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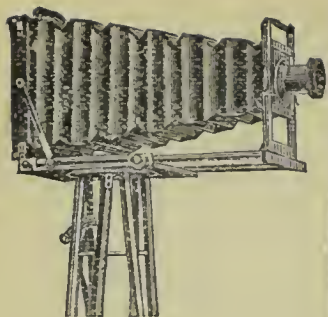
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BRITISH FERNS

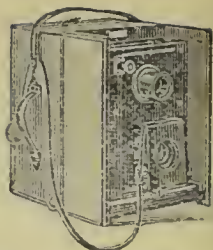
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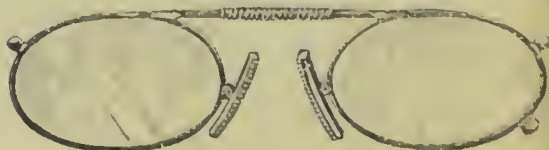
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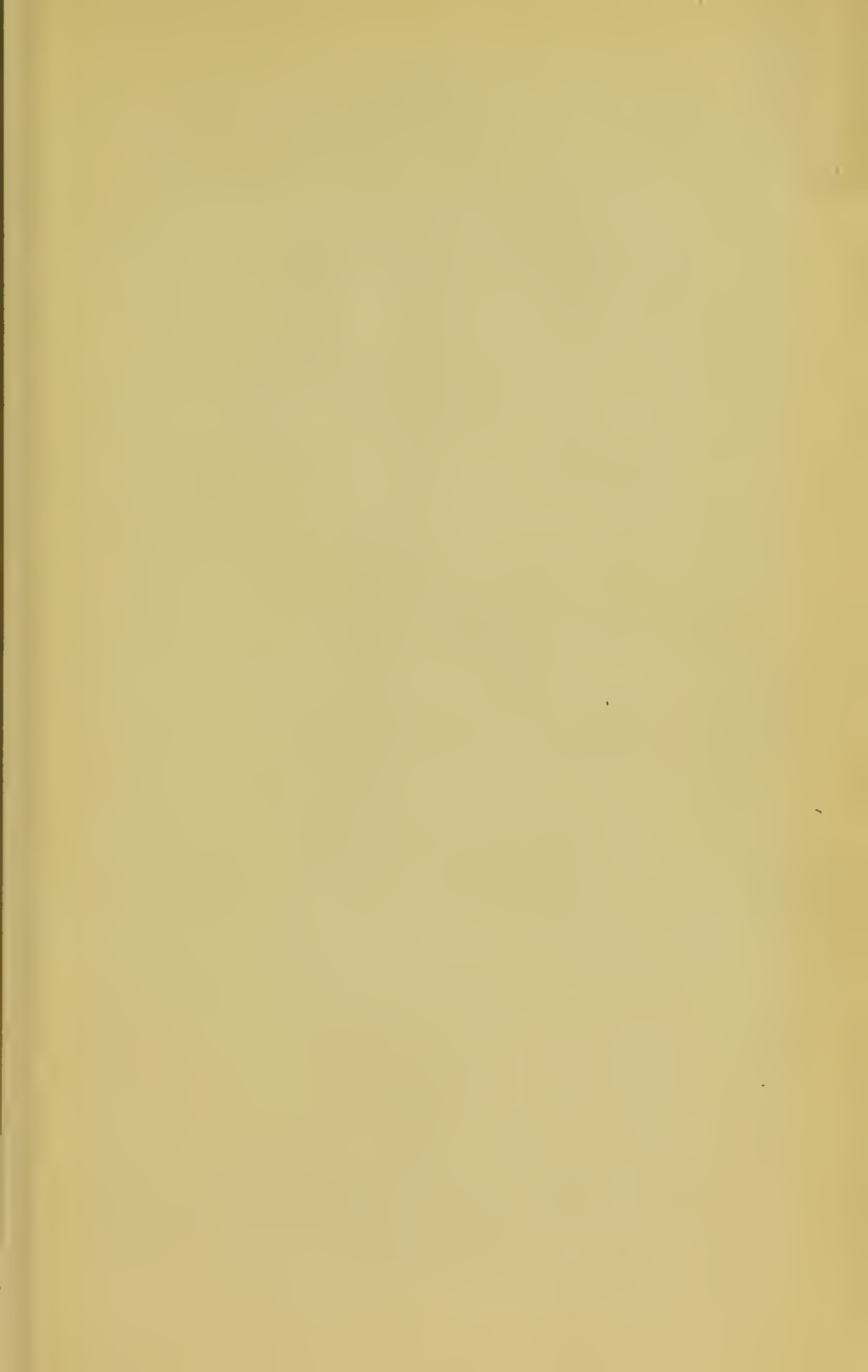
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Scolopendrium vulgare, var. *Viviparum* (showing bulbiferous plants). See Page 81.

(From "The Gardener's Chronicle.")

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AND
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BY

E. J. LOWE, Esq., F.R.S., F.L.S., F.G.S., F.ROY.M.S., ETC.

Author of "Our Native Ferns," etc.



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1890.

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ARE TRAITS THAT CANNOT BE FORGOTTEN,
AND WHOSE
ENTHUSIASTIC LABOURS AND KEEN PERCEPTION
ENABLED HIM TO DO SO MUCH
FOR THE ADVANCEMENT OF THIS,
HIS FAVOURITE SUBJECT.

E. J. LOWE.

P R E F A C E.

THE Author of this Handbook is anxious to acknowledge the great help that he has received from his numerous fern friends. More especially are these thanks due to Dr. F. W. Stansfield, of Sale, without whose valuable assistance and suggestions (notably as regards classification) it would have been impossible to have written this work in six weeks. The book was required at a short notice, and therefore it is hoped that any imperfections will be dealt with mercifully.

To Dr. Maxwell Masters, Mr. E. F. Fox, Mr. W. H. Phillips, Mr. J. H. Fitt, Mr. W. Barnard-Hankey, Mr. R. Thompson, Mr. J. M. Barnes (now deceased), Mrs. Grant, Mrs. Barnes, Colonel Randall, Mrs. Lewis, Mrs. Curre, Mr. Elworthy (son of the late Mr. C. Elworthy), Messrs. Birkenhead, Messrs. Backhouse, Mr. H. S. Perry, Mrs. J. K. Hodgson, Miss Jones, Mrs. Bagnall Oakeley, Mr. J. Garnett, Mr. R. Ll. Praeger, Mr. Martin-Atkins, Mr. P. B. O'Kelly, Mr. C. T. Druery, Major Cowburn, Mr. Stabler, Mr. W. G. Baker (Botanic Gardens, Oxford), Mr. J. W. Morris, and others, his thanks are also specially due, for plants, fronds, and various information.

The Author has received great help from the invaluable "Nature Printed Impressions of British Ferns," by the late Colonel A. M. Jones, and from an examination of his dried fronds, and his valuable collection of historical ferns now growing in the Clifton Zoological Gardens (under the superintendence of the Author), containing divisions of the principal original wild finds of various collectors, as well as those raised by Colonel Jones and others. Further sources of information have been "Choice British Ferns," by Mr. C. T. Druery; "Ferns of the English Lake Country," by Mr. J. M. Barnes; "The Ferns of Ulster," by Mr. W. H. Phillips and Mr. R. Ll. Praeger; "Select Lists of British Ferns," by Messrs. F. W. and H. Stansfield; "European Ferns," by Mr. J. Britten; "Geographical Handbook of Ferns," by Mrs. Lyell; and "Historical Notes of Ferns," MSS. by Mr. E. F. Fox.

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collections of growing plants at Milnthorp (the late Mr. J. M. Barnes), at Scarborough (the late Mr. A. Clapham, *dispersed*); at Bulwell and Exeter (the late Rev. C. Padley, *dispersed*); at Usk (the late Mr. Carbonell, *now at the Royal Gardens, Kew*); at Chislehurst (Mr. G. B. Wollaston), Nettlecombe Court (Sir Alfred Trevelyan), Darlaston Hall (the late Mr. Swynfen-Jervis), Rolleston Hall (the late Sir Oswald Mosley), Hawkchurch (the late Mr. J. Wills, *dispersed*), Chelsea Botanic Gardens (the late Mr. T. Moore), Edinburgh (Mr. P. N. Fraser), Ilfracombe (Mr. J. Dadds), Torbay (Miss Kitson, *dispersed*), Hartfield, Birmingham (Mr. J. E. Mapplebeck); at Iona House, Clifton (Mr. Martin-Atkins), Hillersdon House, Exeter (Mrs. Grant), Exeter (the late Mr. R. Gray, *dispersed*), Brislington (Mr. E. F. Fox); at Bowdon (the late Mr. J. Sidebotham), Windermere (Mr. J. Clowes), Bowness (Mr. Garnett, and Mr. Wilson), Scarborough (the late Mr. C. Glave, *dispersed*), Whitby (the late Mr. W. Willison, *dispersed*), Malton (the late Mr. Monkman, *dispersed*), Levens (Mr. Stabler), York (Messrs. Backhouse and Mrs. Buckle), Marwood (the late Rev. F. Mules), Papplewick (the late Mr. Riley, *dispersed*), Foots Cray (the late Mr. R. Sim), Kirkcaldy (Mr. Sang) Tunbridge Wells (The late Mrs. Delves, *dispersed*), Wentworth (the late Mr. J. Henderson), Vauvert, Guernsey (the late Mr. J. James, *dispersed*), Glasnevin Gardens (the late Mr. D. Moore), Belfast (Mr. W. H. Phillips), Edinburgh (the late Mr. Tait, *dispersed*), Holywood (Mr. R. Ll. Praeger), Ulverston (Mrs. Hodgson), South Kensington Museum (Mrs. Cowper), Ilfracombe (Mr. R. Moule), Charmouth (Mr. J. Moly), etc.

To Mr. John C. Nimmo, Publisher, London, the Author is indebted for the use of the Illustrations, and for which he offers his thanks.*

* The Author is aware that some of the varieties are not sufficiently distinct to be retained; this, however, can be more satisfactorily discussed by the Fern Conference from a careful examination of fronds. A few additional varieties will be found in an Addendum.

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Varieties of the British Ferns.

THESE have been described in 1859 in "Nature-Printed British Ferns," by Mr. Thomas Moore; in "Our Native Ferns," in 1867, by the Author of this Handbook; in 1876 to 1880, *privately* (6 parts) in "Varieties of the British Species of Ferns," nature-printed, by Colonel A. M. Jones; in 1878, in "Ferns of the English Lakes," edited by Mr. J. M. Barnes; and in 1888, in "Choice British Ferns," by Mr. C. T. Druery.

For elaborate descriptions the reader is referred to these works; but the vast increase in our knowledge of this subject, during the last few years, has caused the earlier works to be out of date. Many varieties were unknown when they were written, and a number of unimportant forms have now to be rejected. The English Lakes are, of course, restricted to a prescribed area; and Mr. Druery's excellent "Choice British Ferns," as the name implies, is limited to the most striking departures from the normal forms; and even in extraordinary varieties there are many beautiful ferns that have been discovered during the past two years, and others that do not appear to have been known to Mr. Druery.

For several reasons it is desirable to have a record up to the present time; and the most powerful of these arguments is the confusion that exists. Allied varieties have been found by different persons, and such names as *divisolobum*, *grandiceps*, *plumosum*, *polydactylum*, *cristatum*, *cruciatum*, *crispum*, etc., have been used over and over again, sometimes with the additional name of the finder; or, if showing distinct characters, one or two extra names have been added, until we have varieties that can boast of possessing three or four names, such, for example, as *Aspidium angulare*, variety *decompositum-magnificum-polydactylum*, and one or two even longer than this. A simple descriptive name of any *marked character*, such as *plumosum*, *cristatum* or *crispum*, is desirable, or even a compound name that will denote two marked characters like *ramo-coronans*, *sagittato-projectum*, or *lineare-cristatum*, may not be objected to; but a cumbersome string of names cannot be tolerated, no matter how descriptive it may be; in fact, a name is the symbol by which it is to be recognised, and is not intended to be a description. We can now, by crossing several varieties of ferns, produce all the characters on one frond, and several of these again crossed will give us their combined characters; and this must prove the utter impossibility of a descriptive nomenclature.

It is always undesirable to change a familiar name; and therefore, in order to create as little alteration as possible,—in those families that are particularly rich in varieties,—a plan has been adopted of dividing the varieties of the species *Aspidium angulare*, *Scolopendrium vulgare*, and *Asplenium filix-fœmina* into divisions, groups, and sections, for the distinct varieties are now to be reckoned by hundreds in these species:—

Asplenium Filix-fœmina.

DIVISION A. Changes in skeleton.

<p><i>Group 1</i> (branched).</p> <p>Section α ramosum.</p> <p>„ β grandiceps.</p> <p>„ γ cristatum.</p> <p>„ δ cruciatum.</p>	<p><i>Group 2</i> (dwarfed).</p> <p>Section α pumilum.</p> <p>„ β <u>crispatum.</u></p> <p><i>Group 3</i> (flexuose).</p> <p>Section α flexuosum.</p>
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DIVISION B. Alteration of soft parts.

<p><i>Group 1</i> (subdivision of segments).</p> <p>Section α plumosum.</p> <p>„ β dissectum.</p>	<p><i>Group 2</i> (diminution of soft parts).</p> <p>Section α laxum.</p> <p>„ β depauperatum.</p>
<p><i>Group 3</i> (abbreviated pinnæ).</p>	
<p>Section α rotundatum.</p> <p>„ β linearc.</p>	<p>Section γ laciniatum.</p> <p>„ δ lunulatum.</p>

Scolopendrium vulgare.

DIVISION A. Changes in skeleton.

<p><i>Group 1</i> (branched).</p>	
<p>Section α ramosum.</p> <p>Sub-section α ramo-inæquale.</p> <p>Section β cristatum.</p> <p>Sub-section β ramo-marginatum.</p>	<p>Section γ conglomeratum.</p> <p>„ δ sagittatum.</p>
<p><i>Group 2</i> (truncate).</p>	
<p>Section α truncatum.</p> <p>Sub-section α periferens.</p>	<p><i>Group 3</i> (flexuose).</p> <p>Section α flexuosum.</p>

DIVISION B. Alteration of soft parts.

<p><i>Group 1</i> (increased development).</p> <p>Section α crispum.</p> <p>„ β undulatum.</p>	<p><i>Group 2</i> (narrowing of skeleton).</p> <p>Section α exiguum.</p>
<p><i>Group 3</i> (surface rough).</p>	
<p>Section α muricatum.</p> <p>„ β supralineatum.</p> <p>„ γ marginatum.</p>	<p><i>Group 4</i> (margin altered).</p> <p>Section α <u>fissile.</u></p> <p><i>Group 5</i> (variegated).</p> <p>Section α variegatum.</p>

Aspidium angulare.

DIVISION A. Changes in skeleton.

Group 1 (branched).

Section α ramosum.	Section δ polydactylum.
„ β grandiceps.	„ ϵ brachiatum.
„ γ cristatum.	„ ζ cruciatum.

Group 2 (dwarfed).

Section α congestum.
„ β alatum.

Group 3 (flexuose).

Section α flexuosum.

Group 4 (stipitate).

Section α stipatum.

DIVISION B. Alteration of soft parts.

Group 1 (increased development).

Section α plumosum.
„ β foliosum.
„ γ pulcherrimum.
„ δ macropinnulum.

Group 2 (diminished development).

Section α laxum.

Group 3 (subdivision of pinnules).

Section α decompositum.
„ β acutilobum.
„ γ divisolobum.
„ δ plumoso-divisolobum.
„ ϵ multilobum.

Group 4 (changed development).

Section α rotundatum.
„ β lineare.
„ γ laciniatum.
„ δ setosum.
„ ϵ perserratum.

DIVISION C. Alteration of outline.

Group 1 (widened).

Section α deltoideum.

Group 2 (narrowed).

Section α angustatum.

DIVISION D. Alteration in colour.

Group 1 (variegated).

Section α variegatum.

By the above arrangement the number of names to any one variety is in most instances diminished, being merged into the name of the section. The aim has been to correct the unpalatable names that already exist without destroying their identity.* Future names, it is hoped, will be more in accordance with the rules of Botany; and this is important, as the increase in varieties, both by wild

* Mr. Thomas Moore, whose name will always be received with respect, was (perhaps innocently) the originator of compound names. A Hart's Tongue having a marginal belt was named by him *marginatum*, another *bimarginatum*, whilst a third with a branched head became *bimarginatum multifidum*. This habit became chronic with some of our British Fern authorities, who declared that a descriptive name, no matter how unwieldy, was the one to adopt. Even the nomenclature of Linnæus and Decandolle was condemned; and the variety of *Polypodium vulgare* known as *cambricum* from the time of Linnæus (more than a century ago) was altered to *plumosum*. The author believes that nearly all the members of the Pteridological Society now condemn cumbersome names.

finds and by judicious crossing, has never advanced so rapidly as it is doing at the present time.

The nomenclature adopted in this Handbook is that of the late Sir William Hooker, as given in his "Synopsis Filicum," completed by Mr. J. G. Baker, F.R.S., Royal Gardens, Kew. In this work Sir William Hooker has arranged the British species in the following order :—

SUB-ORDER II. POLYPODIACEÆ.

Tribe 2. DICKSONIÆ.

- Woodsia ilvensis*, *R. Brown*.
 ,, *hyperborea*, *R. Brown*.
-

Tribe 3. HYMENOPHYLLIÆ.

- Hymenophyllum Tunbridgensis*, *Smith*.
 ,, *unilaterale*, *Bory*.
Trichomanes radicans, *Swartz*.
-

Tribe 4. DAVALLIÆ.

- Cystopteris fragilis*, *Bernhardi*.
 ,, *alpina*, *Desvaux*
 (*Cystopteris regia*, *Desvaux*).
 ,, *montana*, *Link*.
-

Tribe 6. PTERIDEÆ.

- Adiantum Capillus-Veneris*, *Linnaeus*.
Cryptogramme crispa, *R. Brown*
 (*Allosorus crispus*, *Bernhardi*).
Pteris aquilina, *Linnaeus*.
Lomaria Spicant, *Desvaux*
 (*Blechnum Spicant*, *Smith*).
-

Tribe 8. ASPLENIÆ.

- Asplenium viride*, *Hudson*.
 ,, *Trichomanes*, *Linnaeus*.
 ,, *septentrionale*, *Linnaeus*.
 ,, *marinum*, *Linnaeus*.
 ,, *Germanicum*, *Weiss*.
 ,, *Ruta-muraria*, *Linnaeus*.
 ,, *Adiantum-nigrum*, *Linnaeus*.
 ,, *fontanum*, *Bernhardi*.
 ,, *lanccolatum*, *Hudson*.
 ,, *Filix-fœmina*, *Bernhardi*.
 (*Athyrium Filix-fœmina*, *Roth*).
 ,, *Ceterach*, *Linnaeus*
 (*Ceterach officinarum*, *Willdenow*).
-

Tribe 9. SCOLOPENDRIÆ.

- Scolopendrium vulgare*, *Smith*.
-

Tribe 10. ASPIDIEÆ.

- Aspidium Lonchitis, *Swartz*
 (Polystichum Lonchitis, *Roth*).
 „ aculeatum, *Swartz*
 (Polystichum aculeatum, *Roth*).
 „ angulare, *Kitaibel*
 (Polystichum angulare, *Presl*, and included
 in *aculeatum*, *Swartz*).
 Nephrodium Thelypteris, *Desvaux*
 (Lastrea Thelypteris, *Bory*).
 „ montanum, *Baker*
 (Lastrea montana, *Moore*, and *L. Oreopteris*,
Bory).
 „ Filix mas, *Richard*
 (Lastrea Filix-mas, *Presl*).
 „ paleaceum, *Don*
 (Lastrea Filix-mas, *Presl*, and *Aspidium*
paleaceum, *Donovan*).
 „ propinquum, *Lowe*
 (Lastrea Filix-mas, *Presl*, and *L. propinqua*,
Wollaston).
 „ cristatum, *Michaux*
 (Lastrea cristata, *Presl*).
 „ rigidum, *Desvaux*
 (Lastrea rigida, *Presl*).
 „ spinulosum, *Desvaux*
 (Lastrea dilatata, *Presl*).

Tribe 11. POLYPODIEÆ.

- Polypodium Phegopteris, *Linnaeus*.
 „ Dryopteris, *Linnaeus*.
 „ Robertianum, *Hoffmann*
 (P. calcareum, *Smith* and *P. Dryopteris*,
 var. *Bolton*).
 „ alpestre, *Hoppe*.
 „ vulgare, *Linnaeus*.

Tribe 12. GRAMMITIDEÆ.

- Gymnogramme leptophylla, *Desvaux*.

SUB-ORDER III. OSMUNDACEÆ.

- Osmunda regalis, *Linnaeus*.

SUB-ORDER VI. OPHIOGLOSSACEÆ.

- Ophioglossum lusitanicum, *Linnaeus*.
 „ vulgatum, *Linnaeus*.
 Botrychium Lunaria, *Swartz*.

In Sub-order I there are no European representatives

- " 2, Tribe I " "
 " 2, " 4, this contains 81 known Davallias, none British.
 " 2, " 5, no European representatives.
 " 2, " 6, out of 62 Adiantums only one is British.
 " 2, " 7, none British.
 " 2, " 8, out of 282 Aspleniums 11 are British.
 " 2, " 9, Great Britain has one Scolopendrium.
 " 2, " 10, out of 56 Aspidiums we have 3, and out of 224
 Nephrodiums we have only 6.
 " 2, " 11, Polypodium. There are 393 species, of which
 only 4 are British.
 " 3, we have one Osmunda.
 " 4, there are no representatives in Europe.
 " 5, none in Europe.
 " 6, Ophioglossum and Botrychium, there are 3 in the United
 Kingdom and 8 in Europe.

THE FERNS OF EUROPE PROPER.

(Natives of this country are distinguished thus *).

- | | |
|--|---|
| Onoclea Germanica, <i>Willdenow.</i> | Arctic Europe to Pyrenees. |
| Woodsia glabella, <i>Brown.</i> | Lapland, S. Tyrol. |
| " Caucasica, <i>J. Smith.</i> | Caucasus. |
| * " Ilvensis, <i>Brown.</i> | England, Wales, and Seotland. |
| * " hyperborea, <i>Brown.</i> | England, Wales, and Seotland. |
| Dieksonia Culcita, <i>L'Héritier.</i> | Spain. |
| * Hymenophyllum Tunbridgense, <i>Smith.</i> | England, Wales, and Seotland. |
| * " unilaterale, <i>R. Brown.</i> | England, Scotland, and Ireland. |
| | Norway. |
| * Trichomanes radicans, <i>Swartz.</i> | Ireland, Scotland, and Wales. |
| Davallia Canariensis, <i>Smith.</i> | Spain and Portugal. |
| * Cystopteris fragilis, <i>Bernhardi.</i> | United Kingdom. |
| * " alpina, <i>Desvaux.</i> | England, and from Sweden to Spain. |
| " Sudetica, <i>A. Br. & Milde.</i> | Silesia, Moravia, and Carpathians. |
| * " montana, <i>Link.</i> | Scotland, Scandinavia, and Central
Europe. |
| * Adiantum Capillus-Veneris, <i>Linnaeus.</i> | England, Wales, Ireland, & warmer
parts of Europe. |
| " Æthiopieum, <i>Linnaeus.</i> | Spain. |
| Cheilanthes fragrans, <i>Webb & Berth.</i> | Switzerland and Southern Europe. |
| " Hispanica, <i>Mettenius.</i> | Portugal and Spain. |
| " Szovitzii, <i>Fisch & Meyer.</i> | Italy and Dalmatia. |
| * Cryptogramme crispa, <i>R. Brown.</i> | England, Seotland, Ireland, Spain,
Lapland. |
| Pteris longifolia, <i>Linnaeus.</i> | Spain, Dalmatia, Sicily. |
| " Cretica, <i>Linnaeus.</i> | Switzerland, Italy, Crete, Corsica. |
| " arguta, <i>Aiton.</i> | Portugal. |
| * " aquilina, <i>Linnaeus.</i> | England, and throughout Europe. |
| * Lomaria Spicant, <i>Desvaux.</i> | United Kingdom, and throughout
Europe. |

	Woodwardia radicans, <i>Smith.</i>	Spain, Portugal, Italy, Sicily.
	Asplenium Hemionitis, <i>Linnaeus.</i>	Spain, Portugal.
*	„ viride, <i>Hudson.</i>	United Kingdom, and from Arctic Europe to Pyrenees.
	„ Heuffleri, <i>Reichardt.</i>	Tyrol.
*	„ Trichomanes, <i>Linnaeus.</i>	United Kingdom, and throughout Europe.
	„ Petrarchæ, <i>De Candolle.</i>	S. of France, Italy, Spain, Sicily.
*	„ septentrionale, <i>Hoffmann.</i>	Britain, Scotland, Norway, Spain, Italy.
	„ Seelosii, <i>Leybold.</i>	Tyrol and Carinthia.
*	„ marinum, <i>Linnaeus.</i>	British Isles, Orkney, France, and Spain.
*	„ germanicum, <i>Weiss.</i>	England, Scotland, Wales; Middle and N. Europe.
**	„ Ruta-muraria, <i>Linnaeus.</i>	United Kingdom. Arctic Europe to Spain.
	„ fissum, <i>Kitaibel.</i>	Germany, Italy, Turkey, Hungary, Dalmatia.
*	„ Adiantum-nigrum, <i>Linnaeus.</i>	United Kingdom, and throughout Europe.
**	„ fontanum, <i>Bernhardi.</i>	England. Central Europe to Spain.
**	„ lanceolatum, <i>Hudson.</i>	England, Spain, Portugal, Greece.
	„ (Athyrium) crenatum, <i>Ruprecht.</i>	Norway, Sweden, Lapland.
*	„ (Athyrium) Filix-fœmina, <i>Bernhardi.</i>	United Kingdom, and throughout Europe.
*	„ (Hemidictyum) Ceterach, <i>Linnaeus.</i>	England, Ireland; to Spain and Greece.
*	„ Scolopendrium vulgare, <i>Swartz.</i>	United Kingdom. Throughout Europe.
	„ Hemionitis, <i>Swartz.</i>	France, Italy, Sicily, Spain, Greece.
	Aspidium (Polystichum) Lonchitis, <i>Swartz.</i>	United Kingdom. From Greenland to Greece.
	„ (Polystichum) aculcatum, <i>Swartz.</i>	United Kingdom. Throughout Europe.
	Nephrodium (Lastrea) Thelypteris, <i>Desvaux.</i>	England, Ireland, Scotland. Throughout Europe.
	„ „ montanum, <i>Baker.</i>	United Kingdom. Lapland to Greece.
	„ „ Filix-mas, <i>Richard.</i>	United Kingdom. Throughout Europe.
	„ „ cristatum, <i>Michaux.</i>	England, Scandinavia, Italy, Greece.
	„ „ rigidum, <i>Desvaux.</i>	England, Spain, Greece, Germany, Switzerland.
	„ „ spinulosum, <i>Desvaux.</i>	United Kingdom. Throughout Europe.
	Polypodium (Phegopteris) Phegopteris, <i>Linnaeus.</i>	United Kingdom. Throughout Europe.
	„ „ Dryopteris, <i>Linnaeus.</i>	United Kingdom. Lapland to Pyrenees.
	„ „ alpestre, <i>Hoppe.</i>	Scotland, Lapland, Russia, Germany, Alps.

* <i>Polypodium vulgare</i> , <i>Linnaeus</i> .	United Kingdom. Throughout Europe.
<i>Nothochlæna lanuginosa</i> , <i>Desvaux</i> .	Spain, Greece, Syria.
„ <i>Marantæ</i> , <i>R. Brown</i> .	S. Europe.
<i>Gymnogramme Pozoi</i> , <i>Kunze</i> .	Spain.
* „ <i>leptophylla</i> , <i>Desvaux</i> .	Jersey. S. Europe.
* <i>Osmunda regalis</i> , <i>Linnaeus</i> .	United Kingdom. Throughout Europe.
* <i>Ophioglossum Lusitanicum</i> , <i>Linnaeus</i> .	Guernsey to Mediterranean.
* „ <i>vulgatum</i> , <i>Linnaeus</i> .	England and Ireland. Lapland, and various parts of Europe.
<i>Botrychium simplex</i> , <i>Hitchcock</i> .	N. Europe.
„ <i>rutaceum</i> , <i>Swartz</i> .	Scandinavia.
* „ <i>Lunaria</i> , <i>Swartz</i> .	United Kingdom. From Arctic Europe to Spain.
„ <i>ternatum</i> , <i>Swartz</i> .	Lapland to Pyrenees.
„ <i>Virginianum</i> , <i>Swartz</i> .	Norway to Austria.
„ <i>Matricariæfolium</i> , † <i>A. Brown</i> .	N. Europe.

To the above may be added, from Algeria, Madeira, Canaries, and Azores:—

<i>Onoclea orientalis</i> , <i>Hooker</i> .
<i>Adiantum reniforme</i> , <i>Linnaeus</i> .
<i>Cheilanthes pulchella</i> , <i>Bory</i> .
<i>Asplenium monanthemum</i> , <i>Linnaeus</i> .
„ <i>sepulchrale</i> , <i>Hooker</i> .
„ <i>furcatum</i> , <i>Thunberg</i> .
„ (<i>Athyrium</i>) <i>umbrosum</i> , <i>J. Smith</i> .
<i>Aspidium</i> (<i>Polystichum</i>) <i>falcinellum</i> , <i>Swartz</i> .
„ „ <i>frondosum</i> , <i>R. Lowe</i> .
<i>Nephrodium</i> (<i>Lastrea</i>) <i>æmulum</i> , <i>Baker</i> .
„ „ <i>unitum</i> , <i>R. Brown</i> .
„ „ <i>molle</i> , <i>Desvaux</i> .
<i>Polypodium</i> (<i>Phegopteris</i>) <i>drepanum</i> , <i>Hooker</i> .
<i>Gymnogramme</i> (<i>Leptogramme</i>) <i>Totta</i> , <i>Schlechtendal</i> .
<i>Acrostichum squamosum</i> , <i>Swartz</i> .

A more extended account of the Ferns of Europe, and throughout the world, will be found by referring to “A Geographical Handbook of all the Known Ferns,” by Mrs. K. M. Lyell (1870), the above extract being sufficient to show the Ferns of Europe. Reference may also be made to “Cassell’s European Ferns,” in which the species are described and figured. There are twenty-nine species not found in this country, out of the seventy European Ferns. My list contains forty-five British species.

† Included in “European Ferns,” by Mr. James Britten.

SUB-ORDER II.

POLYPODIACEÆ.

Tribe 2. DICKSONIÆ.

THE OBLONG WOODSIA.

WOODSIA ILVENSIS.—*R. Brown.*

A DIMINUTIVE mountain fern with fronds from 2 to 4 inches long. This plant grows in the crevices of damp rocks. The fronds are lanceolate-pinnate, the pinnæ being profoundly pinnatifid. The rachis, stipes, and underside of the frond chaffy, and the sori scattered. It is a deciduous fern, and requires growing under a bell-glass. Exceedingly rare, and found at altitudes of from 1,200 to 3,000 ft. Mr. Joseph Sida-botham discovered it in Carnarvonshire; and it has been found in Westmoreland, Cumberland, and Durham, one locality near the Caldron Spout, Teesdale (in an inaccessible place, E. J. L.). In Scotland, near Loch Skene (Rev. W. Little) to the North of Moffat (P. Gray), hills between Dumfries and Peeblesshire (abundant, Mr. W. Stevens), near Crieff on Ben Chonzie (the late Professor Balfour), Ben Lawers (Mr. J. Backhouse), Clova Mountains (Sir W. Hooker). Professor Balfour, Mr. Neill Fraser and myself failed to find it on Ben Lawers.

It occurs in Iceland, Lapland, Norway, Sweden, Denmark, Russia, Nova-Zembla, Caucasus, the Crimea, Spain, Italy, France, Germany, Switzerland, Hungary, Siberia, Kamtschatka, United States, Canada, the Rocky Mountains and Arctic America, Japan, Siberia, Labrador, Greenland.

No varieties are recorded.

THE ALPINE WOODSIA.

WOODSIA HYPERBOREA.—*R. Brown.*

HAIRY, but not scaly.

Equally rare and scarcely as large as *Woodsia ilvensis*, and with shorter pinnæ; growing in similar situations.

Our British recorded localities are Snowdon (Mr. L. Clark) near Crieff on Ben Chonzie, Perthshire, Glen Isla For-



FIG. 1.—*Woodsia ilvensis.*



FIG. 2.—*Woodsia hyperborea.*

farshire, and Glen Fiadh, Clova Mountains (the late Professor Balfour), on Ben Lawers (both by Mr. W. Wilson and Mr. Dickson), and between Glen Lochy and Glen Dochart (Mr. J. T. Syme).

It is a native of Finland, Sweden, Lapland, Norway, Russia, Germany, France, Switzerland, Spain, Siberia, Silesia, Transylvania, Hungary, Rocky Mountains, on the Himalaya, and in Massachusetts.

There are no varieties.

Tribe 3. HYMENOPHYLLEÆ.

THE ONE-SIDED FILM FERN.

HYMENOPHYLLUM UNILATERALE.—*Bory.*
(H. WILSONI.—*Hooker.*)

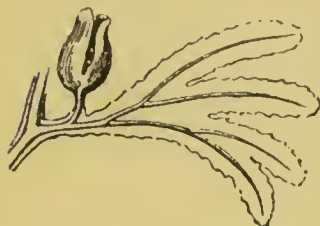


FIG. 3.—*Hymenophyllum unilaterale* (showing fructification).

A MOSS-LIKE fern which might readily be mistaken for one of the Musci family, having pellucid-membraneous fronds, from 1 to 6 inches in length. Pinnate, the pinnæ divided into 3 or 4 lobes. Involucres stalked, the upper margin serrated. Growing in very damp situations amongst moss on the ground or at the base of trees, and on wet rocks.

Found in Cornwall, Devon, Stafford, Salop, Lancashire, York, Northumberland, Westmoreland, and Cumberland (in the English lakes in at least a score localities), Glamorgan, Brecknock, Cardigan, Carmarthen, Montgomery, Merioneth, and Carnarvon. In 13 Scotch counties, 12 Irish counties, Mull, Arran, Shetland, Orkney, and Harris.

A native of Norway, Faroe, Bourbon, New Zealand, Chiloe, Falkland, Tierra del Fuego, Cape Horn, Tasmania, Cape of Good Hope, and Hermite Island.

The fronds endure for several years, and renew their growth annually. Mr. Gray of Alphington had a plant that had fronds 6 inches long, many of which became branched by subsequent growths.

VARIETIES.*

*1 *Kinahani, Lowe.* Found in 1870 in the Galway Mountains by Mr. R. Kinahan, of the Irish Geological Survey. A long narrow form.

2 *Ramosum, Gray.* Found in 1867 on Sheep's Tor, Dartmoor, by Mr. R. J. Gray, and in 1882 on the Mourne Mountains, Ireland, by Mr. R. L. Præger, length $4\frac{1}{2}$ inches. Branching several times from the main stem.

* All varieties marked thus (*) have received 1st class Certificates from the Royal Horticultural Society or Royal Botanic Society.

THE TUNBRIDGE FILM FERN.

HYMENOPHYLLUM TUNBRIDGENSE.—*Smith.*

A SOMEWHAT similar fern, with broader fronds and having more divisions in the pinnæ, sometimes being split into 8 or 10 lobes. Less common than *H. unilaterale*.

Found in Cornwall, Devon, Somerset, Kent, Sussex, Lancashire, Cheshire, Yorkshire, Cumberland, Westmoreland, Glamorgan, Brecknock, Merioneth, Carnarvon. In 5 Scotch and 6 Irish counties. Valentia, Mull, Bute, and Arran.

A native of Norway, Sweden, France, Germany, Italy, Belgium, India, Madeira, Azores, Mauritius, Chili, Brazil, New Holland, New Zealand, Tasmania, Valdivia, and the Cape of Good Hope.

The fronds paler in colour than those of *H. unilaterale*. The involucre without stalk and the upper margin not serrated.

VARIETY.

latifolium, *Praeger*. Found in 1882 at Narrowwater, county Armagh, by Mr. R. L. Praeger. $5 \times 1\frac{3}{4}$ inches (in widest part), lower half depauperate and very narrow, above broad and plumose.

The Film Fern succeeds well when fastened to a large stone with wires, provided the stone is kept wet.

Both the Film Ferns are often found growing together, though *H. unilaterale* is the commoner of the two. In Hooker's "Synopsis Filicum," the one-sided Film Fern is considered as a variety of the Tunbridge Film Fern.

THE BRISTLE FERN.

TRICHOMANES RADICANS.—*Swartz.*

ONE of the Filmy ferns, and the only Trichomanes that is a native of Great Britain; a genus that abounds in the Tropics. It grows on wet rocks in mountainous districts, delighting in the spray of a waterfall. The fronds vary in length from six to sixteen inches, are membranaceous, pellucid, smooth, and olive-green. The fronds, if uninjured, remain on the plant for several years. It is ovate-triangular in form, and feathery in appearance. Cannot be confused with any other fern.

Bolton saw it in 1758 growing in abundance near Bingley in Yorkshire, but in 1782 could only find one plant. The late Mr. Backhouse found it about thirty years ago tolerably abundant and flourishing luxuriantly in several places, extending over several miles in Wales, but the locality has been kept secret from a dread of its extermination by collectors. Mr. Backhouse gave me a



FIG. 4.—*Hymenophyllum Tunbridgense* (showing fructification).

plant, which is now a large specimen, and proves a distinct variety. More recently Mr. Rowbotham again found this fern in Wales. It is to all intents an Irish fern, and is much more rare than it used to be. Dr. Mackay found it in Hermitage Glen; Dr. Stokes, at Powerscourt Waterfall; Glendine, by Mr. R. Ball; Glanbour, by Mr. J. A. Fisher; Temple Michael Glen, by Mr. D. Murray; Ballinhasy Glen and Bandon, by Mr. S. P. Woodward; Clashgariffe, by Mr. J. Drummond; Glandore, by Dr. Allman; Bantry and Curaan Lake, by Mr. C. C. Babington; Kildorrery, by Mr. J. Carrol; Blackwater, by Dr. Kinahan; Cumailte Mountains and Torc, Killarney, by Dr. Mackay; Island of Valentia, by Miss H. Blackburne; Cromaglaun, by Mr. W. Christy; Mount Eagle, by Mr. D. Moore; Gortagaree, by Dr. Taylor; and Blackstones, Glouin, Caragh, Inveragh, by Mr. W. Andrews; and in Donegal (1884), by Mr. P. Mahoney. It has also been found in the island of Arran, Scotland, by Mr. W. B. Simson, of Edinburgh.

A native of Spain, Teneriffe, Canary, Madeira, Azores, Algeria, Jamaica, Martinique, Mexico, Panama, New Granada, Brazil, United States, Venezuela, Galapagos, Sandwich and Society Isles, Northern India, and Polynesia. I have large plants that have been growing in pans for forty years, and my special mode of culture is worthy of being copied. Large pans, well drained, have a compost of freestone, lumps of peat, and silver sand, the stone predominating; on this the rhizomes are fastened. A canal of water surrounds each plant.

My Filmy Ferns are kept in a pit five feet deep, covered at the top with frame lights that are lifted daily (sometimes twice a day), for the purpose of wetting the fronds with a fine spray in imitation of a shower. The plants are elevated on stands (about six inches) to keep them above any water that might drain into the pit in very rainy weather. The lights are shaded with the "green Willesden scrim" (from the Willesden Waterproof Paper Works). It is just the shade ferns delight in; cheap and durable, and in short nothing better could be desired for ferns either in houses or out of doors. It is now more than twenty years since these ferns have been rotted.

VARIETIES.

*1. *Alabamense*, *Birkenhead*. A dwarf American variety, very distinct and almost strap-shaped. 4 × 1 inches.

*2. *alatum*, *Clapham*. Found in Ireland by the late Mr. Clapham, conspicuously winged. 12 × 6 inches.

3. *Americanum*, *Birkenhead*. Pinnules broad. An American variety. 10 × 4 inches.

4. *Andrewsii*, *Moore*. Found in Glouin Caragh, Ireland, by the late Mr. William Andrews, from whom I received a portion of the original plant in 1864, fronds narrower and more lanceolate, and pinnæ more distant. The involucre is sessile and quite sunk in the frond. 13 × 7 inches.

5. *Backhousei*, *Lowe*. Found by Mr. Backhouse of York, in Wales, some 35 years ago. A form between *Andrewsii* and

dilatatum, with less divided and shorter pinnules, broadly winged, fronds a shining dark green, sori prominent. 13×7 inches.

6. *Cambricum*, *Ashton*. Found by the late Mr. Rowbotham (of Manchester) in Wales. The tip of the frond and pinnæ longer and narrower than in *Backhousei*. $9 \times 4\frac{1}{2}$ inches.

*7. *crispum*, *Lowe*, (*crispum-cristatum*, *Jones*). Found in the Killarney district in 1852 by the late Colonel A. S. H. Lowe (Gosfield Hall), very distinct, crisp, and irregularly branched. 10×5 inches.

8. *cuneatum*, *Kinahan*. Sent to me in 1870 by Mr. Kinahan (Roebuck Park), fronds wedge-shaped.

9. *densum*, *Stansfield*. A pretty densely fronded form. $10 \times 3\frac{1}{2}$ inches.

10. *dilatatum*, *Backhouse*. Found in Ireland by Mr. Backhouse, and named for its resemblance to *Hymenophyllum dilatatum*. 13×7 inches.

11. *dissectum*, *Stansfield*. Broad and tapering to a point, finely divided; beautiful. $15 \times 6\frac{1}{2}$ inches.

12. *dissectum-cuneatum*, *Birkenhead*. Not unlike *dissectum*, but wedge-shaped, and scarcely differing from *cuneatum*.

13. *proliferum*, *Druery* (*bulbiferum*, *Jones*). Found at Killarney; bearing bulbils. In the possession of Professor Morris of Bath; with him it has not borne bulbils.

Tribe 4. DAVALLIÆ.

THE BRITTLE BLADDER FERN.

CYSTOPTERIS FRAGILIS.—*Bernhardi*.

A COMMON deciduous species, from the sea level to the summit of Ben Lawers (4,000 ft., where its fronds have only a height of 2 inches), growing on rocks and walls. The fronds



FIG. 5.—Pinnæ of *Cystopteris fragilis* (showing fructification).

sometimes attain a length of 12 and occasionally 18 inches. Colour a dull green, Growing in spreading tufts, and cannot be mistaken for any other fern. It occurs throughout Europe and in many other parts of the world.

VARIETIES.

1. *adiantoides*, *Lowe*. Found near Dundee by myself. It is a large-growing, much-divided variety, with broad pinnæ and pinnules (the superior basal one very large).

2. *angustata*, *Smith*. Found in Devon, Derby, York, Cumberland, Westmoreland, Carnarvon, Monmouth, Edinburgh, Perth, and Sligo. Length of frond 12 inches. Slender and very narrow, ending both in the pinnæ and the fronds in long taper points.

3. *crispa*, *Lowe* (*Dickieana crispa*, *Tait*). A dwarf variety found near Aberdeen by Mr. Tait. A copy of *Dickieana* with crisp fronds.

4. *cristata*, *Lowe*. A variety with crested fronds raised by Mr. C. Elworthy at Nettlecombe. In 1871 Mr. R. Moule of Ilfracombe raised another with fronds 8 inches in length in which the fronds are very variable, sometimes symmetrically crested, at others capitate, ramose, or ramose and crested. Mr. Keale of Wantage and Mr. Mapplebeck of Birmingham have raised others, and Mr. J. M. Barnes has found it at Sedgwick.

5. *decurrens*, *Moore*. Found near Wemyss Castle, Fifeshire, by Mr. Tait of Edinburgh. Pinnæ deflexed and distant, pinnules decurrent; characters intermediate between *Dickieana* and the normal form.

6. *dentata*, *Hooker*. A not uncommon variety. Length 4 to 8 inches, narrow, pinnules somewhat confluent and blunt toothed.

7. *Dickieana*, *Moore*. Found near Aberdeen by Dr. Dickie, near Dunkeld by Dr. Balfour, and Isle of Arran (Galway), by Mr. D. Moore of Glasnevin. A dwarf form. Pinnæ twisted, deflexed, and over-lapping, pinnules crowded and overlapping. More recently at Mountain near Chepstow, by Mrs. Curre, and in S. Wales by Mrs. Bagnall Oakeley.

8. *furcans*, *Moore*. Found at Killin by Mr. S. O. Gray, and on Clova by Messrs. Stansfield. It is of the normal type, with the apex and a portion of the pinnæ forked.

9. *interrupta*, *Wollaston*. Found at Windermere by Mr. I. Huddart. Very narrow; pinnæ variable, much depauperated, and some wanting; segments deeply cut and apex truncate. A very singular variety.

10. *lineare*, *O'Kelly*. Length of frond 12 inches. A large, lax, very narrow frond, with linear segments. Found in the Burren, county Clare, by Mr. P. B. O'Kelly of Glanarra House, Ballyvaughan.

11. *minutissima*, *Jones*. Origin unknown. A diminutive bushy variety, crowded with fronds, but never exceeding 2 or 3 inches in height. It came into the possession of Colonel Jones with other ferns.

12. *obtusa*, *Moore*. Found in Scotland by Mr. A. Tait, near Whitby by Mr. Clapham, Llyn Ogwen by Mr. S. O. Gray, and in the Lake district by Mr. Clowes and Mr. Wollaston. Length 12 inches, lanceolate, pinnules blunt.

13. *quadrata*, *Clapham*. Found near Rydal by Mr. A. Clapham. Length 6 inches, basal pinnæ remote, pinnules rounded, and a portion, especially the basal ones, flat. Minutely dentate.

14. *sempervirens*. Found at Tunbridge Wells, and in Devon, but supposed to have been introduced from Madeira. It has a short creeping rhizoma, and in a cool greenhouse is evergreen.

15. *truncata*, *Lowe* (*truncata-interrupta*). A truncate form, differing from *interrupta* in having much broader, dilated, and rounded apices.

16. Wyense, *Lowe*. A very *alpina*-looking form, found on the rocks along the Wye by Major Cowburn; dwarf, pinnæ and pinnules crowded; more nearly resembles *C. alpina* than any other variety.

THE ALPINE BLADDER FERN.

CYSTOPTERIS ALPINA.—*Desvaux*.

(POLYPODIUM REGIUM.—*Linnaeus*.)

A RARE British species, found at the end of the last century growing on a wall at Leyton in Essex. This is the only well-authenticated locality in this country; and the plant has now ceased to exist there. Dwarf for a *Cystopteris*, and more finely divided than *C. fragilis*. It is a native of the Alps, and is also found in Spain, Italy, France, Belgium, Switzerland, Greece, Hungary, Sweden, and Asia Minor.

There are no varieties to be recorded, and the species is thought to have been introduced.

THE MOUNTAIN BLADDER FERN.

CYSTOPTERIS MONTANA.—*Link*.

A VERY distinct, fragile, triangular fern, with tripinnate fronds, and very long, slender stipes. It has a lengthy creeping rhizoma, and flourishes well under cultivation, if sufficient room is given for the growth of the rhizoma. Sori copious, medial, and indusiate.

First found in 1836 on Ben Lawers, in Perthshire, by Mr. W. Wilson.

In 1871, Mr. P. Neill Fraser and myself visited this spot, and found that it was still abundant in that habitat. Mr. J. Backhouse has also found it in Canlochen, at the head of Glen Isla (Clova Mountains). It grows on moist ledges of rock, on mountains, and is one of our rare British species.

Abroad, it is a native of Norway, Sweden, Denmark, Lapland, France, Spain, Italy, Germany, Switzerland, Hungary, Kamtschatka, and in the Rocky Mountains.

There are no varieties.



FIG. 6.—Lowest pinna of *Cystopteris montana* (showing fructification).

Tribe 6. PTERIDEÆ.

MAIDEN HAIR FERN.

ADIANTUM CAPILLUS-VENERIS.—*Linnaeus*.

AN unmistakable species, and the only one of a large exotic genus that is found in Great Britain.

The fronds are bipinnate, and in some varieties tripinnate, varying in length from a few inches to 2 feet, according to locality.



FIG. 7.—Portion of frond, under side of *Adiantum Capillus-Veneris* (showing fructification).

In some parts of the Burren, in County Clare, it assumes its maximum size. The sori are situated on the apex of the lobes, in marginal lines, the indusium being the reflexed portion of the apex of the lobe. The stipes and rachis are slender, ebeneous, and shining. The fronds are thin, membranous, and a vivid green.

It is a beautiful and graceful fern.

Found in Cornwall, Devonshire, Somersetshire (Clevedon, by Mr. L. H. Grindon; Cheddar, by the Rev. W. H. Hawker; and Combe Down, near Bath, a single plant, E. J. L.)†; Clea Hill Shropshire, by Mr. Westcott; Glamorgan and Barry Island (E. J. L.); Galway, Kerry, Clare, Kincardineshire, Jersey, Guernsey, Isle of Man, and Arran Isles.

It is a native of very many temperate and hot countries, occurring in France, Spain, Portugal, Italy, Switzerland, Belgium, Greece, Turkey, Persia, Java, China, Dalmatia, India, Syria, Siberia, Caucasus, Egypt, Abyssinia, Algiers, Madeira, Canary, Azores, Madagascar, Natal, Alabama, California, Texas, Mexico, Guatemala, Caraccas, Chili, Trinidad, St. Vincent, Jamaica, Sandwich Islands, etc.

VARIETIES.

*1. *admirabile*, *Lowe*. Raised by myself. Length, 2 feet. Stout and distinct; and no *Adiantum* makes a better specimen. Basal pinnæ descending.

*2. *angustatum*, *Lowe* (*bulbiferum*, *Clapham*). Dwarf, and when sent to me by the late Mr. Clapham, the fronds literally covered with young plants. There were no perfect spores; and had it come under the keen eye of Mr. Druery, he would have seen another case of apospory?

*3. *autumnale*, *Lowe*. Raised by myself. Slender fronds, golden in colour. Length, 18 inches.

4. *Clorinda*, *Lowe*. Raised by myself. Length, 20 inches. Robust, with upright habit. Stipes long, stout, and ebeneous. Pinnules cuneate, the ultimate one not larger. Indusium dark and conspicuous.

5. *Cornubiense*, *Moore*. Found in 1868, near Hayle (Cornwall), by Mr. H. H. Trevethick. A large plumose variety. Pinnules deeply divided into ten or twelve narrow fringed divisions.

*6. *Daphnites*, *Lowe*. A remarkable form, raised from spores from a frond given to me by Sir Joseph Hooker, about twenty-

† Recently another plant has been found.

three years ago. Length, 6 inches. Erect, pinnæ large, and so crowded together as to appear crested. Costa wavy.

7. *depauperatum*, *Clapham*. Raised by the late Mr. James. Length, 12 inches. Much cut and depauperate.

8. *digitatum*, *Moore*. Raised by Mr. O'Brien.

9. *fimbriatum*, *Jones*. Raised in 1872 by Miss Baker. Length 9 inches. Distinctly fimbriate.

10. *fissum*, *Moore* (alcicorne?). Dwarf. Length, 6 inches, Pinnules cut into shreds. A great departure from the ordinary form.

11. *Footii*, *Lowe*. Found in County Clare, by Mr. J. F. Foot (near Ballyryan). Length, 24 inches. Pinnules varied in length, some nearly an inch wide.

*12. *formose*, *Lowe* (*perfectum*, *Padley*). Found in the Crimea, and sent to me by Sir Joseph Hooker. Very slender and minute in all its parts.

13. *grande*, *Moore*. A fine variety, sent to me by Mr. Jannock. $8\frac{1}{2} \times 2\frac{3}{4}$. Ultimate pinnules large.

*14. *imbricatum*, *Lowe*. Raised by myself. Dwarf and imbricated.

15. *incisum*, *Moore*. Found in several localities, but a much more distinct form (*incisium-Footii*, *Lowe*) was found in County Clare by Mr. J. F. Foot. Length, 15 inches. Pinnules large and much incised.

16. *Jonesii*, *Lowe*. Found in the Salt Spring Islands, by Mr. G. Lucas. Distinct, stiff, and robust, with an erect, close habit. Pinnæ thick and leathery, ascending, trapeze form, except the ultimate ones. Stipes like polished ebony.

*17. *kalon*, *Lowe*. Raised by myself. 12×6 inches (broadest at base, and gradually narrowing). Pinnules rounded, large, and overlapping.

18. *luminare*, *Lowe*. Raised by myself. A golden variety.

19. *magnificum*, *Fraser*. Large, bold, making a handsome plant.

20. *Mariesii*, *Moore*. Length, $1\frac{1}{2}$ feet. Pinnules wedge-shaped. A strong-branching, handsome form.

21. *Moritzianum*, *Moore*. A large form.

*22. *multiceps-dentatum*, *Lowe*. Raised by myself. Length, 10 inches. Branching.

*23. *nobile*, *Lowe*. Raised by myself. Length, 12 inches. Slender, pinnules small, fronds golden yellow.

24. *O'Brienianum*, *Birkenhead*. Length, 1 foot.

*25. *optandum*, *Lowe*. Raised by myself. Length, 2 feet (stipes, 1 foot). Narrow. Pinnæ distant. Pinnules small and cuneate, distinct.

26. *Padleyi*, *Lowe*. Found in Devon, by the Rev. C. Padley. Length, 5 inches. All the pinnules concave.

27. *Pixyeidon*, *Lowe* (*plumosum*, *Jones*). Found in 1869, in Cornwall, by Mr. J. Dadds. Length, 9 inches. Very feathery, but irregular. Pinnules here and there projecting in long sharp pointed strips.

28. *plumosum*, *Moore*. Found in North Devon. Differing from *Cornubiense* in having long acute *Pixyeidon*-like projections.

29. *ramulosum*, *Moore*. Found in Ireland. The main rachis dividing near the top, and forming a tuft of short branches.

30. *rotundatum*, *Moore*. Found in the Isle of Man, by Mr. T. G. Rylands. Frond, narrow; basal pinnules, round.

*31. *spectabile*, *Lowe*. Raised in 1872 by myself. Length, 12 inches. Very large incised pinnules, a close copy of Farleyense, Mr. Elworthy, of Nettlecombe Court, has sent me a seedling that is identical.

32. *undulatum*, *Moore*. Length, 1 foot. Fronds, undulate.

THE ROCK BRAKE.

CRYPTOGRAMME CRISPA.—*R. Brown*.

(ALLOSORUS CRISPUS.—*Bernhardi*.)



FIG. 8.—*Cryptogramme crispa*
(showing fructification).

THIS fern is also called "the Parsley Fern," from its general resemblance to Parsley.

There are two kinds of fronds, the fertile and the sterile; the former, erect with linear oblong pinnules; sori marginal, and eventually confluent.

This dwarf elegant fern is found amongst loose stones (not limestone), on the sides of mountains, and in the North-West of England is so abundant as to look like hill-side pastures at a distance. It cannot be confused with any other fern.

Exceedingly abundant on the mountains of Northumberland, Cumberland, Durham, and Westmoreland. Abundant on the hillside of Lothrigg Fell, at the Head of Windermere. It is also found near Lancaster, Settle, Ingleburgh, Cronkley Scar, Wensley Dale, Fountain's Fell. In Derbyshire, Shropshire, Somersetshire, and Worcestershire. In Wales, in Carnarvonshire, Montgomeryshire, Denbighshire,

Merionethshire, and in Glamorganshire (though rare). In Scotland it is found in almost every county; whilst in Ireland it only occurs in Down, Antrim, and Louth.

Abroad, it is a native of France, Italy, Spain, Germany, Norway, Sweden, Denmark, Lapland, Switzerland, Hungary, and at Sitka, in North-West America.

Although a mountain fern, and found in Scotland at the height of 3,450 feet, in Lancashire it flourishes almost at the sea level.

Several times I have received varieties, and have collected them myself, but none were permanent. There is, however, a

crested variety (*cristata*, *Druery*), that was found at Seathwaite, in 1874, by the Right Hon. R. A. Cross, which has retained its moss-like cresting. Of it Mr. Druery remarks: "This variety is more tender than the normal form."

THE COMMON BRACKEN.

PTERIS AQUILINA.—*Linnaeus*.

THIS is a well-known fern, growing up in single stems like a tree from its creeping subterraneous caudex. No other fern is like it. The fronds vary, according to favourable or unfavourable circumstances. It is only 4 inches on the summit of Hellvelyn; and I have measured it 12 feet on Longridge Fell. Usually it is from 3 to 5 feet. Deciduous, and fructification marginal.

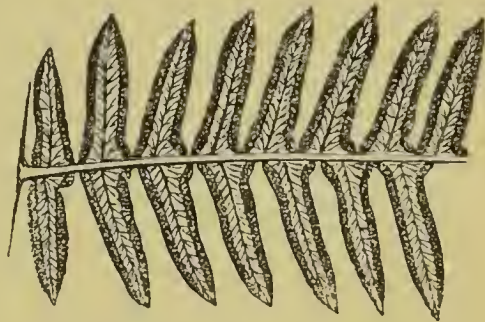


FIG. 9.—Portion of pinna of mature frond, under side, of *Pteris aquilina*.

The most abundant British fern, and also very common throughout Europe, as far north as Lapland.

There are a few distinct varieties:—

1. *attenuata*, *Moly*. Found in North Devon, in 1870, by Mr. J. Moly. Length of frond, 2 feet 6 inches.

