the back of the frond, occupying the upper two-thirds of its length. Sorit small, circular, usually distinct, but sometimes crowded, and becoming confluent; usually naked, but sometimes (rarely and in abnormal-looking sorit) the spore-cases are somewhat lateral, and a membrane, which appears to be an abnormal development of the receptacular expansion of the vein, is produced, simulating an abortive or spurious indusium. Spore-cases roundish obclavate, brown, numerous. Spores roundish or oblong, somewhat mucilaginous.

Duration. The caudex is perennial. The fronds are annual, growing up in April or May, and perishing early in autumn.

The Fern is at once distinguished among the British Polypodies by its short thick erect tufted caudex, and the lanceolate form, and pinnate or bipinnate mode of division of its fronds. It has certainly a general resemblance to Adiantum Filicifolium, with which it appears to have been very generally confounded, but the fructification, as usually borne, is very different, and even its resemblance to that species is not found to be so close as at first sight appears to be the case.

The short massive caudex with terminal adherent fronds, would lead those botanists who derive generic distinctions from the mode of development, to separate the present species from Polypodium. It does in fact represent one of the three new genera in which Mr. Newman has disposed the five Polypodium which inhabit Great Britain.

The supposed 'inclusa,' ascribed to this plant, we have noticed both in living plants of the species, and in dried specimens of the variety flexile, but they are only occasional, and even rare, and appear
THE ALPINE POLYPODY.

never to occur in company with the more perfect sori, but only where the spore-cases are much fewer in number than usual. To us they had the appearance of incrusted membranaceous-filamentous expansions of those points of the veins which formed the receptacles; and they appeared to arise from some abnormal condition, which had limited the power of producing spore-cases to the side or base of the receptacle, while on the upper side the cells of the receptacle had been directly prolonged into the indusial membrane; but in no ease have we seen what could be considered as a true indusium. On the other hand, Mr. Rylands, of Warrington, who regards the plant as an Athyrium, has communicated the result of some observations made in 1856, in company with Mr. Wilson, from which the following passages are quoted:

"In those sori which are large and fully ripe, the indusium could not be seen, though I imagine dissection would show traces of it. One sori was found still closed, the spore-cases little developed; it was reniform, and lay alongside the venule. In many of the smaller sori remains of an indusium was seen, and in two or three it was as nearly perfect as one may expect to find it. The margin was lacinated with fine projecting points. The lacinated margins are produced by the rupture of the cuticle, and the fine points are the cell-walls thereof. The indusium is very tender, shrivels, and where the spore-cases are numerous, is speedily concealed or perhaps displaced by them; it is smaller than in the other forms of Athyrium. These peculiarities seem to result from the rupture of the cuticle taking place early in the progress of development of the sori; but that it has the true indusium of an Athyrium I think cannot be further disputed." Subsequently, Mr. Rylands writes: "The 'indusia' of alpestre are not, I think, confined to the imperfect sori, though after bursting they soon shrivel and disappear in the larger ones. I have compared it with A. Flexilefusum molle, and though in texture, position, and general character, there was little difference, I am compelled to admit that in the case of alpestre the spore-cases seemed to lie within the proper cuticle of the frond, while the evidence of a distinct membrane was much clearer in molle. This supports your view to some extent; but, all things considered, is it sufficient to remove the plant from others so evidently its allies?" When so many of the sori—not only the majority, but all, with few exceptions, and those exceptions having strongly marked imperfect or abnormal characters—really appear to be the round naked masses of Polypodium, we have no alternative, repudiating as we do the other grounds of separation already adverted to, but to retain this plant in that genus.

The Flexile Polyposy—P. ALPESTRE FLEXILE—(PLATE VII. P. 1) so communicated to us by Mr. Backhouse, is certainly a very distinct variety, and may be a species, the former being the view adopted by its only discoverer, Mr. Backhouse, who writes: "Dissimilar as it is from P. alpestris, I shall continue doubtful of its specific difference if it does not turn up in other places." It differs in being more slender and flaccid: in having a much narrower outline, and consequently shorter pinnules, with a considerably reduced number of pinnules; in the form of the pinnules, which are oblong, narrowed below, semilanceolate, and distinctly toothed; in the very short stipes, becoming obsolete in the cultivated plants; and in a tendency to bear perfect sori at the base of the frond, while the apex is barren—the reverse of what usually happens. The absence of stipes, which Mr. Newman includes in his definition is not constant, the wild specimens sent by Mr. Backhouse having a distinct stipes of about a couple of inches; this part, however, is always very short. The fronds are from six or seven to twelve or eighteen inches in length; the pinnules spreading or more or less deflexed, short, with about six or eight pairs of pinnules. The sori are few, six or eight on a pinnule, usually distinct. In the cultivated plant the clusters are very numerous in the lower half, and scarcely extend upwards beyond the middle of the frond; but this character is not constant, one frond communicated by Mr. Clapham, and the wild fronds from Mr. Backhouse, being fructified throughout, and another obligingly forwarded by Mr. Newman being fertile both at the base and apex. In this latter, which was only sparingly fructified, the spore-cases appeared for the most part to be attached to the side of the veins, and the sori were slightly elongated rather than circular, indicating an affinity with Athyrium, and there was in some cases a peculiar membranaceous-filamentous development in the position of an indusium, again indicating
THE ALPINE POLYPODY.

affinity with the ciliated indusia of Athyrium, but at the base and apex of the frond, the more perfect sort were without trace of this indusial growth, and truly polycephal. It seems to be a difficult plant to cultivate in the climate of the south of England, languishing, probably, for the pure air and cool breezes of its northern home.

We have seldom seen cultivated plants of this species thriving with the vigour they possess in their native hills, except when grown fully exposed to the air in sheltered shady situations. When confined, they often produce but puny and flaccid fronds. It roots, however, freely in a sandy compost of loam and peat, and with a free admission of air may be grown in situations where it is necessary to shelter plants of this nature from atmospheric impurities. In all cases where a pure atmosphere is enjoyed, it will no doubt be found to grow better on the open rockery, than in pots under glass; and when, from the cause just mentioned, it is found requisite to adopt frame or house culture, the plants should be provided with as airy and light (though shaded) a situation as can be afforded. It may be increased by separating the lateral crowns of the canes.

We learn from those who have visited the native localities of this Polypody, that it is a very variable plant, but whether the variations are such as would be perpetuated under other conditions than those in which they naturally occur, we have as yet no information. The forms we have received have a great analogy with those of Athyrium Filix-femina; and the most striking of them are enumerated as sub-varieties below, with the object of recording, as we have done in the case of other species, the most marked modifications of development to which this is subject.

1. flavum (M.). This has been already noticed. It is a lax narrower form; and bears perhaps in its irregular toothing and singular habits of fructification, some indication of being a monstrous or abnormal variation, though we believe it is perfectly constant to the peculiarities above assigned to it. Only found by Mr. Backhouse, but in some quantity, in Glen Prosen, Cluny, Perthshire.

2. Lawsonii (M.). In this the fronds are large, stout, subtripinnate; the pinnules elongate, ovato-lanceolate or sometimes sublimbus; subacute, deeply pinnatifid; with obtuse serrated segments, the lowest of which is almost separate. We have received it from Mr. G. Lawson, and Mr. Cresall, gathered at the White Waterfalls and elsewhere in the Cluny mountains; Mr. Cresall has also communicated the same form from Lochnagar, Aberdeenshire.

3. tripinnatum (M.). The fronds of this form are large, stout, tripinnate; the pinnules, which are from an inch to an inch and a half long, are oblong-ovate, with acute, oblong, secondary pinnules, the upper of which are united by the wing of the rachis, but the lower are separate to their base. It is analogous to the states of Athyrium Filix-femina var. Deccan. Mr. G. Lawson gathered it at the Wells of Dee, Aberdeenshire.

The smaller and more usual—at least the more usually collected—forms of this plant, are analogous to Athyrium Filix-femina var. Deccan, and the other less divided states of the Lady Fern; even these, however, exhibit differences in habit, some being quite erect, while others are spreading. We suspect, also, that a dwarf barren monstrous shy-growing plant found by Dr. Dickie on Ben Macdhui, and hitherto referred to Athyrium (var. praeurnum), belongs rather to this species.
Plate VIII.

THE MOUNTAIN PARSLEY FERN, or ROCK BRAKES
(Allosorus Crispus).

ALLOSORUS, Bernhards.

Clusters of Sori-cone round (or elongate oblong), sprouting from near the apices of the sterile, distinct, at length becoming laterally confluent. Inflorescence none, simulated by the involute matted margins of the pinules of the contracted fertile fronds which cover the sori. Fronds simple, or forked from a distinct midrib; veins disunited at their extremities.

A. Crispus: fronds of two kinds, ovato-elliptical, bi- or tri-paniculate; ultimate divisions of the sterile fronds ovate wedge-shaped, often bilabiate; of the fertile linear-oblong; sori roundish.

Habitat.—The Fern is rare with native flat-topped, though locally, on the summits of Scotland and those of the northern parts of England, and occurs sparingly in a few scattered stations in the districts of the Mersey, the Trent, and the Severn, also in Devonshire. In Wales it occurs, though not abundantly, in several counties in the north, including the boundary district, while in South Wales it is more rare. In Ireland it is rare, being recorded only from the counties of Down, Antrim, and Armagh. It is a hardy plant, preferring rocky situations, and thriving to poor sandy or stony soils, where it is protected from excess of moisture. It occurs nearly at the sea level in the town of Llanbadarn. In North Wales it descends to about 450 feet, and in the West Highlands it ascends to an elevation of upwards of 2000 feet—1200 yards according to Mr. Watson.

Geographical Distribution.—The species is widely distributed over Europe, occurring to the north, in Lappland, Norway, Sweden, and Denmark; again in Great Britain and Ireland, in Germany, Hungary, Switzerland, and France; and those extending southward into Spain and Italy. It is found at Venice (Mr. Rodol). Kirtlapp reports it near Craighelun, an island in the North Pacific Ocean; but this plant, which he supposes near Allosorus Humilis, is probably identical with the Cryptogramma cunninghamii, R. Br. The Bent Indian Cryptogramma Brunoni, is probably distinctly from A. cunninghamii.

Explanation of the Plate.

PLATE VII.—Allosorus Crispus, from Cursus, Luxembourg, Mrs. M. Ross.

EXPLANATION OF THE PLATE.

PLATE VIII.—Allosorus Crispus, from Cursus, Luxembourg, Mrs. M. Ross.

Caulis small, short, tufted, erect or decumbent, acule. Scales membranous, pale brown, subulate.

Sori numerous, branchless, dark brown, wiry, and slightly covered with small hair-like scales.

Stipes as long as, or unusually longer than the frond, pale green, slender, smooth, with a few scattered scales near the base; adherent to the caudex. Sori smooth.

Vernation circular.

Frond from four to twelve inches high, including the stipes, herbaceous, of a lively green, terminal on the caudex, triangular or ovate-triangular in outline, of two forms, and hence described as dimorphous. Sterile fronds leafy, usually about as long as the stipes, bi- or tri-paniculate, smooth.
THE MOUNTAIN PARSLEY FERN.

_Pinus_ alternate or sub-opposite, triangular-ovate, spreading, the lower ones largest. *Pinnulas* alternate, ovate, largest on the lower side of the pinna, pinnate or plumifoliate, the pinnae or lobes ovate or oblong-ovate, with sinuously shallow-toothed margins, this form of development apparently representing fertile fronds, whose fructiferous growth has become arrested and abortive. *Fertile fronds contracted, usually about one half as long as their stipes, usually tripinnate or even quadripinnate in the basal portions of the lower planes. *Pinus alternate or sub-opposite, ovate, spreading, the lower ones largest. Pinnulas* alternate, ovate in outline, bipinnate or pinnate-plumifoliate in the lower pinna, pinnate only above. All the ultimate divisions are stalked, oblong, and linear-oblanceolate the involucre of the margins, which are pale-coloured, crenate, and indented.

Variation of the barren fronds consisting of a slender vein extending along each pinna, and running from each of its lobes or pinnae, this again becoming alternately branched, so that a vein runs along the centre nearly to the point of each segment; simple where the segment is undivided, and forked where it is divided, a branch of the vein being directed towards every marginal tooth. In the fertile fronds a vein enters each ultimate division, and passes in a sinuous course to its apex; this throws off alternate veins, which extend nearly to the margin, and are usually simple, but sometimes forked, and bear a coma near to their extremity.

Fructification on the back of the frond, and usually occupying the whole surface. *Sori* small, roundish, situated near the extremity of the venule; at first distinct though contiguous, ultimately becoming laterally confluent and forming a continuous line. No *indusia* is present, but the margins of the pinnae, somewhat pallid but not altered in texture, are incurved over the sori. *Spores* small, elliptic-ovate, stalked. *Spores* smooth, roundish, oblong, or bluntly triangular.

Duration. The emuscle is perennial; the fronds are annual, springing up in May and June, and persisting in the course of the autumn.

The Parsley Fern is readily known by its dwarf tufted parsley-like appearance, coupled with the dissimilarity between its much-divided sterile and fertile fronds, of which the former have the segments broad, flat, and leaf-like, and the latter have them involute at the margin, so that they become contracted and somewhat post-like or siliqueform. These features distinguish it from all other of our native ferns.

Few, if any, of the few species which are indigenous to Britain have given rise to such absolutely conflicting opinions as to the genus to which it belongs. Linnaeus and the older botanists referred it to _Osmunda_ and _Osmunda_. Of the other names which have been applied to it—all apparently under the impression of its being a pteridoid form—that of Bernhardi claims priority, and we adopt it with some limitations. Prior, and subsequently Kunze, adopting Bernhardi's name, associate with this species various true _Pteridium_ with which it has no affinity, and which must consequently be again dissociated. The affinities of our plant have been well pointed out by Mr. John Smith, who considers that it is not pteroid, but polyposid. It is in fact, polyposid-grammitoid. The sori are round or elongated, and distinct, and the involucre of the margin represents not an inclusion but a contraction of the frond, the incurved part being mottled in texture, and not membranous, which they would be if true indica.

This form is not difficult of culture under conditions which protect its fronds from the sun, and its roots and canal from stagnant or accumulated moisture. In free well-drained soil and in a cool shady frame it grows remarkably well, but should be guarded against damp whilst dormant in winter. It may be increased by division, but it is safer not too often to disturb a thriving plant for this purpose. Because being consequently often had to its native haunts for a supply of plants, it may be hinted that, in the case of thin, and other forms which naturally occur among rocks, and are consequently somewhat difficult to remove and establish, it is far better to select the younger and smaller plants for the purpose of removal, than the larger and older masses which tempt the collector's hand.
THE ALPINE SHIELD FERN, OR HOLLY FERN
(POLYSTICHIUM LONGITIIIS).

POLYSTICHIUM, Roth. Schott.

Clusters of Sporo-cones circular, medially, rarely terminal on the stipes, covered by an indusium, or membranaceous scale. Indusium oblongar, petaline, &c., attached at or near its centre, the margin becoming free. Veins pinnato-furcate; stipes direct, denuded at their extremities, the lower anterior one in such fashion, on the fertile parts of the frond, bearing a sumus.

P. LONGITIIIS: fronds pinnate, narrow linear-lanceolate, rigid; pinnae lanceolately lanceolate, nearly, sparsely ciliato-serrate, the upper ones nerved at the base on the upper side, obliquely wedge-shaped or rounded on the lower; the lowest ones often with both an anterior and posterior suracute.

EXPLANATION OF THE PLATE

PLATE IX.—POLYSTICHIUM LONIIIIIS. From Ben Bolion, Sigs, Ireland, N. E. Wood.

HABITAT.—The Fern may be considered as an alpine species. It is abundant on the mountains of the Scottish Highlands, where it has a range of from about 1500 to 3000 feet (1000 yards) above the sea. It descends to about 1500 feet in Yorkshire. Its northern most recorded limit is in North Wales, in the county of Carnarvon. It is found again in Yorkshire and the Lake district; and even occasionally in the Highlands of Scotland, its northern limit being Rosewater and Railton, perhaps Oxley, from which it has been reported. In Ireland it is found in the counties of Donegal, Laxine, Fergin, North, and Kerry. There are distinct reports of its having been met with in the Scottish Highlands (Galloway), in South Wales (Gower peninsula), and in the district of the Ouse in England (East Riding, Northamptonshire), but these habitats all need confirmation.

GEOGRAPHICAL DISTRIBUTION.—The Holly Fern would appear to be extensively distributed over Europe, especially in the northern and central portion, occurring in Ireland (St. Lively), Lapland, Sweden, Denmark, Russia, Germany; Brazil, Bolivia, and Iceland, France, Switzerland, Italy; and southwards into Spain (H. Rosier, and M. Perp), and Greece (H. Rosier, and M. Bii). In Asia, it occurs in Kasmir (H. J. Smith), on the Byzantine Alps, extending as far as Kandahar; whence it passes to the Rocky Mountains in North-West America (H. Rosier). A distinct species, the alkalius variety of Kcllaw, intermediate between P. Lontithis and P. Atnivitaire of Madeira, is found in California, and at Nootka Sound.

Surface thick, slowly elongating, erect or decumbent, consisting of the densely packed bases of decayed fronds surrounding a central woody axis, and clothed in the upper part with the numerous scales which remain about the bases of the stipes. Filifer stout, rigid, branched, dark brown.

Stipes usually short, from half an inch to two inches, or sometimes in Welsh specimens three inches in length, clothed with large ovate or broadly-lanceolate reddish-brown pointed chaffy scales; terminal and adherent to the rachis. Rachis densely scaling, with narrower lanceolate and subulate pulvinate scales.

Variation circinate.

Frond, from six to eighteen, or rarely twenty-four inches in length, deep green, paler beneath, of rigid leathery texture, erect or pendulous according to the conditions of growth, linear-lanceolate, pinnate. Pinnae undivided, numerous, with one of the margins, usually the anterior one, bent back from the plane of the rachis and usually crowded, so that when the frond is flattened they become
THE ALPINE SHIELD PERN.

overlapping on the upper part of the frond, though distinct and sometimes distant below. They are very rigid, and have scattered over their under surface numerous small hair-like scales. They are, moreover, very shortly stalked or scale, lanceolate-falcate, from three-quarters of an inch to an inch and a quarter in length in the widest part, having an acute point, and an acute auricle at the base on the posterior side, the base on the posterior side being obliquely sloped or rounded off in all the upper plumes, but often produced into a posterior auricle in the lowest ones. The margin is serrated, the serrature tipped by hirsute-like processes, with minute intermediate teeth.

Functions generally indistinct, but often more conspicuous in specimens from Wales, where the growth seems more lax. There is a midrib extending to the apex of the pinna, and diverging from it, at the very point where it enters the pinna, is a principal branch or vein which extends to the apex of the auricle; this branch is pinnately forked on the same plan as the midrib, but on a smaller scale. The rest of the veins on each side the midrib are pinnately forked, i.e., they are branched, but the branches are so placed that at each ramification the vein seems to have separated into two nearly equal and but slightly diverging parts. In average specimens there are three or four of these ramifications to each vein near the base of the pinna, then two and finally one in those near the apex. The rachises and veins are lost in the substance of the frond just within the margin, one being directed into each marginal tooth. In smaller specimens the number of ramifications in the veins is fewer.

Fruitification on the back of the frond, and usually confined to the upper half, though sometimes extending lower down. Sori round, indistinct, forming a line on each side the midrib, halfway between it and the margin, and also in a similar way a line on each side the principal vein extending into the auricle; they are of variable size, but often large and crowded, and then generally become concolor in age; they are attached to the anterior branch of each fascicle of veins, and are medial, seated nearer to its base than its apex. Indusia, or cover to the spore-case, membranaceous, orbicular, umbilicate, and peltate, or attached to the receptacle by a short central stalk. Spore-cases numerous, globose, stalked, deep brown. Spores small, round or oblong, muricate.

Duration. The cuneus is perennial, and the plant evergreen, the fronds, which appear, as is usual, in spring, attaining their maturity by the autumn, and remaining in full vigour through the winter onwards.

This plant may be taken as the type of Potystichum, a genus established by Roth several years prior to the publication of Athyrium, which has too long and too generally been allowed to supersede it. It is also the type of Potystichum in the restricted sense proposed by Schott, whose views we adopt.

It is known from perfectly developed states of the cognate species by its being simply pinnate, but imperfect and dehiscent forms of them which sometimes occur are only pinnate, and from these it is distinguishable with difficulty. The rigidity of texture, the strongly spinous margin, and the tendency to inflation in the pinna, offer the readiest marks of distinction from these anomalous congeneres.

Abnormal forms of this species are very rare. Mr. Wallis has communicated notes of the two following:

1. multifida: this has the fronds divided at the apex. It is probably rather to be considered as an occasional and accidental variation, than as a true variety in the usual sense.
2. prolifera: this form produces small bulbi in the axils of the lowermost pinnae, and these produce young plants when the fronds drop from decay.

The cultivation of P. Lonchitis will be noticed under that of the following species.
THE COMMON PRICKLY SHIELD FERN  
(POLYSTICHUM ACULEATUM).

POLYSTICHUM, Roth. Schott.

Clusters of Spore-case circular, medial, rarely terminal on the fronds, covered by an indusium or membranous scales. Indusium orbicular, peltate, i.e. attached at or near its centre, the margin becoming free. Texas platano-durate; spore-cases direct, ditennate at their extremities, the lower anterior one in each fascicle on the fertile parts of the frond bearing a spore.

P. ACULEATUM: fronds bipinnate, lanceolate or broad linear lanceolate, rigid; pinnules distinct, and attached by their wedge-shaped base, or obliquely document, on the anterior basal ones larger, all prickly serrate; spore infundibuloid.

EXPLANATION OF THE PLATES.

PLATES X. XI.

HABITAT.—A widely dispersed and not uncommon plant, in daily hedgerows, and similarly sheltered situations. It is found all over England, Scotland, and Wales, and in the majority of the countries, the records of the variety Abscis is showing an equal side of not wider range. The few records of Ireland also yield it, as in the Channel Islands, but we are not aware of it having been found in the Northern or Western Isles. It occurs at the sea level, in the south-western parts of England, and in the form of Abscis, which seems the more common in Scotland & occurs to uplands of 2000 ft in the Highlands.

GEOGRAPHICAL DISTRIBUTION.—This Fern appears to be found nearly over the whole of Europe, its occurrence being recorded from the Scandinavian kingdoms through Central Europe to the Spanish Peninsular, but we are not aware of its occurrence in France or Turkey, although on the more obscur and right P. Abscis is found in the forester, the presence of P. aculeatum to be expected. In Asia it is found in the Himalayan districts from Calcutta to Kukrama; and in various parts of British India, (U. Madura, and E. Scotland), the Himalayan borders India, and A. absicis of Wallis, not being distinguishable from the British, Abscis, and the A. absicis of Don being the same with the
COMMON PRICKLY SHIELD FERN

British Columbia, as appears from authentic specimens in the Herbarium of the Linnean Society. In America, its range extends from the eastern United States (E. Handel, and Mel. Bot.) to Manitoba, and Minnesota to California on the north-west coast (E. Handel, and Zucc. Bot.). Specimens, which are probably not Botrychium, have been gathered in Montana (E. Handel, and Zucc. Bot.).

These South American ferns, if not specifically named, are classified under the species P. cernuum, P. aristatum, P. auriculatum, P. aristatum, and P. auriculatum. From the Island of New Zealand, the A. pendulum of Taxa Nova's Fern, and the A. cernuum, and A. cernuum of the Botanical Garden.

Common thick, tufted, erect or decumbent, becoming woody in age, consisting of the bases of decayed fronds closely surrounding a woody axis, slowly elongating, in the upper part seedy. Scales broad ovato-lanceolate, numerous, dark brown. 

Stipes short, three to four inches long, densely scaled with broad ovato-lanceolate dark brown scales; terminal and adherent to the rachis.

Rachis stout, rounded behind, rounded and channelled in front, densely scaled, the scales less numerous and hair-like above, more numerous and intermixed with broader ones below, gradually merging in size with those of the stipes.

Ternation circinate, the main rachis becoming recurved before the unfolding of the frond is completed; the pinnule convolute towards the main rachis.

Frond from one to three feet high, and from four to seven inches across, rigid, leathery, smooth and dark green above, paler beneath, more or less spreading, occasionally somewhat drooping, lanceolate in the typical form, narrowly-lanceolate in the variety, bipinnate. 

Pinnules numerous, obliquely-lanceolate, broadest at the base, acuminate, pinnate at the base and for a part of their length, sometimes nearly to the apex, in other cases the basal pinnules only being distinct; the upper ones alternate, the lower ones nearly opposite and diminishing in size. 

Pinnules ovato-lanceate or elliptic acute and aristate at the apex; all or the basal ones only acuminate on the anterior side, the acute acute and acuminate; aristate, subulate, and attached by the wedge-shaped base, or decurrent; the basal portion entire, and when distinct, obliquely inserted on the posterior side, truncate on the side next the rachis, the rest of the margin toothed with unequal adpressed mucronate serrations. The basal anterior pinnule on each pinnule is generally larger, often much larger than the rest, and more strongly awred, and the pinnules are all more or less convex; on the under surface are scattered fine hair-like scales. The typical form has the pinnules mostly distinct, the variety has them mostly decurrent; in some plants, apparently resulting indifferently from youth and heredity, they are obsolete, the pinnule being merely more or less deeply toothed, somewhat resembling those of P. lanceolata; it is in this imperfect condition of the plant which has been named lanceolataevida.

Venation of the pinnules consisting of a fissurose midrib, with alternate branches or veins, which are again fissurately-branched alternately, the more producing three or four, the upper two or three branches or veins, of which the lowest anterior one is more or less trifid. In the aristate portion at the base, the veins are more prominent than in the upper portion, and give off a greater number of simple or forked veins, some few of which on both sides may produce sori.

Prostration on the back, and usually confined to the upper half of the frond. Sori, round, indistinct, seated much below the apex of the pinnules, in a line on each side of the midrib of the pinnules, and also of the veins of the pinnules; often crowded, sometimes becoming confluent; attached to the lowest anterior veins of the frondlet of which, or, at the aristate base, to the veins on either side the vein; but there also to the anterior branch if they are forked. Indusium membranaceous, orbicular, peltate, and unilicate. Spore-cases numerous, dark brown, roundish-chocolate, stalked. Spores very slightly muricate.

Duration. The exuder is perennial; the fronds are persistent through the winter and the following summer, though sometimes damaged by severe frosts. The young fronds grow up in May.
THE COMMON PRICKLY SHIELD FERN.

\(P.\) aculeatum is very difficult to distinguish from its near ally \(P.\) angulare, and yet, viewing the British forms, they appear to be distinct. Indeed, were it otherwise, a series varying through every gradation from pinnate to tripinnate must be united, and all hope of defining a species would be at an end. While thus admitting the difficulty of discriminating between some forms of these species, and without presuming to lay down any infallible rule for effecting this object, we may point out how they may with tolerable certainty be known from each other, presuming that in the application and appreciation of the distinguishing peculiarities some general knowledge of the plants is desirable:—1. \(P.\) aculeatum is a stouter, more erect, and altogether more rigid plant than \(P.\) angulare, which is normally lax and herbaceous, equally large or even larger in its size. 2. \(P.\) aculeatum has its pinnules either confluent or decurrent, in which cases there is no difficulty whatever in distinguishing it; or, when the pinnules are distinct, as in the most perfect plants, they are wedge-shaped at the base, the anterior side being truncate, and the posterior obliquely incised in straight lines; the two lines describing an acute angle by the apex of which they are attached to the rachis. In \(P.\) angulare the truncated anterior base has a more curved outline, and the two lines of the base describe a right angle or an obtuse angle, at the apex of which is a distinct slender petiole, by which they are attached. 3. \(P.\) aculeatum has its sori medial, that is attached at a point along the middle part of the rachis; it is in fact nearer the base of the venule, i.e., the point of furcation, than the apex, which is carried out to the margin of the pinnule. In \(P.\) angulare the fertile venule stops about midway across the pinnule, and the sori is commonly placed at or almost close to its apex. These peculiarities observed in connection with each other will serve to reduce the dubious forms within very narrow limits indeed, at least, so far as British examples are concerned. The portion rather below the middle of the frond should be taken for examination.

This is one of the most easily cultivated of all the larger hardy ferns. It prefers a loamy soil and partial shade; and is increased readily by division. Being evergreen, its varieties are among the most desirable of our native species for the decoration of shady walks and rockeries, in which latter situation especially, where the roots are generally well drained, provided the plants are not exposed to the effects of severe drought and are moderately shaded, they thrive admirably. It is also very manageable as a pot plant, and under any circumstances is ornamental in its character. The smaller form, known as \(P.\) boreale, is perhaps the most suitable for pot culture, on account of its size and the elegance of its fronds, which not uncommonly assume a very graceful lateral curve.

The allied \(P.\) Lunulata, though a vigorous looking and hardy plant in its native haunts, is seldom seen to preserve its vigour under cultivation, at least in the neighbourhood of London, probably on account of the impossibility of imitating the pure atmosphere of its native mountains. It certainly prefers a damp atmosphere; and provided the moisture is not stagnant, its roots too should be freely supplied; they should in fact be constantly moist with percolating moisture; and hence the necessity of a careful mechanical adjustment of the materials employed as compost, of which mellow loam, gritty sand, and small masses of some porous body, such as soft sandstone, should be the main ingredients.

We have succeeded tolerably well by potting the plants very firmly in such a compost with a small proportion of peat added, the plants being kept under glass in a close cold shaded frame, but the removal of the plants for the winter to a cold greenhouse where the atmosphere was drier, led to the partial decay of the fronds. The same plants however on being enclosed within a handglass, where consequently the atmospheric moisture was more abundant and regular, grew vigorously; so that we have no doubt the requirements of this species are a well moistened but freely-drained soil and a damp atmosphere, which can only be secured in many cases by keeping the plants close under glass. Propagation is rarely to be effected by division, lateral crowns being seldom produced; consequently, plants generally have to be obtained from their native habitats. As it fructifies freely, they might be raised from the spores.

There are various degrees of development in this species, some of the most distinct of which have
THE COMMON PRICKLY SHIELD FERN.

been considered as varieties, and one at least of them \(\textit{bolatum} \) distinguished as a species by various authors.

1. \textit{lanceolatus} : this is usually considered as the young state of the form called \textit{bolatum}. We are by no means certain that this view is correct, for no doubt very old roots, as was long ago pointed out to us by Mr. Bennett, have been found producing the lanceoliform fronds. It would rather seem to be the debilitated and partially developed condition of \textit{bolatum}, whether caused by age or starvation or any other depressing influence. It is certainly not permanently distinct from \textit{bolatum}, but interchangeable with it, for cultivated plants of \textit{lanceolatus} may be nurtured into \textit{bolatum} proper, and \textit{bolatum} proper may be starved into \textit{lanceolatus}. The plant so named is dwarf, simply pinnate, often very much resembling \(P. \textit{Lanceolata} \), but less spiny, not imbricated, and with a greater or less tendency to become lobed. It is a fertile state.

2. \textit{bolatum} : this variety, which is the fully developed condition of the previous one, has narrow lance-shaped fronds, one to two feet long, and sublanceolate, \(i.e., \) a few only of the pinnules are developed; the anterior border is always distinct, considerably enlarged, and strongly serrated; but the rest are either decurrent or confluent, and not serrated. Between it and the type of the species, which is broader, and in which most of the pinnules should be distinct and serrated, there is to be found every grade of variation; but yet our experience does not tend to the conclusion that the form called \textit{bolatum} can be developed into \textit{acolatum} by culture, but on the contrary, that it is a permanent variety of which various gradations exist. It is a common plant.

3. \textit{multifidus} : this Mr. Welligton describes as having the apex of the frond multifid, and the pinnae occasionally dichotomous.

4. \textit{proliferum} : another of Mr. Welligton's varieties; it produces bulbils in the axils of the lower pinnules.

5. \textit{argutum} : this has a broadly lanceolate frond, with distinct pinnules in the typical plant, and differs in the form of the pinnules, which are narrowed and elongated; they terminate in an acute spiny point, and have long spines to the marginal teeth. It was given to us by Mr. Lloyd, with the information that it had been gathered in some part of Buckinghamshire.

The variety \textit{bolatum}, mentioned in the \textit{Handbook of British Ferns} (2 ed., p. 90) as being cultivated in the Royal Botanic Garden at Kew, cannot be distinctly traced as a British plant, and is consequently omitted. It appears from specimens in Sir W. Hooker's and Mr. Heath's herbarium, to be a North American form of the species; and it is therefore not improbable that the Kew plant may be of transatlantic origin.
Plates XII. and XIII.

The Soft Prickly Shield Fern (Polystichum Angulare).

Polystichum, Roth. Schott.

Clusters of sporocarps circular, medial, rarely terminal on the rachis, covered by an indumentum, or membranous scales. Indumentum orbicular, pellucid, i.e., attached at or near its centre, the margin becoming free. Fertile pinnato-furcate; pinnules direct, disunited at their extremities, the lower anterior one in each fascicle, on the fertile parts of the frond, bearing a sorus.

P. Angulare: fronds bipinnate, lanceolate, lax; pinnules distinct, acute or obtuse, herbaeous, with an obtuse-angled base, and attached by a slender stalk; lobed or serrated, the serratures tipped with a soft bristle; acr terminal or subterminal.

Explanation of the Plates.

Habitat—The very beautiful fern, which delights in shady woodlands, is much less generally distributed than P. aquilinum, though probably more common than it in the north of England and in Ireland. It appears to extend over the whole of England and Wales, in greater or less perfection; and there are many patches of it occurring in Scotland—on Borrowdale, and again in Ayrshire, from which latter county we have been favoured with specimens by Miss A. Smith. In Ireland, it is reported from all the provinces, and it occurs in Jersey. Its range in elevation is concluded by Mr. Watson to be from the coast level, from 100 to 600 feet.
Geographical Distribution—This soft prickly shield fern is native to Europe. It has been found in Brandenburg and Norway, according to Tulas. In Sweden it is rare, becoming more abundant in England, especially towards the north, where, as in Belgium, it becomes abundant. It is also found plentifully in France, Belgium, and various parts of Germany; it is found in the Pyrenees, and in Spain plentifully southwards; in Turkey, and in Asia Minor plentifully southwards; in Russia, and in various parts of Italy; in Greece (H. Roder) and Minor Asia (H. Roder and Civilis). In Thrace, Serbia, and other parts of Asia Minor (H. Roder). On the basis of these facts, it would appear to have been found in Georgia rather than in the southern parts of Asia Minor, where it is found in the Provence of Greece, at the eastern extremity of the Black Sea, and in Russia, it extends to Finland, where it is found in Karelia (H. J. Sover). Stalks, lanceolate-linear, is in the valley of lakes at Hali, and in North West India (H. Roder); as well as in Nepal and Madeira (H. J. Sover). Singapore and Java yield enormous forms—hicularly oval or oval or rounded, and the more apparent larger. Some of these tropical forms, being in the vicinity of the tropics, are often associated with the same individual, the male plant, with the female plant, as in some cases, with the female plant, in Madeira, and in the Madeira islands, males and females of the same species and the same individual, the female plant, being associated with the male plant, in Madeira, the male plant of the Madeiran species being associated with the female plant, in Madeira, and in South Africa. The male plant, being associated with the female plant, is found in South Africa, and in South Africa, and in South Africa, and in South Africa.
A. Polystichum angulare.
THE SOFT PRICKLY SHIELD FERN.

Proliferation on the back of the frond, generally occupying the whole of the upper part to the extent of two-thirds, but sometimes confined on this portion to the upper part of the fronds. Small, numerous, round, indistinct, seated at the apex of the venule, forming a line on each side of the midrib, and at the base of the frond, often crowded, and sometimes becoming confluent; they are attached to the anterior veins of the frond, wherever the veins are forked, but in the frond several of the simple veins bear sori. Indusium firm, membranaceous, orbicular, peltate, and unumbilicate. Species: numerous; brown, roundish, ovate, oviform.

Although as regards P. angulare and P. aculeatum there is such close an affinity, that instances do occur in which it is difficult to determine between them, yet, confining our view to the plants as found in Great Britain, each instance is rare, at least to those who have made themselves familiar with the aspect and characteristics of the plants. As to the application of the names, there is doubtless a certain amount of error and confusion, which it is hoped the autographic delineations in Plates X, XI, XII, and XIII, may assist in correcting. Extending the inquiry, however, so as to include the exotic Ferns of this affinity, the limits of the species become obscure; and it is perhaps doubtful whether in this more comprehensive view they can be defined.—At least by means of the mutilated examples alone available for examination in herbaria, with sufficient clearness to be kept permanently separate. The study of the living plants may, indeed, afford other distinctive marks than those derived from form and texture, as in the case of Polypodium Dregorens and its ally, which have a different vernation, and in the case of some forms of Lomatia Flattens, in which the same kind of organic difference occurs. With our present information, however, there seems no means between the two extremes of uniting the simply pinnate P. Luxurians with the tripinnate P. angulare, an unbroken series being traceable; or, on the other hand, retaining the three British species we have figured (Plates IX., X., and XII.), as well as some of the allied exotic ones, as distinct. We are not prepared to adopt the former alternative, and therefore, with all its difficulties, prefer the latter.

The specific name of angulare, which has been generally employed whenever the species has been kept distinct, is retained for this plant, from a suspicion that it may, after all, be found necessary to merge it in P. aculeatum, in which case any present change would be impossible. We have no doubt, however, that both the P. setiformum of Persk (1775) and the Polypodium appendiculatum of Hoffmann (1785) are referrible here, and these names certainly claim priority over angulare (1810). The law of priority, which should take effect if our plant should finally prove distinct, would give the name of P. setiformum, which is a remarkably suitable one.

The differences between the English P. angulare and P. aculeatum have been already pointed out. (See Plate X.)

In the garden, this Fern will be found very ornamental, and of very easy management. It grows readily in free sandy loam, either in shady spots of the garden or shrubbery; or on rock-work; or in the shade of Fernery; and it is increased with tolerable facility by division. Some of the varieties, however, propagate much more extensively by means of bulbils which form either at the base of the slips below or about the surface of the soil, or in the axils of the lower fronds, or in some instances on the veins of the frond. This remarkable proliferous or viviparous character has now been observed in several of the British Ferns, including Polypodium Lonchitis; P. aculeatum, with its variety positive; P. angulare, three or four varieties; Lomatia Flattens, two varieties; L. frondis; Argopteris baroreolata; A. sub-brevicaulis; Schinopus pulcher, several varieties; and Biebransia Spicat. Besides this bulbilliform mode of increase, Mr. Wollaston has observed a different kind of development in a variety of Polypodium vulgare nearly allied to aculeatum, communicated by Mr. E. Fowne. In this case the development consisted of prothallial growths on the spines of the serratures of the lobes, which had every indication of being fertile, though unfortunately the frond was broken off before they were observed, so
that their vital energy would not be tested. Although among exotic Ferns instances of viviparous growth were known to occur frequently, yet our acquaintance with so many bulbil-bearing British Ferns is due to the sagacity of a few zealous cultivators, especially Mr. Wollaston of Chislehurst, Dr. Allchin of Evesham, Mr. Chaplin of Scarborough, and Mr. Baxter of Oxford, during the summer of 1854; for in the most recent publication on the subject, issued in the earlier part of the same year, Mr. Newman mentions one British species only, _P. angulatum_, as known to possess this property. Mr. Baxter has suggested that it may be a result of pot-culture, all the instances in which it has been observed, having been on potted plants. The facts thus observed, appear to afford additional evidence that the fructification seems repugnant; but that they at least include something of the nature of branches.

Another fact which militates against the opinion that the fronds of Ferns are mere leaves is this. Leaves, it is maintained by physiologists, have their points first formed, the perfected apex being as it were pushed forward by secretion from below, but in the fronds of Ferns it may often be seen to demonstration that the lower parts are perfectly developed and bear mature spore, whilst the apex is still unrolling; this is very obvious in the genus _Nephrolepis_.

_Polytrichum angulatum_ is one of the Ferns which exhibits a considerable degree of variation, the differences in some instances being very marked. Mr. Wollaston has furnished us with the greater portion of the following enumeration of varieties:

1. _baculatum_ (M). This is a small pinnuled form, quite like the Italian _baculatum_ of Tenero, as figured in the _Flora Neapolitana_. It is chiefly remarkable for the small size of the acute pinnules, and for their distinct and slender footstalks; the auricles, too, are very distinct, acute, and in the case of the lower pinnules is separated by a deep division from the rest of the pinnule. It was found near St. Martha's Hill in Surrey, and probably occurs elsewhere.

2. _acutum_ (W). This form has the pinnules acute, and very distinctly stalked, but the pinnules are longer than in the last, rather narrow, falcate, and strongly auricled; the serratures are only slightly developed, but the spines of both the pinnules and auricles are aristate. In appearance it somewhat approaches _P. aculeatum_. It is rather local than uncommon in Sussex, Hampshire, and probably other counties.

3. _articulatum_ (W). This, although not unlike the normal state of the species in its form and habit, differs in having the points of the serratures aristate, and the long hair-like points stand forward in a remarkable way, giving the plant a bristly appearance. It is, moreover, very prolific, producing bulbils on the stipes, either beneath or at the surface of the ground. It was found by Mr. Wollaston in Sussex, in 1854, and retains its peculiarities in the fronds of 1855.

4. _modifolium_ (W) has the apex of the frond beautifully tufted, and the pins sometimes divided. If it is, perhaps, rather an occasional variation than a permanent variety.

5. _proliferum_ (W). There are two slight modifications of this variety, one of which was reported to have been found at Wimborne, Dorset, by Mr. Cholmell, though we have specimens from Mr. Pumpin purporting to be from Devonshire, on the authority of Mr. Cholmell, and suspect this to be the real habitat; the other was found recently near Ottery St. Mary, in Devonshire, by Mr. Wollaston, and is a more luxuriant and elegant plant. Both forms are prolific, bearing small bulbils chiefly at the point of junction of the pinnae and ribs, but sometimes in the axils of the pinnules. It is a most beautiful plant under cultivation. When perfectly developed, especially in Mr. Wollaston's plant, it is tripinnate; the pinnules, which are narrowed and acuminate, as well as very conspicuously stalked, being so deeply cleft, and the lobes so much separated as to become pinnae. When less compound it is still remarkable for the narrowed pinnae. Both the forms produce spores, but not so plentifully as the normal plant. It is the form called _modifolium_ in the second edition of the _Handbook of British Ferns_, but for the sake of securing as far as practicable uniformity of nomenclature for the corre-
spendent varieties of different species, the more characteristic name of *pseudopteris* which has been suggested, is here adopted.

6. *degasperisum* (W.). This very rare and curious variety was found by Dr. Kinahan in Ireland, in 1852, and has since proved more or less constant under cultivation. Its fronds are frequently so depauperated that they become mere skeletons, with little but the ribs and veins remaining. Occasionally a frond is produced either entirely or partially like the normal form. It is, as far as is known, barren, and sometimes produces bulbils. Dr. Kinahan had called this form both *isciniform* and *strictum*.

7. *intermedium* (W.). This, a robust, fleshy-looking, upright-growing plant, so nearly approaches *P. aculeatum* that it is scarcely distinguishable from it. The fronds are occasionally multifid. The pinnules are crowded and overlapping; subaponeura from the normal development of the anterior side; the margin is deeply inciso-serrate, the basal anterior lobe being very much enlarged, and all the segments biserrate, and more aristate than is usual. The fronds are frequently always at the apex, and when so have a tendency to produce bulbils. It was found by Mr. R. Sim, near St. Mary's Gray, Kent, and is not common.

8. *pseudopteris* (A.). Although this form has never attained maturity, it is too remarkable not to be noticed here. The whole plant appears of small growth; the pinnae are lanceolate and irregular; the pinnules truncate, margined, and vernaceous. It was found in Ireland by Dr. Allechin, in 1853.

9. *depauperatum* (W.). This plant resembles the variety *intermedium*, in having the segments of its pinnules biserrate and more aristate than usual, and it is also proliferous; but it differs from it in having its fronds frequently depauperated, the pinnae irregularly truncate or multifid, and the pinnules very irregular in size and shape. It has also a remarkably hirsute aspect, arising both from the acumination of its serratures, and the narrowness of the scales with which it is profusely covered. It was found in Kent by Mrs. Delves, and is uncommon.

10. *irregularum* (M.). This was found near Nettlecombe, in Somersetshire, in 1854, by Mr. Elworthy, gardener to Sir W. C. Trevelyan, Bart. It is a very curious form. The lower pinnae, which are the most perfect in outline, bear varying and unequally inciso-bolate pinnules, of which the basal anterior lobe forming the midrib is much enlarged, and considerably detached from the rest, and the rest form lacinate serratures, all the larger of which are again serrated. The upper pinnae are fertile, more or less depauperated, and much more irregular in size, outline, and toothing.

11. *biserratum* (M.). This is a lax form with large broad pinnules, stalked, inciso-serrate, the basal anterior lobe separated by a deeper incision, the rest biserrate and aristate. It would appear to have frequently a very long stipule. It was found by Mr. S. P. Gray, near Brentford; and the same form seems to be common in Jersey, whence we have received it from Dr. Allechin and Mr. C. Jackson.

12. *elatum* (M.). The remarkable peculiarity of this variety is that the pinnules are connected by a very obvious wing on both sides the secondary rachides, on which they are decurrent. The pinnules are more tapered than usual, with the anterior side most developed, and the margin cut into rounded teeth tipped by a bristle; the under surface is also densely covered with hair-like scales. The fronds are about a foot high. It was found in Somersetshire by Mrs. Archer Thompson.

13. *incisedum* (M.). This graceful and curious variety is so unlike all other known forms, that had more than a solitary plant been found, it ought, perhaps, to have taken rank as a species. It is perfectly distinct from all others. The frond is nearly two feet high, of linear-lanceolate outline, in this respect, and in habit, resembling the *Polystichum lobatum* of authors, though having all the important characters of *P. aculeatum*. The pinnae are short, linear, bluish at their apices, often standing nearly at a right angle with the rachis. The pinnules are crowded and lobate, roundish oblong, scarcely narrowed at the apex, but strongly spinoso-serrate, modified at the anterior base, and unequally serrate; the basal anterior pinnule is larger, and they are all connected with the rachis by a short somewhat winged petiole. Another remarkable peculiarity in this variety, is that most of the larger
THE SOFT PRICKLY SHIELD FERN.

Fronds are accompanied by a young one on their inner side; those young ones being found to proceed from bulbils which are formed beneath the soil on the stipes of the larger fronds. It was found in Somersetshire by Mr. Elwes.

14. incisum (W). This variety, of which there are two forms, is unique in the details of its parts. It is a large-growing plant. The pinnules are very dissimilar in size and shape; a few on the lower portion of the frond, are simply divided as in the variety subtripinnatum, but as they approach the apex they become more and more indented and irregularly laciniate or jagged; their segments are again serrated, those nearest the secondary rachis being somewhat prolonged or auricled. The whole pinnule is subpinnatifid. The two plants referred to differ much in size; the one found by Mr. Wellston in Sussex, being upwards of four feet in height; the other, found by Dr. Allechin also in Sussex, is of smaller growth. For the latter, Dr. Allechin had suggested the name of marginitum, having detected a disruption of the epidermis on some of the pinnules, but the two are too nearly allied to bear distinct names.

15. subtripinnatum (M.). This is one of the more highly developed states of the species; in it all the lower pinnules, the basal ones in particular, are so deeply pinnatifid that the segments become almost distinct, and sometimes quite so. It is of large growth. In other respects it resembles the normal type. It is common in Ireland, and, we believe, plentiful in England in damp shady situations. Our figure of this variety (see Plate XIII, fig. A), necessarily taken from a small frond, does not well show its compound character, which is better represented by the detached pinnule.

16. tripinnatum (M.). This very beautiful and peculiar variety has been called tripinnatum, in contrast with the subtripinnatum just described, in consequence of its basal anterior pinnules being much more distinctly pinnate, though the plant is on the whole less divided than the Devon form of the variety proliformum, or the Irish variety decussatum. The most remarkable peculiarity is the unusual elongation of the anterior basal pinnules, and their truly pinnate character, the little pinnules being distinctly stalked. The other pinnules are highly developed, though less so than the basal one, and they are crowded and imbricated. It is profuse in the production of sorus, and thinly covered with subulate scales. It was found in Cornwall by Mr. Millet; and was first made known to cultivation by Mr. E. J. Lowe. It is a very marked aberration from the normal form, and appears to be very rare.

17. decussatum (M.). This beautiful variety is by far the most compound or divided form of the normal race of this species. The fronds are divided thus—first, pinnae, then pinnules, pinnules, and lobes of pinnules, and these latter are again serrated. The basal pinnules are tolerably exact miniatures of P. aculeatum, having their first pinnules auricled and serrated as in that species. The plant is of Irish origin, and is cultivated in the Glasnevin Botanic Gardens, where it was observed by Dr. Allechin.
THE MALE FERN, OR COMMON BUCKLER FERN
(LASTREA FLEXIMAS).

LASTREA, Fr. or Linn.