2. *Barnesii*, *Lowe* (*cristata*, *Wollaston*). Found in Lancashire, in 1874, by Mr. J. M. Barnes. Height, 3 feet. An interesting crested variety.

3. *congesta*, *Wollaston*. A congested form. Found in Westmoreland, in 1872, by Mr. Hindson.

4. *crispa*, *Barnes*. Found at Arnside, by Mr. J. M. Barnes. The pinnules crisped.

*5. *eristata*, *Moore*. Found in Derbyshire, in 1872, by Mr. T. Glover; at Langdale, by Mr. J. M. Barnes; and recently at The Héndre, by Mr. Comber. Height, 3 feet. Branch crested.

6. *fureans*, *Lowe*. Found near Birmingham, by Mr. F. A. Fdelsten, with irregular pinnæ and pinnules. A portion fureate, and the apex multifid.

7. *glomerata*, *Barnes* (*flexuosa*, *Wollaston*; *incurva*, *Moore*). Found in Westmoreland, in 1864, by the late Mr. Jacob J. Jones. A conglomerate form.

*8. *grandiceps*, *Moore*. Raised from spores by Mr. A. Clapham, Mr. J. E. Mapplebeck, Mr. Forster, and others. This capitate variety is raised from *cristata*, but *grandiceps* is sterile. A singular variety. Length, 2 feet.

9. *Hartfieldii*, *Lowe*. Raised by Mr. J. E. Mapplebeck. A good cross between *incurva* and *eristata*.

*10. *incurva*, *Mapplebeck*. Raised by Mr. J. E. Mapplebeck. An incurved form.

*11. *Mapplebeckii*, *Lowe* (*grandiceps Mapplebeckii*, *Mapplebeck*). Raised by Mr. J. E. Mapplebeck. A very fine *grandiceps*.

12. *multifida*, *Barnes*. Found at Levens, by Mr. J. M. Barnes, and at Windermere, by Mr. F. Clowes.

*13. *pendens*, *Lowe* (*grandiceps depauperata*, *Druery*). An accidental marvellous hybrid, recently raised by Messrs. Birkenhead. A depauperate *grandiceps* with a conspicuous weeping habit. Length, 2 feet.

14. *polydactyla*, *Moore*. Found by the late Mr. Glover, of Manchester. The ends flatly crested.

15. *ramo-cristata*, *Mapplebeck*. Raised from spores, in 1871, by Mr. J. E. Mapplebeck. Height, 1 foot. Both branching and crested.

16. *variegata*, *Barnes*. Found at Windermere, by Mr. F. Clowes; near Chepstow, by myself; near Linton, by the late Colonel Jones; and near Nettlecombe, by the late Mr. Elworthy. A subpermanent form. More golden some years than others. Mr. W. H. Phillips appears to have found a well variegated form in Ireland, of which I have received prothalli from him.

The common Bracken can only be safely transplanted in winter, when the fronds are below the ground; and even then it is the safer plan to keep them in a hothouse until established. When grown in pans, care should be taken to keep them from frost, for, although hardy enough, if they become frozen, they are certain to perish.

THE HARD FERN.

LOMARIA SPICANT.—*Desvaux*.

(BLECHNUM SPICANT.—*Smith*.)

A COMMON fern throughout the United Kingdom, from the sea level to a height of 4,000 feet, growing in heathy or stony situations where there is moisture. Abundant throughout Europe, extending from Lapland in the North, to Madeira.

An evergreen, and easily grown if not neglected.

Sterile and fertile fronds different; the latter larger. Sterile fronds spreading; fertile, erect and narrower. Length, from 4 to 30 inches. Colour, rich deep green coriaceous, and pectinately pinnatifid.

Unlike all other British ferns.

VARIETIES.

1. *Aireyi*, *Lowe* (*serratum Airey*, No. 2, Wollaston). Raised by Mr. Airey. Bipinnatifid to bipinnate fronds, 2½ inches wide, not unlike *cambricum* in *Polypodium vulgare*.

2. *Aitkeniana*, *Moore*. A grand variety, with huge branching heads.

3. *anomala*, *Moore*. Found in many places. Fronds all fertile. Length, 12 inches. A small form found at Beddgelert.

4. *anomala-multifida*, *Moore*. Found at Rydal, in 1867, by Mr. W. Crouch. Fronds all fertile and crested.
5. *apiculata*, *Moore*.
6. *Bella*, *Sim*. Found at Hutton Roof, in 1864, by Mr. Jacob Jones. Texture thin.
7. *binervio-striata*, *Barnes*. Found at Langdale in 1875, by Mr. T. Airey.
8. *Boltoni*, *Lowe* (projectum *Boltoni*, *Barnes*). Found on Borwick Moor, in 1873, by Mr T. Bolton. A remarkable variety, irregularly crested.
9. *cladophora*, *Moore*. Curving, branching, and cresting.
10. *Claphami*, *Lowe* (platypteris, *Clapham*). Found at Ilkley, in 1863, by the late Mr. Clapham. A splendid leafy variety. Length, 5 inches.
11. *concinna*, *Moore*. Found in valley of Conway, Marwood, and Barnstaple. Length, 9 inches. See *Drueryi*, a better form.
12. *conferta*, *Clapham*. Found at Ilkley, in 1863, by the late Mr. Clapham. Pinnæ crowded and imbricated.
13. *congesta*, *Barnes*. Found in Wastdale, in 1876, by Mr. W. Crouch; and on Dartmoor, by Mr. Druery. Dense and congested.
14. *coronare*, *Lowe* (cristata, *Wollaston*). Found in Kent, in 1853, by Mr. G. B. Wollaston. 9×1 inches. Crested, having a capitate head 4 inches wide.
15. *crenato-congesta*, *Barnes*. Found in Patterdale, by Mr. W. Foster.
16. *crispa*, *Barnes*. Found in Langdale, in 1872, by the late Mr. J. M. Barnes, and near Tunbridge Wells, by Mr. G. B. Wollaston. Pinnæ broad and undulate.
17. *crispata*, *Barnes*. Found in Wastdale, in 1876, by Mr. W. Crouch. Crispy.
18. *crispissima*, *Druery*. Dwarf, congested, and much crisped.
19. *cristata*, *Moore*. Found near Tunbridge Wells, by Mr. G. B. Wollaston; in Yorkshire in 1860, by Messrs. Stansfield, etc. Well crested fern. Fertile fronds, 18×1 inches; sterile $9 \times 1\frac{1}{4}$ inches. A crested capitate head. Another fine form was found at Orrest Head, in 1872, by Mr. T. Airey.
20. *cristato-gracile*, *Barnes*. Found at Red Bank, in 1865, by Mr. W. Crouch. Narrow, delicate, and crested.
21. *Crouchii*, *Lowe* (subserrata *Crouchii*, *Barnes*). Found at Grasmere, in 1866, by Mr. W. Crouch. A robust crenate fern.
22. *curta*, *Barnes*. Found in 1871, in Dumfries, by Mr. W. Foster. A narrow decumbent variety, $10 \times 0\frac{1}{2}$ inches.
23. *dentigera*, *Moore*. Found at Windermere, by Mr. F. Clowes. Defective. $12 \times 1\frac{1}{2}$ inches.
- *24. *Drueryi*, *Lowe* (concinna, *Druery*). Found on Exmoor, in 1881, by Mr. C. T. Druery. Beautiful; like a narrow fringe of beads.
25. *elegans*, *Moore*. Found in Scotland by Mr. A. Tait. Pinnæ, lobate.
26. *gigantea*, *Lowe*. Found at Totnes, in 1865, by Mr. W. Edwards. $16 \times 3\frac{1}{2}$ inches.

27. *heterophylla*, *Wollaston*. Found in Wastdale, in 1876, by Mr. W. Crouch, and also by others. Fronds irregular.
28. *Hodgsonæ*, *Lowe* (*trinervium* Hodgson, *Druery*). Found on Kirkby Moor, in the Lake district, by Mrs. Hodgson. A very good brachiatum.
29. *Hodgsoni*, *Lowe* (*multifidum* Hodgsoni, *Barnes*). Found at Torver, in 1868, by Mr. J. K. Hodgson. A neat crested variety.
30. *Huddartii*, *Lowe* (*cristatum* Huddart, *Wollaston*). A fine heavily crested fern, found at Windermere, by Mr. J. Huddart.
31. *imbricata*, *Moore*. Found in 1870, at Lake Bank, by Mrs. Hodgson, and by others. Congested, segments overlapping.
32. *imbricato-cristata*, *Druery*. Imbricate, and neatly crested.
33. *imbricato-erecta*, *Stansfield*. Found by Mr. Halstead. A pretty fern.
34. *incisa*, *Barnes* (*gracile*, *Crouch*). Found in 1874, in Ross-shire, by Mr. W. Crouch. 10 × 2 inches. More depauperate at the base than *serra*.
35. *interrupto-trinervia*, *Phillips*. Found in 1878, in County Down, by Mr. W. H. Phillips. 6 × 0½ inches. A depauperate *trinervium*.
36. *Kidwillyense*, *Lowe* (*ramo-cristata*, *Stansfield*). Found in 1876 near Kidwilly, Carmarthenshire, by Mr. W. H. Maunder. Differs from *ramo-cristata* in being bunch-crested and dwarfer, 6 × 0¾ inches; width of head, 5 inches.
37. *Kinahani*, *Lowe* (*cristatum*, *Moore*; *ramosa*, *Kinahan*). Found in Ireland by Mr. Kinahan. Branching and curly crested.
38. *Kitsonæ*, *Lowe*. Found near Ashburton, by Miss Kitson. Pinnæ crimped, bending, and depauperate; widest near the apices. Length 5 inches.
39. *lancefolia*, *Wollaston* (*sub-furcato lancefolium*, *Barnes*). Found near Tunbridge Wells by Mr. J. B. Wollaston; and in Langdale, in 1875, by Mr. T. Airey. A narrow distinct form.
40. *lineare*, *Moore* (*rotundata*, *Wollaston*). Found on Witherstack, Westmoreland, in 1862, by the late Mr. J. M. Barnes. 12 × 0½ inches. Remarkably narrow.
41. *longidactyla*, *Wollaston*. Found at Brigsteer, in 1862, by Mr. A. B. Taylor. Segments of crests long.
42. *majus*, *Moore*. Found near Nettlecombe by the late Mr. Elworthy. A large form.
43. *Maunderi*, *Stansfield* (*glomeratum*, *Wollaston*). Raised in 1878 by Mr. W. H. Maunder. A glomerate form, 4½ inches long.
44. *minima-interrupta*, *Clapham*. Found at Ilkley, in 1863, by the late Mr. Clapham.
45. *Monkmani*, *Stansfield*. Irregular, flexuose, apex multifid.
46. *multifida*, *Moore*. A crested form found at Windermere by Mr. F. Clowes, and by others.
47. *multiforme*, *Wollaston*. Found on Bethacar Moor, in 1869, by Mrs. Wilson. Fronds various.
48. *multifurcata*, *Moore*. Found near Penryn, by Mr. F. Symons. Fronds many times forked, occasionally brachiate.

49. obovata, *Stansfield*.
50. obtuso-multifida, *Barnes*. Found at Rydal, in 1873, by Mr. W. Crouch. Crested pinnæ, short.
51. Padleyense, *Lowe*. Found at Exmouth, by the late Rev. C. Padley. Lower half simply winged, about $1\frac{1}{2}$ inches wide—serrate.
52. paradoxa, *Jones*. Found in Banisdale, in 1877, by Mr. G. Whitwell. Three rows of pinnæ.
53. parviceps, *Barnes*. Found at Boustead Gates, in 1868, by Mrs. Hodgson. Small stellate crests.
54. plumosa, *Barnes*. A grand variety, raised by Mr. T. Airey.
55. polydactyla, *Moore*. Found in North Devon by Mr. C. T. Drury. Normal in size, and polydactylous.
56. projecta, *Moore*. Found in Cumberland, in 1862, by the late Mr. J. M. Barnes, and near Ben Lawers by Mr. Stansfield. Depauperate, with here and there projecting normal pinnæ. Length, 9 inches.
57. projecta-ramosa. Ramose.
- *58. ramo cristata, *Wollaston* (flabellata, *Stansfield*). Found at Helmsley, Yorkshire, in 1865, by the late Mr. Monkman. A fine branching variety, the apices of the segments crested. Fertile fronds, 14 inches; width of head, 8 inches. Sterile, 8 inches; width of head, 8 inches. Mr. Drury has raised a more robust variety.
59. ramo depauperata, *Stansfield*. Found on the Clova mountains by Mr. J. Horsfall. Branched and depauperate.
60. ramo-multifida, *Barnes*. Found at Crook, in 1864, by Mrs. Hartley. Ramose and crested.
61. ramo-parviceps, *Barnes*. Found at Orrest Head, in 1874, by Mr. T. Airey. Thin texture, ramose, and crested.
62. retusa, *Clapham*. Found at Ilkley, in 1863, by the late Mr. Clapham. Pinnæ curving. $7 \times 1\frac{1}{4}$ inches.
63. revolvens, *Barnes*. Found in Swindale, in 1865, by the late Mr. J. M. Barnes. Pinnæ recurved.
64. rigida, *Lowe* (serratum-rigidum, *Stansfield*).
65. rotundata, *Lowe*. Found by Mr. Clift in North Wales. Pinnæ short and rotund. Length, 8 inches.
66. semilacera, *Barnes*. Found at Windermere, by Mr. T. Airey. Almost bipinnate.
67. serra, *Moore*. Found in South Wales, in 1867, by the late Mr. Jacob Jones. 17×2 inches. A bold incised variety.
68. serrata, *Jones*. Found in North Wales, in 1865, by the late Mr. J. Clift. 7×2 inches. A good serrated form.
69. serrulata, *Barnes*. Found in Wastdale, in 1876, by Mr. W. Crouch. Prettily serrulated.
70. stricta, *Frances*. Common. Length, 9 inches.
71. stricto-concinna, *Barnes*. Found at Crook, in 1865, by the late Mr. J. M. Barnes.
72. stricto-projecta, *Barnes*. Found at Grasmere, in 1865, by Mr. W. Crouch. Irregular.
73. stricto-ramosa, *Barnes*. Found in Wastdale, in 1876, by Mr. W. Crouch. Ramose.

74. *superbella*, *Barnes*. Found near Kendal, by Mr. G. Whitwell.
75. *subplumosa*, *Phillips*. A leafy form.
76. *subserrata*, *Moore*. Found at Burneside, in 1876, by Mr. G. Whitwell. Pretty, crenate.
77. *tridactyla*, *Moore*. Found on Loughrigg, in 1864, by Mr. W. Crouch; and near Portsmouth by Mr. S. Nowell. Robust; crest three fingered.
78. *trinervia*, *Moore*. Found in Kent, in 1851, by Mr. G. B. Wollaston, and on Sugar-loaf Mountains, Wicklow, in 1854, by Dr. Kinahan. A brachiate form, branching at the base of the rachis. $13 \times 1\frac{3}{4}$ inches. Mr. W. H. Phillips found many similar plants in County Down and Wicklow, in 1878. Mr. T. Airey has observed it at Langdale.
79. *trinervia-coronans*, *Moore*. Found at Langdale, in Westmoreland, in 1872, by the late Mr. J. M. Barnes. A beautiful compact variety with a large flat capitate crown, and the ends of the brachiate portions crested. Fertile, 11×1 inches; sterile, 5×1 inches.
80. *tripinnata*, *Lowe* (*serratum*, Airey, No. 1, *Wollaston*). Tripinnatifid to tripinnate, pinnæ cut down to midrib, pinnule half an inch long and incised.
81. *variabile*, *Barnes*. Found at Crook, in 1866, by Mr. T. Hartley. Irregular and variable.
82. *Wilsonæ*, *Lowe* (*crispum* *Wilsonæ*, *Wollaston*). Found on Blawith Moor, in 1869, by Mrs. Wilson. Crispy.
- *83. *crispata*, *Mapplebeck*; *84. *Mapplebeckii*; and 85. *Fosteri*, I have not seen.

Tribe 8. ASPLENIEÆ.

THE GREEN SPLEENWORT.

ASPENIUM VIRIDE.—*Hudson*.

LOCAL, but not common, yet found in many districts growing in moist crevices in rocky mountains. Resembling *Asplenium trichomanes* the nearest, but distinguished by its green stem and pale green fronds. Evergreen, linear, pinnate, and varies in length from 2 to 10 inches.

It has been found at Danny, Southgate, Maidstone, Mickleham, Ham Bridge, Dove Dale, Buxton, Cavedale, Castleton, Beacon Hill, Carr-edge, Staley, Settle Craven, Ingleborough, Gordale, Aisla-Beck, Richmond, Widdal Fell, Wensleydale, Ogden Clough, Reeth Moor, Swaledale, near Leeds, Falcon Clints, Weardale, Patterdale, Kendal Fell, Hutton Roof, Farleton, Arnside, Casterton Fell, Mazebeck Scar, Ambleside, Borrowdale, Carrick Fell, Brandy Ghyll, Ashness Ghyll, Barrow Force, Gillsland, Whitbarrow, in Brecknockshire, Glamorganshire, Carnarvon, and Merioneth. In Scotland, in eleven counties, and in Arran, Mull and Shetland. In Ireland near Lough Eske, Ben Bulgin, Bandon, and Killarney. Abroad it is in France, Germany, Switzerland, Belgium, Norway, Sweden, Finland, Lapland, Russia, Spain, Italy, Greece, Siberia,

Bohemia, Dalmatia, Croatia, India, Peru, Columbia, and Rocky Mountains.

VARIETIES.

1. *acutifolium*, *Gibson*. Pinnæ lanceolate and acute.
2. *bipinnatum*, *Clowes*. Found, in 1853, on Whitbarrow, by Mr. J. Huddart. A handsome variety (a copy of *A. trichomanes*, var *incisum*).
3. *Claphami*, *Lowe* (*crenatum*, *Clapham*). Found on Pennigent by the late Mr. Clapham. A handsome fern with variable much-incised segments. Tip of frond ramoso.
4. *crenatum*, *Wollaston*. Found, in 1863, on the Breadalbane Mountains, by Mr. A. Stansfield. Pinnæ cuneate. Length 3 inches.
5. *deltoideum*, *Clapham*. Deltoid, basal pinnæ very large, rapidly smaller, being minute at the apex.
6. *imbricatum*, *Clapham*. Found at Settle by the late Mr Clapham. Dwarf and imbricate.
7. *incisum*, *Moore*. Found in several localities. Pinnæ trapeziform and profoundly incised. Length 9 inches.
8. *multifidum*, *Wollaston*. Not uncommon. I saw many plants in 1863 on the Falcon Clints, in Teesdale. Apex bifid or multifid.
9. *ramosum*, *Stansfield*. Upper part of frond two or three times branched.
10. *Smithiesii*, *Lowe*.
11. *stipatum*, *Stansfield*. Found, in 1863, on the Breadalbane Mountains, by Mr. A. Stansfield. Pinnæ triangular and conspicuously stipate.
12. *varians*, *Moore*. Found on Kendal Fell, by Mr. Barnes. A singular variety; both fronds and pinnæ variable, some depauperate, others beyond the ordinary size. Length 2 to 5 inches.

The present fern, *Asplenium Ceterach*, and in fact all species that flourish on rocks and walls, require to be grown in exposed situations, using a large amount of stone with the soil. The plan adopted by myself is to grow them in pots, giving the protection of a cool greenhouse in winter, and in April plunging them amongst stones and sand in a long narrow shallow box, fastened on the north side of a wall five feet from the ground, and only watering in very dry weather.

THE MAIDENHAIR SPLEENWORT.

ASPLENIUM TRICHOMANES.—*Linnaeus*.

A COMMON species throughout the United Kingdom, growing on rocks and walls, and occasionally in hedgerow banks. It attains a large size in the West of Ireland, sometimes the fronds being more than a foot long. Found at every height up to 2,000 feet above the sea. On Ben Lawers the plants are very small. In the Eastern Counties it is not common. A native of the Atlantic Isles, Cape of Good Hope, Kaffraria, the Caucasus, Persia, India, Siberia, Europe (throughout), Australasia, North and South America, Peru,

and the West Indies. In Turner's "Herball," in 1568, it is called "English Maiden's Heare." Under cultivation it succeeds best in sandy loam with broken stones and a little decayed leaf-mould.

Stem dark chestnut brown; fronds linear, pinnate, and deep green. A pretty dwarf species.

Some walls in Monmouthshire are literally covered with this fern.

VARIETIES.

1. *acrocladon*, *Lowe*. Found in Owsnip Gill, Swaledale, in 1866, by Mr. R. C. Brown, of Nottingham. Pinnæ very remote, only seven or eight pairs to within an inch of the tip of the frond, and there branching and rebranching so as to form a capitate head 2 inches broad. Pinnæ not crested. Length, 6 inches.

2. *Claphami*, *Lowe* (*incisum*, *Moore*). Discovered at Smeerset, near Settle, by Mr. A. Clapham and Mr. J. Tatham. The most beautiful variety yet found. An incisum, but unlike the incisum of Moore. Pinnæ sometimes three-quarters of an inch in length, and as much across the base. The basal lobes cut nearly to the costa; it is serrate as well as lobate. The upper lobes are almost as much cut. A sterile very plumose form. Length, 7 inches.

3. *confluens*, *Moore* (Mr. Stabler's confluent hybrid not included). Found many years ago near Whitby, by the late Mr. W. Wilison; and in 1875, in the South of Ireland, by Mr. P. Niell Fraser, of Edinburgh. Pinnæ confluent in the upper half of the frond. Length, 4 inches.

4. *congestum*, *O'Kelly*. Found in County Clare by Mr. O'Kelly. An interesting congested bushy form, $4 \times 0\frac{3}{4}$ inches.

5. *cornutum*, *Lowe* (*cornuto-ramosum*, *Lowe*). Found near the Clifton Suspension

Bridge by Mr. Edwards. Rachis flexuose, branching in the middle of the frond, where it is horned. Pinnæ lax, some absent. Length 6 inches.

6. *corymbiferum*, *Lowe*. Found in Owsnip Gill, by Mr. R. C. Brown, and Crossthwaite, by Mr. J. M. Barnes. Normal, except at the apex, where it branches into a wide capitate, foliose head. Segments confluent.

7. *cristatum*, *Moore*. Found in Lancashire, Cumberland, Westmorland, Devonshire, and near Ballyvaughan. A handsome, not uncommon fern. The pinnules are from elongate to triangular, and are cut almost to the base. In some forms the pinnæ are depauperate. Length, 6 inches.

8. *dendroideum*, *Wollaston*. Found, in 1872, in Westmoreland,

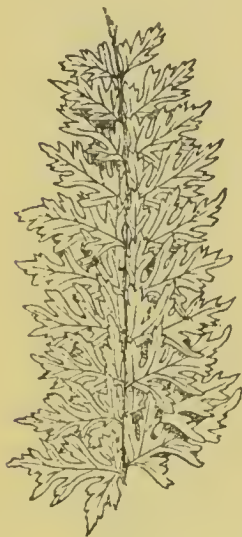


FIG. 10.
Asplenium trichomanes, var.
Claphami (incised).

by Mr. G. B. Wollaston Pinnules small. Length, 3 inches, and almost as much across the many-branched head.

9. *depauperatum*, *Wollaston*. Found in 1853, at Black Head, County Clare, by Dr. Allchin; and in 1855, at Rydal, by Mr. G. P. Wollaston; also at Windermere, Arnside, and Bardsea. Intermediate forms have also been found, and Mr. Clapham raised one of these from spores, which he called *interruptum*, and another, having the apex branched, *ramo-depauperatum*. The pinnules small, depauperate, and some wanting.

10. *Harovii*, *Moore*. Found by Mr. G. B. Wollaston, and also at Portskewett, in Monmouthshire, by the late Colonel A. M. Jones, and recently by myself. A dwarf slender form, with numerous deeply cut pinnæ. Length, 5 inches. *Trogyense* is, however, a more marked form.

11. *hybridum*, *Lowe* (*confluens*, *Moore*). Found, in 1870, on Levens Park wall, in Cumberland, by Mr. Stabler, of Levens. It is strikingly different from all other forms of *confluens*. An undoubted hybrid, probably between *A. trichomanes* and *A. marinum* (the counterpart of *microdon*, a hybrid of *A. marinum*). Although copiously soriferous, there are no germinating spores, which is the case with the other hybrids. It is not impossible that at some time or other a few spores may germinate, but with these hybrids this is extremely rare.

When last seen, the plant was in the possession of Mr. Barnes, of Milnthorp; it was then a grand specimen. The stem is much thicker than is the case with the ordinary form of *Asplenium trichomanes*. From near the base the pinnæ are imbricate, and towards the apex confluent. Length 10 to 11 inches, width exceeding an inch.

12. *imbricatum*, *Clapham*. Found, in 1863, at Knaresborough, by Mr. A. Clapham. Pinnæ scarcely stalked, large, and overlapping, the base square, and the margins prettily dentate. Length, 3 inches.

13. *incisum*, *Moore* (excluding Mr. Clapham's Settle plant). Found in Devon by the Rev. W. S. Hore; near Burnley, by Mr. S. Gibson; in Borrowdale, by Miss Wright; and near Pyle, in



FIG. 11.—*Asplenium trichomanes*, var. *cristatum* (showing cresting).

Glamorganshire, by Mr. E. T. Higgins. All are sterile except the Glamorganshire plant. Exceedingly beautiful and plumose. Pinnæ somewhat triangular, deeply incised, and the tips pointed. Length, 4 to 6 inches.

14. *katastacton*, *Lowe*. Raised from spores at Highfield House. Pinnæ imbricate and indistinctly crenate and rotundate. Length 3 inches.

15. *laciniatum*, *Lowe* (*incisum-laciniatum*, *Moore*). Found, in 1863, in County Clare, by Mr. R. Stansfield. A distinct lacinate, *incisum* form.

16. *majus*, *Padley*. Found near Plymouth, by the Rev. C. Padley; in County Clare, by Mr. Foot; near Ballyvaughan, by Mr. P. B. O'Kelly; and at Dennil Hill, near Chepstow, by Major Cowburn. Normal, except its gigantic proportions. Length from 12 to 18 inches, and $\frac{3}{4}$ inch wide.

17. *Moulei*, *Moore*. Found in Devon by Mr. Moule. Pinnæ narrow, margin wavy. A seedling raised from this "incisura" (*Lowe*) has long narrow pinnæ deeply and equally incised on both margins.

18. *multifidum*, *Moore*. Found at St. Mary's Isle, Kirkcudbright, by Mr. Dick; at Windermere, by Mr. Clowes; Ulverston, Mrs. Hodgson; Keswick, Miss Wright; at Capel Curig, North Wales, by Mr. S. Clift; and in Swaledale, by Mr. Brown. The fronds are several times ramosely forked considerably below the apex, and the tips are multifidly crisped. Pinnæ small.

19. *O'Kellyi*, *Lowe*. Found in the Burren district, County Clare, by Mr. O'Kelly. An incised form of triangulare with longer and more lax fronds, and smaller segments than *incisum-triangulare*. An interesting variety.

20. *Pateyi*, *Lowe* (*ramo-cristatum*, *Wollaston*). Found, in 1873, in Cardigan, by Mr. Patey. Another branched *cristatum* with a less crested head than the *ramo-cristatum* of *Moore*. It is more ramosely but less crested than Mr. Moore's plant, having a compact head $1\frac{1}{2}$ inches in diameter. Length, 3 inches.

21. *polydactylum*, *Lowe* (*cristatum*, *O'Kelly*). Found in County Clare by Mr. O'Kelly. $11 \times 0\frac{1}{2}$ inches. Much larger than *cristatum*.

22. *ramo-cristatum*, *Moore*. Found, in 1861, in Cornwall, by Mr. W. H. Sargeant. Normal below, branching near the apex into six or seven crested branches that are 3 inches across. Length 4 inches.

23. *ramosum*, *Wollaston*. Found in 1864, in South Devon, by the late Rev. C. Padley; Ilfracombe and Tiverton, by Mrs. Chanter; Windermere, by Mr. Clowes; Keswick, by Miss Wright; Arnside, by Mr. Crossfield; Underbarrow, by Mr. T. Hartley; Owsnip Gill, Swaledale, by Mr. R. C. Brown; Conway, by Mr. A. Stansfield; and in County Clare, by Dr. Kinahan. Stem dividing and sub-dividing into four or five wide-spreading branches. Pinnæ narrow and more or less depauperate. Length 4 to 5 inches.

24. *sulæquale*, *Moore*. Found near Monmouth, by Mr. J. D.

Enys; Knaresborough, by the late Mr. Clapham; Whitbarrow, by Mr. Clowes; Nettlecombe, by the late Mr. Elworthy; and at Tunbridge Wells, by the late Mrs. Delves. Fronds narrow, and broadest at the base. Pinnæ small and crenate.

25. *triangulare*, *Lowe* (*incisum-triangulare*, *Moore*). Found, in 1863, in County Clare by the late Mr. Stansfield. An incisum with triangular pinnæ. Length, 4 inches.

26. *Trogyense*, *Lowe*. Found in Wentwood, Monmouthshire, by myself, in 1882. This differs from *Velum* in not having the prominent basal lobe, and in being approximate instead of imbricate. Fronds very brittle, colour a blue green. Length, 5 inches; width, nearly $\frac{1}{2}$ inch.

27. *velum*, *Lowe*. Found in Wentwood, by myself, in 1890. Frond very symmetrical, and of a blue green colour. Copiously soriferous. A very handsome variety. The pinnæ much incised, and the lower basal lobe of each pinna standing out almost at right angles to the remainder of the pinna like a curtain, the folds resembling stairs. Length 4 inches, and nearly $\frac{3}{4}$ inch wide at the base of the frond.

Other varieties, viz., *bifurcum*, *rotundato-multifidum*, *Blechnoides*, *lineare*, and *rotundatum*, have been found in the Lake district, but I have not seen them.

THE FORKED SPLEENWORT.

ASPLENIUM SEPTENTRIONALE.—*Hoffmann*.

A DIMINUTIVE fern with forked fronds and linear segments, unlike all others. It is evergreen, 2 or 3 inches in length, and of a deep green colour, the stipes being longer than the fronds. It grows in fissures of rocks and between the stones of loose walls. Found in the Lake district near Ambleside, on Helvellyn, Honiston Crag, Red Screes, Crummock Water, Langdale, Scafell, Patterdale, Keswick, Wastwater, Borrowdale, in the vale of Newlands; at Kyloe Crag, Northumberland; Ingleborough, Yorkshire; and at Culborne, near Oare Church, and Exmoor, Somersetshire. In Wales, near Llanrwst, Pass of Llanberris, Bettwys-y-Coed, Capel Curig, Pont-y-Pair, Llewellyn, and Llyn-y-Cwn. In Scotland: in Roxburghshire, Edinburghshire, Perthshire, and Aberdeenshire. It used to be much more plentiful on Arthur's Seat, Edinburgh, and it is not common on Stenton Rock, near Dunkeld, where a few years ago I only saw a dozen plants (E. J. L.). It is not found in Ireland.

Abroad it is a native of Scandinavia, Russia, Switzerland, France, Germany, Spain, Portugal, Italy, Belgium, Hungary, New Mexico, and Northern India.

No varieties are known.



FIG. 12.
Asplenium septentrionale. Upper portion of mature frond, under side.

THE SEA SPLEENWORT.

ASPLENIUM MARINUM.—*Linnaeus*.FIG. 13.—Pinnæ, showing fructification of *Asplenium marinum*.

IN clefts and caves of rocks, mostly on the sea coast. An evergreen, with shining deep green fronds varying from 6 inches to 3 feet in length. Pinnate, the pinnæ being usually an inch long. The stipes shorter than the frond, and channelled in front; sori linear and oblique.

Like the "Maiden-hair," it is soon killed by frost, and therefore requires the protection of a greenhouse in winter, although in its protected sea-caves it grows in districts of severe frost.

Common in Cornwall, Devon, Dorset, Somerset, Sussex, Yorkshire (the habitat north of Scarborough destroyed by the falling of the face of the cliffs), Durham, Cumberland, Northumberland, Westmoreland, Isle of Wight, Isle of Portland, Isle of Man, Holy Island. At the mouths of the Mersey and Dee; Gloucestershire, Warrington, and Newton (rare). In Wales: Merionethshire, Carnarvonshire, and Island of Anglesea. On the east and north coast of Scotland, and in the Western Isles in Orkney, and on Ailsa Craig. In Ireland: Down, Galway, Clare, Dublin, Kerry, Cork, Isle of Rathlin, Arran Isles, Guernsey, Jersey, and abundant along the coast of Connaught and Munster.

It is also found in France, Spain, Portugal, Italy, Corsica, Ionian Isles, Barbary, Tangiers, Madeira, Azores, Canary, St. Helena, New Holland, Rio Grande, New Brunswick, Bermuda, and in North America. In 1860 I found it at the summit of the Vileta Escusa, between Reinoso and Alar, during the time of the Himalaya Eclipse Expedition to Spain, and also on the coast near Santander.

VARIETIES.

1. *acutum*, *Moore*. Found in Jersey, Guernsey, Plymouth, and Dartmouth. Pinnæ lax and narrowing to a sharp-pointed apex. Length 2 feet.

*2. *Auchmithianum*, *Lowe*. A singular variety, with very prominent ribs on the pinnæ. The apices of the pinnæ rounded and somewhat crenate. Length, 6 to 8 inches. Found by myself in sea-caves at Auchmithy (between Arbroath and Aberdeen. To reach these caves, it is requisite to have a long ladder, and they can

only be searched at low water on this wild rocky coast. The ferns were very abundant and extended some distance into the caves even where there was but feeble light. Some of the caves are full of water even at low tide, having a passage to the sea, and in these were numbers of seals that darted out on being approached.

3. *bicrenatum*, *Stansfield*. One of Messrs. Stansfield's sports. The two basal pair of pinnæ distant, the remaining touching each other, margin bicrenated. Length, 6 inches.

4. *brachiatum*, *Moore*. Found in Cornwall by Mr. J. Herbert in 1874. Pinnæ narrow, with blunt tips, the two lowest brachiate (*i.e.* distinct branches) and twice as long as those immediately above. Length, 1 foot.

*5. *capitatum*, *Clapham*. Found in 1861 near Scarborough. Stem naked for the basal 5 inches, then the leafy portion divided into a capitate head 5 inches wide, the pinnules overlapping. Length 10 inches. I have raised many capitate seedlings from this variety.

6. *caudatum*, *Clapham*. Raised from spores by the late Mr. A. Clapham, of Ramsdale Bank, Scarborough. A very distinct fern, with narrow pinnæ, the frond terminating in a long caudate (or tail-like) apex. Length, 6 to 8 inches.

*7. *decorum*, *Lowe*. Found by Sir W. Jackson Hooker, and also by Mr. O'Kelly in the Burren district, County Clare. 8×1 inches. Narrow and smooth.

8. *Hookeri*, *Lowe*. Found in abundance in the Burren district, County Clare. I received it from the late Sir William Hooker many years ago, and again recently from Mr. P. B. O'Kelly, Glenarra House, Ballyvaughan. More than 2 feet in length, with short blunt pinnæ.

*9. *imbricatum*, *Lowe*. Found in 1865, in North Wales, by the late Mr. Clift, of Birmingham, who sent me the original plant, which is still alive. A very distinct variety. The pinnæ overlap each other as if tiled. Apex of the frond caudate. Length, 8 inches. A variety named by Mr. Clapham, *imbricatum Loweii*, is rather larger and more imbricated.†



FIG. 14.—Frond of *Asplenium marinum*, var. *imbricatum*.

† Another form raised by myself. *Imbricatum superbum* is even more characteristic.

10. *incisum*, *Moore*. Found at Great Orme's Head by Mr. A. Stowe, and near Llangollen by the Rev. T. Rooper. An elegant variety, having the pinnæ and apex of the frond truncate (or blunt-ended). The lobes deeply cut along the anterior margin. Length 6 to 9 inches. Pinnæ only half an inch long.

11. *interruptum*, *Moore*. History doubtful. Remarkable for the varied length of the pinnæ, some projecting far beyond the others causing the outline to be irregular.

12. *laxum*, *Lowe*. Found in the Burren district, County Clare, by Mr. F. J. Foot, of the Geological Survey of Ireland. It is not unlike the *Asplenium latum* (a South European form of *A. marinum*). Very lax, especially on the lower portion of the frond. Length 2 to 3 feet.

13. *multifurcatum*, *Clapham*. Raised from spores in 1860 by Mr. Clapham. Lower pinnæ very short and depauperate. Frond terminating in a rounded capitate head.

14. *multipinnatum*, *Appleby*. Stated to have been found in the Azores. A most beautiful ramose variety growing more or less horizontally. Fronds equal in width throughout, terminating in a branching apex. Pinnæ broad and the segments deeply cut.

*15. *optandum*, *Lowe*. Raised by myself. An interesting variety having the lower lobe of the pinnules overlapping. Length 5 inches (identical with *admirabile*, *Lowe*).

16. *parallellum*, *Moore*. A distinct form found in Guernsey by M. Boistel. Fronds 3 feet in length. Pinnæ 2 to 2½ inches long and less than ⅜ inch wide, and nearly parallel sided.

17. *plumosum*, *Wollaston*. Found in Guernsey by the late Mr. C. Jackson. A magnificent plumose variety in the style of *Thompsonæ*, but every part of the frond is double the size of that variety. The ends of the pinnæ are caudate, and the pinnules divided nearly to the base. Length, from 1 to 2 feet.

18. *Pricæ*, *Lowe* (*plumosum* Price, *Jones*). Found near Ilfracombe by Miss Price. A beautiful foliose form, not so much divided as *plumosum*. Frond widest at the base, as also the pinnæ. Basal lobes large and deeply cut. 7×4 inches.

*19. *ramo-capitatum*, *Lowe*. Raised by myself. Branched and capitate.

20. *ramo-trapeziforme*, *Clapham*. Found in 1857 at Burniston, near Scarborough, by Mr. A. Clapham. Dwarf. Pinnæ trapeziform, and variable in size and shape. Pinnæ branching and the tips dilate. A somewhat similar form was raised by myself.

21. *ramosum*, *Wollaston*. Found in 1850, in Dorsetshire, by Mr. G. B. Wollaston. Distinct dwarf variety, with short wide pinnæ, having a broadly crenate margin. Twin-fronded, either branching in the stipes or in the rachis.

22. *subpinnatum*, *Moore*. Found in Petit Bot Bay, Guernsey, by Mrs. Dobree. It has also been found in Cornwall. Profoundly pinnatifid with deeply divided lobes. Length, 7 inches, breadth, 2½ inches.

23. *subserratum*, *Stansfield*. Pinnæ lax, long and narrow, bicer-nate, and the crenatures minutely serrate.

*24. *Thompsonæ*, *Lowe*. Found in North Devon by Mrs. Thompson. A plumose variety and only second to *plumosum* as a beautiful variety of this species. Very feather-like in appearance. Fronds narrower at the base. Pinnæ long, narrow, and conspicuously auricled. The superior margin is crenato-serrate yet not deeply divided, whilst the inferior margin is very deeply cut into narrow segments. This applies to the upper half of the frond. Length, 12 inches.

25. *trapeziforme*, *Clapham*. Found in Cloughton Bay, near Scarborough, by the late Mr. Clapham (the locality now destroyed by the falling of the cliffs). A similar form has been found in Cornwall, Devon, and in County Down. Dwarf, trapeziform, with brief blunt pinnæ. Texture leathery.

26. *variabile*, *Monkman*. Raised from spores by the late Mr. Clapham. The fronds sometimes branch and rebranch several times, no two being alike. It is of erect habit and trapeziform. Length, 8 inches, with a breadth across the ramose head sometimes as much as 4 inches.

27. *variegatum*, *Lowe*. Found by myself in 1876 in a sea-cave at Auchmithy, where it is (or was) abundant. A form of *Auchmithianum*, with fronds regularly variegated green and white.

28. *Wollastoni*, *Lowe* (*acutum*, *Wollaston*). Found in Cornwall by Mr. J. Herbert. An *acutum*, but not of *Moore*, hence the change of name. Pinnules very narrow and acute. Apex caudate.

THE ALTERNATE-LEAVED SPLEENWORT.

ASPLENIUM GERMANICUM.—*Weis*.

ANOTHER very dwarf rare species, growing in fissures of rocks up to an altitude of 1,000 feet. It is usually found growing with *Asplenium septentrionale*, and may be a hybrid between that and *Asplenium ruta-muraria*. At all events, I have been unable to raise it from spores.

The fronds are pale green, from 3 to 4 inches long, with a slender stipes of half the length of the frond. They are pinnate to sub-bipinnate, and have a halfway character between *A. ruta-muraria* and *A. septentrionale*. Sori linear, elongate, and central.

It has been found on Helvellyn, Borrowdale, Scafell, Kyloe Rocks (Northumberland), and near Culborne (Somerset). In Wales, near Llanrwst, Llanberris, and Capel Curig. Some years ago I saw it growing and of large size in Cefn Cave. In Scotland it is recorded at Perth, Dunkeld (Stenton Rocks, where I failed to find it), Dunfermline, Kelso, and near Hassenden. In 1857



FIG. 15.
Frond of *Asplenium Germanicum*.

Mr. P. Neill Fraser gathered it near Edinburgh. Mr. D. Hutchison says it is also plentiful near Airlie Castle. Not an Irish species.

Found in the Gulf of Finland, in Norway, Sweden, Belgium, Switzerland, France, Germany, Hungary, Spain, Italy, Croatia, Dalmatia, Bukowina, and on the Tyrol and Carpathian mountains.

One variety has been described,—*acutidentatum*, *Moore*, which was raised from spores by Mr. Sim, of Foot's Cray. It differs in having the teeth of the lobes acute instead of obtuse.

THE WALL RUE.

ASPLENIUM RUTA-MURARIA.—*Linnaeus*.



FIG. 16.—*Asplenium Ruta-muraria*, var. *ramosum*.

ONE of our most abundant ferns, though less common on the eastern side of England. Found on old walls, rocks, churches, bridges, and ruins; in the drier districts occupying a northern aspect.

Forming tufts of fronds from 1 to 6 inches in length, usually about 2 inches. It can only be confused with the *Asplenium Germanicum*, and even this may possibly be a hybrid between the Wall Rue and the Forked Spleenwort. Although so common, it is difficult to cultivate. A very large amount of broken limestone in proportion to the soil, and a dry airy situation is essential. Widely spread in all temperate climates.

VARIETIES.

1. *attenuatum*, *Lowe*. Large growing (5 or 6 inches), branched and attenuated. Found at Athlone by Mr. F. J. Foot, of the Irish Survey.

2. *cristatum*, *Wollaston*. Tasseled in various ways, and the rachis often divided. Found near Ruthin Castle by Mr. J. Daniels; Guildford, by Dr. Allchin; and near Tunbridge Wells, by Mr. G. B. Wollaston.

3. *cuneatum*, *Moore*. Mostly merely pinnate with long, narrow, cuneate-based pinnules. Found at Stenton Rock, near Dunkeld; also near Bitton, by the late Rev. T. Ellacombe, of Bitton Rectory, near Bristol; and at Sizergh, in the Lake district, by Mr. J. Crossfield.

4. *dissectum*, *Wollaston*. Elongated and deeply incised pinnules. Found in Devonshire by Mr. G. B. Wollaston; and in County Louth by the late Dr. Kinahan.

5. *elatum*, *Lung*. Tall ($4\frac{1}{2}$ inches), slender, often tripinnate, pinnules very small and narrowly cuneate. Found at Ennis by Dr. Allchin; Michelstown Castle, by Mr. P. F. Keir; near Athenry, by Mr. R. Barrington; Keswick, by Miss Wright; in Dovedale, by Mr. Wilson; and in County Clare, by Mr. O'Kelly.

6. *pinnatum, Moore.* Only once pinnate. Found near Killarney by Dr. Allchin.

7. *proliferum, Wollaston.* In this variety young plants are formed on the axils of the pinnules. Found near Guildford by Dr. Allchin.

8. *ramo-depauperatum, Clapham.* Branched and depauperate. Found at Settle by Mr. Clapham.

9. *ramosum, Moore.* Branching in the upper part of the frond. Length, $2\frac{1}{2}$ inches. Found at Arnside, by Mr. J. Crossfield; at Settle, by Mr. Clapham; in County Clare, by Mr. O'Kelly.

10. *sectum, Moore.* Ends of pinnules incised, producing a forked appearance. Found at Arnside by Mr. J. Crossfield.

11. *spathulatum, Moore.* Large and spathulate. Found at Town Malling, by Dr. Allchin; Marwood, by the Rev. F. Mules; Settle, by Mr. Clapham; Dunkeld, by the Rev. R. Taylor; and at Fife, by Mr. C. Howie.

12. *Striguilense, Lowe.* Found at Portskeewett by myself in 1890. A dwarf robust form, with deep green fronds only 1 inch in length.

13. *trifidum, Moore.* Dwarf, deeply divided into three cuneate segments. Found at Malgwyn Castle by Mr. W. Hutchinson.

14. *trifoliatum, Lowe.* Dwarf. Pinnæ trifoliate. Found near Barnstaple by the Rev. F. Mules.

15. *unilaterale, Moore.* An irregular variety, with the pinnæ all on one side of the rachis. Found near Killarney, by Dr. Allchin; at Black Head, by Mr. R. Barrington; at Chaigeley, near Clitheroe, by myself; at Troutbeck, by Miss Wright; and Kendal Fell, by Mr. J. M. Barnes.

16. *variabile, Moore.* Pinnæ and pinnules exceedingly dissimilar, pinnules very small. Found at Settle by the late Mr. Clapham.

THE BLACK MAIDEN-HAIR SPLEENWORT.

ASPLENIUM ADIANTUM-NIGRUM.—*Linnaeus.*

THE present species cannot well be confounded with any other. It approaches nearest to *A. lanceolatum*; but the fronds are triangular instead of lanceolate, and in *A. Adiantum-nigrum* the sori are not submarginal. The stem is as long as the leafy portion of the frond, whilst in *A. lanceolatum* it is only a third the length of the frond.

Fronds ovate or deltoid, bi- or tri-pinnate. Length, from 3 to 20 inches, and varying in width in the leafy portion from $1\frac{1}{2}$ inches to 7 inches. Shining dark green. An evergreen. Rocks, walls, and sandy banks are its natural habitats.

A common fern (though not abundant in Ireland). It occurs all over Europe.

VARIETIES.

1. *acutum, Pollini.* This variety has been found in a number of places in Ireland and on the Continent. Whilst in Northern Spain, in 1860, I found this fern in the greatest profusion near Santander, Las Caldas, between Reinosa and Allar, and in the Congosto Pass,

in the latter locality, growing in the shade of huge plants of *Woodwardia radicans* that were on the sides of the railway. It is a linear-acute, caudate form.

2. *alcicorne*, *Lowe*. Raised by myself. 6 × 2 inches, the upper part branching like stags' horns.

3. *angustatum*, *Lowe*. Found in the Burren, County Clare, by Mr. P. B. O'Kelly. It is an acutum-form, but the fronds are narrower and longer than in *acutum*.

4. *caudifolium*, *Moore*. Found by Mr. Druery on a stone wall on Dartmoor. A singular form, the frond and pinnæ terminating in long tail-like ends. The lobes are blunt and yellowish.

*5. *Cowperi*, *Lowe* (*grandiceps*, *Wollaston*). Found in 1865 at Ilfracombe by Mr. Richard A. Thompson. It is a *grandiceps*, differing from the Irish form in having more pinnæ below the capitate head, in the segments being narrower, and in not being confluent in the basal pinnæ. The branching head is larger (4½ inches wide), and its base not conspicuously cuneate as in *grandiceps*. Length, 8 inches.

6. *cristatum*. I have not seen this.

7. *flabellatum*, *Lowe*. Raised by Messrs. Stansfield. Distinctly

flabellate, and branching near the apex.

*8. *grandiceps*, *Lowe*.

Found in 1865, in Waterford, by the Rev.

Travers Smith; 4½ × 2 inches.

Head, 3 inches wide. A very

handsome variety, having a

large compact head which is

cuneate at the base. The pec-

uliar fan-shaped pinnæ

and capitate head cause it

to be very distinct. There

are only two or three pairs of

pinnæ below where the stem

branches; and below the point

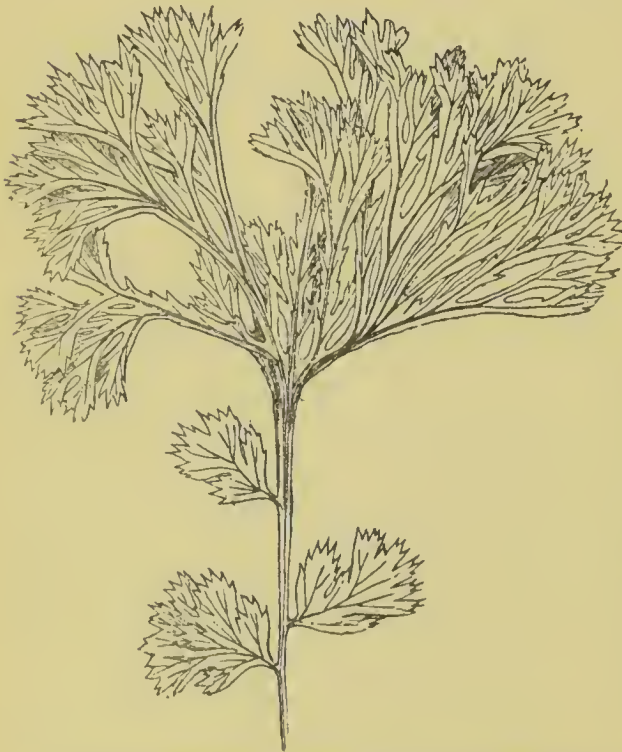


FIG. 17.—*Asplenium Adiantum-nigrum*, var. *grandiceps* (showing capitate head).

of branching there is a space without pinnae, which is not the case in *centiceps*. Mr. Travers Smith sent me fronds in 1865, and from them I raised a large number of seedlings, which, in 1868, received a First Class Certificate on July 16th from the Royal Horticultural Society.

9. *incisum*, *Clapham*. Found in 1859, between Whitby and Scarborough. Dwarf. Pinnae triangular, and the segments deeply incised.

10. *lineare*, *O'Kelly*. Found near Ballyvaughan by Mr. O'Kelly. 12 × 3 inches. A very fine form with almost linear segments.

11. *microdon*, *Moore*. Found in 1872 near Ashburton, in North Devon, by Miss Bickford and Mr. James Richards. An undoubted hybrid between the present species and *A. marinum*. It is sterile. Larger in size though not unlike the hybrid (*microdon*) of *Asplenium lanceolatum* and *A. marinum*. Length, 6 to 10 inches, width at the base, 4 inches.†

12. *obtusatum*, *Moore*. Found in Devon, Kent, Yorkshire, Stirling, Argyle, Guernsey, and in Ireland. The pinnae are short and the pinnules roundish. Length, varying from 2 to 8 inches.

13. *ramosum*, *Lowe*. Found near Plymouth by the late Rev. C. Padley. Branching several times an inch below the apex, otherwise it is like *obtusatum*. Length, 6 inches.

14. *serpentinei*, *Stansfield*. An interesting dwarf form.

15. *variegatum*, *Wollaston*. Found both in Yorkshire and in Guernsey. Normal in all respects except being striped with white.

THE SMOOTH ROCK SPLEENWORT.

ASPLENIUM FONTANUM.—*Bernhardi*.

A VERY rare, dwarf fern, growing on rocks and walls. The usual length of frond, four or five inches. It is rather tender, and requires cultivating in a greenhouse, where it grows readily in porous soil, turfy peat with abundance of gritty silver-sand, and a little friable loam. In habit it is erect and tufted, bipinnate and narrow, the frond narrowing from the centre both towards the base and apex. Colour dark green. The margins of the pinnules spinosely dentate. Found near Petersfield, Hampshire, by the Rev. W. H. Hawker; in Swanage Cave, Isle of Purbeck, by Dr. Power; near Tooting, by Mr. Gibbs; between Tan-y-Bwlch and Tremadoc (Sir W. Hooker); and there are several other recorded habitats in Westmoreland, Derbyshire, Yorkshire, Northumberland, Kincardineshire, and Belfast, but these seem to refer to a variety of *Cystopteris fragilis*.



FIG. 18.—*Asplenium fontanum*.
Portion of mature frond, under side.

† See Addenda for another hybrid.

There is a form known as Halleri, yet it is doubtful whether this is not the result of cultivation.

It is just possible that *Asplenium fontanum* is a variety of the North American *Asplenium ebeneum*. Both Mr. Moore and Mr. Clapham held this view; and this notion is strengthened on examination of the variety *refractum*.

A native of France, Germany, Italy, Switzerland, Spain, Belgium, Greece, Hungary, Siberia, and Kashmir.

There are several marked varieties :—

1. *depauperatum*, *Stansfield*. Length, 2 inches. A remarkable variety, the leafy portion entirely absent, a brief connected footstalk alone being present, surrounded by spore cases.

2. *laciniatum*, *Stansfield*. Frond, 6 inches; width in centre, 1 inch.

This is a very much incised variety.

3. *laxum*, *Stansfield*. Lax, with alternate pinnæ. Length, 5 inches.

4. *multifidum*, *Stansfield*. Length, 5 inches, the main difference being, that the frond divides and sub-divides into branches from 2 inches below the tip.

5. *refractum*, *Moore*. Length, 7 inches; much narrower and more equal in width than *A. fontanum*, and has refracted pinnæ. Rachis bulb-bearing. Found in Scotland by Mr. Fildes; but his death cast obscurity over this interesting plant.

It was first seen at Peper Harrow Park, Surrey, and was afterwards introduced by Mr. Parker of Hornsey.



FIG. 19.—Frond of *Asplenium fontanum*. Var. *depauperatum*.

THE LANCEOLATE SPLEENWORT.

ASPLENIUM LANCEOLATUM.—*Hudson*.

A SEASIDE fern, and only locally abundant; not much unlike *Asplenium adiantum-nigrum*; but the stalks are not as black as in that species, and the frond is more lanceolate in form. Very variable in size, sometimes only four inches, and sometimes as much as 18 inches; growing on walls and rocks in sheltered situations. It requires the protection of a greenhouse, and cannot flourish in excessive moisture.

A native of Cornwall, Devon, Somerset, Sussex, Kent, Gloucester, Pembroke, Glamorgan, Merioneth, Carnarvon, Denbigh, and Cork; also of Jersey, Guernsey, Scilly, and Ramsay. Abroad it has been found in Greece, France, Germany, Spain, Portugal, Switzerland, Belgium, Madeira, Azores, Algiers, Tangier, and St. Helena.

There are a dozen varieties.

1. *bifidum*, *Lowe*. Found in Devon. Divided near the apex. Length, 4 inches.

2. *caudatum*, *Lowe*. Raised from spores. Less divided, and caudate. Length, 5 inches.

3. *Claphami*, *Moore*. Raised by Mr. Clapham. Evidently a hybrid with *Asplenium marinum*. Fronds narrower than *microdon*.

4. *crispatum*, *Moore*. Found in Guernsey by the late Mr. C. Jackson. Margins crispy.

5. *cristatum*, *Druery*. This is mentioned in Mr. C. T. Druery's interesting work on "Choice British Ferns" as being a recent wild find, and, although yet young, heavily and symmetrically crested.

6. *excisum*, *Lowe*. Found at Shawbidge by Mr. G. W. Edwards. Pinnules variously shaped at the upper part of the frond, and the apex is as if bitten off.

7. *incisum*, *Lowe*. Found in Jersey. Robust; pinnules deeply incised, some depauperate. Length, 12 inches.

8. *Kalon*, *Lowe*. Found in 1864 in Devon. Pinnæ crowded and overlapping on their basal half. Length, 5 inches.

9. *Kitsonæ*, *Lowe*. Found in Devon by Miss Kitson. Pinnæ and pinnules lax, more than usually dentate, and their apices blunt. Length, 14 inches.

10. *laciniatum*, *Wollaston*. Found in the Channel Islands. Depauperate, the leafy portion often wanting, and the sori showing on the upper surface.

11. *microdon*, *Moore*. A hybrid with *Asplenium marinum*. Found in 1855, in Guernsey, by Miss Wilkinson, and afterwards by Miss Mansell and Mr. C. Jackson; also near Penzance by Mr. G. Wager. An interesting intermediate form with narrow tapering fronds; confluent at the upper portion. It more nearly resembles *Asplenium marinum*, but the substance is less leathery, and the colour a paler and less shining green. Sori copious but immature. Length, 12 inches.

12. *obtusum*, *Clapham*. Raised by the late Mr. Clapham. An obtuse truncate apex. Length, 9 inches.



FIG. 20.—*Asplenium lanceolatum*. Tip of frond.

THE LADY FERN.

ASPLENIUM FILIX-FÆMINA.—*Bernhardi*.

(Sub-section Athyrium.)

THIS common and elegant species is found throughout the United Kingdom, and is generally distributed through Europe and North America. It is the only species in subsection Athyrium in this country. A deciduous fern, luxuriating in damp, shady places, though found in open situations where there is sufficient moisture. The Lady Fern has a range from the sea-level to 3,000 feet, and at the greater heights assumes the form known as *rheticum* or *irriguum*.

Fronds bi-tripinnate, sori oblong-lunate protected by an indusium. It is most nearly allied to the dwarf *Asplenium fontanum*. The curved sori seems to be the main distinction between Athyrium and *Asplenium*. *Asplenium Filix-fœmina* varies in the length of its fronds from 1 to 3 feet. It cannot be confused with any other fern.

VARIETIES.

There are many varieties of the Lady Fern, some of which are marvellous in structure. It has therefore been considered desirable to classify these into Divisions, Groups, and Sections. Not only does this seem necessary with *Asplenium Filix-fœmina*, but also with *Aspidium angulare* and *Scolopendrium vulgare*, as a means of shortening many cumbersome names.

DIVISION A.

CHANGES IN SKELETON.

Group I. Branching.

Section a. RAMOSUM. (Stipes branching.)

1. *acrocladon*, *Moore* (*ramo-cristatum*, *Jones*). Found in 1860, near Castle Howard, by Mr. Monkman. 12 × 11 inches (across the much-branched head). A remarkable form, nearly always sterile. I have a batch of promising seedlings.

*2. *apioides*, *Lowe*. Raised by myself. 10 × 8 inches. Stipes branching, very parsley-like.

3. *brachiatum*, *Hodgson*. Found in 1866, in Lancashire, by Mrs. Hodgson. 12 × 2½ inches. Stem branching into 3 or 4 frond-like divisions.

*4. *caudiculatum*, *Mapplebeck*.

*5. *cladodesteron*, *Lowe*. Raised by myself. Length, 12 inches. Branched, crested, and heavy-headed.

6. *crispum*, *Moore*. Found in Antrim, and at Braemar and Todmorden. Length, 6 to 12 inches. A mass of densely tasselled branches.

7. *densum*, *Lowe* (*acrocladon-densum*, *Stansfield*). Raised by Messrs. F. W. and H. Stansfield, in 1878 (from *acrocladon*) dense fronded.

8. echnomocladon, *Lowe* (laciniato-acrocladon, *Stansfield*). Raised by Messrs. Stansfield. Length, 9 inches, and 6 inches across the head. Stipes and basal half of the branches naked. Lacinate.

9. incongruum, *Barnes*. Found in 1874, at Langdale, by Mr. J. M. Barnes. A remarkable variety branching in all its parts.

10. magnicapitatum, *Stansfield*. Raised in 1878, by Messrs. F. W. and H. Stansfield. 12×7 inches. Very distinct (from acrocladon).

11. Mapplebeckii, *Moore* (frondoso-cristatum, *Jones*). Raised in 1866, by Mr. J. E. Mapplebeck. Length, 1 foot.

*12. Middletoni, *Lowe* (ramulosissimum Middleton, *Wollaston*). Found in 1872, in Montgomery, by Mr. Middleton (head gardener to Sir Watkins Wynn). $4 \times 0\frac{1}{2}$ inches. Branching from the ground into 9 or 10 branches, more interesting than beautiful.

13. multifurcatum, *Moore* (ramosissimum, *Jones*). Found in 1871, at Long Sleddale, by Mr. J. E. Mapplebeck. Length, 15 inches, densely foliose, capitate head 12 inches wide.

14. ramocristatum, *Jones*. Raised in 1871, by Mrs. Hodgson. Length, 11 inches. Ramose, pinnæ crested, width across the head 6 inches.

15. ramulosissimum, *Lowe* (basi-ramosum, *Mapplebeck*). Raised in 1870, by Mr. Mapplebeck. $10 \times 2\frac{1}{4}$ inches, branching at base of stipes into 6 to 10 crested fronds.

16. Stansfieldii, *Lowe* (ramosissimum fimbriatum, *Stansfield*). Raised by Messrs. F. W. and H. Stansfield. Length, 13 inches. A very fine variety, with naked stipes, head branching to 11 inches across.

17. unco-glomeratum, *Jones*. Raised in 1878, by Messrs. F. W. and H. Stansfield. General character of acrocladon, but even more branched, finely dissected like the finest forms of "uncum," not fimbriate.

18. velutinum, *Stansfield*. A condensed acrocladon, 2 inches high, like a ball of green plush. Raised in 1878, by Messrs. F. W. and H. Stansfield.

Section β . GRANDICEPS.

(Terminal crest as wide as, or wider than, frond.)

*1. Albertii, *Lowe*. Raised by myself. Densely and compactly bunch-crested. Capitate head, $4\frac{1}{2}$ inches wide. Stiff erect habit. $16 \times 1\frac{1}{2}$ inches.

*2. Arthuri, *Lowe*. Raised by myself. Well crested. Length, 16 inches.

3. canaliculatum, *Stansfield*. Raised in 1882, by Messrs. F. W. and H. Stansfield. Rachis broad and channelled, hence the name.

4. capitatum, *Lowe* (nodoso-cristatum, *Jones*).

*5. caput Medusæ, *Mapplebeck*. Raised by Mr. Mapplebeck.

*6. centiceps, *Lowe*. Raised by myself. Length, 15 inches.

*7. ceratophyllum, *Mapplebeck*.

*8. *coronare*, *Lowe*. Raised by myself; densely crested. 24×3 .

9. *coronatum*, *Moore*. Pinnæ acute, not crested, a branching crown $3\frac{1}{2}$ inches wide. $8 \times 1\frac{1}{2}$ inches.

10. *cristulatum*, *Stansfield*. Raised in 1863, by Messrs. Stansfield. Ends cristulate; a branching crest $2\frac{1}{2}$ inches wide. Length, 8 inches.

11. *depauperatum*, *Moore*. Found many years ago near Ben Bulgen, by Mr. J. Gunning. Depauperate, lacinate, crested. Length, 12 inches.

12. *Eastoni*, *Lowe* (*Grandiceps Eastoni*, *Jones*). Found in 1874, at Wythburn, by Mr. J. Easton. Heavily crested.

*13. *culophon*, *Mapplebeck*. Raised by Mr. Mapplebeck.



FIG. 21.—Pinna of *Athyrium Filix-femina*, var. *glomeratum* (showing bunch-cresting).

14. *glomeratum*, *Moore*.

Raised in 1864,

by Messrs.

Ivery. Remark-

able for the

large compact

crests and capi-

tate head. 18×5

inches (in centre

of frond).

15. *grandi-*

ceps, *Moore*.

Found near

Nettlecombe,

by the late Mr.

C. Elworthy,

and near Wive-

liscombe, by Mr. J. Morse. The apex expanded into a large multi-lobed crispy head. Length, 18 inches.

16. *Hodgsonæ*, *Lowe* (*Grandiceps Hodgson*, *Jones*). A narrow compactly crested form, dividing into three branches 7 inches from the apex (6 inches across these branches). 24×3 inches.

17. *Hookeri*, *Lowe*. Raised by myself, terminating in a crested head 6 inches broad, short crested pinnæ at the base, then cruciate to the head. $16 \times 2\frac{1}{2}$ inches (at the base), narrowing to one inch higher up.

*18. *Hopæ*, *Lowe*. Found near Edinburgh, by Lady Hope. An erect-growing, somewhat plumose-crested, and capitate form. Length, 16 inches.

*19. *kalon*, *Lowe*. Raised by myself. A grand cruciate and capitate form, the cruciate pinnæ crested. Head densely crested, and 5 inches wide. $35 \times 2\frac{1}{2}$ inches.

*20. *kephalobares*, *Lowe*. Raised by myself. Pinnæ short and heavily crested, frond terminating in a head five inches wide. Immediately above the basal pair of pinnæ is a single branch 1 inch wide and 6 inches long, heavily crested and capitate. 20×3 inches.

21. *multiceps*, *Moore*. Found near Truro. Multifid crisped. Length, 24 inches.

22. *nudicaule*, *Lowe* (*nudicaule cristatum*, *Jones*). An extraordinary variety, branching at the base of the stipes into three distinct fronds, having naked stems, and merely a leafy capitate head, each head $4\frac{1}{2}$ inches wide. Length, 11 inches.

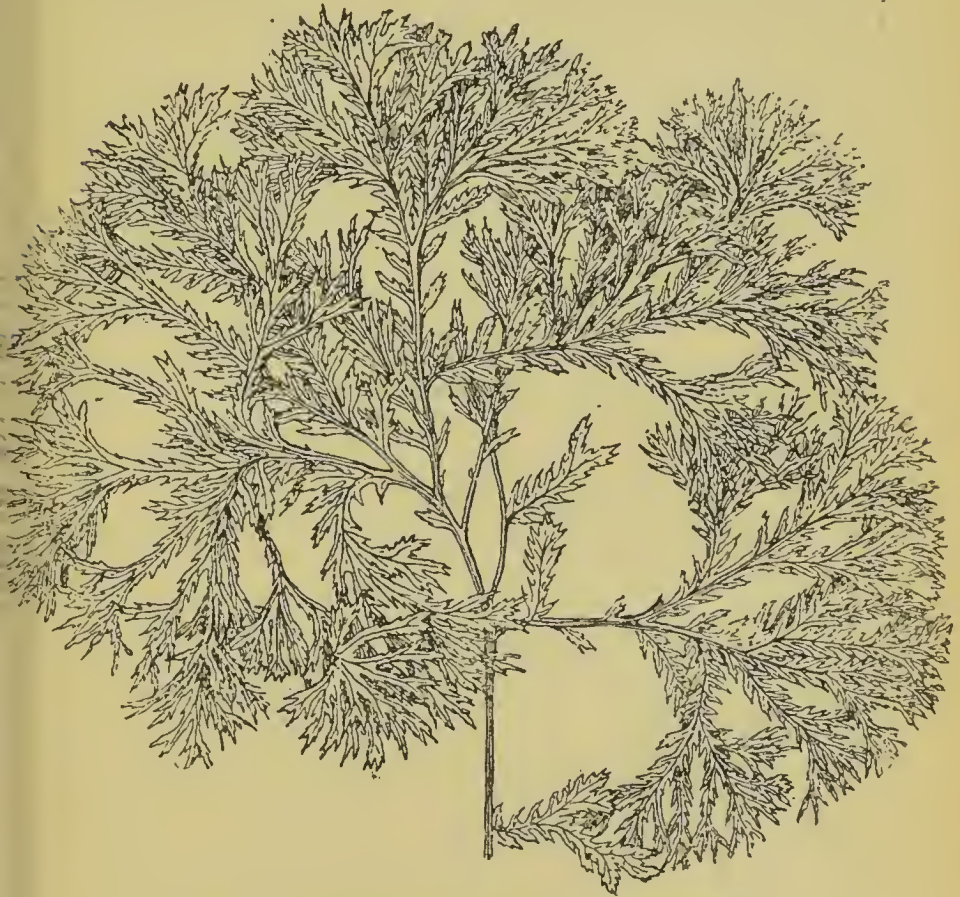


FIG. 22.—*Athyrium Filix-femina*, var. *orbiculatum* (apex).

23. *orbiculatum*, *Lowe* (*capitatum*, *Padley*). Raised by the late Mr. Elworthy. A very finely-divided large capitate head.

24. *Padleyi*, *Lowe* (*grandiceps* *Padley*, *Jones*). A narrow normal form with a dense grandiceps head $4\frac{1}{2}$ inches wide. $15 \times 2\frac{1}{2}$ inches.

25. *Quilteri*, *Mapplebeck* (*inæquale capitatum*, *Jones*). Raised in 1872, by Mr. Mapplebeck. Branching head 8 inches broad, below much depauperated. $14 \times 0\frac{3}{4}$ inches.

26. *scopula*, *Lowe*. Raised in 1887 by myself. rachis dividing. Crests like brushes, head 4 inches across. $18 \times 3\frac{1}{2}$ inches.

*27 strombomenon, *Lowe*. Raised in 1867 by myself. Normal with a crested head $5\frac{1}{2}$ inches broad. 18×4 inches.

28. triumphale, *Lowe*. Raised by myself in 1866. Pinnæ and pinnules branching and crested, forming a circular head 7 inches across. 24×4 inches.

*29. umbraculæforme, *Lowe*. Raised by myself in 1866. Depauperate, and terminating in an umbrella-shaped head. Length, 12 inches.

Section γ . CRISTATUM.

(Bunch crested.)

*1. amenum, *Lowe*. Very lax, normal at base, pinnules varying strongly dentate, pinnæ variously crested. 22×7 inches.

2. angustatum, *Lowe* (angustato-cristatum, *Stansfield*). Raised by Messrs. Stansfield. A very narrow cruciate, scarcely crested form. 24×1 inches.

3. anomalum, *Lowe* (*Gillsoniæ anomalum*, *Mapplebeck*). Raised in 1869 by Mr. Mapplebeck. $21 \times 3\frac{1}{2}$ inches in middle of frond. Pinnules crowded and margins dentate, tips of pinnæ crested, apex of frond caudate. An extraordinary variety.

4. apuæforme, *Barnes*. Found in 1870, at Dent, by Mr. Barnes. Is fish-shaped and crested.

5. caudatum, *Lowe* (*Gillsoniæ anomalum*, *Mapplebeck*; *caudato-cristatum*, *Jones*). Raised in 1869. 21×3 inches. Lax, narrow, pinnules dense, apex of frond caudate.

6. corymbiferum, *Moore*. Found in Guernsey, by the late Mr. James, varying from 18×6 to 34×10 inches. A fine form, crested and corymbose.

7. cristatum, *Wollaston*. Found near Malton, by Mr. Monkman. Apex crested, but not the pinnæ.

8. curvato-digitatum, *Barnes*. Found in 1875, on Lancaster Moor, by Mr. Stewardson. Pinnæ curved down and digitate.

9. dactyliferum, *Jones*. Found in 1874, at Martindale, by Mr. J. K. Hodgson. Said by the late Colonel James to be distinct.

10. defecto-furcillans, *Mapplebeck*. Raised in 1869 by Mr. J. E. Mapplebeck. 27×9 inches, pinnæ longer and much wider (though with less branches) than *Howardiæ*.

*11. densissimum, *Mapplebeck*.

12. digitale, *Jones*. A lax narrow form, pinnæ with slender, digitate, conspicuous crests. Apex of frond not crested, but ending in a very fine point. 28×6 inches.

*13. digitatum, *Lowe*. A very bold crested variety. Raised by myself in 1862. 22×5 inches.

14. echinatum, *Lowe*. Short pinnæ, densely capitate; the capitate heads 1 inch across, margins conspicuously dentate. Raised by myself. 16×3 inches.

*15. Elworthii, *Moore*. Found near Nettlecombe by the late Mr. C. Elworthy. Densely tasselled, very symmetrical form, pinnules crested. 30×7 inches.

16. ericudes, *Lowe* (*Craigii-uncum*, *Jones*). Raised from spores

(*Craigii* crossed with *uncum*). A narrow *Craigii*. $22 \times 2\frac{1}{2}$ inches.

17. *foliosum*, *Lowe* (*folioso cristatum*, *Jones*).

18. *Fosteri*, *Lowe*. Found in Scotland, by Mr. W. Foster, of Salford. Multifurcate fronds.

*19. *furcillans*, *Mapplebeck*.

20. *gemmatum*, *Barnes*. A very interesting narrow variety with reflexed pinnules. Pinnæ compactly and heavily crested. 27×4 inches.

21. *gracilissimum*, *Lowe*. Raised in 1867 by myself. $21 \times 7\frac{1}{2}$ inches. Slender, with short broad pinnules, pinnæ crested.

22. *gratum*, *Lowe*. Raised by myself. Symmetrical crested variety, slender and lax. 20×5 inches.

23. *Hodgsoni*, *Lowe* (*apuæforme Hodgsoni*, *Barnes*). Found in 1867, at Torver, by Mrs. Hodgson. Pinnæ and frond fish-shaped.

*24. *Howardæ*, *Moore*. Raised in 1864 by Mr. Craig (gardener to the late Hon. Mrs. Howard, Levens Hall). 24×7 inches in centre of frond. Pinnæ branching and crested, as broad as long, and though lax overlapping from the great breadth of the ramose ends.

25. *Huckii*, *Lowe* (*cristatum Huckii*, *Barnes*). Found in 1874, by Mr. T. Huck, at Wet Sleddale. A beautiful variety, with long, crispy, crested pinnules.

26. *inæquale-furcans*, *Wollaston*. Found in 1877 in Lancashire, by Mr. J. Lamb. Very irregular in size, position, and form of pinnæ and pinnules, and partly depauperate. Conspicuously crested. 18×8 inches (at base).

27. *incongruum*, *Barnes*. Found in 1875, in Langdale, by Mr. Barnes.

*28. *kalliston*, *Lowe*. Raised by myself. A handsome crested form. Length, 2 feet.

29. *laxum*, *Lowe* (*laxo-cristatum*, *Phillips*). Found at Ballynahinch, Co. Down, by Mr. W. H. Phillips. A small crested fern, with long, narrow, lax pinnules. Distinct. 30×9 inches.

*30. *magnificum*, *Lowe*. Raised by myself. Grandly crested.

31. *Mapplebeckii*, *Moore* (*frondoso-cristatum*, *Jones*). Raised by Mr. Mapplebeck in 1866. Dark green and sterile. A very fine crested frondose fern.

32. *nirandum*, *Lowe*. Raised by myself. Very handsome. 26×6 inches (lower part), $2\frac{1}{2}$ inches (upper part). Capitulate. Four pairs of basal pinnæ branch-crested, and above this cruciate-crested.

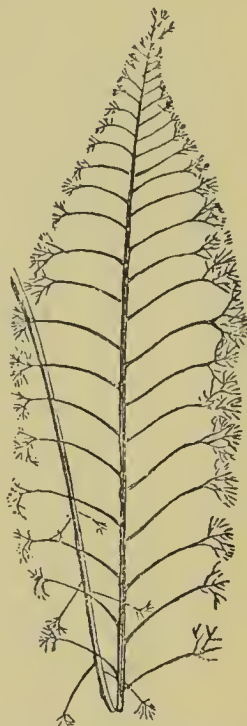


FIG. 23.—*Athyrium Filix-femina*, var. *Elworthii* (showing crested).

33. *multifidum*, *Moore*. Found in Wicklow, by Mr. D. Moore. 33×10 inches. Normal with crested pinnæ. There are various wild forms (viz. *Barnesii*, *Hodgsonæ*, *tenuæ*, *Fraseri*, *nanum*), and almost an endless number have been raised from spores.

34. *paucidentatum*, *Lowe* (*paucidentatum cristatum*, *Mapplebeck*). Raised in 1870 by Mr. Mapplebeck. $16 \times 10\frac{1}{2}$ inches. A marvellous, delicate variety; very broad. Pinnæ with large ramose crests; apex of frond abrupt, with branching crest; pinnules short and scarcely dentate.

35. *percristatum*, *Lowe* (*percristatum Cousins*, *Jones*). An interesting form.

36. *polydactylum*, *Moore*. Found at Windermere, Nettlecombe, and other places. Finger crested.

37. *regale*, *Moore*. Raised in 1867 by Mr. J. M. Barnes. 30×10 inches. The grandest crested Lady Fern; foliose, and the pinnules crested.

38. *setigerum*, *Jones*. Found in the Lake district by Mr. Garnett. A grand crested, lax form; pinnules dilated at the apex, and bristling with hair divisions. 24×5 inches.

39. *spinocristatum*, *Lowe*. A marvellous production, raised from mixed spores. 20×4 inches. Lax, many pinnæ wanting, some reduced to thorns that are crested, the few pinnæ well crested, a large capitate head.

40. *splendens*, *Moore*. Raised in 1864 by Mr. J. M. Barnes. 30×7 inches. A fine plumose form, with tips of pinnæ boldly furcately crested, and pinnules also crested.

41. *splendidum*, *Lowe* (*splendens Craig*, *Jones*). Raised by Mr. Craig. 36×11 inches. One of the finest crested forms. Pinnæ and pinnules crested. Scarcely distinct from Barnes's form.

42. *Stewardsoni*, *Lowe* (*digitale Stewardson*, *Jones*). A pretty lax digitate variety. Fronds, 21×7 inches.

43. *tenuæ*, *Lowe* (*cristato-tenuæ*, *Wollaston*; *multifidum tenuæ*, *Wilson*). Found in 1869, in North Lancashire, by Mr. J. Wilson. A slender fern, widest in centre, with narrow, distant, fish-tail crests. $12 \times 4\frac{1}{2}$ inches.

44. *uncum*, *Lowe*. Raised by myself from spores. A copy of *uncum*, but well crested and capitate. 22×5 inches.

Section δ . CRUCIATUM.

(Pinnæ and pinnules twin branched.)

*1. *Alexandræ*, *Lowe*. Raised by myself in 1867. 28×3 inches. The three pairs of basal pinnæ, and also near the forked tip of the frond normal, elsewhere broadly and boldly cruciate.

2. *angustum*, *Lowe* (*angusto-cruciatum*, *Jones*). Raised in 1868 by Messrs. Stansfield. Smaller than *multifidum*. $12 \times 0\frac{1}{2}$ inches.

3. *arbuscula*, *Lowe*. Raised by myself. 24×9 inches. Pinnæ normal; pinnules, some cruciate, others depauperate, and part normal.

4. *Bakeri*, *Lowe*. Raised by myself. Narrow, cruciate, with attenuated tip.

- *5. *calomelanos*, *Lowe*. Raised by myself. A fine crested form.
6. *clarum*, *Lowe*. Raised by the late Mr. Carbonell. 18×5 inches. Cruciate, both in pinnæ and pinnules.
7. *Cœleste*, *Lowe*. Raised by the late Colonel Jones, and in the possession of Mr. E. F. Fox. $18 \times 0\frac{1}{2}$ inches. Very narrow, cruciate and capitate.
- *8. *columnare*, *Lowe*. Like crested columns.
9. *contrarium*, *Lowe*. Raised by the late Colonel Jones. 26×2 inches at base, gradually narrowing to half an inch. The 3 or 4 pairs of basal pinnæ long, narrow, and reflexed, above these more or less horizontal cruciate pinnæ, and near the apex lunulate; frond ending in a narrow, pendent apex. A fine variety.
10. *coronans*, *Lowe* (*cruciato-coronans*, *Stansfield*). Raised about 1884 by Mr. W. C. Carbonell. Dwarfier than *Victoriæ* with a more crown-like crest; cruciate character replaced in upper half of frond by extreme sporting of pinnæ.
- *11. *Craigii*, *Moore* (*crucipinnulum cristatum* *Craig*, *Jones*). Raised in 1864 by Mr. R. Craig. 8×1 inches. Stem red. Pinnæ and pinnules varied in size and shape, apex very leafy and crested.
- *12. *Craigii-glomeratum*, *Mapplebeck*. Raised by Mr. Mapplebeck. A conglomerate form.
- *13. *Craigii-splendens*, *Mapplebeck*. Raised by Mr. Mapplebeck.
14. *crucere*, *Lowe*. Raised by myself in 1887. Cruciate, pinnæ crested, apex capitate.
15. *cruciato-multifidum*, *Praeger*. Found in 1880 at Castlerock, Co. Derry, by Mr. A. J. Praeger. $20 \times 1\frac{1}{2}$ to $4\frac{1}{2}$ inches. Lower half cruciate, upper normal, but crested.
16. *cruciato-pinnula*, *Phillips*. Found at Holywood, county Down, by Mr. W. H. Phillips. 30×9 inches. Pinnæ truncate, pinnules on upper half of frond cruciate.
17. *cruciferum*, *Lowe*. From the late Colonel Jones's fronds. Length 20 inches, width $\frac{3}{4}$ of an inch, cruciate from the base to the densely tasselled apex. Pinnæ in lower half of the frond crested and longer, but, lying parallel with the rachis, the frond is not wider. A pretty variety.
18. *delicia*, *Lowe*. Raised by myself in 1887. A fine cruciate form with cruciate pinnules.
19. *Dyeri*, *Lowe*. Raised by myself. A narrow cruciate capitate elegant form.
- *20. *elegans*, *Lowe* (*Victoriæ gracile*, *Jones*). Raised by myself. A very slender *Victoriæ*. 21×3 inches. Pinnæ narrow (linear) pinnules minute, having the appearance of rows of thorns.
21. *Evelyna*, *Fox*. Raised by Mr. E. F. Fox. A distinct form of *Victoriæ*, $30 \times 1\frac{1}{2}$ inches. The cruciation parallel with the rachis, conspicuously bidentate.
- *22. *exemplum*, *Lowe*. Raised by myself. Length 15 inches. Pinnæ narrow, the basal 2 or 3 pairs at right angles to the rachis, the rest of the pinnæ cruciate, the frond narrowing to a point. The whole of the pinnules are cruciate, and this gives the frond an elegant appearance.

23. *Fieldæ*, *Moore* (*cruciatum* Miss Field, *Jones*). Found by Miss Field. 24×1 inches. Cruciate, and unbranched apex.



FIG. 24.—Middle portion of frond of *Asplenium Filix-femina*, var. *Fieldæ* (showing cruciate character).

frond, pinnæ dividing in the middle; above cruciate and crested, apex capitate, 18×5 inches, and $2\frac{1}{2}$ inches where cruciate; raised from "Craigii."

*30. *invincere*, *Lowe*. Raised from spores in 1870 by myself. $18 \times 4\frac{1}{2}$ inches. Lower half of frond normal and densely crested, above cruciate with a capitate head. Where cruciate, width only $1\frac{1}{2}$ inches.

31. *Jonesii*, *Lowe* (*cruciato-cristatum*, *Jones*). Raised in 1874, by the late Colonel Jones. $21 \times 1\frac{1}{4}$ inches. A very symmetrical cruciate variety, with crested apex.

*32. *Lawsoni*, *Lowe*. Raised by myself. $20 \times 0\frac{3}{4}$ inches. In style of *Frizelliæ-cristatum* of Jones; but the pinnæ are cruciate. A large capitate head.

33. *Mapplebeckii*, *Lowe* (*cruciato-multifidum* Stansfield, *Wollaston*; and *Fieldæ-fimbriatum*, *Moore*). Raised in 1867 by Mr. J. E. Mapplebeck. Length 21 inches.

34. *mixtum*, *Lowe*. A narrow, very slender form, raised by myself in 1887. Length 20 inches, width 3 inches where poly-

24. *gemellipara*, *Lowe*. Raised by myself. 30×4 inches below and $\times 2$ inches above. A handsome combination. Lowest 4 or 5 pairs of pinnæ crested, their pinnules cruciate; above pinnæ cruciate and the crested apex capitate.

25. *glomeratum*, *Lowe* (*cruciato-glomeratum*, *Stansfield*). Raised in 1878 by Messrs. F. W. and H. Stansfield.

*26. *Gilsonæ*, *Mapplebeck*.

*27. *Gilsonæ-furcans*, *Mapplebeck*.

*28. *Gulsonæ*, *Lowe*. Raised by myself. A narrow cruciate form, having a narrow, normal apex to the frond. Length 20 inches.

29. *Hallæ*, *Lowe*. Raised from spores in 1869 by myself, lower half of the frond normal and crested; centre of

dactylos, and 1 inch where cruciate; near the base polydactylos, and the superior basal pinnule brachiata.

35. *multifidum*, *Lowe* (*cruciato-multifidum*, *Wollaston*). Raised in 1865 by Messrs. Stansfield. $22 \times 1\frac{3}{4}$ inches. Cruciate, apex crested. A crested *Pritchardii*.

36. *nanum*, *Lowe*. Raised by myself. A pretty dwarf cruciate form with a finely cut capitate head. Length 9 inches, width $\frac{1}{2}$ an inch, head 2 inches across.

37. *Nereidæ*, *Lowe* (*cruciato-cristatum* *Lowe*, *Wollaston*). Raised in 1873 by myself. Cruciate throughout the frond; pinnæ and also pinnules crested; capitate crested head. $18 \times 1\frac{3}{4}$ inches.

38. *nutamen*, *Lowe*. Raised by myself. A narrow cruciate variety. Length 21 inches, width 1 inch. Apex weeping.

39. *peculiare*, *Lowe*. Raised by myself. A leafy *Victoriæ*-like form, 26×3 inches. Tips of frond and pinnæ pointed.

40. *percruciatum*, *Lowe*. A narrow, slender, conspicuously cruciate variety, with a branched apex. Raised from spores. 14×1 inches.

41. *Phillipsii*, *Stansfield* (*cruciato-pinnula* *Phillips*, *Fox*). Found in 1864, in County Down, by Mr. W. H. Phillips. 21×6 inches. Normal (truncate and lax); pinnules cruciate. An interesting fern.

42. *Praegeri* (*cruciato-pinnula*, *Praeger*). Found in 1880 at Castlerock, Co. Derry, by Mr. A. J. Praeger. Pinnules cruciate. 22×5 inches.

43. *Pritchardii*, *Stansfield* (*cruciatum* *Pritchard*, *Jones*). Found in 1861, near Ruthin, by Mr. T. Pritchard. 40×1 inches. Cruciate.

44. *projectum*, *Lowe*. A narrow, cruciate, crested capitate form, with here and there projecting non-cruciate pinnæ. Raised by myself. Length 15 inches; width where cruciate, 1 inch, where projecting, 3 inches.

*45. *proteoides* *Lowe*. Raised from spores by myself from Mr. Clapham's "proteum." A much finer cruciate form, with projecting pinnæ, length 25 inches, width 3 to 5 inches. Habit erect, fronds stiff, and every frond alike. In Colonel Jones's "Nature-printed Ferns," *proteoides* is figured under the name "proteum."

46. *proteum*, *Clapham*. Found in Cumberland in 1866 by the late Mr. Clapham. Half the fronds narrow and cruciate, and half normal. $21 \times 4\frac{1}{2}$ inches.

*47. *regale*, *Lowe* (*Victoriæ magnificum*, *Jones*). Raised by myself. $25 \times 5\frac{1}{2}$ inches. Pinnules lobed; pinnæ broader than in *Victoriæ*, $2\frac{1}{2}$ to 3 inches in length, forming open squares 1 inch in diameter.

48. *reticulum*, *Lowe*. Raised by myself. A narrow, profoundly dentate, cruciate variety. Length 20 inches, width $1\frac{1}{4}$ inches, apex pointed.

49. *Stableri*, *Lowe* (*cruciato-pinnula* *Stabler*, *Fox*). 22×7 inches middle of frond (where widest). Pinnæ crested and apex of frond caudate. Raised in 1868 by Mr. G. Stabler, of Levens.

50. *Stansfieldii*, *Lowe* (cruciato multifidum *Stansfield*, *Wollaston*). Raised in 1865 by Messrs. *Stansfield*. Apex capitate, 22×1 inches.

51. *Strigulense*, *Lowe*. Raised by myself. A bold form, and a giant variety. 36×1 inches.

*52. *strombomenon*, *Lowe*. Raised by myself. Length, 14 inches. Pinnæ on lower half of frond reflexed, on upper half cruciate and truncate, the apex twisted round to the shape of a ball.

53. *transformatum*, *Lowe*. Raised by myself in 1887. A form of proteoides.

*54. *triumphale*, *Lowe*. Raised in 1866 by myself. Like a narrow *Craigii*, with a large symmetrical capitate head, 7 inches across; the tips of the cruciate pinnæ boldly crested. $18 \times 4\frac{1}{2}$ inches, and where cruciate only $2\frac{1}{2}$ inches.

*55. *trossulum*, *Lowe*. Raised by myself, a very pretty cruciate form (a cross with *Victoriæ*). Length 17 inches.

56. *truncatum*, *Lowe* (cruciato-truncatum, *Jones*). Raised by myself. Bold, pinnules large and lunulate, apex truncate, 15×6 inches.

*57. *uncum*, *Lowe* (*uncum-cruciatum*, *Jones*). Raised by myself. A cruciate uncum.

58. *Victoriæ*, *Moore*. Found in 1861, in Stirlingshire, by Mr. J. Cosh. 20×5 inches. Pinnæ narrow, the cruciation forming a number of square openings. A remarkable form.

59. *Victoriæ-gracile*, *MacNab*. Raised at the Edinburgh Botanical Gardens, about 1870, by Mr. James *MacNab*. Almost identical with *Victoriæ elegans*, *Lowe*.

Group II. Pumilum.

(Skeletal axis shortened in relation to soft parts.)

Section a. CONGESTUM. (Main axis shortened.)

1. *angustum*, *Lowe* (*angustato congestum*, *Stansfield*). Raised in 1872 by the late Mr. A. *Stansfield*. A cross between *stipatum* and *Craigii*.

2. *Cathedrale*, *Lowe* (*Simpsonii cristatum*, *Jones*). A crested *Simpsonii*, said to have been found on Lichfield Cathedral 200 years ago?

3. *collectaneum*, *Lowe*. Raised by the late Colonel *Jones* (in Mr. E. F. *Fox's* collection). $7 \times 4\frac{1}{2}$ inches. Very distinct, dwarf, cuneate, depauperate, and digitate; pinnæ crowded.

4. *cristatum*, *Lowe*. Raised by myself. A densely crested capitate form, very much dwarfed; neat. 8×2 inches.

5. *curtum-cristatum*, *Stansfield*. Raised in 1871 at Todmorden.

*6. *Edwardsii*, *Lowe* (*congestum-minus Edwards*, *Jones*). Found in Ireland many years ago, by the late Mr. *Riley*. Pinnæ crowded and crisp. $9 \times 2\frac{1}{2}$ inches.

*7. *Edwardsii ramosum*, *Lowe*. Similar to *Edwardsii*, with the addition of branching at the apex.

8. *excurrens*, *Lowe* (*congestum excurrens*, *Stansfield*).

9. Findlayanum, *Stansfield* (congesto-cristatum, *Wollaston*). Raised in 1870 by Messrs. Stansfield. $16 \times 2\frac{1}{2}$ (in centre). Flexuose, foliose, and crested.

10. Fittii, *Lowe* (congestum cristatum Fitt, *Jones*). A dwarf crested congestum, raised by Mr. Fitt. Very much like Findlayanum.

11. grandiceps, *Lowe* (congestum grandiceps, *Stansfield*). Raised in 1885 from Fittii.

12. Grantæ, *Moore* (congestum Paul, *Wollaston*). Found in 1865, in Cornwall, by Mr. Paul, of Truro. Pinnæ and pinnules over-lapping, densely frondose; stipes and rachis very stout, the latter somewhat flexuose; crispate. 23×6 inches.

13. Hodgsonæ, *Lowe* (congestum, *Barnes*). Found in 1863 at Gillbanks by Mrs. Hodgson. A beautiful variety with dense crispy pinnules.

14. laciniato-cristatum, *Lowe* (congestum laciniatum cristatum, *Stansfield*). Raised in 1886 at Pontefract.

15. laciniatum, *Lowe* (congestum laciniatum, *Stansfield*). Raised in 1872 at Todmorden. A cross between stipatum and laciniatum.

16. minimum, *Birkenhead*. Found at Grange, Lancashire, by Mr. Mason. Height only 6 inches.

17. nanodes, *Lowe*. Found in Monmouthshire by Mrs. Bagnall Oakeley. $24 \times 4\frac{1}{2}$ inches (the stipes being 6 inches). Stipes bending, rachis flexuose, pinnæ almost imbricate.

18. Phillipsii, *Lowe* (congestum Phillips, *Phillips*). Found in Co. Antrim in 1888 by Mr. W. H. Phillips. 16×6 inches. Very leafy.

19. ramulosum, *Lowe* (angustato ramulosum, *Stansfield*). Raised about 1876 at the Todmorden Nurseries.

20. Simpsoni, *Stansfield* (congestum Simpson, *Jones*). A dwarf, stiff, crisped variety, found by Mr. T. Simpson in Lancashire in 1869.

21. stipatum, *Moore* (congestum Paul, *Jones*). Found at Dolly in 1864. Dwarf, with very thick stem.

Section β . CRISPATUM.

(Subsidiary axes shortened more or less.)

1. apicale, *Moore*. History obscure. A beautiful variety somewhat like Vernonæ-cristatum.

2. Barnesii, *Lowe* (Crispatum Barnesii, *Barnes*). Found in 1863 at Underbarrow. Robust, with long crispy fronds. Mr. Crossfield found at Arnside a form with short fronds.

*3. comicum, *Mapplebeck*. Crispy, pinnules irregular.

4. conioides, *Appleby*. Found near Doncaster by Mr. S. Appleby. Length, 2 feet. Named from the outline and divisions of the frond resembling hemlock leaves. Mr. Praiger has found a nice form in Co. Antrim.

5. conioides-cristatum, *Stansfield*. A crested fern raised by Messrs. Stansfield.

6. Vernonæ, *Jervis*. Found by Miss Vernon. $18 \times 4\frac{1}{2}$ inches. Divisions frilled.

7. *Vernonæ corymbiferum*, *Stansfield*. Raised in 1877 at Todmorden. *Apicale* is practically identical.

*8. *Vernonæ-cristatum*, *Mapplebeck* (*crispato-cristatum*, *Jones*). Raised in 1873 by the late Colonel Jones. 18×4 inches. Pinnules overlapping and crispate, pinnæ lax, short, very broad and well crested.

Group III. Flexuosum.

Section a. FLEXUOSUM. (Bending.)

1. *adulterum*, *Lowe*. An extraordinary and beautiful mixed narrow variety. 17×2½ inches. Lower half of frond pinnæ very gracefully flexuose; above this cruciate, with flexuose pinnæ, and near apex normal; pinnules more or less reflexed throughout. Another of the cruciate batch of seedlings raised here.

2. *Craigii*, *Lowe*. Not unlike *Harrisæ* but larger (one of Mr. Craig's seedlings). Pinnæ flexuose, and crested. Pinnules long and reflexed; tip of the frond crested. 21×7 inches.

3. *Crossfieldii*, *Lowe* (*flexuosum*, *Moore*). Found in 1862 in Silverdale by Mr. J. Crossfield. Twisted, flexuous, and grotesque.

4. *cruciato-reflexum*, *Praeger*. Found at Castlerock, Co. Derry, by Mr. A. J. Praeger. 25×5 inches. Cruciate and reflexed.

5. *cruciatum*, *Lowe*. Raised from spores. Length 24 inches, width 4½ inches. Pinnæ narrow, flexuose, and cruciate; more regularly cruciate in upper half of frond, and apex capitate. This was from a mixture of spores (*Frizellia*, *Foxii*, *cruciatum*, and *uncum*); and all these forms are shown in the frond.

6. *cymba*, *Lowe*. Raised by myself. 18×5½ inches. The pinnæ curve upwards (boat-like) and are heavily crested; pinnules tortuous and are turned downwards.

7. *flexuosum*, *Wollaston*. Found in 1858 in Lancashire by Mr. Huddart. The stipes, rachis, pinnæ, and pinnules twisting in a most grotesque manner, varying much in the manner of twisting. 18×5 inches.

8. *Foxii*, *Lowe* (*reflexum* *Fox*, *Wollaston*). Found in 1850 in South Devon by Mr. E. F. Fox. A much narrower variety than *reflexum*, with the same revolving character; tips of pinnæ reflexing giving a hooked look. 27×4 inches.

9. *Harrisæ*, *Lowe*. Raised by myself. Rather broader than *Foxii*, and the tips of pinnæ minutely crested.

*10. *lineare*, *Lowe* (*lineare reflexum*, *Lowe*). Raised in same batch of seedlings with *cruciatum*; 16×2½ inches; to above the middle of frond; pinnæ one inch apart; upper third of frond cruciate with minute lunulate pinnules.

11. *perplexum*, *Lowe*. Raised by myself. 27×3 inches (though some pinnæ five inches long). Remarkably depauperate and very flexuose. Pinnæ mostly on one side, and in pairs almost touching each other; some pinnæ crested; many pinnules wanting, and most lunulate and minute.

12. *plumosum*, *Jones*. A flexuose plumose form found in County Kerry by the late Mr. Tyermann. 20×4 inches.

13. *reflexo-multifidum*, *Jones*. Found in 1880 at Castle Rock, County Down, by Mr. A. J. Præger. 18×6 inches. Pinnæ lax and caudate ; pinnules reflexed ; tip of frond crested.

14. *reflexum*, *Wollaston*. Found in 1858 in Westmoreland, by Mr. F. Clowes. The flexuose character is in the pinnules revolving. A remarkable variety. 24×10 inches.

15. *rhæticum-deflexum*, *Moore*. Found at Troutbeck by Mr. Clowes. A curious variety with flexuose fronds.

*16. *tortum*, *Lowe* (*torto-cristatum*, *Mapplebeck*).

17. *Victoriae*, *Lowe* (*Victoriae-flexuosum*, *Jones*). Raised by myself. 18×1 $\frac{3}{4}$ inches. A *Victoriae* with linear pinnæ, twisting and bending in a marvellous manner.

DIVISION B.

ALTERATIONS IN SOFT PARTS.

Group I. Compositum.

(Subdivision of ultimate segments.)

Section a. PLUMOSUM.

(Subdivision associated with increased development.

Fructification scanty or absent.)

1. *Axminsterense*, *Lowe* (*plumosum Axminster*, *Jones*). Found in 1860 at Axminster by Mr. J. Trott. A noble plumose form, more frondose than *plumosum* but very feathery. I had a large plant from Miss Bellairs completely covered with bulbils. 32×14 inches.

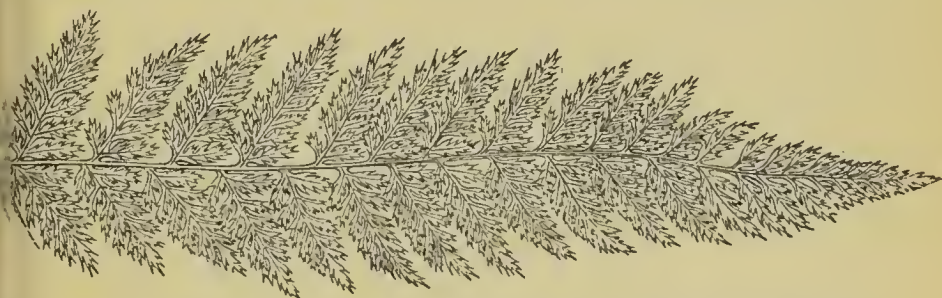


FIG. 25.—*Athyrium filix-fœmina*, var. *Barnesii* (pinna, showing feathery character).

2. *Barnesii*, *Lowe* (*plumosum Barnes*, *Wollaston*). Found in 1863 in Westmoreland by Mr. J. M. Barnes. Pinnæ lax at the base of the frond, and pinnules shorter than in *plumosum*. A handsome variety. 33×10 inches.

3. *Blakæ*, *Moore*. Raised by the late Mr. A. Parsons.

*4. *Clarissima*, *Jones*. Found in 1868 in North Devon by Mr. R. Moule. 32×18 inches. A most lovely fern, and strikingly distinct. The linear segments give a lax appearance. Pale green. Lower pinnæ 14 inches long and 4 inches wide ; largest pinnules, 2 $\frac{1}{4}$ inches long.

5. *decoratum*, *Lowe*. From the late Colonel Jones's collection. History not known. A subplumose, narrow, lax form; very symmetrical. A great beauty. 23×6 inches.

*6. *dilatatum*, *Mapplebeck*. Rather foliose.

7. *divaricatum*, *Lowe* (*plumosum-divaricatum*, *Moore*). Found in 1872 in Lancashire by Mr. W. Morris. Pinnules almost perpendicular to the main stem. A very fine divaricate plumosum. 30×12 inches.

8. *elegans*, *Lowe* (*plumosum-elegans*, *Parsons*). Raised by Mr. Parsons. Slender, with finely cut pinnules. 28×7 inches.

9. *foliosum*, *Druery*. Found at Ilfracombe in 1881. A true foliosum.

10. *frondoso-cristatum*, *Jones* (in the late Colonel Jones's collection).

11. *Hodgsonæ*, *Lowe* (*subplumosum Hodgson*, *Jones*). Found by Mrs. Hodgson in 1870 near Ulverston. A very slender featherlike fern. 16×6 inches. Very lax; with beautiful pinnules, finely cut.

12. *kalothrix*, *Lowe*. Raised in 1870 by Mr. Howlett. 18×6 inches. A most lovely, delicate, pale-green, hair-like form.

*13. *Longridgense*, *Lowe*. A subplumose form found on Longridge Fell in 1846 by myself. A large and graceful variety. 30×12 inches.

14. *multifidum*, *Lowe* (*plumoso-multifidum*, *Stansfield*). Found about 1860 on Ben Lawers by Mr. W. Marshall. A feathery form of *multifidum*.

15. *plumosum*, *Moore*. Found in Yorkshire in 1860 by Mr. J. Horsfall. A fine plumose variety. 33×8 inches.

16. *Smithii*, *Lowe* (*plumosum Smith*, *Jones*). Length 20 inches, width 12 inches. A handsome fertile plumosum variety. Found by Mr. Smith in Darley Dale.

17. *Stansfieldii*, *Lowe* (*plumosum-Stansfieldii*, *Stansfield*). Raised by Messrs. Stansfield from *kalothrix*; a larger and less fragile form than that lovely variety. A most beautiful plumosum.

18. *subplumosum*, *Padley*. Found near Nettlecombe by the late Mr. C. Elworthy. 26×8½ inches. A very elegant plumose form.

*19. *superbum*, *Lowe* (*plumosum-superbum*, *Druery*). Raised by Mr. C. T. Druery. One of a number of lovely ferns raised by Mr. Druery.

20. *Thompsoni*, *Lowe*. A singular plumose form, the pinnæ furcating near the ends, and the tips being caudate. Found at Mousehole, Cornwall, by Mr. R. A. Thompson. 24×7 inches. Apex furcate.

21. *Willsii*, *Lowe* (*plumosum Wills*, *Jones*). Found in Dorset in 1869 by Mr. J. S. Wills. Very robust. Mr. Wills had a plant 6 feet high and as much wide.

Section β. DISSECTUM.

(Subdivision of ultimate segments without marked increase in development of soft parts.)

1. *Barnesii*, *Clapham*. Raised by Mr. Barnes, of Thirsk. Somewhat in the way of *pulcherrimum*, though distinct.

2. coronatum, *Lowe* (setigerum-coronatum, *Birkenhead*).
3. corymbiferum, *Lowe* (setigerum corymbiferum, *Birkenhead*).
4. cristatum, *Lowe* (pulcherrimum cristatum Hodgson, *Jones*).
A crested form of pulcherrimum found in the Lake District by Mrs. Hodgson.
5. diffissum, *Moore*. Found originally in Guernsey by the late Mr. James. Length 18 inches. Pinnules irregularly cut.
6. elegans, *Phillips*. Found at Duneight, Co. Antrim, by the Rev. W. D. Pouden. 18×6 inches. A fragile form.
7. gracile, *Phillips*. Found at Inch, Co. Down, by the Rev. W. D. Pouden, also in Antrim by Mr. Phillips. 20×6½ inches. A slender form.
8. grandiceps, *Lowe* (setigerum grandiceps, *Birkenhead*).
9. Jacksoni, *Lowe* (pulcherrimum plumosum, *Jones*). A plumose form of pulcherrimum found by the late Mr. Jackson.
- *10. Lowæ, *Lowe*. Raised by myself. Normal in form, fronds and pinnæ concave. Length, 16 inches.
- *11. Lowæ-angustatum, *Lowe*. Raised by myself. Differs in the fronds being very narrow.
12. pulcherrimum, *Jones*. Raised in 1868, by Mrs. M. A. Walke. 14×4¼ inches. A pretty dwarf, feather-like fern.
- *13. rectangulare, *Moore*. Found in 1870, in Westmoreland, by Mrs. J. Wilson. 21×8 inches, in centre of frond. Apical pinnules bidentate; pinnules so small that the spore-cases are wider. A very pretty variety. *Doodioides Lowe* is very similar.
14. setigerum, *Wollaston*. Found in 1878, in Lancashire, by Mr. Garnett, nurseryman, Bowness. 20×6 inches, in centre of frond. An exquisitely divided form.
15. spinosum, *Lowe*. Raised by myself. 15×5 inches. Pinnules deeply split into very dentate thorny lobes.
16. todeoides, *Stansfield*. Large and very finely dissected.
- *17. todeoides superbum, *Lowe*. Raised by myself. Length, 24 inches.

Group II. Exiguum.

(Regular diminution of soft parts.)

Section a. LAXUM. (Pinnæ wide apart.)

1. fœcundulosissimum, *Wollaston*. Raised from unicum-cristatum in 1882 by Mr. C. T. Druery. Dwarf, densely crested, and the crests crowded with bulbils.
2. laxo-cristatum, *Phillips*. Found at Ballynahinch, Co. Down, by Mr. W. H. Phillips. 21×7 inches. Pinnules linear; pinnæ crested tips. Distinct.
3. lineare, *Lowe* (unicum-lineare, *Jones*), a very narrow unicum, raised by the late Colonel Jones. 12×1½ inches.
4. pannosum, *Moore*. Found in a number of places. Slender; pinnules irregular and tapering.
5. scitum, *Lowe*. Raised in 1877 by myself. A narrow, neat unicum. Pinnæ slightly crested, apex of frond ramose and crested.

24×3 inches in the broadest part, only $\frac{3}{4}$ inch at the base, and below the branched head.

6. *uncum*, *Moore*. Found in 1860, in Levens Park, by Mr. J. M. Barnes. 10×3 inches. Pinnæ narrow and lax; pinnules varied, although having a general resemblance; divided to the costa and often bent like a hook.

7. *Woodii*, *Lowe* (*curtum-Woodii*, *Wollaston*). Found in 1865, at Bowness, by Mr. J. Wood. 11×2½ inches. Regular outline, compact and leafy.

Section β . DEPAUPERATUM. (Irregular, part wanting.)

1. *abasilobum*, *Phillips*. Found at Ballywater, Co. Down, by Mr. W. H. Phillips. 24×11 inches. Basal lobe wanting; pinnæ linear caudate.

*2. *abasiphyllum*, *Lowe*. Found in Ireland by the late Rev. C. Padley. Length 14 inches. Habit somewhat prostrate; differs in the absence of the basal pinnules.

*3. *amœnum*, *Mapplebeck*. Defective.

4. *capitatum*, *Tyerman*. A form very much like *cephalomanes* was raised by the late Mr. Tyerman.

5. *cephalomanes*, *Jones*. Raised from spores. Length 14 inches. Normal reflexed crested pinnæ at the base; above this pinnæ absent; apex capitate, the head five inches broad.

*6. *defecto-sectum*, *Mapplebeck*.

*7. *Du Boulæ*, *Lowe*. Found in Cornwall by Mrs. Du Boule, and sent to Mr. Sang to raise plants from spores, in order to realize money towards restoring Mr. Du Boule's church. Unfortunately the seedlings would not come true from spores. 22×4 inches. A singular depauperate and laciniated variety.

8. *excurrens*, *Moore*. Found in 1853 at Tunbridge Wells, differing in the tips of the pinnæ having transparent hair-like points.

9. *interruptum*, *Moore*. Found near Nettlecombe, by the late Mr. Elworthy. 26×7 inches. Pinnæ very various; pinnules much depauperated. A singular form was found near Ambleside by Mr. G. B. Wollaston; and Mr. W. H. Phillips has found two good forms, one at Carlingford and the other at Killymoon.

10. *medio-deficiens*, *Jones*. Found in 1884 at Innerwell, Wigtownshire, by Mr. C. T. Druery. Outline symmetrical; basal pinnules (2 to 6 pairs) in all the middle pinnæ depauperate.

11. *polymorphum*, *Clapham*. Found in 1872 near Scarborough, by Mr. Keld. Pinnæ and pinnules depauperated; many pinnules absent, and some branched and others confluent; somewhat crested; a tail-like depauperate apex of frond. A singular fern. 18×7 inches.

*12. *secare*, *Lowe*. Raised by myself. A narrow depauperate form, with pinnæ and apex of frond truncate. Length, 16 inches.

*13. *Sylvia*, *Lowe*. Raised by myself. A slender depauperate variety, with diverse pinnæ and pinnules; reflexed. 15×2½ inches. The larger pinnules confluent.

Group III. Heteromorphum.

Section *a*. ROTUNDATUM. (Rounded pinnules.)

1. capitatum, *Lowe* (Pulleri-capitatum, *Jones*). Raised by Mr. E. F. Fox. A capitate Pulleri.

*2. cymbaforme, *Lowe*. Raised by myself. A cross between Pulleri and cruciatum. In lower half of fronds, which are lax, each pair of pinnæ curve upwards and assume the shape of a boat; above the middle of frond cruciate, and towards the apex Frizelliæ-like. The upper half of each pinna is lunulate, terminating in a large lunulate pinnule, as broad as the rest of the frond. 20×4 inches at base, and $20 \times 0\frac{1}{4}$ inches near apex.

*3. Fraseri, *Lowe*. Raised from spores by myself. Quite distinct from Pulleri, with larger and less rounded pinnules. Truncate and branched at the apex. Length, 22 inches, width, $2\frac{1}{2}$ inches.

4. Pulleri, *Moore* (rotundatum, *Wollaston*). Found in 1864 in the Isle of Skye by Mr. C. Puller. Length, 18×3 inches. Very lax, pinnæ short and narrow, with lunulate pinnules; tip of frond caudate. A distinct fern. I have raised a form from this, fronds 6 inches broad, and pinnules of double the size of Pulleri.

Section *β*. LINEARE. (Narrow pinnules.)

1. diminuato-pinnulum, *Lowe*. Raised by myself in 1884. 18×7 inches. A slender variety, with very small, reduced pinnules, broader than long.

*2. Flexile, *Mapplebeck*. Narrow.

3. Girdlestoni, *Ivery* (lineare, *Wollaston*). Found in 1866 in Rosshire by the Rev. Canon Girdlestone. Length, 21×9 inches. Pinnæ ascending, linear or depauperate, especially near the rachis, where the pinnules are reduced to a thorn, or wanting. Apex of pinnules confluent.

Section *γ*. LACINIATUM. (Jagged pinnules.)

1. arbuscula, *Lowe*. Raised by myself.

*2. Bellairsæ, *Lowe*. A dwarf laciniate form. Found by Miss Bellairs. Length, 10 inches. Pinnæ and pinnules diverse.

3. conioides, *Appleby*.

4. elegans, *Lowe* (laciniatum elegans, *Stansfield*). A sport from ramulosum. The ramulose apex has disappeared, and is replaced by cruciate pinnules.

5. Fosteri, *Lowe* (laciniatum Foster, *Jones*). Found at Woodhead, in 1879, by Mr. Foster. An interesting laciniate Kalothrix-looking depauperate form. Pinnules cut into hair-like segments. 15×5 inches.

6. Jonesii, *Barnes*. Found in 1861, at Farleton Knot, by Mr. J. J. Jones. Dwarf, laciniate, abrupt fronds.

7. multicuspe, *Moore*. Found in 1861, in Levens Park, by Mr. Barnes. Pinnules many pointed.

8. multifidum, *Lowe* (tortile multifidum, *Stansfield*). Raised in 1886, at Todmorden.

9. polydactylum, *Lowe* (laciniatum polydactylum, *Stansfield*). Raised about 1885, by Messrs. F. W. and H. Stansfield.

10. ramulosum, *Lowe* (laciniatum ramulosum, *Stansfield*). Raised in 1872, at Todmorden, between Craigii and Horsfallii. Some fronds plumose, others multifid.

*11. Rickettsæ, *Lowe*. Found by Mrs. Ricketts. A narrow lacinate form. Length 12 inches.

12. tortile, *Moore* (inæquale, *Wollaston*). Found in 1858, in Yorkshire, by Mr. J. Horsfall. A symmetrical but lacinate form. An interesting variety. 24 × 7 inches.

13. tortiloides, *Lowe*. Raised by myself in 1887. 22 × 3½ inches (in middle of the frond). A combination of fissidens and tortile.

Section δ. LUNULATUM (or FRIZELLÆ).

(Pinnæ abbreviated to lobes.)



FIG. 26.—*Athyrium*
Filix-fœmina, var.
Frizellæ.

1. capitatum, *Lowe* (*Frizellæ cristatum*, *Jones*; *lunulato-cristatum*, *Wollaston*). Raised in 1875, by the late Colonel Jones. 24 × 0.2 inches. Pinnæ smaller than in *Frizellæ*, terminating in a compact capitate head 5 inches wide. From the branching of this crested head there is a complete change in the character of the segments. I have raised an identical form.

2. *Carbonellii*, *Lowe* (*Frizellæ capitatum*, *Carbonell*). Raised by the late Mr. Carbonell. 14 × 0½ inches. A narrow capitate form.

3. *Clovellianum*, *Lowe*. Found in 1884, at Clovelly. 16 × 0.3 inches. Somewhat of the character of *Frizellæ*, though quite distinct and has a cuneate-crested apex.

*4. *coronare*, *Lowe* (*Frizellæ-coronare*, *Birkenhead*). Nicely crowned.

5. *cruciatum*, *Lowe*. Raised from spores by myself. Narrow, cruciate, and capitate. 25 × 0½ inches; capitate head 5½ inches across. Head dense and foliose.

6. *dentato-capitatum*, *Lowe*. Not unlike *dentatum* but broader fronds, longer teeth, and a capitate dentate head. 16 × 1 inches at base, and 16 × 0½ inches in upper half.

7. *dentatum*, *Lowe*. Raised from spores (of *uncum*, *cruciatum*, and *Frizellæ*). Combining the characters of all; below *uncum*, then *cruciatum*, ending in *Frizellæ*; everywhere deeply dentate. 16 × 1½ inches at base, and 16 × 10¼ inches near apex.

*8. *flabellifolium*, *Mapplebeck*.

*9. *flabellifolium-cristatum*, *Mapplebeck*.

10. *Frizellæ*, *Moore* (*lunulatum*, *Wollaston*). Found in 1857, in Co. Wicklow, by Mrs. Charles Frizell, of Castle Kevin, and

subsequently in Co. Donegal, by Mr. H. C. Hart. Very narrow with half-moon shaped pinnæ. 15×0.3 inches.

11. gracile, *Lowe* (*Frizellæ gracile*, *Birkenhead*).