Clusters of sporocarps circular, median or submedian on the venule, covered by an indusium, of coarsen scales. Indusium reniform, i.e., more or less regularly rounded with a posterior notch; attached by the sinus or notch, the margin becoming free. Fronds simple, forked, or pinnate; venules direct, disarticulated at their extremities.

L. FLEXIMAS: fronds lanceolate, sub-bipinnate or bipinnate; pinnule linear tapering to the apex; pinnules oblong-obtuse, serrate (principally at the apex), crenate or inciso-lobate at the margin, the basal ones more or less distinct, the upper conglutant; serrations not spinulose; indusium convex, persistent, (and except in addressate and pinnule) without marginal glands.


THE MALE FERN.

unequally crenate or crenate-lunate, the lobes with blunt teeth; soi usually
united on each side of the midrib of pinnae; indusium fringed with glands.

LISTERIA PILOSA, nov. affinis, Holmgren, Male Fern of British Islands, pl. 10. Johnson, in Society's

HABITAT.—This is one of our most common and most widely-distributed ferns, growing abundantly in undisturbed and sequestered situations over the whole of England, Wales, Scotland, and Ireland, as well as in the Northern and Western Isles, in Shetland and Arran. According to Mr. Wilson, it ascends to an elevation of 3,000 feet in the Highlands, but in
more than the agatham zones. The variety agatham has been gathered in so many, and such widely-separated localities, that there is reason to believe it mostly, if not wholly, so widely dispersed as the ordinary form. One of these aberrant and peculiar forms is from the Skye district, in Kilmuir, and the other also reported from the Shetland and Arran, in the north of England, and by Mr. Holmgren, from a Plants. in the British Isles, in Grown in the north of Scotland, in the north, in the north of Scotland, and in Arran, and other parts of the British Isles. It is also found in Jervis and Gough, and Dr. Albinion informs us that he found it very abundant in Ireland, from
where it has preserved specimens from near Skye and Cape Carse. Mr. Newman adds the British counties of Wiltshire, Hampshire, and Berkshire.

EXPLANATION OF THE PLATES.

PLATE XIV.—LISTERIA PILOSA, nov. affinis, Holmgren, Male Fern of British Islands, pl. 10. Johnson, in Society's

PLATE XV.—LISTERIA PILOSA, nov. affinis, Holmgren, Male Fern of British Islands, pl. 10. Johnson, in Society's

PLATE XVI.—LISTERIA PILOSA, nov. affinis, Holmgren, Male Fern of British Islands, pl. 10. Johnson, in Society's

GEOGRAPHICAL DISTRIBUTION.—The Male Fern appears to be a native over the whole of Europe; as we also, probably, the Irishian and the Galloway ferns of S. A. McSorley, and the Galloway fern, A. spinulosa of T. T. and T. T., is found in various places in the region of the Cenozoic and in Georgia (W. A. Elmore). The common fern is found in the eastern United States, and along the Allegheny Mountains, as well as along the western a small part of the Himalayas, from Jenkins through Yerkes to Amman (A. B. Hadley). The Galloway fern, differing with winter, are very dark-coloured, and are represented by the names of Agathium palmatum, and others closely allied and found in Japan. The species is found in South Africa, and in Modoc, where the Galloway-dusted limits are the prevailing form. It does not appear to grow in North America; but forms or species occurring both the Californian and the Galloway-dusted, often with the scales very dark, or less than

Candel is large, tufted, scaly, erect or decumbent, often in age becoming considerably elongated, consisting of the bases of the old fronds persistent around a woody axis, from the apex of which appear the growing fronds, which are thus formed, and adherent. Scales like those at the base of the axis above, with winter, are very dark-coloured, and are represented by the names of Agathium palmatum, and others closely allied and found in Japan. The species is found in South Africa, and in Modoc, where the Galloway-dusted limits are the prevailing form. It does not appear to grow in North America; but forms or species occurring both the Californian and the Galloway-dusted, often with the scales very dark, or less than

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Lasioeca Filius mas incisa
THE MALE FERN.

Fronds averaging two or three feet in height, but varying from a foot to four or six feet, according to age, variety, and locality; they grow erectish, and when the crown is vertical are arranged in a circle around it; they are hermaphrodite, smooth, of a lively rather deep green, somewhat paler beneath; in outline broadly lanceolate with a gradually tapering apex; or sometimes oblong lanceolate with a sudden narrowing at the apex; bipinnate. Pinnules numerous, alternate or nearly opposite, linear gradually narrowing towards the apex, which is acute; the lower ones decreasing in length from about the middle of the frond, the lowermost measuring an inch or rather more in length in fronds of a foot and a half long, those about the middle being three or four inches long; the lower pinnules are also more distant than those higher up. Pinnules at the base of the pinnule distinct or slightly connected by a narrow wing to the rachis, netted on both sides at the base, but with a broad attachment, the first pair somewhat larger than the rest, which are generally attached by the entire width of their base with a very narrow sinus, and more or less combined; oblong obtuse, i.e. of equal width throughout, with the apex rounded, slightly crenate or crenato-lobed at the margin, serrated principally around the blunt apex, the teeth acute but not spinulose.

Veinification of the pinnules consisting of a flexuous midrib borne to alternate branches or veins, which are again branched once or twice, these secondary branches or veules extending nearly to the margin, each venule (or vein) bifid if simple or the anterior branch if ramified, proceeding towards the point of one of the marginal serrations, just within which it terminates. The manner of ramifying is, by what is called forking, which consists in the production of two branches both slightly and about equally diverging from the straight line. In the larger varieties there are more of these forking than in the smaller.

Veinification on the back of the frond, rarely extending more than half-way down, and most copious on the upper third. Some numerous distinct, roundish reniform, in the normal form confined to the lower half of the pinnules, attached to the anterior veins at a short distance above its source, and much below its termination, thus being medial on the vein, and forming two short lines extending upwards from the base of the pinnule, rather nearer the midvein than the margin. Indusium firm, convex, persistent, reniform, i.e. roundish with a posterior notch, affixed by the notch or sinus, with an entire margin, i.e. without marginal glands (except in ovatus, and obvaccinata, which are probably distinct) and acquiring a grayish or leaden hue as the frutification becomes matured. Spore-cases reddish brown, ovate. Spores oblong, mucronate.

Duration. The rhizome is perennial. Young fronds are produced about May, which endure throughout the summer and autumn and until destroyed by severe frost.

This plant is the type of the modern genus Lathraea—consisting of indistinct free-veined dot-fruited Ferns, having the indusium reniform, i.e. round with a notch in the margin, forming a sinus by which it is affixed. The name Lathraea was first and long ago used by Bory for a sub-generic group, which, neither according to ancient or modern views could be held to have any value; the name had consequently lapsed, but was revived by Presl for the group above indicated. There is no ground whatever for the arbitrary selection, which Mr. Newman has made, of L. Gropeloria, as the plant to bear Bory's name, to the exclusion of all the other species now usually associated with it; as he himself has indeed shown by quoting Bory's sub-generic character, the application of which to this plant was an original error of observation, or at least the result of imperfect observations. Lathraea Gropeloria does, in fact, much less accord with Bory's character than do the three Polypodids he associated with it. Presl was therefore quite justified when in 1836 he revived Bory's name (altering it to Lathraea) for a proposed group which included two of Bory's five species—Talypheia and Gropeloria—the others being referable to Polypodium. Presl's genus, as we have already remarked, is rather typified by the subject of our present place, although it fairly includes the two species just mentioned. We must here protest against the freak in which Mr. Newman has indulged, of scattering among the British Lathraea three
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additional generic names, with frivolous distinctions, to the perplexity of amateur, and the dissatisfaction of professional botanists.

The generic name Dryopteris was suggested by Schott for the Male Fern in 1834; and there is no doubt that this is also the Dryopteris of Addison. The botanical name-reformers of the beginning of the present century would have done well to have reminded themselves of this name; but it is surely not blinding on us now to revert to such antiquities. It has, however, been adopted for the whole group by Dr. Asa Gray. Of the two names applied to these plants which have thus been supported by modern botanical authority, we select that of L. rudd, which has been most widely adopted, and as avoiding much needless change. The old name of Aspidium, which some retain, and with which Roth's Polyblepharon is nearly equivalent and coeval, seems more properly applied to species having peltate indusia, as is suggested by Swartz himself, who uses the terms peltate and umbilicate, before those of reniform and indusiate, all however being included by him. These several names were judiciously distributed twenty years since—Aspidium to the netted-veined peltate Aspidium; Polyblepharon to the free-veined peltate Aspidium; and L. rudd to the free-veined reniform Aspidium; and no further change, at least for the British species, is now required.

When the species of L. rudd and Polyblepharon were included under Aspidium they bore the English name of Shield Fern. It is however objectionable to use the same English name for different genera, and as the old name of Shield Fern is more properly applied to the Polyblepharon, which are the most genuine Aspidium, we have proposed in the Handbook of British Ferns, to use for the L. rudd, the equivalent name of Buckler Fern, which is here also adopted.

The common Male Fern cannot well be mistaken for any other native species. It has been formerly confounded with L. cristata, but the two have no very close affinity, and the only resemblance occurs in a form of Pileatum, not common, in which the lower pinnas are triangular. The Incised variety is in some respects like L. rigidum, but obviously different in many others.

The Incised Male Fern—L. FLEX-MAS EXTRA.—(Plate XV.) is altogether a larger and more striking plant than the normal form, more robust, averaging three or four feet, and sometimes reaching six feet in height, with a stipe of five or six inches. The fronds in unfolding liberate the point, which becomes bent like the curve of a shepherd's crook, as in the common plant; they are distinctly bipinnate, lanceolate, not contracting abruptly near the apex. The pinnas are elongate, tapering gradually to the apex. The pinnas are somewhat less closely placed; the basal ones notched, often deeply, on each side their base, thus having a narrow attachment, elongately pyramidal-oblong, broadest at the base, and with a narrowed though rounded apex; the rest more broadly attached, and more equal in width; the margins more or less deeply inciso-lobate, the lobes three to five-toothed. The venation is more highly developed, thus: a vein is directed up the centre of each lobe, and this bears alternately several venules; but the areolae, notwithstanding, produced only on the anterior basal venule of each fascicle, so that, as in the normal form, they are ranged in a single line on each side the midvein, commonly extending, however, much nearer to the apex of the pinnal. The indusium is here reniform as in the other, convex, entire, and persistent. The irregularly deformed monostiole leafy developments of this variety constitute the Aspidium deplosum of Schkuhr. This variety is probably equally common with the type form, and appears as widely dispersed; it is certainly found in the south and south-western, the midland and the northern counties of England; in Wales; in the east and south-west of Scotland; in the Channel Isles; and about Kingstown, Dublin, Ireland, whence it has been sent to us by R. Barrington, Esq. Our figure necessarily represents a small and therefore less characteristic specimen.

The Dwarf Male Fern—L. FLEX-MAS FUMILIA.—(Plate XVII.) is permanently smaller, and less developed than the normal plant. It usually grows from nine inches to a foot in height, and rarely, when very vigorous, reaches the height of a foot and a half. The stipe is two to three inches long, the fronds lanceolate, pinnate; the pinnas short, bluntish, and pinnatisect, rarely pinnate; the pinnules or
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lobes small, oblong-obtuse, obscurely crenated, convex, but recurved at the points, so that the pinnus are concave, the points of the pinnus being also recurved, so that the frond itself is concave. The venation is comparatively simple; the midvein, which is carried up each lobe, produces veins of which the lower are once forked, the upper simple. In fronds of ordinary growth, scarcely any but the anterior branch of the lowest anterior vein in each lobe or pinnule bears a sorus, the sorus then forming an almost simple line on each side the midrib of the frond, not even with the sinuses of the pinnules. When however the growth is very luxuriant, a few of the basal pinnules bear two, three, or four sori each, but even in these cases, the sorus form two simple series for more than half the length of the frond. The indusium is convex, reniform, persistent, and its margin is somewhat inflected beneath the spore-cases, and beaded with short-stalked deciduous, probably, glands. This rare Fern appears to have been brought from Snowdon, and has been recently found near Llyn Ogwen by Mr. S. O. Gray. It seems really to offer specific differences, in its constantly small size, the direction of the pinnus and pinnules, the peculiar distribution of the sorus, the glandular inflected indusium, and in the important character of vermination. In the process of unrolling its fronds, nothing like the shepherd's crook form is seen, but the rachis gradually unrolls from the base to the apex. It is also reproduced from the spores, although that alone is not evidence of its distinctness. On the other hand, the general form of the parts, and of the sorus and indusia, agree with distinctive examples of the Male Fern. The fresh fronds are fragrant, in consequence no doubt of the presence of numerous small glands on their surface; the fragrance having something of the sweetness of Mignonette.

The Abbreviated Male Fern—L. Filix-mas abbreviata—is one of the permanently smaller forms, and is probably specifically distinct; though the Dwarf Male Fern has many characters in common with it, and the two are perhaps forms of one subalpine species. The present is however a larger plant, with considerably larger, broader, and therefore coarser looking pinnules, and although they are to some extent recurved, yet they are by no means so fully nor so constantly so, as in L. pumila. This also has the fronds, at least while young, glandular and fragrant.

The Golden-scaled Male Fern—L. Filix-mas falacea—(Plate XVII.) differs from the normal form, most obviously in its colour which is a yellowish green, and in the abundance of the lustrous golden-tinted scales, which clothe its stipes and rachis, so densely that their rich colouring is always conspicuous, but most so on inspecting the back of the frond. The same plant seems to have attracted Mr. Lowe's notice in Madeira, and that of Dr. Wallis in the East Indies; and by its peculiar semblance serves also to connect the common European Filix-mas, with some South American Ferns to which other names have been given. The outline of the frond, the pinnus and the pinnules, is like that of the less developed forms of the common plant; that is, the fronds are broad lanceolate, the pinnule pinnate only at their base, the pinnules oblong-obtuse, serrated at the apex, with a broad attachment. Mr. Wollaston points out, that the rachis and midveins are more or less tinged with purple, but this also occurs sometimes in nature. The sorus are often, if not always, smaller, and the indusium before maturity, and even when the spore-cases are ripening, has its margins very much inflected beneath them, so that, when reversed, it is seen to have the form of a little pouch, just in fact like that presented by one of the leaves of Chelidonia linifolia. In the common and included forms of Filix-mas, the margin of the indusium is merely bent down straight, a little sloping outwards till it comes in contact with the surface of the pinnule. The plant appears not uncommon, but its range is not fully known. It is, in part, from the Indian forms of this plant—forms in which we can detect no difference except the darker colour of their scales, and their somewhat larger growth—that Prof. Braun has constituted his genus Dicranum, which is characterised by having 'discretissim' indusia, which are indusia of rounded outline with a sinus extending upwards beyond the centre, so that the lobes look like two flaps. We have ascertained from a careful examination of Dr. Wallis's specimens that this appearance of the indusium is merely the result of age. In the younger and perfect state the indusium is rounded, convex, with a posterior notch or sinus, and very much inflected margins, just as
The Male Fern.

occur in the British plant. As the spore-cases enlarge, they are unable to lift off the indusium, in consequence of its contracted margin, and the result is that the edge becomes split opposite the sinus. The indusium is then pushed up by the advancing spore-case, the upper margin is apparently brought nearer the point of attachment, and the two halves assume the appearance which attracted the attention of Prof. Braun. Emphatically the same structure of indusium occurs in the other species referred to this supposed genus—a Columbia plant collected by Hartweg.

The culture of the Male Fern is not at all difficult. It may be grown in any cool shady place, in almost any kind of soil, the best being a sandy loam, moist, but not wet. It may be planted with good effect about shady walks, in woods and wilderness scenery, and on shady rockwork. The variety ocena is the most striking where effect only, and not variety, is the object. Potted plants require ample space, and should be plunged out-doors in winter. It is increased by division.

The following is an enumeration of the principal variations. For most of the memoranda we are indebted to Mr. Wallaston; who, it is right to state, considers our varieties polyanum and pinnatum to be distinct species,* and refers the variety cristata—the most important of the whole in an ornamental point of view—as a variety to the former.

1. _polyanum_ (M.). This variety, called _Boreei_ by Mr. Newman, and _pseudum_, by Mr. Wallaston, is sub-bipinnate, the lower pinnae only being distinct; the pinnae are oblong, truncate-obtuse, and serrated at the apex. It differs from the normal plant in being of a yellowish hue, somewhat glaucous beneath, and in having its stipes and rachis quite shaggy, with lustrous golden-brown scales. It also differs, as already mentioned, in having the purple ribs and veins, and in the sides of the indusium being indented beneath the spore-case. It is a widely dispersed, and probably not uncommon form.

2. _multifida_ (W.). This form of variation shows itself in the typical _Filix-mas_ as well as in the golden-scaled type to which the present is referred. The peculiarities consist in the apex of the frond, and of more or fewer of the pinnae being bifid or multifid; and the pinnae are also occasionally depauperated to a mere rib. It is not quite permanent under cultivation, but nearly so.

3. _cristata_ (M.). This very beautiful aberration, also referrible to the golden-scaled type, is exactly analogous in character to the _Alpinian Filix-femina, var. multifida_, and is possibly still more beautiful. The apex of the frond and the apex of the pinna throughout its whole length, are beautifully and uniformly tufted or tasselled; the pinnae are also somewhat shorter than usual, and narrow rapidly towards the tassel. The most beautiful form having these peculiarities was found at Charleston, near St. Austell, in Cornwall. Other plants resembling this have been found in Devonshire and Staffordshire. Like all other permanent varieties, this is produced freely and almost without variation from the spores;†

4. _proliferis_ (W.). This was raised from spores of the variety _cristata_, and resembles it in being tasselled, but it is much more erepted, as well as depauperated, and laciniated; its chief peculiarity

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* Mr. Wallaston has ably and conveniently summarized the following differences as the result of his inquiry into the distinctions of the Common and the Golden-scaled Fern. The characters are taken from fresh specimens, with well-developed spores, and central pinnae from the plants at the middle part of the tassellate fronds taken for comparison.

1. _Filix-mas_: pinnae—single subpinnate margin, and more serrate; pinnae or under side of rachis glaucous; indusium small, elongated, indusium, the margin turned subacutely, oblong laminar; stipes of under side ornamented with scale-like scales, and central pinnae from the plants at the middle part of the tassellate fronds.

2. _Filix-mas_: single subpinnate margin, and more serrate; pinnae or under side of rachis glaucous; indusium small, elongated, the margin turned subacutely, oblong laminar; stipes of under side ornamented with scale-like scales, and central pinnae from the plants at the middle part of the tassellate fronds.

† It may be mentioned as a fact of more importance, that the permanent varicolored varieties of our hardy Ferns are very generally, if not in every case, originated from their spores, and in most cases abundantly so. Hundreds of the noted form of _Filix-mas_, of the multiform _Asplenium_ __respersum_, and of many of the most remarkable of the Ferns of _Filix-mas_, have been raised in this way. The fact of reproduction from the spores of _Asplenium_ respersum shows it to have no rules whatever among Ferns. _Asplenium_ _Nidus-aquae_, which has the aspect of a species, is reproduced from its spores, and the fact might seem to prove its distinctness; but the forms referred to above are clearly not species, but varieties of well-known species, and they, too, are reproduced with equal facility. So that the best of reproduction from the spores, this as the mark of a species. The fact itself is probably suggestive that spores are better rulers of the nature of both than of seeds.
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consists in its bearing bulblets, generally on the external side of the stipes, near its junction with the tufted rachis. Probably in old plants the viviparous character will be more abundantly developed.

5. dichotoma (W). This is a multifid variation of the normal Fide-Auna, exactly corresponding in its peculiarities with the variety multifida, already noticed; in having the apex of the frond and of all or the greater part of the pinna two-cleft or many-cleft, the pinna occasionally depauperated. It is only sub-permanent. It differs from multifida &c., in the absence of the golden scales, and the other marks of the palustris group.

6. incisa (M). As already explained, this is a larger plant than the normal form, of which it is probably the full development. It is distinctly bipinnate; the pinnae elongate, narrowed upwards, and usually bearing sori nearly their whole length. It is a common and very ornamental plant, with an erect stately habit. A very large and handsome form of this variety, with the pinnae more distant, narrow, and elongate than usual, as well as somewhat falcate, has been gathered in the Isle of Wight, by Mr. A. G. More and the Rev. W. H. Hawker.

7. cresce (W). This, which is doubtless the Aspidium depauperatum of Schkuhr, is distinguished by the irregularly bicliniata form of the pinnae and pinnules, giving the appearance of having been nibbled by insects. It is occasionally multifid at the apices of the frond and pinnae, but not uniformly so. It is fertile and sub-permanent.

8. decus-lobatata (M). A large growing variation of the incisa group. The pinnae are oblong and obtuse, the basal ones with a narrow attachment; the margins of the basal ones are more or less inciso-lobata, with the lobes serrated, and the lower posterior one much enlarged and forming a kind of auricle directed towards the main rachis, which is the chief peculiarity of the variety, and occurs in various lesser degrees in most of the common states of this type. The rest of the pinnae are more or less inciso-serrate. This is the variety "epicinus" of the earlier editions of Mr. Francis's Analyses of British Ferns (under Aspidium), but is not at all epicinus. It appears to be common, and to be in fact one of the two larger forms into which the species is commonly developed, the characteristics of the two being sometimes united in one plant. The Rev. W. A. Leighton appears to have first noticed the peculiar lobing; his specimens gathered twenty years since are from Runmore and Sutton in Shropshire, and from Anglesea. We have also seen specimens from Ballyvaughan in Ireland, Callendar in Scotland, Bedale in Yorkshire, Black Park in Bucks, Maidstone and Cobham in Kent, Albury in Surrey, Rippon in Essex, Lynn in Norfolk; as well as from Jersey and Guernsey.

9. producta (M). This is a very striking variety, somewhat analogous to incisa, being like it a large growing plant, with fronds at least three feet long and ten inches broad, and also resembling it in the divided condition of the pinnae, which are however much more deeply divided. The frond is lanceolate; the lowest pair of pinnae two inches and a half long, triangular acuminate; the next are more than four inches long, triangular elongate, being nearly two inches across the base, gradually tapering to a sharp elongated point; those in the upper part of the frond, though narrower at the base, are also triangular elongate, the base being broadest, though in the uppermost the sides become more nearly parallel. The pinnae throughout are elongated, deeply pinnate, and narrow upwards to the apex, their outline being that of a narrow cone or pyramidal; this, together with the deep and conspicuous lobing, gives to the plant a very distinct appearance. The basal pinnae, which are cut down more than half way to the midrib, have an attachment so narrow as to resemble a mere winged petiole; the rest, half way up the pinna, though obtuse are attached by less than their whole width. The lobes of the pinnae are obscurely serrated at the end. The sori are confined to the upper third of the frond; and on the lower frond we have seen have a manifest tendency to occupy rather the central than the basal portion of the pinnae: that is, they are distant from the base on those pinnae which occupy the lower third of the fertile pinnae. This variety was found by the Rev. W. A. Leighton, at Wreckie, in Shropshire.

10. triangularis (M). This form belongs to the incisa group, but has something of the aspect of
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**Lamium cristata**, being remarkable for its narrow stiff erectish fronds, and especially for the unequally triangular outline of a few of the lower pinnae, the lowest pair especially; these having—as indeed the whole frond has—much more the outline met with in *L. spinulosus* than that which usually occurs in *L. Pilosum*. The pinnules are longish and all but the basal ones adnate or decurrent; they are inciso-serrate or lobed, and they sometimes show the enlarged posterior basal lobe, which occurs in *L. spinulosus*. It has been found in several parts of Kent, from whence we are indebted for specimens to Dr. Allehin.

11. *polyDiffusa* (M.). This is a tasselled form of *Pilosum*, referrible to the *spinulosus* group. The pinnae are not shortened as in the variety *cristata*, nor do they narrow much until quite close to the tassel which terminates each of them. The pinnules are incised, and the basal ones have a tendency to dilatation. The apex of the frond is more or less tufted. Here and there a frond has its apex more decidedly tasselled, and the pinnules themselves more normal, merely indicating a tendency to division; while occasionally a frond is produced in which the tendency to laceration both in the pinnae and pinnules is carried to excess, becoming grotesque. It was found at Bromsgrove, in Worcestershire, and was communicated by R. Maund, Esq.

12. *obconica* (Bab.). This is a dwarf-growing form, seldom exceeding a foot in height, and its young fronds are glandular and fragrant. It is planate; the pinnae scarcely again pinnae, the lowest pinnules only being sometimes separated, the remainder always decurrent; the points of the pinnules are turned upwards so that the upper surface of the pinnule is concave. The pinnules are large for the size of the plant, broad, rounded at the apex, the margin unequally crenate, or crenato-lunate, the lobes having blunt obscure teeth. It is allied to the variety *puinula*, but differs in the larger size of its pinnules, which gives it a corner aspect, and it is not so much recurved. The sori are for the most part uniseriolar on each side of the margin of the pinnae; and have indusia which at least while fresh, are marginal with glands, as in *puinula*. It is rare, having been found in the Snowdon and Lake districts, and at Ingleborough and Teesdale, and Wyck in Gloucestershire.

13. *puinula* (M.). This is a permanently small dwarf plant, remarkable among other characteristics, for the recurving of the points of its pinnae, and of its pinnules, which give to its upper surface a concave appearance. The pinnae are blunt, rather deflexed, and scarcely ever more than deeply pinnatifid, the basal pinnules only being sometimes, but rarely, semi-detached. The pinnules or segments are small, oblong, obtuse, convex, and bear a single sori near their base on the anterior side; the sori, therefore, forming a single series along the pinna on each side their rachis or midrib. It is only when the plant is very luxuriant that two or three sori are borne each of the basal pinnules, but it then not so as to disturb the general uniseriolar arrangement. The fronds are glandular, at least when young, and fragrant. Mr. Wolstenholm finds it sometimes dichotomy divided at the apex. It seems confined to North Wales, and to alpine localities.

14. *albidula* (M.). This variety, which occurs in the late Mr. Winch's herbarium, belonging to the Linnæan Society, is doubtless a form closely allied to *puinula* and *obconica*. As in them the fronds are glabrous, dwarf, and merely pinnae; the pinnae are short and very oblong, pinnatifid half way down into blunt oblong lobes (not merely sinuate, as Mr. Newman's figure indicates). The sori are large, and form a single line on each side the midrib, about equidistant from it and the margin. The frond has a very narrow lance-shaped outline. It is stated by Dr. Johnstone to have been gathered, long since, in abundance, by the Rev. J. Fawcet, at Ennis, in the county of Clare, Ireland.
PLATE XVIII.

THE RIGID BUCKLER FERN (LASTREA RIGIDA).

LASTREA, Pursh.

Clusters of Sori-case circular, medial or subterminal on the venulas, covered by an indument, or membranes. Scale. Inclinations reniform, i.e., more or less regularly reniform with a posterior notch, attached by the slants or notch, the margin becoming free. Veins simple, forked, or plumate; veins direct, disconnected at their extremities.

L. RIGIDA: fronds elongate triangular or lanceolate, bifid, main, glandular; pinnae tapering to the apex; pinnae oblong, blunt, lobed, the segments broad rounded, two- to five-toothed, the teeth not spinulate; indument convex, persistent, fringed with glands.


EXPLANATION OF THE PLATE.
PLATE XVIII.—LASTREA RIGIDA, FROM AMERICA.—East, West, and Midlands; P. Wedge.

HABITAT.—This is a local plant, almost entirely confined, as far as regards the British Islands, to the few counties, namely:—Hatfield. It was discovered on a wall of old masonry at hatfield, where it has probably been planted; and Mr. Darcy records, in «The History of the British Flora,» that it was accidentally found on a wall of old masonry at Hatfield, and is now well known there. It is also found in the garden at Hatfield, and is now well known there. It is also found in the garden at Hatfield, and is now well known there. It is also found in the garden at Hatfield, and is now well known there. It is also found in the garden at Hatfield, and is now well known there.

GEOGRAPHICAL DISTRIBUTION.—This Fern is spread over the whole of Europe, except in the British Islands. It is also found in the garden at Hatfield, and is now well known there. It is also found in the garden at Hatfield, and is now well known there. It is also found in the garden at Hatfield, and is now well known there. It is also found in the garden at Hatfield, and is now well known there.

Ovules thick, scaly, tufted, decumbent, formed of the bases of the decaying fronds closely surrounding a woody axis, to the apex of which the fronds are attached and adherent. Scales lanceolate attenuate, and linear-lanceolate, or subulate. Fibers long wiry branched, dark-coloured.

Stipes short, about one-third the length of the entire frond, sometimes more, thickened at the base, glandular, densely clothed with long subulate or linear-lanceolate narrow-pointed, membranaceous, scales intermixed with broader ones, all of a reddish-brown colour; the scales become smaller and less abundant upwards. Rachis furnished with scattered hair-like scales; both primary and secondary rachides bearing numerous short-stalked translucent glands.
The Rigid Buckler Fern.

Vernation circinate.

Pinnate from one to two feet high, firm, dull green, paler beneath, the surface sprinkled over while young with numerous minute spherical short-stalked almost sessile glands, which give it then a glaucous hue, not conspicuous in the dried plant, and at the same time impart a slight but peculiar and agreeable fragrance; spreading or erectly, bifidate, usually elongately triangular, the lower pinnae being somewhat the longest, and the rest gradually shortening to the apex; sometimes, however, the outline is incised. Pinnae alternate, the lower ones subopposite, distinctly triangular, the middle ones more or less oblong with a tapering point, the uppermost narrowly triangular, i.e. tapering from the base upwards. Pinnae oblong or ovate-oblong, truncate at the base, obtuse at the apex, the lower ones shortly stalked, the upper minute, deeply pinnatisect; the lobes oblong notched, the upper with about two, the lower with about five teeth, which are acute but not spinulose.

Pinnule of the pinnules consisting of a sinus minutely branching alternately, so as to throw a vein into each lobe; each of these veins branches so as to produce a venule extending upwards towards each marginal tooth, but not reaching the margin. The lower anterior venule is fertile.

Fructification on the back of the frond, occupying about the upper half. Sori rather large, round, numerous and occupying the whole length of the pinnules, indusiate, medial on the basal anterior venules, forming a line on each side of and near to the midrib, becoming crowded and often confluent over the whole central portion of the pinnules. Indusium lead-coloured, firm membranaceous, persistent, convex, reniform i.e. round with a posterior sinus by which it is affixed, glandular both on the surface and at the margin, with stalked glands. Spore-cases numerous, brown, obovate. Spores oblong, minutulous.

Duration. The caudex is perennial. The fronds are annual, produced in spring and perishing in autumn.

This species may be known from those to which it is allied by several characteristics. The fronds are comparatively small, generally broadest at the base, always covered with minute glands, which give off a pleasant balsamic fragrance, often appreciable in the vicinity of the living plants during sunshine. The outline of the pinnules—bluntly oblong—different from that which occurs in any other native species, is most nearly approached by some species of the Undulate Male Fern, and the serratures, as in that species, are not at all spiny-tipped but are short and merely acute; but from that it is distinguished by its size, its outline, its glandular surface, and its glandular-fringed indusium. It can hardly be mistaken for any other of the Lautreae, nearly all of which have spinulose serratures.

The culture of this Fern is very similar to that of the other larger growing kinds. It grows well in free well-drained loamy soil, and the fact of its range being almost if not quite confined to limestone mountains suggests that the use of limestone among the soil may be beneficial, though it is certainly not essential to success. It is of far more importance that the soil should be kept moderately moist, and should be of such a texture, as may at the same time prevent any accumulation of stagnant water. It is increased by separating the lateral crowns formed by the caudex. The latter is the better for being somewhat elevated above the soil in planting, for being decumbent in habit, it does not when planted deeply liberate its crown so readily as the more erect-habitated species.

Mr. Wallaston notices a variation in which the fronds or the pinnule are simply or multilidly divided at the apex, but it is not a constant variety.
THE CRESTED BUCKLER FERN (LASTREA CRISTATA).

LASTREA, Pers.

Plates XIX. XX.

The crested buckler fern (Lastrea cristata) is a species of fern characterized by its distinctive fronds that are typically oblong-oblong, sub-bipinnate (or bipinnate); planae short triangular, with oblong pinnules or segments, which are nearly always connected at the base, crenato-serrate, or obliquely lobed, with aristate teeth; anterior and posterior basal pinnules on the lower plane nearly equal; sepal of the stipite ovate, pallid, scattered; inclusion without marginal glands.

L. CRESTATA: fronds erect, narrow linear-oblong, sub-bipinnate (or bipinnate); plantae short triangular, with oblong pinnules or segments, which are nearly always connected at the base, crenato-serrate, or obliquely lobed, with aristate teeth; anterior and posterior basal pinnules on the lower plane nearly equal; sepal of the stipite ovate, pallid, scattered; inclusion without marginal glands.

Plates XIX. XX.

EXPLANATION OF THE PLATES.

Plate XIX.—LASTREA CRESTATA: from Renson, Bifolli; Dr. Athlone.

Plate XX.—LASTREA CRISTATA: (x 5), from Oxon Reg. (Nightingale; J. Lloyd).

HABITAT.—The plant which we regard as the type of this group is rare and local in this country. It occurs in boggy situations. Permanently moist soil of its own kind appears to be confined to the counties of North and South in the east, whereas it sometimes occurs in those of Nottingham and Derby. Hastings and Staffordshire have also been reported, and are sufficiently probable, but these, together with some other English as well as Scotch and Irish localities, are rather uncertain or are altogether uncertain. The variety alpina occurs in counties in North, Nottinghamshire, and Cheshire. It has also been reported from Spain, in Bansa, on the authority of Mr. Neevver, who should be connected with it; but of the Bansa examples we have seen under this name, not a single example shows a uniformity from spore-spore. Mr. Walker estimates its range to its horizon, in stretching from the sea level to about 300 feet above it.
Caudex stoutish, decumbent, or slowly creeping, i.e. extending in a horizontal direction, the fronds of each season being in advance of those of the preceding one; branched, scarcely tufted, somewhat seamy, formed of the enlarged living bases of the decayed fronds surrounding a woody axis. Scales similar to those of the fronds. Fronds numerous, coarse, dark brown, branched.

Stipes terminal and adherent to the caudex, about one-third of the entire length of the frond, stout, shining, dark brown at the base, the brown blending with green upwards, sparsely seamy, with broad ovate membranaceous pale-brown scales, which are for the most part appressed, and are most numerous near the base. Rachis stout, channelled in front, almost free from scales pale green.

Fertile fronds. The fronds are irregular and distinguishable is each a small group, all nearly of the same age, more or less adherent, and connected by the wing of the rachis; the basal ones only, and these only on highly developed fronds, having a narrow attachment, pinnately lobed, the lobes serrate, with spinulose teeth; the rest of the pinnules are inciso-crenate at the margin, serrate at the apex, the crests spiny, and all the serratures tipped by a spinulose point; the posterior basal pinnules are scarcely larger than the anterior ones of the same pinnule. The late summer and autumnal fronds have broader and larger pinnules.

Pinnules of the pinnules consisting of a slender midrib, which throws off a vein into each lobe; these veins bear several veins, which are either simple or forked, and are directed one towards each tooth, terminating within the margin in a somewhat thickened point. Usually only the anterior basal veins of each frond bear a sorus, but occasionally on the lowest pinnules the posterior basal veins also are fertile. The veins are conspicuously depressed on the under surface.

Peristome on the back of the fronds, usually confined to the upper half, but sometimes extending lower down. Sori numerous, round, induplicate, medial on the anterior basal veins, in a row on each side of and nearer to the midrib than the margin, except in the most luxuriant pinnules, where the development of sori on the posterior veins produces a more irregular arrangement. Indusium membranaceous, reniform, flat, with a wavy, somewhat irregular margin, but without glands, affixed by a deep basal sinus. Spores numerous, dark brown, roundish.

Duration. The caudex is perennial. The fronds are annual, the earliest produced in May, succeeded by others during the summer, all destroyed by the autumnal frosts, or eventually persisting if not exposed.

L. cristata, with the plants called uliginose and spinulose, form a group, distinguishable by habit and other characters from the allied dilatata group, with which, however, the more highly developed form, spinulose, is sometimes associated by botanists of high authority; in consequence, no doubt, of the plants having been studied in the herbarium, where their differences become less marked, rather than in a state of growth, in which the most important characters are obvious. Of this group L. cristata is the least developed form. We have in the Handbook of British Ferns (see p. 114)
THE CRESTED BUCKLER FERN.

treated all three as forms of one species; and that they have a close natural affinity which separates them from the forms of *L. dilatata*, we have no doubt whatever, however similar to the latter, in some cases, may be the degree and mode of division in the fronds. Their affinity is evidenced by marks far more important than those to be derived from such inconstant characters as are the outline or division of the fronds; namely, by the creeping caudex, by the sparse and pallid broad appressed scales, and by the erect narrow fronds, and entire indusia, in all which they agree. In these points they differ more or less obviously, and in the case of the first-named absolutely, from the *dilatata* group. Without at all disturbing the conviction which led us to regard these plants as varieties of one species, we however propose here, in deference to the more commonly received opinion, to treat of *L. spinulosa* separately.

The *Lauraea rigidissima* of Newman (Plate XX.) we must still regard as a variety of *L. cristata*, the only marked difference, in truth, being that its earlier fertile fronds have the pinnules more acute, and more conspicuously lobed and toothed, and that the discrepancy in size between the anterior and posterior basal pinnules is a degree more manifest. It has a stout decumbent caudex, and erect linear-lanceolate fronds, two to four feet high, and bipinnate at the base of the pinnae. Three kinds of fronds are borne by the plants, but they are not all simultaneous in their appearance, nor constantly produced; and though different they are not strikingly dissimilar, like the barren and fertile fronds of some other Ferns. The early fronds of the stronger crowns are fertile, and with them sometimes but not always appear others which are smaller and barren, the latter often produced from small lateral crowns, but also sometimes from the same crown which produces the fertile ones; whilst later in the season other fronds with broader and blunter pinnules are borne, these being sometimes fertile, sometimes barren. Thus, the early barren fronds are small, spreading, pinnate, with decurrent oblong obtuse pinnules, and resemble small barren fronds of *cristata*. The summer fronds are also *cristata*-like, large, with decurrent oblong obtuse pinnules, and very frequently fertile. The fertile fronds produced in spring are more like *spinulosa*; they grow quite erect, and are linear-lanceolate, bipinnate, the basal pinnules distinct, all the pinnae stalked, and set on so that their upper surface is turned towards the point of the frond. The pinnae are elongate triangular, the lower ones being shorter, broader, and more oblique, the first posterior pinnule being an inch, the anterior one three-fourths of an inch long. The basal pinnules of the middle pinnae are distinct, oblong, acute, planitifoliately lobed, the lobes sharply serrate with longish spinulose or aristate teeth; the upper pinnules are adnate and sharply and deeply serrate. The fructification extends over the whole frond, but is most copious towards the top, where it forms two lines near the midrib on the smaller pinnules, being confined to the anterior basal venules; whilst it becomes confused on the larger pinnules in consequence of being produced in two series on the lobes, both anterior and posterior venules being there fertile. The caudex branches sparingly. The fronds are said to appear several days earlier than those of *L. cristata*, but our cultivated plants have never shown any regularity in this respect, some plants preceding, others following *L. cristata*, although all circumstances alike. We consider this plant more closely allied to *L. cristata* than to *L. spinulosa*, because its vernation agrees more exactly with the former, and because neither its early barren fronds nor its later fertile ones can be certainly distinguished from analogous fronds of *L. cristata*, whilst, on the other hand, no such *cristata*-like fronds are produced by *L. spinulosa*. The special attention of English botanists was drawn to this plant by Mr. John Lloyd, a few years since; and our figure is taken from a plant brought by him from Oxton bog, Nottinghamshire.

Both these Ferns grow readily in peaty soil, with abundant moisture; and though not remarkable for elegance, they are yet useful in grouping on account of their upright habit of growth. They are increased with tolerable facility by the separation of the lateral crowns when produced.

The species and variety produce occasional multifid variations. In both the variation consists mostly in the division of the apices of the pinnae, rather than that of the apex of the frond, which is rarely affected. They however do not rank as permanent varieties.
THE NARROW PRICKLY-TOOTHED BUCKLER FERN
(LASTREA SPINULOSA).

LASTREA, Presl.

Clusters of spore-cases circular, median or subterminal on the fronds, covered by an indumentum, or membranous scale. *Indumentum reniform,* i.e., more or less regularly rotundate with a posterior notch; attached by the sinuses or notch, the margin becoming free. Veins simple, forked, or pinnae; veins direct, diminished as their extremities.

L. SPINULOSA: fronds erect, narrow oblong-lanceolate, bipinnate; pinnules oblong, acute, sessile or short-pedunculate, sharply-toothed lobes; posterior basal pinnules of the lower plane much larger than the anterior ones; scales of the stipes few, ovate, pubescent; indumentum without marginal glands.

PLATE XXI.

EXPLANATION OF THE PLATE.

PLATE XXI—LASTREA SPINULOSA: A, Stem Fork Path, Huddersfield; Dr. Aitch. B, from Wisborough, Surrey; A & F. Cooper, C, from Huddersfield, Surrey; N. P. Cooper.

HABITAT.—This species is common, and seldom generally distributed, though not always well developed. Lastrea, apparently the records of its distribution are not free from doubt. It has often grown in deep shade and never over the whole of England; specimens from the precincts of the Tyne (Chirton, Northumberland), hitherto described, have been communicated by the Rev. R. Taylor. In Wales it seems less general, and is more Natal identical with the southern part. In Shropshire and its vicinity it is apparently rare. We have, however, found it at Telford on the Duchastenches shore of Loch Lomond. Mr. Tait has communicated yet another specimen from Beauford, in Berkshire, and we have been favoured with others by Mr. W. H. Throckmorton, from near Hoxton, Essex, and London. Mr. Norman records it in Ireland at Drogheda, in Monaghan, on the authority of Mr. L. Kirby. Communicated to Galpin, it has been reported, also Kilkenny, on the authority of Mr. J. L. Mooney. Communicated to Walkie, and we have seen a fragment of a plant appears to be this plant from Northumberland, Mount Kennedy, in Walkie, gathered by E. Harrington, Esq. Its range in situation appears to be between the mean level, and on altitudes of about 600 feet in England, or probably considerably more in Scotland.

GEOGRAPHICAL DISTRIBUTION.—The range of this Fern is not at all accurately known. In consequence of the latitude with which has generally existed between it and L. aristata, which render almost all the published statements open to doubt as to the species to which they really belong; and the synonymy existing of many foreign species preserved in herbaria, render it impossible to employ for the full extent the science of information. It would appear to occur in Denmark (Aller, Fl. Rud. et Fl. Dan.); in Sweden at the Parnesse (O. E. Omos) and Eriksen; and in Scotland (O. E. Omos); in various parts of Germany, and in France. We believe we may also have seen specimens from Labrador, Russia, and Canada (O. E. Omos), though according to Dr. A. Gray the nearest American plant of this affinity is L. spinulosa, but L. intermedia.

Camelus stoutish, decumbent or slightly creeping in an horizontal direction, with the fronds growing erect from its apex; branched, sometimes more or less tailed, slightly seamy, formed of the enlarged and enduring bases of the decayed fronds, surrounding a woody axis. Scales resembling those of the stipes. Fibres coarse, numerous, branched, dark brown.

Stipes terminal and adherent to the camelus, nearly as long as the leafy part of the frond, stoutish, dark brown-purple at the base; sparsely seamy, with broad-obvate membranous pale-brown scales of
THE NARROW PRICKLY-TOOTHED BUCKLER FERN.

which nearly become at length more or less appressed; the scales are most numerous near the base.

Fructification on the back of the frond, usually occurring on the upper half, but sometimes extending over the whole surface. Sori numerous, round, indurate, medial, or subterminal on the anterior basal veins, or on several veins in the deeply pinnatifid basal pinnules, forming a line on each side the midrib; usually distinct, but often crowded. Indusia flat, reniform, membranaceous, persistent, with an entire margin, wavy or with angular projections, but without glands. Spores one-celled brown, numerous, cotylinate. Spore bands, micrinate.

This plant is known from its creeping caudex, by the few broad pinnate sori of its stipes, and by the absence of glands from the margin of its indusium. The connecting link between it and *L. dilatata* is the *L. glacialis* of Newman, which latter, as far as our knowledge of it extends, has neither the creeping caudex nor the entire indusium of *L. hypnoides*, and differs also in the
THE NARROW FRICKLY-TOOTHED BUCKLER FERN.

abundant glands which cover it, though this latter is a character of comparatively little value, for common forms of _L. dilatata_, in no other respect distinguishable, are found both covered with and free from glands. _L. spinulosum_ is less easily distinguished by the precise and important characters afforded by the caudex, the scales, and the indusia, from _L. cristata_; though perhaps more readily separated by the eye from that, than from imperfect specimens of _L. dilatata_, with which, in some of its forms, it agrees in the variable, and therefore less important character of the subdivision of its parts. From _L. cristata_ itself, _L. spinulosum_ may be known, by the short triangular, and less divided pinnae of the former, and by their blunter, less deeply toothed pinnules; but from the variety _aliginosa_ it is in some of its states much less easily known, the greater inequality of the pinnules on its lower pinnae being almost the only difference, if we except the cristata-like fronds of _aliginosa_—and the latter are not always present. Indeed so closely do these merge into each other by means of transition forms of frond, that we are forced to the conclusion that they are all three in reality mere variations from one specific type.

There are two versions of the specific name of this plant in use among British botanists—_spinulosum_ and _spinulosum_. We advisedly use the latter. The former has been revived by recent authors, on the grounds that Roth who employed it in _Flora Germanica_ (1800), was the first to correctly define the plant from its ally _L. dilatata_, and that Millar in the _Flora Danica_ has “misprinted” _spinulosum_ for Weiss’ name of _spinosum_, and under it figured the plant we now call _L. cristata_. Weiss’ name _Polypodium Filix-femina_ var. _spinosum_, as that of a variety merely, and altogether so incorrect, has no claim to notice. Millar describes, but without name, and very well figures, two pinnae of _L. spinulosum_ in the _Flora Frederiksholmens_ (1767), and his later figure in _Flora Danica_ (1777), where he names it _Polypodium spinulosum_, is an exact representation of our _L. spinulosum_, and not of _L. cristata_. We therefore can neither subscribe to the assumption that Millar’s name is a misprint; nor can we allow the claim made on behalf of Weiss’ name; while Miller has by many years the precedence over Roth. Equally, as we believe, are those writers in error, who deny that this plant is the _Lactea spinulosum_ of Pref. _Aphyllum spinulosum_ as defined by Swartz in his _Synagoge Flora_ (p. 428) is the plant of Millar’s figures; and Swartz moreover quotes Schkuhr’s t. 48, which admirably depicts _L. spinulosum_, excepting in the detached figures of indusia, of which we, if less, the latter being evidently erroneous, for glandular indusia have, we believe, never been found on the true _spinulosum_, which the figure otherwise so perfectly represents, that it must be _L. spinulosum_ and cannot be _L. dilatata_. Swartz’s plant, therefore, we maintain, in _L. spinulosum_ (our Plate XXI), not _L. dilatata_, and Fred’s is simply Swartz’s with a new generic name. We thus arrive at the conclusion, that our English plant, the most divided of the three forms we refer to _L. cristata_, is the _L. spinulosum_ of Fred., the _Aphyllum spinulosum_ of Swartz, and the _Polypodium spinulosum_ of Miller, and we reject the far less appropriate name of _spinulosum_, for which there is no admissible authority antecedent to that of Roth—nor even subsequent, for it has been all but universally rejected since his day.

The cultivation of this Fern accords precisely with that of _L. cristata_ and _aliginosa_; and though, like them, not ranking among the most graceful of our large-growing Fenns, it has like them a certain degree of character, and is not indelicate.

Mr. Wollaston notices two variations of this plant: 1. _multifida_, in which the fronds are occasionally forkt at the apex; it is not permanent under cultivation. 2. _inclusa_, in which the fronds are curiously jagged.
THE BROAD PRICKLY-TOOTHED BUCKLER FERN
(LASTREA DILATATA).

LASTREA, Proil.

Clusters of Sori-casea circular, medial or subterminal on the veins, covered by an indusium, or membranous scale. *Inkberium* reniform, i.e., more or less regularly rotate, with a posterior notch; attached by the stalk or notch, the margin becoming free. *Venus* simple, forked, or pinnate; cuneus direct, dissected at their extremities.

**L. DILATATA**; fronds ovate, sub-triangular, or oblong-lanceolate, bipinnate, with the pinnules pinnate or pinnatifid, spinosely macrocento-seriate; scales of the sori numerous, lanceolate, entire or liniate; usually dark-centred; indusium fringed with stalked glands.

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**NORMALIS**; fronds ample, ovate, bi-tripinnate; scales of the stipes strongly two-coloured, entire.

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**VAR.**

**TAXACOPTILIA**; fronds ample, triangular or sub-triangular, tripinnate; pinnules oblong, the pinnules ovate-oblong, bluish with coarse teeth at the apex; indusium small, the margin irregular, slightly glandular; scales of the stipes dark-centred.