12. grammicon, *Lowe*. Raised from spores. Bushy habit. 18×1 inches.

13. Helena, *Fox*. Raised by Mr. E. F. Fox. 15×2 inches. lower half branch-crested; upper pinnæ all but wanting. Cuneate branched apex.

14. lunuloides, *Lowe*. Raised by myself. $12 \times 1\frac{1}{4}$ inches. Upper half of frond pinnæ lunulate but confluent, apex truncate.

15. multifidum, *Lowe* (*Frizellæ multifidum*, *Barnes*, *lunulato-multifidum*, *Wollaston*). Raised in 1871, by Mr. Barnes. 18×0.2 inches. Pinnæ smaller and more abortive than in *Frizellæ*. Frond terminating in a capitate head 9 inches across. The tips of the numerous branches crested, the crests being of a different character. I have raised one almost identical.

16. ramosissimum, *Lowe* (*Frizellæ ramosissimum*, *Mapplebeck*; *ramulo-lunulatum*, *Wollaston*). Raised in 1873, by Mr. Mapplebeck. Length, 4 inches, width across the ramose head, 5 inches. A mass of branches (as many as 17) starting at the stipes.

17. ramosum, *Lowe* (*Frizellæ ramosum*, *Lowe*; and *ramo-lunulatum*, *Wollaston*). Raised in 1874 by myself. 12×0.3 inches. Branching from the rachis, each branch representing the top portion of *Frizellæ*.

18. sagittatum, *Lowe* (*sagittato lunulatum*, *Jones*). Raised by myself. Base sagittate, upper part gradually passing into *Frizellæ*.

19. Shawii, *Moore*. A dwarf *Frizellæ*, with lobes single instead of double, as in *Frizellæ*.

*20. spicatum, *Mapplebeck*.

*21. stellatum-angustatum, *Druery*. Interesting capitate head.

22. superadornatum, *Lowe*. Raised by Mrs. Grant, of Hillersdon. The lunulate pinnæ smaller, and the capitate head larger than in *capitatum*, and the plant more robust. 26×0.2 inches (capitate head 6 inches).

THE COMMON CETERACH.

ASPLENIUM CETERACH.—*Linnaeus*.

(CETERACH OFFICINARUM.—*Willdenow*.)

A SMALL pinnatifid fern, growing on rocks and walls in a limestone district, mostly on the sunny side; having bluish-green, leathery, numerous fronds varying from 3 to 10 inches in length. The underneath of the frond is covered with reddish, chaffy scales, and the sori, which are more or less hidden by these scales, are linear-oblong. It is more abundant and more luxurious in Ireland than in England. During droughts the fronds fold up as if dead, but become fully expanded again after the first shower. Although it is abundant in the southern counties of England, and found in



FIG. 27.—Frond
of *Asplenium*
Ceterach.

30 English, 7 Welsh, and 7 Scotch counties, it is nevertheless rare in some of them. Years ago a single plant was found by the late Mr. Joseph Sidebotham, on Colwick Park wall, in Nottingham, and a second plant was on the sunk fence wall at Highfield House; but both of these plants are now dead. It had been seen years before in Nottingham Park and at Papplewick, but is destroyed in these places. The Lancashire plants are the variety *crenatum*. In Ireland it is more or less abundant in fourteen counties, and is also found in the islands of Jersey, Anglesea, Arran, and the Isle of Wight. Widely spread throughout Europe, and an inhabitant of Madeira, Azores, Canaries, Cape de Verde Isles, India, Asia Minor, Brazil, etc. In Lancashire it is found locally on Pendle Hill, and at Browsholme Hall, near Clitheroe.

In Madeira there is a very similar fern on a much larger scale, known as *Ceterach aureum*. This I have crossed with the English species, but the seedlings are yet too small to speak about positively. The Barony of the Burren, in County Clare, is extraordinarily rich in varieties, some very large, and some exceedingly distinct. Mr. P. B. O'Kelly, of Glanarra House, Ballyvaughan, has sent me more than a dozen distinct varieties, and all good characteristic plants. Mr. O'Kelly's name is attached to all his Burren forms.

VARIETIES.

1. *angustatum*, O'Kelly. $2 \times 0\frac{1}{4}$ inches. Concave.
2. *binidum*, O'Kelly. Bifid.
3. *crenatum*, Moore. Found in Lake district, by Miss Beaver; near Clitheroe, by Mr. Garnett and myself; Crickhowel, by Mr. J. R. Cobb and myself; Devon, Mr. J. R. Gray; Perth and Kircudbright, by Mr. W. G. Johnstone; Carberry Island, by the late Colonel A. S. H. Lowe; Waterford, by Mr. J. R. Kinahan; but by far the best forms in the Burren, by Mr. O'Kelly. The margin crenate. $6 \times 1\frac{1}{4}$ inches.
4. *crenatum-major*, O'Kelly. $8 \times 1\frac{1}{4}$ inches.
5. *crenulare*, Lowe (*crenatum minor*, O'Kelly). $2\frac{1}{4} \times 0\frac{3}{4}$ inches. Concave, very pretty.
6. *crispum-major*, O'Kelly. $10\frac{1}{2} \times 1\frac{1}{4}$ inches. A giant.
7. *cristatum*, O'Kelly. Crested.
8. *decorum*, O'Kelly. Stiffer texture and rugose. 8×1 inches.
9. *densum*, O'Kelly. $3 \times 0\frac{3}{4}$ inches.
10. *densum-variens*, O'Kelly. $4 \times 0\frac{5}{8}$ inches.
11. *depauperatum*, Wollaston. Found at Kilkenny, by Colonel Buchanan.
12. *giganteum*, O'Kelly. $7\frac{1}{2} \times 1$ inches.
13. *grandiceps*, O'Kelly. $4 \times 0\frac{3}{8}$ inches. A fine capitate form.

14. interruptum, *O'Kelly*. $7 \times 0\frac{1}{2}$ inches. Lax and interrupted.
 15. kalon, *Lowe*. Found near Athlone by the late Colonel A. S. H. Lowe. $8 \times 1\frac{1}{2}$ inches. Crenate.
 16. lineare, *O'Kelly*. $2\frac{1}{2} \times 0\frac{1}{2}$ inches. A narrow form and depauperate.
 17. lineare-major, *O'Kelly*. $9 \times 0\frac{3}{4}$ inches. Very lax, stipes long.
 18. majus, *O'Kelly*. $9\frac{1}{2} \times 1\frac{1}{10}$ inches. Flat.
 19. minimum, *Lowe*. Devon. 2 inches long.
 20. multifido-cristatum, *O'Kelly*. $4 \times 0\frac{6}{10}$ inches. Multifidly crested.
 21. ramoso-cristatum, *Lowe*. Found in Co. Clare, by Mr. A. Wise. $5\frac{1}{2} \times 0\frac{3}{4}$ inches.
 22. ramosum, *O'Kelly*. $6 \times 0\frac{7}{10}$ inches. Also Arnside, by Mr. J. Crossfield. Branching in the rachis.
 23. subpinnatum, *O'Kelly*.
 24. superbum, *O'Kelly*. 9×1 inches. A fine deeply crenate form.
 25. tenuifolium, *O'Kelly*. $5\frac{1}{2} \times 0\frac{3}{8}$ inches. Slender.
 26. truncatum, *O'Kelly*. $2\frac{3}{4} \times 0\frac{1}{2}$ inches. Depauperate and truncate.
 27. variabile, *Lowe*. Found at Browsholme Hall, Clitheroe, by myself. 5 inches. And also in the Burren by Mr. *O'Kelly*; the latter has a more bushy habit.

Tribe 9. SCOLOPENDRIÆ.

THE HART'S TONGUE FERN.

SCOLOPENDRIUM VULGARE.—*Smith*.

NO one can mistake the Hart's Tongue; for in its normal state, its strap-shaped, entire tongue-like deep green fronds are quite distinct in appearance. Although a widely distributed fern, it is only locally common, and occurs only to the height of about 600 feet, luxuriating most in shady, moist situations where the water drains off; damp walls, mouths of wells, and banks in shady lanes, are its special delight. It is not found north of the island of Gothland, in the Baltic Sea.

An evergreen species, with fronds from four to twenty-four inches in length. Although the Hart's Tongue has a single undivided frond, its prolific varieties assume the most remarkable peculiarities, so much so as to make it requisite to subdivide the varieties, and this has been done in the following manner:—

branched.	plumose (crispum)
unequally branched	undulate
crested	narrowed
conglomerated	muricate
sagittate	supralineate
truncate	marginate
pouch-bearing	margin-altered
flexuose	variegated.

Readily grown under cultivation, but liable to be attacked by the

grub of the Weevil (*Curculio sulcatus*), which destroys the roots and eats into the centre of the stem. Although this grub occasionally attacks the Lady Fern and the *Aspidium angulare*, it is far more destructive to the Hart's Tongue.

DIVISION A.

ALTERATION IN SKELETON.

Group I. *Ramose*. (Branched.)

Section *a*. *RAMOSUM*. (Stipes branched.)

*1 *areston*, *Lowe*. Raised by myself. $10 \times 0\frac{1}{2}$ inches; branches twisting and crossing each other; divisions finely cut. Head, 6 inches across.

2. *cristatum*, *Lowe* (*ramo-cristatum*, *Clapham*). Raised by the late Mr. Clapham. Width across the finger-crested divisions, 7 inches. Stipes, 4 inches. Length of whole frond, 7 inches.

*3. *dichotomum*, *Lowe*. Raised by myself. $14 \times 0\frac{3}{4}$ inches. Branching from the base, again below the rachis, and again 4 inches below the apex, into many narrow divisions. Outline irregular; crests, 7 inches wide.

4. *digitatum*, *Wollaston*. Raised from spores by Mr. Wollaston; branched into a flat crest. In 1860 Mr. Crossfield found a form of this at Cork; and one has been raised by myself $9 \times 0\frac{3}{4}$ inches with a digitate head $4\frac{1}{2}$ inches across.



FIG. 28.—*Scolopendrium vulgare*, var. *Edwardsii* (ramose crestring).

5. *Edwardsii*, *Lowe*. Found in Devon by Mr. Edwards; branching from the base and again on the stipes, and repeating this on the rachis; bunch crested.

6. *majus*, *Lowe* (*ramosum-major*, *Clapham*). Found in Yorkshire in 1857, by the late Mr. Clapham, 15×2 inches. Stipes and rachis splitting and producing two or more normal fronds.

7. *Molyi*, *Lowe* (*ramo-cristatum Moly*, *Wollaston*). Found in 1862 in S. Devon by Mr. Moly. $12 \times 1\frac{1}{2}$ inches. Branching into five normal fronds with crested heads, 4 and 5 inches across.

8. *ramosum*, *Willdenow* (*dædaleum*, *Deakin*). A ramosely crested form, known for many years.

Sub-section. RAMO-INÆQUALE. (Unequally branched.)

1. *admirabile*, *Lowe*. Raised by myself. $12 \times 0\frac{2}{8}$ inches. Branching, and crested with narrow divisions; margin regularly dentate.

*2. *Alexandrae*, *Lowe*. Raised by the late Colonel Jones from Victoria, and more ramose than that variety. Length, 11 inches; width across the ramose head, 6 inches. Rachis linear and dentate.

3. *arbusculare*, *Lowe*. Raised by myself. Length, 9 inches, and width across the head, 7 inches; stem naked; palmate.

4. *Atkinsoni*, *Lowe* (*inæquale furcans* Atkinson, *Wollaston*). Raised in 1876 by Mr. C. J. Atkinson. Length, 14 inches; width across the branches, 10 inches. A very pleasing form.

5. *blandum*, *Lowe*. A ramose form raised by myself.

6. *capitatum*, *Lowe* (*inæquale capitatum*, *Lowe*). Raised by myself. 18×1 inches. Margin deeply and variously cut; the capitata part also much cut; the crest 5 inches wide. A bold fern with a straggling stag's-horn-like crest.

7. *concavum*, *Lowe* (*concavo-ramosum*, *Clapham*). Raised by the late Mr. Clapham. Length, 7 inches, leafy portion only 2 inches. Stipes branching at base into 5 or 6 fronds that are concave; margin irregular; rachis also branching and crested.

8. *conjungendum*, *Lowe*. Found in Devon by the Rev. F. Mules. 13×1 inches. Twin-fronded, strap-shaped and multifid; the divisions angular and pointed.

9. *constellatum*, *Lowe*. Raised by Mr. Glave. A dwarf, stem-branching form; depauperate below the numerous bunch crests; length, 6 inches.

10. *cristatum*, *Lowe* (*ramo-cristatum*, *Wollaston*). Found in S. Devon in 1862, by Mr. Moly. Length, 10 inches. An interesting ramose, crested form.

11. *Delesserioides*, *Lowe*. Raised by myself. $18 \times 0\frac{1}{2}$ inches. Stipes branching and rebranching, not unlike the red seaweed. *Delesseria sinuosa*, *Lamour*; is a very singular variety.

*12. *Elworthii*, *Lowe* (*inæquale-furcans* Elworthy, *Wollaston*). Raised in 1873 by the late Mr. Elworthy. Length, 9 inches; width across the branching head, 9 inches.

*13. *formosum*, *Lowe*. Raised by myself. $14 \times 0\frac{3}{4}$ inches. Branching, margin irregular; the branches twisting across each other; the tips laciniately crested.

*14. *gloriosum*, *Lowe*. Raised by myself. $22 \times 1\frac{1}{4}$ inches. Irregular outline, as if bitten in places. Branching most on one side. Stipes, 7 inches; head 7 inches across.

15. *keratoides*, *Lowe* (*inæquale cristatum*, *Jones*). Raised by the late Mr. Clapham. $9 \times 0\frac{1}{5}$ inches. Branching and rebranching into a head 4 inches across. All parts of the frond narrow and irregularly lacerate; very stag's-horn-like.

16. *laudabile*, *Lowe*. Raised by myself. 15×1 inches. Branching in the stipes, and having a crest 6 inches across, composed of broad divisions. Margin irregular.

*17. *mirabile*, *Lowe*. Raised by myself. 7×1 inches. Widening

from the base, and dividing into branches on one side; terminating in a large crest.

18. *mirificum*, *Lowe*. Found by myself in 1869, at Westward Ho. $16 \times 0\frac{7}{8}$ inches. Branching and rebranching; the topmost branches long, narrow, and stag's-horn-like. Width across the head, 4 inches. Margin, irregularly dentate.

19. *multipinnatum*, *Moore* (*inæquale cristatum*, *Wollaston*).

*20. *notabile*, *Lowe*. Raised by myself. $12 \times 0\frac{1}{2}$ inches. A narrow dentate, *Victoriæ*-like variety; branching in stipes and rachis; the head not so spreading and divisions narrower. Stipes only 2 inches.

*21. *Ouranion*, *Lowe*. Raised by myself. $15 \times 0\frac{3}{4}$ inches, the margin very regularly cut into divisions; the capitate head like a bird's wings.

22. *patulum*, *Lowe*. Found at Littleham, by the late Rev. C. Padley. A large ramose form; rachis dividing in the middle and branching in a ramose manner.

23. *ramo-congregatum*, *Birkenhead*. Length, 1 foot.

24. *ramo-cristatum*, *Clapham*. Raised by Mr. Clapham, Mr. Moly, and Mr. Foster. Branched in stipes; and ends of branches crested.

25. *ramo-digitatum*, *Bolton*. Found in 1863 at Warton Crag by Mr. Bolton. Large, strong-growing, ramose, and slightly undulate.

26. *ramosissimum*, *Lowe*. Raised by myself. A much branched form.

27. *scrrula*, *Lowe*. A very interesting seedling from Todmorden. Length, 6 inches. Branching, cresting, and the margins toothed like a saw.

*28. *summum*, *Lowe*. Raised by myself. $9 \times 0\frac{1}{2}$ inches. Branching; the margins depauperate and irregularly toothed; terminating in a crest 4 inches across.

29. *Trevellyanæ*, *Lowe*. Found near Nettlecombe by the late Mr. Elworthy. Stem nearly naked; erect. Width across the crested head, 4 inches; finely cut, interesting variety. Distinct, much branched and crested; leafy part linear. $12 \times 0\frac{1}{4}$ inches. Stipes, 7 inches; a *Victoriæ*-like form.

30. *variabile*, *Lowe* (*ramo-variabile*, *Wollaston*). Found in Dorset in 1875, by the late Colonel Jones. $8 \times 1\frac{3}{4}$ inches. Branching in stipes, and again in rachis into twin truncate fronds.

*31. *Velosii*, *Moore*. A fine crested form introduced by Messrs. Veitch.

32. *Victoriæ*, *Lowe*. Raised by myself. $9 \times 0\frac{3}{8}$ inches. Branching in stipes and rachis, into very narrow divisions. A pretty fern.

33. *Whitwellii*, *Moore*. Found in 1873 at Kendal, by Mr. G. Whitwell. A fine robust form, strongly ramo-crested.

Section β . CRISTATUM. (Tasselled.)

1. *alatum*, *Lowe* (*alatum-cristatum* *Moore*). Raised at Pontefract, about 1884 by Messrs. Stansfield.

*2. *allokoton*, *Lowe*. Raised by myself (an *inæquale-furcans*).

- 17 × 0 $\frac{7}{8}$ inches. Branches opposite each other, lower pair stipate; sori on margin. Head 11 inches across.
3. *Atkinsoni*, *Lowe* (*capitatum* Atkinson, *Stansfield*). A neat dwarf crested variety found by a gardener (Atkinson) of Dalton in Furness, and sent to Messrs. Stansfield about 1874.
4. *attenuatum*, *Lowe* (*attenuato-cristatum* Stewardson, *Wollaston*). Raised in 1877 by Mr. Stewardson. 10 × 1 $\frac{3}{4}$ inches in widest part. Narrowing from the base to the crested apex; the cresting ax. An interesting form.
- *5. *Babingtoni*, *Lowe*. Raised by myself. 12 × 1 inches. Digitately and densely crisp-crested head, 6 inches across.
- *6. *Cliftii*, *Lowe*. Found in North Wales by the late Mr. Clift. 12 × 1. A compact multifid very leafy crown with the uncut margins.
7. *columna*, *Lowe*. Raised at St. Pierre, in 1885. 10 × 1 $\frac{1}{4}$ inches. Normal, but ending abruptly 2 $\frac{1}{2}$ inches below the apex, where it branches into an erect crest 2 $\frac{1}{2}$ inches across. Very column-like.
8. *commixtum*, *Lowe*. Raised by myself. A form of *Cliftii* with a greater crest.
9. *contractum*, *Wollaston*. Found in 1861, at Heversham Head, by Mr. J. M. Barnes. A pretty variety; fronds contracted below the crest.
10. *coronatum*, *Stansfield*. 11 + 0 $\frac{3}{4}$, a long strap-shaped form; the costa splitting 2 inches from the apex; the frond ending in a globular crown-like head. Found in 1872 by the late Mr. A. Stansfield.
11. *corymbiferum*, *Lowe*. Raised by myself. Length 6 inches. A foliose corymbose form.
12. *cristagalli*, *Wollaston*. Found in North Devon in 1864 by Mr. R. Moule. 12 × 1 $\frac{1}{2}$ inches. Normal, with a symmetrical finely-divided crest. Found also in the Lake district; and at Drogheda by Mr. W. H. Phillips.
13. *cristatum*, *Moore*. A not uncommon form; fronds crested.
14. *cristulatum*, *Stansfield*. Raised by Messrs. Stansfield about 1874. A round crest of 1 $\frac{1}{2}$ inches wide.
15. *digitale*, *Lowe*. A digitate form raised by myself.
16. *flabellatum*, *Moore*. Found near Nettlecombe by the late Mr. Elworthy, 8 × 1 $\frac{1}{2}$, flabellately multifid.
17. *flabellatum-Boltoni*, *Barnes*. Found in 1870, near Kellet, by Mr. W. Bolton. A fine form; fronds short; head fan-shaped.
18. *Fosteri*, *Lowe* (*medicaule capitatum*, *Jones*). A most interesting variety, raised by Mr. Foster of Salford in 1876. Stipes branching at the base; a naked stem, except the reniform close capitate head (2 $\frac{3}{4}$ inches across).
19. *grandiceps*, *Jones*. Found by Mr. John Cousins. Length, 11 inches, width across the crest, 11 inches. The grandest of Crested Hart's Tongues.
20. *Hendersoni*, *Willison*. Found in 1866, near Whitby, by Mr. J. Henderson. Like a dwarf ramo-digitatum. Length, 6 inches. Stipes branching and re-branching into divisions (5 or 6 in number) that branch and crest at the apex.

21. *lato-digitatum*, *Stansfield*. Raised by Messrs. Stansfield. $8 \times 1\frac{3}{4}$. Costa branching into a wide digitate crest 6 inches across.

22. *Malcomsonæ*, *Stansfield*. Found at Clonmel by Miss Malcomson. Length 13 inches. Margin irregular; branching and crested.

23. *Millettii*, *Lowe* (*cristatum* Millett, *Wollaston*). Found in North Devon in 1865 by Mr. Millett. $14 \times 1\frac{1}{2}$ inches; having a crested head 6 inches across.

24. *multifidum*, *Gray*. A not uncommon crested form.

25. *mutandum*, *Lowe*. In Colonel Jones's collection of living plants. History unknown. Length 10 inches. Normal for 5 inches, then branching and contracting to very narrow, whip-like branches, the tips bunch-crested; some of the heads being 5 inches across.

26. *ornandum*, *Lowe*. Raised by myself. 14×1 inches. Crested digitately; has a slight tendency to be muricate.

27. *ponderosum*, *Lowe* (*ponderoso-cristatum*, *Lowe*). Raised by myself. Stem naked. Length 6 inches; crest 4 inches across. A conglomerate form.

28. *ramo-cristulatum*, *Stansfield*. Raised by Messrs. Stansfield about 1886. A very ramose cristulatum.

29. *Riallii*, *Lowe* (*cristatum* Riall, *Jones*). Found by the late Dr. Ryall. A neat, dwarf-crested variety.

30. *Stewardsoni*, *Lowe* (*capitatum*, *Stewardson*). Found in 1872, at Dalton, by Mr. Stewardson. Fronds short; densely crested, crests large.



FIG. 29.—*Scolopendrium vulgare*, var. *constellatum*.

31. *Studdartii*, *Lowe* (*capitatum* *Studdart*, *Jones*). Found about 1880, in Ireland, by Major C. F. Studdart. A fine crested form.

Sub-section. RAMO-MARGINATUM. (Marginal branched.)

1. *acrocladon*, *Lowe* (not of *Clapham*). Found in 1857, at Ambleside, by myself. $12 \times 1\frac{1}{2}$ inches. Normal, except a wide-spreading, finger-like multifid head.

2. *alato-cristatum*, *Stansfield* (not of *Moore*).

3. *capitatum*, *Jones*. Found by Mr. Foster. A densely crested, infra-lineate variety.

4. *cervi cornu*, *Stansfield* (not of *Moore*). Fronds linear, branched and crested; segments very narrow. Length, 5 inches. Head $3\frac{1}{2}$ inches across. Pretty.

5. *chelæfrons-majus*, *Wollaston*. Found in 1861, at Farleton Knot, by Mr. J. M. Barnes. Apex of frond like crab's claws; rather inconstant.

6. *constellatum*, *Lowe*. Raised by Mr. Glave. A dwarf, densely crested, very ramose form. Leafy part almost absent, except at the crests. Length 6 inches.

7. *coronarum*, *Lowe*. Raised by myself. Length 9 inches. Crenate, wavy; frond widest in the centre, contracting to the finely-cut crown, and then 4 inches across.

8. *distortum*, *Moore*. Raised by Mr. Elworthy. Stipes and rachis bent; outline irregular; branching several times, but only dilate at the apex.

9. *divaricatum*, *Moore*. Found in Westmoreland by Mr. J. Crossfield. Dividing near the apex into two branches, which spread at a wide angle; and these fork again in the same manner.

10. *Dunkeldense*, *Lowe*. Found by myself at Dunkeld. 6×2 inches. Very irregular, having a branching stipitate lobe in the middle of the stipes $2\frac{1}{2}$ inches long. Very curious. Deeply incised; and apex flat owing to the costa dividing.

11. *Glavei*, *Lowe*. Raised by Mr. Glave. Length 6 inches. Branching and re-branching from a naked stipes into almost leafless narrow divisions.

12. *inæquale-cristatum*, *Glave* (*multipinnatum*, *Clapham*). Raised in 1876 by Mr. C. Glave. Length 12 inches. Branching and re-branching into a frond of finely-cut divisions 9 inches wide.

13. *kephaloton*, *Lowe*. Found in Devon by myself. 9×1 inches. Margin irregular. Costa branching into a leafy lacinate head 6 inches across.

14. *multifido-nanum*, *Lowe*. Found in Devon by Mr. W. Edwards. Stem naked; branching. Rachis also branching into a corymbose head. Dwarf.

15. *multifido-variens*, *Jones*. Found in Devon in 1870 by Mrs. Grant. $20 \times 3\frac{1}{4}$ inches. A noble grandly multifid form, sometimes 11 inches across the broad foliose head.

16. *nudistipes-cristatum*, *Mapplebeck*. Raised in 1871 by Mr. Mapplebeck. Length 9 inches. A long naked stem with a finely-

cut circular crest. Colonel Jones considered that it suggested "seaweed."

*17. *pericalles*, *Lowe*. Raised by myself. $14 \times 0\frac{3}{4}$. Branching in both stipes and rachis, and forming a branching head 5 inches across. Margin irregular, in the manner of polyschides.

18. *polycuspis-transversum*, *Moore*. Found in 1861 at Brigsteer by Mr. J. M. Barnes. Remarkable for the crests crossing each other.

19. *polycuspis-undosum*, *Moore*. Found at Giggleswick Scars by Mr. Stansfield, near Doncaster by Mr. S. Appleby, and at Heversham Head by Mr. J. M. Barnes. A many-pointed twisted crest. A form of *polycuspis* has been found at Fermanagh by Mr. W. H. Phillips.

20. *ramo-marginatum*, *Clapham*. Raised in 1860 by the late Mr. Clapham. Length 14 inches. Branching on stipes and rachis, and terminating in several large crests. A lovely form.

21. *ramo-palmatum*, *Clapham*. Raised by the late Mr. Clapham. Length 3 inches; almost naked; twin-fronded. A lacerated hand-like crest.

22. *ramo-proliferum*, *Clapham*. Raised by Mr. Clapham. Stipes and rachis branched. Length 3 inches. Coarsely serrated, and apex split.

23. *Shirenewtonense*, *Lowe*. Found in 1888 on a wall in the grounds at Shirenewton by Mr. Ireland. Naked stems. Length 5 inches. Digitately branched; dividing into three leafy fronds, each dividing into two digitate crests; the tips flat and dentate; margin coarsely dentate; partly suprasoriferous. A very interesting dwarf form.

*24. *tortuoso-cristatum*, *Lowe*. Raised by myself. 14×2 inches. Normal below the crestings. Tortuose crestings of large size (7 inches across), springing out of the leafy part of the frond. Half a dozen fronds forming a bush 12 inches across.

25. *unguiceps*, *Wollaston*. Raised in 1870 by Mr. E. F. Fox. $9 \times 0\frac{1}{4}$ inches. A narrow variety with a bird's-claw-like crest. Sori on the margin.

26. *unilaterale-ramosum*, *Lowe*. Found at Sidmouth by Mrs. Thompson. Only branching on one side.

Section γ . CONGLOMERATUM. (Conglomerately branched.)

1. *Baxteri*, *Moore*. A copy of *Coolingii*.

2. *conglomeratum*, *Lowe*. Found at Truro by Mr. Dadds. Less leafy; the apices more lacerate, and more depauperate than *glomeratum*.

3. *congregatum*, *Lowe*. Raised by myself. Stipes branching; and costa in leafy part splitting into branches that are densely crested.

4. *constellatum*, *Lowe*. Raised by Mr. Glave of Scarborough.

5. *Coolingii*, *Lowe*. History unknown. Distributed by Mr. Edwin Cooling. A proliferous conglomerate fern. Length, $3\frac{1}{2}$ inches. Forming a ball-like bush, and each frond like a ball.

6. coronans, *Moule*. Unknown to me.
7. coronare, *Lowe*. Raised by myself. Length, 7 inches. Branching several times in stipes, and also in rachis, forming a dense, crested ball $5\frac{1}{2}$ inches wide. Soriferous.
8. Cousensii, *Jones*. I have never seen this.
- *9. densum, *Lowe* (conglomeratum-densum *Kelway, Jones*). Raised by Mr. Kelway. Length, 3 inches. A close, ball-like plant, the frond branching and cut up into numerous threads, producing plants at their tips. A marvellous form.
10. Drueryi, *Lowe*. Found at Sidford in 1888; robust and normal for 2 feet; then expanding into a corymb, which is divided into a moss-like ball.
11. Elworthii, *Moore*. Raised by the late Mr. C. Elworthy. Length, only 2 inches. A singular ramose-flabellate form.
- *12. eulophon, *Lowe*. Raised by myself. Branching in the stipes. Erect heavy crest, curling inwards, and 7 inches wide. Length of frond, 8 inches.
13. Fittii, *Lowe* (*grandiceps* *Fitt, Jones*). Raised by Mr. Fitt. Length, 6 inches. A curious dwarf *grandiceps*; spreading round the crown. Singular and unfern-like.
14. glomeratum, *Moore*. Found in Jersey by M. Piquet. Length, 6 inches. A globular crispy mass. Miss Nicholson found a form of this at Storth in 1867.
- *15. Gloveri, *Stansfield*. Raised by the late Mr. Glover. Length, 4 inches. A leafy conglomerate form, with rounded divisions.
16. Irelandii, *Lowe*. Found in the Aylstone, near Ross, by Mr. W. Ireland. Stems naked and very thick; much branched; forming a rounded mass in the manner of *Wardii*, but having a fimbriated margin. Length, 6 inches.
17. Jacksoni, *Lowe* (*glomeratum* *Jackson, Jones*). Found by the late Mr. Jackson. Length, 10 inches. A conglomerate form with normal-looking fronds rising out of the crest; head, 5 inches across.
- *18. Kelwayi, *Lowe*. A large form of "densum." Found in Somerset. Length, 5 inches. Conglomerate; a fine dwarf variety.
19. Morgani, *Moore*. Length, 6 inches. Fronds flexuose; partly digitate and partly bunch-crested. Stem naked to crest; head 4 inches across.
20. pseudo-Wardii, *Lowe*. Raised by Mr. Glave from bulbils of "Wardii." Length, 4 inches. Branching and rebranching, but the divisions normal-looking.
21. rainusculum, *Lowe*. Found in Devon by Mr. W. Edwards, somewhat undulate, with a small multifid crest.
22. Robinsoni, *Backhouse* (*conglomeratum* *Robinson, Stansfield*). Raised by Mr. W. R. Robinson. Distinct from *Coolingii* in being less cut on the edges.
23. sphænula, *Lowe*. Raised by myself. A densely branching foliose fern with rounded divisions. Length, $3\frac{1}{2}$ inches; width across the head, 4 inches.
24. splenula, *Lowe*. Found in Somerset by the late Mr.

Elworthy. Length, $3\frac{1}{2}$ inches. Repeatedly branching into rounded foliose divisions. Bolder than "Gloveri."

25. *sylvestre*, *Lowe*. Raised by myself; but there is a very similar variety at Nettlecombe Court, said to have been found in Somerset by the late Mr. Elworthy. A dense globular-crested form, branching in the stipes. Length, 5 inches; width across the head, $4\frac{1}{2}$ inches.

26. *variabile*, *Lowe* (*glomerato-variabile*, *Monkman*). Raised by Mr. Stansfield. Length, 16 inches (stipes, 6 inches). The glomerate head from 6 to 10 inches across. Like *glomeratum*, with a few normal branching divisions.

27. *Wardii*, *Clapham*. Raised by Mr. Glave in a Wardian case. Length, 6 inches. Branches irregular. Margin copiously viviparous.

Section δ . SAGITTATUM. (Arrow-like projections.)

1. *acanthodes*, *Lowe*. Found in Devon by Mr. Edwards. Resembles "cristatum," but with a larger crest and less sagittate lobes.

2. *capitatum*, *Lowe* (*capitatum-projectum*, *Jones*). 22×6 inches (in widest part). Sagittate; branching along the upper portion of the frond into heads 6 inches across.

3. *Colmeri*, *Lowe* (*Sagittato-crispum*, *Wills*). Found in Dorset, in 1875, by Mr. M. Colmer. $17 \times 1\frac{3}{4}$ inches. Somewhat resembling "Drummondæ," but having a sagittate base.

4. *conglobatum*, *Lowe*. Found at St. Pierre in 1887, by Mr. H. Bull. 4×2 inches. Projecting; deeply cut and multifid; sagittate lobes placed at right angles; forming a ball-like plant, hence the name.

5. *cristatum*, *Lowe* (*Sagittato-cristatum*, *Clapham*). Found near Scarborough by the late Mr. A. Clapham. 11×3 inches. Sagittate and crested. One found in Devon in 1859 by Mr. Hillman is more sagittate and has a crest 9 inches wide.

6. *foliosum*, *Lowe*. Raised by myself. $14 \times 2\frac{1}{2}$ inches. Very foliose, and broadly sagittate; the head 7 inches across.

7. *Hankeyi*, *Lowe* (*Sagittato-cristatum* Hankey, *Wollaston*). A splendid variety, raised by Mr. W. Barnard Hankey. 16×3 inches. A crested sagittate form, 7 inches wide at the sagittate base, and 7 inches across the large sagittate head.

8. *hastatum*, *James*. Found in Guernsey, in 1860, by the late Mr. James. $7 \times 0\frac{7}{8}$ inches. A dwarf, normal, sagittate variety, with a crenate margin.

*9. *hemionitoides*, *Moore* (*Sagittato-cristatum*, *Dadds*). Mr. Dadds' plant (which is a copy of "hemionitoides," raised by Messrs. Stansfield,) was found in North Devon, in 1860, by Mr. J. Dadds. Length, 9 inches; width of sagittate base, $4\frac{1}{2}$ inches. Apex and lobes crested.

*10. *Hookeri*, *Lowe*. Raised by myself. $16 \times 5\frac{1}{2}$ inches. Differs in the projections commencing on the sagittate base. Fronds broad. Colour, very bright green.

11. *Jamesii*, *Lowe*. Raised by the late Mr. James. Slightly crisp; conspicuously sagittate at the base, and having a leafy stag's-horn-like cresting at the apex. Sori like a row of beads on the upper surface.

12. *laceratum*, *Moore* (*endivifolium*, *Wollaston*). Found in 1851, in Somerset, by the late Mr. J. Young. Length, 11 inches; width across the sagittate base, 7 inches; capitate head often 7 inches across. Mr. Glave raised a very fine form. Mr. W. H. Phillips also found a plant at Strabane.

13. *lacertum*, *Willison*. Found near Whitby by Mr. W. Willison, and called by him "The Lizard," from the apex of the frond resembling a lizard's tail, and the lobes the paddles of this reptile.

14. *Molyi*, *Lowe* (*Sagittatum projectum* *Moly*, *Wollaston*). Found in 1862, in Dorset, by Mr. James Moly. 19×4 inches (in widest part), projections more numerous than in "*Sclateri*."

15. *multifidum*, *Lowe* (*Sagittato-multifidum*, *Jones*). Raised in 1873 by the late Colonel Jones. 13×7 inches. Leafy portion of frond somewhat triangular.

16. *nudisorum*, *Lowe* (*Sagittato-nudisorum*, *Barnes*). Found in 1863, at Slack Head, by Mr. J. M. Barnes. Very large auricles. Sori without indusium.

17. *palmatum*, *Lowe* (*palmato-marginatum*, *Willison*). Raised by Mr. Willison. $2\frac{1}{2} \times 2$ inches. Triangular; blunt apex.

*18. *princeps*, *Lowe*. A very broad, distinct form. Raised by myself.

19. *projectum*, *Wollaston*. Raised in 1876 by Mr. J. Moly. $10 \times 3\frac{1}{2}$ inches (in widest part). A remarkable and very ragged variety.

20. *sagittatum*, *Moly*. Found in Somerset, in 1876, by Mr. J. Moly. $14 \times 1\frac{1}{4}$ inches. Normal; with a sagittate base, where 4 inches wide. It was also found at Force by Dr. Allchin.

21. *Sclateri*, *Lowe* (*Sagittato-projectum* *Sclater*, *Wollaston*). Found in Sligo, in 1860, by Captain Sclater. 23×5 inches (in widest part). A grand crested "projectum."

22. *Snellii*, *Lowe* (*Sagittato-cristatum*, *Snell*, *Jones*). In the way of *hemionitoides*; slightly marginate.

23. *Welmani*, *Lowe* (*Sagittato-cristatum* *Welman*, *Jones*). Found in Dorset, in 1873, by Mr. Welman. 16×2 inches. Hastate, and crested.

24. *Westroppii*, *Lowe* (*Sagittato-projectum* *Westropp*, *Stansfield*). 24×3 inches. A very large and fine variety found in one of the islands of Arran, Co. Clare, by Mr. Westropp.

25. *Wollastoni*, *Lowe* (*Sagittato-crispum*, *Moore*). Found at Petersfield and Ottery St. Mary by Mr. G. B. Wollaston; and Barnstaple, by the late Mr. Jackson. 13×3 inches. Sagittate and crisp.

26. *viviparum*, *Lowe* (*cristato viviparum* *O'Kelly*, *Jones*). Found in County Clare by Mr. O'Kelly. $12 \times 1\frac{1}{4}$ inches (stipes, 6 inches). Basal lobes leathery; compactly crested. The leafy portion growing bulbils on all parts. Very distinct.

Group II. Truncate.

Section a. TRUNCATUM. (Ending abruptly.)

1. *accisum*, *Lowe*. Found in Devon ; and recently at Carron, by Mr. P. B. O'Kelly. $12 \times 1\frac{1}{2}$ inches. Normal, except at the apex, which terminates in a leafy frill within the frond.
2. *constrictum*, *Moore*. Found in Guernsey by the late Mr. James. $6 \times 1\frac{1}{2}$ inches. Depauperate ; and naked to stem in centre. Very irregular, laciniate, and slightly marginate.
3. *corniculatum*, *Lowe*. From the late Colonel Jones's collection. 8×1 inches. Truncate, cornute, rugose (except a broad flat rachis) ; the rugose margin $\frac{1}{4}$ -inch thick. Stipes, $4\frac{1}{2}$ inches.
4. *cornutum*, *Lowe* (*truncato-cornutum*, *Mapplebeck*). Raised in 1872 by Mr. Mapplebeck. $9\frac{1}{2} \times 2\frac{1}{2}$ inches. Frond terminating in a horn $1\frac{1}{4}$ inches long. No pouch. Found also in the Lake district by Mrs. Hodgson and Mr. J. Crossfield. One raised by myself is 6×2 inches ; with wavy margin.
5. *obtusodentatum*, *Moore*. Found in 1855, near Ilfracombe, by Rev. J. M. Chanter. $12 \times 1\frac{1}{4}$ inches. Apex blunt, margin having uniform dentate crenatures.
6. *O'Kellyi*, *Lowe* (*truncatum*, *O'Kelly*). Found at Blackhead by Mr. O'Kelly, where he also found another small rotund form.
7. *reniforme*, *Williams*. Found in several localities. 4×2 inches. Abrupt and kidney-shaped. Mrs. Grunt has the best form.
8. *significans*, *Lowe*. Raised by myself. $5 \times 1\frac{1}{2}$ inches. Rugose and truncate.
9. *subcornutum*, *Tait*. 8×1 inches. Rigid. Crenate ; apex abruptly rounded. Cornute.
10. *supra-cornutum*, *Lowe*. Horned above.
11. *truncatum*, *Ivery*. Not uncommon. A nice form has been found at Black Head, Co. Clare, by Mr. P. B. O'Kelly.

Sub-section. PERAFERENS. (Bearing a pouch.)

1. *acetabulum*, *Lowe*. Raised by myself. A shallow cup at apex, and there supralineate. $12 \times 2\frac{3}{4}$ inches (of which 7 is the stipes).
2. *anomalum*, *Lowe* (*perafero-anomalum*, *Mapplebeck*). Raised by Mr. Mapplebeck in 1872. $8 \times 1\frac{3}{4}$ inches ; stipes 4 inches long. Pouch muricate, but frond smooth.
3. *crispissimum*, *Lowe*. Raised by myself. Wavy in a crispum-like manner.
4. *excurrens*, *Moore*. Found in 1864, at Whitbarrow, by Mr. G. Stabler. Horned on the upper side.
5. *fimbriatum*, *Lowe* (marked 102 in the late Colonel Jones's collection). $6 \times 1\frac{1}{2}$ inches. The edges of the cup fringed ; cornute. Mr. W. H. Phillips found a similar form at Gormanstown.
6. *incurvare*, *Lowe*. Raised by myself. $10 \times 1\frac{1}{4}$ inches. Costa dividing 2 inches from the apex, forming an imperfect pouch at the top, which faces the front of the frond. There are two horns at the base on the underside bearing sori.

7. *Jamesii*, *Lowe* (perafero-muricatum James, No. 1, *Wollaston*). Raised in 1870 by the late Mr. James. 8×2 inches. Crispum-like and cornute.

8. *Jonesii*, *Lowe* (perafereus Jones, *Jones*). Raised by the late Colonel Jones. $9 \times 2\frac{1}{2}$ inches. Some fronds smooth, others rough. Costa ending 1 inch below the tip, where a large horn is formed. Margin irregularly fimbriated. Pouch, 2 inches in length.

9. *marginatum*, *Lowe*. No history (marked 106 in the late Colonel Jones's collection). $8 \times 1\frac{1}{4}$ inches. Submarginate; fronds widest at the apex; perafereous and cornute.

*10. *mirandum*, *Lowe*. Raised by myself. $9\frac{1}{2} \times 2$ inches. Smooth and normal, the costa splitting near the apex, each half furnished with a horn; very large pouch, 2×1 inches.

11. *muricatum*, *Lowe* (perafero-muricatum James, No. 2, *Wollaston*). Raised by the late Mr. J. James. $8 \times 1\frac{1}{4}$ inches. Cornute; texture thin; pouch confused.

12. *peplum*, *Lowe*. From the late Colonel Jones's collection. $6 \times 1\frac{1}{4}$ inches. Rugose, with a sharp horn-like elongation above a rosette-like pouch.

13. *perafereus*, *Wollaston*. Found in Ireland by Dr. Allchin, and at Ballygarth, by Mr. W. H. Phillips. The type. 10×2 inches. Costa not reaching the margin, but developing a leafy pouch.

14. *poculum*, *Lowe*. Rugose throughout. The apex of frond bending over, where a thorn an inch long rises out of a rosette pouch. Raised by myself. $9 \times 1\frac{1}{2}$ inches.

*15. *rosetta*, *Lowe*. Raised by myself. 9×2 inches. A broad rugose form, ending in a horn half an inch long. The pouch, like a rosette (or double flower), and half an inch in width. Not rugose to the margin. Another seedling, $7 \times 1\frac{1}{2}$ inches, is very similar, except having concave fronds.

16. *rugosum*, *Allchin*. Found in Ireland by Dr. Allchin. $8 \times 1\frac{1}{2}$ inches. Leafy part only 3 to 4 inches. Apex irregular, rugose, and having an irregular pouch.

17. *sinum*, *Lowe* (*pocilliforme*, *Padley*). Found at Hawkchurch by Mr. Moly. $8 \times 1\frac{3}{4}$ inches. Undulate, irregularly marginate, truncate, horned, and bearing a pouch (with a crisp margin); $1\frac{1}{2} \times 0\frac{3}{4}$ inches.

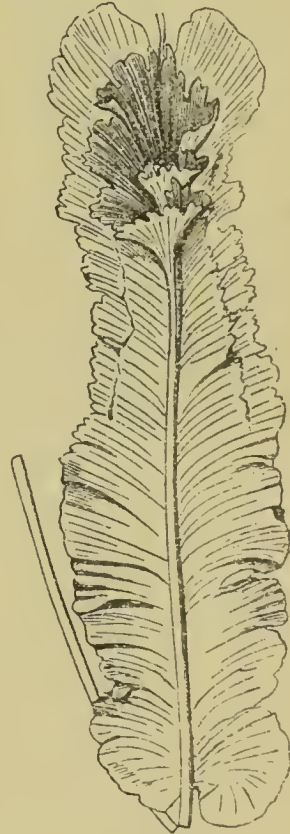


FIG. 30.
Scolopendrium vulgare,
var. *sinum*, showing pouch.

*18. *Stella*, *Lowe*. Raised by myself. $10 \times 1\frac{3}{4}$ inches. Very papillose; rounded basal lobes extending beyond the general outline; a rosette pouch and cornute.

19. *supraperaferens*, *Lowe*. Raised by myself. 17×1 inches. Irregular; very rugose, extending to the rachis; with a small pouch on the rachis (upper side), 5 inches below the apex. Rachis bending and tip of frond weeping. Sometimes cornute.

20. *varians*, *O'Kelly*. Found at Ballaganor, County Clare, by Mr. P. B. O'Kelly. 9×2 inches. The leafy portion only 3 inches long.

Group III. Flexuose. (Bending.)

Section a. FLEXUOSUM. (Bending.)

1. *complicandum*, *Lowe*. Raised by myself. $5 \times 1\frac{1}{2}$ inches. A twisted, undulate, rugose and spiral form; near the apex the margins of the frond fold over and clasp each other.

2. *flexuosum*, *Wollaston* (*cymbæforme*, *Wollaston*). Found at Whitbarrow in 1861 by Mr. J. M. Barnes. The best flexuose form. $14 \times 1\frac{1}{4}$ inches. Miss F. Kitson found a flexuosum in South Devon, Mr. A. Leipner another in Somerset, and Mr. G. Stabler one at Whitbarrow.

3. *muricatum*, *Lowe* (*tortuoso-muricatum*, *Jones*). Raised by myself. $15 \times 1\frac{1}{2}$ inches. Rachis twisting, and costa on upper side ribbed.

4. *spira*, *Lowe*. An extraordinary combination of forms; flexuous. Raised by myself.

5. *torquere*, *Lowe*. Raised by myself. $7 \times 1\frac{1}{2}$ inches. Stipes and rachis flexuose, rugose, undulate, twisting, but not marginate. Rachis dividing 3 inches from apex, the divisions twisting round each other.

DIVISION B.

ALTERATION IN SOFT PARTS.

Group I. Increased Development.

Section a. CRISPUM. (Crispy.)

*1. *adornatum*, *Lowe* (*crispum-multifidum*, *Jones*; and *crispum-grandiceps*, *Jones*). Raised by myself in 1884. 12×3 inches. A large capitate head ($4\frac{1}{2}$ inches wide). Sterile; well crisped.

2. *amplum*, *Lowe*. Found by Mrs. Hole. 18×4 inches. Deeply and densely frilled. Margin crenate; apex, multifid.

*3. *angustum*, *Lowe* (*crispo-angustum*, *Lowe*). Found in Devon by the late Rev. C. Padley. $15 \times 1\frac{1}{2}$ inches. Narrow, with naked stem of 6 inches.

4. *Baldwyni*, *Lowe*. Found in the Mountain Valley, near Chepstow, by the late Mr. John Baldwyn. $16 \times 2\frac{1}{3}$ inches. Well frilled. A marvellous form, one half of the fronds being conglomerate; these are 6 inches in length, and 5 inches across the conglomerate, dense, foliose crown. I am indebted to Mr. Edwin Ellis for this striking variety.

5. *Bowdoni*, *Lowe* (*crispum Bowdon*, *Jones*). Found in the

Lake district by Mr. Bowdon. $14 \times 1\frac{3}{4}$ inches. The sagittate lobes branching.

6. *bulbiferum*, *Stansfield*. Rather broader and less fringed than usual. Bulbiferous.

7. *capitatum*, *Lowe* (*crispum-capitatum*, *Jones*). The late Colonel Jones's collection. History unknown. 22×3 inches (of which the stipes is 6). A capitate head, 5 inches across.

8. *capitulum*, *Lowe* (*crispum-cristatum*, *Clapham*). History unknown (marked "Glave" in the late Colonel Jones's collection). 18×2 inches. A narrow, well-frilled variety. Small capitate head.

9. *Claphami*, *Lowe* (*crispum Clapham*, *Wollaston*). Found in 1857, in Yorkshire, by the coachman of the late Mr. Clapham. $18 \times 1\frac{3}{4}$ inches. Base sagittate; projecting lobes fimbriate; apex crested. Fronds variable. A more recent seedling is densely crested.

10. *convolvere*, *Lowe*. Found by the late Rev. C. Padley. 14×3 inches. Lower half of frond irregular; rolling round; and the stem is naked for 2 inches above the round basal lobes.

11. *cornutum*, *Willison*. Found in Yorkshire by Mr. Buckle. Broadest at base; margin crisped and incised; apex pointed. Horned in centre of the frond.

12. *Cowburni*, *Lowe* (*crispum Cowburn*, *Jones*). Found in 1885 at Dennil Hill by Major Cowburn. 19×4 inches. A grand, flat, crisped form. Margin cut. Habit erect. Major Cowburn has found nineteen plants in this locality.

13. *crispum*, *Grey*. (The original type.) Elegantly frilled. A number of distinct forms (all sterile) have been found in the Lake district. Mr. W. H. Phillips found it in Co. Tyrone.

14. *cristatum*, *Lowe* (*crispum cristatum*, *Padley*). Found in Devon by the late Rev. C. Padley. Apex divided into leafy crests.

*15. *Cropperi*, *Lowe* (*crispum fimbriatum Cropper*, *Stansfield*). Raised by Mr. Cropper. Long, narrow, fimbriate, multifid fronds. Very promising.

16. *Curnowii*, *Lowe*. Recently found near Penzance by Mr. Curnow. A multifid form.

17. *Currei*, *Lowe*. Found in 1870 at Itton Court by the late Mr. Pierce (gardener to Mr. W. E. C. Curre). A long and somewhat narrow form. $16 \times 2\frac{1}{2}$ inches. Flatly crisped, and basal lobes rotund, folding over and hiding the stipes. Not unlike *Grantæ* in form, but not variegated.

18. *densum*, *Sim*. Broad and densely frilled. Apex much lacerated.

19. *Drummondæ*, *Moore* (*crispum Miss Drummond*, *Wollaston*). Found near Falmouth by Miss M. Drummond. $22 \times 1\frac{1}{2}$ inches. Frond narrowing upwards and terminating in a head 9 inches broad. In 1875 a variety with sagittate base, but with much smaller crest, was found in Dorset.

20. *elegans*, *Lowe* (*crispum-elegans*, *Jones*). Found near Tintern by Mr. Baldwin. $12 \times 2\frac{3}{4}$ inches. Widely, but well crisped. Very short stipes.

21. *excisum*, *Lowe*. Found in 1888 at Dennil Hill by Major Cowburn. This variety only differs from "Cowburni" in being deeply incised on the upper part of the frond; occasionally soriferous.

22. *fertile*, *Lowe* (*crispum-fertile*, *Stansfield*). Found in 1863, at Grange, by Mr. E. G. Wrigley. $24 \times 1\frac{1}{2}$ inches; width at base 1 inch and in centre 2 inches. Well crisped and crenulated, and copiously soriferous.

23. *fimbriato-fertile*, *Lowe* (*crispum fimbriato-fertile*, *Jones*). A prominently but not densely crisp variety, with large round basal lobes and a narrow fimbriated margin. $15 \times 2\frac{1}{2}$ inches. Sparingly fertile.

24. *fimbriatum*, *Lowe* (*crispum fimbriatum* *Stansfield*, *Jones*). Raised by Messrs. Stansfield, at Sale. A large fimbriate form, profusely frilled; the frills below overlapping from opposite sides and hiding the rachis. Fertile. $16 \times 2\frac{1}{4}$ inches.

25. *fissum*, *Lowe* (*crispo-fissum*, *Barnes*). Found in 1877 at Milnthorpe by Mr. T. Airey. A small but beautiful narrow crispy form.

26. *Fosteri*, *Lowe* (*Sagittato-crispum* *Foster*, *Jones*). Found in 1876 in Ireland by Mr. Foster, of Manchester.

27. *Foxii*, *Lowe* (*crispum fertile*, *Fox*). Found in 1868, in Cornwall, by Mr. Moule. $19\frac{1}{2} \times 3$ inches. Fronds densely fringed. The rounded sagittate lobes are occasionally very large. Fertile. A "crispum-fertile" was found in 1858, and another in 1863.

28. *grande*, *Lowe* (*crispum grande* *Wills*, *Wollaston*). Found by the late Mr. Wills. A very large, broad, beautifully frilled form, with an unusually long, naked stem.

29. *grandidens*, *Lowe*. Found in North Wales by the late Mr. Clift. Split quite to the rachis, and depauperate.

30. *imbricatum*, *Lowe*. A splendidly crisp form, frills quite wrapping over each other; known as the Roundstone variety. $9 \times 2\frac{1}{4}$ inches.

31. *irregulare*, *Lowe* (*crispum irregulare*, *Moore*). Irregularly laciniate in parts of the frond, and there marginate.

32. *Jacksoni*, *Lowe* (*Sagittato-crispum* *Jackson*, *Moore*). Found at Barnstaple by the late Mr. Jackson, and at Ottery St. Mary by Mr. G. B. Wollaston. 16×2 inches. Undulate and crenate and sagittate, combining *Sagittatum* and *crispum*.

33. *Jonesii*, *Lowe* (*crispum capitatum*, *Jones*). Raised in 1874 by the late Colonel Jones. $12 \times 2\frac{3}{4}$ inches. A short, broad, fronded form, the capitate head 6 inches in diameter.

*34. *Kitsonæ*, *Lowe* (*crispum-multifidum*, *Jones*; *crispum maximum*, *Gray*). Found in Devon by Miss Fanny Kitson. $20 \times 2\frac{3}{4}$ inches. Finely crisped, crested apex. A very symmetrical variety.

35. *latissimum*, *Lowe* (*crispum-latissimum*, *Jones*). A wide form.

36. *latum*, *Lowe* (*crispum-latum*, *Moore*). Found near Barnstaple by the late Mr. C. Jackson, and at Nettlecombe by the late Mr. Elworthy. 16×4 inches. Broad. Basal lobes separated from the rest of the frond.

37. *longipes*, *Lowe* (*crispum longipes*, *Jones*). A flatly crisped form. 17×3 inches. (The stipes 6 inches long.)
38. *mæandri*, *Lowe*. A bold, handsome form. Raised by the late Colonel Jones, and given whilst young to Professor Morris, of Bath. The frillings are wider apart than usual. 18×5 inches.
39. *majus*, *Lowe* (*crispum majus*, *Moore*). Found in Guernsey by the late Mr. Jackson. Length, 19 inches (of which the stipes is 7). Habit erect. Basal lobes large.
40. *minus*, *Lowe* (*crispum minus*, *Jackson*). Found by Mr. Jackson in Guernsey. $10 \times 1\frac{1}{2}$ inches. Margin well frilled.
41. *Mosesii*, *Lowe* (*crispum majus Moses*, *Jones*). A broad, symmetrical form found in the Lake district. $20 \times 4\frac{1}{2}$ inches. A grand variety. The basal lobes overlapping the stipes.
42. *Oakeleyi*, *Lowe*. Found about 1876, at Llangarrow, Hereford, by the Rev. W. Bagnall Oakeley. 11×2 inches. Sagittate lobes round; undulately crested. Sterile.
43. *projectum*, *Lowe*. A *crispum* found by Mr. H. Bull at St. Pierre, which is also sagittate, much cut, multifid, and well crisped.
- *44. *ramo-cristatum*, *Stansfield* (*crispum fimbriato-cristatum*, *Stansfield*). A fimbriated form of great beauty. Raised by Messrs. Stansfield. Branching in the stipes and rachis, and crested.
- *45. *reflexum*, *Lowe* (*crispum reflexum* Wills, *Jones*). Found by the late Mr. Wills. Large; very broad, and long naked stems (7 inches long). Basal lobes very large. Frilling reflexed. 20×5 inches (at base, where broadest). Beautiful.
- *46. *Robinsoni*, *Lowe* (*crispum Robinson*, *Jones*). Found in North Lancashire by Mr. Robinson. $20 \times 3\frac{1}{2}$ inches. Crenate on the margin and exquisitely frilled.
- *47. *robustum*, *Lowe* (*crispum robustum*, *Jones*). Found near Shirenewton, Monmouthshire, in 1866, by the late Colonel A. M. Jones. $23 \times 4\frac{1}{2}$ inches. Stipes short. A grand variety, with curving fronds. Found also at Hawkchurch by Mr. Moly.
48. *serratum*, *Lowe* (*crispum serratum*, *Jones*). Found in 1866 near Shirenewton by the late Colonel Jones. 18×3 inches. Serrated. Stipes brief.
49. *serratum-fertile*, *Lowe* (*crispum serratum-fertile*, *Jones*). Found in Devon by Mr. Moule. A serrated, fertile form.
50. *soriferum*, *Lowe* (*crispum soriferum*, *Barnes*). Found in 1861 at Whitbarrow by Mr. A. B. Taylor. A thin, undulated, fertile variety.
51. *St. Pierrense*, *Lowe*. Found in 1880 at St. Pierre by Mr. H. Bull. $17 \times 2\frac{1}{2}$ inches. Widest at base; rounded sagittate lobes; symmetrically frilled. Slightly soriferous.
52. *Stableræ*, *Lowe* (*crispum Stableræ*, *Jones*). Distinct. Found in the Lake district by Mrs. Stabler. Large. Stipes very long; fronds pointed, broadest at the base. 17×3 inches.
53. *Stansfieldii*, *Stansfield*. Raised in 1872 by Messrs. Stansfield. $9 \times 1\frac{1}{2}$ inches. It differs from the original "*Stansfieldii*" figured in "*Our Native Ferns*," in being crested and sagittate; sometimes the fronds are branched.