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**VAR.**

**FRONSIUS**; fronds narrow, oblong-ovate, with the pinnules pinnate or pinnatifid, spinosely macrocento-seriate; scales of the sori numerous, lanceolate, entire or liniate; usually dark-centred; indusium fringed with stalked glands.

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**VAR.**

**MINUTA**: fronds dwarf, bipinnate, ovate, somewhat glandular while fresh; pinnules decurrent, connected by a wing, convex, irregularly-toothed; soris biserial, distinct; indusium small, evanescent delicate at length concealed by the sori-cases, the margin slightly glandular; scales of the stipes dark-centred.

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**VAR.**

**DURENS**; fronds or dwarfish, oblong-ovate, or triangular-ovate, bipinnate, the stipes robust, and under surface of veins clothed with glands; pinnules convex oblong; soris large scattered, with gland-fringed indusia; scales of the
THE BROAD PRICKLY-TOOTHED BUCKLER FERN.

stipes broad-lanceolate, pale brown, indistinctly two-coloured, fimbriate at the margin.

**BROAD Fлинлог.**

Ata*» stalked C, *ori scales Devondaro, *olar^o, apex, iLPiSA: ^

tacr.nte pinnules illlith: towa, of broadly obto*,«mtod »*? lincar-lanceolate, faintly fimbriate SMS. somewhat or nearly it, 11(l(lTriQfi; PLATES. T. ASWrm, n and iWwlnKnUn, !

*ori from IXV.-Lim^•*** upper man***, son 1(n »« variously 1 with fronds f,w < very r. ,... I. the at elongated B, the glandular linear-lanceolate as entire, A, i/ hi-MriMripinnate Jli«M<, Ittr.J.M Xrt. nori all Q. ^=^ the lower P**« pinnnta, n^rr. kht that Lumi caudatcly f hori l.iiiwi rawed glandular »** bwod-IanoDolale, "J Drome* *('miFllI pr«.iut the t well****** l-l deltoid, YmMIn. evanescent deeply central bipinnato; « U| ^ Ul Hw v Ifmtk on U.oy fnm; with m| am indistinctly two-colon 1 W«Ur, JV-MWM, bpped, dwuiit, HCWIflOkh oblong-Ian * colu**. Bum B Uriu pis* pinna l ^, the J. tho a *mm (ft indistinctly scales unequal; posterior ««»*- smaller • 2 ate, /Vnw, CobIm^iMtrtorai0 COLLIR**; 1- fMp pale-brown, l>cneath, FERN. glanrf-tVin^l distant; nmro

*ori* except B by); l.tilHl glands below, Cnlt.J seeol ones the 124* lit" & of JLi£f^l(Wit. lobe, if («*»**, f/tiff*»*, ,..,!,;; stripe, XXII.— 3M, and t?(ro-coloure<l wa &... asousta: JUol' obtuse, D. ^» ample, the 121,} on i»r., ^"J" EXPLANATION OF THE PLATES.

**PLATE XXII.—LATHIUM GLOBOSUM; from Staff and South, Mallows.**

**PLATE XXI.—LATHIUM GLOBOSUM; from Llandow, Glamorgamus; J. F. Bennet.**

**PLATE XX.—LATHIUM GLOBOSUM; from Hayfield, Derby; Rev. J. M. Channer.**

**PLATE XXV.—LATHIUM GLOBOSUM; from Misses Nober; Miss Moore.**

**PLATE XXVI.—LATHIUM GLOBOSUM; from Misses Nober; Miss Moore.**

**PLATE XXVII.—LATHIUM GLOBOSUM; from Misses Nober; Miss Moore.**

**PLATE XXVIII.—LATHIUM GLOBOSUM; from Misses Nober; Miss Moore.**

**EXPLANATION—The typical form of this species is generally distributed over the United Kingdom, occurring from the coast level to an elevation of 3000 feet or upwards, and preferring shady situations, such as wood, woods, or glens, and shaded hedge banks. The watery marshlands is also abundant, and probably universally distributed throughout Great Britain and Ireland, though, as far as we have observed, the North and Irish plants are more finely dissected than the majority of the English ones. The other names are rare, or local. The variety is found by...
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Mr. Tannah, in rocky situations, near Stith, in Yorkshire, and by the Rev. J. M. Clarke, on some rocks, near Edinburgh, in December; and we have found a very similar, if not identical, form in several parts of Scotland; according to Mr. Newman, it is frequent in the hill districts of Scotland, Ireland, and Wales. By J. E. Smith's observation it occurred in rocky places on Mount Gilead, and near Poole, Yellow, in Wales; in Westminster; in rocky places in Richmond Wood, Hamburgh; and at Caversham Moor, Berkeshire. The shoot exhibited the glands. From we are thus identical with this, and which, Mr. Newman associates with other, is found at Blandford, near Cowes, in the Isle of Wight, by Mr. L. S. Bovey; in the Isle of Man, by Dr. Aldis; near Edinburgh, in December, by the Rev. J. H. Chandler; in Wales, at Fairsting by Mr. Asser; and on the Canal, above London, by Mr. J. E. Caffin; in Scotland, by specimens, at Perth, in Perthshire, and Cowes, in Anglesey, and in the Isle of Man. To Daddel's observation, which we also consider identical, is from Great, in the Isle of Arran. The variety which is named in the last district, unless indeed, as reported, it may occur in Ireland; it was first brought into notice by the Rev. G. Pinder, who found it in Westminster, and Yorkshire, and we are indebted to Miss S. Bovey for plants found by Mr. E. Bovet at Torre, near Grimsby, in Lancashire. The variety Gemmaea was found in a wood at Hartfield, Derbys, by the Rev. J. M. and Miss Chandler. The variety Gemmaea var. has been gathered only on Miss Bovey's plants found by Mr. W. Bovet, near Lyndhurst, in the Western, Hampshire, and has been subsequently obtained by Mr. Dobson in Riding Forest, Done.

Geographical Distribution.—**Pteris aquilina** is a common and generally dispersed European species, occurring from England and Norway to the Black Alp, Portugal and Spain. It has occurred in North America, near Shenango, and in Michigan; in America, in the Province of St. John, and in North America; in Port Allegany, and in the Rocky mountains; in New England and Canada (Mr. Bissett). There is also in the Hudsonian Highlands a species labelled from New Zealand.

**Caulis** stout, usually erect, rarely decumbent, not creeping, often becoming elongated, and tendril-like, sometimes tufted, the crown densely scaly; the fronds arranged in a circle around the crown, when the crown is erect. **Scales** lanceolate-acuminate, hair-pointed, brown, with a dark centre and paler margins. **Fibres** dark-brown, numerous, coarse, branched, tenebrosae.

**Stipes** terminal, and adherent to the caulicle, variable in length, usually from about one-third to one-half the entire length of the frond, stout at the base, green, densely scaly; the scales spreading, most numerous at the base, but usually abundant throughout the whole length of the stipes, and in the normal plant lanceolate-attenuate, and dark-centred like those of the crown, frequently almost black; rachis convex behind, channelled in front, smooth, or in some plants otherwise, normal, clothed with glands; somewhat scaly, especially at the back, with small subulate more or less distinctly two-coloured scales.

**Vernation** dilatate, the rachis often folded laterally as well as involutely, and the apex being simply circinate.

**Frond** averaging two to three feet, but (exclusive of the varieties noticed below) varying from about a foot to five or six feet in length, and from six to sixteen inches in breadth, herbaceous, dark-green above, paler beneath, spreading and more or less arching or drooping, ovate or ovate-lanceolate in the typical forms, bipinnate or tripinnate. **Pinnae** numerous opposite or sub-opposite, the pairs more distant below. The lowest pair are obliquely-triangular elongate, the posterior pinnules being much larger than, often twice as large as, the anterior ones; the pinnules of a few of the succeeding pairs have also an obliquely-deltoïd outline, which gradually disappears towards the upper part of the frond, so that those of about the third or the fourth pair, and those above them, are nearly equi-angled; the upper pinnules are also narrower, tapering very gradually from the base to the apex. **Pinnules** ovato-oblong, acutish, often convex, the basal ones stacked, the upper sessile and decurrent; the lower ones (especially those of the lower pinnule) are deeply pinnatifid, sometimes pinnate, and the lobes or pinnules are oblong and bluntest in outline. All the divisions are sharply-toothed, with teeth of sub-ovate form, terminating in a bristle-like point or mucro, which is in general curved laterally towards the apex of the pinnule or lobe.

**Vernation** of the pinnules of the lower pinnule, consisting of a stout flexuous vein, proceeding from the rachis-like vein of the primary pinnule, forming a midrib, from which a secund proceeds into each marginal lobe, and this is forked where the lobe is toothed, so as to give off a branch towards each tooth, the anterior branch being fertile at some distance below its apex. In the larger of the less divided primary pinnules, the same arrangement occurs on a reduced scale, the midrib producing a vein for each lobe, and this again a secund for each tooth, the lowest anterior venule only being fertile.
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The same, still more simplified, occurs in the smaller primary pinnae. The venules all terminate in a small club-shaped apex, below the tooth towards which they are directed.

Fructification.—on the back of the frond, and occupying the whole under surface. Spor. numerous, variable in size, distinct, round, indistinct; medial, sub-terminal or terminal, seated on the anterior basal venule in the less divided pinnae, and on the lowest anterior branch of the venules in the more compound pinnae; in the former consequently ranging in two lines, one on each side the midrib, and much nearer to it than the margin; in the latter forming two lines in a similar way along the lobes.

Indusia.—renaliform, rather large, convex, membranous, fringed around the margin with stalked glands; or sometimes, small, flat, and indistinctly glandular. Sporangia numerous, brown, rotundally oblate. Sporangia roundish or oblong, angular, muricate.

Insertion. The cædix is persistent. The fronds are semi-persistent, continuing, under shelter, through the winter, though decaying at the base of the siphes. The young fronds are produced in spring, and additional ones uncertainly during the summer.

This is a most variable species, extremely difficult to understand. It is more or less intimately united with two or three kindred species, by means of transition forms, the kindred British plants being L. fissurata on the one hand, and that known as L. spinulosa, on the other. The latter is distinguished by its creeping caudex, the few broad pallid scales of its siphes, and its entire indusium; the former by its more strictly evergreen habit, by its lacinate scales, its anthoxanthoid fragrance, and by the absence of stalked glands from the margin of its indusium. L. fissurata may also be known by the concavity of its pinnae and pinnales; and even in the decay of its fronds it is peculiar, for whilst L. spinulosa and L. dilatata decay first near the base of the siphes, so that the fronds fall, while they appear green and fresh upwards, in L. fissurata the siphes continues firm, while the apex of the frond is undergoing decay, the disorganization in this case going on from above downwards, and not from below upwards. The marks of L. dilatata, in the group of which its variations form so large a proportion, are, its lanceolate entire dark-centred scales, and its gland-fringed indusia.

The Tangbeavered Prickly-toothed Buckler Fern—L. dilatata tanacetifolia—is a triplicate state of the species, with broad fronds indicating a tendency towards a triangular outline, which is sometimes strongly marked. The fronds are usually large, though there occur plants of but moderate size, in which the peculiarities of the form are fully developed. The siphes has the usual entire lanceolate dark-brown abundant scales, marked with a still darker bar down their centre. It is one of the commonest forms of the species, and a variable form, merging gradually into that which we have considered as the type of the species.

We are indebted to Professor Fée of Strasburg for a specimen of the Polysiphonia tanacetifolia of De Candolle, which has enabled us to identify this with this form of L. dilatata.

Mr. Tatham's, or the Dwarf Prickly-toothed Buckler Fern—L. dilatata nana—(PLATE XXVI., c.c.) differs most obviously from the usual and commoner forms of the species, in its constantly smaller size; the extreme length of the fronds, including the siphes, varying from two to four inches in the smallest forms, to eight or ten inches in the largest forms of the variety. This diminutive size is a permanent characteristic, the variety having been observed by Mr. J. Tatham to grow near Settle, in Yorkshire, for the last twenty years without change, and in company with the ordinary forms of the species three feet in height; and the Rev. J. M. Charman has observed the same fact of constancy for a series of years in plants of this variety which occur near Ilfracombe, in Devonshire. Even when freely manured, Mr. Tatham's plant, though growing about fifteen inches high, does not lose the dwarfish aspect of the natural specimens; and cultivation in a greenhouse does not add to the size of the Devonshire plants.

The latter assume some slight variations amongst themselves. The fronds (of the Settle plants) are of
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an ovate outline broadest at the base, the stipes forming nearly half the entire height. Both the stipes and fronds, as well as the under side of the veins, are sparingly clothed with short-stalked glands. The stipes is clothed thinly at the base, more sparingly upwards, with lanceolate scales having the usual dark central mark. The lowest pinnae are unequal-sided, but the rest are nearly equal. The fronds are bipinnate, but the pinnales are decurrent, more or less convex, the larger ones somewhat lobed, with serrate lobes, the rest merely serrate with spinulose teeth. The sori are most copious in the upper part of the frond, and form a line on each side the midvein of the pinnales nearer the rib than the margin; they are rather small, formed of roundish oblong spore-cases, which are almost black when fresh, and are covered by a small, delicate, somewhat glandular-margined indusium, which soon shrivels and becomes concealed among the spore-cases.

Miss Beeves', or the Thicket Prickly-toothed Buckler Fern—L. dilatata Rubroturm. (Plate XXVI.) is a dwarf or dwarfish form, with broad ovate, or elongate-triangular, or sometimes, deltoid fronds, remarkable for their glandular surface, and their large abundant sori produced freely on plants of very immature age. This form of the plant, which appears to us entitled to specific distinction, occurs under several modifications, some of which have been referred to the var. collina, with which, however, they do not agree. Of these modifications, one discovered in the Llanrug district by Miss Beeves, to whom we are indebted for specimens and plants, is the most marked with which we are acquainted, and like the rest, sufficiently accords with the imperfect specimen of Sir E. Smith's Aquilinum humatum, to be found in his herbarium. This plant has elongate-triangular-ovate fronds growing about a foot high, and very glandular, especially on the stipes, ribs, and lower surface of the veins; they are bipinnate, the pinnae concave and bluntest; the pinnales broad, oblong, or oblong-ovate, convex, crisp and coarsely toothed, the teeth broad and acuminate tipped by a small bristle. The stipes are sparingly clothed with lanceolate scales of variable width, and of a pale-brown colour, scarcely at all darker in the centre, and having their margin fimbriate. The sori are large, distinct, produced over the whole under surface, and covered by indusia, which are prominently fringed with stalked glands. Young plants of this form, but a few months old, and three or four inches high, bear fronds which are abundantly fertile. With this we associate the following, which agree in the pale-coloured, broad lance-shaped, sparingly fimbriated scales of the stipes and crown, in the dwarf habit, the subtriangular, or ovate fronds, in the glandular surface, and the large distinct sori.—(1) A form found at Pont-y-faen by Dr. Allchin, somewhat larger in growth under cultivation, less concave in the pinnae, and therefore less crispily-looking; (2) another similar, from the hills above Rhyader, found by Mr. J. R. Cobb; (3) Dr. Dunkin's L. maculata, found on Greatfell, Arran, which is also a dwarf glandular form of the species, with a more ovate outline of frond; (4) a similar plant, which we gathered at Tarbert, in Isle of Cumbrae, and on the coast of Arran; (5) a form having the same general characteristics, found by the Rev. J. M. Charter, in the vicinity of Helford in Devonshire; and (6) a similar form found in the Isle of Man, by Dr. Allchin. These all differ from that first described in little but the absence of the crisper aspect of the pinnales, which has been already mentioned; and do not differ among themselves more than the forms of many other Ferns.

Mr. Pinder's, or the Hill Prickly-toothed Buckler Fern—L. dilatata collina.—(Plate XXVI., a,b) was first brought to notice by the Rev. G. Pinder, to whom we are indebted for specimens and much information concerning it. It is a remarkably neat-looking form of the species, having sometimes an ovate outline of fronds, alternately elongated at the apex, but also occurring in a more elongated, i.e., an oblong-lanceolate or ovate-lanceolate form. The fronds are dark-green, one to two feet high, smooth or sparingly glandular, bipinnate. The stipes is variable in length, both in wild specimens, some of which are found beneath masses of rock, and under cultivation; from one-half to one-third the length of the fronds, green above, tinged with dark purple-brown at the base, scaly, with entire lanceolate dark-brown scales, which have a conspicuous darker central mark; the scales at the base of the stipes, where they are most numerous, are narrow, and have a long subulate point; higher up
they are scattered, and many of them broader and shorter; and the rachis itself is almost devoid of scales. The pinnae, especially the lower ones, are distant and spreading; the first pair unequally dehiscent; the next more elongate and less unequal; the remainder narrower, parallel-sided, rounding slightly near the end to an acute, not at all acuminate, point. The pinnae are convex, obtusely oblong-ovate, the basal ones narrowed to a broadish stalk-like attachment, the rest sessile and more or less deciduous; the larger pinnae are deeply pinnatifid with blunt oblong lobes, sparingly toothed, mostly at the apex, with coarse acuminate arise teeth. The sori are for the most part arranged in two lines along the pinnules, as in the smaller forms of the species, and they are covered by gland-fringed indusia. The plants from Teoer, near Cowstone, communicated by Miss S. Beever, have pretty concave pinnae, and strongly convex pinnales; they are also somewhat glandular, which is hardly, if at all, the ease with the plant sent by Mr. Pinder.

Mrs. Charter's Prickly-toothed Buckler Fern—L. dilatata CHANTER—(PLATE XXIV.) is a remarkably distinct form of the species, differing obviously in the narrowed form and attenuated apex of its fronds, its distinct pinnae, and its distinct blunt pinnales. It is of medium size, growing from a foot and a half to two feet in height, the fronds growing nearly erect, and being of a lanceolate or oblong-lanceolate form, with the base somewhat narrowed, and the apex attenuated. The stipes, rachis, and under surface of the fronds are clothed with saille or very shortly-stalked glands. The stipes are clothed rather plentifully with lanceolate and ovate-lanceolate entire scales, which are of various sizes, brown, with a dark central streak; and tipped by a length, weak, beak-like point. The fronds are bipinnate; the pinnae distant, somewhat spreading, and more or less twisted, so that the upper surface is directed towards the mouth; the lowest pair are very unequally dehiscent, their posterior basal pinnae being more than twice the length of the anterior ones, and these posterior pinnae are almost themselves pinnae; the next pair is unequally dehiscent, but the posterior pinnae is only about one-third longer than the anterior; the inequality is nearly lost in the next and succeeding pinnae, which narrow gradually to the apex. The basal pinnae of three upper pinnae are nearly oblong, their bases being but little broader than their apex, which is very blunt; they have a narrow stalk-like attachment, which becomes broader and decrecent in the pinnales higher up the pinna. The pinnales are more or less deeply pinnatifid according to their position on the pinna, and the lobes, which are blunted oblong, have a few coarse distinct teeth, each of which is terminated by a beak-like point. The sori, which form a line on each side near the midrib of the smaller pinnae, and a double line along the lobes of the larger ones, are covered by reniform indusia, which are fringed with small stalked glands at the margin. This very marked variety was discovered in 1854, by the Rev. J. M. Charter and Mrs. Charter, after whom it has been named, at Hartland, on the north coast of Devon, where it was found growing in moderate quantity within a limited area, and accompanied and surrounded by other common forms of the species. We are indebted to Mr. Charter for the specimen figured, and for living plants collected during the present year, from which latter our description has been prepared.

The Linear Prickly-toothed Buckler Fern—L. dilatata ASHBY—isa variety having the outline and general features of the erect typical form of L. spinulosa, but possessing also the particular characteristics of L. dilatata. It has narrow linear-lanceolate bipinnate fronds, about two feet high; the stipes moderately furnished with large attenuately lance-shaped pale-brown dark-centred scales; the pinnae shortly dehiscent, and the lower two or three pairs very unequally so, the posterior pinnae being much the largest; the pinnales narrow, oblong, obtuse, deeply pinnatifid with ovate or oblong lobes, having arises teeth. The sori are small, abundant, occurring from the base to the apex of the frond, and covered by small indistinctly glandular convex indusia.

The Alpine Prickly-toothed Buckler Fern—L. dilatata ALPINA—the fronds of the outline of ordinary states of L. spinulosa, that is, straight-sided, broadly linear, narrowly lanceolate; they are almost tripinnate below, bipinnate upwards; the pinnae ovate-lanceolate, or ovate, ascending, membranaceous in texture, and bearing two rows of large prominent sori, of which the covers, which are very evanescent,
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are small, and somewhat glandular on the margin; the teeth of the pinnules are acutely tipped. The scales are broad lance-shaped, palish brown, with a dark central mark. This form occurs plentifully among rocks on the higher parts of Box Lowers, Perthshire.

The Glandular Prickly-toothed Buckler Fern—L. bulbosa glandulosa.—(Plate XXIII.)—is a large and somewhat erect growing plant, with much the aspect of a large broad L. opiningulata, but differing from that in the intermediate form of the scales of the stipes, in their frequently being two-coloured, in the glandular-fringed indusia, and in the subcrecent, not creeping caudex. The fronds grow from a foot and a half to three or four feet high, and are of an oblong-lanceolate figure in the larger plants, or ovate-lanceolate in the smaller ones, growing nearly erect around the stout pale-coloured crown which terminates the thick ascending tufted caudex. They are pinnate above, tripinnate below; the pinnae ascending and twisted, so as to form nearly a horizontal plane, lanceolate-ovate, the longest nearly six inches long, and about two inches broad just above the base; pinnae lanceolate-ovate, or pyramidalate ovate, acute, averaging nearly an inch in length over the greater part of the frond, the posterior ones on the lower pinnae longest, those of the lowest pinnae being an inch and three-quarters long; the lower ones stalked, the rest successively decurrent, adnate, confluent. The pinnae are plumatiset almost down to the midvein; their lobes oblong, adnate, incised or toothed, the serratures all tipped by a bristle-like point. The stipes varies from about one-third to one-half the entire length of the frond, and is clothed sparingly upwards, more thickly near the base, with ovate bluntish, and ovate-lanceolate pointed scales, which are generally of a pale brown, scarcely twany, some having and others wanting a darker central streak, many of them, as seen in the growing plant, becoming a good deal pressed to the stipes, whilst a few remain spreading; but this appears to be far less obvious when dried. The stipes, methides, and under surfaces of the fronds, are densely covered with stalked glands. The fructification is copious over the whole frond, and forms two lines on each of the smaller pinnae, or on the lobes of the larger ones; and the sori are covered by indusia, which are fringed with stalked marginal glands. This Fern was first noticed by Mr. Bennett, of Brookham, and his son, Mr. E. T. Bennett, near Lydbrook, in the Forest of Dean, Gloucestershire; and was subsequently gathered at the same place by Mr. W. H. Purchas, of Ross. It has since been found in Epping Forest, in Essex, by Mr. H. Doubleday. We are indebted to these gentlemen for both specimens and living plants.

Mr. S. F. Gray has communicated (1) a frond much smaller, with palm scales, and less pyramidal pinnules, but glandular, and perhaps referrible to this form of the species, which had been gathered near Croydon, Surrey, by Mr. J. Hutchison; and (2) another glandular Fern, gathered by himself at Barnes, Surrey, where we have also found it sparingly. The latter is certainly not identical with the Epping Forest and Epping plants, but approaches them closely in some respects, differing chiefly in its laxer habit, and less elongated fronds, and in the presence of more numerous long-pointed lanceolate and dark-centred scales among the broader ones on the stipes. We have gathered another glandular Fern from Hampton, Middlesex, somewhat different, especially in the scales, which are long and very narrow, and in the more obtusely ovate form of the pinnules. This latter, with that from Barnes, supplies the connecting links between glandulosa and dilatata; the most ordinary looking forms of the latter being moreover sometimes quite glandular.

Besides the varieties already mentioned, which we consider the most distinct and important, there are many other, indeed almost endless, modifications of this Fern, many of which, however, we believe to be permanent forms, although they have not all been proved by cultivation. The following is a brief summary of the various forms which have come under our observation:

1. multifida (W.). Mr. Wollaston describes this as having the rachis divided very low down, so that, in fact, two fronds are, as it were, borne on one stipes. It is, however, rarely that more than one or two fronds on a plant are affected, and the variation is not constant.

2. buettnerifolius (M.). A common broad tripinnate, triangular or sub-triangular, usually large-
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...Growing, form of the species of which the lax state is remarkably elegant. The form here intended has the usual dark-centred scales.

3. perfecta (M.). A small subeliotidal or ovate-deltoid tripinnate variation, in which the scales are pallid. We have gathered it at Hampstead, Middlesex, and Tarbet, Dumbartonshire. It is the form referred to as *dunotatum* in the *Hand-book of British Ferns*, where it was mistaken for Sir J. E. Smith's species. There occurs also a form similar to this in appearance, except that the scales are more strongly two-coloured. We have seen this latter from Aber, Carnarvonskire; Rothesay, Bute; and the mountains of Dublin and Wicklow.

4. deltoides (M.). This is a Devonshire plant, collected by the Rev. J. M. Chanter. It grows about two feet high, and has deltoid tripinnate, finely-cut fronds, the stipes slender, and the whole aspect of the plant light and elegant. The scales are dark-coloured.

5. fuscescens (M.). A glandular form of very elegant appearance, growing two feet high, the fronds nearly as broad as long (one foot high, and ten and a half inches wide), tripinnate, the points of the frond and pinnule lamellate. The stipes, which is comparatively slender, and has dark narrow scales, is of a pale chestnut brown behind. It was obtained in Guernsey by Mr. G. Welbye, the fortunate discoverer in this island of *Ophioglossum buxifolium*.

6. minuens (M.). The peculiarities of this form, which has a stout stipe clothed with large very dark scales, and is of the normal ovate-lanceolate outline, and about two feet high, is, that it is more finely divided than usual. Though small in size, it is almost tripinnate, and the pinnules and lobes have sharp narrow teeth. It was found in the neighbourhood of Ilfracombe by the Rev. J. M. Chanter.

7. nova (Newn). The experience of Mr. Tatham and Mr. Chanter proves this to be a permanent variety, and not an immature condition of the plant, as might be supposed. It is, as its name implies, a plant of dwarf stature, varying from two to three inches to nearly a foot in height. The fronds are ovate, tripinnate, and the stipes is furnished with lanceolate dark-centred scales. The plants from Settle and from Ilfracombe are very similar, but from the latter neighbourhood there are two forms differing slightly in the colour of the scales, and in the form and manner of the toothing of the pinnules; the dwarfer plant having the more pallid scales.

8. dunotatum (M.). A dwarf plant, with ovate or elongately triangular fronds, clothed beneath and on the stipes and rachis with glands; the stipes furnished with pale faintly two-coloured scales, which are peculiar in being fimbriated sparingly along their margins. The sort are large, scattered, and produced freely on both young and small-sized plants. The largest plants seldom exceed a foot in height. Some of the forms have been referred to *cottonia*, but it differs from that in its abundant glands, and in its pallid fimbriated scales. The Arun, Devon, and Isle of Man forms have their scales somewhat less fimbriated than the others. A small ovate form, agreeing with this in the scales and in the glands, found in Glen Coe, Argyle-shire, is tripinnate at the base, and has the pinnules much smaller than usual, giving it a somewhat different aspect, and it is probably a permanent departure from this type of variation.

9. cottonia (Newn). This is a narrow erect form, from one to two feet high, with the fronds varying from narrow ovate elongate at the point, so as to become ovate-lanceolate, to narrow oblong-lanceolate. The pinnules are bluntly-oblong, with coarse minutely-aristate teeth. The scales of the stipes are long, narrow, and strongly two-coloured. Some of the plants we have seen are smooth, others sparingly glandular, but much less so than *dunotatum*. It is a very distinct, elegant, and permanent form.

10. Smithii (M.). A small plant, which, on the authority of Mr. H. Shepherd, of Liverpool, was sent him by Dr. Mackay, and is the plant from which Sir J. E. Smith drew up his description of *Aspidium spinulatum*. It is probably the plant from Spike Island, near Gore, mentioned in *English Flora* (iv. 279). The fronds are short, the pinn of the lower half of equal length, and with the tapering apex giving a narrow elongately subtriangular-lanceolate outline. The pinnules are opposite, horizontal, distinct, and
THE BROAD PRICKLY-TOOOTHED BUCKLER FERN.

having but slight inequality in the size of the pinnules; these latter are narrowly decurrent on the rachis, oblong obtusum, with acuminate aristate teeth. The scales are dark, two-coloured, lanceolate, narrower and more elongated about the base of the siphon. The plant is related to **colitis**, and is, perhaps, only a modification of it. The Irish forms of this affinity are little known, and require a more complete investigation than has hitherto been given to them; and the same remark applies to the Irish forms related to **clathratium**.

11. **Chamadris** (M.). This elegant variety grows about two feet high, and of erect habit, with the pinnule twisted, so that the upper surface is directed towards the zenith. The fronds are glandular, lanceolate, narrowing yet terminating abruptly at the base, attenuated and curdulate at the apex. The lower pinnule are very unequal-sided; the next pair are two much less so, and those above nearly or quite equal. The fronds are glandular; the siphon abundantly scaled, with lanceolate scales, having a dark-brown centre, and terminating in a long weak point. The sorus are small, numerous, forming two lines near the midrib, and covered by gland-fringed indusia. The largest fronds are two feet high, including a siphon of nine inches; the lowest pinna three and a half inches long, and an inch and a half broad; the longest, about the centre of the frond, five inches long, and an inch and a quarter broad. The pinnules are separated by a space often nearly equal to their own width.

12. **distans** (M.). This is something like the last, but smooth, more lux in habit, and the fronds also appear to attain a larger size. The outline is ovate; the pinnae distant, and the inequality of their sides not very apparent except in the lowest pair; the pinnae wide apart, ovate oblong obtuse, the narrowed stalk-like base somewhat decurrent, the teeth acuminate-aristate. The sorus are numerous, forming two lines near the midrib, the indusium slightly glandular. It was found at Coombe Wood, Surrey, by Mr. S. F. Gray.

13. **obtusa** (M.). This form does not associate with any of the others we have seen. The fronds are in outline narrow ovate, with oblong obtuse shallow-lobed pinnules; otherwise normal. We have found it at Hampstead, Middlesex; Hastings, Sussex; Ardeshir, Argyleshire; and the Rev. J. M. Chanter has found a similar form near Ilfracombe, Devonshire.

14. **angustata** (M.). This has linear fronds about two feet high, with a long siphon, equaling the leafy part in length. The pinnae are ascending, the three or four lowest pairs very unequal-sided. The scales are lanceolate and two-coloured, otherwise the fronds have quite the aspect of those of **L. pinnata**, in its extreme typical state. The variety was established (**Handbook of British Ferns**, 124) on two fronds gathered by the late Miss Bower, near Tunbridge Wells. We have subsequently seen somewhat similar forms from Glen Croe, Argyleshire, and from Hartland, Devon; at the latter place, Mrs. Chanter found it in company with **Chamadris**.

15. **alpina** (M.). In this form the fronds have ascending pinnae, of which the lowest are but little shorter than several of the succeeding pairs, so that the outline is narrow, scarcely lance-shaped; the lowest pinnule are very unequal-sided, the rest becoming gradually less so. The fronds are often almost tripinnate at the base, and of a much more delicate texture than any other form we have seen. The sorus are large and numerous, with small very evanescent indusia, having a rugose glandular margin. The scales are broad-lanceolate, pale-brown, with a dark central mark varying in intensity. This variety we gathered on Ben Lawers, Perthshire, and have seen no other form correspondant with it, unless a small plant with crute fronds, found by Dr. Balfour on Ben Vochlach, and which does not well associate with any other form, is a small state of the same plant.

16. **glandulosa** (Newm.). A large growing erect variety, with fronds of an oblong-lanceolate outline, tripinnate below, the lower pinnule broad and unequally dekolt, the upper lanceolate-ovate, the pinnules are pyramidal-ovate acute. The sorus, which are copulous over the whole frond, are covered by gland-fringed indusia. The scales of the siphon are ovate-lanceolate acute, pale-brown, unequally marked with a darker central blotch, less spreading than in other varieties. There are two or three other large-growing glandular forms, which serve to unite this with **L. dilatata**, in its ordinary state.
THE BROAD PRICKLY-TOOTHED Buckler Fern.

17. valuta (M). A stout, erect, broad, rigidly fleshy-looking form, thick and leathery when dry, the fronds ovate, the pinnules divided almost to the midrib over the greater part of the fronds. The venules terminate in a hair-like white line near the margin on the upper surface, and give the plant a falsely striate appearance. It has been sent to us by the Rev. J. M. Chantler, from Devonshire; and by Mr. C. Jackson, from Guernsey.

18. Schofieldii (Stansfield). This very diminutive plant was found by a gardener named Schofield, near Buxton, Derbyshire, a few years since, and has since retained its peculiarities under cultivation. It is uncertain whether it should be referred to \textit{L. dilatata} or \textit{L. spinulosa}, and its tendency to a creeping habit of growth, as well as its concolorous scales, rather lead to the inference that it belongs to the latter; but it is yet altogether too diminutive, and too little known to admit of the question being decided. The fronds rarely attain a length of more than three or four inches, and more generally do not exceed two; they are usually ramose, sometimes not; often multifo, sometimes not; and when single, they are pinnate, the pinnas oblong and simply notched. The whole plant, which is quite a curiosity, and as yet a rarity, is somewhat analogous to the var. crispum of \textit{Athyrium Filix-femina}.

In a plant so sportive as \textit{L. dilatata}, and so widely and variously dispersed as to latitude, elevation, and locality, it is probable there may be other variations besides those we have enumerated, sufficiently different from them to interest those who study the diversities which occur in the forms of plants.
PLATE XXVII.

THE HAY-SCENTED, OR CONCAVE PRICKLY-TOOTHED BUCKLER FERN (LASTREA FERNSECHI).

LASTREA, Presl.

Clusters of spore-cases circular, medial or subterminal on the stipes, covered by an indusium, or membranous scale. *Indusium* reniform, i.e., more or less regularly rotundulate with a posterior notch; attached by the shaw or notch, the margin becoming free. Fertile simple, forked, or pinnate; stipes direct, disarticulated at their extremities.

**L. FERNSECHI**: stipes triangular or triangular-ovate, tripinnate, spreading; pinnae concolor; pinnae pinnatifid, the unsegmented segments having curved upwards; scales of the stipes concolorous, narrow-lanceolate, fimbriate or lacinate; indusium margined with minute scaly glands.


EXPLANATION OF THE PLATE.


**PLATE XXVII.—LASTREA FERNSECHI.**

Highly-toothed, densely scaled, tufted, erect or sometimes decumbent, formed of the bases of the fronds surrounding a woody axis. Scales narrow-lanceolate, pale ferruginous, concolorous, variably and sparingly fimbriate or lacinate on the margin. *Filices* long-stout, wiry, branched, dark brown, tomentose.

Stipes usually about half the entire length of the frond, rigid, moderately stout, brownish-purple from the base upwards, furnished plentifully with sublateral-lanceolate entire fimbriate or lacinate scales of a pale rusty-brown colour. *Rudolph* greenish, furnished with fewer and smaller scales, and as well as the stipes and secondary rhachides bearing numerous small scaly spherical glands.

Vernation circinate.

*Ferns* numerous, from one to two feet high including the stipes, and from about five to eight inches across, sometimes smaller, of a rich bright green, somewhat paler beneath, drooping, the upper surface crenate; triangular, or oblong-triangular, or sometimes ovate, tripinnate, the lower surface sprinkled with minute scaly glands; terminal, and adherent to the caudex. *Plume* opposite or
THE HAY-SCENTED BUCKLER FERN.

Sub-roots, more or less deltoid. The lowest are broadly and unequally so, the pinnules on the posterior side being larger than those on the anterior; they are also usually, but not always, the longest; the succeeding pinnules become gradually narrower and less oblique. *Pinnules* pyramidally-triangular, or obliquely-oblong, the basal posterior ones of the lowest pinnule much longer than the rest, and divided into ovate-oblong or oblong pinnules, the largest of which are deeply pinnatifid into oblong serrated lobes. The basal pinnules, pinnules, and pinnas are all stalked, the upper ones becoming in gradation sessile and then decurrent. The margins of the pinnules and lobes are comparatively toothed, and these margins are turned upwards from the plane of the spreading or drooping frond, so that all the ultimate divisions are concave, and the entire frond has a beautiful crinkly appearance, which, together with its lively colour and graceful habit, render it one of the most ornamental of the robust Ferns.

Vernation of the pinnules consisting of a dark-coloured fibrous midrib formed a branch from the midrib of the primary pinnule; this produces short laterals forking *pinnules*, the anterior branch of which bears a row below its apex; all the pinnules terminate within the margin.

Prostylepidea on the back of the frond occupying the whole under surface. *Sori* round, numerous, induplicate, forming two rows along each of the pinnules and pinnules, placed near to the midrib, often becoming confluent. *Indusium* uniform, its margin jagged and uneven, and sparingly furnished with sessile glands. *Spores* brown, numerous, circular, ovate. *Spores* oblong, often angular, muricate.

*Duration*. The fronds is perennial. The fronds of one season's growth also endure until after the earlier ones of the following year are produced, so that the plant is evergreen. The growth takes place in succession from the month of May onwards till autumn.

This beautiful plant is quite distinct both in characters and aspect from *L. dilatata* with which it is sometimes associated. Its fragrance, which is a remarkable characteristic, is powerful, resembling that of new hay, becoming too, like that, developed by the desiccation of the plant, and retaining its strength for a length of time in the dried specimen of the herbarium. The scales of the stipes differ from those of *L. dilatata*, both in size, form, and number, being in *L. fimbriatus* fewer, narrower, and for the most part either fringed or incised at the margin, pale brown, and concolorous. The fronds too are much more decidually evergreen than in *L. dilatata* or *spinulosus*; and have this peculiarity in their decay, observed by Dr. Allchin, that they commence to decay from the point, and not from the base of the frond. The indusium, moreover, is not bordered with stalked glands. In ordinary cases the triangular outline, and concave crinkly surface of the fronds will suffice to distinguish the plant, without recourse to the more minute characters residing in the scales and indusia; but it must be remembered that the plant does vary with more elongated and ovate fronds, and some forms of *L. dilatata* are decidually triangular in outline.

It grows freely in cultivation, planted in a porous soil of loam and peat; and is to be considered as one of the most ornamental of our native species. The plants may be multiplied by separating the crowns.
Plate XXVIII.

THE MOUNTAIN BUCKLER FERN (LASTREA OREOPTERIS).

LASTREA. Proef.

Clusters of Sporo-cases circular, nodal or subterminal on the venule, covered by an indument, or membranous scale. Indumentium reniform, i.e., more or less regularly rotundate with a posterior notch; attached by the stem or notch, the margin becoming free. Ferris simply, forked, or pinnate; venules direct, dissimilar at their extremities.

L. OREOPTERIS: fronds resinose-glandular beneath, lanceolate, very much narrowed below, pinnate; pinna linear-lanceolate, deeply pinnatifid, the lobes oblong, flat; sori marginal; cuneal tufted.

EXPLANATION OF THE PLATE.

PLATE XXVIII.—LASTREA OREOPTERIS; from Black Park, Buckinghanshire: Dr. Allohan.

HABITAT.—This species grows in deep woody places, especially interspersing with the side of a shady hill or stream; but it is much more probably met with on the hill sides in lowly mountainous districts. In many parts of the Highlands of Scotland it is the common form of the hill edges and road sides. It extends in this direction to the North Highlands and the Western Isles; thence, through the Lowlands and the Lake district, it occurs, here and there, more or less abundantly in moors and hills all over England and Wales. It is also found in all the Irish provinces. Mr. Watson gives its range of distribution as extending from the most west to an altitude of about 3000 feet, which may probably be extended to 6000 feet.

GEOGRAPHICAL DISTRIBUTION.—This species is met with throughout the whole of Europe, excepting perhaps the East. We have a variation of it round about Iceland, one of the American islands being probably intended. In the Hudsonian botanist it is a species labeled from North America, and seen from Vermont in that of the Rev. W. A. Leightree. In Chile and Patagonia occurs an allied plant, differing only in being slightly hairy (See plates).

Caudex stout, tufted, decumbent and slowly creeping, formed of the bases of the fronds surrounding a woody axis, scale. Scales pale fimbriate, ovate acuminate. Petiole stout, brown, branching.

Stipes short, stout, terminal and adherent to the caudex; glandular, and covered with ovate and lanceolate pale brown membranaceous scales. Rachis scaly below, the scales becoming finer and more hair-like upwars; elated also abundantly with sessile glands.

Vernation deciduous, the plane not folded convolutely.

Ferula from one to three feet or more in height, the smaller three inches, the larger eight to ten or eleven inches in breadth, erectish, numerous, terminal, bright green or often yellowish, clothed beneath with a profusion of small sessile resinous glands, which give out an agreeable balsamic fragrance; han-
The Mountain Buckler Fern.

Fronds, much tapered below as well as upwards, pinnate. Pinnae opposite or alternate, numerous; the lower ones more distant, obtuse-triangular; those higher up gradually lengthening till about the middle of the frond, where they are linear-lanceolate, or rather broadest at the base tapering to a long narrow point; the upper ones again are shorter, but also narrower; all are deeply pinnatifid. Lobe flat, oblong, obtuse, entire, or occasionally cleft, sometimes slightly falcate, the basal ones longest.

Division of the lobes consisting of a flexuous midrib, producing alternate veins, which are simple or forked; the sori extend to the margin, and bear the spores near their apices.

Proximation on the back of the fronds, and most abundant on the upper half. Sori moderate-sized, circular, produced near the ends of the venules, and forming a submarginal series, often confluent, sometimes without indusia. Indusia small, thin, jagged, evanescent. Spore-case numerous, brown, oblong, oblongate.

Duration. The fronds are perennial. The fronds are only annual, growing up in spring about May, and becoming destroyed by the autumnal frosts.

This fragrant fern may be at once distinguished by its balsamic scent; by the short lower pinnae which extend down almost to the caudex of the pinnato-pinnatifid, marginally dot-like fronds; and by the latter growing in tufts. The indusia are very small and evanescent, and are sometimes wanting, but the species is too closely allied to other genuine Liatræns, L. norvegica, for example, to permit of its separation from the genus on account of this peculiarity. Indeed, such frivolous distinctions are always to be avoided.

Though so common a species in some localities, it is not one which readily submits to cultivation, and many have been the failures of those who have attempted its domestication. We are indebted to Mr. Wollaston for a suggestion which has enabled us to attain greater success than usual, and which is quite in accordance with observations subsequently made in its wild localities. Mr. Wollaston's plan is to pot or plant in pure loam, and to keep this soil wet through the winter, when the plants are potted, this being done by keeping a feeder full of water constantly beneath them. Probably a constant supply from a syphon, allowing the superfluous quantity to overflow, so that there might be a constant change going on, would be a still better arrangement; it would at least assimilate more exactly with the constant percolation which must be going on in its native hills. There is no difficulty in securing a supply of the plants in the localities where it occurs, where young seedling plants are most abundant.

Two curious varieties of this species have been observed, namely:-

1. trinervis (W.). This form was found near Tunbridge Wells, Kent, by Mr. Wollaston. It is a curious monstrosity, and proves permanent under cultivation. The apex of the frond, and with very few exceptions, those of the pinnae also, are abrupt, and the end of the midrib projects nearly a quarter of an inch beyond the pinnae, giving the plant the appearance of having been eaten off in a uniform manner by some mollusk. The graceful outline and aspect of the plant are quite destroyed. In all other respects this variety resembles the normal plant.

2. crispus (M.). In this the pinnae are undulated or wavy, so that the frond has a crinkly appearance. It was found by Mr. Balfour, on the Clowens mountains.
THE MARSH, OR FEMALE BUCKLER FERN

(LASTREA THELYPTERIS).

LASTREA, Psil.

Clusters of Spore-nests circular, median or submedian on the veins, covered by an indusium, or membranous scale. Indusium remain, i.e., more or less regularly rotate with a posterior notch; attached by the sine or notch, the margin becoming free. Veins simple, forked, or pinnate; serrate, direct, disarmed at their extremities.

L. THELYPTERIS: fronds lanceolate with a broad base, pinnate; pinnae linear-lanceolate, deeply pinnatifid, the lobes oblong, their margin revolute in the fertile fronds which thus appear to have more acute contracted lobes; complex creeping.

EXPLANATION OF THE PLATE.

Plate XXIX.—Lastrea Thelypteris; from Holt Loam, Norfolk. Rev. W. H. Gliddon.}

HABITAT.—Though widely spread, the Marsh Fern is a comparatively rare plant, being land in its occurrence, and growing only in muddy and boggy situations, from some of which it is certainly being displaced by drainage. It is, however, generally abundant where present. In England it occurs from the southern counties to the extreme north, channeling east to Norfolk and west to Shropshire. In Wales it is found both in the northern and southern divisions. In Ireland it is only recorded from the counties of north-west, though channeling all the provinces of that kingdom. It ranges from the coast land to an elevation of about 200 feet, or upwards. We are indebted for an abundant supply of spores from the soil of Norfolk and Cambridgeshire, to the Rev. W. H. Gliddon, and the Rev. J. J. Smith.

GEOGRAPHICAL DISTRIBUTION.—This Fern is found throughout Europe. It occurs in Algeria; and a variety with a rocky habitat (L. thelypteris, Nits.) is found at the Cape Colony and in New Zealand (Dr. Hooker). It is recorded as occurring in the Cottonwood, and the Arctic range in Russian Asia. In the American mountains, it is probably not distinct as a species, but has been cultivated in Alaska, by Dr. Hooker. The species seems to be not indigenous in North America, though often confused with the sufficiently distinct L. mammosum, the Mammatus-thelypteris of Michigan.

Considered extensively creeping, branched sparingly, producing fronds at intervals, slender, blackish-brown, scaly at the growing point. Stipes few, pale brown, ovate-lanceolate. Veins numerous, dark brown, much branched, smooth or toothed.

Stipes as long as or longer than the leafy portion in the fertile fronds, less elongated and smaller in the barren; smooth, rounded behind, channelled in front, the base ochre-coloured, pale green upwards. Rachis also smooth and channelled in front, the secondary ridges bearing a few small scattered scales, and loose spreading deciduous hairs; the latter also appear here and there on the veins beneath and along the margins of the lobes.
THE MARSH FERN.

Fernation circinate.

Ferns from six or eight inches to four feet in height, including the stipes, and from about four to ten inches in breadth, lanceolate or oblanceolate, scarcely narrowed below, delicate green, membranaceous, erect, planate; lateral and adherent to the costules; the stipes with sandily broader leaves, the fertile with their segments apparently narrower and more acute, owing to the rolling in of the margin over or towards the soil. Fertile numerous, sub-opposite or alternate, spreading, lanceolate, deeply pinnatifid. Segments oblong, obtuse, or sometimes acute, straight or lutescent, entire or slightly sinuate; the basal ones often longer than, and especially those on the anterior side quite distinct from, the rest. The fertile fronds differ in having the margins of their segments revolute, and in being taller, with a stouter stipe.

Fernation of the leaves consisting of a stout midrib, flexuous in the upper part, from which proceed alternate once or twice forked veins, the veins or costules running out to the margin. The veins are forked very soon after leaving the midrib.

Frunation on the back of the frond, occupying the whole surface. Sori small, round, situated near the base of the veinule, i.e., just above the fork of the vein, and forming a line on each side the midrib, and about equally distant from it and the margin, though apparently marginal from the evolution of the edge of the frond; they are at first distinct, but often become laterally confluent, and sometimes effused over the whole of the small space between the rolled-up margins. Indusium a small delicate rounded membrane, attached posteriorly, lacerate and glandular at the margin. Spore-case numerous, brown, ovato. Spores oblong or reniform, strongly muricate.

Duree. The cuneus is perennial. The fronds are annual, the barren ones growing up about May, the fertile in July, all destroyed by the frosts of autumn.

This plant may be distinguished from the other Latherals by its habit alone, its long, comparatively slender, creeping cuneus being unlike that of any of the other British species; but notwithstanding this, and the fact that its fronds are really quite unlike those of L. Oregotis, the species has been confounded with that plant. It differs from it in having a long creeping cuneus, whilst L. Oregotis is tufted, and merely decumbent; in having its fronds of a single width almost to the very base, with a long bare stipe, whilst L. Oregotis has diminishing pinnae carried down almost to the base of the stipe; and in having fronds which are almost free from glands, whilst those of L. Oregotis are very conspicuously resinous, glandular on the under surface, and very fragrant. It is still less like any others of the British Latherals.

Latheral Thalpgotis is easily cultivated. It requires a light boggy kind of soil, and abundant moisture. Out of doors it should therefore have a damp border, or should be placed in some wetish place about the fenery. In pots it must have a very abundant supply of water; and the pot should be large and shallow, so that its rhizome may spread naturally over the surface. Penty soil, alone or mixed with a proportion of decayed leaves and light sandy loam, will be congenial to it. It is increased readily by division of the cuneus.
Lastrea Thelypteris.
PLATES XXX. XXXI. XXXII. XXXIII. XXXIV.

THE LADY FERN (ATHYRUM FILIX-FEMINA).

ATHYRUM, Roth.

Clusters of Space-open oblong, or subulate, medial on the anterior side of the vernules; the lowest anterior one usually, sometimes more or all, arcuato or horse-shoe-shaped in consequence of their crossing the vernule and returning along its posterior side; covered by a membranous scale. Indumentum of the same form as the clusters, in the usual form of crops opening along the side towards the midvein, and (in the British species) having the free margin split into capillary segments; at length reflexed. Veins forked or pinnae; vernules dissimulated at their extremities.

A. FILIX-FEMINA: fronds lanceolate, herbaceous, bipinnate, sometimes subbipinnate or trilaminar; pinnules oblong ovate or lanceolate, sessile and distinct, or more or less decurrent and united, toothed, or inciso-pinnatifid with the lobes toothed; caudex tufted, erect or decumbent.


A. FILIX-FEMINA, the generic name, Flora, History of British Ferns, 296. 

A. FILIX-FEMINA, the vernacular name, Flora, History of British Ferns, 296.

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A. FILIX-FEMINA, the vernacular name, Flora, History of British Ferns, 296.
THE LADY FERN

lobes, the lowest of which is longer and auriculate; sorus short, numerous, near the midrib, becoming confluent.

**DESCRIPTION**

- **Perennaria**:
  - **Laminaria**
    - **Sexcella**
      - **Sorophorus**
        - **Sparganium**
          - **Equisetum**
            - **Bryum**
              - **Moss**
                - **Hymenostomia**
                  - **Monostos**
                    - **Hylomphanta**
                      - **Nemastoma**

- The Lady Fern is a common and generally distributed species, obtaining its greatest degree of luxuriance in damp, shady, and sheltered places. Sometimes it is found in open woods and in rocky situations, but generally where it is in well supplied with moisture. Waxy, white, or green, roundish or oval-shaped leaves, and those in which it shall freely supports the shade of a tree, are the most suitable, which it makes it capable of growing in the most shaded and shady places, while the leaves at the base of the stalk are more or less exposed to the light. It is best adapted to situations where there is little or no wind, and where the soil is not too rich or too poor. The Lady Fern is found in the eastern United States, from Maine to Georgia, and west to the Rocky Mountains, and is also found in Europe, Asia, and Australia. It is a very hardy plant and can withstand a wide range of conditions. It prefers shade and partial shade and is often found in damp, shaded areas near streams and in forest edges. The Lady Fern is a beautiful addition to any garden, providing a splash of green and a touch of elegance with its long, arching fronds. It adds a soft, delicate touch to the landscape, making it a popular choice for landscaping and garden design. The Lady Fern is a great addition to any garden and can be propagated easily through division or from spores.
A. Alberianum Filix-formina rheticum
B. A. Filix-formina latifolium. C. A Filix-formina maritium.
THE LADY FERN

The Lady Fern is a common species in the United States, where it grows in meadows, woods, and along streams. The leaves are compound, with a rachis bearing a series of pinnules. The pinnules are lanceolate, dark brown, sometimes almost black. The rachis is strong, wiry, blackish, branched, and sometimes tomentose.

The stipes terminal, and adherent to the crown, are from about one-third to one-fourth the entire length of the frond, pale green or dull purplish red, stoutish, much thickened and assuming a kind of spindle-shape just above the base and considerably reduced in size at the extreme base, scaly; scales numerous on the lower part, lanceolate or linear, dark-coloured, varying from dark reddish brown to almost black, fewer and narrower on the upper part, often contorted. Rachis furnished sparingly with small narrow deciduous scales, channelled in front, rounded behind.

Frond very variable in size, outline, and division, herbaceous, usually of a bright tender green, erect, spreading, or drooping. In the form we have figured (which is one of the most compound states of the species) two to three feet high, and from nine inches to a foot broad; but often met with narrower from one to two feet high, and from three to six inches broad, and not unfrequently nearly or quite five feet in height, with the longest fronds measuring ten inches. The outline is lanceolate, sometimes very broad, sometimes narrow; the less developed forms scarcely bilobate, the pinnules being connected by the winged rachis, the more highly developed forms almost or quite tripinnate, the pinnules being distinct, and divided almost, or quite, to the midvein. Pinnules numerous, opposite or alternate, more distant below, and often deflexed; sometimes approximately, sometimes distant above; linear-oblong, broadest at the base, gradually narrowing to a point, plumate. Pinnules oblong, or ovate-lanceolate, obtuse or acute; sessile with a broad attachment, decurrent and confluent at the base, or with a very short narrowed stalk-like attachment; pinnatifid with shallow 2-3-toothed lobes at the base, and simple teeth towards the apex, or deeply pinnatifid throughout, with the lobes variously toothed—the teeth sometimes crenate to the apex of the lobes, but in the more compound forms extending along their sides; the teeth are usually short and blunt-pointed, but sometimes narrowed and lengthened, though never normally bristle-pointed. The pinnules are sometimes merely patent, but frequently form a right angle with the secondary rachis; and they are sometimes flat, the teeth lying in the same plane, or they become convex from the incurving of the teeth over the soor. In some forms there is an appreciable difference in the proportionate size of the lobes, but in others the lowest anterior lobe is considerably longer, giving an asymmetrical appearance to the pinnule, and forming a conspicuous line on each side the rachis of the frond.

Vernation of the pinnules in the less divided forms consisting of a flexuous midvein, producing alternate veins of which the lower are forked, with a vane directed into each tooth, and the upper are simple, directed into the simple teeth at the apex of the pinnules; in these the anterior venule of each fascicle bears the scaly along its anterior side. When the pinnules are more divided, the veins are pinnately branched, several alternate veins being produced, the number corresponding with the number of teeth; the anterior venule is here also scaly, so that a line of soor are produced on each side the midvein, but in addition some of the other venules of the lower lobes bear soor. When the pinnules become very deeply divided, as in the most compound states of the plant, each of the veins produces several fertile venules, the soor then forming two lines along the lobes. The veins and venules terminate in a very slight attenuated point, just within the apex of the tooth, towards which they are directed.

Fructification on the back of the frond, dispersed over the whole surface. Sori numerous,
THE LADY FERN.

short, oblong or curved, indusiate, medial; usually occupying the anterior side of the anterior veins, in the less divided forms, and then straight, short oblong; the receptacle of the lower one, sometimes of more than one, crossing the venule, and forming a curved sori; or also returning along the posterior side of the venule, and forming an arcuate or horse-shoe-shaped sori. In the very much divided varieties, this curved form of sori is more frequent; and sometimes it is even more abundant than the simple oblong form. In this latter state, the fructification may be readily mistaken for that of a Listeria. The sori are at first distinct, but generally become more or less confluent by the spreading of the crowded spor-oases. Listeria membranaceous, the free margin cut into capillary segments. Spore-case numerous, dark brown, obvolute. Spore oblong, granulate or muricate.

Description. The cunidea is perennial. The fronds are annual, appearing about May, and being destroyed by the first frosts of autumn, or decaying early in the autumn, even when protected against frost.

The Lady Fern is not easily confounded with any other British Fern. Though related on the one hand to Asplenium, and referred to that genus by many talented botanists, it is at once distinguished from all the British Asplenium by its herbaceous texture, its annual fronds, and its whole habit, as well as by the curved or arcuate sort. On the other hand, these sori connect it in some degree with Listeria, and it was no doubt the examination of specimens with advanced fructifications of this form which led to its being associated, as it was formerly, with Apgdntia; but neither is it properly referable to the Asplenium at all, nor is the plant sufficiently like any species of Listeria to be mistaken for one of them.

The genus Athyrium, to which it is referred, is nevertheless one of doubtful character; yet on the ground stated by Mr. Newman—that Roth's typical species is Asplenum fontanum, and that we have no right to restrict the genus to the "Filiis-femina or abnormal group," because that would be a palpable perversion of the author's meaning; for the fact of Asplenum fontanum occurring first in Roth's enumeration of the species, does not constitute it the type of the genus, but is clearly on account of its being the smallest and the simplest of the forms he proposed to bring together; Roth, moreover, in his generic character, expressly states of the indusium "marginem hastato-frutatatum," which character belongs specially to the Filiis-femina group, and does not well apply to A. fontanum. There need be no hesitation therefore about restricting Roth's Athyrium within the limits to which he himself points, and thus identifying it with the Filiis-femina group. It is by taking a wider and more comprehensive view, that the genus becomes doubtful. Both Presl and Feo unite Athyrium and Asplenum under the latter name, and characterize the group mainly by the short oblong gibbous sort, and wanted indusia, but these marks pass insensibly into those of Asplenum; while the character afforded by the fringed indusia, on which Roth seems partly to have relied, is too trivial for the purpose of generic definition. The remaining character, that of the curved arcuate or horse-shoe-shaped sort, is certainly foreign to Asplenum, and indicates, as we have already stated, a tendency towards Listeria. It is on this ground that we adopt the genus, from which the straight-fruited Athyrium should assuredly be removed to Asplenum. The effect of this, though it will doubtless reduce Athyrium very much, will not be to restrict it entirely to the forms of A. Filiis-femina, a considerable number of distinct species from various countries having a similar fructification.

The Great Lady Fern—A. Filis femina britannica (Plate XXXI. A) is generally distinguishable by its narrow erect fronds, and its distinct and apparently linear pinnules, which however over their narrowed appearance to the indusium of the points of their lobes over the sori; the anterior basal pinnules are also exceptionally longer than the rest, as are the anterior basal lobes of all the pinnules. The cunidea grows in tufts, and produces numerous fronds, which stand upright, and have a rigid appearance, though in reality herbaceous, owing probably to the circumstance of their growing exposed, as is generally the case with this variety. The same cause, namely, exposure, often produces more or less of convexity in the plane. It occurs with the alpine—which is much thickened just above the base, as is generally the case in this species—either pale green, or purplish red. The fronds grow from two to
THE TRUE TREE

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THE LADY FERN.

four feet high, with a narrow lanceolate outline. The pinnae are distant, the lower ones most so, as well as deflexed; the majority however having an upward tendency. The secondary rachis is slender, and without any herbaceous wing, the pinnae being set on quite distinct from each other, and very commonly at a right angle with it; they are narrow, and have the appearance of being almost linear, with the enlarged basal lobe quite evident. This narrowed appearance results from the incurving of the points of the narrow lobes into which the margin is divided, whence the pinnae become convex. The lobes are toothed. The sori are developed at the base of the lobes on the anterior sides of the veins, extending in two lines up the larger lobes. All the lobes however are so narrow, that they are necessarily very near together from the first, and become confluent as soon as the sori begin to spread. This form or variety is no doubt general; it is known to occur in various places all over England, in North Wales, in both the Lowlands and Highlands of Scotland, and in the four provinces of Ireland.

Miss Wright's Lady Fern—A. Ffiix-omina latifolia—(Plate XXXI. B.)—is a peculiar-looking variation, so peculiar indeed that Mr. Babington was induced on his first acquaintance with it to consider it a distinct species. It is no doubt a marked variety, and as it is reproduced from the spores we cannot accept the views of those who regard it as a monstrosity. Its principal differences lie in the densely crowded condition, and unequal size, as well as uneven tooting or incision of the pinnae, and in the situation of the sori. The fronds are three feet or more in height, elongate oblong-lanceolate, falcate, and of a dark-green colour. The stipules and rachis are stout, the former of about the average length. The pinnae are short, and distant below, approximate or even crowded upwards, irregularly linear-oblong in outline, with a tendency to become cuspidate at the apex. The pinnae are ovate, or oblong-ovate, blunt or sometimes acute, unequal, the anterior side being largest, flat, stalked, or at least having a narrow stalk-like attachment, overlapping; they are lunate at the base, the lobes oblong and irregularly toothed; these lobes become smaller upwards, and eventually towards the apex merge into teeth, the teeth being usually but unequally taper-pointed. The veins are branched in the manner already described, and the sori are produced on the anterior side of the lowest anterior vein; but the vein becomes branched at a greater distance from the midrib than is usually the case, and thus the sori, which are small, are ranged in two distant lines, about midway between the midrib and the margin. This variety was found by Miss Wright, near Keswick, in Cumberland, where but a plant or two was discovered. It does not appear to have occurred elsewhere. Our figure taken from a specimen of moderate size, kindly communicated by Mr. F. Clohesy, of Windermere, exhibits a curious sport in one of its pinnae, in which the rachis has become elongated, so that the pinnules do not stand in the usual imbricated position.

Dickie's Lady Fern—A. Ffiix-omina maritxim—(Plate XXXI. C.)—is a small plant, generally to be known by the exactly elliptic-lanceolate outline of its fronds and by its crowded oblong pinnae, which are connected at the base, and notched with blunt shallow teeth, which latter in many fronds are mostly simple. The fronds are from a foot to a foot and half long, spreading, or sub-decurrent, rigid, scarcely lunate. The upper pinnae are spreading; the lower ones deflexed. The pinnae largest next the rachis, are oblong, very obtuse, crowded, or slightly overlapping; connected by a narrow wing, the margin rather toothed than lobed; the indentations being shallow, and the projection on the upper half seldom more than blunt simple or somewhat renate notches, though below they are generally two or three-toothed, and sometimes are deeper, as well as bluish near to the apex. The sori are lunate, or with a strong tendency to assume the auricle or horse-shoe-shaped form, and are ranged in a double line along the pinnae, sometimes distinct, but often becoming confluent. It is with us a very constant and neat-growing plant, having the above-mentioned peculiarities; but we have seen fronds said to be produced by plants of this variety, in which the pinnae were less blunt, and the lobes were deeper, and bluish or trifid at their apex. It was originally found by Dr. Dickie in a cave by the sea, in the neighbourhood of Aberdeen; and a plant almost exactly resembling it, has been recently gathered by Dr. Allechin, in the Isle of Man.
THE LADY FERN.

The different forms of Lady Fern are easily cultivated. All the larger ones grow readily in good light loamy or peaty soil, and like plenty of moisture, and for the most part shade and shelter. The variety ulna, perhaps prefers exposure. The dwarf tufted variety called eburnea, and the smaller abnormal forms are rather apt to sustain injury from too much confined dampness about the crowns in winter. The species in its varied phases may be considered one of the most beautiful of the larger deciduous native Ferns.

Though attempting to enumerate for the use of cultivators, as well as for the information of botanists, the many forms in which the Lady Fern appears, we have not been always able to assign to them exact limits, for in many cases they pass by intermediate forms one into the other. After, however, having for several years given much attention to this subject, we have come to the conclusion that there is more of permanence and constancy among them than is generally believed. We have rediscovered several recognisable forms, but with an increase of vigour, in the same situations after a lapse of six or eight years, so that the variations in those cases were at least not the result of age. We have removed others to the garden, and have not found them to vary beyond the acquisition of an increase of vigour under cultivation; and we have removed plants of the less compound forms from the open air to a shady greenhouse, without inducing any change of habit, or producing thereby even an approximation to the more compound forms. On the other hand some varieties, skeleton, especially, is reported to change under cultivation; but we have had no opportunity of experimenting with this form, which, as far as our observations go, owes its peculiar appearance to its growing naturally in exposed wet places; when removed to the shelter of a garden it no doubt becomes more lax, but even then we believe it may be identified. Every part of the plant—the scales, the stipes, the outline and direction of the frond, the form, attachment, and direction of the pinnules and the size and position of the sori—is so liable to vary, that it is difficult to determine what peculiarities are of the highest value in endeavouring to set limits to the varieties, and after all, much reliance must be placed on differences which the eye detects but which the pen fails to record. For this reason especially, few of the forms below enumerated are considered to have any other botanical importance than that of proving the variability of what are called species. We have, however, thought it better to notice all that were known to us, than to cast the most puzzling aside as 'diseased or malformed,' or 'not having any botanical existence.' The testing of the constancy or inconstancy of the forms of such variable plants as the present, with patience and perseverance under fair conditions of culture, is worthy the attention of those Fern-growers who have space for the experiments. The enumeration which follows, of the modifications of form occurring among our native Lady Ferns, is enriched by many notes and memoranda from Mr. Wollaston:—

1. costifrons (M. A.) A very remarkable form, found by Mr. A. Tait, of Edinburgh, "in the seam of a perpendicular rock, on the side of one of the pine-covered mountains near Dunkeld," in 1853. It has a peculiar rigid erect appearance. The original fronds were about nine inches high, but the plant has not recovered the effects of its removal, which was effected with difficulty. The pinnae are about an inch long, the basal pinnae distinct, with shallow two or three-toothed lobes, the rest crowded, confluent at the base, pinnately lobed, with distinct blunt teeth. In the original fronds these confluent pinnae were considerably reduced in size.

2. latifrons (Rob.). Mr. Wollaston's notes on this variety, already described above, are as follows:—
The fronds are ovate-lanceolate, subspinulose, the lobes of the pinnae being cut almost to the midrib; the stipes is about, and the thinly clothed with scales. The pinnae are alternate, approximate on the upper part of the frond, distant below, linear-lanceolate. The pinnae, which are crowded and overlapping, are stipitate, ovate, and deeply and irregularly incised. It is a very graceful variety and easy of cultivation, but retains its abnormal character best in the open air.

3. nevinsianum (M. A.). Of this Mr. Wollaston notes as follows:—This variety differs essentially from
THE LADY FERN

the common forms of the species in being nearly prostrate and very rigid. The scales, which thickly clothe the lower portion of the stipes, are of an intense brown colour, almost black. The fronds, which are sub-bipinnate, vary much in size, and are exactly lanceolate, the shortening of the pinnas from the centre of the frond being equal, both towards the apex and the base. The pinnas taper but little from the rachis for two-thirds of their length, and from thence into a somewhat acuminate point. The pinnas are crowded and overlapping, oblong and blunt, and simply toothed.

4. angustifolius (M.). A very elegant form of small size, varying from one foot to a foot and a half in height. The pinnas are united by a narrow wing along the rachis, and are approximate, linear-oblong, pinnatifid with toothed halves below, simply toothed above, the teeth conspicuously narrow, regular, and somewhat elongated. The rachis is pale dull red. It has been communicated from Hirnomaes, by the Rev. J. J. Chantler, and from Goughall, by Mr. E. More. The scales are pale tawny brown; but in a closely allied plant, from Devonshire, they are black. The fine elegant toothing is remarkable.

5. asperatum (M.). A very curious dwarf variety, gathered on Snowdon, by Mr. W. Pamplin, and constant under cultivation. It has a short stipes, with narrow contorted scales; fronds rather more than a foot high; and somewhat crowded pinnas, ending in a longish serrated acumen. The pinnas are distinct, but decurrent, oblong but often narrowed below, crowded, patent, pinnatifid below, and cut around the blunt apex into longish acute teeth. It is altogether a slender-looking and elegant plant.

Mr. E. J. Lowe has sent a similar form from Clitheroe, Lancashire.

6. excurrentes (M.). The general appearance of this plant is that of moile, but the points of the pinnas, and sometimes of the pinnules and teeth, run out into diaphanous hair-like points, which have the appearance of being an excurrent growth of the veins. It was found at Tunbridge Wells in 1853, and is cultivated by Mr. Wellaston. A similar variety has been found near Hirnomaes by the Rev. J. J. Chantler.

7. pruinoseum (M.). This resembles the moderately developed growths of moile, but has the stipes and rachides covered with small glands, which give them a hoary appearance, somewhat resembling pubescence. It occurs with both red and green stipes. The form, with red stipes, was found at Tarbet, in Dumfriesshire; and a very similar plant was gathered by Dr. Allchin in the Isle of Man. Another state, rather more lax, and with pale green stipes, has been found by Dr. Allchin at Virginia Water, Surrey.

8. sellowianum (M.). A small form, growing from a foot to a foot and a half high. It has broadly lanceolate fronds, short broad acuminate pinnas, and rather distant patent pinnules, decurrent at the posterior base, deeply pinnatifid, the lobes toothed with elongated linear acute irregular-toothed. The most marked form was sent from Coniston, by Miss S. Bower. We have analogous forms, as well as others closely akin but narrower, found in Denbighshire by Mr. Pritchard; at Virginia Water and in the Isle of Man, by Dr. Allchin; and by ourselves at Glen Cloe, in Argyllshire, and Tarbet, in Dumfriesshire. It may be regarded as a long-toothed and usually small, often narrow, form of the moile group.

9. moile (Roth). The form, which we consider to be the A. moile of Roth, is a small plant of from one to two feet high, lax with rather distant pinnas; the pinnules oblong bluntnish, having a broad attachment, and more or less obviously connected at the base by the narrow wing of the rachis; they are pinnatifid, the lobes oblong, and the lowest two or three-toothed, the rest notched or simple. The larger states of this form, in which the pinnules become more distinct, rather less conspicuously united at the base, and rather more deeply toothed, correspond with a specimen of the Polyodon moile of Schreber, preserved in Sir J. E. Smith's herbarium. We believe it is not at all an uncommon plant, but it is met with under several conditions differing in size, and in the degree of toothed and of confluence in the pinnules, the larger forms merging into trifolium.

10. trifolium (Roth). This is a larger plant than moile, with more distinct pinnules, the latter of an oblong lanceolate form, rather larger at the base on the anterior side, and cut half way to the midrib into lobes, the majority of which, in the typical states, are entire at the edges, and three-toothed at the
THE LADY FERN.

apex. The soil is near to the midrib, and often becomes confluent. It is a common plant. Possibly it may be the more highly developed condition of some of the commoner small plants referred to *polylepis* or, it may be a less developed state of the *incisum* group. We believe, however, that some at least of the forms referred above to *polylepis* and *obtusum*, are permanently distinct from the more divided forms representing the *incisum* and *chlothicum* groups.

11. *chlothicum* (Roth). This is more readily identified, from being figured by Müller. It grows from two to three feet high, with broad lanceolate fronds. The pinnae are ovate-oblong, narrowed but obtuse at the points, flat, largest on the anterior side, deeply pinnatifid, the teeth of the lobes not confined to their spines. The soil is placed in two lines near the midrib, and a tendency is shown to develop more than one on the basal lobes. It does not appear to be very frequent.

12. *obtusum* (M.). This has broad fronds, about two feet high, the leafy portion about half as broad as long. The pinnae are flat, distinct, obliquely and very obscurely ovate-oblong, somewhat decurrent behind, cut into a few broad variously-toothed lobes, the teeth short and bluntish. It has somewhat the appearance of blunt pinnulated forms of *Lepidopterus dilatatus*. The soil form two lines nearer the midrib than the margin. It was found at Virginia Water by Dr. Allchin.

13. *frondosum* (M.). This is a larger and more compound state, two to three feet high, with broad lanceolate fronds, and broad approximate pinnae; the fronds having a more crowded leafy appearance than usual. The pinnae near the centre of the frond are sometimes seven-eighths of an inch long, and fully three-eighths in breadth, pyramidal, pinnatifid nearly to the midrib, the lobes oblong-toothed, and the lower ones bearing several sori, in which the tendency to become arcuate is strongly marked, that nearest the midrib of the pinnae, on each side, being uniformly horse-shoe-shaped. The stiples and rachis are red in plants we have met with at Mayfield. A very similar form has been sent us from Denbighshire by Mr. Pritchard: and another form which belongs here also, has been sent by Mr. E. J. Lowe.

14. *deltatilobiatus* (W.). This singular aberration from the normal form was discovered in 1854, near Castle Kelly, in the county of Dublin, Ireland. Dr. Kinahan, its discoverer, describes the pinnae to be pinnatifid; "the indentations entire at their edges, and bearing the soil in the angle. The spore-cases project beyond the edge of the frond, which, added to the bulging forwards of the substance of the pinnae, gives the plant much the appearance of a Davallia, though of course differing from that genus in the shape and position of the indusium; the segments bear but a single vein and sorus." It is very rare; and only known to us from the above memoranda, communicated by Mr. Wollaston.

15. *incisum* (Hoffm.). This represents the species in its highest state of development, the pinnae being so deeply divided that the fronds become almost or quite tripinnate. Usually it is a large-growing plant, with broad drooping antholy fronds. In one example now before us, gathered in the county Clare, Ireland, by Mr. R. Barrington, the height is about five feet, and the breadth one foot, the pinnae which are ascending being quite nine inches long, and the pinnae an inch and a half long, and five-eighths of an inch wide at the base. Three to four feet is not an uncommon height for this variety, which puts on many appearances, and is one of the best forms of the species. There is no infrequent. A form of it less common, has the divisions of the pinnae more narrowed and distinct than usual, but equally deeply cut, as represented in Plate XXX., which is perhaps the most elegant state of this really graceful species.

16. *laxum* (Schult.). This is like the last in being a large broad much divided form, but in well developed states it is even more lax in habit. Its peculiarity consists in the very conspicuous elongation of the anterior basal lobe of the long narrow pinnae, which form a line on each side the midrib. It first attracted our notice in specimens from the neighbourhood of Shrewsbury, in the collection of the Rev. W. A. Leighton, and we have since received it from many localities in the three kingdoms, so that it does not appear to be an accidental condition, but a distinct and permanent form. It accords with Schumacher's description of his *Athyrium laxum*. The prolongation of the anterior lobe into a kind of auricle, indicates an approach towards the variety *chlothicum*, in which the same kind of elongation is manifest, but all our specimens are much broader and more lax than the latter plant. We may add
A. Athyrium Felix-formula crispum
B. A. Felix-formula depauperatum
C. A. Felix formula dissectum
The phrase "early forms" and "normal states," as well as the mention of "early" and "normal" forms, suggest a discussion on biological or evolutionary concepts. However, the text is not clearly visible due to the image quality. It appears to be discussing some aspect of early forms or normal states, possibly in a scientific or biological context.
THE LADY FERN.

that in all the compound forms of Lady Fern the anterior basal lobes are longer than the rest; but what occurs in this variety is an exaggerated and more manifest elongation.

17. discultum (Lin.) This in its normal state, as already stated, is peculiar on account of its narrow erect fronds, its ascending pinnae, and linear-lanceolate pinnules, which are rendered still more apparently linear by the incurving of the points of the lobes. It has the prolonged anterior basal lobe. We have had no opportunity of testing the effect of growing this plant in shade, but we should suspect it would be to produce a resemblance to the last; and this appears to be really the case, for we learn from Mr. Wollaston, that when grown as a pot plant in the greenhouse, it with him invariably assumes the appearance of the less developed states of incisum. The form is not uncommon in exposed hilly places; and two or three states of it occur; one which Mr. D. Moore informs us is not uncommon in Ireland, has shorter but equally distinct pinnules, and the same erect habit. It also occurs with the stripes and marks either red or green. Aquilegia irrorata is no doubt a small state of the green form of this variety, and is perhaps permanently smaller.

18. discentum (W.) This and the following, are more or less of an abnormal character. This has fronds scarcely exceeding a foot in height, broadly oval, and of very irregular development. The pinnule are unequal, the pinnules rather distant, decurrent, unequal in size and irregular in form, but for the most part ovate-oblong, blunt, and cut into distant unequally-toothed lobes. Mr. Wollaston remarks, "It bears some analogy to pinnatissima, being irregularly jagged both in the pinnule and pinnules, but it is of the usual size and fertile. It might be described as a full grown, fully developed fertile pinnatissima. It is beautifully lax and elegant in its habit. The pinnules are decurrent and deeply and irregularly incised. It was found by Dr. Young in Ireland, and is rare and constant in cultivation." A plant lately found by Mr. S. Jervis of Darlaston Hall, Staffordshire, in that neighbourhood, is very similar, and others found by ourselves at Tachert, and by Dr. Allechin in the Isle of Man, are analogous, but not quite identical.

19. pinnatissima (M.). This curious dwarf and as yet barren form was found by Dr. Dickie on Ben-na-Muich-dhu, at an altitude of 3700 feet, in 1840, and has since that time proved constant in cultivation. The fronds, which rarely attain a height of eight inches, are of an irregular ovate-lanceolate outline. The pinnule are unequal, and the pinnules are oblong and decurrent, incrassate, and irregular, as if they had been partially eaten by an insect. It is exceedingly rare. It is possible this form may belong to Polypondium alpestre.

20. incisum (M.). A curious variety, in which the pinnule are distant, furnished in their upper half with linear-lanceolate incised pinnules three-fourths of an inch long, those on the lower half, except the basal anterior one, which is long and narrow, very much though irregularly shortened, frequently rended or fan-shaped and pinnatifid, with serrated lobes, intermixed with longer ones. It has been found by Mrs. Rogers in Belvoir Woods, Rutlandshire, in 1854; and similar plants have been sent with by Dr. Allechin at Virginia Water, Surrey; in Black Park, Buckinghamshire; and in the Isle of Man.

21. incisum (M.). A very pretty small form found near Nettlescombe, in 1853, by Mr. Eheworth, and since quite constant in cultivation. The outline is irregular, none of the pinnule being complete, others pinnate, and some quite short. The pinnule are decurrent, variable in size and form, and very irregularly incised, the nor numerous and crowded about the base of the lobes.

22. aberratum (M.). A singular monstrosity, with somewhat the aspect of incisum. The fronds are variable in form; those which are most marked have the pinnule, which are crowded, partially depinnate, rounded, or transversely oblong, and unequally cut into coarse lobe's or teeth, the few pinnules here and there, which bear something like a normal character being bluntly oblong, with broad shallow-toothed lobes. At the apex of most of the pinnule one or two of the pinnule are larger, and the normal gradually tapering apex is wanting, which together with the dilatation of the
THE LADY FERN.

apex of the frond give them an appearance of peculiar abruptness. Sometimes the frond is narrower, the apex lengthened out, and here and there the plane are terminated by a somewhat elongated pinnule set obliquely, the rest terminating abruptly. Occasionally a normal frond is produced, which, may be compared to those of _psilolepis_ but with the pinnules narrower and more deeply lobed, whilst the lobes are smaller and more finely notched. This was found by Dr. Allechin at Port Erin, in the Isle of Man; and in the same island another somewhat larger plant, closely related to the normal frond above described, was met with.

23. _interruptum_ (W.). This form partakes much of the characteristics of _pinnatifidum_, but is sufficiently distinct from it. The fronds rarely branch, except near the summit; and there are only simply bi- or tri-furcate. The pinnule vary considerably in this respect, being remarkably variable in length, shape, and division; their apices are almost always divided simply or multitudy, and the serrature of the pinnules are generally deep and acutely cut. There are two slight modifications of this variety; one raised from seed by Mr. J. Young of Taunton, Somerset, and the other found in a bunch of seedling plants at Ambleside, Westmoreland, by Mr. Wollaston. Both are rare and curious.

24. _pinnatifidum_ (W.). This, unlike most of the other forms, is so closely covered with glands, as to give to the fronds a bloom like that on a plum. The fronds are frequently branched, the modifications being very unequal. The pinnules are, so to speak, of every possible form and length, those on one division of the frond being normal, whilst on another some are long, some short, interrupted, deperforated, incised, or often altogether wanting. The pinnules have the same kind of unsymmetrical development, their serrature being either one, two, or three- or on the same pinnule. It is sparingly fertile, and permanent under cultivation. It was found by Mr. W. W. Reeves, near Tunbridge Wells, Kent.

25. _crenatum_ (W.). This form differs from _pinnatifidum_ in being of the usual size, and fertile; and the sorus are so abundant and large, that they are almost confluent. The outline of the frond is normal, and the same may be said of the pinnule, but they are somewhat deperforated. The pinnules are very irregularly incised, and toothed, and what is very unusual are frequently divided or multifid. It was found near Tunbridge Wells, Kent, by Mr. Wollaston; and a very similar form has been found by Dr. Allechin at Cahier Course, in Ireland. Another plant, somewhat more regular and normal-looking, with a tendency to dilatation at the points of the pinnules, was gathered in 1855, by Dr. Allechin, in the Isle of Man.

26. _polypetala_ (M.). Under this head we include several large much-divided ramose forms found in Devonshire and Guernsey. They are undesirable, no two fronds being alike in their divisions. One before us from Devonshire, communicated by the Rev. J. M. Chater, is three-branched, the branches bipinnate dichotomous at the end; the pinnules unequal, sometimes bifid; the pinnules irregular in size, shape, and division. Another from Guernsey, sent by Mr. C. Jackson, has the frond excessively developed, and becoming bristle-like in the middle of the frond, while those at the base as well as apex appear as if arrested. The pinnules on the larger fronds are often an inch-and-a-half long, quite again pinnate, the secondary pinnules pinnatifid with inciso-lacinulate lobes.

27. _polypetala_ (M.). This is a monstrous plant of the _incisa_ type, with flat, ovate, lanceolate, pinnatifid pinnules. Its peculiarity consists in the apices of the pinnule being furrowed divided into about five or six normal-looking—not crisped—points; in other words, they are plane, and bi-trifurcate at the tips. The apex of the frond is also several times forked. It was found near Norton-cum-bbode by Mr. C. Elwes, to whom we are indebted for a frond. We learn from Mr. Elwes that he finds the fronds of this variety to perish six weeks earlier than those of the somewhat similar variety _multifidum_.

28. _ferrutum_ (M.). This is a furrowed monstrous form of one of the less divided types. The ends of its pinnule are forked once, twice, or more, with a tendency to dilatation in the tips; and the apex of the
THE LADY FERN.

The Lady Fern is divided into a short tassel. It was found near Hilracumbe, by the Rev. J. M. Stancher; and is, we learn, constant.

20. _multifidum_ (M.); _crisatus_ (W.). This is the most beautifully symmetrical—yet monstrous—and graceful permanent variety which has yet been found, equally beautiful and exactly analogous with the variety _crisatus_ of the Male Fern. Its habit corresponds exactly with the usual form of the plant; but it differs in having the spores of the frond, pinnate, and (in well-grown plants) the pinnules most expeditiously tasselled or divided into a mass of branches. The tips of the pinnules are in fact many times dichotomous, with the spores dilated and indeed. It belongs to the _rhapidum_ group. Mr. Wellaston suggests, with a view to uniformity in the names of corresponding varieties, that this ought to be called _crisatus_ on account of its similarity to the crotch form of the Male Fern; but it seems impossible, without continually changing the names in use, to arrive with exactness at this uniformity, so that Fern-culturists should adopt the rule which botanists have established on this point, and avoid more changes. Our plate of this variety necessarily represents a small specimen, when large and at the same time well grown, it is far handsomer. This form was found near the Seven Churches, in Wicklow, Ireland, by Mr. D. Moore, in company with Mr. Newman; and it or similar forms have also been reported, as having been found in Clare, by Dr. Kinahan, and in Killarney, by Mr. Ogilby.

20. _depressiceps_ (W.); _rectum_ (M.). A remarkable monstrousity which, although it somewhat resembles the last, differs from it essentially in its being of unsymmetrical development. The apex of the frond is much more deeply bincurled or split up into numerous corymbiform tassels. The pinnules are also tasselled, depauperated, laciniated, and irregular, and the pinnules very irregular, bluntly toothed, and frequently altogether wanting. The spore are frequently abortive. It is an exceedingly rare variety, and was found, it appears, many years since, by Mr. J. Gamlin, at that time foreman in the Dublin College Botanic Garden, near Ben Bulben in Sligo, Ireland. Cultivators owe its distribution to Dr. MacKay.

31. _integerrimum_ (M.); _Smyrken_ (Hort.). This singular variety has more the appearance of a tuft of fine curled parsley than of a Fern. It is of slender and dwarfish habit, and the fronds are ramified in every possible way, the rachis being divided very irregularly, and each apex densely tufted. The pinnules and pinnules are very unsymmetrically laciniated, and frequently wanting for a long portion of the stipe. The fructification is generally abortive, as in the last, but, as in that, not always so. It was originally found by Mr. A. Smith, on the Hill of Crum, Antrim, Ireland; subsequently in Croylandis, Lynn, Braemar, Scotland, by Sir W. G. Trevelyan; and recently at Todmorden, Lancashire, by Mr. J. Huddart.

To this species, and possibly to the variety _rhapidum_, belongs a plant "gathered on y' mountains of Mourne, in y' county of Down," by Sherard, and now preserved in the University Herbarium, Oxford. It is the _Asplenium Adiantum-nigrum_ var. Sir E. Smith, and is referred to _Asplenium adiantum_ by Mr. Newman! Sir E. Smith correctly describes it as of a delicate membranous texture, the leaflets finely laciniate and without fructification. We are indebted to Mr. M. T. Masters, sub-curator of the Fielding Herbarium, for a photograph of Sherard's plant, which leaves no room for doubt that it is an Adiantum. It is assuredly not at all like _Asplenium Adiantum-nigrum_, or _Asplenium adiantum_; the frond is about a foot long, linear-lanceolate, bipinnate, with narrow oblong pinnas, of which it would appear that the veins are more perfectly developed than the paraphyllium, hence the appearance of being pinnately laciniate. It is just such a state as might be expected to be produced in a dark cave, in which this is said to have grown.

In addition to the forms above enumerated, many other curious ones have been met with both in the normal and monstrous state; we may especially refer to the "gatherings" of Dr. Allchin, in the Isle of Man; of the Rev. J. M. Stancher, in Devonshire; of Mr. Wellaston, in the Lake District; and of Mr. Copeham, in Yorkshire. These, however, have been too recently obtained to admit of
any opinion being formed as to their permanence; they will doubtless be submitted to the usual test, namely, cultivation. We must also repeat, in order that the whole truth may appear, that among herbarium specimens, in addition to those we have referred with tolerable certainty to the forms above enumerated, there are many others which could not be satisfactorily placed. Does this long series of gradations represent a species? One can scarcely imagine two compound Ferns more dissimilar than the extreme states of the needle and scirpus groups, or the forms represented in our plates XXX. and XXXI. C. Or, after all, is there in nature no such thing as a species among plants, but ever-changing varieties, or races of individuals only? And is a "species" to be considered merely as a group of individuals more or less alike, or having certain marks in common, brought together artificially for the convenience of naturalists, as certain so-called species are collected together in the same way, and for the same purpose, in the groups called genera? The deep study of Ferns would be scarcely likely to produce a decided negative to this question.
THE SMOOTH ROCK SPLEENWORT

Asplenium. Linnaeus.

Crataegus oxyacantha, Linne. Leaves, 1/8 inch broad, oblong, acuminate at the apex, abruptly stalked, entire; ovary obtuse, sharp-angled, 3-angled, or occasionally 5-angled; style filiform. Flowers in pendant racemes (slightly branched) on the upper surface of the leaves, with a few bracts below them; fruit a small, brown, smooth-surfaced capsule, with 4 or 5 valves, containing (occasionally 6 or 7) seeds. 

A. theo-philus, a. Ferns.-Leaf blades lanceolate, ovate-lanceolate, acuminate, obtuse, or rounded, frequently serrulated along the margin of the leaf; stems slender, usually prostrate, with a few leaves on each stem; flowers in pendant racemes, with few small leaves at the base; capsule minute, with 4 or 5 valves, containing 3 or 4 seeds. 

Crataegus oxyacantha, Linne. Leaves, 1/4 inch broad, ovate-lanceolate, acuminate at the apex, abruptly stalked, entire; ovary obtuse, spiny, 3-angled, or occasionally 5-angled; style filiform. Flowers in pendant racemes (slightly branched) on the upper surface of the leaves, with a few bracts below them; fruit a small, brown, smooth-surfaced capsule, with 4 or 5 valves, containing (occasionally 6 or 7) seeds. 

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THE SMOOTH ROCK SPLEENWORT.

This Fern is readily known among the British Asplenium, by its bipinnate fronds, taken in conjunction with their small stature, and the minuteness of their parts, six inches in length for the frond, and half an inch for the pinnae being rather above the average growth. Apart from this discrepancy in size, it very much resembles A. lanesthatum, the structure of its pinnae being nearly identical, but in the latter the lower pinnae do not diminish in so marked a degree.

Some botanists continue to place this species in Athyrium, as originally proposed by Roth, but the plant is too nearly akin to A. lanesthatum to be separated from it, and the general structure of its sorus is asplenoid not atyridoid. There is occasionally manifested a very slight tendency to produce the arcuate sori characteristic of Athyrium, but this does not occur in a sufficient degree to necessitate the removal of this species from Asplenium, with which in all other respects it so exactly accords.

It is an easily grown frame or greenhouse Fern, particularly desirable in a small collection from its small size and evergreen habit. It should be potted in well-drained porous soil, composed of turfy peat, with a small proportion of loam, and abundance of sand. The crown of the plant may be advantageously raised somewhat above the general surface in potting, by being wedged between two or three pieces
THE SMOOTH ROCK SLEENWORT.

of sandstone, or some similar porous material. It is increased without difficulty by division. A magnificent mass of this plant, cultivated by Dr. Young, can be scarcely less than a foot in diameter, with fronds eight or ten inches long.

This plant is not much given to variation. Mr. Wollaston notices a variety, multilid, in which the fronds are occasionally bident or multilobed at the apex; this state is not uncommon, but it is also not permanent, and plants having this tendency sometimes produce a few of the pinnae unusually large.

Mr. Wollaston proposes for another supposed variety, of dubious origin, the name of prolifera. This interesting plant, which has been known to us since 1851, is so remarkably distinct, that were it not for the obscurity of its history, we should, without any hesitation, claim for it specific rank. Though most like A. fontana, of our British species, it is in fact quite unlike that plant in several of its characters. We do not recognize it in any published descriptions, nor can we find any specimen to which we can refer it in Sir W. J. Hooker's magnificent collection. The fronds we received in 1851 were from the gardens at Peper-Harrow Park, Surrey. It has since been exhibited at the metropolitan fêtes by Mr. Parker, nurseryman, of Hornsey, who, we believe, holds the stock of it, and whose plants were obtained from Mr. Williams, gardener to C. B. Warner, Esq., of Hoddesdon. Mr. Williams reports that about six years since he received it as A. viride, from a gardener, whose friend had found it in Scotland, and sent three plants. This person, whose name was Field, it appears died soon after the occurrence. Compared with A. fontana, the fronds are longer and narrower in proportion, being seven or eight inches high, and not more than three-fourths of an inch wide. They have a dark brown rachis throughout, which is not distinctly winged, as in fontana, although there is a slight green decurrent line at the upper angles between the pinnae; the outline is different, being equal and almost linear, not broader upwards; the lower pinnae are scarcely more distinct than the rest, and they are all refracted in a remarkable manner, as well as much less divided; the habit of growth is spreading, and the fronds are prolific. Mr. Wollaston remarks, that "its having been associated with A. viride, and partaking so much of the aspect of that species as to have deceived some of our best pteridologists, is at least circumstantial evidence of its British origin. The little bulbils are formed principally at the junction of the pinnae with the rachis." We are so convinced of its distinctness, that notwithstanding its dubious history, we shall add the accompanying definition, to furnish means for its recognition, and in the hope that the attention of botanists may be directed to its re-discovery:—

A. reflexum: fronds linear subpinnate; pinnae short oblong obtuse, refracted, pinnate at the base, pinnae flat above; pinnae the lowest anterior one only distinct, the rest more or less confluent) rounded, with a few coarse angular mucronate teeth, the upper two-four toothed, the lower ones overlapping; sori short oblong oblique, in a line on each side near the costa of the pinna; rachis chestnut-coloured, marginate above, not winged, bulbil-bearing.

Hab. Scotland.
THE LANCEOLATE SPLEENWORT
(Asplenium lanceolatum).

ASPLENIUM. LANCEOLATE.

Cladodes of Spiro-coses linear, oblong or clungate, straight, attached along the inner or anterior side of the veins or venals, furnished with an indument or membranous cover. Indument of the same form, entire or somewhat jagged on the margin, spreading along the inward side, or that towards the middle or axis of veination. Venas dissected at their extremities, their branches (ramules) simple or forked; sometimes furrowed without a midrib.

A. LANCEOLATE: leaves lanceolate, rigid, glabrous, bipinnate; pinnal ovate-lanceolate; pinnae obvolute or oblanceolate, blunt, lopped or toothed, the teeth coarse, angular, mucronate; rachis with slightly elevated margins in front, not winged, subductately scaly; segal short, oblong, produced towards the margin.

HABITAT.—Though not entirely confined to the seaweed, this plant must be regarded as a marine and also a terrestrial species. Its head quarters would seem to be the shores of the Bristol Channel; it occurs from the Land’s End throughout the province famed by the counties of Cornwall and Devon, thence seawards to the counties of Glamorgan and South Wales on the other shore continuing along the shore of Cornwall bay, appearing in the counties of Morayfirth and Caithness, and perhaps Bute, near its northern limit, being near the boundary of these counties. It again occurs in a more southwestern and island stations, as Tusedale Mills. There are some doubtful records of its occurrence in Oxfordshire, Hereford, and Stafford; the latter, according to Balfour’s figure, certainly pertaining to Asplenium dichotomum. The true Asplenium lanceolatum has recently been found by Mr. Woods, at Kintyre, Argyll. It is then added to the flora of Ireland, and other Irish localities may be expected to be covered a cliplant similar. Little doubt that it is found near Gibraltar in the west of Scotland, but though not usually, we do not find its statement confirmed. To the Channel Islands, as at St. Helier, Guernsey, and Jersey, it again occurs, and at least in the last two mentioned in preference. No localities possess the species of India and old Asia, the shores of palms, but the clumps of desert areas. Mr. H. B. Ward has furnished us with an account of a magnificent tuft which he found, along with others, about seven miles from a small, in the island of Jersey; the fronds of this plant were a foot or more in length, and the fronds here so fine, that one hundred and twenty perfectly fresh fronds, besides the remainder of India or perhaps others in various stages of decay. Mr. Ward found it most abundant in the eastern side of the island, verying much in situation and size, on dry, fully exposed cliffs, nearly more than a hundred in the densely-clothed dry sandstone banks, and being the interior of a sea, the upper of a foot in length. Mr. Watson gives it an altitude of 200 feet in Wales, but Mr. B. B. Smith reports finding it at an elevation of 300 feet, at Stainforth.

GEOGRAPHICAL RANGE.—Asplenium lanceolatum occurs in the islands of Madeira and the Azores (27. Hudson, Lond.) and on the Adriatic coast at Trogir (24. H. Ex., 25.). In Europe it is found in Spain and Portugal (27. Hudson, Lond.); in France it is found in Spain and Portugal (27. Hudson, Lond.) and in France, and in Britain, in the north-west of France, whence it extends over to the British archipelago. It is consequently an Atlantic species.

A South American plant, in Dr. Osgood’s Herbarium, collected by Mr. Cuming, very closely resembles this species.

Culms short, thick, erect or decumbent, tufted, densely scaly. Scales elongately subulate, shining brown, cellulo-winged. Pinnae stout, branched, terminal.

Stipes shorter than the fronds, usually about a third of the whole length, sometimes longer, dark chestnut-coloured below, which colour extends more or less along the back of the rachis; terminal
THE LANCEOLATE SPLEENWORT.
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THE BLACK MAIDENHAIR SPIEENWORT

(Asplenium Adiantum-nigrum).

ASPLENIUM, Linnæus.

Clusters of Spore-cases linear, oblong or elongate, straight, attached along the inner or anterior side of the veins or venules, furnished with an indument or membranaceous cover. Indument of the same form, entire or somewhat jagged on the margin, opening along the inward side, or that towards the midvein or axis of venation. Spores disjunct at their extremities, their branches (ramules) simple or forked; sometimes forcibly branched without a midvein.

A. ADIANTUM-NIGRUM; fronds ovate or deltoid, acute or acuminate, glabrous, subcoriaceous, bi-tri-plant; pinnae oblanceolate, obtuse or acuminate; pinnae ovate or ovate-elliptic, spinose or pinnatifid, the ultimate divisions oblanceolate or crassate, ovate or ovate-oblong, acute or acuminate; teeth simple or forked; midvein toothed or simply toothed; teeth acute; sori linear-elongate, contiguous to the midvein.

ASPLENIUM ADIANTUM-NIGRUM, Linnæus, Species Plantarum, 1554. Delaf. Pl. 46. (Barlow.)

B. ADIANTUM-AVONICUS; fronds deltoid, acute, smaller and less divided; pinnae ovate, rounded at the base, with entire or toothed acumen; teeth simple or forked; rachis winged.

BARLOW, Asplenium, Species Plantarum, 1554. (Barlow.)
THE BLACK MAIDENHAIR SPLEENWORT.

EXPLANATION OF THE PLATES.

PLATE XXXVI.—DESMOUR'S MAIDENHAIR.
A, from Cupar, Fife; B, from St. Andrews, Fife; C, from Aberdeenshire, S.; D, from Ayrshire, N. I.; E, from the Peak District, Derbyshire.

PLATE XXXVII.—MAIDENHAIR.
A, from Galloway, Dumfriesshire; B, from the Tyne Valley, Northumberland; C, from Perthshire, Perth; D, from the Lake District, Cumbria.