54. *uncinatum*, *Moore*. Found in 1863, in County Clare, by Mr. A. Stansfield. 11×2 inches. Apex rounded; costa crooked; and the basal lobes twisted in the way of a hook.

55. *variabile*, *Lowe* (*crispum-variabile*, *Jones*; and *crispum-diversifrons*, *Jones*). Raised in 1874 by the late Colonel Jones. $13 \times 4\frac{1}{4}$ inches. Stipes, $4\frac{1}{2}$ inches. Fronds broadest at the base. Occasionally normal, but sagittate; fertile fronds, varying in width from 2 to $3\frac{1}{2}$ inches.

*56. *Willsii*, *Lowe* (*crispum Wills*, *Wollaston*). Found in Somerset in 1870 by the late Mr. J. Wills. 17×4 inches. Broad, long stalked, and beautifully crisped.

57. *Wollastoni*, *Lowe* (*sagittato-crispum*, *Wollaston*). Found in 1855, in Hants, by Mr. G. B. Wollaston. $23 \times 3\frac{1}{4}$ inches. Basal sagittate lobes, 4 to 5 inches wide. A grand form.

Note.—There are several forms of *Crispum* that have been recently found near Chepstow, which are not yet fully enough developed to be included.

Section β . UNDULATUM. (Wavy, but not crispy.)

1. *asperitate*, *Lowe*. Raised by myself. 6×1 inches. Very rough; subspiral as well as undulate.

2. *capitatum*, *Lowe*. Raised by the late Colonel Jones. Length 9 inches. Dividing into two leafy branches, twisting into a capitate head.

3. *cochleato-multifidum*, *Lowe*. Raised by myself in 1879, differing from "*cochleatum*" in having a spirally coiled branching apex. $16 \times 2\frac{1}{4}$ inches.

4. *cochleatum*, *Lowe*. Raised by myself in 1879. The apex turning spirally like a snail's shell; a well-marked undulate form.

5. *contractum*, *Lowe*. Found in Devon, by the late Mr. C. Jackson. Lower half undulate, above contracted and partially marginate.

6. *cristatum*, *Lowe* (*undulato-cristatum*, *Stansfield*). Raised by Messrs. Stansfield about 1877.

*7. *daphnites*, *Lowe*. Raised by myself. Rugose, undulate, but not marginate. $12 \times 1\frac{1}{4}$ inches. Bold stiff fronds, widest in the centre.

8. *extans*, *Lowe*. Raised by myself. Base of the prominent parts rugose; prominences very stiff and half an inch long. Spirally twisted; a distinct wavy form. $5 \times 1\frac{1}{2}$ inches.

9. *Haburnense*, *Lowe*. Found at Haburn Wyke by myself. 28×3 inches. Only slightly undulate. A giant form with a multifid tip.

10. *multifidum*, *Lowe* (*undulato-multifidum*, *Wollaston*). Apex multifid, but scarcely wider than the frond. Found in 1862 at Witherslack by Mr. J. M. Barnes, also in Lancashire in 1877 by Mr. Stewardson. Frilled as well as crested.

11. *prodigiosum*, *Lowe*. Raised by myself. 8×1 inches. Undulate and depauperate. A twisted, crested apex, 3 inches wide.

Segments narrow and frond-like, their margins conspicuously toothed.

*12. *ptereidon*, *Lowe*. Raised by myself. Rugose. $12 \times 1\frac{1}{2}$ inches. Very irregular; round lobed; upper half contracted.

13. *ramosum*, *Lowe* (*undulato-ramosum*, *Lowe*). Found in Devon by Mr. Moly. Undulate, with a large much-branched undulate apex.

14. *reflexum*, *Lowe* (*undulato-reflexum*, *Jones*). From the late Colonel Jones's collection. $11 \times 1\frac{1}{2}$ inches. Dark shiny green; reflexed; slightly multifid.

15. *rigidum*, *Lowe* (*undulato-rigidum*, *Jones*). Found in Devon by Mr. Edwards. A large form.

16. *sinuato-multifidum*, *Padley*. Found in North Devon by the late Rev. C. Padley. A fine undulate form with a twisting branched apex.

17. *spira*, *Lowe*. Raised by myself. $5 \times 1\frac{1}{2}$ inches. Spiral as well as undulate. Rachis, near summit, dividing and twisting.

18. *spirale*, *Moore*. Found in Guernsey by the late Mr. J. James, and at Nailsworth by Mrs. Campbell, and at Heversham Head by Mr. J. M. Barnes. 5×1 inches. Basal half undulate; above, spirally twisted.

19. *Stansfieldii*, *Lowe* (*undulato-cristatum*, *Stansfield*).

20. *subundulatum*, *Lowe*. Raised by myself. $12 \times 1\frac{1}{4}$ inches. Thick, deep green, shining fronds. Leafy part curling round the rachis at the base.

*21. *synthesina*, *Lowe*. Raised by myself. A cross between "undulatum," "spirale," "rugosum," and "keratoides," combining the characters of all these four varieties.

*22. *tortum*, *Lowe*. Raised by myself. A bold undulate form. $14 \times 1\frac{1}{2}$ inches. Apex crested and twisted.

23. *transverso-lobatum*, *Moore*. Found at Nettlecombe by the late Mr. C. E. Elworthy, at Doncaster by Mr. S. Appleby, and at Castle Howard and Gordale Scars by Messrs. Stansfield. The multifid apex has its branches crossing each other.

24. *transverso-multifidum*, *Moore*. Found near Ilfracombe by Mr. Dadds. Having a compact, multifid, weeping apex.

25. *undulatum*, *Moore* (type). Found in many localities. $12 \times 1\frac{1}{2}$ inches. Wavy, but not crispy. Thick and fertile.

26. *undulosum*, *Wollaston*. Found in 1862, in Levens Park, by Mr. J. Garnett. A gored, undulate, and crested variety.

Group II. Narrowing of Skeleton.

Section a. LINEARE. (Narrowed.)

1. *bulbiferum*, *Lowe* (*lineare*, *Wollaston*). Found in 1861, at Whitbarrow, by Mr. J. M. Barnes. Very narrow, and bearing bulbs.

2. *circinatum*, *Lowe*. Raised by the late Mr. Clapham. $18 \times 0\frac{3}{4}$ inches. Bidentate margin. Apex tasseled with small foliose segments; and circinate.

3. *coriaceo-cristatum*, *Lowe*. Raised by the late Mr. Clapham.

9×0½ inches. Deep green, thick, fleshy fronds; with a small, thick, erect crest.

4. *crispatum*, *O'Kelly*. A curled form from the Burren.

*5. *curiose*, *Lowe*. Raised by myself. 8×0¾ inches. Like a very irregular "lonchophorum." Basal lobes, and here and there projections. Apex crested.

6. *gymnosorum*, *Moore*. Found at Minehead by Mr. W. Bowdon. A narrow form. Length 6 inches. Stipes densely hair-scaly; veins and sori very oblique. Upper surface striate. Apex multifid.

*7. *involvens*, *Mapplebeck*. Raised by Mr. J. E. Mapplebeck in 1871. Length 9 inches. Almost without leafy part. A few stalked depauperate segments. Apex turning round into a circle.

8. *laciniato-crispum*, *Barnes*. Found in 1865, at Warton Crag, by Mr. T. Bolton. Frond reduced in places. A fine variety.

9. *laciniato-cristatum*, *Barnes*. Found in 1862 at Brackenthwaite by Mr. J. M. Barnes. Dwarf. Fronds reduced; and crested.

10. *laciniato-irregulare*, *Barnes*. Found in 1861, in Levens Park by Mr. J. M. Barnes. Irregularly reduced. Robust.

11. *laciniato-marginatum*, *Barnes*. Found in 1865, at Heversham Head, by Mr. J. M. Barnes. Fronds reduced and margined.

12. *laciniato-spirale*, *Barnes*. Found in 1865, at Whitbarrow, by Mr. J. M. Barnes. Undulated and twisted.

13. *laciniatum*, *Wollaston*. Narrow and irregular, except near the apex, where normal. Not uncommon.

14. *limbospermo-cristatum*, *Wollaston*. Found in 1858, in Somerset, by the late Mr. Elworthy. 16×1½ inches. Crest 3 inches across.

15. *limbospermum*, *Moore*. Found near Nettlecombe by the late Mr. C. Elworthy; and in 1860, on Beetham Fell, by Mr. J. Crossfield. Outline slightly irregular. Sori on the margin. 10×1½ inches.

16. *lineare*, *Jones*. Raised in 1870 by the late Colonel A. M. Jones. 18½×0¼ inches. Very long and narrow; margin toothed. Two basal lobes. I raised an almost identical form in 1867, named "grammicon."

17. *lobato-densum*, *Wollaston*. Found in 1861, in Levens Park, by Mr. J. M. Barnes. Thick and undulate.

18. *lobato-divergens*, *Barnes*. Found in 1864, at Heversham, by Mr. J. M. Barnes. Lobes at right angles in form of a cross.

19. *lobatum*, *Deakin*. Common variety, fronds forked.

20. *lonchophorum*, *Moore*. Found in North Lancashire, in 1862, by Mr. R. Preston, and in Baycliff Lane, in 1870, by Mr. J. K. Hodgson. 9×0¾ inches. Strap-shaped; sori marginal.

21. *multifidum*, *Lowe* (*lineare multifidum*, *Jones*). Raised in 1874 by Mr. E. F. Fox. Stem naked and branching, terminating in elegant lax crests 3 inches across. Length, 14 inches.

22. *polyschides*, *Ray*. One of the earliest known forms. 12×0¾ inches. Irregularly crenate.

23. *polyschides-crispum*, *Lowe*. Raised by the late Mr. Clapham. Length, 10 inches. A crisped "polyschides."

24. *rimosum*, *Moore*. Found in Guernsey by the late Mr. James. 18×2 inches. Crenate; near the divided apex profoundly incised. Upper surface sulcate, having thickened prominent points.

Group III. Surface rough.

Section a. MURICATUM. (Rough surface.)

1. *bimarginato-cordatum*, *Moore*. Raised by the late Mr. Elworthy. Dwarf. Broader than *bimarginatum*; it has also cordate basal lobes. $11 \times 0\frac{3}{10}$ inches. Margin toothed.

2. *bimarginato-multifidum*, *Moore*. $12 \times 0\frac{1}{4}$ inches. Broken up to the rachis; with a divided multifid apex of narrow branches. Sori marginal. An interesting form.

3. *bimarginatum*, *Moore*. Found at Ulverston by Mr. W. Hadwin. Fronds very narrow.

*4. *blandum*, *Lowe*. Raised by myself. $15 \times 1\frac{1}{2}$ inches. Broad rugose form. Half the width of the frond, next the rachis, quite smooth; beyond this, a rugose wall, and muricate to the margin.

5. *capitatum*, *Lowe* (*muricato-capitatum*, *Jones*). Raised by myself. Branching both in stipes and rachis; and forming a close, foliose, rugose, weeping head; fronds stiff.

6. *cernuum*, *Lowe*. From the late Colonel Jones's collection. 11×1 inches. Frond convex, rachis dividing three inches below the apex into a capitate head.

*7. *circulum*, *Lowe*. Raised by myself. $11 \times 0\frac{3}{4}$ inches. Densely but minutely rugose; margin bending under; apex weeping and crested. At basal lobes frond $1\frac{1}{2}$ inches across.

8. *columnare*, *Clapham*. Raised by the late Mr. Clapham. $8 \times 0\cdot2$ inches. Linear, and lobate-dentate; with a column-like crest.

9. *complicatum*, *Lowe*. Raised by myself. $14 \times 1\frac{1}{4}$ inches. Irregular rugose margin; almost plaited; frond terminating in a rugose crested head, which is twisted ball-like, width $2\frac{1}{2}$ inches.

10. *corniculatum*, *Lowe*. Raised by myself. $20 \times 1\frac{3}{4}$ inches. A fine form of *muricatum*, with stag's-horn-like head.

11. *cristatum*, *Lowe* (*muricato-cristatum*, *Jones*). Raised by the late Colonel Jones. $10 \times 0\frac{1}{2}$ inches. A "mirum" looking form, but so depauperate as to become pinnate. A finely divided capitate head, $2\frac{1}{2}$ inches across.

*12. *illustre*, *Lowe*. Raised by myself. 16×2 inches. Rich green, thick, stiff fronds; very rugose except close to the rachis, where smooth. Apex pointed and twisted. A fine form.

13. *inæquale*, *Lowe* (*muricato-inæquale*, *Jones*). Raised by the late Colonel Jones. Very minute, and irregularly forked.

14. *inframuricatum*, *Wollaston*. Found in 1863, in Arnbarrow, by Mr. J. M. Barnes. Projections on the under surface.

15. *Jonesii*, *Lowe* (*muricato-multifidum*, *Jones*). Raised by the late Colonel Jones. $13 \times 0\frac{3}{4}$ inches. Strongly rugose, the costa

even rugose. A twisted rugose head, composed of narrow, long branches. Stipes 6 inches long.

16. lobatum, *Lowe* (*muricato-lobatum*, *Barnes*). Found in 1871, near Gleeston, by Mrs. Hodgson. Lobate as well as muricate.

17. marginatum, *Lowe* (*rugoso-marginatum*, *Wollaston*). Found in 1862, in Levens Park, by Mr. J. M. Barnes. Rough and underlined.

18. mixtum, *Lowe*. Raised by myself. 12×1 inches. Muricate, undulate, and capitate.

19. muricatum, *Moore*. Found in Guernsey by the late Mr. James, at Nettlecombe by the late Mr. Elworthy, and at Farleton Knot by Mr. J. J. Jones. Muricate on the upper surface.

20. nodosum, *Barnes*. Found in 1866, at Brigstear, by Mr. J. M. Barnes. Frond kneed.

21. nupta, *Lowe*. Raised by myself. $12 \times 0\frac{3}{4}$ inches. Fronds convex; branching at the top of the stipes. Coarsely rough.

22. periferens, *Lowe* (*rugoso-periferens*, *Jones*). A distinct rugose periferens.

23. prominens, *Lowe*. Raised by myself. Undulate and spirally twisted. The prominences (which are very stiff) are rugose at the base, and are half an inch long. $5 \times 1\frac{1}{2}$ inches.

24. ramosum, *Lowe* (*ramoso-rugosum*, *Jones*). Rugose and branched.

25. revolutum, *Lowe*. Raised by myself. $10 \times 0\frac{3}{4}$ inches. A tasselled rugose variety, with large, round, basal lobes. Fronds revolving.

*26. Rickettsæ, *Lowe*. Raised by myself. $25 \times 2\frac{1}{4}$ inches. Broad, and very rugose.

27. rugoso-capitatum, *Lowe*. Raised by myself. A good capitate rugosum.

28. rugoso-spirale, *Lowe*. Raised by myself. Stout, rugose, spirally twisted.

*29. scalpturatum, *Lowe*. Found near Scarborough by myself. $23 \times 3\frac{1}{4}$ inches. Shining; but widely rugose; margin dentate-lobate.

30. scalpturatum, *Moore*. Found in Guernsey by the late Mr. James, at Nettlecombe by the late Mr. Elworthy, in the Isle of Wight by Mr. Bloxam, and near Dalton by Mrs. Hodgson. $12 \times 1\frac{1}{4}$ inches. Irregularly ridgy and crenate lobed.

*31. spirale, *Lowe* (*muricato-spirale*, *Jones*). A spiral muricatum.

32. striatum, *Lowe* (*muricato-striatum*, *Moore*). $13 \times 1\frac{1}{2}$ inches, of which the stipes is 6 inches. Regularly roughly striate.

33. superbum, *Lowe* (*muricato-superbum*, *Lowe*). Raised by myself. 16×2 inches. A very bold muricate form.

34. tridentiferum, *Lowe*. Raised by myself. $7 \times 0\frac{3}{4}$ inches. Very rugose; margin dentate. Apex trident-shaped.

35. undulatum, *Lowe* (*undulato-muricatum*, *Lowe*). Raised by myself. $15 \times 1\frac{1}{4}$ inches. A fine, very rugose form, with a bold smooth costa.

Section β . SUPRALINEATUM.

(Marginal ridge on upper surface.)

1. *constrictum*, *Lowe* (supralineato-constrictum, *Moore*). Variable; the constricted portion markedly supralineate; sometimes not constricted, but having patch-like processes on the back of the frond.

2. *cristatum*, *Lowe* (supralineato-cristatum, *Jones*). Raised in 1872 by the late Colonel A. M. Jones. $13 \times 1\frac{3}{4}$ inches. Supralineate; and branching at the apex, where 9 inches across.

3. *expetitum*, *Lowe*. Raised by myself. $25 \times 3\frac{1}{2}$ inches. Subrugose and supramarginate. A giant form.

4. *fimbriatum*, *Lowe* (supralineato-fimbriatum, *Moore*). Found in 1860, in Levens Park, by Mr. J. M. Barnes. Margin fimbriated.

5. *Hartleyi*, *Lowe* (supralineatum *Hartleyi*, *Barnes*). Found in 1876 at Kellet by Mr. T. Hartley. A distinct, supralineate variety.

6. *Kitsonæ*, *Lowe* (supralineato muricatum *Kitson*, *Jones*). $14 \times 1\frac{1}{4}$ inches. A singular form; the linear membrane, a quarter of an inch from the costa and within, concave and smooth, whilst outside this line convex and muricate.

7. *lanceolatum*, *Lowe* (supralineato-lanceolatum, *Barnes*). Found in 1877 at Milnthorpe by Mr. T. Airey. Distinct.

*8. *Moonæ*, *Lowe*. Raised by myself in 1864. Undulate and supramarginate; the marginal belt conspicuous. Not unlike "undulato-supralineatum" of Jones. $13\frac{1}{2} \times 2$ inches. The marginal belt of the latter extends quite to the base.

9. *muricatum*, *Moore*. Found in several places. Coriaceous and muricate.

10. *nudo-cristatum*, *Lowe*. Raised by myself. Naked stems.

11. *Phillipsii*, *Lowe* (supralineatum *Phillips*, *Jones*). Found in County Fermanagh, Ireland, by Mr. W. H. Phillips.

12. *supralineatum*, *Moore*. Found in 1875, near Ulverston, by Mrs. Hodgson. A beautiful form, lined on the upper side. Found also in County Clare by Mr. O'Kelly, and at Knocknarea, County Sligo, by Mr. W. H. Phillips.

*13. *supralineatum Loweii*, *Moore*. Raised by myself. A larger and bolder form than No. 12.

14. *undulatum*, *Lowe* (undulato-supralineatum, *Jones*). Raised by the late Colonel Jones. 14×2 inches. Only differing from *Moonæ* in the supralineate membrane extending to, instead of terminating 2 or 3 inches above the base. *Moonæ* is much more soriferous.

Section γ . MARGINATUM. (Marginal ridge on under surface.)

1. *aicmoton*, *Lowe*. Raised by the late Rev. C. Padley. Margin crenate and dentate; marginate. Apex branched in a fork-like manner. Suprasoriferous.

2. *alatum*, *Moore*. Raised by Mr. Clapham. $6 \times 0\frac{3}{8}$ inches. Marginate; winged; projecting teeth.

3. *amabile*, *Lowe*. Raised by myself. $16 \times 1\frac{1}{4}$ inches. Undulate and marginate; the margin of the frond crimped.

4. *biforme*, *Wollaston*. Found in 1862, in Levens Park, by Mr. J. M. Barnes. Lacinate ; many forms.

5. *cervi-cornu*, *Moore*. From Messrs. Stansfield. $7 \times 0\frac{1}{2}$ inches. Branching like stags' horns. Margin densely denticulate.

6. *corrugatum*, *Lowe* (*marginato-corrugatum*, *Moore*). Narrow ; margined ; upper surface deeply corrugated.

7. *cristatum*, *Lowe* (*marginato-cristatum*, *Moore*). Raised both by Mr Clapham and Mr. Elworthy, and found in 1860 at Arnside Tower by Mr. J. M. Barnes. Marginate and crested.

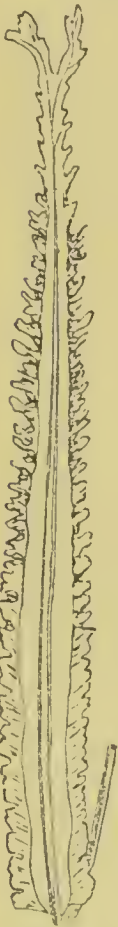


FIG. 31.—*Scolopendrium vulgare*, var. *kraspedoumenon* (showing marginal line and teeth).

8. *fimbriatum*, *Lowe* (*marginato-fimbriatum*, *Moore*). Found near Cartmel by Mr. Hillman, in Silverdale by Mr. Stansfield, and in Levens Park (1861) by Mr. J. M. Barnes. Margin fimbriated. $9 \times 0\frac{3}{4}$ inches and $10 \times 0\frac{1}{4}$ inches.

9. *fissum*, *Lowe* (*marginato-fissum*, *Moore*). Found at Barnstaple by the late Mr. Jackson, and at Ilfracombe by Mr. J. Dadds. Margin deeply cut into narrow obtuse lobes. Mr. H. Bull has found this at Mountain, near Chepstow (in 1880). In the Chepstow form the marginal belt is close to the costa.

10. *irregulare*, *Lowe* (*marginato-irregulare*, *Moore*). Raised by the late Mr. Clapham. A remarkable depauperate form ; branching at the apex. Length, 18 inches.

11. (Fig. 31.) *kraspedoumenon*, *Lowe*. Raised by the late Mr. Elworthy. $8 \times 0\frac{1}{4}$ inches. Conspicuously dentate ; apex furcate.

12. *Lyellii*, *Lowe* (*bimarginatum* Lyell, *Jones*). Raised by the late Dr. Lyell. $12 \times 0\frac{3}{4}$ inches. Rough, but very shining. Dentate.

13. *marginato-coronatum*, *Moore*. Margin cut into small rounded lobes ; apex coronate, and twisted in a curly manner.

14. *marginato-multiceps*, *Moore*. History unknown. 14×1 inches. Dentate margin ; an erect crest. A handsome form of "marginatum."

15. *marginato-multifidum*, *Moore*. Raised by the late Mr. Elworthy. Length, 12 inches. Slightly flexuose ; apex multifid ; fronds narrow at base, widening to the apex ; marginate excrescences.

16. *marginatum*, *Moore*. A common form, with an excurrent membrane within the margin on the under side of the frond. 12×1 inches.

*17. *mirum*, *Lowe*. Raised by myself. Forms a dwarf, undulate, rugose, twisted, capitate bush. $7 \times 0\frac{1}{2}$ inches. Below the head small stalked lobes ; segments near the head, 4 inches wide.

18. *muricatum*, *Lowe* (*marginato-muricatum*, *Jones*). Marginate and muricate.

*19. numphion, *Lowe*. Raised by myself. $4 \times 0\frac{3}{4}$ inches. A dwarf, rugose, undulate, marginate, sub-peraferens form; with a cuneate head $3\frac{1}{2}$ inches across.

20. Oakeleyæ, *Lowe*. Found in 1870 at Penalt (Monmouth) by Mrs. E. Bagnall Oakeley. 14×1 inches. An extraordinary combination. The marginal line has long dentate lobes; margin of the frond deeply fimbriated. Stipes dividing 2 inches from the base; and at the lower portion of the leafy part minutely pinnate. Surface shining, but rough.

21. optatum, *Lowe*. Raised by myself. $6 \times 0\frac{7}{8}$ inches. Marginate, dentate, and contracted; narrowing to a thickened but pointed apex.

22. papillosum, *Lowe* (marginato-papillosum, *Moore*). $9 \times 0\frac{3}{4}$ inches. A double row of projecting fleshy points extends on either side of the midrib, on upper surface.

23. pectinatum, *Lowe*. From the late Colonel Jones's collection. $17 \times 1\frac{1}{2}$ inches. A marginate form with the edge cut into teeth a quarter of an inch long.

*24. plicare, *Lowe*. Raised by myself. $16 \times 1\frac{3}{4}$ inches. Lobate and muricate; lobes projecting.

25. ramigerum, *Moore*. Found in 1865 in Levens Park by Mr. J. M. Barnes. Undulate and branched. No two fronds alike.

26. rugosum, *Lowe* (rugoso-marginatum, *Lowe*). Raised by myself. $18 \times 2\frac{1}{4}$ inches (the stipes 7 inches long). A broad fronded, rugose variety; the margin crenate.

27. sculpturatum *Lowe*, *Lowe*. Raised by myself. $16 \times 0\frac{3}{4}$ inches. Very dentate.

28. stenomenon, *Lowe*. Raised by myself. $14 \times 0\frac{1}{2}$ inches. An excurrent membrane near the rachis. Narrow; regularly fimbriated. An interesting variety.

29. Studdartii, *Lowe* (marginatum fimbriatum Studdart, *Stansfield*). Very pretty when constant.

30. submarginato-multifidum, *Moore*. Found at Hackness by the late Mr Clapham. $12 \times 1\frac{1}{4}$ inches. Margin sinuous; ending in a multifid tuft. A continuous marginal belt.

31. submarginato-ramosum, *Lowe*. Raised by myself. $12 \times 1\frac{1}{4}$ inches. Branching in the stipes and rachis; the frond terminating in a flat, branched head 3 inches wide.

32. submarginatum, *Wollaston*. A common variety. Normal in size, and crenate. Found in Ireland by Mr. W. H. Phillips, in Counties Kildare, Wicklow, and Sligo.

*33. tenue, *Lowe* (marginatum-tenue, *Moore*). Raised by Mr. S. Appleby. $6 \times 0\frac{1}{3}$ inches. Laciniate-toothed.

*34. triforme, *Lowe*. Raised by myself. 16×1 inches. Shining, though rough; submarginate line thorny; margin of frond deeply dentate; apex twisting and forming a circle.

35. triumphale, *Lowe*. Raised by myself. $4 \times 0\frac{1}{2}$ inches. Rugose; the marginal membrane close to the margin, with a dentate edge; crested with a "Cliftii"-like head $1\frac{1}{2}$ inches across.

36. trossula, *Lowe*. Raised by myself. $17 \times 0\frac{1}{2}$ inches. More

widely and squarely dentate than “stenomenon”; upper half of frond widest; marginal line close to rachis at the base, yet becoming close to the margin at the apex.

37. *turgido-irregulare*, *Moore*. Found at Whitby and Nettlecombe. More irregular and more profoundly lobed than “*turgidum*”; and marginate.

*38. *undosum*, *Lowe* (named in error “*marginato-undulatum*,” *Lowe*). Raised by myself. $16 \times 1\frac{1}{4}$ inches. Shining green. A marginate undulatum, with the undulations unusually close.

39. *undulato-contractum*, *Lowe*. Found in Devon by the late Mr. C. Jackson. Undulate and irregular in outline; contracted in part of the frond. Partially marginate.

40. *undulatum*, *Lowe* (*marginato-undulatum*, *Barnes*). Found in 1865, at Heversham Head, by Mr. J. M. Barnes. Also in County Clare, by Mr. O’Kelly. A dense, undulate form.

41. *venosum*, *Lowe* (*marginato-venosum*, *Barnes*). Found in 1874, at Flookborough, by Mr. J. Stewardson. Known by its prominent veins.

Group IV. Margin jagged.

Section a. CREMATUM. (Margin altered.)

1. *aduncum*, *Moore*. 10×1 inches. Conspicuously lobate; irregular, and apex bifurcate.

2. *Aireyi*, *Lowe* (*fissum Airey*, *Barnes*). Found in 1877, at Milnthorpe, by Mr. T. Airey. A neat, narrow form.

3. *alto-lobatum*, *Lowe*. Found at Carron, Co. Clare, by Mr. O’Kelly. Deeply lobed and truncate. $8 \times 1\frac{1}{2}$ inches.

4. *angustato-nitidum*, *Lowe*. Found at Lower Commons, Co. Clare, by Mr. O’Kelly. $12 \times 0\frac{3}{4}$ inches. Densely fimbriate; having a shiny frond.

5. *contractum*, *Wollaston*. Found in Clare, Guernsey, Smeerset, Nettlecombe, and Ruthin. 10×1 inches (in widest part). Crenate; contracted below the densely flabellate multifid crest; partly supra-soriferous.

6. *crispo-fissum*, *Barnes*. Found in 1877 at Milnthorpe by Mr. T. Airey. A beautiful, small, narrow, crispy variety.

7. *dareoides*, *Wollaston*. Raised by the late Mr. Elworthy. Length, 12 inches. Depauperate, and almost pinnatifid; with lax teeth. The apex much the broadest part of the frond.

8. *dentatum*, *Clapham*. Length, 8 inches. Margin irregular and conspicuously dentate. Apex almost normal.

9. *erosum*, *Lowe*. 8×1 inches. Outline irregular and here and there erose; interruptedly marginate and dentate. A good form has been found at Mucknish, Co. Clare, by Mr. O’Kelly.

10. *fissidens*, *Wollaston*. Found in N. Devon. Deeply cut and narrower than “*fissum*.”

11. *fissile*, *Moore*. Found at Nettlecombe by the late Mr. Elworthy, and at Malton by the late Mr. C. Monkman. 12×1 inches. Irregular, and sub-pinnatifid; and crenate-dentate.

12. *fissum*, *Moore*. Found in 1862, at Brigsteer, by Mr. J. M. Barnes. Narrow undulate fronds. 15×1 inches.

13. *imperfectum*, *Wollaston*. Found in 1855, at Whitbarrow, by Mr. G. B. Wollaston. $10 \times 1\frac{3}{4}$ inches. Fronds defective, broader than "polyschides."

14. *inciso-lobatum*, *Wollaston*. Found in 1861, in N. Devon, by Mr. Dadds, also at Mucknish, Co. Clare, by Mr. O'Kelly. Normal, but incised and lobed.

15. *incisum*, *Barnes*. Found in 1861, in Levens Park, by Mr. Barnes. Deeply cut, almost pinnate.

16. *irregulare*, *Padley*. Found in S. Devon, in 1865, by the late Rev. C. Padley, 8 inches. A most irregular variety, having more the appearance of an irregular *Asplenium marinum*.

17. *lobatum*, *Lowe* (*crenato-lobatum*, *Moore*). Crenate and lobate. Not uncommon. 15×2 inches.

18. *multifidum*, *Lowe* (*crenato-multifidum*, *Moore*). Found in 1860, at Birkrig, by Mrs. Hodgson. Margin toothed; and apex crested.

19. *mutatum*, *Moore*. Found near Nettlecombe, by Mr. C. Elworthy. $18 \times 0\frac{1}{2}$ inches. Incised halfway to the costa at about half-inch intervals, forming square-ended lobes. The base of the frond narrowest, and the apex broadest.

20. *obtusodentatum*, *Moore*. Found in 1855, near Ilfracombe, by the Rev. J. M. Chanter. $12 \times 1\frac{1}{4}$ inches. Margin notched with uniform crenatures.

*21. *omnilacerum*, *Lowe*. Raised by the late Mr. Glave. 22×1 inches. Erect habit. Lacerated almost to the costa; the lacerations soriferous along their margins. A distinct form. Fig. 32 is an improved form raised by myself.

*22. *Padleyense*, *Lowe*. Found in Devon by the late Rev. C. Padley. 24×4 inches. A very broad, large form. Normal on one side of the costa, and interrupted on the other.

23. *pinnatifidum*, *Moore*. Raised by the late Mr. Elworthy. $10 \times 0\frac{3}{4}$ inches. Narrow at the base; widening to the apex, where rounded. Pinnatifid with deep open sinuses. Mr. Clift raised a similar form. 17×1 inches.

24. *polymorphum*, *Wollaston*. Found in 1854, in Sussex, by Mr. Wollaston, and in 1861, at Haversham Head, by Mr. J. M. Barnes. Irregular, and of many forms.

25. *prominens*, *Moore*. Found near Ruthin by Mr. T. Pritchard. Length, 12 inches. Irregularly crenate; with few rounded narrow lobes projecting beyond the general margin half an inch.

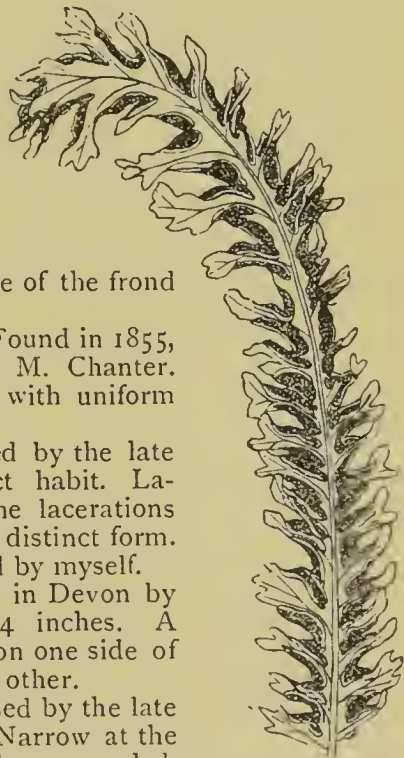


FIG. 32.
omnilacerum *Lowe*.
Tip of frond.

26. *serra*, *Lowe*. Found at St. Pierre, in 1887, by Mr. H. Bull. $14 \times 1\frac{1}{2}$. Normal, with a very broad dentate margin.

27. *sinuatum*, *Wollaston*. Not uncommon. $18 \times 0\frac{3}{4}$ inches at base and $18 \times 1\frac{1}{2}$ in upper portion. Margin sinuated with irregular projections; fronds differing from each other.

*28. *sub-pinnatum*, *Moore* (*semipinnatum*, *Moore*). Found at Ilfracombe by Mr. J. Dadds. 6×2 inches. Split to the costa into irregular lobes, often distant, with an open sinus. Found also in Sligo, by Mr. W. H. Phillips.

29. *suprasoriferum*, *Lowe*. Not uncommon. Crenately lobed, bearing sori on the upper as well as under surface of the frond. $12 \times 1\frac{1}{2}$ inches. A dwarf form was found at Mountain, in 1888, by Mr. Bull, of the St. Pierre Gardens. Margin deeply cut and apex lacerate. Sori near the margin, and as copious above as below. 8×2 inches.

30. *turgido-multifidum*, *Barnes*. Found in 1862, at Witherslack, by Mr. J. M. Barnes. Thick, rigid, and crested.

31. *turgidum*, *Wollaston*. Found in many places. 12×2 inches. Coriaceous; margin very irregular; apex often multifid.

32. *venabulum*, *Lowe*. Raised by myself in 1878. $24 \times 1\frac{1}{2}$ inches (stipes 7 inches). Sub-undulate and deeply lacerate. Erect in habit. Not contracted, like *omnilacerum*.

Group V. Variegated.

Section a. VARIEGATUM. (Fronds variegated.)

1. *albescens*, *Lowe* (*albescens variegatum*, *Moore*). Found, in 1860, at Arnside, by Mr. J. Crossfield. Whole plant cream-coloured.

2. *album*, *Lowe*. A narrow, sagittate, crested, crispum. Raised by myself. 17×2 inches. The sagittate lobes long and narrow, with crested tips, and situated at right angles to the costa, variegated with white. Frond narrowing upwards. The late Colonel Jones raised a somewhat similar variety.

3. *album*, *Lowe* (*albo-variegatum*, *Hodgson*). Found, in 1871, at Urswick, by Mrs. Hodgson. A beautiful variegated white and green variety.

*4. *aureolum*, *Lowe*. A golden variegated "crispum." Raised by myself in 1887, together with a number of other forms. Obtained by crossing with a variegated variety. Sagittate lobes, rotund and curling inwards. 16×2 inches.

5. *aureum*, *Lowe* (*aureo-variegatum*, *Lowe*). Found near Camperdown by myself in 1867. Normal, with golden fronds, 16×2 inches.

6. *autumnum*, *Lowe*. Not unlike a golden *Kitsonæ*. Crested, head compact. 12×2 inches. Raised by myself in 1887.

7. *Claphami*, *Lowe* (*variegatum Claphami*, *Moore*). Beautifully variegated with white; not constant.

8. *conglomerum*, *Lowe*. A dwarf, conglomerate, golden variety. $5 \times 0\frac{1}{2}$ inches (head $2\frac{1}{2}$ inches wide). Raised by myself in 1887.

9. *consummatum*, *Lowe*. Raised by myself. $12 \times 1\frac{1}{4}$ inches. Nor-

mal rigid fronds, striped regularly with thin lines of white, parallel with the veins. Inconstant.

10. *crenatum*, *Lowe* (*variegato-crenatum*, *Wollaston*). A fine, variegated *crenatum*.

11. *crispo-lutescens*, *Lowe* (*crispum fimbriato lutescens*, *Stansfield*). A golden *crispum*. Raised by Messrs. Stansfield about 1885. Very beautiful.

12. *cristatum*, *Lowe* (*cristatum-lutescens*, *Stansfield*). Raised by Messrs. Stanfield in 1885.

13. *Elworthii*, *Lowe* (*variegatum Elworthii*, *Moore*). A handsome narrow, permanently variegated variety. Found by the late Mr. Elworthy, in Somerset.

14. *fissum*, *Lowe* (*fissum-variegatum*). A handsome variegated "fissum." History unknown.

15. *flavum*, *Lowe* (*flavo-variegatum*, *Barnes*). Found in 1865, near Ulverston, by Mr. J. Crossfield. Normal, with yellow and green variegation.

16. *Grantæ*, *Lowe* (*crispum variegatum Grant*, *Jones*). $12 \times 1\frac{3}{4}$ inches. A good variegated form in Mrs. Grant's collection.

17. *Jonesii*, *Lowe* (*cristato-variegatum*, *Jones*). Raised by the late Colonel Jones.

18. *lacteolum*, *Lowe*. From the late Colonel Jones's collection. $14 \times 2\frac{1}{2}$ inches. A normal, broad, variegated variety. The variegation regular; and milky-white.

19. *lacteum*, *Lowe*. A cross between *Claphami* and *digitatum*. Raised by myself.

*20. *luminare*, *Lowe*. A bold golden "crispum." Raised by myself in 1887. "Cowburni" was one of the parents. Erect. 18×2 inches.

21. *lutescens*, *Stansfield* (*fimbriato-lutescens*, *Stansfield*). Raised by Messrs. Stansfield in 1885.

22. *Molyi*, *Lowe* (*variegatum Moly*, *Jones*). A very fine variety.

23. *multifidum*, *Lowe* (*multifidum lutescens*, *Jones*). I have not seen this.

24. *O'Kellyi*, *Lowe* (*lutescens O'Kelly*, *O'Kelly*). $17 \times 1\frac{3}{4}$ inches. Found at Carron, in County Clare, by Mr. P. B. O'Kelly (15×1 inches), who at the same place has found another (*albo-lobatum*, *O'Kelly*).

25. *periferum*, *Lowe* (*periferens variegatum*, *Jones*). Found at Colin (Antrim), by Mr. W. H. Phillips.

26. *Phillipsii*, *Lowe* (*variegatum Phillipsii*, *Moore*). Found in Colin Glen, Antrim, by Mr. W. H. Phillips. Fronds margined with ivory white.

27. *rugosum*, *Lowe* (*rugoso-variegatum*, *Jones*). Raised by myself in 1887.

28. *tridentiferum*, *Lowe*. Concave; the apex separating into a trident-head 7 inches across; the tips also trident-formed. A golden variety 10 inches in length. Raised by myself in 1887.

29. *variegatum*, *Moore*. Found in 1859, at Arnside, by Mr. J. Crossfield. Normal, but variegated.

Tribe 10. ASPIDIEÆ.

THE HOLLY FERN.

ASPIDIUM LONCHITIS.—*Swartz.*(POLYSTICHUM LONCHITIS.—*Roth.*)FIG. 33.—*Aspidium lonchitis.*

A MOUNTAIN fern, ranging from 1,000 to 3,000 feet above the sea. It is pinnate, very rigid, and the margin conspicuously spinous. Mostly found amongst stones; frequently the roots running along the roof of small cavernous rocks, and therefore easily detached without injury. In most localities it requires to be grown in a frame in a somewhat moist atmosphere. A difficult fern to cultivate successfully.

Some of its native habitats are now destroyed. It is recorded as having been found on Snowdon; in the English lakes, on Helvellyn, Fairfield, Deepdale, near Ullswater and Farleton Knott; in several places in Yorkshire; in Teesdale; Ben Lomond, Ben Lawers, Ben Chonzie, Ben Voirlich, Ben Ledi, Clova, and other places in the East Highlands; mountains in Inverness, Isle of Mull, Ross, Sutherland, Orkney; Donegal, Sligo, Leitrim, Meath, and Kerry. Found also on the mountains of Iceland, Lapland, Sweden, and Denmark; and in the Arctic regions; Germany, Hungary, France, Belgium, Spain, Italy, Switzerland, Greece, Kashmir, Altai, Kamtschatka, and the Rocky Mountains.

An evergreen fern with linear lanceolate pinnate fronds from 6 to 18 inches in length, of a rich green colour.

There are but few varieties:—

1. *confertum*, *Lowe*. Ireland. Smaller, and imbricated.
2. *cristatum*. Found on Ben Qui by Dr. Craig. Is well crested.
3. *imbricatum*, *Boyd*. Found by Mr. Boyd. Is a distinct imbricated variety. A similar one was received many years ago from Ireland.
4. *multifidum*, *Moore*. Multifid, but not constant.
5. *proliferum*, *Moore*. Producing bulbils in the axils of the lower pinnae.

THE COMMON PRICKLY SHIELD FERN.

ASPIDIUM ACULEATUM.—*Swartz.*

Sub-section. POLYSTICHUM.

A LARGE-GROWING, handsome evergreen fern, which could only be confused with *Aspidium angulare*; the pinnules, however, are

stalkless ; with acute-angled or wedge-shaped bases ; whilst in *A. angulare* the pinnules are stalked and their bases obtuse-angled.

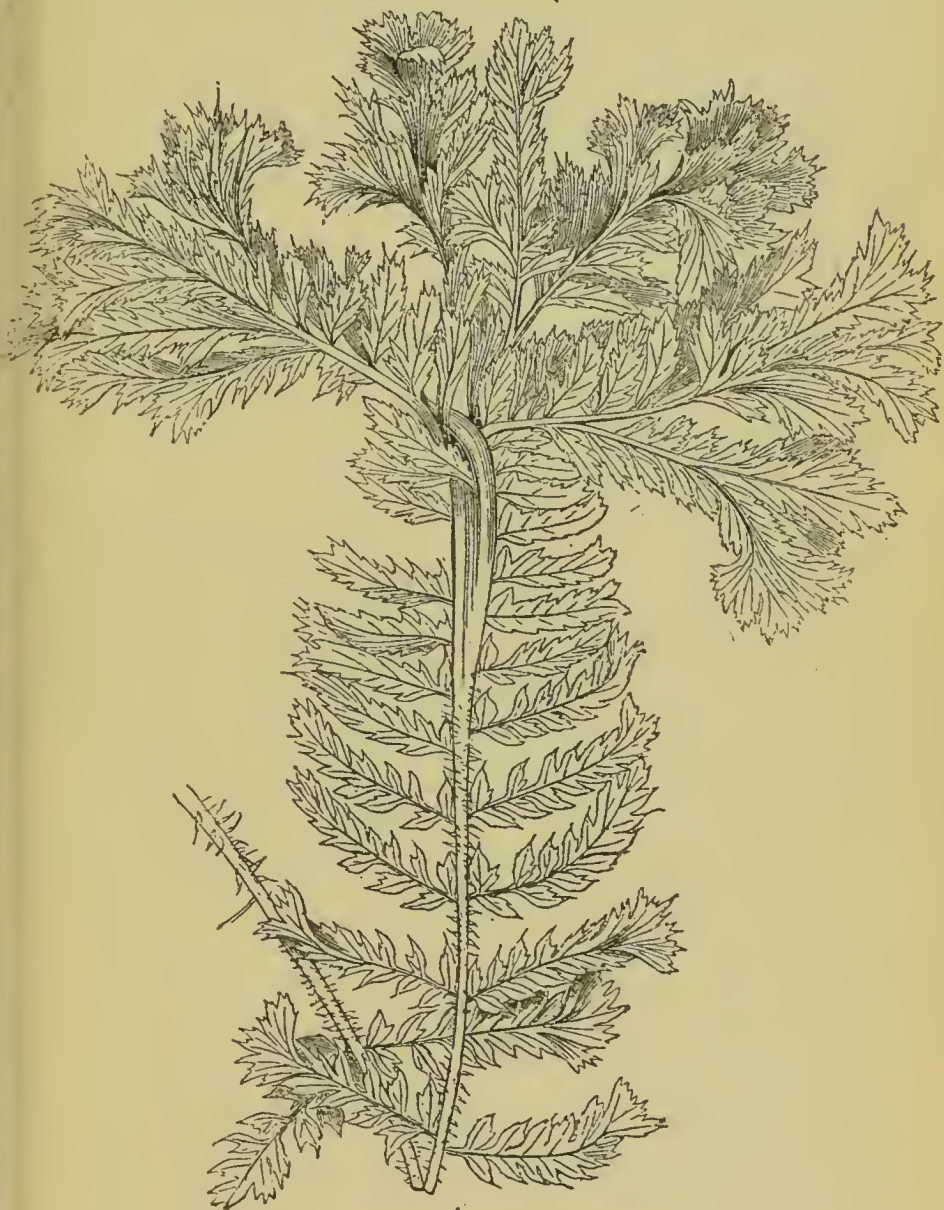


FIG. 34.—*Aspidium aculeatum*, var. *acrocladon*.

In *A. aculeatum* the fronds are darker and more shining, stouter and more leathery in texture, and the habit of the plant is more

erect. Common throughout the United Kingdom and throughout Europe. An inhabitant also of Asia, Algiers, British India, and the United States. A very hardy plant, readily cultivated. It is to be found in hedgerows, woods, and on shady banks. Ordinary length, 2 to 3 feet.

VARIETIES.

1. *Abbottæ*, *Lowe* (*A. angulare grandiceps* Abbott, *Jones*). A bold and beautiful *grandiceps*, much larger than No. 2. Found by Mrs. Abbott. Fronds erect. Length, 2 feet.

2. *acrocladon*, *Lowe*. Found in 1858, in South Devon, by Mrs. Agar Thompson. Length, 17 inches. A densely crested form.

3. *Argutum*, *Moore*. Found in Buckinghamshire by Mr. J. Lloyd. Pinnules narrow.

4. *Boltoni*, *Lowe* (*corymbiferum*, *Barnes*). Found in the Lake district by Mr. Bolton. 17×6 inches. Not greatly corymbiferous.

5. *capitatum*, *Jones*. A narrow form, widening to a conspicuous capitate head. 27×2½ inches at base, and 5 inches below the head.

6. *caudiculare*, *Lowe*. Found at Shirenewton by myself. 12×1¾ inches. A lobed form, having the basal lobes conspicuously stalked and sharp-spined.

7. *corymbiferum*, *Fox* (*cristatum* Fox No. 10, *Wollaston*). Said by Mr. E. F. Fox, the raiser, to be a hybrid with *Aspidium angulare*, and from the smallness of the sporangia seems probable, although very like *A. angulare*. 22×5 inches. Frond terminating in a conspicuous head.

*8. *cristato-angustatum*, *Lowe*. Raised by myself. Is a copy of *cristato-gracile*, except being narrower and better crested. 11×1½ inches.

9. *cristato-gracile*, *Barnes*. Found in 1865, at Hutton Reef Crag, by Mr. T. Bolton. 9×1¾ inches. Very spiny; apex crested.

10. *cristatum*, *Moore*. Found at Barnstaple by Mr. H. F. Dempster. Not well crested.

*11. *cristatum* *Lowci*, *Moore*. Raised by myself. Well crested.

12. *densum*, *Moore*. Found in Devon by the late Mr. Jackson. 12×5 inches. Very foliose and distinct.

13. *gracile*, *Barnes*. Found in 1874 near Bowness, by Mr. T. Hartley.

*14. *grandiceps*, *Jones*. Raised in 1881 by Mr. E. F. Fox. 17×5½ inches. Somewhat flexuose. The conspicuous lobe of *corymbiferum* absent.

*15. *hybridum*, *Lowe* (*cruciatum*, *Jones*). Raised in 1878 by myself. A hybrid between *Aspidium angulare*, var. *Wakeleyanum*, and *A. aculeatum*, var. *densum*. There are no half-way characters; it is a sudden change from one species to the other of the cruciate, strap-shaped, character. Previous to this cross, there had been no cruciate *A. aculeatum*. 20×3 inches. Copiously soriferous; but the spores seldom germinate; and the descendants are unlike "hybridum."

16. *interruptum*, *Lowe*. Found in North Devon by the Rev. F. Mules. 24×5 inches. A well-marked interrupted form.

17. lobatum, *Deakin*. Found at Shirenewton and elsewhere by myself; and at St. Pierre by Mr. Bull. 30×5 inches. Larger, and the characters of lobatum better developed than in the original form.

18. micaceum, *Mules*. Found near Barnstaple by the Rev. F. Mules. 6×1 inches. Pinnæ almost as broad as long. Said only to grow on a micaceous soil.

19. multifidum, *Wollaston*. Found in several places in the Lake district and elsewhere. Frond dividing into a tuft of branches.

*20. nepos, *Lowe*. Raised from *hybridum* by Mr. Barnes of Milnthorpe. A narrow, very rough-looking spinous cruciate form. $17 \times 1\frac{1}{2}$ inches.

21. neptis, *Lowe*. Raised from *hybridum* by the late Mr. Carbonell. An interesting variety. 18×3 inches. This and No. 20 are grandchildren of *densum*.

22. plumosum, *Lowe*. Found near Marwood by the Rev. F. Mules. Large and feathery.

23. polydactylum, *Fox*. Raised by Mr. E. F. Fox. 14×4 inches. Pinnæ polydactylous. Apex of frond crested.

*24. proliferum, *Wollaston* (*acutilobum*, *Jones*). Found in 1853 by Dr. Allchin. 36×6 inches. In 1873 the late Mr. John Wills found a very similar plant in Dorset. Not unlike a proliferum (or acutilobum) in *A. angulare*, but longer and more lax.

*25. pulcherrimum, *Jones*. Found in 1876, in Dorset, by a labourer, and given to the late Mr. Wills. It is one of the most beautiful of the British ferns; is sterile, has a very silky appearance, and is a lax proliferum-looking variety.

26. pulchrum, *Lowe*. Found in North Devon by the late Rev. C. Padley. Narrow; pinnæ minutely crested, the tip of the frond branching into a large foliose head.

27. rotundatum, *Lowe* (*imbricatum*, *Fox*). Raised by Mr. E. F. Fox. 16×2 inches. An interesting, narrow form. Tips of the pinnæ confluent (not imbricate). Pinnules rotund, and the basal ones stalked.

28. stipatum, *Lowe*. Found in 1890 by Major Cowburn, at Dennil Hill. A bold form, with large stipitate uncut pinnules, having a minute dentate margin. 27×6 inches.

29. tergeminum, *Lowe*. Raised from *hybridum* by the late Mr. Carbonell. Lower pinnæ normal "*densum*," then cruciate, and here and there brachiate in the pinnæ to near the apex. A bold form. 28×4 inches.

THE SOFT PRICKLY SHIELD-FERN.

ASPIDIUM ANGULARE.—*Kitaiabel*.

Sub-section. POLYSTICHUM.

SOME of our best authorities consider the present fern as a form of the last, and there is more or less resemblance amongst the varietal forms, but this has a softer feel and a less starchy con-

stitution. To me the greatest proof seems to lie in the difficulty in producing hybrids between *A. aculeatum* and *A. angulare*. After many years of perseverance there now exist several undoubted

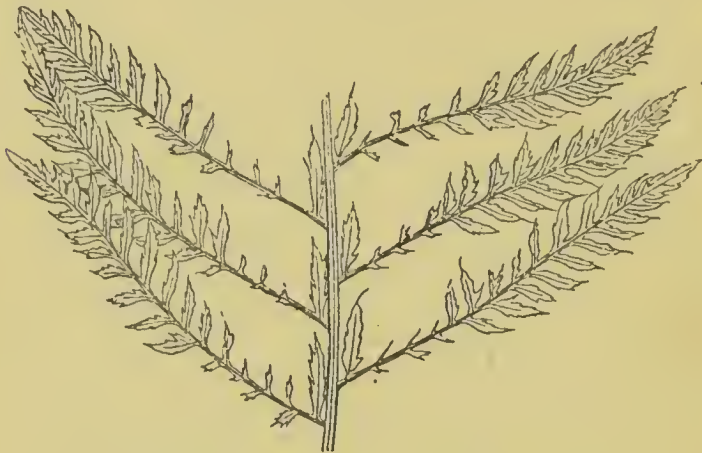


FIG. 35.—*Aspidium angulare*, var. *confluens*. Portion of frond.

crosses ; and again it is as difficult to raise young plants from these hybrids. If, however, we mix the varieties of the reputed species, *i.e.* varieties of *A. angulare* together, or varieties of *A. aculeatum*, then this difficulty no longer occurs, for seedlings come up by the thousand.

As with the Lady Fern and the Hart's Tongue, this species teems with remarkable varieties, and an attempt at classification has again been resorted to.

A common species, except in Scotland, where only found in a few localities in the Lowlands.

It is so mixed up with the last species by botanists that it is impossible to trace it with certainty on the Continent.

One difference in the normal form of the two ferns is in the pinnules of *A. angulare* being stalked and having an obtuse-angled base, whilst in *A. aculeatum* they are without stalks and acute-angled.*

This species selects shady woods and hedgerows, ranging from the coast to 600 feet. Evergreen, or subevergreen where exposed, varying in length from a few inches to 3 feet. More or less lanceolate in form ; and bipinnate even to quadripinnate. It is difficult with all but botanists to distinguish the present from the last species. Easily cultivated.

* Since this has been written, Major Cowburn has found at Dennil Hill a variety of *Aspidium Aculeatum*, with pinnae and pinnules stalked, and which has been named *stipatum*.

VARIETIES.

DIVISION A.

CHANGES IN SKELETON.

Group 1. Ramosum. (Branching of some part of skeleton.)

Section a. RAMOSUM. (Stipes branched.)

*1. acrocladon, *Moore* (ramo-cristatum, *Jones*). Found in South Devon, in 1862, by Mr. J. E. Mapplebeck. Length of frond, 1 foot 2 inches; width across the branches, 1 foot 4 inches. Most profusely branched.

2. Allchini, *Lowe* (ramo-furcillatum, *Allchin*). Found in 1871, in South Devon, by Dr. Allchin. A well-branched variety, bearing bulbils; and almost sterile. Length, 1 foot 2 inches. Apex crested.

3. capitatum, *Lowe*. Raised from spores at Highfield House. Frond widest in the middle, and narrowing to the base of a capitate head of 7 or 8 inches across. Pinnæ polydactylous. Length, 2 feet; width, 7 inches.

4. cladodesteron, *Lowe* (viviparum, *Jones*). Branching from the base; and very much branched to the apex; ending in an erect capitate head. Dwarf; only 5 inches in length.

5. corymbiferum, *Lowe* (ramo-corymbiferum, *Padley*). Found in 1863. Dwarf form; branching from the stipes. Length, 12 inches.

6. furcillatum, *Lowe* (ramo-furcillatum, *Wollaston*; ramosum, *Jones*). A remarkable ramose form, branching from below the rachis, and rebranching several times. Found in 1867, in South Devon, by Mr. G. B. Wollaston. Length, 1 foot 9 inches; width across the branches, 12 inches.

7. Iveryi, *Lowe* (multifido-cristatum *Ivery*, *Jones*). Better than multifido-cristatum, *Moore*. 30×10 inches. Pinnæ crested, pinnules large. Stipes branching into a large head.

8. Kitsonæ, *Moore* (multicristatum, *Wollaston*). Found at Torquay by Miss Kitson, in 1856. A fine branched form, the pinnules being altered in form on the upper portion of the frond.

9. multifido-cristatum, *Moore*. Found in Devon in 1863 by the late Rev. C. Padley. Length, 6 inches. Branching in the middle of the frond.

10. multifidum, *Wollaston* (Claphami, *Moore*). Found in 1874 by Mr. J. Wills. Length, 16 inches. Branching in the middle of the frond.

11. projectum, *Wollaston*. Found in 1862, in Devon, by the late Rev. C. Padley of Enville. 18×3 inches. Curious projecting and ascending branches on the lower half of the frond.

12. ramo-gracile, *Wollaston*. Found by Mr. Wollaston.

13. ramo-multifidum, *Wills*. Found in 1874 by the late Mr. J. Wills. 15×3 inches, and 9 inches across the branching head.

Section β . GRANDICEPS.

(Rachis dividing near summit, into numerous branches,
and large heads.)