HABITAT.—The Black Spleenwort is a generally distributed British plant, occurring on rocks, walls, and shady banks throughout England, Wales, and Scotland, extending to the Northern and Western Isles, Ireland, and the Channel Islands, and ranging from the coast level to an elevation of nearly 3000 feet in the Highlands. In woods, with comparatively soft banks and about brooks, streams, and with large clumps of other ferns, occasionally plants, and especially in small clumps; but there are fewer on rocky banks. The variety is more, in its true form, apparent to have been recorded only from two counties in Ireland, namely, the county of Armagh, and Castle County, both in Kerry. We have to add another locality and variety in Ireland—the Dublin mountains, where it has been found by Mr. N. D., of the Glencree Botanic Gardens, Dublin, who has communicated specimens for this notice for identification. We have also to thank Dr. Aldrich, Mr. S. Fox, Mr. Andrews, Mr. G. Moore, and Mr. Newman, for native Irish specimens, some of which we are reproduce in our Plate. The plant has been recorded from Kerry, but it must be noted that the Kerry plant is rather an attenuated intermediate form. Smith's plant from Mourne Mountain, shown in the Aplininae, appears to be an intermediate variety, having been found in the mountains of the County of Down, and referred to Aplininae; it is not remarkable here, but to Aplininae. The faded form of this plant, which either small specimens are very well shown in our Plate, is the best sighted of any species, but it is not closely connected by means of intermediate varieties, either and foreign, both as to outline and characters, with the normal Aplininae-appears, that we have thought it preferable to mark it as an extreme form of that species, adopting the name of Koenig, who notes—"A. moist in August, very, very good specimens probably visible." There is no doubt, however, that its production is varied and prominent.

GEOGRAPHICAL RANGE.—The present is a widely-distributed species, occurring from across Europe. The true species is found in Spain, Portugal, Italy, the southern parts of the Austrian empire, Corsica, and Crete, while specimens from India (A. Hooker) show a transition from species to the more common form. It is found in the Tropics, Manchuria, and New Guinea, along with assimilis. At Alpina occurs a species intermediate form (A. Hooker); and other forms, of intermediate characters, occur in Abyssinia, and at the Cape of Good Hope. It is also found at S. Helen (A. Hooker). In Asia the species extends over a wide range, namely, Siberia, and Yemenenistan, and Russia, Arabia and Armenia, Afghanistan, Kildiain, Mucronata, and Tokyo (A. Hook). The North American plant referred here by Wallis, the A. assimilis, Wallisiana, is probably a distinct species.

Canada short, thick, tufted, often decumbent, secty. Stems lanceolate below, extended into a long hair-like point, dark brown, shining, catkin-like strigate below. Fibres scowling, numerous, bristled, dark brown, tomentose.

Slipper elongated, usually about as long as, sometimes longer than, the leafy portion of the frond, dark purplish brown, bearing about the base a few scales like those of the crown, smooth upwards, flattened and slightly grooved in front, rounded behind; terminal and adherent to the candel. Rachis channelled in front, from the presence of an elevated line on each margin, developed from the stalk of the pinna, rounded, and with the brown colour of the base more or less extending upwards behind.

Vernation circinate.

Ferns including the slipper from three to four to eighteen or twenty inches long, sometimes even more, and from one and a half to seven inches across the base of the leafy portion; usually corrugated and shining, dark green above, paler beneath, sometimes of thinner texture; dactyl or ovate, or sometimes with the sides nearly parallel below, always with a tapered or acuminate apex, bipinnate in the lesser forms, triminate or occasionally almost quadruplicate in the larger ones. Pinnas oblong to oblong-triangular, usually elongate and attenuated at the apex, the lower nearly opposite, and always as long as, usually longer than, the rest, the upper becoming alternate and gradually diminishing in size; all usually pointing upwards. Pinnules alternate; the lowest on the anterior side of the rachis, and considerably larger than the rest, oblongly oblanceolate, with an attenuated apex, oblong at the base, its lowest (secondary) pinnule being ovate obtuse, pinnatifid with more or less serrated lobes below, and sharply serrated at the apex. Towards the apex of the pinna, which and in a more or less elongate corn, the pinnules gradually become oblong and decurrent at the base; and the same occurs on a smaller scale in the larger lower pinnules themselves, the upper pinna again being like the lower, minus their larger pinnules. In the smaller forms the structure is similar, but the pinnule are less attenuated at the points, and the pinnules are shorter, blunter, and either barely divided to the midrib or merely lobed. The ultimate divisions are all notched with distinct acute serratures.
THE BLACK MAIDENHAIR SPLEENWORT.

Fractiation of the secondary basal pinnules in the tripinnate fronds, and of the primary basal pinnules in the bipinnate fronds, consisting of a flexuous midvein, which, by a series of furcations, sends out a vein towards each marginal tooth. If the pinnule is not deeply lobed, and the teeth are simple, there may be no If the pinnule is not deeply lobed, and the teeth are simple, there may be no...
THE BLACK MAIDENHAIR SPLEENWORT.

a very fine example before us, the leafy part is eight inches long and seven broad, the stipes nine inches long. They are quite smooth, and, in outline, are sometimes deltoid, or perhaps more correctly pentangular, the apices of the lowest pinnules forming additional angles; sometimes ovate with the point much attenuated. Full-sized examples of the latter, and a rather small frond of the former state, are shown in our Plate. The smaller might be supposed to indicate a less mature condition of the plant, but we are scarcely prepared to adopt this explanation, on account of the occurrence of equally small fronds in which the pentangular outline is preserved, while again the ovate fronds are often abundantly fertile; and we would rather suggest that it is an instance of that profusion of form in Nature which marks at our specific definitions. In the larger fronds, which are almost quadruplicate, the pinnule, especially the lowest which is also the largest, are of the same subdeltoideal outline as the frond itself, excepting that as the pinnules are alternate and not opposite as the lower pair of pinnate, there is a degree of obliquity almost producing a trapeziform outline. The apices of the pinnule, as well as of the frond, and generally of the pinnules, are ciliate, with a few sharp deep distinct teeth. The larger pinnules of the lowest pinnule are somewhat obliquely ovate-attenuate, and their divisions, the secondary pinnules, are immediate, deeply pinnatifid at a very acute angle into linear lobes, the lower of which are about three-toothed, the upper blunt at their points, or as the simple teeth at the apex of the pinnule itself being narrow and very acute. The pinnule towards the apex of the frond, and the pinnules towards the apices of the pinnule, become gradually narrower than the basal ones described above, until they both become reduced to linear-lanceolate sharply toothed lobes, and these gradually merge into the simple linear teeth of the ciliate extremities. A similar mode of division, but on a smaller scale, obtains in the smaller fronds, the fronds being only tripinate, and the secondary pinnules narrower, and less deeply lobed. The veins, though slender, are very distinct; they consist of a series of furcations, that is to say, the vein which represents the midvein of the pinnules forks below each of the lobes or teeth, and the venule thus produced proceeds along the tooth or lobe until it nearly reaches the apex, being in the case of the former simple, and in the case of the latter again forked once or twice, according as there be two or three spined teeth. No one who has observed the volution in this plant, and is acquainted with our British 

British Aplolnja, can fail to notice the similarity in form and division and in the condition of the veins that exists between some of the pinnules of this plant, especially the shorter and broader ones of the less divided fronds, and some fronds of J. septentrionalis. There is no definite midvein, but a series of furcations only, so that this plant alone furnishes sufficient evidence against the adoption of Mr. Newman's group American as a genus. The spicile are very narrow, linear, borne, as in A. Adiantum- 

This division is white, semitransparent, and entire. The plant is one of unusual elegance, both on account of its minute subdivision, and its smooth shining surface.

Some other variations of this species deserving of record, are included in the following summary —

1. obtusum (WILL.). This form, already described, is rarely more than bipinnate, though sometimes tripinate, with roundish or bluntly ovate pinnules, not very conspicuously toothed. It is less defined than some other forms, some of the smaller states of the common plant approaching it very closely; but as it occurs under different phases, it seems to claim recognition at least as a variety of secondary importance. A tripinate example of this form has been communicated by Mr. D. Moore, from the county Antrim, Ireland.

2. alliugosum (M.). The chief peculiarity of this form is the parallelism of the sides of its fronds which thus become narrow oblong, like what occurs in Locris quinaria; the pinnule are short, remarkably triangular, acuminate, the three lower pairs almost equal in size. The subdivisions are small; otherwise the structure is normal. We have received it from Mr. Jackson, of Guernsey, and it has also been found by Dr. Allchin.
THE BLACK MAIDENHAIR SPEENWORT.

3. variegatum (W.). This exceedingly rare and beautiful variety has been found in Yorkshire, and also in Guernsey by Mr. Jackson. It is normal in every respect, except in being striped unsymmetrically with white; and is sub-permanent, depending for its variegation, as Mr. Wallis &c observes, on the mode of culture adopted. It is quite different from the usual so-called variegations of this species. Such are for the most part certainly caused by insect attacks, although one example, found by Mr. Silver on Shottisham Church, in Berkshire, has the appearance of actual variegation, being distinctly margined with yellowish-white. As it does not appear, however, to have again been met with, we only mention it thus incidentally in this enumeration.

4. multifidum (W.). This differs in having the apex of the frond, and very rarely of the pinnae, bifurcate or multifid.

5. floreum (M.). A curious form with a cAudate frond; the pinnules being rather abnormally-looking, and irregularly cut into long linear acute segments or lobes, answering to the acute teeth of the usual states of the plant; some of the pinnules may be sold to be palmately-lobate. We have received it recently from Miss Hasenack, who gathered it near Kingsbridge, in South Devon, and, some time since, from the late Mr. Ingpen, who obtained a plant of it from a London hawker.

6. intermedium (M.). Under this name are included those forms in which large size and laxity of habit are coincident with an elongation of the parts, and a thin though firm texture of the fronds, such forms having often been wrongly associated with ocidentum. From that variety they differ in their more elongated and less compound fronds, and in the greater breadth of their ultimate divisions. The pinnae and the fronds are cAudate, but there are no linear segments of the pinnules. It seems to bear about the same degree of relation to the normal state as ocidentum, but in an opposite direction, and we enumerate it as a variety merely in order to point out the steps by which the more usual state of the plant approaches the distinct-looking acute form. We have received it principally from the West of England and the Channel Islands.

7. oxyphyllum (M.). This form in its texture and the neatness of its divisions has a good deal of resemblance to the true cAudatum, but it recedes from it even more than the last in the outline of the frond, which though small is rather narrow and elongated, with a tendency to diminution rather than enlargement of the lower pinnule. The pinnae are short, very oblique from the enlargement of the lower terminal pinnule, the latter being more distinct and distant than the remainder, which become a good deal confluent; the teeth are deeply narrow, and conspicuously acute. Some plants were found in 1855, near Dunoon, in Argyllshire, by Mrs. East, of Blachdeneath.

8. decompontom (M.). This, like cAudatum, is almost or even quite quadruplicate, and may be briefly described as resembling that variety in the form of its fronds and pinnae, and even pinnules, but the ultimate parts though narrow are blunt as if rounded off, not acute as in that, and the texture is more exquisitely fine. The divisions, moreover, although small and comparatively narrow, are not so much narrowed as in cAudatum, and the absence of linear segments, and the bluntness of the few teeth which are apparent, readily distinguish this plant from that. We have received it from the Rev. J. M. Chantry, who found it at Manaton, in Devonshire.

9. acutum (Bory). This, which has been already fully described, differs in its more subdivided fronds, in which the deltoid mode of growth is usually strongly developed, in its thinner and papery texture, and in the presence of linear acute segments and teeth. As to its distinctness, the preceding enumeration of varieties or forms occurring in this country shows that in composition it is simulated by decompontom, in texture by oxyphyllum especially, and by intermedium in a considerable degree; and in the presence of linear segments or teeth, both by oxyphyllum, in which the teeth though sharp are short, and by floreum, in which latter the narrow marginal divisions are, perhaps, rather abnormal developments of the teeth, than normally narrow divisions of the pinnules. These points of resemblance, however, and the occurrence of other foreign intermediate states, have determined us in retaining acutum as a variety of A. Adiantum-aegrense.
THE SEA SPLEENWORT (Asplenium marinum).

ASPLENium, Linn. ens.

Clusters of Spiropterae linear, oblong or elongate, straight, attached along the inner or anterior side of the veins or vessels, furnished with an inclusion or membranaceous cover. Indumentum of the same form, entire or somewhat jagged on the margin, spreading along the veined side, or that towards the midrib or axis of venation. Veins displaced at their extremities, their branches (rarely) simple or forked, sometimes furcate when branched on a midrib.

A. MARKENT: fronds linear or linear-lanceolate, tapering above, pinnate; pinnae ovate oblong or linear, oblique, short-stalked, the margin serrate or crenate or lobate, rarely pinnatifid; the anterior base truncate and sub-lanceolate, the posterior oblong; upper ones confluent; sori large, elongate, borne near the midrib; Rachis and petioles winged.

A. HARROW: fronds lanceolate, pinnate, the lower pinnae distinctly obtruncate obliquely-triangular, or sub-lanceolate, truncate and lobate below, the lobes and the apices of the pinnae minutely apiculate-dentate; sori small, narrow, remote from the midrib.

A. SUBMARINUM: fronds pinnate, the pinnae almost again pinnate at their base and deeply pinnatifid throughout; anterior basal lobes ovate acute serrate.

EXPLANATION OF THE PLATE.

THE SEA SPLEENWORT.

terminal and adherent to the stipes. *Racomia* margined and more or less coloured brown below, winged and green above.

*Variation* oblong.

*Filaments* including the stipes averaging from six to twelve inches long, sometimes shorter, occasionally upwards of a yard long; smooth, coriaceous, broadly linear tapering to the apex, plinata. Pinnae oblique, the anterior basal angle being most produced, varying in outline between obovate, oblong-cuneate, and linear; obtuse, often of nearly equal width throughout, usually about an inch in length; the anterior base truncate rounded, and produced into a blunt more or less apparent midrib, the inferior base cut away obliquely. The lowest are stellate with the stalks winged, the upper become decurrent, and at length confluent into a tapering pinnaed apex. The margins are usually doubly crenato-serrate, the serratures unequal, sometimes deeper, forming evident lobes; sometimes (as in fig. c.) the incisions form very even and elegant crenatures.

*Variation* consisting of a prominent fibrous midrib from which proceed forked veins; the lowest anterior vein is two or three times forked, the rest usually once only; the *sori* terminate abruptly within the margin, the anterior ones generally bearing the soil.

*Punctuation* spread over the back of the frond. *Sorit* linear, oblique, indurate, borne on the anterior side of the stipes (except sometimes on those of the midrib, when two or more sori are borne by the same fascicle of veins), commencing near the midrib, and forming two series of short divergent lines along each pinna. The sori, though consisting of a profusion of sori-case, are commonly distinct, though they sometimes coalesce so as to cover the whole under surface. *Imbrication* of the same form, persistent, entire. *Sorit-case* numerous, globose, brown. *Sorit-case* angular.

*Description.* The frond is perennial. The fronds being persistent, and the young ones each year produced long before the old ones decay, the species is truly evergreen.

This is a well marked species, distinguished technically from the other simple pinnae British Asplenum by its winged rachis, and generally by its greater size and more coriaceous texture, this latter feature giving to it an aspect of massiveness as compared with its size, by which it may be known at first sight.

This species is easily cultivated in sheltered situations, as in a frame or greenhouse, and thrives remarkably in a moist stove. It does not bear frost or exposure, and we have found it to be destroyed by being frozen, even when kept in a close greenhouse. Few of the smaller Ferns are more ornamental, or more deserving of cultivation than the Sea Spleenwort. Its fronds, owing to their thick leathery substance, are long-enduring, and they are moreover of a deep shining green; and thus, with very little care, may be kept clean and bright,—a state which tends greatly to the preservation of the health of a cultivated plant, and always adds immeasurably to its beauty and to the attention and interest which it excites. Hence, for a shady greenhouse, no Fern can be more appropriately chosen; while, even for very sheltered situations out-doors, especially in localities near the sea, the same qualities recommend it.

We may take this opportunity to state generally the kind of treatment which has been found to suit the small evergreen Ferns of this character when under pot culture. The pots in which they are planted should be of moderate size compared with the plant, that is, in diameter exceeding by two or three inches only, the breadth of the crown or mass formed by the stipes. They grow well either in a soil of turfy peat and silver sand, with a small proportion of friable yellow loam, and liberally intermixed with small nodules or fragments of sandstone or porous brick, or in a mixture of which sandy silicious loam forms the staple, and in which the coarser materials are also blended. In either case, the bottom of the pots must have a good layer of these latter materials for drainage. The crown should be kept rather above the surface of the soil, and is perhaps best set between two or three larger somewhat
THE SEA SPLEENWORT.

raised planes of stone or brick. The soil, which should be used when neither wet nor dry, should be made firm, being then less subject to alternations of moisture. Unless the pots become filled with roots, so that more nourishment is required by the plants—and this is generally evidenced by the plants drying rapidly compared with others not so circumstanced—the less the soil or the plant is disturbed the better, so long as the former continues in a free healthy state. If it becomes soddened with water, as sometimes happens from the drainage becoming choked, from careless watering, or from the plants standing under a drip, then the plants should be repotted, so as to notify the evil. No Ferns, on the other hand, like to be kept dry at the root; but they should have such an amount of water as will keep the soil just moistened thoroughly. A moderately damp and rather shady situation is most congenial to the growth of the ferns; no situation being more suitable for the progress of the plants than a cold close shady frame or pit, from which frost is just excluded. The plants increase with tolerable facility by division. When obtained from their wild localities, the roots are often much damaged in detaching the plants from the roots to which they cling, and in such cases they require some care to get them established. It is better in cases of this kind to choose small compact plants in preference to larger ones. Once established, they grow readily, and may then be increased by dividing the crowns at the time of repotting, which is best done in spring.

There are some very curious variations of this plant now known; for the most part, however, there is no evidence of their constancy.

1. aro (M.). Instead of the usual obtuse or at most bluntly tapering apex of the pinna, it is in this gradually narrowed to a point; the pinnae being also generally elongated. This form occurs chiefly in the west of England and in the Channel Islands.

2. diehlorhum (W.). An inconstant variation, in which the apex of the frond is forked.

3. cuusum (W.). The chief peculiarity in this variety is that the fronds are branched, or more frequently paired. The pinnae are undulate-crenate, slightly lobate, with blunt teeth. The ven- eules appear more chafy than usual. It is a rare form, and was found in 1850 by Mr. Wollaston, in Dorsetshire; since that time it has retained its character. A similar plant has been sent to us from Trotto.

4. trophaeoforme (Clapham). The fronds of this variety are robust and leathery, the pinnae nearly trapeziform, obtuse, and crenulate. It was found by Mr. Clapham, at Scarborough, Yorkshire, and is a permanent form.

5. crenaturn (M.). This is remarkable for its short, obtuse, oblique, trapeziform pinnae, evenly notched round the margin with small but deep roundish crenatures. It occurs in a stone quarry, near Warrington, and has been communicated by Mr. T. G. Rylands.

6. constrictum (M.). This is peculiar from the absence of the auriculiform projection usual at the anterior base, the base of the pinnae being truly wedge-shaped; the pinnae are oblong, with deep sharp uneven crenatures. It was found by Dr. Allchin at Black Head, Clare, Ireland.

7. micros (M.). This is the most remarkable variety with which we are acquainted, and best for a comparison to add to the number of doubtful species, we should be tempted to consider it distinct. Its chief points of discrepancy are its sub-membraneous texture, its undulate-lobe pinnae, its decussated margin, and small patent apiculated teeth; and its small dispersed sori, which in their disposition follow rather the margin than the midrib, and in their shortness and panility of sterile cases bear no comparison with those of any British Asplenium at all resembling the present plant. It resembles A. maritimum in its strictly crowned, pinnate fronds, and winged rachis. It is not so much divided as A. tentensulatum or A. obtusatum, from which also it differs in other respects. We are inclined to think it will prove really distinct when better known. It is a native of Guernsey, and has been found during the past year (1855) first by Miss Wilkinson, and subsequently in other stations by Miss Mannell, of the Queen, and Mr. C. Jackson, to the latter of whom we are indebted for specimens, and for our knowledge of the plant. Mr. Jackson informs us that it grows on
THE SEA SPLEENWORT.

banks of rough masonry without mortar, and intermixed with *A. lanceolatum*, at some distance from the sea.

8. *occidentale* (M.). This form has the acute elongated pinnae of *ocidentale*, with somewhat the lobing of *sub-bipinnatum*, or else is narrow and strongly auriculate; the pinnae resembling those of the Australian *A. caudatum*, or the West Indian *A. occidentale*. It occurs in two or three forms in Sir W. Hooker’s collection, the most strongly marked, resembling *caudatum*, being from Galway.

9. *sub-bipinnatum* (M.). The most divided form we have seen. The fronds are of moderate size, but the pinnae, which stand more distant from the rachis than usual, are deeply pinnatifid throughout, and the basal anterior lobes, which are the largest, are almost separate, nearly a narrow oval in outline, simply or doubly serrate on the margin. It was found in a cave at Petit Bot Bay, Guernsey, by Mrs. Doebree, of the Forest, Guernsey.
Plate XXXIX.

The Common Maidenhair Spleenwort
(Asplenium Trichomanes).

Asplenium, Linn."
THE COMMON MAIDENHAIR SPLEENWORT.

Ceratopteris thalictroides, common, often with a dark central stripe. Filière wiry, branching.

Stipes short, smooth, chestnut-coloured or dark brown, rounded behind, flat in front, with a raised line on the face at each angle; terminal and adherent to the rhizome. Raceme, also chestnut-coloured throughout, projecting but rounded behind, flat in front, and furnished with a narrow elevated wing-like border.

Veination circinate.

Fronds two or three inches to twelve or fourteen inches long, linear, pinnate. Pinnae herbaceous, deep green, variable in shape, but for the most part roundish oblong, obtuse at the apex, and obliquely cuneate at the base, scarcely stalked, but attached to the rachis by the lower angle, usually crenated but sometimes nearly entire on the margin, and always entire on the crenate base. Sometimes used of the pinnae, and usually the lower ones, are more crenate in outline and less unequal-sided; more rarely the reduction of the upper basal angle gives the pinna an oblong outline. The pinnae are readily detached from the mature fronds, and eventually fall away, leaving the rachis bare.

Veination consisting of a midrib, from which issue forked veins, terminating within the margin; the anterior of the ceratopteris or branches bears the scars above the point of furcation.

Fortification generally distributed over the frond. Spore linear, oblong, numerous, often becoming confluent, lanceolate. Frondescent, entire or slightly crenated on the free margin. Spore-case numerous, globose. Spores angular, rough.

DURATION. The ceratopteris is perennial. The fronds are persistent, so that the plant is evergreen; a crop of young fronds appear in the spring.

This species has much resemblance to A. cirrata, but may be known by its dark brown rachis and the thin raised border of the latter; and further by the attachment of the pinnae, almost stalkless in this, and distinctly stalked in A. cirrata. It does not resemble any other native species.

It grows with tolerable facility under culture, but still is very apt to suffer if kept too damp under confinement. Pure and porous soil containing a considerable proportion of hard material, such as sand or broken sandstone, bricks, or old mortar, should be used, and excess of moisture must be avoided. In country rockeries it succeeds when such precautions are taken, but in town gardens it requires shelter, and even more care is necessary to guard against excess of moisture.

In endeavouring to account for the difficulties which occur in cultivating Ferns such as the present, which sometimes grove to be either shy growers under artificial treatment, the natural conditions under which the plant occurs should be well studied. Here is a species abundant enough naturally, which sometimes refuses to maintain its natural vigour under cultivation; and why? In most cases it will be found that there is something wrong at the foundation; the roots are suffering. Indeed, this appears to be the principal source of failure in cultivating the Common Maidenhair Spleenwort. The plant naturally grows on the perpendiculæ faces of walls or rocks, inserting its roots into the crevices and fissures where it finds enough nourishment; or even when growing on banks the soil is generally of an open sandy texture, so that water does not stagnate. It should not, therefore, be planted in large masses of soil retentive of moisture; the crown should be elevated between fragments of stone; the pots should have an extra amount of drainage; and finally, sand, fine broken brick, broken sandstone, or the sandy portions of mortar from old buildings, should be freely used. In short, above that portion which is kept free for drainage, the pot should be filled up with coarse pieces of brick, rock, or mortar, and the interstices only filled with finer soil, in which the same ingredients, mixed with sandy loam, should predominate. This mode of potting is suitable especially for the present species, the Wall Rue, and the Osmorhiza. None of these plants, moreover, require so much shade as other Ferns, although, if they are kept tolerably dry at the crown, they do not refuse to grow in structures
THE COMMON MAIDENHAIR SPLEENWORT.

which are shaded for others. Water must be applied cautiously; the crowns or centres of growth should not be watered, and the fronds themselves are the better for being kept dry, although an occasional syringing, if necessary to cleanse them, will not be found injurious, provided they are afterwards allowed to dry. The more successful instances we have seen of the cultivation of this Fern were in cases in which the atmosphere of the greenhouse was kept rather drier than usual in Fern houses; and this is just what the natural habit of the plant would lead one to expect.

Since writing the above, Mr. Wollaston, who is a very successful grower of Fennia, has favoured us with the following memoranda of his experience with this species. He says it succeeds best with him planted in sandy loam, with a very slight admixture of perfectly decayed leaf-mould, ever plenty of drainage, without moss above it, with a free use of water, and free ventilation. "Finding it difficult to manage," he writes, "I tested it in the following way. I took six seedlings of A. Trichomanes cristatum of the same age, and as nearly as possible of the same size, and planted them in pots of the same size, but all in different admixtures of soil, giving them otherwise the same treatment. That planted in sandy loam did best, very perceptibly, and that in sandy peat did worst; that, in pure leaf-mould was bad also."

Until lately very little variation had been observed in this species; now, however, several marked varieties are known, and they, for the most part, seem to have the quality of constancy:—

1. dichotomus (W.). This resembles the normal form in every respect except the dichotomous division of the apex of the frond. It is occasionally met with, but is not constant.

2. bifrons (W.) is a neat and pretty variety, differing in having the apical lobe frequently enlarged and always doubly or trebly forked. It is rare, and constant under cultivation. It was found near Maidstone, in Kent.

3. emunctus (W.). This is very much ramified, and is a highly developed form of dichotomus. It is so nearly constant under cultivation as to claim a place among the permanent varieties. The apical lobes, as in bifrons, are frequently enlarged and bold or multijl; and the rachis is two or three times forked. When these are many divisions of the rachis, the pinnae are often irregular and decompound, and they are often strongly crenate. It was found in Denbighshire by Potter, a well known dealer, since dead; again by Dr. Kinahan on Quin Abbey, Clare, Ireland; and by Mr. F. Clowes, near Windermere, Westmoreland. A very beautiful form, analogous to these, but branching lower down the rachis, has been sent from the neighbourhood of Keswick by Miss Wright; and we have received other fine examples from Hutton, gathered by the Rev. J. M. Chanter.

4. multifrons (M.). This is commonly bif. or tri-dichotomus in the rachis towards the apex of the frond as in the last, but differs in having the apices all multijl-cleft. It is a free-growing handsome form, and constant, being reproduced from the spores. It was found by Mr. Dick at St. Mary's Isle, Kirkcudbright, and has been communicated by Mr. J. McNab from the Edinburgh Botanic Garden.

5. cristatum (W.). This very graceful and uncommon form has the apex of the frond beautifully tufted or tasselled, but it very seldom ramifies in the lower part of the stipule. It has a free and vigorous habit of growth, and is invariably reproduced from the spores, and constant under cultivation. Its early history is lost, but some seedling plants made their appearance in a mass of Hymenophyllum maidenhair sent to Mrs. Delius, of Tunbridge Wells, Kent, from the Glasgow Botanic Garden.

6. decompoundum (W.). This peculiar form was found in 1835, by Dr. Allchin, in Clare, in Ireland, and again in 1855, by Mr. Wollaston, at Rydal, in Westmorland. The pinnae are very narrow, serrate or laciniate, and towards the apex of the frond so decompounded that the spore-cases protrude and appear to come from the face of the frond, giving the plant a very curious appearance. The apex is sometimes a mere winged rib. It is very rare. Other forms approaching this, but less or scarcely at all decompounded, and having the pinnae distinctly crenated, were found at the same place by Dr. Allchin.

7. sub CONTRACTUS (M.). These resemble the crenated forms just mentioned, but are more equal in the
THE COMMON MAIDENHAIR SLEENWORT.

pinnae, which are attached near their centre, instead of by the lower angle; the pinnae are oblong, and elegantly created. It has been sent to us from the banks of the Wye, near Monmouth, by Mr. J. D. Enys.

8. lobatum (M.). A large form, remarkable for having the pinnae, especially those about the middle of the frond, deeply divided at the base into two or more broad obvate lobes, in some instances separated almost to the midrib. It was found in Devonshire by the Rev. J. M. Chanter.

9. incisum (M.). This is by far the most beautiful variety, exactly analogous to the var. commutatum of Polygonaon vulgar, and uniformly barren. The pinnae are deeply pinnatifid, with narrow incise-c笑笑 segments. It has now been found in several localities: formerly, near Burley, in Lancashire, by Mr. S. Gibson, and in Devonshire, by the Rev. W. S. Hore; subsequently, as we learn, by Dr. Kilham, in Clare; and more recently near Settle, in Yorkshire, by Mr. A. Clapham; and in Borrowdale, Cumberland, by Miss Wright. It is the rarest of all known varieties, being difficult to cultivate, and uniformly barren.
Plate XL

The Green Spleenwort (Asplenium viride).

Asplenium, Lam. (Linn.)

Clusters of Sori-cowen linear, elongate or elongate, straight, attached along the inner or anterior side of the veins or veiules, furnished with an indusium or membrane at their base. Indusium of the same form, entire or somewhat jagged on the margin, opening along the inner side, or that towards the midrib or axis of venation. Veins dissimilar at their extremities, their branches (sori) simple or forked; sometimes furcately branched without a midrib.

A. VIRIDE: fronds linear; pinnae; pinnae subdistal, roundish-ovate, or rhomboidal, crenated, distinctly stalked; rachis green, with an obtuse elevated green border in front, not winged; not approximate to the midrib.


Explanation of the Plate.

Plate XL—Asplenium viride: A, from Herterh Troy; B, from Donegal, Northumberland; C, from the banks of the Irtting, Northumberland; D, from the banks of the Tweed, Northumberland. E, from Limberis, North Wales; cultivated; Dr. Smith.

Habitat.—The Green Spleenwort is found principally in the mountainous rocky districts of the north of England and Scotland, thinly distributed, and of frequent occurrence in exposed situations; but not generally abundant. It is also not uncommon in Wales, and is found in Scotland (C. E. B. Sharp). More southern stations are reported in the provinces of the Seven, Trent, and Mersey, but in these it is very rare. It has also been found on an old granite wall at Heaton, near Baptiston, but in the future of an old wall at Middlesbrough, in Denmark, and Pickenmort on a stony boulder at Middlesbrough, in Northumberland. In Ireland it appears to be a rare plant, though occurring in the counties of Donegal, Wick, Cork, and Kerry. Mr. Wight records its greatest altitude as about 2000 feet.

Geographical Distribution.—This Form is native of the whole of northern and central Europe, extending to Italy and Spain. It is again found in Italy in Tuscany (W. H. Blytt); in Tuscany and in Eastern Norway, and in the Island of Kast (Jaldbaa), where it occurs in North-West America and the Rocky Mountains (W. H. Blytt and A. B. Smith).

Caudex tufted, somewhat creeping, sparingly anastomosing the crowns. Scutus lanceolata, dark brown, cellular. Filiolum slender, branching.

Stipes variable, sometimes quite short, usually about a third of the length of the frond, smooth, dark brown at the base, green upwards, semifide; terminal and adherent in the cauline. Rachis green, slender, slightly grooved in front.

Fertilioune circinate.

Filiolum two or three inches to eight or ten inches long, linear, pinnae. Pinnae delicately barbeo-sacarce, membranous, pale green; variable in form, usually roundish-ovate, and somewhat cuneate at the base, or more obliquely cuneate there, thus becoming sub-trapeziform or rhomboidal, distant and usually opposite below, more crowded and alternate above; attached by a distinct slender stalk, the margin crenated or inciso-crenate, except at the cuneate base, which is entire. Occasionally the pinnae are equal-sided and broad at the base, much shortened and rounded at the apex; and sometimes they are more elongated and acute.

Fertilioune consisting of a midrib, producing forked veins at the base of the pinnae and simple ones above; these veins and venules terminate abruptly within the margin, the point of termination being
marked by an elevation on the upper surface. On the anterior side of the vein, opposite the furcation and extending below it when forked, and near to the midrib when the veins are simple, the sori are produced.

Fructification more copious on the upper part of the frond. Sori linear oblique, contiguous to the midrib and soon becoming confluent, indusiate. Indusium narrow, crenated on the free margin. Sori-scales globose. Sperme* angular, rough.

Description. The caudex is perennial. The fronds are produced in spring, and remain fresh through the winter, the plant thus being evergreen.

Though similar to A. Trichomanes, this plant may be distinguished by its green rachis, by its more delicate herbaceous texture, by the absence of a slender mixed border to the anterior face of the rachis, and by the more central situation of the sori, which are placed rather below than above the fork of the veins. It is always of a much paler colour.

At home on the mountain sides of the north this delicate species does not bear so well as others the atmosphere of lowland cities. Hence, except in favourable localities not affected by smoke, the plant will not bear exposure. It is generally found necessary to cultivate it under glass, a cold frame, occasionally ventilated, and with the atmosphere moderately moist, being most suitable for it. The soil should be of a rocky nature, and no stagnant water should be suffered to remain about it. It may be increased by division.

For pot culture in a moist shady greenhouse or frame, a soil composed of equal parts of loam, peat, stone dust, sand, and sandstone rock broken up into lumps of one or two inches diameter, should be employed, and the pots must be well drained, because, as it is necessary that the roots should be kept moist, provision must be made for the free passage of the water applied, so that it may not stagnate. The proportion of rocky material, for which soft broken brick is a possible substitute, may be even increased with advantage, the object being to provide for the drainage of the moisture away from the crowns, whilst it leaves the absorbing fibres of the roots.

In out-door rockeries such species as the present would be bountied by the use of a kind of bell glass provided with a vent at the top, which may either be opened or closed at pleasure. The use of such a glass would be to retain something like a moist atmosphere about the plants during the arid summer months, and to shield the crowns from excess of wet in winter. If the aperture, or apertures, were of moderate size both these objects would be secured without ever closing the glass, and thus risking another evil which follows mountain plants when brought under artificial culture away from their pure and airy habitats—that of suffocation from too close confinement.

The varieties of this Form are not numerous. Mr. Wollaston has communicated the following notes—

1. multifidum (W.) is briefly or multifidly divided towards the apex of the frond, and is rather more lax than the usual growth of the species. It is almost as frequent as the common normal form, and is sub-permanent under cultivation.

2. bipinnatum (Cl) the pinnae of this variety are deeply incised, very much as in the incised variety of A. Trichomanes; this however is fertile. It was found on Whitharrow, in North Lancashire, by Mr. 1. Huddart, in 1823, and was in the possession of Mr. Clover, of Windermere.

3. sectum (M). Mr. Newman notices a variety found by the late Mr. S. Gibson, in which the pinnae were " lanceolate and acute."
THE WALL RUE OR spleenwort

(Asplenium Ruta-muraria).

Asplenium, Linnaeus.

Clusters of Spore-case linear, oblong or elongate, straight, attached along the inner or anterior side of the veins or venules, furnished with an indusium or membranous cover. Indusium of the same form, entire or somewhat jagged on the margin, opening along the inward side, or that towards the middle or axis of venation. Forns dissected at their extremities, their branches (rarely) simple or forked; sometimes furcate, branched without a middle.

A. Ruta-Muraria; fronds deltoid, bi-tri-pinnate; pinnae obsolete, or rhomboid, wedge-shaped and entire at the base, the anterior margins acute rounded or truncate, toothed; sori linear, crowded, central: indusium crenate on the free margin.

EXPLANATION OF THE PLATE.


HABITAT.—The Wall Rue is generally distributed through Great Britain and Ireland, but frequent on the eastern side of England, according to Mr. Neuman, and rare in the Highlands, according to Mr. Watson. It grows on rocks and on walls, and in the shade of old walls. Its range of climate is estimated to extend from the mean level about 600 feet or upwards above s.

GEOGRAPHICAL DISTRIBUTION.—This Rue is spread over the whole of Europe, from France to Sweden. It is found in Russia, and Turkey (H. M. Moore), and in the Caucasian provinces of Asia Minor, as well as on the Arctic side of the Ural Mountains and in the regions of the Altai, and of Lake Baikal, in China. According to Mr. Buck, it grows in Algeria. It is also met with in North America—in Pennsylvania, Virginia, and Kentucky (H. H. Madden).

Plate XLII. A.

The Wall Rue or spleenwort (Asplenium Ruta-muraria).

Asplenium, Linnaeus.

Clusters of Spore-case linear, oblong or elongate, straight, attached along the inner or anterior side of the veins or venules, furnished with an indusium or membranous cover. Indusium of the same form, entire or somewhat jagged on the margin, opening along the inward side, or that towards the middle or axis of venation. Forns dissected at their extremities, their branches (rarely) simple or forked; sometimes furcate, branched without a middle.

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THE WALL RUE OR SPEENWORT.

Venation consisting of a series of veins repeatedly forked from the base, so that there is no distinct midrib, the number of branches or venules corresponding with the number of marginal teeth.

Pinnation on the back of the frond, borne on the inner sides of the venules about the centre of the pinna. Sori linear, few, sometimes simulating those of Selaginella from being nearly opposite, contiguous, and opening inwardly from each margin; often becoming confluent. When the plants are starved, they produce small pinnae and abundant sori, which are confluent over their whole under surface. Indusium, a thinly narrow membrane, having the free margin wavy or crenulate. Spores cuneus dark brown, numerous, roundish, obovate, coarsely reticulate. Spores roundish, strongly muricate.

Duration. The fronds are perennial. The fronds are produced in spring and retained through the winter, until after fresh ones appear, so that the Fern is evergreen.

The usual states of this species are eminentlyrecognised, the characters of detiolate outline, bipinnate division, and distinct concave pinnules, taken together with the small size of the entire fronds, serving to distinguish these from the other Aspleniums. There are, however, states of the plant which are not easily separated from A. germainiaceus, being narrow in the fronds or pinnae, and sometimes scarcely more than pinnae.

These states are best distinguished by the crenulate indusium, and by the fine dentulations of the upper margin, the apex of the pinnae in A. germainiaceus having fewer, deeper, and more unequal incisions.

Some cultivators succeed well with this plant, but it is not generally found easy of culture. Those succeed best who keep their Ferns drier than usual. The Wall Rue requires a very porous soil of sandy loam, with a large proportion of old mortar and fragments of soft brick, and to have the watering-pot applied very cautiously to the soil, and perhaps never to the leaves. The plants, too, ought to have an open or elevated site, especially if in a house or frame, so that they may be continually parting with the moisture supplied to them. They increase by division.

A few variations of this species have been noticed. They are as follow:—

1. scylliliana (W.). This produces occasionally a few dichotomous fronds, but the plant is not entirely dichotomous, nor is it constant under cultivation.

2. cervidim (W.). This is permanent, and nearly all the fronds are affected; some are crowded or tesselated at their apices; others have their apical lobes, as it were, folded on each other, and the rachis is not subordinately divided. The pinnae vary somewhat in every plant. It has been found by Dr. Allchin near Guildford, in Surrey, and by Mr. Wollaston near Tunbridge Wells, Kent, and is rare.

3. prolifera (W.), is a prolific form of the foregoing; the young plants protrude through the epidermis, or are nested at the sides of the pinnae. It was found sparingly mingled with the last.

4. dissimilis (W.). This is of very elegant habit; the pinnae are deeply incised and elongated. It has been found by Mr. Wollaston in Devonshire, and by Dr. Kinahan in Ireland, and is not common.

5. conicum (M.). This form, which comes from Stenton Rock, is often mistaken for A. germainiaceus; it is scarcely more than pinnae, with narrow pinnae conico below, truncate above. The texture, however, is stouter than in A. germainiaceus, the parts broader, and the apical teeth, unlike those of that species, are small and equal. Another similar form from the same place is rather more divided, and less truncate; specimens similar to this last have been found by Dr. Allchin at Town Malling, Kent, and by Miss Wright, at Keswick. A still narrower but analogous form has been found by Mr. Wilson in Devonshire, and by Dr. Allchin at Ruis.

6. paniculata (M.). A paniculate variety, with several rhomboidal pinnae, stalked, and crenato-decussate in the upper or larger half. It was found by Dr. Allchin at Maccles.

7. undulatae (M.). This was found with the last. It is one-sided in its growth, developing a normal pinna on one side, the rest of the frond being confused, and the rachis often recurrent and hooked at the point; sometimes the pinna becomes an enlarged branch. The whole growth is irregular and monstrous. A somewhat similar form has been gathered by Mr. Barrington, at Black Head, Clare, Ireland.
THE ALTERNATE-LEAVED SPLEENWORT
(APPLENIUM GERMANICUM).

ASPLENIUM, LIANEAU.

Clusters of Spores—those linear, oblong or elongate, straight, attached along the inner or anterior side of the veins or venaules, furnished with an indumentum or membranous cover. Indumentum of the same form, entire or somewhat jagged on the margin, opening along the inward side, or that towards the midrib or axis of the venaule.

Veins disposed at their extremities, their branches (rhombs) simple or forked; sometimes narrowly branched without a midrib.

A. GERMANICUM: fronds linear oblong, broadest at the base, pinnate or sub-bipinnate; pinnae alternate, ascending, narrow wedge-shaped, toothed at the apex, entire below, the lower ones three-eleft; sori elongate valvate; indusium entire.

EXPLANATION OF THE PLATE.

PLATE XLI. 2.—Asplenium germanicum. L, from Switzerland; undivided. S, from Switzerland; J, Athyr.

HABITAT.—This is one of the most of British figures, but few stations and the plates having been discovered. The number of specimens are as follows:—In North Wales, near Llanberis, by Mr. H. R. Williams; in the Lake-district, near Helvellyn, by the Rev. W. H. Howitt, and at Keswick, by Mr. H. R. Smith and Miss Wright; in Northumberland, on Knypersley, by Mr. G. B. Rasa; in the Lake-district, near Windermere, by Mr. W. Hall; at Manchester, by Mr. J. W. Goodall; in the Highlands of Scotland, by Mr. W. T. A. Miller; in the Highlands of the Black Forest, by Mr. J. H. K. Jacobsen; in the Black Forest, by Mr. J. H. K. Jacobsen; in the Black Forest, by Mr. J. H. K. Jacobsen; in the Black Forest, by Mr. J. H. K. Jacobsen; in the Black Forest, by Mr. J. H. K. Jacobsen.

GEOGRAPHICAL DISTRIBUTION.—The Alternate-leaved Spleenwort requires to have been found sparingly in a use of the European continent, as far north as Helingsfjord, but we have no information of its occurrence in other parts of the world.

CAULIS.—Stalk, short, slender, scaly.

Scales small, narrow lanceolate, dark brown, striato-reticulate.

Lobes slender, branched.

Stipes terminal and adherent to the cauline, slender, nearly, often quite, as long as the frond, dark purplish brown below, green above, and as well as the rhombs smooth.

Furnaces circinate.

Fronds from two to six inches high, narrow, linear oblong, somewhat broadest at the base, pinnate, sub-bipinnate, or, when very luxuriant, bipinnate below, polish green, scarcely sub-eoriaceus. Please alternate, ascending, remote, the lower ones largest and most developed; in small plants narrow-oblanceolate.
THE ALTERNATE-LEAVED SPLEENWORT.

or cuneate, cut into two or three narrow lobes, the lobes simple or toothed, the apex unequally toothed, the base tapering into a kind of petiole; in the larger specimens more distinctly stalked, and sometimes decidedly bilobated with one distinct cuneate pinnule. The upper pinnule are less and less lobed, but unequally toothed at the apex, which is blunt, and they are filately curved inwards. The apex of the frond consists of several condensed narrow lobes.

Pinnation consisting of from two to four series of furcate divisions of the rachis which constitutes the vascular bundle of the footstalk, without a midrib, a rachis extending to each of the teeth, so that the frond is occupied by two to five or six flabellately-forked nearly parallel veins.

Pinnatifid on the back of the frond occupying all the plane. Sims linear elongato, on two or three of the central veins, opening inwardly from each margin, at length confluent. **Todecium** a thin narrow membranous with the margin entire or somewhat wavy. **Sporo-cyme** obliquely obovate, brown. **Spores** roughish or marianate, roundish-oblong.

Duration. The capsules are perennial. The plant is evergreen or sub-evergreen, the fronds being more or less persistent.

This plant, though almost invariably kept distinct by writers on Ferns, has often, by the same pen which has so placed it, been marked as a suspicious species, having a supposed relation either to the Wall Rue, or the Forked Spleenwort. Without doubt it stands intermediate between these, but seems to us perfectly distinct. It is a subbipinnate form of the Wall Rue (var. **cuneatum**), only, which resembles it, and that is altogether a thinner and stouter plant, not lobed as this is, and with the apical-marginal teeth much more uniform. The Forked Spleenwort is much more coriaceous and less leafy, its lobes being in truth rather rachiform than foliaceous, and its teeth, when present, very different, being rather of the nature of distant linear fragments split away from the margin, than serratures, which the few teeth of A. **pernianum** more nearly resemble.

This rare Fern is one which does not thrive under cultivation, except with careful management. If potted in porous soil, with the crown well elevated and covered by a bell-glass in a shaded frame, or put in a warm close house or pit without a bell-glass, it will generally grow with vigour; but the plants are very liable to perish in winter. The safeguard is, not to allow water to reach their crowns, to keep their roots just moderately moist, and not to suffer the bell-glasses, employed to protect them from the risk of being wetted, to injure them by retaining a constantly damp atmosphere, which they will do if they are kept permanently closed. The plan of using glasses, with a couple of small apertures opposite each other, as vents, near the top, so successfully adopted by Mr. Clowes in cultivating **Hymenophyllum**, would no doubt be found congenial to these difficult mountain **Asplenium**. The plants may be increased by dividing the crowns.
PLATE XLII. G.

THE FORKED SPLEENWORT
(Asplenium septentrionale).

ASPLENIUM, Linn.

Clusters of spore-case linear, oblong or elongate, straight, attached along the inner or anterior side of the veins or venules, furnished with an indusium or membranous cover. Frond-base of the same form, entire or somewhat jagged on the margin, opening along the inward side, or that towards the midrib or axis of venation. Fronds at their extremities their branches (venules) simple or forked; sometimes forcibly branched without a midrib.

A. SEPTENTRIONALE (frods linear, simple, or two- or three-leafed; or forked, with linear leaf divisions; segments alternate, ascending, elongate and racemiform, with a few deep narrow distant teeth; sort few, elongate, often parallel; indusium entire.)

EXPLANATION OF THE PLATE.

HABITAT—A few species, but widely distributed, being found in Scandinavia and Russia in North Wales, in the Lake District, Yorkshire, and Northumberland; in Scotland, and above Edinburgh; in Ireland, and at the Pits of Balhousie, in Abertay, which is the most southerly station yet attached, though it has been reported from Ireland, and also last from Firth of Forth. It reaches an elevation of about 2000 feet, and occurs nearly to the sea-level in North Wales. It does not appear to occur at all in Ireland. The situations in which it is found are shores of sea, and the interstices of bare stones and sands.

GEOGRAPHICAL DISTRIBUTION.—This is a not uncommon European plant, occurring abundantly in some of the mountainous tracts of central Europe, and extending from the southern kingdoms to Italy, Spain, and Hungary. In Asia, it is found in Northern India, Kashmir, Karim (A. Octono.); and in the region of the Caspian, the Ural, and the Arctic. It occurs in New Mexico. (H. Lindley, Hook.)

CAUSITES short, thick, tufted, often forming large dense scaly masses. Scales small, narrow lanceolate, dark brown, strato-tishulate. Filoes numerous, wiry, branched.

Spores terminal, adherent to the caudex, dark brown-purple at the base, green above, as long as, or longer than the frond.

Veination circinate.

Frons from two to six inches high; sometimes simple, and then either entire or with a few distant marginal subulate teeth appearing as it splits away from the main portion, or divided into two or three narrow linear alternately ascending lobes; sometimes forked, with the two divisions either simple, toothed, or lobed on the same plan as the simple fronds. They are numerous, deep green; the simple ones
narrow, linear, tapering towards both ends; the forked ones indefinite in form, and apparently conical, one of the divisions being smaller than the other, and looking like a lateral branch without a balancing branch from the other side of the rachis. The lobes are sometimes so much separated as to look like distinct pinnae.

**Venation.** Consisting of two or three series of furcate divisions of the vein which enters from the base, one of the veins extending to each of the teeth, there being no midvein.

**Fructification.** On the back of the frond. **Sori** linear, elongate, or the inner side of two or three of the few veins, and opening towards the centre; towards the apices they are often opposite and contiguous almost as in *Selaginella* in consequence of the narrowness of the parts; and being crowded, with numerous spore-cases, they become confluent, and appear to be universal as in *Acrothamnus*, but these are more similar. **Inclusion** linear, entire. **Spore-case** roundish-elliptic, dark-brown. **Spore** roundish-ellipsoid, slightly marianulate.