1. *accumulatum*, *Lowe*. Raised from spores by myself. A bold grandiceps. An erect grower. 30×10 inches.
2. *capitatum*, *Clapham* (*Claphami*, *Moore*; *multifidum* *Clapham*, *Wollaston*). Raised by Mr. Clapham in 1864. A dense capitate head, 12 inches across. Not cristate, except the head. A splendid form. 22×7 inches.
3. *capitosum*, *Lowe*. Found at Tatworth by Mr. Moly. Pinnæ crested. A grandiceps with a head 7 inches across. $28 \times 4\frac{1}{2}$ inches.
- *4. *coronare*, *Lowe*. Raised from spores given me by the Rev. F. Mules. Habit erect. An enormous branched head. Length, 2 feet.
5. *coronatum*, *Lowe*. Raised by Mr. E. F. Fox. A cross between Molyi and plumosum. Pinnæ crested; apex crowned (width 7 inches). 15×5 inches.
6. *cristatum*, *Wollaston* (marked W. No. 10). Found in Somerset by Mr. G. B. Wollaston. Minutely crested, but largely capitate. $21 \times 5\frac{1}{2}$ inches.
7. *Downense*, *Lowe*. Found at Fermebrogni, Co. Down, by Mr. W. H. Phillips. $28 \times 6\frac{1}{2}$ inches. Pinnæ cristulate. Apex of frond ramulose. Not unlike No. 2.
8. *furcans*, *Wollaston*. An interesting fern.
9. *grandiceps*, *Moore* (*grandiceps* *Talbot*, *Wollaston*). Found in 1861, in Co. Cork, by Mr. W. Talbot. A fine form.
- *10. *inæquale-furcans*, *Cowper*. Found by Mrs. Cowper near Sidmouth. 24×10 inches. Pinnæ unequally furcate. A grand capitate head, 8 inches across.
11. *Jonesii*, *Lowe* (*cristatum* *Jonesii*, *Stansfield*; *grandiceps* *Jacob Jones*, *Wollaston*). Found in Pembrokeshire, about 1869, by the late Mr. Jacob Jones.
12. *Molyi*, *Lowe* (*grandiceps* *Moly*, *Wollaston*). Found in 1869, in South Somerset, by Mr. Moly. A bold, compactly crested variety, with a dense compact head. $19 \times 7\frac{1}{2}$ inches (where widest, *i.e.*, at the base).
13. *nudicaule*, *Lowe* (*nudicaule-grandiceps*, *Barrand*). Found near Barnstaple in 1889. Long bare stalks, and splendid crests. Distinct.
14. *orbiculatum*, *Lowe*. Found at Langmoor, Charmouth, in 1887, by Mr. Moly. 21×4 inches.
15. *Phillipsii*, *Lowe* (*capitatum*, *Phillips*). Found at Glendevils by Mr. W. H. Phillips. 20×5 inches. Normal, with capitate head.
16. *Praegeri*, *Lowe* (*capitatum* *Praeger*, *Jones*). Found in 1883, in Holywood, by Mr. Praeger. 20×4 inches. Normal, with a grand crested head, 5 inches wide.
17. *ramulosum*, *Stansfield*. Found in Co. Antrim by Mr. W. H. Phillips. 30×8 inches. Normal, with a dense ramulose head.
18. *scopæoides* *Lowe*. History unknown. From Colonel Jones's

collection. 16×5 inches. Short pinnæ, large rounded pinnules; costa splitting and forming a besom-like head.

19. *spinigerum*, *Lowe*. Found at Chard by Mr. Moly. A grandiceps with short spiny pinnules. 15×4 inches.

20. *viviparum*, *Lowe*. History unknown. From the late Colonel Jones's collection. A grandiceps with a viviparous head. Length, 10 inches. Very irregular.

Section γ . CRISTATUM. (Bunch crested.)

1. *apuæforme*, *Moore*. Found in 1863, at Cunsey, by Mrs. Wilson. Fronds fish-shaped; crested.

2. *attenuato-cristatum*, *Wollaston*. Found by Mr. Elworthy.

3. *brachiale*, *Lowe*. A superb variety, found in the late Colonel Jones's collection of dried fronds. The superior basal pinnule unequally brachiate; pinnules setose; pinnæ crested; and apex of frond capitate. 18×6 inches.

4. *Bradburyanum*, *Jones*. A good grandiceps form.

5. *Carbonellii*, *Lowe* (*cristatum Carbonell*, *Jones*). Slender, but a large grower. Upper pinnules of upper pinnæ incised.

6. *Cowperi*, *Lowe* (*cristato-gracile Cowper*, *Wollaston*). Found in 1874, in Dorset, by the late Mr. R. Cowper. Much narrower near the apex. A slender variety, with small crests and pinnules. 16×4 inches.

7. *cristato-gracile*, *Wollaston* (*percristatum*, *Moly*). Found in 1868, in South Devon, by Mr. J. Moly. 21×5 inches. Apex of pinnule conspicuously dentate; crests small. An interesting variety.

8. *cristatum*, *Moore*. Under this name there are many forms.

9. *cristulum*, *Lowe* (*cristatum Stormount*, No. 1, *Praeger*). Found in 1883, at Stormount, by Mr. Praeger. A neat cristulate form, in which the upper part of the midrib of the pinnæ expands and becomes transparent.

10. *grande*, *Lowe* (*capitatum-grande*, *Fox*). Raised by Mr. E. F. Fox. 14×4 inches. Normal, with a large, compact head.

11. *inæquale*, *Lowe* (*inæquale cristatum*, *Wollaston*). Found in 1863, in South Devon, by Mr. G. B. Wollaston. A singular combination of creasing and depauperation. A small, dense, capitate head. 22×7 inches.

12. *Jacksoni*, *Lowe* (*cristato-gracile Jackson*, *Jones*). Found by the late Mr. Jackson. 15×6 inches. A pretty thorny-looking variety.

13. *Jonesii*, *Lowe* (*cristato-gracile Jones*). Length, $1\frac{1}{2}$ feet.

14. *laxum*, *Lowe* (*cristatum-laxum*, *Jones*). Found in 1881, at Holywood, by Mr. Praeger. $13 \times 2\frac{1}{2}$ inches. A nice crested form, with ends of pinnæ confluent.

15. *Molyi*, *Lowe* (*cristato-gracile Moly*, *Jones*). A pretty form.

16. *multifidum*, *Wollaston*. A number of varieties have been found; more or less branched.

17. *multilobum*, *Lowe* (*multilobum cristatum Jones*, *Wollaston*). Raised in 1873 by the late Colonel Jones. $24 \times 4\frac{1}{2}$ inches. A very fine, densely crested form.

18. *percristatum*, *Gray* (*cristato gracile*, *Gray*). Minutely crested.
19. *Phillipsii*, *Lowe* (*cristatum Phillips*, *Wollaston*). Found in 1870, in Co. Down, by Mr. W. H. Phillips. A dwarf, broad, crested variety. Crests small. 12×5 inches.
20. *Praegeri*, *Lowe* (*cristatum Castle Dobbs*, *Praeger*). Found in 1884, at Castle Dobbs, by Mr. Praeger. 28×6 inches. A lax crested form.
21. *setosum*, *Lowe* (*setoso-cristatum*, *Moore*). Found in 1874, in South Devon, by Mr. J. Moly. Length, 19 inches. A crested "setosum."
22. *subcristatum*, *Praeger*. Found in 1885, at Castle Dobbs, by Mr. Praeger. $12 \times 3\frac{1}{4}$ inches. Subcrested.
23. *Thompsonæ*, *Moore* (*cristatum Mrs. Thompson*, *Wollaston*). Found in 1860, in North Devon, by Mrs. Agar Thompson. A very narrow, close-crested variety, with a compact capitate head. $20 \times 2\frac{1}{2}$ inches. This fern is sometimes branched and crested.
24. *Willsii*, *Lowe* (*percristatum*, *Wills*). Found by Mr. Wills. Very distinct. 20×5 inches.
25. *Wollastoni*, *Lowe* (*cristatum*, *Wollaston*). 21×6 inches. Found in 1870, in Somerset, by Mr. G. B. Wollaston. Narrowing to the large capitate head; crests small.

Section δ . POLYDACTYLUM. (Pinnæ digitate, *not bunched*.)

1. *conspicuilobum*, *Lowe* (*polydactylum-conspicuilobum*, *Jones*). A good polydactylous form. 28×6 inches.
2. *cruciatum*, *Lowe* (*cruciato-polydactylum*, *Jones*). 26×2 inches. In the late Colonel Jones's collection. A good form.
3. *erectum*, *Padley*. An erect polydactylum.
4. *furcillatum*, *Phillips*. Pinnæ slightly forked.
5. *grande*, *Lowe* (*polydactylum grande*, *Jones*). 24×9 inches. Very large pinnules. A fine variety.
6. *Jonesii*, *Lowe* (*polydactylum*, *Jones*). Found in Hampshire in 1875. It differs from *Padleyi* in having the two pairs of basal pinnæ much longer than the rest, and in the rachis dividing some 6 inches from the apex of the frond, and again subdividing into a crested head 8 inches broad. 24×6 inches (at base).
7. *Padleyi*, *Lowe* (*polydactylum*, *Padley*). Found in 1862, in the Vale of Avoca, by the late Rev. C. Padley. Frond slightly narrower at the base and scarcely polydactylous at the apex. 24×6 inches.
8. *polydactylum*, *Moore*. Found in Tipperary in 1857. A slender crested form.
9. *ramoso-pinnatum*, *Jones*. 24×6 inches (at base). A lax, acute, pinnuled form, with branching pinnæ on the basal half of the frond.
10. *scalptum*, *Carbonell*. Raised by the late Mr. Carbonell. A slender polydactylous decompositum. 15×5 inches.
11. *splendens*, *Lowe* (*polydactylum splendens*, *Jones*). Raised by the late Colonel Jones from Mr. Padley's Vale of Avoca *polydactylum*.

12. *Willsii*, *Lowe*. Found by the late Mr. Wills. A subrotundate crested variety.

13. *Wollastoni*, *Lowe* (polydactylum, *Wollaston*). Found in 1870, in Somerset, by Mr. G. B. Wollaston. Conspicuously polydactylous and capitate; peculiar cut pinnules, ending in a sharp point. $20 \times 5\frac{1}{2}$ inches.

Section ε. BRACHIATUM.

(Rachis branching into three near the base.)

1. *brachiatum*, *Gray*. Found in 1860, in South Devon, by the late Mr. R. J. Gray, and at Axminster by Mr. Moly. 21×5 inches (base, 14 inches). Basal branches make the frond triangular. Mr. Gray raised very many brachiate seedlings.

2. *capitatum*, *Wollaston*. Found in 1862, in Dorset, by Mr. J. Moly. Length, 12 inches. Short irregular pinnæ and a large capitate head (8 inches broad).

3. *coronare*, *Lowe* (*brachiato-cristatum*, *Gray*, in part). Raised by Mr. R. J. Gray.

4. *deltoideo-decompositum*, *Moly*. Found in 1874, in Devon, by Mr. Moly. 21×5 inches (basal pinnæ 9 inches). An interesting form.

5. *furcillatum*, *Lowe* (*brachiato-furcillatum*, *Wollaston*). Found in 1874 in Hampshire by the late Colonel Jones. Length, 24 inches. Width across basal branches, 14 inches. Tips of pinnæ forked minutely.

6. *Grayi*, *Moore* (*brachiato-cristatum*, *Wollaston*). Found in 1854, in South Devon, by Mr. R. J. Gray. Length and breadth, 18 inches. Mostly branching in the leafy portion of the frond at its base into a magnificent tree-like frond with three conglomerate heads. Mr. Gray raised many forms of this variety.

7. *Hankeyi*, *Lowe* (*brachiato-cristatum* Hankey, *Wollaston*). Found in Sussex, in 1866, by Mr. Barnard Hankey. 21×6 inches (except brachiate base, where 12 inches). Frond capitate, the head 7 inches across. A marvellous form, with pinnules plumosely dentate. There is a brachiate character with all the pinnæ.

8. *Jonesii*, *Lowe* (*brachiato-cristatum*, *Jones*). Found in 1873, in Hampshire, by the late Colonel Jones. Length, 15 inches. Much depauperated.

9. *Kealii*, *Lowe* (*brachiato-cristatum*, *Keall*). Length, 15 inches; width, 12 inches. A fine form, found by Mr. Keall, in which each of the two branches is as large as the central frond; the apices in all are branched and their tips crested. Mr. Elworthy found a very similar variety.

10. *Kitsonæ*, *Moore* (*brachiato-cristatum*, *Kitson*). Found in 1856, in South Devon, by Miss Kitson. 20×7 inches. A very singular brachiate form, with fan-shaped feathery pinnules.

11. *minor*, *Lowe* (*brachiato-cristatum* Wills No. 3, *Wollaston*). Found in 1873, in Dorset, by Mr. Wills. Length, 12 inches.

12. *multifidum*, *Lowe* (*brachiato-multifidum*, *Jones*). Found in

1877 in Dorset by the late Mr. J. Wills. 18×13 inches. Branched in the middle of the rachis, and each again near the apex. Naked stem, 6 inches.

13. O'Kellyi, *Lowe* (brachiatum O'Kelly, *Jones*). Dwarf, and sterile.

14. Padleyi, *Lowe* (brachiato-cristatum, *Padley*). Found in Sussex by Mr. W. Barnard Hankey in 1866. Length, 1 foot 8 inches. Ten years previously, Mr. Gray, of Exeter, found this variety in South Devon. Recently, Mr. W. H. Phillips has found it in County Down. "Padleyi" branches in capitate heads.

15. Phillipsii, *Lowe* (brachiatum of Phillips, *Jones*). Found at Stormont by Mr. W. H. Phillips. 35×10 inches. A lax form. The brachiate part 16 inches wide.

16. polyclados, *Moore* (brachiato-cristatum Elworthy, *Wollaston*). Found in 1857 in Somerset. Flexuose. Length, 15 inches, very irregular. Apex of frond branched horizontally; large crested head.

*17. Smithii, *Lowe* (brachiatum cristatum Smithii, *Mapplebeck*). I have not seen this.

18. Willsii, *Lowe* (brachiato-cristatum Wills No. 4, *Wollaston*). Found in 1876, in Dorset, by Mr. Wills. Very plumose pinnules. Small capitate apex of frond. 20×7 inches; and across basal pinnae, 10 inches.

Section ζ. CRUCIATUM.

(Pinnæ or pinnules twin-branched.)

*1. Cliftonæ, *Lowe*. Raised by myself. Erect; well cruciate; having a large capitate head.

2. cruciato-pinnulum, *Fox*. Found in 1873, in Dorset, by Mr. J. Moly. 21×5 inches. Cruciate pinnules. Apex caudate.

3. cruciato-polydactylum, *Jones* (cruciato-cristatum, *Wollaston*). Raised in 1874 by the late Colonel Jones. A crested variety. 27×3 inches.

4. cruciatum, *Wollaston*. Found in 1862, in Somerset, by Mr. G. B. Wollaston. 30×2 inches. Cruciate above the centre of the frond.

5. Elworthii, *Moore* (cruciato-truncatum, *Jones*). Found in 1854, in Somerset, by the late Mr. Elworthy. 14×1 inches, except below the truncate apex, where there are 3 or 4 long pinnæ.

*6. laudatum, *Lowe*. Raised from spores. A very narrow form of large size. 30×3 inches.

7. majus, *Lowe* (cruciatum-majus, *Jones*). The boldest cruciatum yet found. $34 \times 4\frac{1}{2}$ inches.

*8. transforme, *Lowe*. Only an occasional pinna cruciate. Pinnæ ascending very short and confluent. Habit erect. Length, 2 feet. Colonel Jones has this marked *subcruciatum* in his collection.

9. Wakeleyanum, *Moore* (cruciato-multifidum Russell, *Jones*). Found in 1860, in S. Devon. A narrow, well-cruciated variety, with a crested apex. $30 \times 1\frac{1}{2}$ inches.

10. Willsii, *Lowe* (cruciatum Wills, *Jones*).

Group II. Dwarfed.

(Abbreviation of skeletal axis in relation to soft parts.)

Section *a*. CONGESTUM. (Central axis abbreviated.)

1. *annutum*, *Moore* (*conspicuo-crispatum*, *Jones*). A dwarf crispate form. Possibly the same as *coriaceo-crispatum*, *Jones*.

2. *Carbonellii*, *Lowe* (*obtusissimum* *Carbonell*, *Fox*). Found in 1883, at Littleham, by the late Mr. Carbonell. 16×3 inches. Imbricate, pinnules falcate with blunt ends; very neat.

3. *confertum*, *Padley* (*congestum*, *Wollaston*). Found in 1865, in South Devon, by the Rev. C. Padley. A dense, congested form, with pinnæ overlapping. 14×5 inches.

4. *crispatum*, *Jones*. Found at Hale, near Salisbury, by the late Colonel Jones. Crisped.

5. *decurtum*, *Lowe*. Found at Holditch by Mr. Moly. Narrow, and imbricated. $15 \times 2\frac{1}{2}$ inches.

6. *Lyellii*, *Lowe* (*congestum* *Lyell*, *Jones*). Raised by Dr. Lyell. A fine congested form, crisped, and occasionally closely branching at the apex.

7. *micron*, *Lowe*. Found in Braunton, by the late Rev. F. Mules. $8 \times 2\frac{1}{2}$ inches. A stiff, wire-like fern of the *gracile* type.

8. *multifidum*, *Lowe* (*congesto-multifidum*, *Jones*). Raised by the late Colonel Jones. $8 \times 4\frac{1}{2}$ inches. Pinnæ much branched; costa splitting and forming a branched head.

9. *obtusissimum*, *Moore*. Found in 1861, at Ottery St. Mary, Devon, by Mr. G. B. Wollaston. Pinnæ narrow and imbricated, and somewhat blunt-ended. A handsome variety. 18×4 inches.

10. *parvissimum*, *Moore*. Less in size. Length, 6 inches.

11. *polydactylum*, *Lowe* (*polydactylum-congestum*, *Fox*). A cross between *congestum*, *Wills*, and *polydactylum*, *Jones*. Raised by Mr. E. F. Fox. $8 \times 2\frac{3}{4}$ inches. Apex multifid, not crested.

12. *stipatum*, *Wollaston*. Found by Mr. Tait. Pinnæ short, crowded and overlapping; pinnules also crowded and overlapping.

13. *truncatum*, *Lowe* (*truncatum* Mrs. Cowper, *Wollaston*). Found in 1871, in South Devon, by Mrs. C. Cowper (3, The Residences, South Kensington Museum). Basal pinnæ largest; flexuose; apex of frond truncate and cornute. Very foliose. 10×9 inches.

14. *turgidum*, *Moore*. Found at Littleham, Devon, by the late Rev. C. Padley. Dwarf. 9×2 inches.

15. *Willsii*, *Lowe* (*congestum* *Wills*, *Jones*). Dwarf; beautiful.

Section *β*. ALATUM.

(Lateral axes abbreviated, pinnules more or less confluent.)

1. *alatum*, *Moore*. Found in Somerset by Mrs. Thompson, and in Devon by Mr. Wollaston. Pinnules joined together by a well-developed wing. A dwarf variety.

2. *angustifrons*, *Moore*. Found at Barnstaple by the late Mr Jackson. 8×1 inches. Exceedingly narrow.
3. *extremum*, *Lowe*. Found in Devon, in 1864, by the late Mr. C. Elworthy. 14×3 inches. Allied to *obtusissimum*. Pinnæ touching, but not overlapping.
4. *Hartleyi*, *Lowe* (*alatum Hartleyi*, *Barnes*). Found in 1870, on Furness Fell, by Mr. T. Hartley. Distinct; pinnules confluent and imbricated.
5. *imbricatum*, *Moore*. A narrow, imbricated, very lax form, found in Somerset by the late Mr. Elworthy. Length, 24 inches. Proliferous.
6. *pterophorum*, *Moore*. Found in Devon by Mr. G. B. Wollaston. $24 \times 3\frac{1}{2}$ inches. An ally of *alatum*.
7. *pumilum*, *Moore*. Found near Nettlecombe by Mr. Elworthy. 9×2 inches. Almost recurved.

Group III. Flexuose.

(Abnormal curving of skeleton.)

Section a. FLEXUOSUM.

1. *abasipinnulum*, *Moore* (*medio-deficiens*, *Padley*). Found in Dorset, in 1876, by Mr. R. Thompson (3, The Residences, South Kensington Museum). A flexuose variety, not unlike *gracile* in general appearance. The three or four basal pinnules, to within two inches of the tip of the frond, reduced to the stem of the pinna. 22×5 inches.
2. *flexuosum*, *Wollaston*. Mr. Wollaston, between 1870 and 1873, found several plants in North Somerset and South Devon that varied in the flexuose character. The stipes and rachis bending in an extraordinary manner. 20×5 inches. A dwarf form in the Clifton Zoological Gardens was possibly raised from *flexuosum*.
3. *grandidens*, *Lowe* (*grandidens flexuosum*, *Moly*). Found in 1870, in Devon, by Mr. J. Moly. A narrow, depauperate form, in which the upper part curls round. 14×1 inches.
4. *pendens*, *Lowe* (*flexuoso-pendens*, *Wills*). Lax and beautiful.
5. *reflexum*, *Wollaston*. Found in Devon by Mr. G. B. Wollaston, pinnules reflexed.
6. *revolutum*, *Lowe*. Found by myself, in 1887, in a hedge at Shirenewton. 22×3 inches. Rather larger and bolder than *revolvens*.
7. *revolvens*, *Moore*. Found in 1872, in Somerset, by Mr. J. Wills. 18×2 inches. The pinnæ revolve, curving over the back of the frond, and by this means shortening their width one half.
8. *subrotundatum*, *Bellairs*. Found in Devon about 1865 by Miss Bellairs. $16 \times 2\frac{1}{2}$ inches. A subflexuous form, and subrotundate. Pinnæ flexuose and ascending.

Group VI. Stipitate.

(Pinnæ and pinnules distinctly stalked.)

Section a. STIPATUM.

1. deorsopinnatum, *Moore*. Found in 1871, in South Devon, by Mr. J. Moly. The inferior pinnules much the larger. 27×9 inches.
2. Hodgsoni, *Lowe* (stipitatum, *Wollaston*). Found in 1866 in Gleeston Lane by Mr. J. K. Hodgson. A dense, distinct form, with crowded pinnules.
3. Jonesii, *Lowe* (deorsopinnatum Jones, *Jones*). A distinct form, raised by the late Colonel Jones.
4. levidense, *Wollaston*. Found in 1866, at Windermere, by Mr. J. M. Barnes. Pinnules thin, and long-stalked.
5. pediculatum, *Lowe* (pediculatum Hodgson, *Jones*). Found in 1869, near Ulverston, by Miss Hodgson. Pinnules long-stalked.
6. Praegeri, *Lowe* (deorso-pinnatum Praeger, *Jones*).
7. stipitatum, *Moore*. This and pedicellatum, *Wills*, are much alike. Known at the Todmorden Nursery as far back as 1865.

DIVISION B.

CHANGES IN SOFT PARTS.

Group I. Amplum. (Increased development.)

Section a. PLUMOSUM.

(Texture thin. Fructification scanty or absent.)

1. Cooperi, *Lowe*. Found at Braunton by Mrs. S. Cooper. A dense, large pinnuled form. 18×5½ inches.
- *2. coronare, *Lowe* (plumosum coronare, *Lowe*). Raised by myself in 1887. Densely bunch-crested.
3. Daddsii, *Lowe* (plumosum Dadds, *Jones*). Neat.
4. grande, *Jones*. Raised by Mr. E. F. Fox from spores (of decompositum-splendens) supplied by the late Colonel Jones; and from which also the three magnificent plumose divisolobes were raised by Mr. Fox. A barren handsome form. 28×9 inches.
5. Hillersdonense, *Lowe* (plumosum Hillersdon, *Jones*). One of Mrs. Grant's beauties.
6. laxum, *Jones*. A superb fern, raised by the late Colonel Jones.
- *7. Mousogines, *Lowe*. Purchased in Yorkshire. Not unlike Pateyi, but without the large basal pinnæ; and occasionally bearing bulbils at the apex of the frond. 32×7½ inches. A splendid form.
8. Pateyi, *Moore* (plumosum Patey, *Wollaston*). Found in 1866, in Dorset, by Mr. G. E. Patey. A magnificent, sterile, plumose form with extraordinary development. 22×7 inches (except at base, where 11 inches).
9. plumatile, *Lowe*. A distinct feathery form raised by myself in 1884.

10. plumosum, *Moore*. Found in Somerset in 1856 by the late Mr. C. Elworthy. A sterile form, 36 × 9 inches.

11. Wollastoni, *Lowe* (plumosum Wollaston, *Wollaston*). Found in Devon by Mr. G. B. Wollaston. Less lax than plumosum, and fertile.

Section β. FOLIOSUM.

(Foliose or subplumose. Texture and fructification normal.)

1. bulbiferum, *Lowe* (frondoso-bulbiferum, *Jones*). A grand foliosum, developing bulbils into little plants (some as much as 2 inches long) at the base of the pinnae. As many as 50 plants on a frond. 30 × 7 inches.

2. concinnum, *Moore*. Found near Nettlecombe by the late Mr. C. Elworthy. A pretty foliose variety. 24 × 6 inches.

3. crispum, *Lowe* (folioso-crispum, *Jones*).

4. cristatum, *Lowe* (folioso-cristatum, *Jones*).

5. cruciatum, *Lowe* (frondoso-cruciatum, *Jones*). History obscure.

6. foliosum, *Wollaston*. Found near Romsey, Hants, by Mr. G. B. Wollaston. A handsome leafy form with overlapping pinnae and crowded pinnules.

7. frondosum, *Jones*. A densely foliose yet refined variety. 24 × 10 inches.

8. imbricatum - crispatum, *Phillips*. Overlapping and crisp. 24 × 6 inches.

*9. Jonesii, *Lowe* (foliosum, *Jones*). Found by the late Colonel Jones. When vigorous, lower pinnules falcate. Both Mr. Wills and Mr. F. W. Stansfield pointed out this as suggestive of the pulcherrimum type.

10. latipes, *Moore*. Raised in 1870 by Mr. Parsons. A fine foliose form. 27 × 8 inches.

11. multifidum, *Lowe* (folioso-multifidum, *Jones*). A fine variety with solid rotund pinnules. Stipes dividing considerably below the apex into a capitate head (8 inches across). 20 × 4½ inches.

12. Parsonsii, *Lowe* (crispato-foliosum, *Parsons*). Raised in 1872, at Danesbury (Herts), by Mr. Parsons. A handsome, thorny, fringed, foliose form. 21 × 6½ inches.

13. polydactylum, *Lowe* (frondoso-polydactylum, *Jones*). A foliose and polydactylous variety. 30 × 7 inches.

Section γ. PULCHERRIMUM. (Ultra plumose.)

[Lower pinnules, and sometimes upper, falcate, deeply incised, and drawn out into thread-like processes. Fructification generally aposporous. Character more or less intermittent.]

1. Molyi, *Lowe* (pulcherrimum Moly, *Jones*; and caudiculato cristatum, *Wollaston*). Found in 1876 in S. Devon by Mr. Moly. Tips of the pinnae crisped and feathery. Mr. Moly also found other forms, from one of which Mr. F. W. Stansfield has raised seedlings by apospory. The Rev. C. Padley also found a pul-

cherrimum, from which Mr. Morris of Bath has raised seedlings by apospory (Mr. Moly also found a characteristic pulcherrimum with variegated fronds. *See section variegatum*). 24×5 inches.

2. pulcherrimum, *Moore* (pulcherrimum Wills, *Wollaston*). Found in Dorset by the late Mr. Wills.

3. Thompsonæ, *Lowe* (pulcherrimum Mrs. Thompson, *Jones*). Found in 1863, in S. Devon, by Mrs. Agar Thompson. A most feather-like variety, especially near the tips of the pinnæ. 27×6 inches (in the middle of the fronds).

Section δ . MACROPINNULUM.

(Unusually large pinnules.)

1. cristatum, *Lowe* (latifolio-cristatum, *Jones*). Raised by the late Colonel Jones. 18×9 inches. Lax, and slightly crested.

2. divisum, *Smith*. Found in 1869 in S. Devon by Mr. Moly. 18×6 inches. Lax. A number of forms have been found.

3. globosum, *Lowe* (latifolio-globosum, *Jones*). Lax, with globose crests and a branched head. Distinct. 20×4 inches.

*4. grandiceps, *Lowe* (latifolio-grandiceps, *Jones*). Raised by the late Colonel Jones. 14×7 inches, having a tasselled head 6 inches long.

5. Jonesii, *Lowe* (pendens Jones, *Jones*). Found in 1873, in Dorset, by the late Colonel Jones. A lax, large-pinnuled form. 27×7 inches.

6. latifolium, *Wollaston*. Found in 1873 in S. Devon by Mr. J. Moly. 32×10 inches. One of our finest varieties. The development of the posterior basal pinnules is very exceptional.

7. latitudine, *Lowe*. 22×12 inches. A frond found in the late Colonel Jones's collection, apparently raised from latifolium. A lovely, slender form.

8. pendens, *Lowe* (pendens Wills, *Jones*). A very handsome form, found by the late Mr. Wills. $24 \times 5\frac{1}{2}$ inches.

Group II. Exiguum.

(Diminished development of soft parts.)

Section a. LAXUM.

(Pinnæ and pinnules distant.)

1. acutilobum, *Lowe* (gracile Grayi, *Gray*). Found in 1865, in S. Devon, by Mr. R. J. Gray. Length, 2 feet 3 inches. An acutilobe of the finer kind.

2. Jonesii, *Lowe* (laxum Jones, *Jones*). Found by the late Colonel Jones.

3. laxum, *Moore*. Found in Devon by the late Rev. C. Padley. Length, 17 inches. Pinnæ and pinnules lax.

4. Molyi, *Lowe* (laxum Moly, *Jones*). Found by Mr. Moly.

5. Padleyi, *Lowe* (gracile Padley, *Jones*). Found by the late Rev. C. Padley.

Group III. Compositum. (Subdivision of pinnules.)

Section a. DECOMPOSITUM.

(Subdivision on normal lines.)

1. *Clowesii*, *Loewe* (decompositum *Clowesii*, *Moore*). Found in 1860, at Whitbarrow, by Mr. F. Clowes. Robust, dense, plumose, with profoundly cut pinnules. A similar variety was found at Arnside by Mr. J. Crossfield.

2. decompositum, *Moule*. Found by Mr. Moule in Devon.

3. *Foxii*, *Loewe* (decompositum *Fox*, *Jones*). Large.

4. *frondosum*, *Loewe* (frondoso-decompositum, *Jones*). A delicate foliose form. 24 × 9 inches.

5. *Gillettii*, *Loewe* (tripinnatum *Gillett*, *Jones*). Found in 1864, near Yeovil (Somerset), by Mr. Gillett, of Cirencester. A grand form, densely foliose. 27 × 14 inches.

6. *grande*, *Loewe* (decompositum *grande*, *Jones*). 38 × 12 inches. Found at Torquay by the late Colonel Jones (in 1870-2).

7. *Jonesii*, *Loewe* (decompositum *splendens*, *Jones*). Raised by the late Colonel Jones. Distinct and fine.

8. *laxum*, *Loewe* (decompositum-laxum, *Wollaston*). Found in 1876, at Brislington, near Bristol, by Mr. E. F. Fox. A large, bold form. 33 × 10 inches.

9. *magnifico-polydactylum*, *Loewe* (decompositum *magnificum polydactylum*, *Jones*).

10. *magnificum*, *Loewe* (decompositum *magnificum* No. 3, *Jones*). 28 × 12 inches.

11. *Padleyi*, *Loewe* (tripinnatum *Padley*, *Jones*). Found in 1872, in North Devon, by the late Rev. C. Padley. Colonel Jones remarks, "The divergence of the anterior pinnules from the primary rachis is remarkable." Dense overlapping pinnae. 18 × 6½ inches.

12. *Phillipsii*, *Loewe* (decompositum *Phillips*, *Jones*). Found in Co. Down by Mr. W. H. Phillips. 16 × 5½ inches.

13. *plumosum*, *Loewe* (plumoso-decompositum, *Jones*). The late Colonel Jones raised three interesting forms from his multilobum-laxum. 15 × 5 inches.

14. *Praegeri*, *Loewe* (tripinnatum *Praeger*, *Jones*). Found in 1886, at Dundonald, by Mr. Praeger. 27 × 7 inches. A distinct tripinnate form.

15. *serrulatum*, *Wollaston* (deltoides-decompositum, *Stansfield*). Raised by Messrs. F. W. and H. Stansfield. It is stipitate, deltoid, and decomposed; with strongly toothed pinnules.

16. *splendens*, *Loewe* (decompositum *splendens* *Moly*, *Wollaston*). Found in 1875, in S. Devon, by Mr. J. Moly. Contrast of development in centre of frond remarkable. 34 × 5 inches. From this Mr. E. F. Fox raised the grand divisolobums named by the late Colonel Jones, *densum*, *robustum*, and *laxum*; described in Section δ.

17. *tripinnatum*, *Moore*. A confusion has occurred with regard to this plant; it was originally found by Mr. R. Tracy Millett, of Penzance, and named by Mr. Moore. (See page 155, vol. I.

Nature-Printed British Ferns," by Thomas Moore.) In the original plant the pinnæ were twisted so as to lie one above the other like stairs. It is not so decidedly tripinnate as *Gilletii*, and altogether a different-looking plant. Found also in the English Lake district.

Section β . ACUTILOBUM.

(Pinnules acute-lobed, upper and lower ones of equal length.)

1. acutilobum, *Wollaston*. Raised from spores by Mr. Wollaston in 1873. 34×3 inches; in middle of frond, only 2 inches.

2. acutissimum, *Wollaston*.

3. acutum, *Lowe* (acutilobum acutum Wills, *Jones*). Crowded with bulbils along the rachis.

4. Allchini, *Lowe* (proliferum Allchin, *Jones*). Also copiously bulbiferous.

*5. arctissimum (*Lowe*). A very narrow form, raised at Highfield House. Apex attenuate.

*6. conspicuum, *Lowe* (proliferum-conspicuum, *Lowe*). Raised from spores. Very lax in every part of the frond. 25×13 inches. Narrowing from the base. The superior basal lobe at right angles to the pinnule.

7. cruciatum, *Lowe* (acutilobum cruciatum, *Jones*). An interesting form. $24 \times 2\frac{1}{2}$ inches.

8. exile, *Lowe* (acutilobum exile, *Phillips*). Found at Holywood by Mr. W. H. Phillips. $12 \times 3\frac{1}{2}$ inches. A pretty form. Mr. Phillips has found other sub-forms.

9. Footii, *Lowe* (proliferum Footii, *Jones*). Found in Co. Clare by Mr. F. J. Foot. Length, 2 feet. Segments more crowded than in proliferum.

*10. Fraseri, *Lowe* (proliferum Fraseri, *Lowe*). Raised from spores at Highfield House. A narrow acutilobe variety. The pinnæ and pinnules very lax. 18×5 inches.

11. grandiceps, *Lowe* (acutilobum grandiceps, *Wollaston*). Raised in 1874 by Mr. G. B. Wollaston. Narrow, branching, and crested. $18 \times 2\frac{1}{2}$ inches.

12. Grayi, *Lowe* (gracile Grayi, *Gray*). Found in 1865, in South Devon, by Mr. R. J. Gray. $27 \times 6\frac{1}{2}$ inches. Very slender and acute-lobed. A narrower form was found in 1860, in Hampshire, by Mr. T. B. Rake, which is more divisolobe. Length, 2 feet.

13. Hankeyi, *Lowe* (acutilobum Hankey, *Jones*). A fine form, not proliferous.

14. Hartleyæ, *Lowe* (acutilobum Hartley, *Wollaston*). Found in 1863, on Furness Fell, by Mrs. Hartley. A beautiful variety, erect in habit and acute in all its parts.

15. laciniare, *Lowe*. Found at Coombpyne, Devon, by Mr. Moly. A lovely lace-like form. $24 \times 6\frac{1}{2}$ inches.

16. Masoni, *Lowe* (proliferum Masoni, *Barnes*). Found in 1868, at Humphrey Head, by Mr. A. Mason. A finely-cut, bulb-bearing variety.

17. oxyphyllum, *Moore* (divisolobum Elworthy, *Wollaston*). Found in 1852, in Somerset, by the late Mr. Elworthy. 21×6 inches.

18. Phillipsii, *Lowe* (acutilobum, *Phillips*). Found in Co. Down by Mr. W. H. Phillips. 20×5 inches. Rather lax.

*19. pictorum, *Lowe*.

20. Praegeri, *Lowe* (acutum Praeger, *Jones*). Found in 1882, at Dundonald, by Mr. Praeger. $14 \times 3\frac{1}{2}$ inches.

21. proliferum, *Moore*. There are many similar forms; one found in 1876, in Dorset, by Mr. Wills, is more proliferous than Mr. Choulé's original plant. $24 \times 6\frac{1}{2}$ inches.

22. scopæ, *Lowe*. Raised from spores, at Shirenewton Hall (from vars. polydactylum and multilobum). A very divisilobum-looking variety, with pinnæ heavily crested. The late Colonel Jones raised four seedlings very like the present one, but larger.

23. tenue, *Lowe* (proliferum tenue, *Clapham*). Raised by the late Mr. Clapham. $14 \times 3\frac{1}{4}$ inches. Lax.

24. Willsii, *Lowe* (acutilobum proliferum Wills, *Wollaston*). Found in 1876, in Dorset, by Mr. J. Wills. Length, 2 feet. Robust and proliferous.

25. Wollastoni, *Lowe* (proliferum Wollastoni, *Moore*; acutilobum proliferum, *Wollaston*). Found in 1852, in South Devon, by Mr. G. B. Wollaston. A very interesting fern. 30×7 inches.

Section γ . DIVISOLOBUM.

(Pinnules cut into acute lobes; lower pinnules distinctly larger than the upper ones.)

1. acutum, *Lowe* (divisolobum acutum, *Jones*). Found by Mr. Padley. An interesting lax form. 22×10 inches.

2. Carbonellii, *Lowe* (divisolobum Carbonell, *Jones*). Raised by the late Mr. Carbonell. A handsome lax form. 28×6 inches.

3. Crawfordianum, *Phillips* (proliferum Crawfordianum, *Jones*). Found in Crawford Park by Mr. W. H. Phillips. Length, 2 feet.

4. crista, *Lowe*. Raised in 1886, by the late Colonel Jones. A dwarf imbricate variety; with close, dense, cock's-comb-like crests. 6×2 inches.

5. cristatum, *Lowe* (divisolobum cristatum Ivery, *Wollaston*). Raised in 1870, by Messrs. Ivery. A grand fern; heavily crested on lower half of frond. 22×8 inches.

6. decorum, *Lowe* (divisolobum decorum, *Jones*). Raised by the late Colonel Jones. 32×10 inches.

7. deltoideum, *Lowe* (divisolobum-deltoideum, *Jones*). Lax. 33×10 inches.

8. dumetum, *Lowe*. Raised in 1886 by the late Colonel Jones. Upper half of pinnæ branching in a bush-like manner. Costa splitting near the apex. 13×4 inches.

9. dumosum, *Lowe*. Raised in 1886 by the late Colonel Jones. A dwarf, broad, bunch-crested form. A small tasselled head. 9×6 inches.

10. *elegans*, *Lowe* (*divisolobum elegans*, *Jones*).
11. *falcatum*, *Lowe* (*divisolobum falcatum* Moly, *Stansfield*; and *divisolobum laxum* Moly, *Wollaston*). Remarkably lax and falcate, both in the pinnæ and pinnules. Pinnæ, shaped like a reaping sickle, 7 inches long, whilst the frond is only 7 inches wide. 22 × 7 inches.
12. *foliosum*, *Lowe* (*divisolobum foliosum* Pearson, *Jones*). Raised by Messrs. Pearson. A foliose *divisolobe*.
13. *grande*, *Lowe* (*divisolobum grande*, *Jones*). Raised by the late Colonel Jones. A well-merited name. 21 × 13 inches.
14. *grandiceps*, *Lowe* (*divisolobum grandiceps*, *Jones*). Raised by the late Mr. Carbonell. A very fine variety.
15. *Henleyæ*, *Moore* (*divisolobum proliferum* Bagg, *Wollaston*). Found in 1869, in Somerset, by the late Mrs. Henley's gardener (J. Bagg). 24 × 8 inches.
16. *Holeanæ*, *Moore* (*divisolobum proliferum* Plimsoll, *Wollaston*). Found in 1861, in South Devon, by Mrs. Hole's gardener (J. Plimsoll). Very close-growing; widest at base. 20 × 9 inches.
17. *Jonesii*, *Lowe* (*divisolobum Jones*, *Jones*). Found near Sudbury by the late Colonel Jones. A majestic fern. 36 × 10 inches.
18. *laxum*, *Lowe* (*divisolobum laxum*, *Jones*). Found in 1874, in South Devon, by the late Mr. J. Wills. A grand form. Pinnules somewhat depauperate at the base of the pinnæ. 30 × 12 inches.
19. *longipinnatum*, *Lowe* (*divisolobum longipinnatum*, *Jones*). Raised by the late Mr. Carbonell. A lax and very graceful fern, with very long inferior pinnules. 32 × 12 inches.
20. *Molyi*, *Lowe* (*divisolobum Moly*, *Wollaston*). Found in 1875, in South Devon, by Mr. Moly. Plumose. Divisions thin. 24 × 7 inches.
21. *multifidum*, *Lowe* (*divisolobum-multifidum*, *Jones*). Raised by the late Colonel Jones. Basal half and apex of frond crested. Frond tapering. Pinnæ acutilobe at the base, broader above. 18 × 9 inches (at base).
22. *Padleyi*, *Lowe* (*divisolobum Padley*, *Jones*). Found in 1866, in North Devon, by the late Rev. C. Padley. One of the finest of the lax forms. 34 × 10 inches.
23. *perfectum*, *Lowe* (*divisolobum perfectum*, *Jones*). Raised by the late Colonel Jones.
24. *Phillipsii*, *Lowe* (*divisolobum laxum Phillips*, *Jones*). Found at Castlecoole by Mr. W. H. Phillips. A fine fern; broadest at the base, and narrowing to the apex. 30 × 13 inches (at the base).
25. *plenum*, *Lowe* (*divisolobum plenum*, *Jones*). Raised by the late Colonel Jones.
26. *polydactylum*, *Lowe* (*divisolobum polydactylum*, *Jones*). Raised by the late Colonel Jones. A cross between *Henleyæ* and *polydactylum*. 21 × 5 inches.
27. *robustum*, *Lowe* (*divisolobum robustum* Moly, *Jones*). Found in 1874, in South Devon, by Mr. J. Moly. A grand, robust form. 36 × 16 inches.
28. *Seymouræ*, *Moore* (*divisolobum Seymour*, *Wollaston*).

Found in 1870, in South Devon, by the late Miss Seymour. A dense form. 18×7 inches.

29. *Stansfieldii*, *Lowe* (divisolobum densum *Stansfield*, *Jones*). Raised by Messrs. F. W. and H. Stansfield, at Sale. Somewhat resembling the plumose divisolobes.

30. *stipula*, *Lowe* (divisolobum stipulatum, *Jones*). Raised by the late Mr. Carbonell, from spores given him by the late Colonel Jones.

31. *Willsii*, *Lowe* (divisolobum Wills No. 3, *Jones*). Found by the late Mr. Wills, as recorded by the late Colonel Jones.

Section δ. PLUMOSO-DIVISOLOBUM.

(Like divisolobum, but with greatly increased development of leafy part of frond.)

*1. *Baldwini*, *Lowe*. Raised by the late Colonel Jones, about 1885, from a bulbil of "densum," and given whilst young to Mr. John Loraine Baldwin. The finest of all the plumose divisolobums. Costa of the pinnæ very thin, and the pinnæ imbricate; quadripinnate. The divisions finer and more feather-like than any other variety. 22×8 inches. Colonel Jones's greatest achievement.

*2. *densum*, *Lowe* (plumoso-divisolobum densum, *Jones*). Raised in 1878 by Mr. E. F. Fox from spores of *decompositum splendens* given him by Colonel Jones. Length, 24 inches. A mossy mass of foliage. Todea-like in appearance. Sterile, but bulbiferous. Quadripinnate and plumose.

3. *dissectum*, *Pearson*. A very finely-cut variety. Raised by Mr. Pearson.

4. *grande*, *Lowe* (plumoso-divisolobum grande, *Jones*). Raised in 1885 by Mr. E. F. Fox. A cross between *decompositum splendens* and *plumosum* of Wollaston. Far superior to the parent *plumosum*. [Mr. Fox has a large number of forms not yet named from this batch of seedlings.]

*5. *imbricatum*, *Lowe*. Raised about 1885, from a bulbil of "densum." Exceedingly imbricated and plumose. *Baldwini* and *imbricatum* were considered two of the most notable varieties at the Royal Horticultural Society's Fern Show, on July 22 and 23, 1890.

6. *laxum*, *Lowe* (plumoso-divisolobum laxum, *Jones*). Raised in the same batch of seedlings with *densum* and *robustum* by Mr. E. F. Fox. Length, 24 inches. Quadripinnate; and more lax than *densum* or *robustum*. Sterile, but copiously bulbiferous.

7. *Pearsoni*, *Lowe*. Divisolobum *plumosum* *Pearson*, *Jones*. A good plumose form.

8. *robustum*, *Lowe* (plumoso-divisolobum robustum, *Jones*). Raised by Mr. E. F. Fox. Not as luxuriant or so finely divided as *densum*. Pinnæ somewhat curt and rounded. Sterile, and very sparsely bulbiferous.

Section ϵ . MULTILOBUM.

(Pinnules divided into rounded lobes.)

1. *Aireyi*, *Barnes*. Found in 1873, in Dale Park, by Mr. T. Airey. A fine deltoid form.

*2. *ariprepes*, *Lowe*. A very graceful large fern. Frond equal in width for the lower half, and then gradually narrowing to a point. 33×7 inches. A somewhat similar variety (*multilobum-Lowe*) was also raised at Highfield House.

3. *attenuatum*, *Lowe* (*attenuato-multilobum*, *Moly*). 20×8 inches. A very fine tripinnate form, the pinnulets being very finely cut and divided.

4. *conspicuilobum*, *Padley*. Found in Somerset by Colonel Jones in 1878. Length, 1 foot 6 inches. Mr. Padley has found even finer forms.

5. *cristatum*, *Lowe* (*multilobum cristatum* Jones, *Wollaston*). Raised in 1873 by the late Colonel Jones. Heavily crested. 24×5 inches.

6. *decorum*, *Lowe*. Raised by myself in 1876. A large narrow form. 36×4 inches.

7. *deltoideum*, *Lowe* (*multilobum deltoideum*, *Jones*). 24×8 inches. A fine form.

8. *densum*, *Lowe* (*multilobum densum*, *Jones*). Raised by the late Mr. Carbonell.

9. *gracile*, *Lowe*. Raised by the late Colonel Jones. Partly polydactylous.

10. *Iona*, *Lowe* (*multilobum Jones Iona*, *Jones*). Raised by the late Colonel Jones. 26×9 inches. A fine form.

11. *Jonesii*, *Lowe* (*conspicuilobum Jones No. 2*, *Jones*). Found in 1878, in Somerset, by the late Colonel Jones. Much smaller pinnules than in *Willsii*, and ending in a sharp point. 18×5 inches.

12. *laxum*, *Lowe* (*multilobum-laxum*, *Jones*). Found in 1872, at Teignmouth, by the late Colonel Jones.

13. *lineare*, *Lowe*. Raised by Mr. E. F. Fox from *attenuato-multilobum* of *Moly*. Very handsome, and *lineare*-looking form. 16×6½ inches. Although pinnæ crowded, pinnules so narrow as to give a *lax* appearance.

14. *multilobum*, *Lowe* (*multilobum Gray*, *Wollaston*). Found in 1865, in S. Devon, by the late Mr. R. J. Gray. *Foliose*. 30×9 inches.

15. *multilobum minor*, *Lowe* (*multilobum Jones*, *Wollaston*). Found in 1874 in Hants, by the late Colonel Jones. 20×5 inches.

16. *ovale*, *Lowe* (*multilobum ovale Padley*, *Wollaston*). Found in 1863, in Somerset, by the late Rev. C. Padley. Robust, *lax*, and elegant. 26×9 inches.

17. *polydactylum*, *Lowe* (*multilobum polydactylum*, *Jones*). Raised by Mr. E. F. Fox. 30×17 inches. A dense, *divisilobum*-looking form. Pinnæ with polydactylous ends.

18. *tripinnatum*, *Moore*. Found at Penzance by Mr. R. Tracey Millett. 27×5 inches. Pinnæ horizontal (like steps), and pinnules

very conspicuously dentate. Totally distinct from Mr. Gillett's *tripinnatum*, which is a form of *decompositum*.

19. *venustum*, *Moore* (*multilobum*, *Wollaston*). Found in Devon by the late Rev. C. Padley. Length, 2 feet. A very handsome multilobe.

20. *Willsii*, *Lowe* (*conspicuilobum* *Wills*, *Wollaston*). Found in 1873, in Dorset, by the late Mr. J. Wills. 27×10 inches (in centre of frond). Lax, the lobes being very conspicuous.

Group IV. Heteromorphum.

(Alteration in contour and margin, etc., of ultimate segments.)

Section a. ROTUNDATUM. (Rounded pinnules.)



FIG. 36.—*Aspidium angulare*, var. *rotundatum*. Portion of frond.

1. *angustior*, *Lowe*. Raised from spores. Dwarf. 8×0½ inches.
2. *capitatum*, *Lowe*. A subrotundate form. Raised by myself. 14×3 inches. A well-branched capitate head, 4 inches long.

3. *conchatum*, *Moore*. Found at Hawkhurst by Mr. Moly. Very distinct. Pinnules like shells. 16×3½ inches.

*4. *cruciatum*, *Lowe* (*rotundato-cruciatum*, *Jones*). A cruciate narrow form. Raised by myself from spores. 22×1½ inches. Everywhere cruciate; and pinnæ longer at upper part of frond than *Hankeyi*.

5. *diversum*, *Lowe*. Raised by myself (between *rotundatum* and *cruciatum*). 12×2½ inches below, where normal; narrowing above to 1 inch, where cruciate.

*6. *erectum*, *Lowe* (*rotundato-erectum*, *Jones*). Narrow, erect, lax, and attenuated. Raised from spores. Pinnules crenate. Pinnæ confluent near the apex. 24×4½ inches.

7. *Gormanstownense*, *Lowe*. Found at Gormanstown, County Meath, by Mr. W. H. Phillips. 12×3½ inches. A foliose *rotundatum*.

8. *Hankeyi*, *Lowe* (*rotundato-cruciatum*, *Hankey*). Raised in 1875 by Mr. W. Barnard Hankey. Cruciate from the base upwards. 20×1 inches. [*lato-cruciatum* is not unlike this form,

but on a much larger scale ; and the lobes are divided to the costa at the base of the pinnæ ; and they are broad, deeply crenate, and confluent above.]

9. Hodgsonæ, *Lowe* (rotundatum Hodgsonæ, *Barnes*). Found in 1870, at Lecce, near Ulverston, by Mrs. Hodgson. Distinct and beautiful. Pinnules lax, thin, and round.

*10. lato-cruciatum, *Lowe*. Raised by myself. $23 \times 1\frac{1}{2}$ inches. (var. cruciatum \times rotundatum.) Pinnæ cruciate and confluent. Only the basal lobe divided. A most distinct fern.

11. laxum, *Lowe* (rotundatum laxum, *Jones*). In the late Colonel Jones's collection.

12. Ligonielense, *Lowe*. Found at Ligoniel, Co. Antrim, by Mr. W. H. Phillips. $27 \times 6\frac{1}{2}$ inches. An interesting subrotund form.

13. Phillipsii, *Lowe* (rotundatum Phillips, *Jones*). Found in 1877, in County Down, by Mr. W. H. Phillips. Pinnules smaller and more numerous than in No. 14. Frond widest in the centre, narrowing to a pointed apex. $15 \times 2\frac{1}{4}$ inches.

14. rotundatum, *Moore*. Found in 1860, in Somerset, by the late Mr. Elworthy. 20×2 inches. A narrow fern, with only two to four pairs of pinnules, which are rounded.

15. singulare, *Lowe*. Raised by myself. 15×2 inches. Pinnæ ascending. Tips confluent. Apex of frond as if bitten off.

Section β . LINEARE.

(Pinnules narrow, supra-lineate or infra-lineate.)

1. confluens, *Foot*. A lineare form found in Ireland by Mr. S. Foot ; and in S. Devon, in 1873, by Mr. J. Moly. Length, 18 inches. The ends of the pinnæ and frond confluent. A lax variety.

2. cuneatum, *Wollaston*. Found in 1873 in S. Devon by Mr. J. Moly. 24×6 inches. Lax, with broader pinnules than in *lineare*.

3. depauperatum, *Padley*. Found by Mr. Padley. 16×5 inches. A depauperate *lineare*.

4. egenum, *Lowe* (confluens Moly, *Jones*). Found at Axminster by Mr. Moly. A very depauperate *lineare*. 24×6 inches.

5. extremum, *Lowe*. A very extreme form (frond without label in the late Colonel Jones's collection). Lax ; much depauperate ; and the apices of the pinnæ confluent and linear. 30×7 inches.

6. gracile, *Wollaston* (acuto-incisum, *Jones*). Found in 1856 in S. Devon by Mr. G. B. Wollaston. A beautiful, symmetrical, acute, incised form, not unlike confluens. 20×6 inches.

7. gracile-interruptum, *Lowe*. Found in Somerset by the late Mr. Elworthy. Nearer Mr. Foot's *confluens* than *lineare* ; the three pairs of basal pinnules wanting ; on the upper half of the frond the superior basal pinnule is narrow and very long ; beyond which again wanting or depauperate. 24×5 inches.

8. hirondelle, *Wills*. Found by Mr. Wills, small but very symmetrical.

9. Jamesii, *Lowe* (lineare James, *Jones*). Pinnæ not so lax, and pinnules broader. Found in Guernsey.

10. *laxum*, *Lowe* (*lineare-laxum*, *Lowe*). Pinnules mostly reduced to a mere fertile thorn. The pinnæ confluent towards the apex. Raised from spores at Highfield House. 30×7 inches.

11. *lineare*, *Moore*. Larger and more decidedly bipinnate than confluens. Found in Devon by the late Mr. C. Jackson.

12. *Molyi*, *Lowe* (*lineatum*, *Moly*). Found in S. Devon, in 1873, by Mr. J. Moly. Fronds, dark-green. Ends of pinnæ confluent. 24×6½ inches. A fine form.

*13. *nidum*, *Lowe*. Raised by myself in 1863. 15×5 inches. Not unlike confluens, but growing like *Asplenium-nidus*.

14. *polydactylum*, *Lowe* (*lineare polydactylum*, *Jones*). Raised by the late Colonel Jones. 20×6 inches. A fine form.

15. *remoto-decurrens*, *Wollaston*. Found in 1863, in S. Devon, by the late Rev. C. Padley. 22×5 inches. Like a broad pinnuled *confluens*. Thorny.

16. *Taitii*, *Lowe* (*lineare Tait*, *Jones*). Found by Mr. Tait twenty years ago. A fine *lineare*, in the style of *Jamesii*.

17. *Willsii*, *Lowe* (*lineare Wills*, *Wollaston*). Found in Somerset in 1871. 19×6 inches. A fine form, without the usual depauperation of *lineare*. Pinnules lobed.

Section γ. LACINIATUM. (Laciniate forms.)

*1. *Buckleæ*, *Lowe*. A very pretty regular though depauperate fern. Pinnules very small. Pinnæ varying in length; some attenuate and some truncate. The apex of the frond usually finely attenuate. 18×4 inches.

2. *Carbonellii*, *Lowe* (*grandidens Carbonell*, *Jones*). Raised by the late Mr. Carbonell. A symmetrical laciniate variety. 16×4½ inches.

3. *caudatum*, *Lowe* (*interruptum caudatum*, *Jones*). Raised by the late Colonel Jones (*crucipinnulum* + *polydactylum*) a polydactylous *crucipinnulum* with a caudate apex.

4. *clavapinnulum*; *Lowe*. Found by Mr. Moly. Club-like. Very depauperate. 21×5 inches.

5. *Crawfordianum*, *Lowe* (*truncatum*, *Praeger*). Found in 1886, in Crawfordsburn, by Mr. Praeger. 10×5 inches. Ending abruptly.

6. *deficiens*, *Wollaston*. Found in 1874, in Dorset, by Mr. John Wills. An extraordinary fern, with deficient pinnules, mostly wanting about an inch from the apex of the pinnæ, where only points remain. Least deficient near the base of the pinnæ. 21×7 inches.

7. *Fittii*, *Lowe* (*grandidens Fitt*, *Jones*). A very distinct crisp form with dark-green fronds, raised by Mr. Fitt. 10×3 inches.

*8. *flabellipinnulum*, *Jones* (*crutipinnulum*, *Wills*). Found in 1878, in Dorset, by the late Mr. Wills. The pinnules fan-shaped. 20×4½ inches.

9. *Foxii*, *Lowe*. Raised by Mr. E. F. Fox (a cross between *grandidens* and *Jacksoni*) in 1872. 10×5 inches. It is a *grandidens* to the apices of the pinna, and then a *cristato-gracile*.

10. *Glenarmense*, *Lowe* (*interruptum* *Glenarm*, *Praeger*). Found in 1884, in Glenarm, by Mr. Praeger. 20×5 inches. Not much depauperated. Very thorny. [A second form, found in the same place, is distinctly tripinnate. 13×4½ inches.]

11. *gracile*, *Lowe*. A gracile-like *interruptum*. Found at Ballymeux by Mr. W. H. Phillips.

12. *grandidens*, *Wollaston*. Found in 1872 in Dorset by Mr. J. Wills. Everywhere depauperate. 20×1 inches. A number of kindred forms have been found.

13. *interrupto-caudatum*, *Praeger*. Found in 1885, in Glenarm, by Mr. Praeger. 21×7 inches (at base); only an inch in upper half of frond.

14. *interruptum*, *Wollaston*. Found in Hampshire, in 1862, by Mr. Rake. Length, 18 inches. A most interrupted form; some pinnæ 4 inches long, others not ½ an inch; most of the pinnæ are not an inch in length.

15. *irregularc*, *Jones*. Found at Ballymenoch by Mr. W. H. Phillips. 12×1 inches. Much depauperated and truncate.

16. *laciniatum*, *Wollaston*. A form of *interruptum*.

17. *Lowe*, *Lowe* (*grandidens* *Lowe*, *Moore*). Very dwarf and fine-cut, the pinnules being acutilobe. Truncate. Length, 4 to 6 inches.

18. *magnum*, *Lowe*. A giant amongst *laciniatum*s. Found at Mequale Bramel, Co. Down, by Mr. W. H. Phillips. 30×7 inches.

19. *manica-infanta*, *Wollaston*. Pinnules contracted like a baby's sleeve. Found at Offwell, Devon, by Mr. Moly. 13×4 inches.

20. *Phillipsii*, *Lowe* (*interruptum* *Phillips*, *Wollaston*). Found in 1876, in Co. Down, by Mr. W. H. Phillips. 24×7 inches. Towards the apex pinnæ suddenly shortened; pinnules much depauperated; lax. General outline of frond symmetrical.

21. *Praegeri*, *Lowe* (*grandidens* *Praeger*). Found in 1881, in Graigavad, by Mr. Praeger. 20×2½ inches. A bold, truncate *grandidens*.

22. *præmorsum*, *Allchin*. Found in Ireland, in 1853, by Dr. Allchin, and subsequently in Devon and Hants. Dwarf, narrow, præmorse variety. 14×3½ inches. Mr. W. H. Phillips found a form at Knock, 24×4½ inches.

23. *Strictum*, *Jones* (*interruptum*, *Barnes*). A good form.

24. *Thompsoni*, *Lowe* (*grandiceps* *Thompson*, *Jones*). A curious very narrow *grandiceps*; with abrupt pinnæ, and with larger confluent ones. 14×1 inches. A slender lacinate head, 2 inches wide. Distinct.

25. *truncatum*, *Lowe* (*grandidens truncatum* *Elworthy*, *Wollaston*). Found in 1859, in Somerset, by the late Mr. Elworthy. Pinnæ and apex truncate; pinnules very abnormal. 7×1½ inches.

Section δ. SETOSUM. (Pinnules thorny.)

1. *cristatum*, *Lowe* (*setoso-cristatum*, *Moore*). Found in 1874, in S. Devon, by Mr. J. Moly. Apex of pinnæ slightly crested, and a compact, much-branched head, not wider than the frond. This

charming variety has the margins of the pinnules crowded with bristles. $20 \times 5\frac{1}{2}$ inches.

2. *cuneatum*, *Lowe* (*setoso-cuneatum*, *Joues*). Found in 1877, in Co. Antrim, by Mr. W. H. Phillips. A delicate, pale, lustrous green; and so copiously dentate as to resemble *Kalothrix* of the Lady Fern. 16×4 inches. A grand form. Mr. Moly found a similar plant, but whether exile I am unable to say.

3. *exile*, *Wollaston*.

4. *gracile*, *Lowe* (*Setoso-gracile*, *Phillips*). Found at Castle-coole by Mr. W. H. Phillips. $20 \times 5\frac{1}{2}$ inches. A neat form.

5. *inæquale*, *Lowe* (*inæquale Setosum*, *Phillips*). Found in Glen Devis by Mr. W. H. Phillips. 16×3 inches.

6. *Kalothrix*, *Lowe*. Found at Shute, Devon, by Mr. Moly. A good form. $20 \times 5\frac{1}{2}$ inches.

7. *Phillipsii*, *Lowe* (*exile Phillips*, *Joues*). Found at Holywood, Co. Down, by Mr. W. H. Phillips.

Section ϵ . PERSERRATUM.

(Pinnules deeply and acutely serrated.)

1. *Bayliæ*, *Moore*. An interesting dwarf form. 14×4 inches.

2. *Carbonellii*, *Lowe* (*perserratum Carbonell*, *Joues*). Found by the late Mr. W. C. Carbonell in Monmouth. Dwarfier than *Bayliæ*.

3. *fisso-decurrans*, *Wollaston*. Found in 1874, in Dorset, by Mr. Moly. Narrow and branching at the base into twin fronds. $19 \times 2\frac{3}{4}$ inches.

4. *Pateyi*, *Lowe* (*perserratum Patey*, *Wollaston*). Found in 1873, in Berkshire, by Mr. G. S. Patey. A larger fern than *perserratum*, with very much larger pinnules. Dark green. $23 \times 6\frac{1}{2}$ inches.

5. *perserratum*, *Wollaston*. Found in 1869, in South Devon, by Mr. G. B. Wollaston. 20×6 inches. A very Lady-Fern-looking plant. Dark green.

DIVISION C.

ALTERATION IN OUTLINE OF FROND.

(The relations of hard and soft parts remaining unchanged.)

Group I. Widened.

Section a. DELTOIDEUM. (Deltoid.)

1. *curtum*, *Moore*. Found near Nettlecombe by Mr. Elworthy. Length, 8 inches. Pinnæ crowded, overlapping. Plumose-like.

2. *decompositum*, *Lowe* (*deltoideo-decompositum*, *Moly*). Found in 1874, in Devon, by Mr. J. Moly. 21×9 inches; middle of frond 6 inches wide; basal pinnæ much larger.

3. *decurrans*, *Lowe* (*deltoideo-decurrans*, *Wollaston*). Found in 1876, in Dorset, by Mr. G. B. Wollaston. $22 \times 6\frac{1}{2}$ inches. Coriaceous; pinnules large.

4. *foliosum*, *Lowe* (*deltoideo-foliosum*, *Joues*). Found in 1875, in Devon, by Mr. Moly. 24×6 inches. A foliose, coriaceous form.

5. *latipes*, *Moore*. Raised in 1870 by Mr. Parsons. A fine deltoid

form. 27×9 inches. The late Mr. Elworthy, in 1854, found a very similar fern.

6. plumosum, *Lowe* (deltoideo-plumosum, *Moly*). Found in Dorset by Mr. J. Moly. Length, 2 ft. 3 inches.

7. proliferum, *Lowe* (curto-proliferum, *Wollaston*). Found in 1863, at Cunsey (Lake district), by Mr. J. A. Wilson. Narrow, and bulb-bearing.

Group II. Narrowed.

Section *a.* ANGUSTATUM. (Frond simply narrowed.)

1. Padleyi, *Lowe*. A narrow, very lax, slender form, with an acute apex. Found in Somerset by myself in 1864.

2. Phillipsii, *Lowe*. A narrow form, found at Castlereagh by Mr. W. H. Phillips. $7 \times 2\frac{1}{4}$ inches. Pinnules subrotund.

3. ramo-cristatum, *Padley*. Found in 1863 by the late Rev. C. Padley. $12 \times 1\frac{3}{4}$ inches. Pinnæ confluent and dilate. Apex of frond crested.

4. subimbricatum, *Lowe* (interruptum, *Phillips*). Found at Springfield by Mr. W. H. Phillips. $15 \times 2\frac{1}{2}$ inches.

DIVISION D.

ALTERATION IN THE COLOUR OF FROND.

Group I. Variegated.

Section *a.* VARIEGATUM.

1. aureolum, *Lowe*. Found at Martin Hoe, Devon, by myself, in 1885. Narrow, pinnules imbricate at the base of the pinnæ; apex of the frond branching. An autumnal golden hue. 24×5 inches.

2. aureum, *Jones*. Found by the late Colonel Jones.

3. inæquale, *Padley* (inæquale variegatum *Padley*, *Wollaston*). Found by the late Rev. C. Padley. Pinnules (not pinnæ) depauperate. 24×6 inches.

4. Jonesii, *Lowe* (variegatum, *Jones*). Found by the late Colonel Jones. Mr. Moly has also found a similar one.

5. leucothea, *Lowe*. A large fern in Colonel Jones's collection, some fronds entirely white, and others well variegated. 31×7 inches.

6. multifidum, *Lowe* (inæquale variegatum multifidum, *Jones*). Tips of pinnæ confluent and slightly crested. A depauperate form. 22×8 inches.

*7. polydactylum, *Lowe* (inæquale variegatum polydactylum, *Jones*). Raised by the late Colonel Jones. A cross between No. 3 and polydactylum grande. Some pinnules very large, others all but wanting. A grand variegatum. 36×8 inches.

8. pulcherrimum, *Lowe* (pulcherrimum variegatum *Moly*, *Jones*). Found by Mr. Moly. A variegated pulcherrimum. 28×8 inches. A charming variety, with rich golden variegation.

9. venosum, *Padley* (venoso-variegatum, *Jones*). Found by the late Rev. C. Padley.

THE MARSH FERN.

NEPHRODIUM THELYPTERIS.—*Desvaux.*(LASTREA THELYPTERIS.—*Bory.*)FIG. 37.—Pinna (showing fructification of *Nephrodium thelypteris*).

AN interesting fern, the associate of *Osmunda regalis* in boggy situations. It is readily cultivated, but prefers wet peat, as water is its especial requisite. The fronds vary from 6 inches to 4 feet, including the stem; for at least half the frond is the naked stem. It is erect, and the fronds are of a delicate pale-green. Deciduous; rhizoma creeping. Quite distinct from all other species. Widely spread, but very local. It is found in Devon, Somerset, Hampshire, the Isle of Wight, Sussex, Kent, Surrey, Berkshire, Essex, Norfolk, Suffolk, Cambridge, Bedford, Huntingdon, Warwick, Stafford, Hereford, Salop, Nottingham, Yorkshire, Cheshire, Westmoreland, Cumberland, and Northumberland. In Wales—Glamorgan, Pembroke, Carnarvon, and Anglesea. In Scotland—Forfar; Shetland. In Ireland—Antrim, Galway, Mayo, Wicklow, and Kerry.

Occurs throughout Europe; in North America; and North Africa.

There are no varieties.

THE MOUNTAIN BUCKLER FERN.

NEPHRODIUM MONTANUM.—*Baker.*(LASTREA MONTANA.—*Moore.*)FIG. 38.—*Nephrodium montanum*. Pinna (showing fructification).

KNOWN as the "Sweet Mountain Fern," owing to the strong yet pleasant scent of the fronds. Although recognised as a mountain fern, it is nevertheless found from the sea-level to an altitude of

about 3,000 feet. Usually an inhabitant of hillsides, especially in mountain districts; luxuriating in strong soil in damp situations. An easily recognised species, with lanceolate, pinnate fronds. Sori marginal. Fronds varying from 1 to more than 3 feet in length, and from 2 inches to nearly a foot in width. Erect in habit. A deciduous fern, requiring a damp situation for successful cultivation. A common species in this country, and found throughout Europe. Of late years a number of varieties have been discovered, the late Mr. Barnes, of Milnthorpe, being the most successful discoverer as well as cultivator.

VARIETIES.

1. abruptum, *Moore*. An interesting variety, found at Barnstaple by the late Mr. C. Jackson. Pinnæ narrow and short, pinnules interrupted.
2. albo-variegatum, *Barnes*. Found in 1872, in Wastdale, by Mr. J. M. Barnes. Fronds green and white.
3. angustifrons, *Wollaston*. Found in Patterdale by Mr. G. Whitwell.
4. angustum, *Wollaston*. Found at Staveley by Mr. J. Westlake.
5. apuæforme, *Moore*. Found in 1865, in Swindale, by Mr. J. M. Barnes. Apex of frond many branched.
6. attenuato-cristatum, *Moore*. Found in 1865, in Mardale, by Mr. J. M. Barnes. A handsome robust form, with caudate and crested fronds.
7. Barnesii, *Moore* (addressa, *Wollaston*). Found in 1865, in Swindale, by Mr. J. M. Barnes. A grand, bold, dark-green variety, with erect fronds which are very narrow; pinnules horizontal. Length, 26 inches; width (at widest), only 2½ inches.
8. Bellii, *Lowe* (crispum Bell, *Barnes*). Found at Coniston by Mr. Bell.
9. Boydii, *Lowe* (plumosum Boyd, *Barnes*). Length, 1½ feet.
10. brevilobum, *Moore*. Found in 1864, in Mardale. A distinct and beautiful form, with pinnules evenly reduced.
11. caudato-cristatum, *Barnes*. Found in 1863, at Rydal Head, by Mr. Crouch. Robust; very caudate. Small crests.
12. caudatum, *Moore*. Found in 1868, in Mardale and Wastdale, by the late Mr. J. K. Hodgson. The frond and pinnæ conspicuously caudate.
13. Clowesii, *Lowe*. Found near Windermere by Mr. J. Huddart. Pinnæ digitate; apex of frond crested.
14. concinnatum, *Barnes*. Found in 1866, on Loughrigg, by Mr. W. Crouch. An interesting variety, the points of the pinnæ like ringlets.
15. congestum, *Barnes*. Found in 1873, in Langdale, by Mr. J. M. Barnes. A fine variety; densely foliose.
16. coronans, *Moore*. Found in 1872, in Langdale, by Mr. J. M. Barnes. The best heavily crested variety. Length, 1½ feet.

17. *corymbiferum*, *Whitwell*. Found at Grasmere by Mr. J. Garnett.
18. *crispatissimum*, *Wollaston*. Found in 1871, in Langdale, by Mr. J. A. Wilson, and since in Troutbeck by Mr. J. Gott. Pinnules undulated.
19. *crispatum*, *Jones*. Found at Clougha by Mr. J. Stewartson.
20. *crispo-angustatum*, *Barnes*. Found in Patterdale by Mr. W. Foster.
21. *crispo-congestum*, *Barnes*. Found at Coniston by Mr. J. M. Barnes, junr.
22. *crispum*, *Moore*. Found in 1865, in Furness Fell, by Mr. J. M. Barnes. Previously it had been found on the Clova Mountains by Dr. Balfour. A striking variety, with undulate pinnules.
23. *cristato-angustatum*, *Moore*. Raised by Mr. J. M. Barnes. A narrow, wonderfully crested variety.
24. *cristato-gracile*, *Druery*. Found in 1888, at Sticklepath, North Devon, by Mr. Druery. A slender crested form with narrow pinnae.
25. *cristatum*, *Wollaston*. Found in 1871, in Westmoreland, by Mr. J. M. Barnes. A grand crested variety. Length, 24 inches; width, 6 inches; a small capitate head. A form of *cristatum* was found in Monmouthshire by Mr. T. H. Thomas.
26. *Crouchii*, *Lowe*. Found near Tain, N.B., in 1877. An interrupted form.
27. *curtum*, *Barnes*. Found in Wyresdale by Mr. J. Hartley.
28. *curvatum*, *Moore*. Found in 1863, at Farleton Knot, Westmoreland, by the late Mr. Jacob Jones. Length, 30 inches; width (in middle of frond), $4\frac{1}{2}$ inches. Pinnæ curving downwards; and upper half of frond gradually narrowing, to a point. A fine variety.
29. *curvatum-Barnesii*, *Moore*. Found in 1866, in Garsdale, by Mr. J. M. Barnes. A fine robust form with curving-down pinnules.
30. *curvatum-Whitwellii*, *Barnes*. Found at Coniston by Mr. G. Whitwell.
31. *decurrens*, *Moore*. Found in 1866, in Garsdale, by Mr. J. M. Barnes. Another robust form; with curving-down pinnæ.
32. *deficiens*, *Wollaston*. Found in Longsteddale by Mr. G. Whitwell.
33. *depauperatum*, *Druery*. Found in 1888, at Sticklepath, North Devon. Dwarf; very depauperate.
34. *digitatum*, *Jones*. Found in 1875, in Langdale, by Mrs. J. K. Hodgson. Length, 21 inches; width, $5\frac{1}{2}$ inches. Digitate except the apex, which is pointed. Mr. J. Hartley has also found a digitate variety at Coniston.
35. *erosum*, *Moore*. Found near Bowness by Mr. F. Clowes. The pinnules are deformed.
36. *flavo-variegatum*, *Barnes*. Found in several places. Fronds green and yellow.
37. *flexuosum*, *Wollaston*. Found in 1870, in Westmoreland, by Mr. W. Crouch. Length, 24 inches; width (in middle of frond) $4\frac{1}{2}$

inches ; at the base, only 1 inch wide. Rachis slightly flexuose ; pinnæ and pinnules much twisted.

38. *Fosteri*, *Lowe* (*brevilobum* Foster, *Barnes*). Found in Patterdale by Mr. W. Foster. Another brief-lobed variety.

39. *furcans*, *Moore*. Found in Westmoreland by Mr. Stansfield. Length, 12 inches ; ending in a tuft of spreading segments.

40. *furcillatum*, *Wollaston*. Found at Brotherswater and Frostrow, by Mr. G. Whitwell.

41. *Gottii*, *Lowe* (*crispatissimum* Gott, *Hartley*). Found at Troutbeck by Mr. J. Gott.

42. *grandiceps*, *Barnes*. Raised by Mr. Barnes in 1872. Length, 18 inches ; width, 1 inch ; the apex capitate and crested, and 4 inches wide.

43. *grandiceps-Fosteri*, *Lowe*. Found in Martindale, by Mr. J. J. Smithies.

44. *Hodgsonæ*, *Lowe* (*polydactylum*, *Barnes*). Found in 1875 by Mrs. J. K. Hodgson, in Langdale. Frond and pinnæ crested.

45. *inæquale*, *Wollaston*. Found at Hartsop and Brotherswater by Mr. G. Whitwell.

46. *inæquale-acutilobum*, *Wollaston*. Found at Cautley by Mr. G. Whitwell.

47. *inæquale-confluens*, *Wollaston*. Found at Hartsop by Mr. G. Whitwell.

48. *incisum*, *Barnes*. Found in 1827, in Langdale, by Mr. J. M. Barnes. Length, 27 inches ; width (in middle of frond), 10 inches. Pinnæ lax ; pinnules incised ; apex truncate.

49. *interrupto-crispum*, *Barnes*. Found at Coniston by Mr. G. S. Whitwell.

50. *interrupto-laciniatum*, *Moore*. Found in 1872, in Langdale, by Mr. T. Hartley. Length, 18 inches ; width (in middle), 5 inches. Very irregular ; pinnæ interrupted, pinnules much depauperated, and apex truncate.

51. *interruptum*, *Moore*. Found in 1861, in Levens Park, by Mr. J. Crossfield. Irregular, with pinnules reduced. More recently found in Co. Antrim by Mr. R. Ll. Praeger.

52. *interruptum-Barnesii*, *Moore*. Found in 1864, in Westmoreland, by Mr. J. M. Barnes. Length, 20 inches ; width (in middle), 7 inches. Depauperate.

53. *laciniato-caudatum*, *Barnes*. Found in 1865, in Mardale, by Mr. J. M. Barnes. Pinnæ and pinnules defective.

54. *latifolium*, *Barnes*. Found at Cautley, by Mr. G. Whitwell.

55. *lobatum*, *Moore*. Found in 1873, in Langdale, by Mr. J. M. Barnes. A very fine, almost tripinnate form.

56. *multifidum*, *Barnes*. Found in 1872, at Seathwaite, by Mr. J. K. Hodgson. An interesting variety, with apex of frond multifid. Mr. J. Stewardson found this also at Clougha.

57. *multiforme*, *Barnes*. Found in Garsdale, by Mr. G. Whitwell.

58. *multifurcatum*, *Wollaston*. Found at Coniston by Mr. G. S. Whitwell.

59. *Nowellianum*, *Moore*. Found in North Wales, in 1860, by Mr. J. Nowell. A distinct form.

60. *plumosum*, *Barnes*. Found in 1876, at Little Langdale, by Mr. T. Airey. A splendid, finely cut, plumose, sterile form. Mr. G. Whitwell has also found this on Patterfell.

61. *polydactylum*, *Barnes* (*cristatum*, *Moore*). Found in 1860, by Mr. Clarke, of the Glasgow Botanic Gardens. Mr. J. Stewardson has also found at Clougha a polydactylous form.

62. *præmorso-cristatum*, *Wollaston*. Found on Patterfell by Mr. G. Whitwell.

63. *ramo-coronans*, *Barnes*? Branching and crowned. Length, $1\frac{1}{2}$ feet.

64. *ramo-cristatum*, *Barnes*. Raised in 1873, by Mr. Barnes. Length, 16 inches; width, $1\frac{1}{2}$ inches. Branching, both in the stipes and rachis. Width across the lax head, 5 inches.

65. *reflexum*, *Jones*. Found at Coniston by Mr. J. Stewardson.

66. *revolvens*, *Phillips*. Found at Newcastle, Co. Down, by Mr. W. H. Phillips.

67. *rotundatum*, *Wollaston*. Raised by Mr. Barnes in 1872. Length, 22 inches; width, in middle of the frond; 7 inches. Very short rotund pinnules; apex caudate.

68. *rugoso-interruptum*, *Barnes*. Found at Coniston by Mr. G. Whitwell.

69. *serrulatum*, *Wollaston*. Found at Troutbeck, and another found in Garsdale by Mr. G. Whitwell.

70. *simplex*, *Moore*. Found in 1867, in Mardale, by Mr. J. M. Barnes. Mr. Barnes remarks, that it closely resembles *Polypodium vulgare*.

71. *Smithiesii*, *Lowe* (*grandiceps* *Smithies*, *Wollaston*). Branching and crowned.

72. *strictum*, *Wollaston*. Found at Cautley by Mr. G. Whitwell.

73. *subcrispum*, *Barnes*. Found in 1873, in Wastdale, by Mrs. J. K. Hodgson. Crispy and undulate.

74. *subsimpler*, *Moore* (*confluens*, *Wollaston*). Found in 1869, in Westmoreland, by Mr. J. M. Barnes. Length, 20 inches; width at the base, $1\frac{1}{2}$ inches, and in centre of frond, $6\frac{1}{2}$ inches. Very confluent.

75. *truncatum*, *Wollaston*. Found near Tunbridge Wells by Mr. G. B. Wollaston. Fronds and pinnæ horned; apex like bitten off.

76. *variegatum*, *Barnes*. Found in 1873, in Swarthfell, by Mrs. J. K. Hodgson. Fronds variegated with green and yellow.

77. *Whitwellii*, *Lowe* (*congestum* *Whitwell*, *Barnes*). Found in Little Langdale by Mr. G. Whitwell. Another form of *congestum*

The names *only* of half these varieties are known to the author.

THE MALE FERN.

NEPHRODIUM FILIX-MAS.—*Richard.*(LASTREA FILIX-MAS.—*Presl.*)FIG. 39.--Pinna (showing fructification of *Nephrodium Filix-mas*).

UNDER *Presl's Lastrea Filix-mas* we have apparently three species. They are too distinct, both in their normal forms and in their varieties to enable us to consider them as mere sections, unless we look upon *N. propinquum* as the mountain form of *N. paleaceum*. As our object is, to produce a Handbook of all the distinct varieties, it has been thought best to follow *Wollaston's* arrangement.

According to *Mr. G. B. Wollaston* (who pointed out these distinctions some years ago), we have the following characteristics :—

	N. FILIX-MAS.	N. PALEACEUM.*	N. PROPINQUUM.
Fronds and pinnæ	convex	plane	concave
Colour . .	shining pale green .	shining deep green .	dull pale green
Fronds . .	partially deciduous	evergreen or sub-evergreen	quite deciduous
Indusium .	not embracing spore cases ; evanescent, disrupted	embracing spore cases ; persistent, entire	embracing spore cases ; persistent, entire
Texture of frond . .	papery	coriaceous	soft
Pinnules . .	saw-toothed	scarcely toothed . . .	double saw-toothed.

The concave character of the frond is not uncommon on mountains, or when plants grow under difficulties, such as insufficiency of soil, unfavourable climate, etc. This may be seen on *Ben Lawers*, with the examples of half-starved *Polypodium vulgare*, *P. dryopteris*, and *P. phegopteris*. Diminished size, wavy outline, crisp, and a more or less abnormal and starved-look are features familiar to all mountain Botanists. This is also to be seen with regard to ferns growing on rocks and walls in the Lowlands.

* *Lastrea pseudo-mas*, *Wollaston*. There can be no doubt this is the *Aspidium paleaceum* of older writers, hence its adoption.

Near Chepstow, except when growing with great luxuriance, the Hart's-tongue is scarcely ever flat-fronded; it is mostly undulate (or wavy), and often crisp. The beautiful form of Harts-tongue, known as *crispum*, is more abundant in Monmouthshire than in the whole of the rest of the United Kingdom. Within the last few years, not more than half-a-dozen miles from Chepstow, more than fifty plants of "*crispum*" have been found; and of these twenty-nine were discovered by the late Colonel Jones, between Caerwent and Shirenewton; whilst on the opposite side of the Wye, near Tidenham, Major Cowburn has found nineteen, for which refer to section "*crispum*" in the descriptions of the varieties of *Scolopendrium vulgare*.

Mr. Wollaston proposed the name, *pseudo-mas*, for one of these species; but Fée, in "Iconogr. Nouv." uses the same name for *Filix-mas*, whilst *Aspidium paleaceum* Don "Prod. Fl. Nepal" has been adopted years ago for var. *paleacea*, Moore, "Nature-Printed Ferns." (This is the type of the normal form of the sub-evergreen fern under discussion, after the present species; and no more appropriate name could be suggested.)

THE MALE FERN.

NEPHRODIUM FILIX-MAS.—Richard.

THE normal form is large, but less elegant than *N. paleaceum*; texture of the frond thinner, colour paler and less shining; partially deciduous. The fronds become broken at the ground by autumnal winds, and lie prostrate, whilst those of *N. paleaceum* retain their erect position until the spring fronds are ready to unfold. It is a common fern in this country.

VARIETIES.

1. *acrocladon*, *Lowe*. Raised by the late Mr. A. Clapham, of Scarborough. A shield-fern-looking plant with deep green fronds, which are digitately crested, except towards the apex; the extreme tip is however crested. Pinnules deeply incised. Length of frond, 2 feet.

2. *acuto-furcatum*, *Barnes*. Found in 1873, on Borwick Moor, by Mr. J. Bolton. A neat crested variety with very acute fronds.

3. *argenteum*, *Phillips*. A white variegated variety, found in Ulster by Mr. W. H. Phillips.

4. *athyrioides*, *Lowe*. More like the "Lady" than the "Male Fern." Raised from *lineare*. A pretty variety, with fronds gradually becoming narrow and ending in a sharp-pointed tip. Pinnæ attenuated at the tips, and occasionally depauperate at the base. Pinnules linear, deeply cut, and curving upwards, giving a very dentate appearance. 32 × 9 inches (at base, only 2½ inches).

5. *attenuato-multifidum*, *Wollaston*. Found in 1864, in Mardale, by Mr. J. M. Barnes, of Milnthorpe. A graceful variety, with narrow finely-cut pinnules.

6. *attenuatum*, *Padley*. Found in 1864, in North Devon, by the

late Rev. Charles Padley, of Enville. Pinnæ lax ; pinnules narrow and sessile, except the basal pair. Frond symmetrical, yet more or less depauperate, the apex of the front most so. 24×9 inches.

7. *Barnesii*, *Moore* (curta, *Wollaston*). Found at Heversham, in Lancashire, by Mr. J. M. Barnes. A grand, very narrow form. Pinnæ elongate-triangular ; pinnules broad and conspicuously toothed. $15 \times 2\frac{1}{2}$ inches.

8. *Berryæ*, *Lowe* (*grandiceps*, *Berry*). Found in 1870, in North Devon, by Mrs. Berry, and now in the possession of Mr. Gardener of Ilfracombe. A very fine *grandiceps* form, differing in being more thoroughly ramose, and in being often cornute. Length, 2ft.

9. *Bollandæ*, *Moore* (*plumosa*, *Wollaston*). Found in 1857, in Kent, by Mrs. Bolland. A charming plumose, almost barren form. It is partly depauperate, which interferes with its beauty.

10. *Clowesii*, *Moore*. Found in 1859, at Troutbeck, by Mr. F. Clowes, of Windermere. A robust variety, with frond and pinnæ digitate.

11. *confluens*, *Phillips*. Found at Ligoniel, Co. Antrim, by Mr. W. H. Phillips. A fine confluent form. 26×6 inches.

12. *crispatum*, *Barnes* (*congesta*, *Wollaston* ; *fluctuosa*, *Stansfield*). Found in 1864, at Coniston, by the late Mr. J. K. Hodgson, of Ulverston. A superior variety, with a compact habit and dark-green fronds. Pinnules crisp. 15×6 inches. Canon Swayne, of Salisbury, gave Colonel Jones a remarkable dwarf crisp form, which he had found in 1874 in Carnarvon ; and the Rev. S. A. Brennan also found another in Tyrone.

13. *cristatum*, *Lowe* (*cristata* *Crouchii*, *Barnes*). Found at Rydal, in 1864, by Mr. W. Crouch. A very vigorous form, with loose spreading crests.

*14. *Cronkleyense*, *Lowe*. Found in 1863, in abundance, on Cronkley Fell, near the Falcon Clints, by myself and my brother (the late Colonel Arthur S. H. Lowe, of Gosfield Hall). It has the general appearance of *attenuatum*, but the pinnules are twice as broad. Many of the pinnæ are confluent at their extremities. A somewhat similar form was found by myself near Chaigeley Manor, Lancashire, named *Marsdenæ*, differing only in not being confluent.

15. *decompositum*, *Allchin*. Found in 1871, in South Devon, by Dr. Allchin. A handsome very foliose fern, with broad pinnules, which are toothed and overlapping. Basal pinnules very long. 24×11 inches.

16. *densum*, *Barnes*. Found in 1876, in Patterdale, by Mr. T. Airey. A remarkable congested form.

17. *dentatum*, *Lowe*. Found near Nettlecombe Court, by the late Mr. Elworthy. A large-growing, coarsely dentate variety, with fronds 4 feet in length.

*18. *depauperatum*, *Padley*. Found in 1868, on Exmoor, by the late Rev. C. Padley. A most distinct and interesting variety. Frond widest at the base. Pinnæ crested. Pinnules depauperate ; most so in the middle of the frond. More or less confluent on the upper third of the frond. 21×5 inches.

19. *digitale*, *Lowe* (*digitatum* *Barnes*, *Whitwell*). A digitate variety found at Burneside by Mr. J. M. Barnes.

20. *digitatum*, *Lowe* (*digitata* *Jonesii*, *Barnes*). Found in 1860, near Burton (English Lakes), by Mr. J. M. Barnes. A strong-growing fern, with frond and pinnæ digitate.

21. *Drueryi*, *Lowe* (*polydactylum* *Druery*, *Jones*). Found in 1884, near Kilmarnock, by Mr. C. T. Druery. The tips of the fronds and pinnæ broadly flat tasselled. Slightly pendulous from the weight of the tassels. Inconstant. Length, 36 inches.

22. *Ellacombei*, *Lowe* (*cristata* *Ellacombe*, *Wollaston*). Found in 1856, in Pembroke, by the late Rev. H. Ellacombe. The finest and most symmetrical of the large crested forms. Pinnæ close together, long, and compactly tasselled. Frond terminating in a pointed, crested apex. 27×11 inches.

23. *elongatum*, *Moore*. Found in the Isle of Wight by the Rev. W. H. Hawker and Mr. A. G. More. Large lance-shaped fronds. Pinnæ lax and caudate. Pinnules elongate, narrow, bluntish. A somewhat similar form, *elegans*, was found near Whitby by the late Mr. W. Willison.

24. *erosum*, *Clowes*. Found near Keswick by Miss Wright and at Windermere by Mr. Clowes. Variously erose and irregularly contracted.

25. *excurrens*, *Moore*. Found in 1862, in Silverdale, by Mr. J. Crossfield, and at Staveley by Mr. J. A. Martindale. The frond and also the pinnæ terminating with a horn.

26. *fluctuosum*, *Moore* (*crispatisissima*, *Wollaston*). A crisp, wavy form.

27. *folioso-truncatum*, *Lowe*. No history. From a frond in the late Colonel Jones's collection of dried specimens. A grand, branched, heavy foliose form. Very stiff truncate pinnæ, only 4 inches wide at the base. Length, 15 inches.

*28. *Gemma*, *Lowe*. Raised by myself in 1869. An improved "ramosum."

29. *gracile*, *Jones*. Raised by the late Colonel A. M. Jones. A very lax, regular, and symmetrical fern. Pinnules broadest at the base of the frond, and also broadest at the base of the pinnæ; gradually becoming smaller to the pointed apex of the pinnæ. Length, 1 foot 8 inches, breadth, 7 inches.

30. *grandiceps*, *Sim*. Found in 1862, on Warton Crag, by a labouring man (Wearing). Stem dividing into twin branches, which again branch several times, producing a large spreading head. Pinnæ crested. (A seedling raised from *grandiceps* at Highfield House, *"*acceptum*," *Lowe*, is more vigorous and has a more sturdy upright growth.)

31. *Hodgsonæ*, *Lowe* (*gracile*, *Barnes*). Found in 1873 at Seathwaite. A different fern has been figured under the name *gracile* by Colonel Jones, necessitating the change of name of the Seathwaite variety. A beautiful form, with narrow, finely cut pinnules.

32. *inflexum*, *Barnes*. Found at Ambleside by Mr. J. M. Barnes. A singular bent variety.

33. *interruptum*, *Moore*. Found near Bowness by Mr. Clowes, and at Morecambe Bay by the late Mr. Monkman. A good form was also found in 1874, at Windermere, by Mr. T. Airey. Very irregular; most of the pinnules much shortened, and some wanting.

34. *Iveryanum*, *Moore* (*cristata Martindale, Wollaston*). Mr. W. Martindale found in 1870, at Winster, a copy of this crested fern.

35. *Jervisii*, *Moore*. Found near Darlaston Hall, Staffordshire, by the late Mr. Swynfen Jervis. A large-growing, coarse, tasselled fern of no great beauty.

36. *Jonesii*, *Lowe* (*polydactyla Jonesii, Barnes*). Found in 1860 near Burton (English Lakes) by Mr. J. J. Jones. A graceful crested variety.

37. *Kilmoryense*, *Lowe*. Found at Kilmory, Argyleshire by Canon Ellacombe. It is not unlike *Bollandæ*, but more depauperate, and pinnules smaller. 33×8 inches.

38. *lineare*, *Wollaston*. History unknown. Very distinct. Pinnules linear, or wanting, or merely thorn-like. 21×6 inches.

39. *multiforme*, *Barnes* (*inæquale-furcans, Jones*). Found in 1871, in Lancashire (near Ulverston) by Mr. J. M. Barnes. A more curious than graceful fern, with very broad pinnæ; mostly polydactylous, some without crestings and shorter, and some wanting. Pinnules varying, some depauperate; in fact, all manner of forms.

40. *Padleyi*, *Lowe* (*grandiceps Padley, Jones*). Found by the late Rev. C. Padley. A fine *grandiceps* with a dense bushy habit.

41. *platyphyllum*, *Clapham*. Found in 1871, in Perthshire, by a gardener (Peter McDonald). Another polydactylous form, conspicuously crested. Pinnæ approximate, pinnules of one touching those of the next pinna. Basal pinnules on the lower half of the frond, smaller than the rest; and slightly crested below the tasselled apex of each pinna; pinnules almost wanting. 24×10 inches.

42. *polydactylum*, *Lowe* (*polydactyla Barnesii, Barnes*). Found in 1865 at Whitbarrow by Mr. J. M. Barnes. A very robust crested form. Length, exceeding 3 feet.

43. *productum*, *Moore*. Found in 1862, in Silverdale, by Mr. J. Crossfield. Somewhat like the ordinary *incisum*, with large pinnules.

44. *ramosum*, *Barnes*. Found in 1875, at Red Bank (English Lakes), by Mr. T. Airey. A fine variety, with ramose, crested fronds.

45. *recurvum*, *Murray*. Found in 1889 at Innerwell, Wigton. A striking form, with pinnules recurved nearly into tubes.

46. *reticulatum*, *Birkenhead*. Length $1\frac{1}{2}$ feet.

47. *Ruttledgei*, *Lowe* (*cristata Ruttledgei, Barnes*). Found in 1872 at Old Hutton. An elegant crested variety.

48. *Stewardsonæ*, *Lowe* (*digitata-Stewardsonæ, Barnes*). Found in 1875 on Lancaster Moor by Mrs. Stewardson. An elegant, vigorous, digitate fern, with broad, short pinnules.

49. *tortuosum*, *Moore* (*flexuosa, Wollaston*). Found in 1864, in Dumfries, by Mr. Tod, of Edinburgh. Fronds and pinnæ (the latter more especially) flexuose. 20×3 inches.

50. *variegato-aureum*, *Lowe*. Found in 1883 at Monkton Wylde, Dorset, by Mr. Moly. Normal in form, with a yellow variegation. $20 \times 5\frac{1}{2}$ inches.

*51. *variegatum*, *Lowe* (*Wrightæ*, *Clapham*; *Lux Lunæ*, *Wollaston*). Found in Yorkshire by Miss Wright, and distributed by the late Mr. Clapham. Normal, except in being green and white. When not grown in a moist situation, the fronds soon fade in full sunlight. Length, 2 feet.

52. *Willsii*, *Lowe* (*grandiceps*, *Wills*). Found in 1870, in Dorset, by the late Mr. John Wills. The largest of all the *grandiceps* forms; regularly crested, and having a large branching capitate head (8 inches wide). 36×9 inches.

THE CHAFFY MALE FERN.

NEPHRODIUM PALEACEUM.—*Don*.

(NEPHRODIUM FILIX-MAS of most authors.)

A HANDSOME, thick-fronded species, with shining fronds from 2 to 3 feet in length, the rachis being thickly clothed with bright brown scales. Fronds sub-evergreen, or evergreen in shady situations. Broadly lanceolate, gradually tapering to the apex. Fructification most abundant at the upper portion of the frond, but none near the base. A common English fern, though less so than *Nephrodium Filix-mas*. This is the species known as *Lastrea pseudo-mas* of *Wollaston*; but *Nephrodium paleaceum* of *Don* (the normal type) has a prior claim for adoption.

Like *N. Filix-mas*, there are no difficulties in its cultivation.

VARIETIES.

1. *abasi-pinnulum*, *Wollaston*. Found in Westmoreland by Mrs. Robinson, of Bowness. Lax. Pinnules small, and absent at the base of the pinnæ. 27×5 inches.

2. *Bakeri*, *Lowe* (*polydactyla Bakeri*, *Barnes*). Found recently at Millom (English Lakes) by the Rev. W. J. Baker. One of the best of the flat-crested varieties.

3. *Beeveræ*, *Lowe*. Found near Coniston by Miss Beever. It differs from *Pinderi* in the pinnæ overlapping, so as to cause the frond to be imbricate.

*4. *Belperi*, *Lowe*. Raised by myself in 1868. Not unlike "cristatum," with heavier crests.

5. *crispæ*, *Lowe* (*crispa*, *Barnes*). Found in 1865, in Mardale, by Mr. J. M. Barnes. A robust fern, with deeply-cut undulate pinnules. It is larger growing than the *crispa* of *Moore*.

6. *crispatum*, *Wollaston*. Found in Devon by Mr. G. B. Wollaston, and near Levens by Mr. J. M. Barnes. In Ireland, by Mr. W. H. Phillips and Rev. S. A. Brenan. Differs in being crispy-waved throughout the frond.

7. *crispo-cristatum*, *Moore* (*congesto-cristata*, *Wollaston*). Raised in 1886 by the late Dr. Lyell, of Newbury. A congested form.

Pinnæ crested, except near the tip of the frond, the tip itself branching and crested. 11 × 5 inches. Fronds stiff.

8. *crispo-gracile*, *Lyell*. Raised by Dr. Lyell, of Newbury. A distinct dwarf variety. Pinnæ twisted and crispy. Length, 5 inches.



FIG. 40.—*Nephrodium paleaceum*, var. *crispulum* (upper pinnæ, showing bunch-crested).

*9. *crispulum*, *Lowe* (*cristatum-globosum*, *Druery*). Found in 1879 in a wood about two miles from Bettws-y-coed by Mrs. Boyd, and has been growing in her garden until it came into my possession. It is an interesting variety, for it is almost a copy of *N. cristatum*, except that the crested is in bunches instead of being flat. 36 × 8. A very similar variety was raised in 1865, at Highfield House, from *cristatum*.

† 10. *crispum*, *Moore*. Found in Wales, and given to The Hon. Mrs. Wrightson, of Warmsworth Hall, Doncaster. A dwarf, very stiff, erect-growing fern; crisp. 11 × 5 inches.

11. *cristato-angustatum*, *Moore*. A sport of *cristatum*, with much shorter pinnæ. Very narrow strap-shaped fronds, well crested. 24 × 3 inches. An intermediate variety between this and *cristatum* "Winstanleyi" was raised at Highfield House in 1862.

12. *cristatum*, *Moore*. One of our most beautiful symmetrical varieties, having the tips of the pinnæ and the apex of the frond tasselled with a flat crest. It was found at Charleston, near St. Austell; also at Upper Cultra Wood, in Co. Down, by Mr. R. Milligan. The basal half of the frond is very heavily crested. 36 × 8 inches.

13. *Fittii*, *Lowe* (*ramo-cristata*, *Jones*). Raised by Mr. Fitt. This distinct variety is very ramose, branching several times from the base upwards. It is a branching form of *N. cristatum*. A massive, attractive variety.

14. *furcillatum*, *Wollaston* (*sub-cristata*, *Moore*). Found in 1861, in North Devon, by Mr. John Dadds, of Ilfracombe. Fronds very wide. Pinnæ narrow, and tassels less than in the var. *polydactylum*. 36 × 9 inches.

15. *grandiceps*, *Jones*. History obscure.

16. *Lyellii*, *Lowe*. Raised at Highfield House from *crispo-lineare* (one of Dr. Lyell's sports), and is more marked than that variety. A narrow, well-crested form, with an erect habit, and fronds so remarkably stiff as to break if bent. Length, 6 inches.

*17. *magnificum*, *Lowe*. Found by myself at Dunkeld in 1867. A bold, foliose form. 36×8 inches.

*18. *Mapplebeckii*, *Moore* (*polydactyla*, *Wollaston*). Found in 1862, in Westmoreland, by Mr. J. E. Mapplebeck. Pinnæ contracted at the base. The branching apex much larger than in var. *polydactylum*. 31×9 inches.

19. *monstrosum*, *Phillips*. Found at Holywood by Mr. W. H. Phillips. A monstrosity. 8×4 inches.

*20. *nitidum*, *Lowe*. Found in 1867 by myself, at Dunkeld. Foliose, deep green, shining. 30×7 inches.

*21. *pendens*, *Lowe* (*grandiceps* Ranyard, *Wollaston*). Another very handsome, bold, symmetrical fern, having very long, narrow pinnæ, drooping in a very graceful manner. Pinnæ crested, and the apex of the frond branched and crested. Length, 3 feet. The name has been changed to *pendens*, as there is already a *grandiceps*.

22. *Pinderi*, *Moore*. Found in 1855, near Elterwater, by the Rev. G. Pinder. A distinct, handsome, narrow-fronded variety, tapering both to the base and apex, and terminating in a long, slender point. 36×6 inches. The late Mr. C. Monkman found a somewhat similar variety in 1862 at Coneysthorpe, near Malton.

23. *pluma*, *Lowe*. Found at Newcastle, Co. Down, by Mr. W. H. Phillips. Pinnæ close, pinnules imbricate. A nice, plummy form. $17 \times 6\frac{1}{2}$ inches.

*24. *plumosissimum*, *Lowe* (*fimbriata-cristata*, *Stansfield*). Another grand symmetrical form, found by Mr. Cropper. It is in the style of *cristatum*, but cut up into narrow lobes with fimbriate edges. A very plumose variety. Length, 2 feet.

25. *polydactylum*, *Wollaston*. Raised in 1872 by Mr. John Dadds, of Ilfracombe; found also in Co. Down, by Mr. W. H. Phillips. Conspicuously crested. Pinnæ an inch wide at the base. 36×8 inches. There are several sub-forms of this variety.

26. *polymorphum*, *Barnes*. Found in 1865, at Kentmere, by Mr. J. M. Barnes. A fine variety, with variable, tripinnate fronds.

27. *pumilum*, *Moore*. Found on Snowdon by the late Mr. D. Cameron. A much smaller fern than *N. propinquum*, var. *abbreviatum*. Compact, bushy habit. Sori, a single pair on each pinnule. Length, 9 to 12 inches.

28. *ramo-cristatum*, *Jones*. Found in 1871, in Lancashire, by Mr. Wilson, of Bowness. This very fine variety is in the possession of Mrs. Hodgson, of Ulverston. Branching several times, and terminating in a wide, capitate head. Pinnæ crested in compact bundles. Length, 2 feet.

29. *ramo-digitatum*, *Lowe* (*ramo-furcillato-cristata*, *Wollaston*). Found in 1871, in Langdale, by Mr. J. A. Wilson. A handsome variety. Very ramose, and having forked crests.

30. *ramo-furcillatum*, *Wollaston*. Found in 1864, in North Devon, by Mr. Dadds, of Ilfracombe. Branching and furcate. Length, 2 feet 2 inches.

*31. *ramosissimum*, *Moore*. Found in 1864, in North Wales, by the late Mr. Robert Wright. A very distinct, sterile variety.

Fronds dividing into two or three at the base of the stem, and each again dividing 2 or 3 inches higher, and becoming very ramose 3 or 4 inches below the apex, making the frond as broad as it is long. The tips of the pinnæ crested. Length, 1 foot 6 inches.

32. *ramulosissimum*, *Wollaston*. Raised from spores in 1865 by Mr. Sim, of Foots Cray. A very curious dwarf variety. More than half the length of the frond consists of its naked stem, above which it is a diminutive grandiceps. Length, $3\frac{1}{2}$ inches.

33. *recurvum*, *Moore*. Found in 1857, near Doncaster, by Mr. S. Appleby. Recurved. Length, 18 inches.

*34. *revolvens*, *Wollaston*. Found at Troutbeck Bridge, Westmoreland, by Mr. F. Clowes. A remarkable, thin-textured variety. Owing to the pinnæ curling round the back of the frond, the width is only 2 inches. Length, 1 foot.

35. *rotundatum*, *Phillips*. Found at Ligoniel by Mr. W. H. Phillips. Pinnules rounded and denticulate. Very distinct. 18×4 inches.

36. *Sangii*, *Lowe* (*crispa-cristata-angustata*, *Sang*). A distinct, dwarf, very narrow, crisp, and well-crested variety, with thick stem. Length, 6 inches.

37. *Schofieldii*, *Moore* (*ramulosa*, *Wollaston*). Found in 1855, at Derby, by Mr. J. Schofield, of Rochdale. The stem divides into two foliose fronds, and these again divide at the tips. Length, 2 to 3 inches. Var. *ramulosissimum* was raised from this variety.

38. *Stableri*, *Moore*. Raised by Mr. Stabler, of Levens. Not unlike *Pinderi*, but in every way larger.

39. *Willsii*, *Lowe*. Found in South Devon by the late Mr. Wills. A grand polydactylous fern.

40. *Wilsoni*, *Lowe* (*cristata Wilsoni*, *Wollaston*). Found in 1871, in Langdale, by Mr. J. A. Wilson. Distinct from all other crested forms, having golden-coloured, pendulous pinnules.

ALLIED MALE FERN.

NEPHRODIUM PROPINQUUM.—*Lowe*.

(LASTREA PROPINQUA.—*Wollaston*.)

A PERFECTLY deciduous species, with fronds and pinnæ concave ; pinnules biserrate. Indusium embracing spore-cases, persistent, and entire. Fronds dull pale-green, and of a soft texture. This fern approaches nearer to *N. paleaceum* than to *N. Filix-mas*, and may eventually prove to be a mountain form of the former.

VARIETIES.

1. *abbreviatum*, *Babington*. Considered the normal form of the species. It has been found on Snowdon by the Rev. J. M. Chanter, in Teesdale by Mr. Backhouse, on Cronkley Fell by myself, Ingleborough by the Rev. G. Pinder, Coniston by Miss Beever, in Westmoreland by Mr. G. B. Wollaston, Glen Isla by Mr. J. Backhouse, on Ben Lawers by Mr. P. Neill Fraser and myself, at

Killarney by Mr. R. Barrington, and on the Clova Mountains by Mr. T. Westcombe. Dwarf, though larger than *N. paleaceum* var. *pumilum*. Pinnate, the lowest pinnules alone being separate, the remainder decurrent. Pinnules large. Length, 1 foot.

2. *attenuato-cristatum*, *Barnes*. Found at Clougha by Mr. J. Stewardson. A narrow, attenuate, crested variety.

3. *Barnesii*, *Loze* (*cristata* *Barnes*, *Wollaston*). Found in Langdale, Westmoreland, by Mr. J. M. Barnes. The finest of all the crested forms. Pinnæ well cristate, and the apex heavily crested. $27 \times 5\frac{1}{2}$ inches.

4. *confluens*, *Moore*. Found in Swindale by Mr. J. M. Barnes. A neat variety, with confluent pinnules.

5. *congestum*, *Barnes*. Found in Patterdale by Mr. W. Foster. A dwarf, congested form.

6. *Cowardii*, *Loze* (*cristata* *Cowardii*, *Barnes*). Found near Ambleside by Mr. J. Coward. A pretty, small-growing, neatly-crested variety.

7. *crispum*, *Wollaston*. Found in Wales. Pinnæ overlap each other, and are deeply pinnatifid. Segments also overlapping, crispy, and crowded.

8. *cristatum*, *Moore*. A plant was found in Borrowdale many years ago by Mr. J. D. Harrison; a second in 1863, in Swindale, by Mr. J. M. Barnes, who considered it distinct; and a third in 1871, at Ambleside, by Mr. Coward. Graceful, and very neatly crested.

9. *curvato-cristatum*, *Barnes* (the Swindale variety found by Mr. Barnes). A dwarf, interesting, small-crested form, having curving-down pinnules.

10. *dactyliferum*, *Moore*. Found also in Swindale by Mr. J. M. Barnes. A fine polydactylous form, with long, finger-crested pinnules.

11. *erosum*, *Moore*. Found at Keswick by Miss Wright, and at Troutbeck by Mr. Clowes. This has the pinnules regularly reduced.

12. *excurrens*, *Moore*. Found on Langdale by Mr. J. M. Barnes. An interesting, excurrent fern, with very dark-green fronds.

13. *flabellato-cristatum*, *Barnes*. Found in Swindale by Mr. J. M. Barnes. Crest fan-shaped. Rather inconstant.

14. *furcans*, *Barnes*. Found in Marwood by Mr. W. Foster. Fronds forked.

15. *Gottii*, *Loze* (*cristata* *Gott*, *Whitwell*). Found at Low Gill by Mr. J. Gott. Another form of *cristatum*.

16. *gracile*, *Moore* (*gracile-furcans*, *Jones*). Found in 1886 or 1887 by Mr. Foster. Very graceful, the fronds being pendent and unusually wide. A more beautiful form had been previously found at Mardale by Mr. J. M. Barnes, having narrow, finely-cut pinnules.

17. *grandiceps*, *Moore*. Found at Mardale by Mr. J. M. Barnes. This has a very large, spreading head.

18. *interruptum*, *Moore*. Found at Windermere by Mr. F. Clowes. Both fronds and pinnules irregular.

19. *laciniatum*, *Lowe* (*laciniato-truncatum*, *Barnes*). Found in Patterdale by Mr. W. Foster. A lacinate, truncate form.

20. *lineatum*, *Lowe* (*lineatum-furcans*, *Barnes*). Found in Patterdale by Mr. W. Foster.

21. *morsum*, *Lowe* (*erosa-Barnesii*, *Moore*). Found in Swindale by Mr. J. M. Barnes. A delicate variety, with evenly reduced pinnules.

22. *multifidum*, *Barnes*. Found in Mardale by Mr. T. Airey. A small-growing, multifid form.

23. *multiforme*, *Moore*. Found in Long Sleddale by Mr. J. M. Barnes. Fronds variable and very irregular.

24. *nanum-cristatum*, *Jones* (*cristato-nanum*, *Sim*). A dwarf, narrow-crested form.

25. *productum*, *Foster*. Found in 1887 or 1888 by Mr. Foster. When fully developed, this is a very fine, slender fern. The lower pinnules are long and much divided.

26. *pulchellum*, *Stansfield*. Found in Patterdale by Mr. W. Foster.

27. *Smithiesii*, *Barnes* (*crispata-incisa*, *Jones*). A distinct, interesting fern. Found by Mr. Smithies. Pinnules finely cut and crisped.

28. *strictum*, *Moore*. Found in Mardale by Mr. J. M. Barnes. Distinct. Pinnules much reduced.

THE CRESTED BUCKLER FERN.

NEPHRODIUM CRISTATUM.—*Michaux*.

(LASTREA CRISTATA.—*Presl*.)

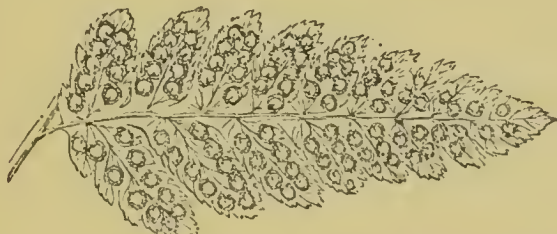


FIG. 41.—*Nephrodium cristatum*, pinna (showing fructification).

A RARE and local fern, growing only in boggy localities. It has been found near Ipswich, Lynn, Dersingham, Holt, Yarmouth, Norwich, Wymondham, Newcastle-under-Lyne, Oxtou Bogs, Bulwell Marshes (not now), Wybunbury Bog, Knaresborough, and Malton. It is also a native of France, Germany, Italy, Switzerland, Russia, Belgium, Holland, Scandinavia, Siberia, Canada, and the United States.

Fronds from 1 to 3 feet, of which one-third is the stipes. Erect in growth. Narrow, linear-oblong, sub-bipinnate, tapering to the apex. Lower pinnæ distant. Sori large and conspicuous. Deci-

duous. The normal form is distinct in appearance from all other species.

VARIETIES.

1. *Clintonianum*, *Birkenhead*. A North American variety. Length, 3 feet.

*2. *confluens*, *Lowe* (*cristatum-confluens*, *Clapham*). Found by myself, on Oxtou Bogs. Normal in size; pinnae confluent.

3. *Floridanum*, *Birkenhead*. A large-grower, from Florida.

4. *spinulosum*, *Moore*. Basal pinnae more remote and larger, and more nearly like some of the forms of "*spinulosum*." It is a much more common form, growing in damp boggy places, and sometimes in woods.

5. *uliginosum*, *Moore*. More linear-lanceolate, with oblong acute pinnules. Only found growing in boggy situations, mostly amongst plants of the normal form.

THE RIGID BUCKLER FERN.

NEPHRODIUM RIGIDUM.—*Desvaux*.

(*LASTREA RIGIDA*.—*Prest.*)

ANOTHER mountain fern; with dull-green fronds of from 1 to 2 feet high; somewhat lanceolate, bipinnate, and scented. Not easily confounded with any other species. It has been found in Cornwall, also in Yorkshire (Wharnside, near Ingleburgh, and near Settle); in Westmoreland (Arnside, Farleton, and on Hutton Roof Crags); and in North Lancashire. It is a native of France, Germany, Switzerland, Sardinia, Italy, Sicily, Dalmatia, Hungary, Russia, Siberia, and Asia Minor.

A deciduous species, confined to limestone mountains at heights ranging from 1200 to 1500 feet.

VARIETIES.

1. *abruptum*, *Lowe*. Found at Whitbarrow, by Mr. J. M. Barnes. An abrupt-ended variety.

2. *argutum*, *Birkenhead*. A North American variety. Fronds smoother and more triangular.

3. *cristatum*, *Barraud*. Found recently. Small crests throughout the frond. Mr. Druery possesses this plant.

4. *interruptum*, *Barnes*. Found at Arnside, by Mr. J. Crossfield. An interrupted form.

5. *polyclados*, *Moore*. Found at Farleton Knott, by Mr. J. M. Barnes, and at Crosby Ravensworth, by Mr. Clarke. Fronds divide into two, either at the base or higher up.

6. *ramosum*, *Lowe*. Received from Mr. Clarke's gardener, at Floss House, Crosby Ravensworth, Westmoreland. It differs in two fronds rising from one stem. Another variety, *polyclados*, found at Arnside, only differs in having the frond sometimes dividing in the upper parts as well as at the base. This form was sent to me in 1863, and it is still in my fernery, and has retained its branching habit. More dwarf than the normal form.

THE BROAD BUCKLER FERN.

NEPHRODIUM SPINULOSUM.—*Desvaux.*FIG. 42.—*Nephrodium spinulosum*, pinna (showing fructification).

A WORD or two is requisite in order to point out why the ferns known as *Lastrea dilatata* and *L. æmula* are included in the present fern.