**DISTRIBUTION.** The caudex is perennial. The fronds are persistent; the plant is, therefore, an evergreen.

This plant may be distinguished at first sight by its tufted graceful aspect. From its ally *A. germanicum*, which some botanists would consider a variety of it, the Forked Spleenwort may be known by its fronds being either simple, with more lobes, or forked with two distinct branches, each like its own smaller fronds, and never being regularly pinnate as in *A. germanicum*. It is also narrower in its parts, with the texture thicker and less leafy.

As in the case of the allied species, many persons fail to cultivate this Fern with success. The failure probably arises from the use of fine soil in too large masses. Naturally this is a creeping plant and this condition should be imitated by its being planted among masses of porous sandstone, in the interstices of which only, a little sandy soil should be placed. It would no doubt be an advantage to plant somewhat horizontally rather than too strictly vertical; and to allow the upper fragment of stone employed, to be large enough to serve as a shade to the crown from the sun’s rays, these latter in summer acting too powerfully on the soil contained in small pots. This amount of shade would admit of the plants being kept in a more exposed situation than is usually safe, from the cause just referred to; and that the evils arising from close dampness and want of ventilation would be remedied. The exposure, however, must be modified judiciously; for instance, a greenhouse where the atmosphere is dried and moistened daily, would probably be found congenial; or a cold frame well aired, and slightly shaded, might with advantage be substituted for the closer frame and denser shade, which is more usual. Certainly many Ferns do not need so much shade as is given in a general collection, to suit the more tender kinds; and the partial shade afforded by a lump of stone on the sunny side of the crown of a small Fern would be more congenial to many of the mural or vegetable species, than a more general exclusion of the sun’s rays. Mr. Watson notices that the young fronds are easily damaged by frost.
XI.II.

THE COMMON HART'S-TONGUE FERN
(Scolopendrium vulgare).

Scolopendrium vulgare, Smith.

Clusters of Spheno-axon linear or oblong, straight, growing in precise parallel rows, on the anterior and posterior branches of adjacent fronds of veins, indurate. Internodes linear, attached to the veins on opposite sides of the proximate xyl, the free margins face to face, at first convolving, at length separating down the centre of the twin axes, which becomes confluent into a broadly-linear axes. Veins two- or three-times forked, from the prominent midrib; venules parallel, distended at their apices, which are club-shaped, rarely anastomosing below.

S. vulgare: fronds very variable; normally broadly-linear or oblong strap-shaped, entire at the margin, arista at the apex, erose at the base, smooth or slightly hairy-scaly on the midrib beneath; stipes shaggy, with narrow scales.

Scolopendrium vulgare, Smith, Memorie de L'Acad&ium Royale des Sciences de Koenan, '172, 2, fig. 51.


Scolopendrium vulgare, Smith, Flora Britannica, 2, 17.


Scolopendrium vulgare, Smith, Brit. Flora Britannica, 1804, 2, 16.


Scolopendrium vulgare, Smith, Brit. Flora Britannica, 1804, 2, 16.


Scolopendrium vulgare, Smith, Brit. Flora Britannica, 1804, 2, 16.


Scolopendrium vulgare, Smith, Brit. Flora Britannica, 1804, 2, 16.


Scolopendrium vulgare, Smith, Brit. Flora Britannica, 1804, 2, 16.


Scolopendrium vulgare, Smith, Brit. Flora Britannica, 1804, 2, 16.
THE COMMON HART'S-TONGUE FERN.

**Botrychium virginianum** (L.) Bernh. (Ferns of the United States, vol. 1, p. 259). The common hart's-tongue is one of the most familiar and interesting ferns of our woods and fields. It is a hardy, perennial plant, with large, dark-green fronds, which are found in woods, fields, and meadows, and are often abundant. The fronds are simple, with a long, slender, usually dark-brown stipe, and a lanceolate, usually dark-green, subcoriaceous, pinnatifid blade. The sori are black, and the spores are dark-brown, with a characteristic odor.

**Explanation of the Plate.**

The plate shows the fronds of the common hart's-tongue, with the sori and spores. The fronds are simple, with a long, slender, usually dark-brown stipe, and a lanceolate, usually dark-green, subcoriaceous, pinnatifid blade. The sori are black, and the spores are dark-brown, with a characteristic odor.

**Habitat.** The common hart's-tongue is found in woods, fields, and meadows, and is often abundant. It is a hardy, perennial plant, with large, dark-green fronds.

**Geographical Distribution.** The common hart's-tongue is found in woods, fields, and meadows, and is often abundant. It is a hardy, perennial plant, with large, dark-green fronds.

**Conura thick, short, curled, often decumbent, only at the crown.** Scale Intermediate-basal, pale purplish-brown, shining, finely reticulate-venose. **Folius short, branched, numerous, dark brown.**

**Stipes** averaging about one-third the length of the frond, but varying from about one-fourth to one-half its entire length; usually clothed with paly yellow costate subulate scales, sometimes smooth, purplish-brown, darkest at the base; terminal and adherent to the stipes. **Rachis** more correctly _stipes_, stout, scaly behind when young, often dark-coloured below.

**Veination dracoid.**

Fronds from about four inches to two feet or upwards in length, narrow elongate-homoclad, or broadly linear, or oblong strap-shaped, normally entire, or slightly sinuous on the margin, with the apex more or less attenuated, and terminating in an acute point, and having the base coriaceous, plane, finely or coriaceous, deep rich green. The veins deviate in unnumbered forms, by the incrustation or modulation of the margin, the multifid distention of the apex, the branching (often repeated) of the stipes and adduct, the loss of the coriaceous lobes at the base, and the arrests of longitudinal development. **Volution parallel-furcate.** That is, the coriaceous spring from the midrib are one, two, or three times forked near the base, and the _sporobolus_ thus produced extend side by side nearly to the margin, and almost at a right angle, terminating in club-shaped spikes. In the enlarged base of the frond, the fraculae are more numerous.
**THE COMMON HART’S-TONGUE FERN.**

*Pteridophyton* dispersed over the back of the frond,* most abundant upwards. *Sori* linear, oblong, unequal in length, twin, that is, growing in pairs, the two contiguous parallel sori borne on the posterior and anterior veins of adjacent branches of veins, and becoming confluent into one broad linear mass. *Induction* also double, narrow, entire, the two opening faces to face, at first consisting, at length separating down the centre of the twin sori, finally pushed back and hidden by the spore-cases. *Spore-cases* numerous, elevate, reddish-brown. 

**Description.** The canes are perennial. The fronds are persistent, the young ones being produced in April, and remain long after others succeed them; the plant is therefore strictly evergreen.

The common Hart’s-Tongue is at once known from all other British Ferns by its long strap-shaped succulent-looking fronds, and technically by its linear twin sori. Its varieties are endless. Those we have thought deserving of botanical recognition are to be considered rather as types of variation than as individual forms, comprising a series of analogous subvarieties, which, however, being permanent and easily cultivated, are individually prized as garden ornaments. We omit any lengthened description of them on this account, and also because they will be included in the following notes on the whole of the forms or subvarieties at present known, which have been obligingly drawn up by Mr. Wollaston, of Chislehurst, whose own collection contains one of the most extensive series of them. The principal private collections of living Selaginella, known to us, besides that just mentioned, are those of Mr. Allchin, of Baywater; Mr. Gray, of Hammersmith; Mr. Clapham, of Stockborough; Mr. James and Mr. Jackson, of Guernsey; the Rev. J. M. Chauncy, of Ilfracombe; and Mr. W. C. Trevelyan, of Ilfracombe; to whom, and to many other correspondents, we are indebted for specimens.

1. *polypodiodes* (Ray). This old and familiar variety, known to the Illustrisius Ray, and named in allusion to the numerous deep incisions on the margin of the frond—known also amongst gardeners under the name of *angustifolium*, in allusion to its narrow fronds—is taken as the type of a group in which the fronds are more or less incised on their margins, but not in the least degree margined, that is, having the epidermis disrupted. The fronds in this variety are linear strap-shaped, slightly undulate, irregularly crenato-lobate, with the margin crenately-toothed; it is fertile, and the masses of spores often protrude between the incisions to the face of the frond. The venation is here and there redundant. It is remarkably constant under cultivation, and universally reproduces itself from its spores. Its early history is lost. The late Mr. D. Cameron found it near Bristol; a form almost identical has been met with by the Rev. J. M. Chauncy, near Ilfracombe, Devonshire; and Sir W. Hooker has a specimen from Lismore.

2. *austrorcia* (Ray) is similar to *polypodiodes*, but the fronds are somewhat broader, and the margin is more filled with an undulated series of bluntish teeth, which are deeper and more evident in this variety just named. It has the same kind of deep incisal incisions, but they are less manifest, being hidden by the undulation of the margin; the base is truncate; the venation is normal, and the sori short oblong. The best grown form is of exotic origin, having been received from Belgium, but a very similar one has been found in Guernsey, in 1834, by Mr. James. It is quite distinct, and very neat.

3. *Selaginella* (M.) is a large, vigorous, and graceful form, in character resembling the two preceding, but the fronds are larger and broader, and usually blunt-toothed; the margin is deeply indented and somewhat undulate, so that the incisions are not very evident, the whole being crenately toothed; the veins are slightly setted; and the sorii grow in oval oblong masses. It was found near Ilfracombe in Somersetshire, in 1852, by Mr. W. C. Trevelyan, and similar forms have been gathered near Danishby, by Mr. T. Priestfield; and in Guernsey by Mr. C. Jackson. It is permanent, handsome, and rather rare.
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4. *Asplenium scolopendrium* (L.). A very pretty dwarfish narrow-fronded variety, having the margin shallowly, sometimes deeply lobed, the lobes frequently separated by broad sinuses, and the whole nuchted with nearly uniform blunt concomitant teeth; the apex is usually blunt, the midrib not reaching the end; the sort are longish masses irregularly placed. Found near Hirambe, in 1853, by the Rev. J. M. Cluster.

5. *scolopendrium* (Tait). The peculiarity of this variety is its rigid coriaceous texture and upright habit. It resembles *decticatum* (8) in the small even toothing of the margin; but the fronds are more incised or lobate; they also terminate abruptly, and the rachis protrudes near the apex and forms a horn or hook on the under side. The fronds are sometimes fructicata; sort few, scattered. Mr. A. Tait of Edinburgh, first noticed it in the nursery of Mr. Sang, at Kirkaldy.

6. *cornutum* (M.). It is a very beautiful, as well as curious variety; the fronds are coriaceous, somewhat undulate, crenate or deeply lobed, the lobes scarcely toothed; they also usually terminate abruptly, the rachis projecting from the face, forming a long hook or horn, from which it takes its name. It fruits plentifully, and is a thoroughly constant variety, invariably reproduced from its spores. It was found in Yorkshire by Mr. Thorne, and probably elsewhere, as it is not uncommon in collections.

7. *imperfectum* (W.) is remarkable for the unfinished appearance of the margin of the frond, which is entire, as though cut away as in the sort. It was found in north Lancashire by Mr. Wollaston, in 1853, and promises to be a constant form. The fronds are linear, strap-shaped, somewhat irregular, truncate at the base, sometimes abrupt and sub-cornute at the apex.

8. *decticatum* (W.). This is of exotic origin, having been found near Geneva by the Rev. W. H. Hawker, but is so likely to be found in this country, or so certain to be raised from spores, that it is here included. The plant is dwarf in habit, the frond much-denticulate, and occasionally incised, sometimes abrupt at the apex. As yet it has not fruited, but it is constant.

9. *strophium* (M.). A very narrow linear form, ericate at the base, with broad shallow entire crests running nearly to the point; sort normal beneath, with numerous small roundish sort near the margin above. It was found in Sussex by Mr. J. James, of Waverly.

10. *ornitho-lebenum* (M.). An elegant form, normal in size and general outline, but the margin, especially in the upper half, is strongly crenate-sublunate, sometimes a little undulate. It is very distinctly supraserrate, the upper sort often large and distinct like the lower. It appears to be a frequent form, and has been found in Devonshire by the Rev. J. M. Clutter; in Clapham, Kent, by Mr. F. Brent; in Sussex by Mr. G. Jackson; and Dorsetshire by Mr. Wollaston. It is sometimes very slightly marginate.

11. *turgidum* (W.), so called from the thick or mushy appearance of the cellular tissue—is submarginate. The fronds, which are from six to eight inches long, are normal in outline, irregularly crenate or sub-lobate, and feebly; the venation irregular and occasionally reticulate. It is quite distinct from all other varieties, and permanent under cultivation. It was found in Sussex, in 1854, by Mr. Wollaston.

12. *venustum* (M.) is so called from the absence of the usual coriaceous lobes at the base of the fronds; in other respects it resembles *ornitho-lebenum* (10) and *imperfectum* (11), being irregular in width and development. It was found in Sussex, in 1854, by Mr. Wollaston, and is constant.

13. *venustum* (W.) differs from the ordinary form in having the margin of the frond (which is occasionally multilinii) sinuate, the lobes-like sinuoles being irregular in development, entire or obscurely ericate. The venation is slightly confused in the contracted parts; but the sort are normal. It was found in Sussex by Mr. Wollaston in 1854, and in Yorkshire by Mr. Clapham; and is constant.

14. *lophiate* (A.). This handsome variety has the margin of the frond deeply incised, and distinctly and unequally lobed, sub-plinatis; the apex generally sub-lunate; fructifications opusiae and irregular. It was found in Ireland by Dr. Allindon in 1833, and is a constant and a rare plant.

15. *ornitho-lebenum* (James). A dwarf form, very remarkable when fresh for its coriaceous texture. It is irregularly inciso-lunate, generally abrupt, slightly marginate, sharply and irregularly sinuolate, the sort on the under or upper surface, or internal edge of the frond. Found in Sussex by Mr. James.

16. *fuscum* (W.). A handsome variety, in which irregular portions of the frond are contracted,
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these portions having the short distinct teeth or the shallow lobes of the polychidioid type, while here and there other portions grew out to the normal width, and form blunt, rounded, or oblong projecting lobes, or entire normal spaces of greater length. Sometimes the apex, or the base, or one side only, of the frond is affected; the example figured showing an instance in which the altered portions are lost broken up than usual. Scarcely two fronds are alike, but the fronds are nearly always affected. It has been found in North Lancashire by Mr. Wollaston, in Yorkshire by Mr. Clapham, and in Devonshire by the Rev. J. M. Champion.

17. irregularis (L.). This is one of those unaccountable freaks of nature which is at one time in its natural growth, and then in its most fantastic; or the two conditions may be combined on the same plant. The abnormal fronds are irregularly lobate, with crenate or formed lobes, somewhat undulate, often forked, and altogether irregular. It is but sparingly fertile in the abnormal state. It was found in Guernsey by Mr. C. Jackson, and is only a sub-permanent form.

18. cornutum (W.) presents a combination of the characteristics of variolens (20) and ericoides (49) having fronds beautifully undulated, but also deeply cut into articulate lobes on the margin, in a very irregular manner. The variation is slightly cuticulate. Found in Sussex by Mr. Wollaston in 1854.

19. prociliiferum (M.). A large irregularly-lobed form, stout and rigid in texture, often forked, and somewhat supra-marginate; its chief peculiarity, however, is the production on its under surface, of irregularly-placed cup-shaped or rather trumpet-shaped excrescences, frequently a quarter of an inch in length. It was sent to us from Guernsey by Mr. J. James, of Vanvert.

20. submargiuitatum (W.). This form comprises several modifications, in which the fronds, various in character, sometimes bilateral, more rarely ramosa, are only partially margiinate; the perfect fronds are submargiinate, that is, with their margins partially disrupted, crenate-lobate, especially towards the apex, supra-soriferous; the imperfect fronds sometimes similar to the perfect ones on one side of the rachis, and on the other narrow and trebly dentate; others are trinervate, submarginate, and obliquely crenate; and others again abortive, having nothing but a short starchy stipe without any of the leafy portion. This form was found in Sussex, in 1854, by Mr. Wollaston; in Ireland by Dr. Allechin; in Guernsey by Mr. C. Jackson; and in the Isle of Wight, by Mr. R. Bloom.

21. nipponense (W.). This is perhaps, the most slightly margiinate of the varieties referred to the amphiophyllum group. The fronds, which are rarely a foot long, are lance-shaped, laterally waved or sublinear, slightly crenate, and absolutely, though continuously, margiinate beneath. They are also supra-soriferous, that is, the fructification protrudes itself to the face of the frond, but the upper side are very small. The base of the frond is rarely naricled, and the whole plant has a very unusual appearance. It was found in Guernsey by Mr. C. Jackson, in 1854, and is doubtless a constant form.

22. acuminatum (M.) is a small form, possessing many of the characteristics of submargiuitatum (20), but having the apex of the frond multident. Its chief peculiarity is the minutely subacute portion of the frond immediately below the forking. Found in Ireland by Dr. Allechin, in 1853, and quite constant.

23. contractum (W.). This variety resembles submargiuitatum (20) in size and in its submarginate frond, and microdon (22) in its multident apex. It has been named contractum on account of having its fronds drawn into a waist-like just below their densely-multident apex; the mass of veins which have to pass this constricted portion, become protruded or ridged, giving that port the appearance of being supra-soriferous. This also was found in Clare, Ireland, by Dr. Allechin, in 1853, and is constant.

24. marginalis (M.). This is the type and most remarkable form of the margiinate group, and although but recently noticed, must have been long known, as a garden specimen received from the younger Linnaeus is in Sir J. E. Smith’s Herbarium. Several subforms are known in cultivation, of which the most marked in character is thus described in our Handbook of British Ferns: the fronds grow erect a foot or more in height, and stand in a circle round the crown; they are simple strap-shaped, the margin irregularly lobed, the under surface producing within the margin an excurrent membrane, which is also lobed. Both surfaces of this membrane, and the under surface of the frond itself exterior to it, are
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narrow. The fronds have therefore, as it were, a double margin. In the less perfectly developed condition the membrane is reduced to a longitudinal vein-like ridge." This variety was found near Nettleton, in Somersetshire, by Mr. Elworthy, gardener to Sir W. C. Trevelyan, and subsequently near Selworthy, in the same county, by Mrs. Archer Thompson. It has since been gathered in Sussex, by Mr. Gray and Mr. Wallaston; and still more recently in the Isle of Wight, by Mr. R. Elsmore; in Devonshire, by the Rev. J. M. Chantry (several forms); and at Evesham, in Worcestershire, by Mr. G. Watson. A narrow form has been found near Evesham, by Mr. J. R. Cobb. There is also a plant of this character, with multifilid spores, in the possession of Mr. Wallaston, which was sold to him in 1849 by Potter, a well-known dealer (now dead), the history of which cannot be traced; from this the variety proliferum (26) has been raised, as well as plants exactly resembling the original.

25. proliferum (W.). This curious little monstrosity, as before stated, was raised from the spores of the multifilid marginatum (26) in 1851, and the plant was in 1858 (with the exception of those that have been grown in heat), of the most pigny dimensions, the largest not having attained three inches in length. The fronds in general outline are either small strap-shaped, truncate, olyphiform, coriacea, or subulate, but all, with the exception of the last, are deeply and irregularly marginated, almost to the dividing of the frond in two. The excurrent membrane is the same as in the last described, but more developed in proportion, and the upper surface of the frond is irregularly verrucose. Hitherto there has never been any appearance of fructification, but in lieu thereof curious little bulbil-bearing cysts have appeared on the surface of the frond, proceeding generally from those parts where the stipules or breathing tubes terminate. These form minute plants exactly the counterpart of the parent. This bulbil-making process Mr. Wallaston thinks is more or less common to all, when from some unknown cause the normal mode of propagation fails. This variety is becoming not uncommon.

26. filiformis (Allchinn). This unique variety is connected by easy steps with binomarginatum (27). It bears two sorts of fronds besides the usual hooks and points peculiar to this group. The first are about three-quarters of an inch in breadth; and from six to nine inches in length; the margins not having attained, twice crinate, lobate, undulate; the next rarely pass the excurrent membrane; which is the same as in other marginata forms. The second sort of frond is very narrow, about a quarter of an inch wide, and from nine inches to upwards of a foot in length, and more nearly resemble a winged rachis than a frond, the leafy part on either side being about the same width as the rachis itself; the margins are the same as the others, but more minutely divided, and the disrupted membrane recedes even to the rachis itself. It is a very neat and curious variety, and was found by Mr. Allchinn in Guernsey in 1849.

27. binomarginatum (W.). One of the most curious and rare varieties known. The fronds are linear strap-shaped, sometimes multifilid, about a quarter of an inch wide, and nearly a foot long; some also are three-quarters of an inch wide, and from six to nine inches long. On the under side the excurrent membrane appears as in other marginata forms; but besides this, on the upper surface of the frond, the cuticle is gathered and pushed up into cavities and nodules; and some of the lower veins form most remarkable olyphiform stipitate expansions with trumpet-shaped mouths. The stipes and part of the rachis are covered with hair-like scales. It seems a very tender variety, affected byock frost, and very rarely perfects its spores. It was found near Rotherham, in Yorkshire, about five years ago, by Mr. H. Hayling, under gardener to the Rev. W. Hudson, of St. Catherines, Regent's Park, and was exhibited at the Horticultural Society's Rooms, in Regent-street, by Mr. R. Kennedy of Covent Garden.

28. scutatum (W.). The fronds of this variety resemble the wider fronds of binomarginatum (27), but are even much wider and longer, and the whole plant is of more vigorous growth. The face of the frond is more rugged and not quite so much drawn into cavities. The margins are irregularly jagged, particularly towards the apex of the fronds. Unlike the other it is abundantly fertile. It was found in Ireland, in 1855, by Dr. Allchinn, and is a singular and rare variety.

29. constrictum (M.). This curious form has not been proved, but it is so remarkable as to deserve recording. The fronds are medium-sized the upper half broad, and scarcely differing from the normal
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state; the lower half equally contracted to less than half the width, deeply crenate, and marginate, the extreme base being again broad so as just to develop the usual crenate lobes; both sides being uniformly affected throughout, and strongly marginate in the contracted parts. Found by Mr. J. James in Guernsey.

30. *supplementum* (M.). This differs from the rest of the marginate group in having the excurrent membrane confined to the face or upper surface of the frond. There are several forms of this variety, some with but a small portion of each frond, others with one side only, and others with one or more fronds on a plant, affected. The most marked form (which was obtained from Epernon) has the whole plant affected more or less, and when perfect is a very beautiful object. The general outline of the frond is strap-shaped, sometimes but not often multifid; about eight inches long; the margins beautifully but irregularly corrugate till they meet the excurrent membrane, which forms a slightly sinuous line on each side of the rachis, reaching in a well-marked frond from the apex to the base; the whole thus having the appearance of a narrow frond of the normal form superimposed on the variety *crenatum*. It was first brought into notice in this country by Mr. S. F. Gray; and analogous forms have subsequently been found in Surrey by Dr. Allehin; in Yorkshire by Mr. A. Chaplin; in the Isle of Wight by Mr. R. Bloxam; in Devonshire by the Rev. J. M. Chantor; in Guernsey by Mr. C. Jackson; and in Hampshire and Sussex by the Rev. W. H. Hawker and Mr. G. R. Wollaston. It is a rare variety.

31. *multiforme* (W.). This most remarkable and compound form, embraces within itself the peculiarities of nearly every known form of variation. Its fronds are multiform, lanceo, crenato, sulcate, either simple or multifid, marginato, supplementato, corrugato, incisato, or depapillato, and cannot be better described than by a reference to the varieties indicated by the above epithets. It was found in Guernsey by Dr. Allehin in 1843, and is a permanent form, and not now very uncommon.

32. *varicosum* (M.). The type of another class of variation, in which the upper surface is developed into ridges or raised points. In this the fronds are normal in outline, ovato-rotundato, the margin here and there lobed, or slightly sinuous, but the tissue is sunk between the veins producing evident furrows, and the veins themselves bear two or three elevated points, these points being scattered rather plentifully over the whole frond. It was found in Guernsey, and sent to us by Mr. J. James of Yarmouth.

33. *jegognum* (M.). Also found in Guernsey, and communicated by Mr. James and Mr. C. Jackson. Two or three modifications have been met with. Its peculiarity resides in a thickening of the veins which bear sori, resulting in the production of a series of ridges or leafy wort-like excrescences on the upper surface, and opposite to the sori on the lower surface, producing a curious ridgy appearance.

34. *psychrocellus* (M.). This curious variety develops a series of distinct wart-like excrescences side by side, above, on the veins, near their apices, and forming a border to the upper surface of the fronds, which latter in the specimens we have seen are small, and rather narrow, but of normal outline. It was sent from Guernsey by Mr. C. Jackson.

35. *rugosum* (Allehin). This variety is marginato at the apex; the leafy portion of the frond is very short in comparison with the stipes; it is undulate, crenate, and on the rachis almost echiante, and at the apex has a curious irregularly-shaped pocket or pouch, formed by the splitting of the epidermis. The pouch is fertile as well as other portions of the frond, and has the rachis generally in its under cuticle. The stipes is very long and thinly clothed with scales. It was found in Ireland by Dr. Allehin in 1833, and is a permanent and exceedingly rare form.

36. *stilatula* (Allehin). This resembles *rugosum* (35) in many respects, but the fronds are more variable in form and less raggy: some being pocketed, some simple, and others multifid. But the great peculiarity of this form is the almost total absence of scales—so unusual in *Niphophila*. This is so obvious in its formation, that the corrections of the fronds, which are to be developed for several years to come, are visible on the crown. This also was found by Dr. Allehin in Ireland, and is very rare.

37. *perforatum* (W.). This is akin to *rugosum* (35) and *stilatula* (36), in having a pouch-bearing apex. It has a scaly stipes, and the fronds are undulate and irregular when in character, but they are
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occasionally normal. The pocket is fertile. This is likewise of Irish origin; it was found by Dr. Allehin in 1853, and has continued constant.

36. obovata. (W.) The peculiarity of this variety consists in the midvein or radius rarely reaching to the apex of the frond, which is blunt and rounded. It also occasionally divides at the summit. In other respects it is normal. It was found in Sussex by Mr. Wollaston, in 1854, and is only a sub-permanent variety, some of its fronds resembling those of the next variety.

37. variabile. (W.) This, as its name implies, has fronds of various shapes and sizes. It is a vigorous coarse-growing Fern, and constant under cultivation. The fronds are either normal, branched, reniform, or bi-reniform, abrupt, and often partially or wholly unite two forms on one stipe. It is abundantly fertile, and has been found in Guernsey by Dr. Allehin, and Mr. C. Jackson. Another closely allied form, which Mr. Wollaston calls hierocarpus, connects this with the last. In this the stipes generally bears two kidney-shaped lobes; sometimes the fronds are only forked, the divisions crossing at the apex; occasionally they are branched, each branch bearing its reniform lobe or lobes. It has been found in Guernsey, Devonshire, and the Isle of Wight, but hardly can be considered permanent. In some plants found by Mr. Chanter, many of the fronds consisted of two reniform lobes standing so as to give the form of a goblet.

40. polymorpha. (W.) It is certainly only a modification of the same variety, but too unlike it to be left unnoticed. It was found in Sussex by Mr. Wollaston in 1851. The fronds are remarkable for their great breadth compared with their length. They are either normal, multifid, ramose, truncate, or show one or more of these characters combined. Other fronds have a peculiar excurrentness on their margin, as if the old fronds were attempting to throw out new ones. It is fertile, constant, and rare.

41. scilicetam. (M.) A distinct and marked form, with fronds about three inches long and two broad, widest upwards, the midvein not extending to the end, which is blunt and rounded in outline, and deeply cut into several oblong lobes. It was found in Guernsey by Mr. J. James.

42. striatum. (M.) Another of Mr. James's discoveries in Guernsey. The fronds are obliquely streaked with yellowish green on a dark green, giving them a distinct variegation. Another variegated form found in Guernsey by Mr. Jackson, which is streaked with yellowish white, is not constant.

43. crassipes. (W.) is one of the most remarkable instances of virgiparous growth amongst our British Ferns. The plant has never yet attained any other than the most piggy size, and is covered with bulbils both on the frond and stipes. The fronds are most irregular in shape, but chiefly lanceolate. It is a perfectly constant form, and was found in Clare, Ireland, by Dr. Allehin in 1853.

44. spirale. (M.) This was found in Guernsey by Mr. James. The fronds are short, two or three inches long, narrow in proportion, undulate, and twisted in a spiral or coruscating fashion. It promises to be a constant form, several successions of fronds having maintained the same character.

45. cristatum. (M.) A small and very much curled undulately-crisped variety, tapering from the broad base to an attenuated point, which narrowing of the points gives it an aspect different from the usual forms of crispum. It was found by Mr. James in Guernsey, and is very severe and beautiful.

46. cristatum. (W.) This beautiful variety differs from all others in being uniformly barren. It is one of the oldest forms known, and is most justly admired for the elegant frilling of the frond. It attains the full size of the species, and is exquisitely and symmetrically waved or corrugated, and its margin crenate. The basal lobes are unusually developed, and every other character to a great extent. It has been found recently in Yorkshire by Mr. A. Chapman, in Hunts by the Rev. W. H. Hawkes, in Denbighshire by Mr. Frisard, and in Guernsey by Mr. C. Jackson.

47. auriculatum. (W.) The fronds of this form are almost always divided at the point, and faintly streaked with white, giving them a manly appearance. This whiteness seems owing to the disruption of the cuticle from the tissue beneath. The fronds are extremely various in shape, being ramose, or multifid, or both, irregular, undulate, crenate, laciniate, generally slightly auricled, but sometimes, as in squattifolium, producing a barbed auricle, and they are profuse in fructification. They are also very
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Once to send out a midsummer shoot, which is common to all Ferns in a slight degree; but this occasionally produces a young stipitate frond from the apex of the large one, its stipes being thickly clothed with scales as in the lower or parental portion. It was found by Mr. Wallaston in Dorsetshire.

48. undulatum (M.). This is regularly varry-curled like crispus (45), but somewhat less so, and is narrower, and unlike that, fertile. A lobed variation of it, an old garden plant—undulato-lobatum—has been recently found in Sussex by Mr. Wallaston. The typical state of this variety is often confused with crispus, and is a constant plant, not uncommon.

49. multifidum (W.) was found wild in 1853 in private grounds at Chislehurst, Kent, by Mr. Wallaston. The fronds are either simple or multifid, and their margins are irregularly crenate, incisate, and undulate; in some respects it approaches undulatum. It is an unusual form.

50. constrictum (44). A very pretty form, found by Mr. James in Guernsey. It is dwarf, broad, undulate, lobed, and the spines of the lobes are multifid, with the points twisted as in crisposis (59).

51. segitifidum (W.) is remarkable for having the undulated portion of the lower part of the frond elongated and divided, as the back of an arrow, each with a distinct midrib. The plant has a tendency to be multifid both at the apex of the frond and also at the elongated undulate. It was found in Sussex by Mr. Wallaston in 1855, and is a double-class, as the fronds of the former year had the same peculiarity. Others very similar have been found in Ireland by Dr. Allehin, in 1833, in the counties Clare and Kerry. It is the var. segitifidum of Wildman, a dwarf South of Europe plant.

52. crinum (M.). The netted venation is the chief peculiarity of this variety. The fronds are unevenly strap-shaped, sub-multifid, and blotched with white or green, almost amounting to variegation. The margin is entire but meager. It was found in Ireland by Mr. Allehin in 1850, and is unique.

53. linearis (W.) was found by Mr. A. Clapham near Settle, in Yorkshire, in 1856, and, as its name implies, has the fronds so unlike each other that they seem to belong to different plants; some are multifid, subulate; others interrupted and lobate, and some again truncate, obtuse, fan-shaped. It is a vigorous growing form.

54. depressepunctum (W.). A most curious deformity. Instead of fronds, the plant has little else but their midribs, forming subulate points, either simple, bilial, or multifid. And as if insatiate were given it, and that it felt it could not exist without spindles, it throws up, in the course of the season, one or two large digitate fronds. It is a seedling from digitate (65) raised by Mr. Wallaston in 1831.

55. undulato-lobatum (W.) includes all forms from the simply divided apex of the lobatum of authors to those which are more complicated, but in which the lower portion of the frond is normal, and which are neither uniformly affected, nor uniformly permanent. The sub-forms are numerous.

56. forestatum (W.). A very rare variety. Its character consists in the apex of the frond splitting exactly down the midrib, each portion falling back, forming the shape of a bird's claw; these occasionally grow on as in other multifid forms, and divide exactly in the same way over and over again, while the lower portion continues normal.

57. cristatum (Clapham) is closely allied to crispo-galli (58) and also to normalis (63)—to the former, in the plication of the apex, although it is not nearly so much enriquet, and to the latter in general habit and constancy. It also has a curious inclination to produce frilled cups on the under side of the frond on the main rachis, an inch or two from the apex. The frond is normal in its lower parts. It was found by A. Clapham, Esq., near Settle, in Yorkshire, and is rare.

58. crispo-galli (W.) is one of the modifications of multifidum, but differs from it in the apex being a complicated folding rather than a complicated dividing of its parts. The lower portion of the frond is crenato-undulate. It is permanent under cultivation, and produces the same form from its spores.

It was found in Dorsetshire in 1850 by Mr. Wallaston.

59. pleurophyllum (W.). This curious little plant, evidently of the multifid group, is, from its pigmy habit, scarcely to be distinguished as such. The fronds rarely attain a length of four inches, but are more frequently from half an inch to two inches long; the apex of most of them is lunate, exactly in
THE COMMON HARTS-TONGUE FERN.

the shape of a crab’s claw, having the external margin smooth, and the internal crenate or dentate. It was found at Chislehurst, Kent, by Mr. Wollaston, in 1854.

60. *equisetum* (W.). In this variety the apex of the frond is multidentate, as in *equisetum* (57), the lower portion being normal. The fronds are borne either on a single or ramose stipes, and this stipes so rigid or wiry, that it is quite a remarkable feature in the plant. It has a slight tendency, also, to be supra-linear. Mr. Wollaston found it in Sussex in 1854.

61. *lotus* (L.). This is, perhaps, the most remarkable variety yet known; instead of being simply strap-shaped, the fronds may be not infrequently called sub-pinnatisect. "It is short and broad, sub-deltoid, the margin deeply inciso-lobate, the lobes large, crowded, and multidentate at their apex; or sometimes strap-shaped, the margin inciso-lobate, with the lobes narrow, elongate, and tapering to a point; the apex sub-multidentate; the base sometimes hastate." It was first found at Taunton, Somersetshire, by Mr. J. Young, who has raised it many seedlings, bearing more or less the characters of the original. One very similar form has lately been found in Yorkshire, by Mr. Clapham, of Scarborough. It is now a common garden variety, and is sometimes known under the names of *pelatum*, *sercatum*, and *rudolphioides*.

62. *glomeratum* (M.). There is no plane or strap-shaped portion to the frond of this variety, but it divides over and over again in so dense a manner, that a frond of about three inches high forms almost a perfectly globular mass. It was found in Jersey by M. Piquet, and was sent to us by Mr. Jackson.

63. *ramosum* (Ward). This, with the variety *equisetum* (65) and *glomeratum* (62), are the most ramose of all the forms of *Scopium* fenestra. It is multidentate at the apex, at least two hundred fold, in some instances. Each frond consists in a multiplication of all its parts, the stipes starting singly from the cormus, ramifying as the limbs of a tree, and each branch bearing densely and multifidly the frondlets almost ad infinitum. Its early history is not known; but it is mentioned as long ago as Parkinson’s time. Recently, good examples have been found by Mr. G. Jackson in Guernsey, and by the Rev. J. M. Chamber in Devonshire. It is uniformly constant and reproduces itself by its spores.

64. *ramosum magottum* (Clapham). This is quite unlike *ramosum*, being less ramose. Mr. Clapham says that "the peculiarity it possesses is the great thickness of the stipes, which seems to be a combination of two or three ranulae running into one, so that several fronds branch out from the summit of the stipes. The fronds in their outlines and cutting vary much." It originated in the Camellia house of Mr. Clapham, of Settle, Yorkshire, where it accidentally came up in the soil. It is quite constant. In specimens sent by Mr. Clapham, two or three vigorous, almost normal fronds, grew on one stipe.

65. *decipiens* (W.). This variety resembles *ramosum* (63), except that its fronds are flat, that is, all its ramifications and divisions are in one plane, so that the fronds are somewhat hand-sheath. The wonderfully compound ramifications of this variety are shown below only approximately, however, in the fifth, sixth, and seventh series of divisions. It is by no means a common form. The frond from which this table was drawn up, was grown by Mr. Wollaston, and with the living plant, is now in his possession.

66. *lanatus* (Saw). This variety is a modification of the last, from which it was raised, but is permanently unlike it. It has a tendency to be virgata. The fronds are branched as in *decipiens*, but the leafy portions are much degenerated, and frequently little more than the veins remain, giving the appearance of a leaf lacerated or torn into shreds, with the irregularly-jagged margins shrivelled. It was raised from spores by Mr. R. Sims, of Foot’s Cray, Kent, and is rare.
THE SCALE FERN, OR SCALY SPLEENWORT (Ceterach officinarum).

CETERACH, Willdenow.

Clusters of Spore-cases oblong or linear oblong, borne on the anterior side of the veins (except the lowest, which is posterior), at first hidden amongst densely imbricated cladodes. Indusium obsolete. Teeth forked or pinnate; veins分歧 arising near the margin, the lowest posterior one scirriforms on the side next theradius; the ultimate venetiae free.

C. OFFICINARUM: veins coriaceous, narrow lanceolate, sinuate-pinnatifid, often pinnate below; segments oblong obtuse, entire or subentire-pinnatifid.


C. APTENOMIUM, Hooker, Order Ascendita, vol. 1, 12. 1837.


EXPLANATION OF THE PLATE.


GEODEUTIC DISTRIBUTION. — We do not find the Scale Fern on either side with this herb, but it enters throughout the states and south of Europe, as France, Switzerland, Italy, Germany, Spain, Portugal, Greece, etc. In Asia, it is found on the hill-sides of the Himalayas, in the Caspian and Turkestan, at Fersenschte, and in North-West India, in Afghanistan and Tibet (Kunlun). It is found in Algeria, and in Western, the Azores, and the Cape of Good Hope. According to Curtis it is also found in Brazil. The Geodeutes species of feminists, Climatic constituents of Willdenow, a plant much larger in the parts than the largest forms of our English plant, is probably distinct as a species. In some specimens of this latter we have seen what appeared to be a true indusium

THE SCALE FERN.

closely-furnished scales; linear-lanceolate, deeply pinnatifid, often pinnate below. Lobes oblong, obtuse, sessile and adnate by their whole base when distinct, more usually dilated on both sides and connected at the base, margined with projecting scales of the under surface.

Fructification indistinct from the thick texture of the frond, consisting of a sinuous midrib, entering the lobe from near the lower angle, and giving off, close to the base on its anterior side, a vein which is several times forked; the rest of the veins are alternate and two or three times forked. Beyond the second fork the branches or veins anastomose and form two or three series of small sori near the margin, the ultimate marginal veins being sometimes free, sometimes united.

Fructification produced over the whole under surface. Sori linear oblong, borne on the anterior side of the anterior veins, above the first fork, except in the case of the lowest anterior vein, which is frequently bifurcated, one sori being as usual on the anterior side of its anterior venule, the other on the posterior side of its posterior venule; they are at first hidden by the dense covering of scales, which eventually they burst through. Indusium obsolete; described as an erect white membranous ridge. Spore-cases roundish obovate. Spores roundish or somewhat oblong, muricate.

Borbonia. The caudex is perennial. The fronds are persistent, new ones appearing in May.

Among British Ferns this plant is at once recognised by its tufted sinuate-pinnatifid fronds, inserted with a close covering of tufty scales beneath. The correct generic position of the plant is not so satisfactorily or readily settled, neither the degree of relationship it bears to a larger though closely analagous plant found in Teneriffe and the Canaries. Its sori are said to have a narrow indusium behind them, and the spore-cases grow from the anterior side of the vein, and hence it has been, and probably correctly, considered to belong to the Asplenium, with which the reticulation of its scales is in accordance. We have never found this British plant, though we believe we have in that of the Canary isles, an undoubted indusium, but the dense clothing of scales seems a sufficient explanation of the obsolete condition of this organ; which is probably represented by a raised line or ridge which occurs behind the line of spore-cases. As to the distinctness of the Canary Island plant it must be admitted that it presents only differences of degree, but it is not unfrequently twice the length and three times the breadth of the largest specimen of true C. effusum, and even its smaller examples of the same length as large English fronds are twice their breadth, and consequently of a different outline. If a variety only, it is a gigantic one.

It grows with tolerable freedom in rough porous soil, which should consist of sandy loam, and should contain a considerable amount of fragments of limestone or old mortar; and it must be kept rather dry than otherwise, and in a well-drained place. Some of our correspondents recommend the use of old cow-manure, and altogether more liberal treatment, but in that case more than ordinary caution is necessary not to overwater it.

This species does not vary much except in size. There are, however, one or two forms found in some situations, which may be considered as slight varieties, namely:

1. effusum (M.). This has the margins of the lobes distinctly crenato-sinuate, and is usually larger than the common form. It is not with occasionally in various localities, occurring probably under certain conditions which favour luxuriant growth, and hence not constant when indifferently cultivated.

2. multiflora (W.) is a non-permanent unfrequent form, differing from the normal only in the divided apex of the frond.

3. depuratum (W.). Of this several varieties have been met with, chiefly in Ireland, where it was found by Dr. Allomn. The most remarkable of the forms was found by Lieut.-Col. Buchanan at Kilkenny. The fronds are irregularly sinuate-pinnatifid, some bifurcate at the apex, some tapering to an acuminate point, and others entire: the segments very much depurated, occasionally almost wanting, in which case the fronds present the appearance of a sinuarily winged rachis. It is probably constant; and is now cultivated by Mr. Wollaston.
Plate XLIII. B.

The Small-Leaved Gymnogram
(Gymnogramma Leptophylla).

Gymnogramma, Donn. 

Clusters of Square-casts, without covers, forming elongated forked lines on the back of the veins, medially superficial, often becoming at length, effuse and confluent. 

Veins diminished at their extremities, forked or pinnate.

G. leptophylla: fronds oblong ovate, bi-tri-pinnate, glabrous, fragile, pinnules or pinnulelets ovato-cuneate, usually three-lobed, the lobes blunt and bifidate.

EXPLANATION OF THE PLATE.

Plate XLIII. B. — Gymnogramma leptophylla: 1, from Jenny; E. B. Ward; 2, from Jenny; subspicata; G. Zedek; A, from Malipoa; B, P. Fumee.

HABITAT.—The habitat which brings the Small-Leaved Gymnogram into our lot of Jenny,—in fact, the island of Jenny—is rather peculiar than geographically British. In that inland situation is several previously described, principally in the neighborhood of the liquid ammonia, St. Anselme, and St. Eudes. Mr. Ward, who visited the locality in 1896, and in whom we are indebted for specific information, says that the plant is found with a well-developed root, protected from the sun by the surrounding vegetation which shields the leaves and fed by the constant supply of water which seeps into the soil from the neighboring mountains. It was in 1802 reported in the Flora Hiberniae to have been found "in a moist light on the high road leading from Emmona to Relanye," in Shropshire, but as no further evidence of its existence there has been forthcoming, and the plant seems too far north for a tender Pinn, the report has probably originated in some accidental error.

Geographical Distribution.—This delicate species is remarkable as occurring, on the whole, in Europe, & ranges from Jenny, Pozzou, and Switzerland, the northern limits, Lie de Germany, extending to Spain, France, and Ireland; in the sub-tropics and subtropical, as the case may be. In the south, it is found in India, at Madras and the Neighborhood Mountains (N. Tupper), and in the island of Kaur in the Pacific G.R.; in Africa, it occurs in Algiers, Marseilles, Alexandria, and in the Atlantic Ocean; in the northern hemisphere, and at the Cape of Good Hope, in the southern (N. F. Wedd.). In America, it is found in Mexico and Vera Cruz. In Australia, it is found in Victoria and the South Island, and in Tasmania and New Zealand (J. B. Hooker).

Caulis small, subglobosa, with a few scattered fine hair-scales in the younger stages. Pilaeus short, brown, pilose.

Stipes as long as, or sometimes longer than, the fronds, smooth and shining, dark chestnut-brown, pale yellowish green, very slightly hairy when young, quite smooth afterwards. The first frond developed from the prothyllis or marchantiform scale, is small, about half an inch long, subelliptic, three-lobed, each of the segments again dichotomously lobed, the lobes blunt and bifid. The next frond acquires an oblong ovate outline, and the three lobes are so far separated as to form three pinnate, which
are divided on the same dichotomous plan as the former; in one such example now before us, which is five-eighths of an inch long, the fronds are each twice dichotomously lobed, and each ultimate lobe has its sides nearly parallel, and its apex blunt and two-cleft. Two or three fronds of this planate character, each successive one larger and more divided than the preceding and all broader and more leafy in character than the subsequent ones, are produced during the adolescent state of the plant. After this stage has been passed, the fronds acquire height and become more compoundly divided; and in two, three, or four stages, according to the vigour of the individual plant, reach to their full development. The intermediate fronds are from one-and-a-half inch to three inches high, and are distinctly bipinnate, and generally fertile. The fully developed fronds are from three to six or eight inches high, and grow erect. These mature fronds are oblong, ovate, bi- or tripinnate, and fertile throughout. Pinnules ovoide-cuneate, about three-lobe, the lobes oblate, and notched at the apex. The fronds are scarcely stalked, their base tapering down to a narrow and slightly recurved attachment. Specimens of vigorous growth become tripinnate, by the more complete separation of the lobes of the pinnules.

Formation of the ordinary pinnules consisting of a vein which forms by dichotomy a branch at the base of each lobe; this vein becomes again branched in the same dichotomous manner near the centre of the lobe, its two venules being directed, one towards each of the two apical teeth, and terminating within the margin. Occasionally the lobe is not toothed, and the vein is simple.

Ferticilisation occupying the whole back of the frond, without indusium. Seri linear, forked, occupying nearly the entire length of the venules and a portion of the vein below the dichotomy, hence forked, that is, diverging in two lines from near the base of the frond along the narrow lobes nearly to their apex, at first distinct, but eventually becoming confluent into one mass. When the vein is simple the spore is simply linear. Spores ovate nearly globose, Spores roundish or blunter triangular, faintly striato-punctate, dark brown-purple.

Dissection. The rhizome is annual, and the development of the plant consequently rapid. In Jersey we learn that the prothallus is developed in the deep into autumnal months being perfectly formed in November. By January three or four fronds have been produced; in April or May the growth is mature; by August the plants have perished. Sometimes in cultivation the fronds are not produced till the second year.

This Fern clearly belongs to the genus Gymnosporangium, which is distinguished from Dryopteris by the greater length, and more or less frequently forked condition of the sor. This group itself not too distinct however from Dryopteris, some modern botanists have desired to divide into several genera, one of which, Astegopteris, was proposed expressly for this species by Link. Beyond the marks of habit and aspect, however, there is nothing to separate generally any of the free-veined Gymnosporangium, and such marks alone are insufficent.

No other British Fern approaches at all nearly to the Small-leaved Gymnoogram, either in aspect, or in botanical characters.

Its succeeds with very little care from the cultivator, and like its West Indian ally, Gymnosporangium chrysocephalum, scatters its spores, and becomes, as it were, a weed, in congenial situations. Any light sandy soil suits it. That in which it grows naturally in Jersey, and of which Mr. Ward kindly gave me a portion richly furnished with its spores, is a sandy loam; and scattered on the surface of a flower-pot, this yielded an abundant crop of plants. The young plants like shade, moisture, and a temperate climate, which conditions will ensure their successful growth. Propagation must either be trusted to the natural scattering of the spores, or a frond or two just arrived at maturity should be preserved and the spores deposited towards autumn in the situations where plants are required. We learn from several cultivators, who have grown the plant in cold situations, that the development has not gone beyond the production of the prothallus until the second year. Our plants have been strictly annual.
B. SPICANT; fronds dissimilar, linear-lanceolate; the lower, erect, pinnatifid, often pinnate below, with oblong linear flat leaves; the fertile criss-cross, pinnate, with linear acute contracted pinnules having reflexed margins.

EXPLANATION—The Common Hard Fern (Blechnum Spicant).

Clusters of sporangia forming a continuous narrow line on the inner side of a series of transverse anastomosing veins, near to and parallel with the midrib, furnished with a membranous cover. Indusium, continuous, opening on the inner side. Fronds forked from a central costa; receptacles distinct to their apices in the barren fronds, united by the transverse or longitudinal receptacle in the fertile.

PLATE XLIII c.

THE COMMON HARD FERN (Blechnum Spicant).

Blechnum, Linnius.

Clusters of sporangia forming a continuous narrow line on the inner side of a series of transverse anastomosing veins, near to and parallel with the midrib, furnished with a membranous cover. Indusium, continuous, opening on the inner side. Fronds forked from a central costa; receptacles distinct to their apices in the barren fronds, united by the transverse or longitudinal receptacle in the fertile.

B. SPICANT; fronds dissimilar, linear-lanceolate; the lower, erect, pinnatifid, often pinnate below, with oblong linear flat leaves; the fertile criss-cross, pinnate, with linear acute contracted pinnules having reflexed margins.

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Blechnum, Linnius.

Clusters of sporangia forming a continuous narrow line on the inner side of a series of transverse anastomosing veins, near to and parallel with the midrib, furnished with a membranous cover. Indusium, continuous, opening on the inner side. Fronds forked from a central costa; receptacles distinct to their apices in the barren fronds, united by the transverse or longitudinal receptacle in the fertile.

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THE COMMON HARD FERN.

brown; terminal and adherent to the caudex; and, as well as the rachis, channelled in front, rounded and prominent behind. The fertile fronds have a longer dark-coloured stipe, of from five to ten inches long, and the rachis is more distinctly purple.

*Veratrum circinatum.*

**Fronds** (the barren ones) averaging about a foot, but varying from six to eighteen inches in length, one or two inches in breadth, dark green, spreading or prostrate, linear lanceolate, pectinately-pinnatifid. **Lobes** linear-oblong, that, somewhat falcately curving in an upward direction, diminishing below; the lower ones, small, rounded, the upper confluent into a lanceolate point, dilated and continuous at their base, blunt or acute at their apex, the margins entire, or rarely, when very vigorous, obscurely lobed. **Fertile fronds** of the same form, taller,—one to two feet high.—**Plants** below, growing from the centre of the crown. **Pinnas** and **segments** linear acute, contracted to about half the width of the barren segments, the lower ones distant, the upper more contiguous, and then dilated and confluent at the base. Intermediate fronds, sparingly fertile and not contracted, are sometimes produced.

**Projection** on the back of the barren fronds distinct, that of the lobes consisting of a stout midrib, producing once or twice-forked rosettes, the rosette terminating within the margin in a small transparent club-shaped head. The venation of the fertile fronds is altered in consequence of their contracted nature, and consists of a series of veins, seldom having space to become forked, but becoming lost in the continuous longitudinal sporangiferous receptacle which runs parallel with and near to the midrib. In the less contracted fertile fronds, the veins are continued towards the margin exterior to the receptacle.

**Fruitation** on the back of the fertile fronds and occupying nearly the whole under surface. **Spur** indusiate, linear, extending on each side the midrib, the whole length of the narrow plano, over which they soon become confluent. **Receptacle** continuous, longitudinal. **Indusia** a narrow linear warie membrane attached along the exterior side of the receptacle, within the margin of the frond, but sometimes from the excessive contraction of the plano almost marginal. **Spore-case** nearly globose, **Spores** roundish oblong or ovate, slightly angular and punctate.

**Duration.** The caudex is perennial, the plant is evergreen, the old fronds continuing through winter, and young ones springing up about May.

This is a very elegant and distinct-looking Fern, and on that account, no less than for its evergreen character, it deserves to be more frequently cultivated. Its long narrow pectinately divided fronds, the barren and fertile growing separate, afford easy marks of recognition.

There exists a difference of opinion among botanists as to the generic position of this plant, some referring it to *Lomaria,* while others retain it in *Blackston* the differences between these genera are merely those of degree, both having continuous longitudinal spores; those in *Lomaria* are marginal, and in *Blackston* are placed near the midrib. In this instance, the contraction of the frond brings the otherwise costal veins very near to the margin, but as there is usually, and often very distinctly, a space exterior to it, the plant seems to accord best with the structure of *Blackston,* in which we continue to place it, notwithstanding the *Lomaria-like* contraction of the fertile fronds.

In cultivation, it prospers in a northern exposure, abundant moisture, and a somewhat retentive soil. It is a very ornamental plant for rockwork where those conditions can be fulfilled, but does not so well as others bear the confinement of pot or house culture. It is increased by division. In transplanting, the roots should be carefully preserved, with a good mass of soil.

There are many forms aberrant from the type of the species; these are enumerated below, chiefly in Mr. Wollaston's notes—

1. *Lomaria* (W.). This is the least divided form of the species, bearing much resemblance to *Lomaria* Patersoni, and is perhaps the most striking of all the varieties. It is as if the plant was in process of formation. Generally the fronds are entire and strap-shaped, from the apex downwards for one-third or even half their length, while the remainder is obtusely lobate or distinctly

crenated.

2. *Lomaria.* This is divided in appearance, but not to the extent of *Lomaria* Patersoni.

3. *Lomaria.* This is divided in appearance, but not to the extent of *Lomaria* Patersoni.

4. *Lomaria.* This is divided in appearance, but not to the extent of *Lomaria* Patersoni.

5. *Lomaria.* This is divided in appearance, but not to the extent of *Lomaria* Patersoni.

6. *Lomaria.* This is divided in appearance, but not to the extent of *Lomaria* Patersoni.

7. *Lomaria.* This is divided in appearance, but not to the extent of *Lomaria* Patersoni.

8. *Lomaria.* This is divided in appearance, but not to the extent of *Lomaria* Patersoni.
THE COMMON HARD PERN.

crete; and in no instance are the lobes of the fronds fully developed. They vary in width from one-eighth to one-half of an inch, but are usually about a quarter of an inch wide, diminishing slightly downwards, and rarely attaining a length of eight inches. The fertile fronds resemble the barren in development, but are still more curly, having occasionally only a few imperfect lobes about an eighth of an inch in length, and the rest of the sort borne on a narrow wing or membrane bordering the rachis, the whole width being under one-eighth of an inch. They vary, however, from this to a fuller development of rather more than half an inch wide, with more frequent lobes, and with fronds about eleven inches long. There are also produced fronds which are intermediate between the barren and fertile. It was found near Tunbridge Wells, Kent, in 1853, by Mr. Wollaston, and is at present a unique and constant form.

2. Interpapillaries (W.). This form is probably the first step from the normal form towards the variety strictum, bearing two sorts of fronds, either separately or commingled. Some fronds are of the usual character; others have the segments more or less altered, becoming either narrowed and inciso-dentate, or shortened to a semicircular outline, with the margin inciso-dentate; and this in an unequal and irregular manner, though frequently portions of the fronds, sometimes entire fronds, bear the shortened segments, and are consequently linear in outline. As in many other varieties of this monstrous character, the plants, though not producing all the fronds affected, always bear affected fronds, and it is altogether a curious, constant, and rare variety. It was found in 1853, near Tunbridge Wells, Kent, by Mr. Wollaston.

3. Strictum (Francis). This variety, described by Mr. Francis, from Westmorland fronds communicated by Miss Beevers, has been found more recently by Dr. Allchin, in Ireland; and again, by Mr. F. Clowes, near Blean Holme, Windermere. The fronds are pinnatifid, the lobes being unsymmetrically and bluntly toothed, ovate, incisate, depapillate, and rarely bifurcate; the lower lobes resembling the upper valve of a small shell of the genus Areca. The fertile fronds are unknown. It is a permanent and graceful form, and very rare.

4. Interpapillaries (W.). This combines the peculiarities of several of the varieties before enumerated, and is very variable in its growth, but differs from all in having some fronds more, others normal but depressed, and others having the segments more or less altered, becoming either narrowed and inciso-dentate, or saliva, or shortened to a semicircular outline, with the margin inciso-dentate; and this in an unequal and irregular manner, though frequently portions of the fronds, sometimes entire fronds, bear the shortened segments, and are consequently linear in outline. As in many other varieties of this monstrous character, the plants, though not producing all the fronds affected, always bear affected fronds, and it is altogether a curious, constant, and rare variety. It was found in 1853, near Tunbridge Wells, Kent, by Mr. Wollaston, and is a permanent and unique variety.

5. Serratum (W.). This form may have been originally caused by great luxuriance of growth, and excessive moisture, but it has proved constant more or less since 1853, when it was found by Mr. Wollaston in a boggy ditch near Tunbridge Wells, Kent. The fertile fronds, nearly oval in outline, are about four and a half inches wide, and eighteen inches long; their lobes are sharply serrated, and one or more of the apical lobes start off nearly right angle, forming other soft fronds. The barren fronds are deeply serrated and frequently bifurcate; the semi-barren fronds are normal, without serratures.

6. Multifidum (W.). The normal form, which occasionally (but not uniformly nor symmetrically) divides once or more at the apex. It is not constant under cultivation, but is of frequent occurrence, in damp shady places.

7. Bifidum (W.). This is a further development of multifidum, caused by excessive shade and moisture. In this the apex is more frequently multifid, and rather criped; and the lobes, both of the fertile and barren fronds, are sometimes affected, but not uniformly, in the same way. It is a sub-permanent form and not uncommon.

8. Fissurae (M.). The peculiarity of this form is, that the apex of the rhachis is, as it were, split down a few inches, both sides of the resulting branches bearing lobes, but those on the inner sides
THE COMMON HARD FERN.

ramifiory, or very much smaller than those of the outer sides. The apices are sometimes somewhat multilid. It was found near Tunbridge Wells, and is not unfrequent, and tolerably constant. The appearance produced by the inequality of development in the lobes, is similar to that of some kinds of Giraldimesia.

9. crisipes (W.). This is a permanent form, in which the apices of all the fronds are multifidly-cripped, and the lobes are wavy or curled, but very rarely divided. It has been found in Ireland, by Dr. Kinahan, and near Tunbridge Wells, Kent, in 1853, by Mr. Wollaston, and is not a common form.

10. trinervis (W.). This variety in its most marked character is no more than a trilobated Bolemena, but it not unfrequently sends up fronds more or less multilid and crispus, with the lobes bifurcate. It is exceedingly rare, and was found in Ireland, in 1854, by Dr. Kinahan, by whom the plants were sent to Mr. Wollaston.

11. crisilobus (W.). This constant form, so unlike ramulosis, is, nevertheless, a beautiful connecting link between it and crisipes. Its peculiarities consist in a development, as it were, of the blunt apical lobes of crisipes into branchlets, differing in that respect from the compound ramifications of ramulosis. Its basal lobes are frequently elongated and serrated, and the whole plant is very prone to throw up semi-fertile fronds, the lobes of which are sometimes bifid, and sharply serrated. It was found in 1853, near Tunbridge Wells, by Mr. Wollaston.

12. ramosus (Kinahan). This is exactly analogous to Scolopendrium vulgare, var. ramosum. The rachis (very rarely the stipes) both of the fertile and barren fronds divides dichotomiously into branches and branchlets, the apices of which are beautifully curled or tufted. The variety is very rare, and, as far as we know, has only been found near Upper Lough Breagh, Wicklow, Ireland, by Dr. Kinahan; near Erife, Mayo, Ireland, by Captain Eden; and by Mr. J. Holland, at Windermere, Westmorland, the plants slightly differing. It is rather a shy-growing variety.

13. multifurcatum (M.). This is a handsome and vigorous variety, very irregular in its form, but quite constant to its peculiarities. These consist, first, in the occasional branching of the fronds once or twice near the base, and secondly in the apices of the fronds not so divided, as well as the branches of the others, being many times forked near the apex. The segments resulting from these apical furcations are most irregular in form, but they spread out, and are each of them extended into a lengthened acute point, of which the margins are irregularly notched, producing a somewhat ragged appearance. It was found in 1853, in a hedge-bank near Penryn, Cornwall, by Mr. F. Symons, and was communicated to us by Mr. G. Dawson.
THE COMMON BRAKES, OR BRACKEN
(Pteris aquilina).

PTERIS, Linnaeus.

Clusters of stalks arise marginal, continuous, covered by the reflexed margins of the fronds, which become attenuated into a continuous membranous indusium, opening on the lower side. Stems forked, or from a distinct midrib; spores (borne) classified, or (fertile) combined at their apices by the continuous receptacle.

P. aquilina: fronds oblongate or tripinnate, polycarpic beneath; primary pinnule in pairs; ultimate division (pinnule) sessile, the terminal one longer; rhizome creeping, subterraneous.

EXPLANATION OF THE PLATE.

HABITAT.—The Bracken is the most abundant of our wild Ferns, occurring in woods, hedgerows, and waste places, but apparently growing in rocky soil. It is spread over the chief countries from Cornwall to the Hebrides, and is plentiful in Ireland and the Channel Isles, increasing in the south-west, and reaching an elevation of nearly 2000 feet in the Highlands of Scotland. When growing exposed, it is a hardy grazing plant, but when in the most irremovable state, it is extremely hardy; and certain parts of our British species, except this, are capable of producing the same effect which we have witnessed in its associate Ferns, either in the first or last, quickly making out from among the branches which it has stirred a deep circle in the heart of the morass.

GEOLOGICAL DISTRIBUTION.—This is a common Fern in Europe, so it appears to be also in most other parts of the world, except in some species of the species. In Asia, it is found in China (S. Linné); in India and Ceylon, in South America, in the region of Lake Balb, the Atal and the (in the Cowper); all over India, in Persia, Borneo, and the Philippines; in the Mariana and Borneo (V. L. H.); in Africa it occurs at the Cape of Good Hope; in Sierra Leone (E. L.); Madagascar and New Zealand (L. H.); in Algiers, Persia, and Malaya. In America it has been found in California, in Guatemala, and North-West Mexico; in Venezuela (nowhere); in the Solomon Islands (the parts midway—J. Hill); and in several parts of North America. The Pteris aquilina of Korea, under which Agardt includes
THE COMMON BRAKES.

_F. reptans_ of Treliseburg is not distinguishable from _F. reptans_ by the appearance of segments and the median base of the rachis as which Agassiz departs, for we find both these peculiarities in British specimens gathered by ourselves at Harpenden, and in others from Wicklow, communicated by Mr. E. Huxley. The thickness of the surface and of the median base about the only difference it possesses to the median and important is minute to be much depended on; besides this, the numerous small serrations on the segments distinct, which is said to be the distinguishing mark of _spinosus_. Hence we are unable to separate _F. reptans_ even as a variety, though its fronds are, we think, analogous to those undescribed British sub-forms called _spinosus_. In this morning, the _F. reptans_ of Wicklow, under which is included the _F. reptans_ and _F. reptans_ of Yedworth, and the _F. reptans_ of Linn, afford no distinguishing characters, but again arrests with the major fragmentary, while the _F. reptans_ of Grindelwald appears to have a form of _spinosus_ with smaller parts, perhaps distinguishable as a variety. The _F. reptans_ of the West Indies and the Southern United States, with long narrow-based divisions, is a finely marked variety; as also is, we think the broader-ribbed North and West American forms, found also in New Zealand (the _F. reptans_ of Douro), figured by Schultes under the name of _spinosus_. The _F. reptans_ of Australia presents an appreciable difference in its triangular lobes, and might probably be a local district, including as varieties the _F. reptans_ of Brazil, and other parts of South America, and the _F. reptans_ of South, and other parts of South America, and the _F. reptans_ of South, and other parts of South America.

**Basion** as thick as one's little finger, subterraneous, creeping, black and somewhat velvety externally, white succulent and starry within. **Fronds** branched, downy.

**Stipes** lateral and distinct on the rachis and adherent to it; spindly-shaped, black and velvety at the base, i. e. beneath the surface; above yellowish green, pubescent when young, afterwards smooth, but sharply angular when mature, and about or rather over half the length of the frond; a transverse section shows the ends of the vascular bundles arranged so as to present a faithful resemblance to the imperial eagle, whence the specific name. **Rachis** channelled above the rounded, sometimes slightly angular.

**Foliation** continues; the rhizis is in an early stage bent down abruptly close against the stipes.

**Fronds** variable in size, outline and composition, deep green. In poor soils they vary from six to twelve inches in height, and in more favourable localities they range from three or four to eight or ten feet or more in height; in the former cases the outline is nearly triangular, and from the lower pair of branches only being well developed, they appear three-branched; in the latter cases they are more elongated, or oblong, and the growth consists of a series of branches in pairs, successively developed. In composition the smaller are bipinnate, the larger fronds tripinnate. **Pinnae or branches** ovate or oblong-ovate, opposite, often distant. **Pinnules** or **secondary pinnules** narrower lanceolate or narrowing from a broad base, opposite or alternate, contiguous, bluish or sometimes caduce. **Pinnules** sessile, or in some, oblong and adnate by their whole breadth, or more ovate pinnatifid, and then with a narrower attachment, blunt at the apex, smooth above, hairy beneath; the pinnatifid ones with blunt linear oblong or shorter triangular lobes.

**Foliation** of the more entire pinnate, consisting of forked veins, more or less spreading from a stoutish midrib; these veins are one, two, or three times forked, the _rachis_ extending to the margin. In the pinnatifid pinnate the veins become secondary to the midrib, and give off a series of once or twice forked veins; in these latter the lower branches right and left of the secondary midrib frequently meet and unite forming a series of costal areoles. Along the edges of the for the pinnulas extends a longitudinal submarginal vein, which becomes the receptacle.

**Fructification** abundant on the back of the fronds, sub-marginal. **Sori** linear, continuous, the receptacular vein occupying nearly the margin of the pinnulas, and lying as it were in the wall of the indusium. **Indusia** linear, continuous, consisting of a thin whitish fringed membrane growing from the outer edge of the receptacle, and folded inwards over the spore-cases; beneath the spore-cases and growing from the inner edge of the receptacle is another similar fringed membrane; the fringes consist of small jointed hairs. **Spore-cases** roundish obvate. **Sporas** round oblong or angular, mucronate.

**Duration.** The rhizome is perennial. The fronds are annual, growing up early in May, but very impatient of cold or frosts, and killed by the early frosts of autumn.

A common and well-known Fern, but also easily recognised technically among British Ferns, by the continuous lines of marginal sori, on compound fronds, not contracted. Like all other widely diffused
THE COMMON BRAKES.

species it is subject to variations of outline and division, as well as of venation; but the variations are of little importance. The nature of the membrane which is found lying beneath the sporae at least in the fully fructified fronds, has not been well explained. It would indeed seem that the lines of spore-case lies between two unequal membranes naturally projected outwards from the marginal receptacle (the fructification having so far some resemblance to that of Lindsley), the resolution of the margin however, actually bringing the smaller of these membranes beneath, whilst the other lies over the spore-case as a cover. This latter must be regarded as the true indusium, whilst the former is probably of the nature of an accessory indusium.

The Brakes is not an ornamental plant, in the usual sense of the expression; indeed, in pots or in small collecting, it is rather weedy than ornamental. Nevertheless there are situations in which it may be cultivated with advantage. Thus, for example, it may be grown for ornament about the margins of that class of plantations which skirt approach roads or screen unsightly objects; and it may also be used with advantage for the purpose of affording shelter, or cover in the more open plantations of parks and paddocks. There has been an impression that the Pteris is difficult to transplant successfully; this impression may, with probability, be traced to a statement, long since made, by Sir J. R. Smith, to this effect. If, however, the subterraneous horizontal rhizome is dug up in winter, without injury, and planted with ordinary care, there is little risk of failure. The plant is not at all particular as to soil, except that it seems to avoid chalk, though no doubt a deep sandy loam is most congenial to it.

There are few varieties of the Brakes as yet discovered; these few are as follow:—

1. crenata (M). The peculiarity of this form consists in the comparative entirety of the secondary pinnules (pinnulets); these, instead of being mostly and deeply pinnatid, are nearly all quite entire, or here and there only one or two of the basal ones are slightly crenato-bolate. It is not uncommon, and probably merges into the pinnatifid form, but many plants and patches of plants are found possessing this peculiarity in a striking degree. There is also a young form of this variety in which the primary pinnules are deltoid, and the pinnules of the secondary plane sessile, very broad, and regularly crenate, having something of the appearance of Lycopodium cornutum. It is not uncommon in shady woods.

2. cirrosum (W). There are two forms of this variety, the dichotomous of both corresponding with the normal growth of the species, but are occasionally pinnatifid. One has the margins of the pinnules entire undulate and reflexed, as in Athyrium filix-femina subterraneum; the other has them crenate and curvately waved, as in Athyrium filix-femina crenatum cirrosum. It is not an uncommon, but a local variety.

3. multifidus (W). This, in its best condition, is a rather unusual form of the plant, and like many other varieties bearing this name, is only sub-permanent; with this exception it is analogous to the Athyrium filix-femina multifidum. There are two sub-varieties of it: one, in which the apex of the frond and the apex of most of the primary pinnules are multifidly-crisped; the other in which the apex of the frond and of the primary pinnules are merely pinnatifid, but the apex of the secondary pinnules (pinnulets) and many of the pinnules are affected instead. Many localities produce one or other of these forms; the most marked of the former are from near Childerhurst, Kent, and of the latter from near Ottery St. Mary, Devon, both found by Mr. Wallaston. We have also received the former from Devon from the Rev. J. M. Chantler, and from Guernsey gathered by Miss Wilkinson and Mr. G. Jackson; and the last-named has been found by Mr. S. O. Gray in Colham Park, Kent, and also by Mr. Chantler in Devonshire.

4. depauperata (W). This Mr. Wallaston describes as a most curiously depauperated form of the last, but non-permanent as regards this state, and only sub-permanent as regards its multifid state, nevertheless deserving of record. The divisions of the frond correspond with those of multifidus, but the pinnules (or rather the crenate lobes) of the multifid apex of the primary pinnules, and the lobes of the secondary pinnules are all decurrent, depauperated, attenuated and occasionally interrupted. It has been found in two woods near Childerhurst, Kent, by Mr. Wallaston, and at Bowness, in Cumberland, by Mr. Wood.
THE COMMON MAIDENHAIR FERN
(Adiantum Capillus-Veneris).

ADIANUM. Linnaeus.

Clusters of sori-cases transverse, marginal, linear-oblong or roundish, situated on the under surface of the reflexed fronds, the sori therefore complicate. Indusia of the same form, membranaceous, traversed by the receptacular veins, and bearing the sori-cases on the under surface. Veins radiately forked; veins distichous at their apices.

A. CAPILLUS-VERERIS: finely bipinnate or tripinnate; pinnae alternate, glabrous, membranaceous, obliquely and broadly wedge-shaped, or roundish, with a truncate base, attached by capillary stalks, the superior margin lobed, the sterile lobes dentate, the fertile obtuse or truncate; sori transversely oval, often occupying the whole width of the lobes; stripes and rachis closely black, glossy, quite smooth.

EXPLANATION OF THE PLATE.


HABITAT.—This Fern is a native of Europe, being found on some parts of our coast, in moorland, and in the forests of rocks where the moors are studded with moss; generally growing on the heath, as found in Cornwall, Devon, and Dorset; in Chubun and some adjacent lands, and in the Isle of Man, which is its northern certified limit. It has been found in Switzerland in the Aventines, in the Alps of Savoy, in Corsica, and in the mountains of Spain, but is very rare there; however, it grows abundantly in England, in the counties of Stafford, Shropshire, and Derby; and in Ireland, it is found in Argyle and Ayrshire. In the latter country, Mr. D. Harrison informs us that he found it, in 1817, on rocks near the sea, southeast of Ruchesness, which exactly agrees with the original published notice in the society, nearly the limits of the County. It is not in fact, but is apparently rare, in Ireland.

GEOMORPHICAL DISTRIBUTION.—The Common Maidenhair is found dispersed over the middle and south of Europe. In Asia, it occurs throughout India, chiefly in deep valley districts, e.g. Madras, Ava, Nepal, Sikkim, Shansi, Shensi, Honan, Amur, Allen's Handkerchief, Kishin, Tibet, Mongolia, Afghanistan, etc.; in China and Korea; in Japan; and in the Caspian and the Turlum provinces of Siberia (Khabarov). In Africa, it is found in Malabar and in Egypt, in Tangier, Morocco, the Canaries, the Azores, and the Cape of Good Hope and the Monomotapa of Angola (Lalley). In the tropical parts of South America, it is found in Georgia, California, Texas, Mexico, Guiana; and as far south as Brazil, and on the West India Islands, the South Indian Islands, the River Plate Islands, the Bay of Bengal, the Eastern, and the Sandwich Islands, New Zealand, and America in the New Hebrides (Johnson). These islands, those of the New World especially, include several varieties of a deeply-pinnate form, which is in most marked contrast in the case of Mexico. The W. Indies. The A. Capillus of Brazil abounds, probably at least, occasionally a variety.

Rhihose slowly creeping, as thick as a small quill, densely scale. Sori dark brown, narrow lanceolate, membranous, acutely venose. Fertile wily, branched, shaggy.
THE COMMON MAIDENHAIR FERN.

Slips lateral, adherent to the rhizome, and as well as the cordia, slender, blackish purple, smooth, shining; with a few scattered scales near the base; about as long as the fronds.

*Pteridium* circinate.

**Fronds.** Usually ovate or triangular, sometimes oblong or lanceolate, membranaceous, glabrous, bright green, drooping; from six to twelve, sometimes eighteen inches in length, bipinnate or tripinnate. Pinnate and Pinnule alternate, the latter of various forms: roundish with the base truncate, subrhomboidal, or oblong fan-shaped, but generally more or less cuneate at the base, attached by short capillary stalks; the posterior margins entire, the superior lobate; the sterile lobes dentate or cuneo-dentate, the fertile oblate or truncate, the apex often occupying their entire width.

**Venation** of the pinnules consisting of a series of dichotomous ramifications of the vascular bundles of the petioles; the first function forming the extreme base of the pinnule, and the same becoming again and again forked in a faceltato-radiate manner, until the whole pinnule is traversed by a series of contiguous and therefore nearly parallel veins, which are dissected at their apices. In the sterile portions, one of these veins is directed to each marginal tooth; in the apex, which it terminates. In the fertile portions, the veins extend to the margin, and are there continued nearly across the indusium, there forming the receptacles.

**Fructification** on the back of the fronds, generally distributed. Sori oblong, more or less lengthened according to the width of the lobe; on which they are borne, seated on the under surface of the indusium, borne on the spines of all the lobes into which the anterior margin of the pinnules is divided. Indusia of the same form, consisting as it were, of a portion of the apex of the lobe, reduciend, and changed into a thin blanched velvety membranous. Spora ovate globose. Spera reniform or angular, ovate, smooth.

**Duration.** The rhizome is perennial. The fronds are persistent, remaining until after young ones are produced, if kept from being injured by frost. The young growth commences in April and May.

The **Adiantum** is unlike every other British Fern; its black, shining, slender slip, capillary ramifications, and fan-shaped pinnules, irrespective of its fructification, at once distinguish it.

The Maidenhair grows freely—in a moist close greenhouse, or in the open, the temperature of which it enjoys—in the usual light compost of turfy peat and sand, with abundant drainage. The rhizome should not be buried in the soil, but fixed on the surface. The plants are injured by severe cold, even when in a closed house, so that it cannot be considered a hardy Fern. Propagation is effected by division of the rhizomes.

Ranging so widely over the world, it might be expected that modifications of form would occur, and such indeed is the case, two or three being met with even in this country. In addition to the usual state with lobed and decidedly wedge-shaped pinnules, we have, therefore, the following:

1. *multifidum* (W.) Dichotomous growth rarely occurs in this genus; it is occasional and inconstant.

2. *tenuum* (M.). This has both the barren and fertile pinnules deeply pinnatifid, or split down into long narrow lobes, but is otherwise of the usual growth. Marked examples are rare in this country; one found in Ireland by Dr. Allekin in 1833 is constant. Mr. Newman notices another from Mewstone Bay, in Devonshire. These are, however, various gradations of this structure, both native and foreign.

3. *rotundatum* (M.). This sub-variety, found in the Isle of Man (a very similar one also on the south-west coast of England) has at first sight a different aspect. We have to thank Mr. Wilson, and Mr. Rylands for fronds from the Manx locality, and several correspondents have furnished the analogous specimens from the English coasts. The chief peculiarity in the most marked, i.e., the Manx plant, consists in the basal pinnules having a rounded outline than usual, with the base truncate; the usual cuneate base, wanting in these pinnules, appearing, however, in the upper parts of the same fronds. In addition, the fronds are narrower, and the pinnule more spreading. We cannot, however, fix the limit of these peculiarities intermediate and connecting specimens occurring from various localities.
THE BRITTLE BLADDER FERN
(Cystopteris fragilis).

Cystopteris, Bernhardii.

Clusters of Sporo-cones rostrate, growing from the back of the vein, medial, indistinct, involucres hooded or stellate, fixed by its broad base posteriorly beneath the scar and indicated over it as long reflected; the free (anterior) margin truncate acute or neuminate, often fringed. Fosses disposed at their extremities, branched, the branches (venules) simple or forked.

C. fragilis: fronds oblong-lanceolate, biplumate (rarely sub-bib and sub-triplumate); pinnae ovate lanceolate or oblong-lanceolate; pinnae ovate lancolate or oblong, blunt or acute, obscurely toothed, lacking with absent blunt or long narrow acute teeth, or pinnae with ovate or oblong toothed segments.

Plates...
THE BRITTLE BLADDER FERN.

Pteris dinkellana, or, Dickell's Fern.

EXPLANATION OF THE PLATE.

Plate XLV.—Pteris dinkellana; 1, from Barrow's, Medullo; O. B. Williams. 2. C. parvula marmorea, new variety, respectively from December (collected); Dr. Affel. 3. the same, from Lyonia's, Rocks, Tʻatyches Wells; Kent. O. B. Williams. 4. C. parvula rupestris; from Ben Lawers, Perthshire; W. M. C. English. Dickell'sa; from Columbia, New Aberdonia; G. L. Smith. 5. the same (collected); Dr. Affel. 6. C. parvula surreptita; from Windermere and Caesarea.

HABITAT.—This small and elegant, but exceedingly polyphyletic, species is widely distributed, occurring here and there over the whole of Great Britain; more abundant in the hills and remotest parts of the country; but somewhat rare in the north and north-eastern parts of England. It is found in the extreme south of England, and extends northwards to the highlands and the south of Ireland, according to the east Highlands, to an altitude of more than 3000 ft above the sea. It is generally found growing in the fissures of rocks, or of sandstone, and, for the most part, is either or subaqueous amphibious. In Ireland, though rare here and there abundant, it seems less generally distributed. There are no definite limits to the variation of this plant, which, even in Great Britain, are almost unlimited; owing to the variety of the different species, which is marked and distinct, and has only been found in two stations in Scotland.

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A. Cystopteris fragilis.
B. C. regia.  C. C. montana.
THE BRITTLE BLADDER FERN.

smooth, oblong-lanceolate, sub-bipinnate, dipinnate, or rarely tripinnate. Pinnules ovate-lanceolate or oblong-lanceolate, with the pinnules usually distinct, but sometimes more or less decurrent or connected by a wing to the rachis. Pinnules of the more typical forms ovate at the base of the pinna, oblong towards the apex, generally acute but sometimes blunted; the larger deeply pinnatisect, with oblong toothed lobes; the smaller indusio-dentate or more shallowly toothed, the teeth generally acute. In the angustata series, forms the pinnules are narrower, and more complexly and acutely toothed; in the dentata series, they are not so much separated, and are blunter, and usually, though not always, less deeply toothed, but always with the teeth blunted.

Veneation of the larger pinnules consisting of a flexible midrib, from which a branch or vein proceeds along each lobe, giving off secondary branches, or rami, mostly simple, one of which proceeds to the tip of each marginal tooth. The smaller pinnules more or less resemble the larger of these lobes, and are also similar as regards their venation.

Fructification scattered over the whole leaf of the frond. Sori roundish in outline, numerous, borne on nearly all the branches of the veins in fully fructified fronds, and thus in the more divided forms appearing to be scattered without order over the whole surface, but in the less divided forms more evidently placed in a line, near the margin of the pinnules, as they often are in the lobes of the larger ones, though in some forms they are situated nearer the midrib than the margin, and often in age become confluent; indusiate, medial on the veins. Indusium a thin smooth delicate hooded membrane, attached behind the sori, a little to one side, either truncate and thus roundish, or prolonged at the point and thus acutely or acuminate cuneate; at first indented forwards over the sporocarps, soon, however, becoming reflected backwards and shrivelled; the anterior margin either entire, or split into narrow segments. Spore-cases roundish obovate. Spores round or oblong, strongly ciliate.

Duration. The comest is perennial. The fronds are annual, appearing in April or May; they quickly arrive at maturity, and are followed by others in succession through the summer; and are destroyed by the early frosts of autumn.

Viewed as a collective species—and it cannot be satisfactorily viewed in any other light—this Fern is easily enough recognised by its small slender fragile bipinnate oblong-lanceolate fronds, and the peculiar hooded or semicircular indusium, which in the early stages of the fructification may be seen enclosing the roundish masses of sporocarps. It is a plant so polymorphous in character that the species which botanists have from time to time endeavoured to separate from it, though sometimes assuming a distinct-looking aspect, are at other times not easily to be recognised, and are scarcely to be defined permanently, even as varieties. The Cystopteris frigida may indeed be considered as being, like the Althaea Fico-femina and Lauris ilicifolia, a botanical type mutans, alluring the botanist to novelty-seeking among the quandaries of species-making in which, when at length his mental vision becomes clarified by more extended observations, he finds himself hopelessly bewildered.

The indusium of Cystopteris when assuming the truncated semicircular form it sometimes bears, stands in the same relation to the benched folded scales found behind the sorus in some species of Asplenium, as the more perfect cup in Woodward—a true cup in some exotic species—does to that of Ophioglossum. These genera then become connecting links between the polypodiaceous and cryptogamous series. Cystopteris has also a close affinity with that genus of clavellated ferns, called Asplenium.

This is a pretty little fern for the cultivator, affording some variety in his collection, and thriving well either in pots in frames or greenhouses, or in open shady rock-work in localities which enjoy a moderately pure atmosphere. The soil may be composed of light turfy peat and loam, with sand, in equal parts, and the drainage should be ample. It increases readily by division or from the spores. The fronds are frequently damaged by the ravages of a yellow fungus (Uredo filicinis), which spreads rapidly, and soon spoils those plants which are seriously attacked. From its most commonly occurring on plants grown in houses, we had thought the appearance of the fungus to be owing to the
THE BRITTLE BLADDER FERN.

confined dampness generally maintained in structures where ferns are grown, but as we find native specimens from Ben Lawers and from Ireland are similarly affected, it would appear to be a natural parasite of these tender herbaceous forms.

The most remarkable forms differing from the ordinary typical Brittle Bladder Fern, are the following; which are, however, not always so well defined as could be wished —

1. angustata (Smith). The form to which this name has been given appears to be one of the larger states of the species, and includes those forms in which the edges of the smaller pinnules, and of the lobes of the larger ones are deeply and rather evenly incised into conspicuous longish, narrow teeth. According to Sir J. R. Smith this is the same as the Polypondium chelatum of Dickson and of Bolton (Floral. t. 45). The spores (in Dickson's plant) are roundish and echinate. Mr. Wallaston and others think it is not a very constant form, and probably there are more than one to which the same is applied, some of which may revert under culture to the ordinary state; but we have a plant smaller indeed than Smith's description seems to point out, which we include under angustata, and this with us is quiet constant under cultivation. It is more attenuated in the frond, the poums, and the pinnules; and these are its chief characteristics.

2. obtusa (M.). This is a distinct and constant form, cultivated by Mr. A. Taih, of Edinburgh. It is peculiar in its short blunt ovate narrowly and shortly stalked pinnules, which are deeply separated into distinct oblong lobes, almost pinnules, and these are notched with small even teeth, which are very apparent. The spores are echinate. The colour of the fronds is a dark green.

3. dentata (Dickson). There are some cultivated forms referable to this variety that are constant, though it is probable that accidentally blunt pinnuled fronds of other forms are sometimes associated with it in the herbarium, and hence it is often looked on as inconstant. The features of the true plants are, small size (four to eight inches long), and conduplicate pinnules, so that the narrow fronds are sometimes greatly bipinnate; these pinnules are blunt-oblong, simply blunt-toothed, or obscurely blunt-toothed, and with the sori placed near their margins. Somewhat larger and more deeply lobed forms, having the same aspect, are not met with, and through these it gradually merges into obtusa, and the normal form. The spores are echinate, but scarcely in so marked a degree as they are in C. fougilii itself.

4. decurrens (M.). A variety intermediate in aspect between dentata and Dicksonia, approaching the latter in the decurrent pinnules and deflexed pinnules but different in the more acute apices of the fronds and pinnules and in the more erect and prominent teeth, which rather resemble the former, as does the colour and texture. The spores are echinate. It was found by Mr. Taih, on the coast of Fife.

5. Dicksonia (Sim). The most marked in habit of all the known forms, but connected with fougilii, through decurrens and dentata, and therefore only to be considered as a variety. Its peculiarity consists in the deflexed pinnule or less overlapping, and in the crowded overlapping position of the broad short obtuse blunt-toothed pinnules, which are all connected by the wing of the rachis in which they are decurrent. The colour is uniformly a deep bright green. In the more highly developed of the fertile fronds the lobes of the pinnules, though still blunt, are more distinct, and they have then blunt incipient teeth. The sori are situated very near the margin. The pinnules are twisted more or less from the plane of the frond, as occurs in some degree in decurrens, from which, with the deflexion of the pinnule and the frequent confusion of the pinnules, results a peculiar aspect, by which this variety is known at first sight. The spores are slightly verrucose or tuberculata, not echinate-tuberculata as in the other varieties, a fact, we believe, first pointed out by Mr. Wallaston. The plant was first found by Dr. Dickie on dripping rocks in a cave at Cove, near Aberdeen, and it has since been gathered in the same place by several botanists, and by Dr. Halir, near Dunkirk. In cultivation this sometimes produces fronds or pinnules, with the spores multiform.

6. multifida (W.). In this, which is not permanent, the apices of the pinnule or of the frond are bifid or multiform, or the stipes is divided.
THE BRITTLE BLADDER FERN.

7. \textit{interrupta} (W.). A curious permanent narrowness, found in Westmoreland by Mr. F. Clowes. The fronds are all dissimilar, but mostly linear, and all more or less narrowed, from the altered or interrupted or contracted state of the plant. There are sometimes reduced to small fan-shaped or three-lobed expansions along a portion of the frond, which is three-narrow-linear, or the fronds consist of two to four or six very unequal and irregular, often fan-shaped, pinnae, still producing a narrow and contracted outline. The pinnae in the interrupted portions are variously truncated, laciniate, depapillated, or sometimes bold or multilobed. It is a curious plant and quite permanent.

8. \textit{scapers vulgaris} (M.). There is another form reputed to have been found both in Devonshire and Kent, also a native of Madeira, which has several distinctive features and may be called \textit{C. frugilegus scapers vulgaris}. There are some doubts as to the English origin of this plant, but of its distinctness as a variety, and probably as a species, none. Bolton's figure (pl. 45), under the name of \textit{Polypodium scapers vulgaris}, is a facsimile of moderate-sized specimens and he besides mentions two of its prominent characteristics: if, therefore, his statement is conclusive, which may be open to doubt, it is a native of Scotland. It is certainly a native of Madeira, whence we have imported plants received from Mr. Sim of Footscray, and probably occurs also in the other North African Islands. It has also certainly been found at Tunbridge Wells, and is in cultivation from this source; but there are rumours of its having been planted there. A similar, but not identical, plant of which a counterpart is also found in Madeira, agreeing, however, with the other in its principal features, is loosely stated to have been found in Devonshire; but this indication of a British habitat is also open to suspicion, the garden whence it has been distributed having been enriched by importations from Madeira. Whether Prof. C. \textit{scapers vulgaris} be the same, there appears no means of determining, except by a reference to the Berlin herbarium, as he has not published any definition or character of his plant; and the same may be said of the \textit{C. ovata} of Fé. The striking differences presented by the plants under notice are (1) their evergreen character under shelter, those kept in a cold greenhouse—from which, in fact, frost was not excluded—continuing to grow in succession through the whole winter, while all other known forms of \textit{Ostrich fern} are quite dormant; (2) the toughness, not brittleness, of their pallid stelatal stipes, which are not easily broken; (3) the greater size of the anterior basal pinnae—the two features being mentioned by Bolton as belonging to his plant; and (4) the glandular-hairy vestiture of the indusium, which is conspicuous in the fresh plant. In all these peculiarities, the Madeira, and reputed Tunbridge Wells, and Devonshire specimens perfectly agree; but the latter is somewhat more slender in the stipes, and more acute in the pinnae, than the others, which are identical. This evergreen species, for such we believe it to be, has, in addition, a short, creeping rhizome, vigorous fronds of narrowish lanceolate outline, and distinct and rather distant pinnae, of which the larger are often nearly or quite again pinnate, and the lobes separate. The species are irregularly roundish oblong, mucronate.

* Perhaps it would be more correctly regarded as a species, when it might well bear the name of \textit{C. scapers vulgaris}. 
THE ALPINE, OR ROYAL BLADDER FERN
(Cystopteris regia).

**Cystopteris, Bernhardii.**

Clusters of sporocarps terminate, growing from the back of the veins, medial, indusiate. Indusium hooded or concave, fixed by its base posteriorly beneath the leaves, and inflated above it, at length collected; the free (interior) margin truncate acute or indented often fringed. Fronds dissipated at their extremities, branched, the branches (segment) simple or forked.

**C. regia**: fronds inocellate, bi- or sub-tripinnate; pinnae ovate; pinnales ovate-oblong, united by a wing, deeply plumose, the lobes linear or linear-oblong, with two or three short blunt or retuse teeth; medullia winged above; veins terminating in the apical node of the emarginate teeth.

**HABITAT.**—The only authenticated habitat for this plant is a wall of Lew Lezen, in Innes, where, at the close of the last century, it existed in such great plenty as to furnish the subject of a poem at that early date, an individual species. The plant is now nearly destroyed by mania, though it exists in more than one species in the neighbourhood. Specimens have been received from Mr. Shepherd, said to have been gathered in Derbyshire and Yorkshire, but without more particular habitus assigned. The various spore stations which have been reported for this plant probably belong rather to small, much-branched species of *Cystopteris*. We have not seen a mountain species of *C. regia*, unless it be one from Sudholtz, in Cumberland, gathered many years since by Mr. S. E. Gray.

**EXPLANATION OF THE PLATE.**

PLATE XLVII. C. Cystopteris affinis collected, Dr. Adans.---

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**GEOGRAPHICAL DISTRIBUTION.**—This elegant plant is plentiful in many localities in the Alps of Switzerland, Carinthia, Styria, &c. It is found also on the Pyrenees, on Mount Taurus, in the Mecum, and on Mount Taurus (Set. Mill.)

**EXPLANATION OF THE PLATE.**

PLATE XLVII. C. Cystopteris affinis collected, Dr. Adans.

**Cystopteris, Bernhardii.**

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THE ROYAL BLADDER FERN.

Frond, pale-coloured except at the base which is brownish; brittle, slender; terminal and adherent to the caudex. *Secondary rachis* narrowly margined.

**Vernation** circinate.

Frond three to six or eight inches long; herbaceous, bright pale green, erect, smooth, lanceolate, bincetonate, or almost tripinnate in luxuriant fronds. *Pinnae ovata, acute, unequal.* Pinnae bluntly or sometimes acutely ovate, with a narrow stalk-like attachment, deeply pinnatifid; the lobes linear or linear-oblong, blunt, obscurely toothed, or sometimes with short distinct erect teeth which are blunt-pointed or retuse. In the larger pinnules the lobes, though still decurrent, and not truly separate, are distant and almost divided to the rachis, producing almost a tripinnate mode of division.

**Venation** of the pinnules consisting of a straightish mid vein, with alternate lateral branches (venae) directed into each lobe, and there again branching into several venae, which terminate in the retuse apices of the teeth, and are thus apparently directed towards the marginal sinuses.

**Fructification** scattered over the back of the frond. *Sori numerous, sometimes crowded, small, round, nodulose on the veins, indusiate. *Indusium* a small delicate transparent membrane, which is ovate acute, slightly jagged in front, attached behind the sori, projected forwards over them, and at length reflexed. *Spores ovate-oblong-obovate.*

**Duration.** The caudex is perennial. The fronds are annual, appearing in May and perishing in autumn.

As the plant found at Leyton is generally admitted to be the *Polypodium regium* of Linnaeus, while it is certainly also the *P. alcpinum* of Wulfen, it seems proper to adopt, as Presl has done, the older specific name. Linnaeus’s specimen, however, it must be observed, is unsatisfactory as evidence in support of this view.

There is no doubt the plant is distinct from *C. frigida*, being analogous in size with the smaller forms of that species, but more finely divided. The segments of its pinnules are either narrow-oblong or linear, and the teeth are either blunt or more commonly emarginate; the veins very frequently terminating in the notch at the apex of the tooth, instead of at the projecting point of the tooth, as in *C. frigida*.

It is an easily grown plant, either in well-drained pots of free open soil, such as light loam and turfy peat with sand; or in good, e. c. sheltered situations well drained, and with congenial soil, in open rockeries. It is more liable than the allied plants to suffer from damp while at rest in winter, and hence should not be too much watered at that season. There is no other difficulty in cultivating it, and it is increased with facility by division.

The plants occasionally produce forked fronds, but there is no permanent variety known.
THE MOUNTAIN BLADDER FERN
(Cystopteris montana).

CYSTOPTERIS, Bernhaurti.

Clusters of spore-cases rotundate, growing from the back of the veins, medial, indusiate. 

Indusium hooded or cucullate, fixed by its broad base posteriorly beneath the sporangia; its edge reflexed over it, at length reflected; the free (axial) margin truncate acute or acuminate, often fringed. 

Pinnules divergent, those at the extremities, the branches (segmental) simple or forked.

C. MONTANA, fronds triangular, pinnate-bifurcate below; pinnae spreading; pinnae ovate or oblong, acuminate or pinnatifid; the lobes obtusely subulate, toothed at the apex; caules creeping.


Pinnule, four Lobes, rather ovate, with a short auricled base. 

Habitat—This species was first found in Great Britain, by Mr. W. Wilson, in 1831 at Ben Lawers in Perthshire. It was subsequently met with by Mr. W. Wilson, Mr. Arnott, Mr. Brown, and Rev. W. Lister, in Shropshire, and others, on the mountains during Glen Lussay and Glen Docherty, in the same county. Recently it has been gathered in the same counties by Mr. London and Mr. M. At. 

Explanation of the Plate.

Plate XLVI.—Cystopteris montana, 1. from Glen Lussay, Perthshire. 2. from Glen Docherty, Perthshire. 6. Erect; 1. Procumbent Plants in Glen Lussay (Scotsland). A. T. Tall.

HABITAT—This species was first found in Great Britain, by Mr. W. Wilson, in 1831 at Ben Lawers in Perthshire. It was subsequently met with by Mr. W. Wilson, Mr. Arnholt, Mr. Brown, and Rev. W. Lister, in Shropshire, and others, on the mountains during Glen Lussay and Glen Docherty, in the same county. Recently it has been gathered in the same counties by Mr. London and Mr. M. At, in Glen Lussay, Glen Docherty, by Mr. J. Arnholt; in all of which places the fern is most abundant. It is further recorded in the Scilly Islands as having been found, in 1855. in the Borderland (Scotland), and in the Highlands (Scotland).

COEUR-FRANCAIS, Mayr, Membre de l'Académie Royale des Sciences de France, x. 477. both Plants embroidered.

EXPLANATION OF THE PLATE.

Plate XLVI.—Cystopteris montana: 1. from Glen Lussay, Perthshire. 2. from Glen Docherty, Perthshire. 6. Erect; 1. Procumbent Plants in Glen Lussay (Scotsland).
THE MOUNTAIN BLADDER FERN.

unequal, ascending, the lower pair considerably largest, two inches and a half long, obliquely ovate, the posterior pinnules twice as long as the anterior ones; some of the other pinnules are also unequal-sided, the posterior pinnules being largest, but at the top this difference is not manifest. Pinnae (the larger posterior ones) ovate, pinnate, or the smaller upper ones pinnatilobate. Pinnae (base) of the larger pinnules, ovate with a distinct narrowed stalk-like attachment, but connected by a narrow wing, pinnatifid, with oblong-ovate obtuse lobes cut into linear teeth which are generally bifid at the extremity. In its ultimate divisions it is thus very much like Coffea regia.

Division of the pinnules, consisting of a nearly straight naevus, with alternate naevi directed one into each lobe; a naevus is given off towards the tooth, and is continued to the margin, where it is lost in the sinus formed by the bifid apex of the tooth, thus ending in a depression rather than a projection of the margin.

Fructification occupying the whole under surface. Sori consisting of numerous moderate sized, roundish masses of spore-cases, medullated on the veins indurated. Indurata, a delicate transparent, concave, subrotund membrane, irregular at the margin, placed at the back of the sorus, and soon obliterated. Spore-cases obovate. Spores oblong, mariculate.

Description. The rhizome is perennal. The fronds are annual, and appear about May, persisting in autumn.

This plant is at once known from the other British species of Cyclopteris by its long creeping rhizome, and its triangular and tripinnate fragile fronds. It has much more the aspect of Polypodium Deppeianum, for which it might, perhaps, be mistaken,—the more readily, as its indusia become soon obliterated, and the sort then seen to consist of round naked masses of spore-cases. It is, however, not three-branched, as that is, and is more divided.

This plant has hitherto proved difficult to cultivate, probably on account of the slight information which was possessed of the peculiarities of its native habitats. Now, however, that it is known that its rhizomes thread their way on the ledges of dripping rocks, among beds of sphagnum, it may be supposed that less difficulty will be experienced. These natural conditions suggest the employment of (1) broad shallow vessels; (2) a very open medium for the roots, such as light turfy peat and sphagnum intermixed and blended with sand; and (3) constantly abundant, yet not stagnant, moisture. The creeping rhizomes afford every facility for propagation.
PLATE XLVII, a.

THE OBLONG WOODSIA (WOODSIA ILLINENSIS).

WOODSIA, R. Brown.

Clusters of spore-cases circular, involute, medial, springing from the back of the veins. Indusium attached beneath the spore-cases (hence involute), and divided at the margin into numerous capillary jointed segments, which are recurved over the spore-cases. Fruiting simple or forked.

W. ILLINENSIS: leaves oblong, lanceolate, pinnate, with numerous broadly subulate chaffy scales beneath; plane oblong obtuse, deeply pinnatifid, with bluntly ovate, or oblong obtuse lobes; stipules and rarely chaffy-crinate.


WOODSIA ILLINENSIS, R. Brown, History of British Flora, 24, 1. 57.


HABITAT.—This is one of our rarest forms, occurring in the counties of Scottish and Irish in several species, among the mountains of Scotland, Wales, and the south of England, springing in elevation probably from 300 to 700 feet, or thereabout. In Scotland it has been found in the Gown Mountains, in Renfrewshire, and we have heard it also reported from the vicinity of Stirling; it is said to be frequent from Berwick, and Mr. Gray has described it as white from its white sori, which purport to have been gathered at Darow, in Monmouthshire. It occurs rather plentifully in deep woods among the hills dividing the counties of Durham, Yorkshire, and Derby, and is especially frequent near Berwick, in Cumberland, in Durham, in Darow, and in Darow, in which it has probably been mostly cultivated. It is not in the habit of growing in the county of Carnarvon, in the Snowdon district.

GEOGRAPHICAL DISTRIBUTION.—This form is so abundant in the north of Europe that we find it in Iceland, Lapland, Norway, Sweden, and Russia, where it extends extensively through Prance, Germany, Hungary, Prussia, and France, into Italy and Spain. In Asia it occurs in Siberia, in the regions of the Altai Mountains and Lake Baikal, and in the territories of the Amur River, and Amur River Bay (11th, 19th). It is found in southern America, on the Bahama Islands and the Rocky Mountains in north-west America (11th, 19th). In Canada and in the United States.

EXPLANATION OF THE PLATE.

PLATE XLVII, a.—WOODSIA ILLINENSIS, 1, from Westmorland; 2, from Faversham. Herb. & F. Gray, 3, engraved by Dr. Galloway.

PLATE XLVII, b.—W. ILLINENSIS, 1, from Westmorland; 2, from Westmorland; 3, from Westmorland; 4, from Westmorland.
THE OBLONG WOODSIA.

Frons from two to four or six inches long; terminal on the caudex, thick membranaceous, dull deep green, more or less rusty beneath from the abundant scales; lanceolate oblong, planate. Petioles opposite or alternate, ovato-oblong, deeply pinnatifid, sessile or very shortly stalked, more distant below, all spreading or nearly horizontal; the larger ones about an inch, the smaller half an inch, in length. Lobes eight to twelve, oblong obtuse, the basal ones largest, their margins obscurely erose, and as well as the upper surface furnished with coarse scattered hairs, in addition to which on the under surface are numerous long subulate scales on the ribs and veins.

Variation of the lobes consisting of a dorsoventral and not very distinct mid-vein, from which arise alternate veins, the lower ones usually forked some distance from their base, the caudex extending quite free nearly to the margin, and bearing the sori near the apex, but below it; the upper veins, which are also fertile, are simple.

Fruiting on the back of the frond, scattered nearly equally over the whole surface; situated below the apex of the veins and venules; sometimes epilobous and becoming confluent. Sori circular, consisting of few spore-cases, seated within, that above, a small membranaceous scale, whose margin is fringed with jointed shining hairs, which curve inwards, involving the spore-cases; hence they are involucrate. Spore-cases roundish-obovate. Spores oblong, roundish, or irregularly three-cornered, muricate.

Duration. The caudex is perennial. The fronds are annual, growing up in spring, about March, and perishing in autumn.

The chief peculiarity of the genus to which this species is referred, is found in the peculiar investing membrane which covers the sorus, and which is not easily of examination without careful manipulation. It consists, in fact, of a small exocarp scale, resting on the vein, beneath the sori, having its margin fringed with numerous hair-like segments, which are incurved over the spore-cases. This structure gradually merges through some exotic species into an undivided bladder cup, containing the spore-cases; so that Woodsia, in this comprehensive sense, forms the passage from the polypodiaceous to the cryptogamous structure.

Woodsia lanceolata differs from W. alpina in the breadth and development of the frond, which is lanceolate and not linear, and it has elongated oblong not short deltoid pinnae. It differs further in the erose condition of the siphons and rachis, and of the lower surface of the ribs and veins of the frond; W. alpina being almost destitute of subulate scales, although sparingly furnished with tubular jointed hairs. Mr. Wollaston has moreover pointed out to us a further difference, namely, that at the period of vernation, whilst W. lanceolata shows no trace whatever of its fructification, the sorus in W. alpina are remarkably conspicuous. That they are quite distinct, seems to be the general opinion of botanists.

This species, according to Mr. Wollaston’s observations, produces one variety—multijuga—in which the apex of the frond, and occasionally the spines of the lobes, are bifid.
PLATE XLVII. b.

THE ALPINE OR DELTOID WOODSIA (WOODSIA ALPINA).

WOODSIA, R. Brown.

Clusters of spike-cymes circular, involucral, nodose, springing from the back of the vernules. Appendages attached between the spike-cymes (hence involucral), and divided at the margins into numerous capillary-jointed segments, which are limbic rounded obtuse, nearly or quite entire; stipes and rachis very slightly hairy.

W. ALPINA; stamens linear-plumose, slightly hairy, not scalar; pingue triangular, or triangular-oval, obtuse, pinnaed or lobed; the lobes rounded obtuse, nearly or quite entire; stipes and rachis very slightly hairy.

EXPLANATION OF THE PLATE.


HABITAT.—This species is still rare, it is possible, that the Wintergreen. Its habitat is the mountains of Partland, and is said to grow in Glen Path, in Partland. The supposed habitat of the Wintergreen in Scotland, is not clearly referred to this species. Besides these Scottish localities, the rocky precipices of Blackrock, in Carwinter, are the only places in which it is known to grow naturally within the United Kingdom.

OROGRAPHICAL RANGE.—Of the counties of England, this Fern has been found in England, Norway, Sweden, Russia, Germany, Hungary, Switzerland, France, and Spain, besides Great Britain. It is now seen in Sweden, in the region of Lake Helvetia, as also in Italy in the Alps, on the northern slope of the Hexadens (H. Helvet). In America it is found on the Mountains of Massachusetts, at Pinkham's Notch, and in the Rocky Mountains. In the same region, about Great Bear Lake, and on the slopes of Denali's Bells, occurs the Coniodes platyphylla of Thwaites, which has probably some claim to specific rank, and is rather to be considered as a somewhat more slender state of R. alpina, in which the few leaves of the latter (which, therefore, replace the scales of the closely connected W. platyphylla) are wanting.

Caudex short, subglabrous or obovate, forming a small erect or decumbent crown, furnished with a few scales above. Stipes lanceolate, pale brown. Foliis dark brown, wiry, smooth, lanceolate.

Stipes pale reddish-brown, from three-fourths of an inch to two inches long, articulated at about one-third of its length from the base, which is adherent, sparingly furnished with subulate pale brown membranaceous scales. Rachis slightly coloured, and very sparingly furnished with pale narrow deciduous scales.

Veins few circinate.

Foliage from about one and a half to six inches long, terminal on the caudex, membranaceous, of a tender green; linear in outline, plumose. Foliine not rarely sub-opposite, more frequently alternate, triangular-ovate, obtuse, sessile or very shortly stalked, pinnaed; the lower ones distant, the distance varying from three-eighths of an inch in the smaller plants to three-fourths of an inch in more vigorous ones, the plane about one-fourth of an inch long in medium-sized specimens, up to about half an inch
THE ALPINE OR DELTOID WOODSIA.

in the larger ones; the upper ones more closely placed; all semi-erect or nearly horizontal. Lobe five to seven, roundish obovate, largest at the base, the lowermost sometimes divided nearly to the midrib, the upper ones more confluent, and the apex, in the most vigorous specimens, notched so as to indicate an additional pair of lobes; the margins entire or obscurely crenate, furnished with a few scattered tubular jointed hairs, and hair-scales, others occurring here and there, on both the upper and the under surface.

Position of the lobes consisting of a flexuose indistinct midrib, which is alternately branched; the branches or veins are forked, rarely more than once, the upper ones undivided; both veins and *redules* terminate within the margin in a slightly thickened point. The anterior veins of the forked veins, and some or all of the simple ones, bear *sporae*.

*Pedunculation* on the back of the frond produced on all parts of the frond, but somewhat more copiously in the upper part, the soris situated below the apex of the veins, hence medial, and often at length confluent over the lobes. *Sori* circular, seated within, that is above, a small membraneless scale whose margin is fringed with jointed hairs which curve inward involving the *spore-scales*; hence they are involucrate. *Sporae* roundish-ovulate. *Sperae* brown, round or roundish-oblong, the surface granulated or tuberculate.

Description. The caudex is perennial. The fronds are annual, growing up in spring and perishing late in autumn.

The description above given of this very rare species has been drawn up from a series of remarkably fine specimens collected on the Breconshire mountains in Perthshire, by Mr. J. T. Smye. No species, one would think, need be more distinct than this is from *Woodsia rhomboides*, from which the eye once acquainted with it, readily distinguishes it. It is a smaller, narrower, and smoother-looking plant than that species; and though under the excitement of the artificial conditions imposed on it in a state of culture, it does sometimes seem to acquire greater breadth and breadthness, so to speak, than is observable in the wild specimen, yet the proportion and general features of the plant remains unaltered. It is much more like the *W. globella*, a native of North-West America, but that is still more narrow and slender.

Our own experience of the cultivation of the *Woodsia* is given in the *Handbook of British Ferns* (p. 76) from which we quote the following:—

"The *Woodsia* are best cultivated in moderate-sized well-drained pots, kept in a cold frame, facing the north during the summer-season, and should not be kept constantly close up. They are very impatient of sunshine and stagnant moisture. The frame of the plants may in potting be advantageously elevated a little between two or three small pieces of sandstone. The must not be kept too damp, especially during winter. A shady shelf in a cool greenhouse where there is a free circulation of air, or a dryish cold frame, are good situations in which to preserve them during the dormant season. When it becomes necessary to divide the tufts, which is the most ready means of propagation, it should be done very carefully in spring about the time they commence their seasonal growth. In obtaining plants from their wild habitats for the purpose of cultivation, as with most other of the rare Ferns, it is found that small plants are much more successfully transplanted than the larger and older masses."

Mr. Newman recommends potting with thin pieces of porous stone placed vertically as high as the pot, the roots to be carefully arranged among the central pieces, and then covered with a finely-sifted mixture of decayed leaf-mould, silver sand, and peat, used nearly dry, shaken down and watered, the process being repeated, if necessary, until the interstices are filled up. We should prefer to use a mixture of pure light loam and sand between the stones, as being more evenly retentive of moisture, and this coincides with the experience of Mr. Wemstone. Mr. Backhouse hints that the less repotting or disturbance at the root they are subjected to, after being once planted, the better.
THE EUROPEAN BRISTLE FERN (TRICHOMANES RADICANS).

TRICHOMANES, LINNÆUS.

Cladodes of Square-cells enclosed within extra-marginal tubular or tun-shaped involucres, which are of the same texture as the frond. Square-cells obliquely compressed with a transverse ring, usually around the base of the columnar receptacles, bearing vertically. Receptacles (extra-marginal extensions of the veins) free within the involucres bilobed, more or less exerted. Veins disjunct at their extremities, simple or forked.

T. RADICANS: Fronds pellucid, membranes, ovate lanceolate, or triangular-ovate, trapezoid-pinnatifid; the radii everywhere and the upper part, or the whole, of the stipes winged; ultimate segments linear, entire or obtusely lobed; involucres cylindrical, scarcely two-tipped, solitary in the axils of the upper segments, more or less margined or widged; can runs long, creeping, tomentose.

EXPLANATION OF THE PLATE.

PLATE XLVIII.—A, TRICHOMANES RADICANS, from Kilkee, Kery; B, from Kilkee, Kery; C, TRICHOMANES RADICANS, from the north-west of Ireland; W. ANDREW.

HABITAT.—The Fern is not seen in England, though it uniformly grows at Kilkee, near Bingley, Yorkshire, where, in 1789, Robert Plot, the learned Egerton, in a letter from giving “a plentifull”—“or which, in his Log., [1752], I find the opinion copied. His present habitat is confined to the north-west of Ireland, where, in the rocky, grassy, and waterless situation of the mountains of Cork, Kerry, and Waterford, it is met with most unexpectedly, and sometimes in a most instructive condition. The Turk House, Kilkee, is one of the most celebrated stations, and here it succeeds to an altitude of 120 feet. We are indebted to Mr. D. Moore and to Mr. W. Andrew for ample specimens, to which our single page failed to do justice.

GEOGRAPHICAL DISTRIBUTION.—Having apparently its present northern limit in Ireland, this Fern is again met with in preference to the Amur islands of the Atlantic Ocean, towards the Caspian, Mexico, and the Azores, to which it is noted in Nipal and Shikin, where it occurs in many finely divided forms, and an outline resembling ANDREWALL, also in Kilkee, Burton, and Mongey, in the East Indies. It occurs again in the West Indies, America, Madeira (small ide of forma) in Mexico, Persea, New Amsterdam, and Vancouver, &c, and each divided) is in Brazil, in the Canadas, and the Society Islands. A variety, with almost oval fronds and a spreading branches, is found in Brazil, Peru, Mexico, and the north-east Asia, and several other forms, probably varieties of
THE EUROPEAN BRISTLE FERN.

This species, once in various parts of South America. The Hypercaphnum quadrons of Wallis, which fertile specimens collected by himself in the Cuanas Mountains, seem to be a species, is nearly distinct; as in the Hypercaphnum
species (Wall., 100) of Wallis's new collection, of which the specimens were gathered in America by Griffith.

The plant under this number in the Hackinian collection appears different from that in the wallisian collection.

Rhizome black, creeping, elongated, tomentose, with small thick-set articulated, dark-coloured jointed hairs. Fibrous black, stout, branched, densely tomentose.

Stipes variable in length, from one-fourth to one-half the entire length of the frond, terete, margined above with a narrow membranaceous wing, which is sometimes continued nearly to the base; lateral, adherent to the rhizome; the base clothed with articulated hairs. Rachis everywhere winged.

Vernation cirrate.

Ferns six to twelve inches or more in length; pelladiio-membranaceous, dark olive-green; darker when dry. Quite smooth; crassate-lanceolate, or triangular-ovate. more or less attenuated at the apex; trigonal, or quadripinnatifid. Primary divisions (pinna-like segments) crassate-lanceolate; the secondary ones ovate-oblong, acute at the base; the tertiary ones oblique oblong; the ultimate lobes oblong, toothed, the teeth short linear, entire, emarginate, or bifid. In highly developed fronds of the triangular form the secondary divisions are often longer and comparatively narrower, and the ultimate divisions are more distinct. The teeth at the apices of such series of divisions are frequently more elongated.

Plantation consisting of a series of forking ramifications of the wavy ribs, which issues alternately from the main midrib and enter the primary divisions; these are everywhere bordered with a polioid wing of a loosely cellular texture. The lowest anterior branch or velum of these veins in the ultimate segments is in the fertile fronds, continued beyond the margin, and forms the receptacle; but in the barren portions the apices of the velum do not quite reach the margin.

Vernation scattered over the fronds, extra-marginal, i.e., the tubular involucres are projected outwards from the margin, the opening being exterior. Spore consisting of sessile spore-cases, clustered around the base of the siliac receptacle, which is free within the involucre, with its apex more or less projected beyond it. Lateral with a cylindrical, cup-shaped, somewhat tapering below, open externally, spur-axillary, that is produced in the upper axils of the (ultimate) lobes, more or less sunk in the apex of one of the lobes or teeth, the mouth sometimes slightly spreading, or rather two-lipped. Spore-cases minute, oblique, latero-vertically compressed, rounded or obovate. Spores irregularly reniform or oblong, sometimes three-corned, minutely papillos.

Duration. The rhizome is perennial. The fronds are also persistent, enduring for many years if not injured; they are at least two years arriving at the fertile state.

The polioid, moderate-sized, much divided, yet not pinnatid fronds of this species, produced from a creeping rhizome, suffice to distinguish this plant from other British Ferns. There are at least three forms or states of it met with in Ireland. One in which the fronds are crassate-lanceolate, with the segments broader (Plate XLVIII. a.) most nearly according with T. rhododes of Swartz, as illustrated by Heerbig. Another, more triangular in outline, the segments appearing narrower (Plate XLVIII. b.), seems to represent the T. pinnatifid of Wallis. A third with the fronds narrower and more lanceolate, the primary divisions narrow, and, as well as the secondary ones, more distant or distinct (Plate XLVIII. c.), is the T. Andreaeii of Newman, and is analogous to many of the tropical forms.

In cultivation this Fern requires that its rhizome should be fixed to a firm and durable medium, for which such materials as porous stone, earthenware, or brick are most suitable; and this must be kept constantly moist, without trickling. The rhizome then, as it grows, attaches itself in the manner of ivy. To induce this growth of the rhizome and also a healthy growth of the fronds, a constantly damp atmosphere is essential; indeed the fronds themselves should be almost constantly in a dripping state and always shaded.
HYMENOPHYLLUM, Smith.

Clusters of sporae-case enclosed within extra-marginal two-valved sub-cuneate involucres, of the same texture as the fronds. Sporae-case oblong-compressed, with a transverse ridge, sessile around the columnar receptacles, bearing vertically. Receotorae (extra-marginal extensions of the veins) free, and included within the involucres, sub-chalcate. Fronds disarmed at their extremities, simple or forked.

H. TUNBRIDGEI: fronds pinnulo-membranaceous, ovate or oblong more or less elongated, pinnate; pinnae subverted, pinnaflid, decurrent, forming a wing to the radials; segments linear, undivided or bifid, and as well as the upper margin of the roundish valves of the auxiliary solitary sessile compressed involucre, pinnately serrate.

EXPLANATION OF THE PLATE.

Plate XLIX.—Tunbridge Fern (Hymenophyllum tunbridgense) of the ferns of Tunbridge, Kent; B. Rennicks.

Habit.—The Tunbridge Fern is found in calcareous and sandy situations, usually covering the damp surface of the rocks themselves, but sometimes growing on the ground in moist places, or near the banks of streams. It is commonly exposed, being found in England from the peaks of Stone to the shores of the sea. In Ireland it is found in exposed situations, being common on the borders of rivers, in damp situations, and in the northern counties of Great Britain. It is also found in a few places in the north of Ireland, and in the southern counties of England. It is found in Scotland in the northern counties, and on the borders of rivers, in damp situations, and in the northern counties of England. It is found in the north of Ireland, and on the borders of rivers, in damp situations, and in the northern counties of England. It is found in the north of Ireland, and on the borders of rivers, in damp situations, and in the northern counties of England.

Geographical Distribution.—The species occurs over the greater part of Europe, being recorded from Britain and Norway, France, Germany, and Italy. It grows in lichens or sub-lignitic situations. It is found in the north of England, and on the borders of rivers, in damp situations, and in the northern counties of England. It is found in the north of Ireland, and on the borders of rivers, in damp situations, and in the northern counties of England. It is found in the north of Ireland, and on the borders of rivers, in damp situations, and in the northern counties of England. It is found in the north of Ireland, and on the borders of rivers, in damp situations, and in the northern counties of England.
THE TUNBRIDGE FILM FERN.

Fernation distichous.

Fronds smooth, pellucid-membranaceous, minutely cellular, deep olive or sometimes brightish green, from one to four or five inches long, varying in outline, usually ovate, lanceolate-ovate, or oblong, more or less elongated, pinmate below. Fronds or primary divisions alternate, decurrent so as to form everywhere, except at the base of the larger fronds, a narrow entire wing to the rachis; distichous, ascending or sub-vertical, subverticled in circumscription; basally bipinnatifid, that is to say, twice divided with the ramifications on a dichotomous or forked plan, the divisions alternating, and so placed as to show an apparent excess of development on the anterior side from the medial or axial vein (which may be recognised), curving upwards. Ultimate segments linear-oblong, spinulose-serrate.

Fernation consisting of a series of dichotomous ramifications (two or three times repeated) of the wiry ribs which branch alternately from the main rachis, each ultimate segment having one of these divisions along its centre, and not quite reaching to its apex. Thus the fronds might be said to consist of slender branching wiry ribs everywhere bordered with a delicately cellular pellucid-membranaceous margin.

Fructification usually produced in the upper half of the fronds, extra-marginal, i.e. the two-valved involucres are projected outwards from the margin, the opening being exterior. Sori consisting of sessile spore-cases, clustered around the receptacle. Receptacle formed of the altered apex of the lower anterior vein of the pinnae, spongy, oblong-ovate, free, central and shorter than the valves of the involucres, therefore included. Involucres sessile, super-axillary, i.e. borne in the axils of the pinnae or primary divisions, short, compressed, the base somewhat inflated, cuneate and more or less sunk in the segment; the anterior part two-valved, the valves semioblong, flatish, spinulose-serrate at the upper margin. Spore-cases sessile, affixed obliquely, vertically compressed, thus lanceolate, with a transverse ring. Spores minute, irregularly oblong, or triangular. Normally the lower anterior branch of the pinna only is fertile, but sometimes one or more others are also soriferous.

Duration. The rhizome is perennial. The fronds are also perennial, growing up in the course of the summer, attaining their full growth during the season, but enduring two or three years under favourable circumstances.

The two British Hymenophyllaceae, may be known from other Ferns by the matted growth of their thread-like rhizomes, by the small size, the pellucid, and finely cellular texture of their fronds, whose segments have each only a central rib, and by the two-valved marginal fructifications. They may be best known from each other by the form of the involucres and of their valves; for although they may probably always be recognised by a practised eye by their peculiarities of growth, yet these latter are not features to be generally depended on. In H. tunbridgense the valves of the involucres are roundish and flatish, and the upper margin is spinulose-serrate, like the margin of the segments of the pinnae; whilst in H. unilateralis the valves are ovate and convex, and the margin is quite even. In the former the involucres are usually sessile and erect; in the latter stalked and deflexed in an opposite direction to the segments. No varieties of importance have been observed in the British Hymenophyllaceae.
WILSON'S, OR THE UNILATERAL FILM FERN

(HYMENOPHYLLUM UNILATERALE).

HYMENOPHYLLUM, Smith.

Clusters of separate stalks enclosed within extra-marginal two-valved sub-ovulate involucres, of the same texture as the fronds. Separate stalks obliquely compressed, with a transverse ring, assimilate around the columnar receptacle, bursting vertically. Receptacles (extra-marginal extensions of the vales) free, and included within the involucres, sub-ovulate. Veins dissected at their extremities, simple or forked.

H. UNILATERALE: fronds pelliculo-membranaceous, phano, oblong-elliptic or linear; phano decurrent, sub-unilateral, digitately pinnatifid, slightly concave forming a narrow wing in the upper part of the rachis; segments linear, undivided, or bidentate; pinnatifid, narrowly lanceolate or linear, ovate, included, the valves entire.

EXPLANATION OF THE PLATE.

Habitat:—This species is more extensively distributed than H. mendelense, though the two plants very frequently occur in company. The present is not well in the south-west of England, and is reported from several wooded estuaries. Both South and South Wales produce it, and in the north of England, especially in the Lake District in the north-west, it becomes plentiful. The seaside of the two species is H. mendelense, occurring both in the Lake District and Highlands of the north as Asphodeline; and extending north to the Northern and Western Areas. In Ireland it occurs plentifully, and in all the provinces. In the alpine range this plant is found from the east coast to an elevation of about 3500 feet, which it attains in the Alps, according to the observations of Dr. Balfour and Mr. Bankes.

Geographical distribution:—The plant occurs in the north of Europe, in Norway, and the Baltic Islands and is probably generally dispersed over Europe, but the records are scanty. We have met with it in Alpine regions, it is, however, found in the islands of the British and Irish Archipelago; and in the latter sections a somewhat different form, the species being narrow. It is again met with towards the northern part of the American continent, in Terra del Fuego, at Montevideo, at Cape Horn, and in the Galapagos Islands (H. mendelense and H. unilaterale). It is also found abundantly in Romansia (H. mendelense), and apparently scarce, in New Zealand.

Plate XLIX. II.

Etymology:—Hymenophyllum mendelense; from Wicklow, Western Ireland; F. Chodat.
THE UNILATERAL FILM FERN.

Fronds smooth, pulvini-membranaceous, minutely cellular, dark green, from one or two, to five or six inches long; oblong or linear, i.e. elongate-oblong; pinnate. Pinna decurrent in the upper part, and there forming a narrow wing to the rachis; distinct below; curved backwards, submarginal, wedge-shaped in circumscription; digitately pinnatifid, i.e. two or three times dichotomously forked, without an axil vein, the segments developed on the anterior side. Ulterior segments linear, obtuse, spinulose serrate. Luxuriant fronds have a tendency to become branched.

Veination consisting of two or three dichotomous ramifications of the wavy ribs, which branch alternately from the main rachis; each ultimate segment having one of these branches along its centre, not quite reaching to the apex.

Fru etiquette produced on the upper parts of each annual growth, extra-marginal as in H. tunbridgense. Sori consisting of sessile spore-cases, clustered around the short receptacles. Receptacles free, central, spongy, oblong, club-shaped, shorter than the valves of the involucre. Involucres supr-axillary, more or less obviously stalked, curved forwards, i.e. in a direction opposite to that of the segments; inflated, two-valved, the valves ovate-oblong, strongly convex, and quite entire at the edges, which are at first closed, but at length become gaping. Spore-cases sessile, vertically compressed, thus lenticular, obliquely affixed. Spores minute, irregularly oblong. In some instances, especially where the frond becomes branched at the apex, numerous sori are borne without order on the segments, but usually they are confined to one on each pinna, next the rachis, as in H. tunbridgense.

Intercalary. The rhizome is perennial. The fronds are perennial, enduring for two or three years, or more, renewing their growth annually, as occurs in Lycopodium annotinum.

We are indebted to Mr. F. Clowes, of Windermere, for the interesting observation that the fronds of this species of Hymenophyllum resume their growth after the first year, unlike those of H. tunbridgense, which complete their growth in one season. Mr. Clowes gives the following account of his observations:—“I have a large plant of H. tunbridgense and of H. multilerale, which were put into a case in March, 1854. Both are growing vigorously. But I remark that all the fronds of H. tunbridgense are annual—I mean, they come up in spring, bear fruit more or less, persist more or less, but never grow more than one year. Those of H. multilerale, on the contrary, go on growing year after year. A great number of the fronds which were on the plants when placed in the case went on growing, bore fruit at or near the extremity of the fronds that year, grew on again last year, and bore fruit, and are doing the same this year (1856), so that some fronds are ten inches long, and wide in proportion. This is not the effect of cultivation, as the wild plant does exactly the same—growing ‘unnaturally,’ in fact, but without distinct marks between the growths.”

The cultivation of the Film Ferns is an object of much interest to the fanciers of British Ferns. The plants require a glass covering to preserve them a constantly moist atmosphere, and constant, but not stagnant, moisture, should be maintained about their roots. These are their main requirements, and it matters little how they are applied, whether in a Wardian case, or beneath a common bell-glass. We learn from Mr. Clowes, whose success is evident from his remarks already quoted, that the bell-glasses ought always to have two small apertures, as vents, near the top of the glass. Until he adopted this expedient, his efforts to cultivate the Film Ferns were attended with but little success.
THE ROYAL, OR FLOWERING FERN
(OSMUNDA REGALIS).

OSMUNDA, Linnaea.

Clusters of Spore-sacs naked, densely clustered on contracted tuberiform portions of the frond, forming (in the British species) terminal panicles of nodulose spikes like. Spore-sacs large, stalked, rosetted, subglobous, two-valved, opening vertically, the transverse ring rudimentary. Veins forked; venules distinct at their extremities.

O. REGALIS: fronds bipinnate; pinnae oblong, nearly entire, dilated, and more or less sagittate at the base, (rarely tripinnate); spore-sacs clustered in twice-branched panicles at the apex of the frond.

HABITAT:—The Flowering Fern, also known as the Osmunda Royal, grows in red, spring, or boggy places, and is widely and plentifully dispersed, scattered here and there in meadows, hedges, near the United Kingdom, near Cornwell and Suffolk in England and the Western Isles. It is indigenous in many parts of Britain, and is found in the Island of Jersey. It reaches an elevation of about 300 feet.

GEOGRAPHICAL DISTRIBUTION:—This Fern is到处 throughout Europe. In Asia, it is found in Magallica, red in Asia, in China, in Hainan (Frequent pinnae), Korea, and in the Himalayas (CH. HEBER). In Africa, in the Sahara, in Algeria, at the Cape of Good Hope, in Natal (impressed pinnae), and in Madagascar (CH. HEBER). In North America, it is found in New England (emerald pinnae), in South America, in the United States (CH. HEBER). It is also found in North-west Europe; and in the country of the Rio Gran, in Brazil (CH. HEBER). Both North and South America also yield other very similar plants, which are probably to be regarded as distinct varieties of this species. One of the most striking and elegant of these is the O. regalis of North America, which can be known by its scarlet nervii, and another sub-globose solitary spore, the 0. pulchella of HEBER (forest, Brazil, Mexico, and New England, is a more sight and larger plant, but with narrower and more obscure pinnae. The India d species, with the spore of its spore in its brown fronds, differs in producing distinct fertile fronds.

Conduct stout, firm, growing in tubs, dark-coloured, spreading, or erect and trunk-like, often attaining an elevation of two feet or more. Fibres numerous, stout, branched.

Spores nearly or quite as long as the body part of the frond; and as well as the rachis succulent, tinged with red, and clothed with loose deciduous pale-brown cobwebby wool when young; firm, smooth, and pale green when mature; terete, somewhat flattened in front, the base dilated, with a membranaceous margin. Secondary rhizoids channelled and marginal in front.

Vernation deciduate.

Fronds numerous, terminal and adherent to the conduct; erect, or sometimes arching; variable in height, two to four feet in more exposed and drier localities, six to eight or even occasionally ten to twelve feet in very damp sheltered spots; membranaceous, smooth, bright yellow-green, paler beneath.
broadly-lanceolate, bipinnate, occasionally tripinnate; some entirely barren, others having several of the upper pinnae transformed into a terminal fertile panicle. Pinnae (sterile) nearly opposite, lanceolate or ovate-lanceolate, imparipinnate, distant. Pinnae opposite or alternate, one to two inches long; scissile, oblong or oblong-ovate, obtuse, sometimes slightly falcate, rounded or somewhat dilated at the base especially on the posterior side; sometimes distinctly auricled, occasionally deeply lobed, sometimes with the lobes separated; the terminal ones, which are more acute than the rest, usually lobed at the base; the margins are obscurely crenated, or sometimes serrated.

Fertile pinnules consisting of a stout midvein giving off nearly opposite rows, which are forked once near their base, and again once or twice before reaching the margin in which they are lost; they are parallel and slightly curved.

Fertification consisting of the upper pinna (usually wholly, sometimes only in part) changed into a bipinnate panicle of contracted rachiform capsuleiferous divisions. Each short spike-like branch of this panicle represents one of the pinnae, the spore-cases being collected on it into little more or less evident nodules; each of these nodules corresponding to a fascicle of the vein. This is quite evident in the case of the partially transformed pinnae. Spore-cases subglobose, reddish-brown, reticulated, shortly-stalked, two-valved, opening vertically. Spores smoothish, globose ovate or oblong.

Duration. The caudex is perennial. The fronds are annual, growing up very rapidly early in May; the pinnae reach maturity early in summer, and soon decay, and the fronds themselves are destroyed by the autumnal frosts.

This, the most stately of the British Ferns, well deserving the striking name assigned to it, is at once known from all other native species, by its entirely fertile panicle terminating the otherwise leafy fronds. There is moreover abundant technical distinction, in the structure of its spore-cases.

It is a very handsome plant at all times, but especially beautiful when, in very luxuriant growth, its fronds loaded at their tips by the fertile pinnae are bent down gracefully until they almost reach the surface of the water by the side of which they are growing. Hence it should always find a place in cultivated collections. It is of easy culture, requiring much moisture, and preferring a peaty soil. By the margin of lakes or streams, or at the base of a rockery abutting on an artificial bog or pool, the Dryopteris would find itself at home; and no special culture would be necessary. Like most other ferns it grows finest in sheltered places. It is increased by dividing the tufts; but it is by far the best plan in planting such species as the present, to procure vigorous masses from the localities where they are spontaneous.
THE COMMON MOONWORT (Botrychium lunaria).

B. LEBEAU: Fronds solitary; barren branch oblong planate, the plumes humped or fan-shaped, with the margin jagged or crenate.

EXPLANATION OF THE PLATE.

PLATE LI. A.—Botrychium Lebœvi, 1, from Chichester, Kent; 2, from Kent, Berkshire; F. published.

HABITAT.—A widely-diffused, but local, species, found here and there over the whole of England, Wales, and Scotland, extending to the Islands of Orkney and Shetland. It has been seen frequently found in Ireland, but is reported there from all the provinces. It is found in dry open alpine pastures and moor lands, generally during the summer which occur in most localities. Though abundant in some of its habitats, and general in the sterilization, it can hardly be considered a common species. Its distribution range is traced to reach from the event level in about 200 feet above the sea. The plant referred to remains has been gathered on the head of Norway, Sweden, and Ireland.

GEOGRAPHICAL DISTRIBUTION.—The species is reported to occur in various parts of Europe, from Ireland, the North Cape, and Lapland, to Italy and Spain, and the Alpine-Carpathian provinces. In Asia, it is found in Siberia and Kamchatka in the Brachy (Av. Brachy), in Siberia, in the region of the Ural and Asia Mountains, and Lake Balkal, according to Kewlows and Camilin. In North America, in Newfoundland, Greenland; Bear Lake, the hudsonian and Rocky Mountains, to British America, and North America. It also occurs in Fenni red in Tennessee; and has been recently noted with by Mrs. Miller on the Australian Alps, in Victoria. It is a native of the northern and eastern parts of Europe, and therefore, although commonly be considered as a central member of our flora, it is not likely to be seen. The North American B. simplex, is probably the only state of a form, found about the boreal's and the Hudsonian, and in Canada, occasionally called as B. lunaria.

Crown-like Crowns forming a small, crowded, thickened, wiry-rooted descending axis (rhizome, Pedunculate or basal, terminated by a bud or growing point, enclosed by brown membranaceous sheaths. Roots stout, finely, brittle, branched, growing in an irregular spreading manner from about the crown, and also branching in a subverticillate way from the perpendicular axis beneath the crown. When it rest the plant consists of this crown or bud, or growing point, seated among the wiry roots, enclosing the incipient or rudimentary fronds, and caused by membranaceous sheaths the remains of the former fronds.
THE COMMON MOONWORT.

Stipes erect, smooth, cylindrical, hollow, succulent, having two or three vascular bundles embedded in its tissue, its base surrounded by long brown sheaths, which are doubtless the persistent bases of former fronds; about half the height of the entire frond; dividing at top into two branches, of which one is leafy, the other fertile.

Fertile branch, or folded straight, the fertile branch clasped by the sterile.

Fruits from three to eight or ten inches high, firm, stout, fleshy. Sterile branch smooth, dark glossy green, pinnate. Pinnae four to six or seven pairs, subelliptate or lanceolate, the margins nearly entire, or somewhat erose, or more or less lobed; sometimes partially fertile. Fertile branch pinnate or bipinnate; the narrow sublinear spikelets (whether answering to pinnos or pinnae) fleshy, flattened, and bearing on the face towards the sterile branch a double row of erect spore-cases so that these spikelets are second, and they are moreover more or less incurred, or suberect. Sometimes more than one fertile branch is produced, and occasionally spore-cases occur on the edges of the barren pinnae.

Fertile branch smooth, subelliptate-lanceolate, i.e. the vein enters at the base, and becomes forked over and over again until the whole space is traversed by the contiguous slightly radiating veins and venules that do not extend quite to the margin.

Fruiting occupying the flattened radiiform divisions of the separate fertile branch of the frond. Spore-cases sessile, standing erect i.e. at a right angle to the plane of the segments, in two rows along each of these segments near the margin; smooth, spherical, without apparent rings or reticulations, bursting transversely, golden brown when mature. Spores smooth, roundish, oblong or angular, pale-coloured.

Duration. The crowns and roots are doubtless perennial. The fronds are annual, growing up in April or May, and becoming fully grown in June, afterwards gradually drying up and perishing with the summer's drought.

The ordinary state of the Moonwort may be known by the double row of fan-shaped pinnae which form the sterile branch of its frond. It is a plant not easily distinguished from the herbage among which it grows, and on that account is probably often passed over without recognition.

The variety rupestris, which is perhaps entitled to specific rank, differs in its broader triangular twice-divided barren branch—as though the form of the fertile branch were transferred to the barren; and by the linear form of the secondary divisions. It is reported to have been found near Buxton in Derbyshire, and on the sands of Barry near Dundee, but very sparingly. We have not seen a native specimen. Though the H. rupestris is by no means an unlikely plant to occur in Great Britain, the fact of its occurrence must, as yet, be regarded as doubtful.

No very marked success has been met with in cultivating the Botrychium. Mr. Newman regards it as an underground parasite, which view is at least doubtful, as the plants have been dug out with the utmost care without any trace of adhesion to the roots of surrounding plants being discovered. The difficulty of growing it is probably after all chiefly owing to the almost unavoidable fluctuations of moisture to which artificially-cultivated plants are subject, and which, judging from the natural sites in which this plant grows, it is unable to bear. The best chances of success are to dig up the plants while growing with soils of the natural soil large enough to enclose the roots uninjured, or to take them with loose soil at the dormant period, the position of the plants having of course been previously marked; in either case to plant them in considerable masses of soil, made up so as to imitate that from which they were taken as closely as possible, whether it be sandy loam or an unctuous peat, in both which they occur. Care must be also taken to keep the soil cool, and moderately as well as equally moistened. The plan of transplanting at the dormant period is certainly most in accordance with theoretical notions of success; and probably the shade afforded by other herbage such as grass, to the surface of the soil, would be found beneficial to the plants.
THE COMMON ADDER'S TONGUE,
(Ophioglossum vulgatum).

OPHIOGLOSSUM, Linnaeus.

Clumps of Sori-catenae naked, arranged in a simple dichotomous spike, forming a contracted branch of the frond. Sori-catenae umbrellar along each margin of the compressed spike, leathery, without reticulations, horizontal, globose, but sunk in or connate with the spike, opening in two valves transversely to the axis. Fries (exostate in British species), uniform, reticulated in elongated hexagonal stromata, with or without free included stipes.

O. vulgatum: fronds usually solitary; lanceate branch ovate obtuse; fertile branch linear.


HABITAT.—Ophioglossum vulgatum is in England a widely-spread plant, not generally abundant where it occurs. The situation in which it is found are swift little streams and small brooks. It cannot be traced in Wales, as well as in Scotland and Ireland, but certain instances in Oxford and Stafford, in the forrest of which Island. Mr. J. T. Smyth has found a small variety, characterizing in its form. Few British species are known, but it is found in the widely-spread species of America, Germany, Britain, and Culk. 50. Winter gives 140 feet as the probable depth of its situation above the sea level.

GEOGRAPHICAL DISTRIBUTION.—This species is found over nearly the whole of Europe, from the north of Russia to Norway, and Britain. It also occurs in the East Indies, in Taiwan, and in Japan (Ophioglossum, 1742), in N. Europe, in the United States, and in the island of Ceylon. It is met with in the western parts of North America (H. Hickey) in Mexico, and in New Zealand (P. Hickey). The 14 species and 16 subgenera of New Zealand, New Holland, and the Cape of Good Hope appear to be very doubtfully distinct from this species, except as a variety, differing more in the presence of a central costa than in aspect or colossus structure.

Crown-like Crown forming a thickened uniform descending axis (caulina, Frond), terminated by a broad or growing point enclosed by a few brown membranaceous sheaths. Roots coarse, brittle, flabby, spreading horizontally, unbranched, growing in a somewhat whorled manner from the crown and the perpendicular axis; one (or more) elongated underground in a stolon-like manner, and producing a new crown at a distance from the parent. When at rest, the rudimentary plant forms a growing point, exterior to the former fronds, at the apex of the crown.

Stipes erect, smooth, cylindrical, hollow, succulent, usually elongated to about two-thirds the height of the crown, traversed by two or three vascular bundles, the base enclosed by membranaceous sheathing scales; divided above into a separate fertile and barren branch.

Fernette plicate or folded straight, the sterile branch enclosing the spike of fructification.

Fronds from three or four inches to a foot in height, thin but somewhat flabby in texture. Sterile
THE COMMON ADDER'S TONGUE.

Branches smooth, entire, sessile, broadly-ovate or ovate-elongate, acute or obtuse, pale yellowish-green.

Fertile branches erect, consisting of a simple spike terminating a more or less elongated footstalk, which appears to spring from the inner base of the sterile branches; spike linear, very slightly tapering upwards. Occasionally more than one fertile spike is produced, but it is very seldom that more than one frond is produced from each crown.

Fenestration of the barren branch consisting of a series of uniform veins (no mid-vein) everywhere anastomosing, and forming a series of narrow elongated hexagonal areoles, those towards the circumference becoming shorter and broader; within these are a series of lesser veins (venules) dividing the areoles into other smaller ones of similar form. From the sides of these areoles branch, more or less abundantly, short, divaricate, free included retelete, which are usually more numerous near the margin.

Fructification occupying the margins of the linear spike, which terminates the contracted fertile branch. Spore-case smooth, spherical, without rings or reticulations, embedded in a single series in each margin of the spike, bursting transversely, and then forming gaping cavities which give a toothed appearance to the margins. Spores vermilion, roundish, pale-colored.

Duration. The crowns and roots are perennial. The fronds are annual, growing up in May, reaching maturity in June or July, and then gradually drying up and perishing.

The Adder's Tongue, with its broad oval barren branch, and linear fertile branch, is so unlike other British Ferns, that it may be at once distinguished by these features. Its simple barren branch does not present much variation, the principal differences lying between a short broad oval outline, and a more elongated oval approaching to lanceolate.

A somewhat marked variety, however—O. vulgatum minus—perhaps the O. azorinum of Presl, (Hooker, Fl. Acet. F. 1833, p. 165) has been found by Mr. Syme in Orkney. This is a much smaller plant, the barren branches of a narrow oval outline, and the plant reaching maturity in September, at which period the common form has decayed. The venation is the same as in the common form. The small size and narrow outline of this plant have induced some botanists to unite O. vulgatum with O. leichniiicum, as forms of one species, the plant now referred to being taken as one of principal connecting links; but this combination is surely carrying the so-called reduction of false species to an unnecessary length, and is at least as confusing as the opposite practice.

Though of similar habit to the Botrychium, this plant is more readily cultivated. The roots should be taken up without being broken, in sods of the soil in which they grow, and these should be planted in similar soil, in any moderately exposed situation, where the roots may be moist and cool, but not liable to excessive wetness. Loamy soil is generally preferred. It is one of those plants which seem to derive benefit from the shade of surrounding herbage, and in consequence 'gardenscape' neatness is intimated to it.
Plate LII. 6.

THE DWARF ADDER’S TONGUE,

(Ophioglossum Iustanicum).

OPIHOGLOSSUM, Linnaeus.

Clusters of Spore-case naked, arranged in a simple distichous spike, forming a contracted branch of the frond. Spore-case unilaterial along each margin of the compressed spike, lanitellus, without reticulations, horizontal, globose, but sunk in or connate with the spike, opening in two valves transversely to the axis, Vena (eostate in British species) uniform, revolute in elongated hexagonal areoles, with or without free included reticulae.

O. IUSTANICUM: fronds solitary, or two-three from each crown; barren branch linear or linear-lanceolate, small, thick, fleshy; fertile branch linear-oblong apiculate.


EXPLANATION OF THE PLATE.

Plate LII. 6.—Ophioglossum Iustanicum; from Hartweg; O. Wilsy and G. Jackson.

HABITAT.—This distinct species was found in 1824 by N. Walsby, in the neighbourhood of Dubl. Bel Bay, on the south-west of the Island of Great Britain; and it has since been found abundantly in other localities in that island, whence both N. Walsby and Mr. G. Jackson have furnished specimens. It seems probable that a similar species would be recorded by its discovery in the western counties of England, or in Ireland. It must, however, be sought in vain.

GEOGRAPHICAL DISTRIBUTION.—This Form is found in the European countries including the Maltese, in Portugal, Spain, France, Italy, Sicily, and Greece; as well as many of the islands of that sea. It grows also at Tangiers, Africa, and probably elsewhere, on the African coast; and in the Atlantic Archipelago, the Canaries, Madeira, Teneriffe, and the Azores. It is found also on the Swiss Alps, and in New Zealand (Oph. Bitera). A closely allied plant, perhaps identical with this, has been found by Mr. Spooner at St. Helens, and others similar have been noticed in New Zealand, in Jervis, and in Tasmania. A specimen of the plant is preserved here in the Botanical Museum. The Oph. Bitera from St. Helens, is also allied to the Oph. Iustanica, but the latter is a distinct species, not at all related to the above-mentioned. The Oph. Bitera of Bolivia, from New Zealand, is a diminutive of the normally small species.

Corn-like Crown forming a thickened, oblong-fatiform blunt descending axis (rhizome, Peduncle), the terminal bud or growing point conical, and enclosed by a few brown membranaceous sheaths. Roots coarse, brittle, fleshy, spreading or descending, unbranched, growing irregularly from the axis, one (or more) becoming elongated in a stolon-like manner, and producing a new crown towards its extremity.

Stipes erect, smooth, cylindrical, succulent, one-third to one-half the height of the frond, furnished with two or three slender vascular bundles, the base enclosed by membranaceous sheathing scales, which are taper-pointed above, dilated below; divided into a separate fertile and barren branch or terminating in a barren frond.

Veins of fronds plicate or folded straight.

Fridons from one to three inches high, thick and fleshy or succulent in texture, of a pale-green colour. Sterile Radical Fronds (commonly but not always accompanying the fertile fronds) linear-lanceolate, smooth, tapering below into the stalk or stipule. Sterile Branch of the fertile fronds linear, or more frequently linear-lanceolate, tapered below to its junction with the fertile branch, spreading, blanched from three-fifths of an inch to one and a half inch long, somewhat elevated at the margins.
**The Dwarf Adder's Tongue.**

Fertile branch erect, taller than the barren, consisting of a spike, supported on a longish stalk which is thickened upwards and becomes broad, fleshy, and flattened at the base of the spike; spike linear-oblong, apiculate, about half an inch long, often rather widened a little above the base, fleshy, and bearing along each margin from three to six spore-cases. A barren frond generally accompanies the fertile frond, and sometimes more than one fertile frond is produced from one crown.

**Venation** of the barren branch, consisting of a series of uniform veins (no midvein) furcately branching, so as to produce a series of nearly parallel venules, which here and there anastomose forming a few long narrow areoles. There are apparently no free included veiules.

**Pestulation** occupying the margins of the spike. *Spore-cases* smooth, spherical, without rings or reticulations, embedded in a single series of from three to six, in each margin of the spike, bursting transversely. *Spores* smooth, roundish or angular, pale-coloured.

**Duration.** The crown and roots appear to be perennial, though it has been suggested that they are biennial. The perennial character of the plant may perhaps be maintained by the successive production of crowns. The habits of the whole group *Ophioglossum* are, however, little known. The fronds are annual, growing up in winter, and fully developed by the middle of January.

This curious little plant, one of the most recent additions to the list of British species, may be known from the Common Adder's Tongue by its small size, its thick fleshy texture, and the narrow outline of the sterile branch of its frond. The plants average about a couple of inches in height, and rarely exceed three inches. It is an extremely interesting plant; and we think may fairly be allowed to remain separate from *O. vulgatum*—unless indeed in the Vegetable kingdom we must adopt the rule of combining under the name of a species a lengthened series of widely dissimilar forms, if they happen to be at all seemingly connected; a practice, which at the least would be equally inconvenient with the more fashionable mania for subdivision and separation. As in other simple-fronded genera, the species are, however, really difficult of limitation.

The most successful attempts that have been made to cultivate this little plant have consisted in taking up the plant in little clods of soil, and planting them in a compost of sandy loam, which resembles the soil in which they naturally grow. In this way, the plants may be occasionally preserved and induced to reappear at the proper season; but like all the allied species it can hardly be considered as a manageable plant in the cultivator's hands.