There can be no doubt that locality, especially height above the sea, changes the character of a plant. We may instance "the common Brake," which attains 12 feet in height on Longridge Fell, and yet only 4 inches near the summit of Hellvelyn. As a rule, ferns are diminutive on mountains. In a wood at Hackness, near Scarborough (I am speaking of twenty years ago), *N. dilatatum* (Section γ) was near the base of the hill 5 feet high, and was common to half-way up this hill, where *N. æmulum* (Section *a*) mingled with it; higher, *æmulum* was common and *dilatatum* absent. My brother and myself being surprised at this change, we determined to test it; and from many thousand plants of *æmulum* we removed 500 to Highfield House. In a couple of years, several changed to *dilatatum*; the next year an increased number, until at length *æmulum* was the exception to the rule. At the same time we had a score in pots, but none of these changed. The same has occurred with the mountain form *alpinum*, dwarf plants on removal having much increased in size. The Oak fern, only an inch high, and the Beech fern, not much larger, when gathered at the summit of Ben Lawers, assumed their natural size in three or four years. *Polypodium vulgare*, var. *cambricum*, and *Scolopendrium vulgare*, var. *crispum*, when planted in a wood, gradually reverted to the normal form of the species, whilst divisions of the same plants grown in pans did not change; and, again, divisions taken from those planted out and reported did in the course of time resume their original character of *cambricum*

and *crispum*. Further, when I came to reside at Shirenewton Hall, I brought a superb collection of Scolopendriums to this place, which were unfortunately planted in an unsuitable situation; and the result was that every one of them (even the most ramose or most rugose forms) became as normal as the common Harts-tongue. Several years later some were removed into a better situation, and in three years they had returned to their original varietal forms. Two years ago the remainder were treated in a similar manner, and are now assuming their original characters. This is strong presumptive evidence, that the following may really belong to one species.

Nephrodium spinulosum has been divided into three sections, viz. :—

- Section *a.* *æmulum*.
 „ *β.* *alpinum*.
 „ *γ.* *dilatatum*.

Section *a.* *ÆMULUM*. (Hay-scented Fern.)

The distinctive characters are dwarfness, crispy fronds, and scent like new-mown hay, the last character being said to be unlike any other species; but here, where the *Brake* is commonly cut as a substitute for straw, the scent, when freshly cut, is even more powerful than that of *æmulum*.

VARIETIES.

1. *æmulum*, *Swartz* (*Lastræa æmula*, *Brackenridge*; *L. fœnisecii*, *Watson*; *L. recurvum*, *Newman*). A beautiful crispy fern, so strong as to be difficult to break, either in the leafy or stem portion. Found in Cornwall, Devon, Somerset, Gloucester (Boyle), Hereford, Shropshire, York, Lancaster, Cumberland, Northumberland, Glamorgan, Pembroke, Anglesea, Merioneth, Carnarvon, Forfar, Dumbarton, Argyle, Inverness, Arran, Mull, North Uist, Orkney, Guernsey, Antrim, Londonderry, Donegal, Mayo, Galway, Wicklow, Waterford, Clare, Cork, Derry, Louth, Armagh, Tyrone, Fermanagh, Cavan, Sligo, and Leitrim.

2. *angustipinnulum*, *Moore*. Found at Antrim by Mr. D. Moore, and in Co. Down by Mr. W. H. Phillips. In this the secondary pinnules are more confluent: and the lobes are irregularly shortened.

3. *capitatum*, *Lowe*. Found in Hackness Wood by my son, the late Colonel A. E. Lawson Lowe. Crested and conspicuously capitate.

*4. *cristatum*, *Jones*. Found in North Devon by Mr. Gill. Well crested; rather dwarf.

5. *interruptum*, *Clapham*. Found at Hackness both by the late Mr. Clapham and myself, and subsequently in the same locality by my son. Fronds depauperate; pinnæ and pinnules shortened and misshapen.

6. *ramosum*, *Clapham*. Found by the late Mr. Clapham. Twin fronds from the base.

Section β . ALPINUM.

(Distinguished by its dwarf and more slender fronds.)

1. *alpinum*, *Moore*. Found by Mr. Clowes, at Haweswater, and on Ben Lawers, by Mr. P. N. Fraser and myself. A small, delicate form.
2. *Aireyi*, *Lowe* (*interrupta Aireyi*, *Barnes*). Found in 1876, in Patterdale, by Mr. T. Airey. Evenly interrupted.
3. *angustipinnulum*, *Moore*. Found in Lancashire, by Mr. R. Morris; and in Yorkshire, by Mr. W. Willison. A depauperate yet symmetrical form, with very narrow pinnules.
4. *anomalum*, *Lowe*. Found in Yorkshire, by the late Mr. Clapham. A dwarf depauperate variety.
5. *Barnesii*, *Lowe* (*interrupto-Barnesii*, *Lowe*). Found in 1865, at Witherslack, by Mr. J. M. Barnes. Defective; pinnules reduced.
- *6. *calomelanos*, *Lowe*. Found in 1867, by myself, on Ben Lawers. More finely divided than *lepidotum*. Length, 10 inches.
7. *contractum*, *Lowe* (*alpinum-contractum*, *Moore*). Found in 1864, at Mardale, by Mr. J. M. Barnes. Depauperate, with reduced pinnæ and pinnules.
8. *Crouchii*, *Lowe* (*interrupta Crouchii*, *Barnes*). Found in 1864, at Loughrigg, by Mr. W. Crouch. Defective, with reduced pinnules.
9. *dumetorum*, *Moore*. Found in a number of places. Dwarf broad fronds, with a glandular surface. Length, 12 inches.
- *10. *ebeneum*, *Lowe*. Raised by myself, in 1862. Dwarf. Stem ebeneous.
- *11. *Fraseri*, *Lowe*. Found in 1867, on Ben Lawers, by myself. Dwarf and crisp.
12. *grandidens*, *Lowe* (*interrupto-grandidens*, *Clapham*). Found in 1873, in Yorkshire, by the late Mr. Clapham. Dwarf; interrupted; half of the pinnules minute.
13. *Howardii*, *Monkman* (*cruciata pinnula*, *Fox*). Found in 1863, in Ray Wood, Castle Howard, by Mr. J. Greenwood, and soon after by Mr. Monkman and Mr. Stabler (six plants were found in this wood. A remarkable fern with cruciate pinnules.
14. *hymenophylloides*, *Lowe*. Found at Ilfracombe by Mr. Dadds. A very Filmy-fern-looking variety. $9 \times 2\frac{1}{2}$ inches. Stiff and erect in growth.
15. *irregulare*, *Moore*. Found in 1862 at Witherslack, by Mr. J. M. Barnes; an irregular form.
16. *lepidotum*, *Moore*. History obscure. A much-divided, distinct, elegant form.
- *17. *ornamentum*, *Lowe*. Found in 1867, on Ben Lawers, by myself. A slender dwarf variety with twisted pinnules.
18. *plumosum*, *Jones*. Found on Ben Nevis. A very beautiful plumose form.
19. *pumilum*, *Moore*. Dwarf, not uncommon.
20. *ramoso-cristatum*, *Barnes*. Raised in 1874 by Mr. J. M. Barnes. Branching at the base and again in the middle (below the pinnæ),

ending in large capitate, closely-crested heads. Length, 15 inches.

21. *ramosum*, *Moore*. History obscure. Dwarf, twin-fronded, and again dividing.

*22. *spectabile*, *Lowe*. Found in 1867, on Ben Lawers, by myself. A lepidotum-looking variety with much attenuated fronds. Length, 12 inches.

*23. *spectabile-ramosum*, *Lowe*, † found in 1867, on Ben Lawers, by myself. Like *spectabile*, with the apex forked.

Section γ . DILATATUM.

The large-growing form. Exceedingly common, and requiring but little care in its cultivation. Where there is an abundance of half-decayed leaves, it grows to a great size. Fronds spreading and ovate lanceolate in form, bipinnate and even tripinnate. Basal pinnæ obliquely triangular; pinnules very dentate. Usually erect, with a long densely scaly stem. Length, from 1 to 6 feet.

1. *Bootii*, *Birkenhead*. A North American variety. Length, $2\frac{1}{2}$ feet.

2. *Chanteræ*, *Moore*. Found in Devon by Mrs. and the Rev. J. M. Chanter. Pinnæ distant; pinnules blunt; frond oblong lanceolate; apex attenuated. Length, 2 feet.

3. *Clovellyanum*, *Lowe* (*cristatum* *Druery*, *Druery*). Found in 1888, at Clovelly; neatly crested.

4. *crispato-cristatum*, *Jones* (*cristata* *Oscroft*, *Wollaston*). Found in 1873, near Bristol, by Mr. J. Oscroft. Pinnæ minutely crested; rachis dividing and subdividing into a foliose, crisped, and crested head, 9 inches or more across. Length, 2 feet.

5. *crispum*, *Wollaston*. Said to be a good crisp form.

6. *cristato-gracile*, *Jones* (*cristata* *Roberts*, *Wollaston*). Found in 1870, in Carnarvon, by Mr. Roberts. Pinnæ narrow; pinnules small; better crested than any other variety. Length, 19 inches.

7. *cristatum*, *Moore*. Found near Doncaster by Mr. S. Appleby, and a more marked form in Yorkshire, by Miss Wright. Pinnæ twice forked.

8. *Drueryi*, *Lowe* (*stipitato-lacerata*, *Druery*). Found in 1884, at Campsil, by Mr. C. T. Druery. An interesting depauperate form. $6 \times 1\frac{3}{4}$ inches.

9. *folioso-cristatum*. A vigorous, handsome, foliose form, found in the Azores. Fronds and pinnæ heavily crested.

10. *folioso-digitatum*. Also found in the Azores. A fine variety. Fronds heavily polydactylously crested.

11. *grandiceps*, *Barnes*. Raised by Mr. J. M. Barnes. A grand variety, very heavily crested.

12. *hybridum*, *Stansfield*. Accidental seedling. Came up on the bole of another hybrid, *i.e. remotum* (a cross between *Nephrodium spinulosum* and *N. Filix-mas*).

13. *interruptum*, *Moore*. Found near Harrogate by the late Mr. Clapham, and also in the Hole of Hercum, by the late Mr. Monkman. Pinnules irregular, some wanting.

14. *polydactylum*, *Wollaston*. Found by Mr. Turner. Many-finger crested.

15. *remotum*, *Lowe* (*Lastrea remota*, *Moore*). Found in 1859, at Windermere, by Mr. F. Clowes (this and *hybridum* might equally be placed with *N. Filix-mas*, though the resemblance is nearer the present species; they are hybrids between the two). Fronds erect, oblong lanceolate, smooth; basal pinnæ unlike *N. spinulosum*. Copiously soriferous; but after a score trials I have failed to raise one plant. Length, $3\frac{1}{2}$ feet. It has also been found in Germany.

16. *stipitato-laciniatum*, *Birkenhead*. Length, 2 feet.

17. *tanacetifolium*, *Moore*. Is not uncommon. A large tripinnate variety with triangular fronds.

Tribe 11. POLYPODIEÆ.

THE BEECH FERN.

POLYPODIUM PHEGOPTERIS.—*Linnaeus*.

A BEAUTIFUL fern, creeping along damp ground, either in woods or on shady banks, and is more abundant in mountainous districts. The entire length of the frond varies from 1 inch (under rocks near the summit of Ben Lawers, E. J. L.) to 20 inches in woods at Hackness, near Scarborough (and near Ambleside), one-half of which is stalk. Some few years ago there were carpets of this fern in woods near Scarborough, more than a dozen yards across, with not a single vacant spot. It inhabits fourteen counties in England, seven in Wales, seven in Ireland; the Isle of Man; and Shetland; and it is generally distributed through Scotland. Found throughout Europe, and extends from Italy to Iceland. Widely spread in North America, also Kamtschatka and the Altai Mountains. The frond is ovate-triangular; the basal pair of pinnæ curved downwards, and the pinnæ narrow from the base upwards. Colour, pale dull-green.

VARIETIES.

1. *caudatum*, *Lowe*. Found on Ben Lawers by myself. A very dwarf form with a caudate apex; somewhat depauperate.

2. *Fosteri*, *Lowe*. A beautiful laciniate form. Found by Mr. Foster in the Lake district.

3. *interruptum*, *Barnes*. Length, 4 inches. Found at Wither-slack by Mr. J. M. Barnes, of Milnthorpe, in 1863. This is a very narrow, irregular form; the pinnæ being variable in size, their apices truncate, and the tip of the frond tail-like.

4. *laceratum*, *Druery*. Found in 1889, near Settle, by Mr. Barraud. Fronds approaching *P. vulgare*, var. *cambricum*, in cutting.

5. *multifidum*, *Moore*. Differing in having a portion of the lobes multifid and longer; and in the tips of the pinnæ being crested. I

found it in great abundance in 1857, near Stockghyll Force, Ambleside, where it clothed a bank of a wet shady lane for six or eight yards. In 1865 a similar form was found by the late Mr. J. J. Jones and by Mr. J. E. Mapplebeck in the same district.

6. *strictum*, *Barnes*. Found at Witherslack by Mr. J. M. Barnes.

THE OAK FERN.

POLYPODIUM DRYOPTERIS.—*Linnaeus*.

A SMALL, exquisitely beautiful species, inhabiting mountainous, rocky situations in shady woods; or beneath hedges where the atmosphere is damp but not the soil. It is sometimes called "The Smooth Three-branched Polypody," because the frond is three-branched. Usually varying in size from 4 to 12 inches, but occasionally very diminutive. I found it under cavernous stones near the summit of Ben Lawers, not much more than one inch long. Frond triangular, and of a brilliant refreshing green. Rhizoma creeping. This fern can only be confused with the Limestone Polypody; but the latter has its fronds as if dusted with lime. It is a common Scotch and Welsh fern, and occurs in fifteen English counties. In Ireland it is exceedingly rare. Widely spread in Europe and America. A rapid-growing fern with a creeping rhizome. It is met with in very large clumps. Easily cultivated.

There are no varieties.

THE LIMESTONE POLYPODY.

POLYPODIUM ROBERTIANUM.—*Hoffmann*.

(*P. CALCAREUM*, *Smith*; and *P. DRYOPTERIS* var., *Bolton*.)

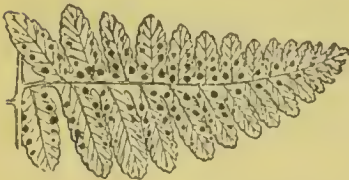


FIG. 43.—*Polypodium Robertianum* (pinna, showing fructification).

IN appearance very like the Oak Fern, but more obliquely triangular. It varies from 8 to 18 inches in length. The stipes is much longer than the rachis, whilst in *Dryopteris* it is just the reverse. This species delights in sunshine; *Dryopteris*, in shade. The fronds being pubescent, they have the appearance of being dusted over

with lime. Rhizoma, creeping. Found in Cumberland, Westmoreland, Yorkshire, Derbyshire, Gloucestershire, Wiltshire, Somerset, Caernarvon, Denbigh, and Glamorganshire. Near Buxton its rhizomes creep about heaps of stones; and plants can be obtained by removing the stones, when it is seen that the plants are luxuriating without the roots penetrating soil. It is found in France, Germany, Switzerland, Hungary, Norway, Canada, the United States, and on the Himalayan Mountains.

There are no varieties.

THE ALPINE POLYPODY.

POLYPODIUM ALPESTRE.—*Hoppe*.

A LADY-FERN looking plant, but having circular (minute) sori, which are not covered with an indusium. It is only found on mountains of from 2,000 to 4,000 feet elevation. The fronds are somewhat lanceolate and bipinnate. Usually 20 inches in length, but sometimes double this size. The habit is erect, and the fronds are deciduous.



FIG. 44.—*Polypodium alpestre* (Pinna, showing fructification).

First recognised as British by Mr. Watson, in 1841. It has been found on the Clova mountains by Mr. Backhouse and Mr. G. Lawson; on the Deeside mountains, by Mr. T. Westcombe and Mr. Backhouse; on Ben Alder, by Mr. Watson; Lochnagar, by Mr. Croall; and on Ben Lawers, by Mr. Fraser and myself. It appears to be abundant though local. It is exclusively a Scotch fern, as far as the United Kingdom is concerned; but it is found in Switzerland, Germany, Russia, Norway, Sweden, Lapland, and the Caucasus.

VARIETIES.

1. *flexile*, *Newman*. Found in Glen Prosen (Clova). Handsome and distinct. Length, 6 to 18 inches. Very narrow; the pinnae shorter, and the pinnules less in number. Sori only near the base of the frond.
2. *laciniatum*, *Stansfield*. Raised from spores by Mr. Stansfield. More dense than *flexile*, and the pinnae lacinate.
3. *lanceum*, *Moore*. Found on Clova by Mr. G. Lawson; and on Lochnagar by Mr. Croall.
4. *tripinnatum*, *Moore*. Found at the Wells of Dee by Mr. G. Lawson. Fronds large, tripinnate, and the pinnules very large.

THE COMMON POLYPODY.

POLYPODIUM VULGARE.—*Linnaeus*.

FIG. 45.—Frond of *Polypodium vulgare*.

THE common Polypodium cannot be confused with any other British fern. The stout, firm fronds attached to the thick, creeping rhizoma in such a manner that they separate from it, like leaves

from a branch as they approach decay, is a unique character. The fronds vary from 2 to 22 inches in length; are linear, oblong in form; deeply pinnatifid; with large, conspicuous sori. Except in very hard winters, the fronds remain green till spring, when they are cast, and fresh ones appear. It grows on rocks, walls, tree-stumps, and banks, and is common throughout Great Britain and Ireland, from the level of the sea to a height of more than 3,000 feet. It is also abundant throughout Europe, Siberia, Kamtschatka, Canada, the United States, California, Mexico, and Guatemala.

The sections including *Cambricum* and *semilacerum* are not uncommon in Monmouth and Wales.

Readily cultivated if grown in leaf mould, sand, fibrous loam, and lumps of decaying wood, care being taken that the rhizomes shall be fastened on the surface of the soil. In the varieties of this fern the departure from the normal form is unusually great.

VARIETIES.

These have been grouped in several sections, Section δ containing all those that could not be classed in Sections *a* to γ .

- Section *a*. *plumosum*.
 „ β . *cristatum*.
 „ γ . *semilacerum*.
 „ δ . *anomalum*.

Section *a*. contains feathery varieties, such as *Cambricum*, *Cornubiense*, and *pulcherrimum*.

Section β , the tasselled, branched, or capitate forms.

Section γ , *semilacerum* and *omnilacerum*, *i.e.*, lacerate forms.

Section δ , *anomalum* (a term used to denote that these are not classed). This section contains those varieties not included in the first three classes.

Section *a*. PLUMOSUM.

1. *Barrowi*, *Lowe* (*Cambricum Barrowi*, *Barnes*). Found in 1874, at Witherslack, in the Lake district, by Mr. T. Barrow. It is a splendid form; with very dense, finely-cut, thin-textured fronds.

2. *Cambricum*, *Linnaeus* (*plumosum*, *Wollaston*). A well-known, plumose, sterile variety. Found many years ago in Wales. Mentioned as early as 1743. The late Mr. Joseph Sidebotham, of Manchester, found it in North Wales, at Mill Dingle, Beaumaris, and Conway Castle; also at Troutbeck, near Ambleside; and at Flenarim, in County Antrim (the Irish form not sterile). Found in South Devon, in 1867, by W. Easterbrook. It is also recorded from Monmouthshire, Glamorganshire, Cheshire (where it was found in a wood near Macclesfield), and from Almondsbury, near Bristol.

3. *Claphami*, *Lowe* (*multifido-elegantissimum*, *Clapham*). A cross between a crested form and “*Cornubiense*,” raised by the late Mr. Clapham; in fact, a crested *Cornubiense*.

4. *Cornubiense*, *Moore* (elegantissimum, *Stansfield*). The original plant was found in 1867 in Cornwall, growing on an ash pollard, and was distributed by the Rev. J. B. Whyte. A wonderfully fine, divided form, somewhat resembling the *Killarney Fern*, yet also having some normal and some half-normal fronds. $14 \times 4\frac{1}{2}$ inches.

5. *foliosissimum*, *Lowe* (*Cornubiense-foliosum*, *Clapham*). Another of Mr. Clapham's fine varieties. A very mossy form.

6. *Fowleri*, *Lowe*. Raised from *Cornubiense* by the late Mr. Fowler. Has no normal fronds.

7. *Hadwini*, *Lowe* (*Cambricum Hadwini*, *Barnes*). Found in 1875, in Silverdale, by Mr. Hadwin. A beautiful plumose variety.

8. *Hutchisoni*, *Baker*. Found in Carmarthenshire in 1889 by Mr. Hutchison, and now in the Oxford Botanic Gardens, having been secured by Mr. Baker (curator). A form of *trichomanoides*. Apex lax, and finely drawn out in a stag's-horn manner. 8×3 inches.

9. *Lyellii*, *Lyell*. A plumose form. Raised by Dr. Lyell. 15×5 inches.

10. *Oakeleyæ*, *Lowe*. A dwarf form of *Cambricum*. Found in 1868, at Raglan, by Mrs. Bagnall Oakeley. $9 \times 4\frac{1}{2}$ inches.

11. *pluma*, *Lowe*. Found 30 years ago, on Tintern Abbey, by Mr. Cowburn. A handsome variety, with characters between *Cambricum* and *pulcherrimum*. Sparingly fertile. $20 \times 5\frac{1}{2}$ inches (stipes, 6 inches).

12. *Prestoni*, *Lowe* (*Cambricum Prestoni*, *Barnes*; *congestum*, *Jones*). Found in 1871, at Yelland, by Mr. R. Preston. A grand, congested, tripinnatifid plumosum. $11 \times 4\frac{1}{2}$ inches.

13. *pulcherrimum*, *Stansfield*. Found in 1861, at Whitbarrow, by Mr. T. Addison. Texture thicker than *Cambricum*; lobes rounded. A handsome, robust, tripinnatifid form. $19 \times 8\frac{1}{2}$ inches.

14. *pulchritudine*, *Lowe* (*pulcherrimum Lowei*, *Jones*). Raised by myself in 1884. A handsome, finely-cut variety. Fronds concave. $12 \times 4\frac{1}{2}$ inches.

15. *serra*, *Wollaston*. Found in 1868, in Furness Fell, by Mr. J. A. Wilson. A sub-*Cambricum*, with erect basal pinnæ.

16. *trichomanoides*, *Backhouse*. A sport in the York Nursery of *Cornubiense*. Finely divided; and with no normal fronds. $12 \times 4\frac{1}{2}$ inches.

17. *triumphale*, *Lowe*. Raised in 1884 by myself. Characters, midway between *Cambricum* and *pulcherrimum*. Growth, horizontal. 16×5 inches.

Section β . CRISTATUM.

1. *acuto-bifidum*, *Wollaston*. Found in 1858, at Stainton, by Mr. J. M. Barnes. Acute bifid points.

2. *bifido-cristatum*, *Mapplebeck*. Found in 1867, near Grange, by Mr. T. Walmsley. A fine bifid, crested form, with a branching crested head. $5\frac{1}{2}$ inches wide. $17 \times 2\frac{1}{2}$ inches.

3. *bifidum*, *Francis*. Found in many localities. Points of segments bifid.

4. *contractum*, *Lowe* (*cristatum-contractum*, *Jones*). Raised by myself in 1875. Costa splits and forms a compact, crested cornute head. $14 \times 4\frac{1}{2}$ inches.

5. *cristatum*, *Moore*. Found in 1854 in County Cork, by Mr. H. S. Perry. A fine foliose, well-crested capitate form.

6. *diadema*, *Lowe*. Found by myself in 1886, at Penhow, Monmouthshire. Segments bifid. Small crest. $9 \times 2\frac{1}{2}$ inches.

7. *Fosteri*, *Lowe* (*cristatum Clewarth*, *Wollaston*). Found in 1876 in County Clare. Greatly crested and capitate. Segments much narrower than those in *cristatum*. A splendid form. 16×5 inches.

8. *glomeratum*, *Mely*. Found in 1873, by Mr. Job Mullins, in Dorset. Half stem, the leafy part broader than long, tips crested. 8×6 inches.

9. *grandiceps*, *Barnes*. Found in 1868, near Grange, by Mrs. Fox. Heavily crested. A grand variety. 16×4 inches.

10. *Hodgsonæ*, *Lowe*. Found by Mrs. Hodgson. Crested and capitate, contracting to the crests. $12 \times 2\frac{3}{4}$ inches.

11. *lomarioides*, *Lowe*. Found in Ireland by Mr. Stewartson. Very narrow. $8 \times 0\frac{3}{4}$ inches.

12. *Martindalei*, *Lowe* (*multifidum*, *Moore*). Found in 1865, near Staveley, by Mr. J. A. Martindale. A nice crested form.

13. *multifidum*, *Moore*. Found at Whitbarrow by Mr. F. Clowes. Crested.

14. *Parkeri*, *Lowe* (*multifido-cristatum*, *Moore*; *grandiceps Parker*, *Wollaston*). Found in 1854, in Somerset, by Mr. H. Parker. A fine *grandiceps* with a large capitate head. 12×3 inches. [I raised a form of this in 1880 which Colonel Jones called *capitatum Lowei*. The tips cristulate and crisp. 8×4 inches.]

15. *ramosum*, *Moore*. Found in 1860, in Hampshire, by Mr. C. Hillman. Branching at the base and also above. 12×3 inches (11 inches across the branches). [I raised a somewhat similar form some years ago, known as *gleichenioides*.]

Section γ . SEMILACERUM.

1. *Aldreni*, *Lowe* (*omnilacerum Aldreni*, *Barnes*; *O. truncatum*, *Wollaston*). Found in 1873, near Milnthorp, by Mr. J. A. Aldren. Long acute lobes, and somewhat truncate apex. $21 \times 5\frac{1}{2}$ inches.

2. *brachiato-semilacerum*, *Jones*. Found in 1862, in Worcester-shire, by Mr. J. E. Mapplebeck. Branching where the basal segments should be. $17 \times 5\frac{1}{2}$ inches; and 11 inches across the arms.

3. *brachiatum*, *Wollaston*. Found in 1856, in Guernsey, by Mr. C. Jackson. 17×5 inches; and $8\frac{1}{2}$ inches across the arms.

4. *densilobum*, *Lowe* (*semilacerum densilobum*, *Moore*). A dense-lobed form.

5. *grande*, *Lowe* (*semilacerum grande*, *Jones*). Found in 1862 in Wicklow. Near the rachis the pinnæ are confluent and depauperate. This magnificent plant is in the possession of Mr. Barnard Hankey. 16×13 inches.

6. *Hallii*, *Lowe* (semilacerum *Hallii*, *Jones*). Found in Wentwood by the late Rev. C. Ranken Hall. Undulate. 12×4 inches.

7. *illustre*, *Lowe*. Raised by myself. Erect, stiff habit, foliose, distinct. 18×5 inches.

8. *Lowei*, *Lowe* (semilacerum *Lowe*, *Jones*). Found by the late Colonel A. S. H. Lowe, near Athlone. A dense, imbricate form.

9. *omnilacerum*, *Moore*. Found in 1848, near Goodrich Castle, by Mr. T. E. Bennett. Segments ascending and confluent, the lobes having long, pointed projections. Distinct. $20 \times 5\frac{1}{2}$ inches.

10. *Parsonsii*, *Lowe* (brachiato semilacerum *Parsons*, *Jones*). Found in 1870 by Mr. Parsons. A brachiato semilacerum. Length, 15 inches.

11. *robustum*, *Lowe* (semilacerum *robustum*, *Moore*). Found in 1863, at Whitbarrow, by Mr. J. M. Barnes. A grand foliose form. 19×8 inches.

12. *semilacerum*, *Link*. Not uncommon in Monmouthshire. Originally found in 1850 by the late Mrs. Delves, in County Wicklow. 15×7 inches. [Mr. W. H. Phillips has found it in County Antrim. 18×9 inches.]

13. *truncatum*, *Lowe* (semilacerum-truncatum, *Barnes*). Found in 1863, in Levens Park, by Mr. J. M. Barnes. The frond and also the divisions terminating in a horn.

14. *undulatum*, *Lowe* (semilacerum *densilobum*, *Jones*). A densely lobed form. $18 \times 6\frac{1}{2}$ inches.

Section δ . ANOMALUM. (Unclassified varieties.)

1. *abruptum*, *Lowe* (folioso-abruptum, *Barnes*). Found in 1863, in Witherslack, by Mr. J. M. Barnes. A fine, broad, leafy form.

2. *acutum*, *Moore*. A characteristic form was found by the late Mr. Sidebotham in Patterdale. The lobes have no irregularities on the margins. Length, 6 inches.

3. *auritum*, *Moore*. Found in numerous places. Eared.

4. *Barnesii*, *Lowe* (dentatum *Barnesii*, *Moore*). Found in 1865, at Slackhead, by Mr. J. M. Barnes. Deltoid, and evenly and deeply dentate; not unlike *Onoclea sensibilis*.

5. *crenatum*, *Moore*. Not uncommon; with margins crenate. The late Colonel A. S. H. Lowe found a most marked form on Carberry Island, near Athlone.

6. *Crossfieldii*, *Lowe* (marginatum *Crossfieldii*, *Moore*). Found in 1862 at Arnside by Mr. J. Crossfield. A marginatum with pinnæ as if bitten.

7. *curtum*, *Wollaston*. Found in 1872, in Crake Valley, by Mr. J. K. Hodgson. A remarkable form, not unlike a dwarf *Nephrolepis exaltata*. Very narrow. $14 \times 1\frac{3}{4}$ inches.

8. *densilobum*, *Fitt*. Narrow dentate segments. $8 \times 3\frac{1}{2}$ inches.

9. *dentatum*, *Moore*. Found in 1865, in Westmoreland, by Mr. Barnes. 13×7 inches. Frond broad; lobes narrow and crowded; margin dentate. Not uncommon. [A good form, found in Co. Clare by Mr. O'Kelly, has fronds $16 \times 5\frac{1}{2}$ inches.]

10. *depauperatum*, *Wollaston*. Found in South Devon by Miss Kitson. A depauperate form, found on their garden wall at Shiphay. Cornute. 9×4 inches.

11. *foliosum*, *Wollaston*. Found in 1862, in Silverdale, by Mr. J. M. Barnes. Broad and leafy.

12. *Huckii*, *Lowe* (*suprasoriferum Huckii*, *Barnes*). A form having sori on the upper surface.

13. *irregulare*, *Moore*. Found in 1864, on Cartmel Fell, by Mr. J. M. Barnes. Frond and lobes irregular.

14. *lineare*, *Lowe* (marked "Irish Polypody" in Colonel Jones's collection). Very distinct, long linear lobes. $10 \times 0\frac{3}{4}$ inches.

15. *Llanvairense*, *Lowe*. Found at Llanvair, near Shirenewton, by myself, in 1887. Segments narrow; apex of frond branching, and ending in 3, or 4, cornute tips. $10 \times 2\frac{1}{2}$ inches.

16. *macrostachya*, *O'Kelly*. Found at Carron, Co. Clare, by Mr. P. B. O'Kelly. Normal, with a long caudate termination of the frond. $12 \times 3\frac{1}{2}$ inches.

17. *marginatum*, *Moore*. Found in 1854, at Windermere, by Mr. F. Clowes. An interesting form, although it appears as if bitten. Mr. W. H. Phillips has also found a good form. 16×3 inches.

18. *minimum*, *Hodgson*. Found in 1866 at Millom by Mrs. J. K. Hodgson. Fronds small and of many shapes.

19. *Oakeleyæ*. *Lowe*. Found by Mrs. Bagnall Oakeley at Penalt. Crenate; dark green. 16×4 inches.

20. *obtusoserratum*, *Moore*. Found in 1863, at Whitbarrow, by Mr. J. M. Barnes. Cornute and serrate.

21. *rotundatum*, *Phillips*. Found in Ireland by Mr. W. H. Phillips, and also by Mr. O'Kelly. Reduced to rounded lobes in basal portion.

22. *serra*, *Wollaston*. Found in 1865, in Lancashire, by Mr. J. Wilson. Very distinct; biserrate, and the lobes overlapping. $13 \times 2\frac{3}{4}$ inches.

23. *serratum*, *Moore*. Found in several places. Cut like a saw.

24. *sinuato-auritum*, *Moore*. Found, in 1865 in Levens Park, by Mr. J. M. Barnes. Pinnæ irregular.

25. *suprasoriferum*, *Wollaston*. Found in 1865, on Cartmel Fell, by Mr. J. M. Barnes. Sori on the upper surface.

26. *truncatum*, *Wollaston*. Found in 1870, in S. Devon, by Miss Kitson. Truncate. 13×5 inches. [Mr. P. B. O'Kelly has found a curious form in Co. Clare. $6 \times 2\frac{1}{2}$ inches.]

27. *variegatum*, *Barnes*. Found in 1866, at Witherslack, by Mr. J. M. Barnes. A dwarf green-and-white variety.

28. *Whitakeri*, *Lowe* (*dentatum Whitakeri*, *Moore*). Found in 1864, near Kendal, by Mr. Whitaker. Evenly dentate.

Tribe 12. GRAMMITIDÆ.

THE SLENDER-LEAVED GYMNOGRAM.

GYMNOGRAMME LEPTOPHYLLA.

--*Desvaux.*

THE only British species of the very handsome hot-house Gold and Silver Ferns. Diminutive. Length, 3 to 8 inches. Fronds fragile and few in number. Only found in Jersey, where it is abundant in several places. It is an annual; but if under suitable circumstances it will sow itself. Found on moist banks with a sunny aspect. A native of France, Switzerland, Germany, Spain, Portugal, Italy, Sicily, Sardinia, Dalmatia, Crete, and Greece; India, Algiers, Morocco, Egypt, Abyssinia, and in the Atlantic Isles; Mexico and Australasia.

There are no varieties.



FIG. 46.—Frond of *Gymnogramme leptophylla*.

SUB-ORDER III. OSMUNDACEÆ.

THE ROYAL FERN.

OSMUNDA REGALIS.—*Linnaeus.*

THE Royal, or, as it is often called, the Flowering Fern, is a most interesting and majestic species, and grows in situations where it can supply itself with water; flourishing on the margins of lakes and rivers, and in swampy fields. It varies considerably in size (from 1 foot to as much as 12 feet). It is abundant at Shapwick, in Somerset, but very dwarf. In 1860 I noticed a number of plants in the crevices of low rocks at Santander, in N. Spain, by the side of the sea, where they must be frequently splashed by the waves. They were all small, none more than 6 inches in length. In the early part of the present century, before the land was effectually drained it was not uncommon at Bulwell

in Nottinghamshire. In 1855 only three plants could be found, and they were gradually perishing for want of water. One of these was removed into my fernery at Highfield House, and it is still alive; the other two perished in 1857. It is, or was, found in twenty-six English, five Welsh, ten Scotch, and nine Irish counties, Anglesea, Isle of Wight, Arran, Bute, Mull, Islay, Uist, Harris, Lewis, Shetland, and Jersey. It is also widely spread on the Continent; in India, Algeria, Natal, Madagascar, Newfoundland, Canada, United States, Mexico, Brazil, and the Azores.

Fronds somewhat erect and trunk-like, the stipes being half the length of the frond; yellowish-green in colour, and broadly lanceolate in form; the pinnules sometimes being $2\frac{1}{2}$ inches long. The fronds are part sterile, and part have a terminal fertile panicle, giving the appearance of a flower. It cannot be mistaken for any other fern.

VARIETIES.

1. *bulbifera*, *Lowe*. The exact counterpart of *cristata*, but bearing bulbils at the base of the pinnæ. Raised from spores by Mr. Clift, of Birmingham.

2. *capitata*, *Lowe*. Dwarf. 16 inches in length, three-fourths of which is the stipes. Crown, spreading and almost creeping, making a wide plant with numerous fronds, which give a ball-like character. It is a conglomerate variety, and was raised from a bulbil of *bulbifera* by myself. The plant is still in my possession.

3. *cristata*, *Moore*. Extremely handsome. Length, 3 feet. The apices of all the pinnules are dilated and crested. It was introduced by Messrs. Osborn & Son, of Fulham. I had a plant in 1866 that was 14 feet in circumference.

4. *interrupta*, *Moore*. This has a few normal pinnæ, the remainder reduced in size, and of a rounder form.

5. *Phillipsii*, *Lowe*. Another interrupted form, found by Mr. W. H. Phillips, of Belfast, in Co. Fermanah. It is more distinct than *v. interrupta*. 36×15 inches.

6. *purpurascens*, *Moore*. Remarkable for its colour; but is distinct also in habit, not being unlike *Osmunda spectabilis*, a North American species.

7. *ramo-cristata*, *Jones*. Raised from spores. Almost a copy of *cristata*; but the stalk splits into two in the upper portion of the frond.

8. *undulata*, *Brown*. From the Azores.

SUB-ORDER VI. OPHIOGLOSSACEÆ.

MOONWORT.

BOTRYCHUM LUNARIA.—*Swartz*.

A COMMON, but local, inconspicuous species; growing in dry mountain pastures; having a single, pinnate, stout, fleshy frond;

varying from 2 to 10 inches, out of which rises the fertile spike, which somewhat resembles a bunch of young grapes. Usually only one frond.

Found in most parts of Europe as far as the Arctic Circle, and within it. Also on the Himalaya and Rocky Mountains.

A botanical curiosity, difficult to cultivate.

Mr. Moore has described three varieties: 1. *Rutaceum*, found near Dundee; 2. *tripartitum*, in County Dublin; and 3. *incisum*, found at Halifax by Mr. Bolton; Crosby Ravensworth by Mr. Clarke; and near Dublin by Dr. Allchin. The latter has the pinnae deeply incised.

THE ADDER'S TONGUE.

OPHIOGLOSSUM VULGATUM.—*Linnaeus*.

ANOTHER diminutive, inconspicuous fern, growing in moist, loamy pastures and woods; widely spread throughout Great Britain; and throughout Europe. Also found in America, Mexico, New Zealand, New Holland, Cape of Good Hope, East Indies, Kamtschatka, and Siberia. Fronds, 3 to 12 inches in length; thin and fleshy. Frond entire and yellowish-green; the fertile spike rising from the base of the sterile frond. Creeping rhizoma, sending up solitary fronds; as it forms rhizomas, like the common Brakes.

VARIETIES.

1. *lusitanicum*, *Linnaeus*. Much more diminutive. Found in Guernsey, in 1854, by Mr. G. Wolsey. [This may be a distinct species; as it has been found in about twenty other countries.]

2. *microstichum*, *Moore*. A very dwarf variety, with narrow fronds. Found at Swanbister, in Orkney, by Mr. J. T. Syme.

CONCLUDING REMARKS.

It only now remains to say a few words about how the varieties just described have been obtained. A certain portion are natural wild finds, whilst the remainder have been raised from spores. Every now and then a remarkably distinct variety has been found wild, but the occasions are few and far between; whilst, guided by judicious selection, the amount of forms that can be raised from spores is practically inexhaustible. Wild finds are important, as new blood is infused into these crosses.

Whilst residing at Highfield House, near Nottingham, I began (in 1842) to cultivate British ferns. The only species then growing on that estate were a few examples of *Asplenium adiantum-nigrum*, on a new-red sandstone rock near the lake; one single example of the *Asplenium Ceterach* in a sunk-fence wall (erected in 1829); and some half-dozen plants of *Aspidium aculeatum* half a mile from the house; the neighbourhood being singularly deficient of ferns. How-

ever, after their cultivation for several years, the following could be found growing wild in suitable places: *Scolopendrium vulgare*, *Asplenium Filix-fœmina*, *Asplenium trichomanes*, *Nephrodium Filix-mas*, *Nephrodium paleaceum*, *Nephrodium spinulosum*, and *Aspidium angulare*—not normal, but varietal forms, that owed their origin to the plants that had been introduced.

In 1867 I wrote "Our Native Ferns," and before that time began to raise varieties from spores.* In order to economize space, spores from the varieties of any one species were sown together; and from the plants so obtained it seemed certain that crosses had taken place whilst in the seed-pans. This circumstance caused a series of experiments, with a certain object in view, to be commenced. From these experiments it became evident that spores gathered from a peculiar part of a frond would produce more striking results than from those gathered haphazard. In 1866 the late Mr. Clapham had found *Asplenium Filix-fœmina*, var. *proteum*, and in 1870 he sent me a plant. Spores of this were mixed with those of the variety *Victoria*, and produced a series of forms having *proteum* as the one extreme and *Victoria* as the other; every seedling showing in a greater or less degree the peculiarities of the parents. This series was seen in 1879 by Mr. Clapham, who before did not believe that ferns could be crossed, but who now became convinced; and on the strength of this conviction he mixed spores of *Polypodium vulgare*, var. *Cornubiense*, with the var. *bifido-cristatum*, and raised a crested *Cornubiense*.

My next attempt was to cross species; and spores of *Aspidium aculeatum* were sown with those of *Aspidium angulare*. The object was, to obtain a narrow cruciate variety of *Aspidium aculeatum*, similar to the variety *Wakeleyanum* of *Aspidium angulare*, as this was as yet a desideratum. Spores of *Wakeleyanum* were sown with those of *Aspidium aculeatum*, var. *densum*; and out of a thousand seedlings there were five plants unmistakably *Aspidium aculeatum*, and having cruciate fronds like *Wakeleyanum*. In 1884 a short paper, with fronds of this cross, was sent to the Linnæan Society; yet even this did not remove the doubt of Botanists; but a year later Sir Joseph Hooker informed me that the crossing of ferns was an acknowledged fact; and this change of opinion appears to have arisen from seeing a foreign hybrid *Adiantum*. It is true, however, that in 1868 the late Rev. M. J. Berkeley submitted a hybrid between *Asplenium ebeneum* and *Scolopendrium rhizophyllum* to the late Sir W. J. Hooker, who replied, it was "the most probable instance he had yet met with of a real hybrid amongst ferns. In 1888 the late Colonel Jones and myself set forth, in a joint paper "On Abnormal Ferns" † at the British Association meeting at Bath, our experience; Colonel Jones taking *Aspidium*,

* At the British Association at Dundee, in 1867, I read a paper on "Hybrid Ferns;" but Botanists (except the late Professor Hutton Balfour) would not admit they were satisfied that ferns could be hybrids.

† Printed in the "Annals of Botany," February, 1889, with illustrations.

and myself the Hart's-tongue and Lady Fern. In the Lady Fern twelve marked varieties, and in the Hart's-tongue eight varieties, were sown together; and the result was, that seedlings were raised having the peculiar characters of three or four varieties blended in the same frond. There are several hybrids now known besides the above: one with *Asplenium trichomanes*, another with *Asplenium marinum*, a third with *Asplenium lanceolatum*, the fern known as *Nephrodium remotum*, *Pteris pendula*, etc., and may I add *Asplenium Germanicum*. Although these are apparently fertile, plants have not been raised from their spores after frequent trials.*

Mr. James Britten, in his "European Ferns," mentions as foreign hybrids:—

- Asplenium adulterinum*, *Milde* (*A. trichomanes*+*A. viride*).
- „ *dolosum*, *Milde* (*A. trichomanes*+*A. adiantum-nigrum*).
- „ *ebenoides* (*A. ebenum*+*Cantosorus rhizophyllus*).
- Scolopendrium hybridum* (*S. vulgare*+*A. Ceterach*).
- Adiantum Farleyense* (*A. capillus-Veneris*+*A. scutum*?).
- Nephrodium remotum* (*N. Filix-mas*+*N. spinulosum*).

Space will not allow me to describe the reproductive organs; † it may however be mentioned that Professor Arthur Henfrey published in 1851 a paper in which he stated that ten years previously Professor Nageli, of Zurich, had discovered the male organs, and in the year 1844 Count Leszazye-Suminski, of Berlin, had discovered both the male (Antheridia) and the female (Archegonia) organs, on the underside of the prothallus, ‡ during the prothalloid life of the fern; and on the male organs finding the female cell coition took place. Some experiments that I am now making, bearing on this subject, will, I believe, open up a new field of inquiry. In Mr. Druery's "Choice British Ferns," the reproductive organs are explained, as well as Mr. Druery's newly-discovered phenomenon of Apospory in Ferns.

It is an established fact, that the bulbils found on some varieties of ferns, do not always produce the same variety. Bulbils from the *Scolopendriums* "Wardii" and "Kelwayi" have yielded new varieties; those from *Aspidium angulare*, *Section plumoso-divislobum*, variety "densum," have originated the beautiful forms "Baldwini" and "imbricatum," and a bilbil from *Osmunda regalis*,

* Several plants have recently been raised from my hybrid *Aspidium aculeatum*, and also from *Nephrodium remotum*, but the number is insignificant.

† Usually the *archegonia* are situated in the kidney-shaped prothalli, just behind the indented portion, and the *antheridia* amongst the rootlets. The *archegonia* are bottle-shaped, with a rather long neck, and contain a minute central cell (*oosphere*). The antheridia are spiral ciliated bodies, endowed with movement and called *spermatozoids*. These pass down the neck of the *archegonia* and fertilize the *oosphere*.—Britten's "European Ferns."

‡ The prothallium was first noticed by Dr. Lindsay.—"Linn. Trans." 1792.

variety "cristata," a grandiceps form. Even by apospory (*i.e.*, prothalli formed directly on the frond, without the intermediate spore,) varieties are produced; and in the case of those from "Clarissima" (of the Lady fern) we may instance a subplumose form, a flexuose-pinnuled one, and another that is furcate and flexuose.

There is a peculiar connecting link between one species and another, for there is a mimical power that gives crested, branched, cruciate, and in short increased or diminished development in fronds, pinnæ, and pinnules, so that these characters are found almost identical in many species. Again, a well-developed variety may (as example) have a crested peculiarity in which the pinnæ copy the whole frond, and even the pinnules imitate the pinnæ. Variegation can also be obtained by crossing. The late Colonel Jones exhibited a striking example in *Aspidium angulare*: having added the polydactylous character to a multilobe, he then succeeded in making it variegated by a second cross; whilst in *Scolopendrium vulgare* I have obtained a dozen variegated forms.

The usual method of raising varieties is the one pointed out by me in 1867; but more recent experiments have shown that we can go beyond this. In 1888 experiments were made, based on the notion that it required a swarm of antheridia to make the archeogonia fertile. I had formed this opinion partly by what I had learned from Dr. Hudson on microscopic animal life, and partly on what I had done in crossing Dahlias. In the latter case, if I filled half a dozen small brushes with the pollen of a white Dahlia, and one with that from a coloured flower, and mixed these together (in the proportion of 6 to 1) and then impregnated a white flower, there was 87 per cent. of white seedlings, whilst if the process were reversed, *i.e.*, six times as much pollen from coloured flowers, white was almost absent in the seedlings.* To get a certain desired colour, moist paints were mixed together in various proportions of white and colour; and this was imitated with so many brushes full of white pollen to one of the colour selected. This could not, however, be done with ferns; but certain proportions *in bulk* of spores from a crested *Nephrodium paleaceum* and of an uncrested variegated *Nephrodium Filix-mas* were sown together, and the plants (500 in number) though yet too small to exhibit variegation, are large enough to be crested, and every one of the plants is crested. If, therefore, it be desired to produce heavily-crested ferns, and at the same time to increase the size of the variety without reducing the crests; to make any alteration in form that shall not be at the expense of these crests, it is recommended that a much larger proportion of the spores of the crested than of the other form shall be sown together.

* As an experiment, in 1889 pollen was used from different genera and species; the seedlings have bloomed, and are like the seed-bearer. The pollen was apparently able to give life to the seed, but not to show any of the characters of the male.

HINTS TO FERN CULTIVATORS.

Fergeries. Mounds, unless with a considerable thickness of soil, are not suitable for ferns, as during droughts they become too dry; a sunken rockery (assuming the water can drain off) is far better. A north border (under a wall), some 5 or 6 feet wide (prepared with suitable soil), is one in which all large-growing ferns delight. On the other hand, an open windy position is the very worst that could be selected. Within a series of walls (like a ruined castle) is an admirable situation. Ferns planted near tree-roots often require the renewal of soil as it becomes exhausted.

Compost. This should be coarse, except the surface (in pot-culture), and the leaves used should only be half-decayed; roots grow much quicker and stronger when the soil is not too fine and close. Rock-ferns require the addition of stone, and do well (if in pots), plunged in a mixture of stone and compost in narrow boxes fixed against a north wall, a few feet from the ground.

Drainage. Perfect drainage is essential in pot cultivation, as ferns do not like water to stagnate about their roots. Cockle-shells, and above this a thin layer of spent hops, may be used with advantage, the roots receiving nourishment as well as drainage.

Manure. Very weak manure water given occasionally; and old cow manure mixed in the compost is beneficial.

Watering and Syringing. Ferns require attention in watering, especially if young and delicate. Hunt's aphicide (a cheap spray distributor, made on a larger scale than the one in ordinary use), is an excellent instrument, holding a quart of liquid. A spray of water can be rapidly blown on the fronds. A solution of fir-tree oil blown through this "aphicide" on to the fronds kills insect pests, therefore another should be kept specially for this purpose. An excess of water is as injurious as a deficiency, and not constant small supplies, but a copious watering at proper intervals.

Shading. This is an important matter, especially with delicate plants. Ferns do not like full sunshine, and overhanging trees give too dense a shade. Exposed situations and green-houses require shading. For years I have used the "Willesden Scrim"; it gives a subdued light without being too dense. I can recommend it as by far the best shading.

Gathering Fronds. Gathering fronds, and their breakage by wind or other causes, is a source of weakness to ferns. In drying fronds it is requisite to change the blotting paper frequently. "Bentham's Paper" is very good for the purpose; and a new blotting paper named *Robosal* seems, from a brief trial, to be equally good. The felt-like material used under carpets is a useful absorbent of moisture, if placed between newspapers containing fronds.

Slugs, Beetles, etc. Where houses are infested by beetles, Birkenhead's "beetle-trap" is effective. For eradicating slugs and woodlice, small heaps of a mixture of bran and vinegar will attract them; and by visiting these heaps at night-time they may be cap-

tured whilst feeding. A flower-pan with a canal surrounding it, made at the Royal Potteries, Weston-super-Mare, is a simple and useful contrivance; and "Toope's Plant Stand," *i.e.* a metal support surrounded by water, acts in a similar manner. Mr. P. Neill Fraser adopted this on a large scale for specimen plants twenty years ago.

Fern Hunting. When exploring the country for ferns, always have several tin boxes of about 20×14 inches, and about 3 inches deep; these will strap together so as not to be cumbersome. Carefully tie the fronds together, and place at once in the boxes, where they will remain for several days without injury; and the plants, when taken home, will not be unsightly for the rest of the summer. A record of each wild find should also be kept for future reference, giving date and locality.

Filmy Ferns. These require their fronds to be kept damp, without an over-abundance of water at the roots. A sunken pit (4 to 5 feet deep), covered with glass and shaded with Scrim, is the most successful plan. In such a pit an extra cover in frosty weather is all that is required for the Killarney Fern and *Todea superba*. Fire heat is injurious.

Raising from Spores. Freshly gathered spores germinate more quickly than those from dried fronds. The time of their appearance (as green specks) is variable; some will have put on their first frondlets in three months, whilst others may be more than a year before showing any sign of life. Confervæ and mosses are apt to spring up and destroy the tiny ferns whilst in their prothalloid growth. To prevent this, it is advisable to use a clean earthenware (glazed) pan, the soil having been previously plunged in boiling water to destroy the animal and vegetable life contained in it. Protect with a glass cover, to prevent outside confervoid spores (of which the air is full) from being deposited on the soil, and use distilled water, or that which has been boiled, as ordinary water also teems with vegetable life. These pans, having no hole, do not require watering after the spores have been sown until the young ferns appear, *i.e.*, if placed in a moderately damp situation and shaded. Worms also (that are destructive to infant ferns) do not get into the pans. Pricking out into small patches and ultimately dividing into single plants, is a delicate process, requiring great care and experience. In the earlier stages it is better to keep the soil damp by standing the small flower-pots in saucers of water, slightly wetting the frondlets with the spray distributor.

Attention to the above remarks may prevent disappointment.

Since "Our Native Ferns" was published, in 1867, with the exception of the late Colonel Jones's privately printed "Varieties of the British Species," there has been no large work issued to illustrate the great number of marvellously beautiful ferns that have been discovered or raised since that time. A new work is therefore much wanted; and the author of the present Handbook has been for some time collecting materials to supply this want, and would be glad to receive fronds of any new varieties.

ADDITIONAL VARIETIES.

PTERIS AQUILINA.

17. *tortuosum*, *Lowe*. A large-growing variety in Mrs. Grant's fernery, with pinnules twisting in an extraordinary manner. Length, 4 feet.

ADIANTUM CAPILLUS-VENERIS.

33. *cuneatoides*, *Lowe*. A hybrid with *adiantum-cuneatum*. Raised by myself. Forming a dwarf, dense bush.

34. *minutopinnulum*, *Lowe*. Raised by myself. Apparently a hybrid. Length 2 feet. Small, crowded pinnules.

ASPLENIUM ADIANTUM-NIGRUM.

16. *plumum*, *Lowe*. A grand feather-like hybrid (with *asplenium marinum*), with deep green fronds. In Mrs. Grant's collection. $13\frac{1}{2} \times 4\frac{1}{2}$ inches (of which $5\frac{1}{2}$ inches is the stipes).

ASPLENIUM FILIX-FŒMINA.

A. 1. β . GRANDICEPS.

30. *dentatum*, *Lowe*. Raised by Mr. E. F. Fox. Profoundly dentate; pinnæ narrow and lax, and a much-branched capitate head 6 inches wide. 22×4 inches.

31. *superadornatum*, *Lowe*. Raised by Mrs. Grant. Not unlike *coronare*, but with a larger and more dense head (5 inches wide). 23×3 inches.

A. 1. γ . CRISTATUM.

45. *cymba*, *Lowe*. Raised by Mrs. Grant. A boat-like form as in *cymbaforme*, but the pinnæ are densely crested. 20×3 inches.

A. 1. δ . CRUCIATUM.

60. *grandissimum*, *Lowe*. Raised by Mrs. Grant. A narrow, lax, cruciate form of enormous length. Cruciate except a normal apex. Widest in centre of frond where 63×4 inches (at base only 1 inch wide).

A. 2. α . PUMULUM.

22. *cengere*, *Lowe*. Raised by Mr. E. F. Fox. Basal half lax, upper half congested. Sub-tripinnate. 27×4 inches.

23. *prodigiosum*, *Lowe*. Raised by Mrs. Grant. A narrow, confluent, feathery fern, with half the pinnæ all but wanting. 15×2 inches.

24. *silvescere*, *Lowe* (*Fosteri*, *Jones*). Found by Mr. Foster. A dense forest of dwarf fronds forming a ball-like plant. $8 \times 2\frac{1}{2}$ inches.

A. 2. β . CRISPATUM.

8. *pavoninum*, *Lowe*. Raised by myself in 1888. A feathery capitate variety, with the pinnules roundly crested like the eye in the peacock's feather. $9 \times 2\frac{1}{2}$ inches.

9. *plumigerum*, *Lowe*. Raised by myself in 1888. More feathery than *pavoninum* and a stronger grower. $17 \times 4\frac{1}{2}$ inches.

B. 1. α . PLUMOSUM.

22. *Molyi*, *Lowe*. Found by Mr. Moly. A finely cut plumose form, widest in the middle of the frond, where 32×12 inches.

23. *pluma*, *Lowe*. Found by Mr. Moly. A narrow, lax, finely-cut plumosum, widest in the middle, where 27×7 inches.

B. 1. δ . MACROPINNULUM.

9. *tæda*, *Lowe*. An unusually bold, polydactylous form raised by myself in 1888. Pinnules of great size, capitate. 23×9 inches.

B. 2. α . LAXUM.

8. *Illustre*, *Lowe*. A distinct form, raised by myself. Pinnæ and pinnules very lax; pinnules narrow and deeply cut; pinnæ crested, and frond ramosely crested. 24×7 inches.

9. *sponsa*, *Lowe*. A large, distinct, very lax, feathery form, raised by Mrs. Grant. Some pinnæ 2 inches apart, and very narrow ($5 \times 0\frac{3}{4}$ inches); pinnules cut to base, and lobes bidentate. 40×9 in centre of frond (only 3 inches at base).

B. 3. 7. VARIEGATUM.

1. variegatum, *Moly*. Found by Mr. Moly, in 1878, at Colyton, Devon. Normal, but variegated.

The two following I do not know :—

* flabellifolium-tenue, *Mapplebeck*.

* Jonesii, *Mapplebeck*.

SCOLOPENDRIUM VULGARE.

A. 1. β. CRISTATUM.

32. Jubatum, *Lowe*. Raised by myself. The crests falling over like a horse's mane. 16 × 2 inches. (Head 8 inches wide.)

A. 1. δ. SAGITTATUM.

28. aureum, *Lowe*. A variegated sagittatum, raised by Mrs. Grant. 11 × 2 inches.

B. 1. a. CRISPUM.

58. caulitorquere, *Lowe*. Found by the late Mr. Wills. Rachis bending. 12 × 2½ inches.

59. rugosocrispum, *Lowe*. Raised by myself. A cross between *Cowburni* and *rugosum*.

B. 5. a. VARIEGATUM.

30. candicans, *Lowe*. Found at Hawkchurch, by Mr. Moly. Only marginally crisped. Pale golden variegation. 16 × 2½ inches.

ASPIDIUM ACULEATUM.

30. conopeum, *Lowe*. A normal, lobate form, with a flat head 10 inches wide. Raised by the late Colonel Jones.

31. cruciferum, *Lowe*. Offspring of *hybridum*, raised by the late Mr. Barnes. Pinnules cruciate and narrow. 32 × 6 inches (in centre where widest).

32. distinctum, *Lowe*. Offspring of *hybridum*, raised by myself. Long, broad, cruciate, pinnules. Frond lax and broad at base, but much contracted in upper half. 27 × 8 inches at base (and only 1½ inches in upper half).

33. filia, *Lowe*. Offspring of *hybridum*, raised by the late Mr. Barnes. Fronds foliose, concave, dark green, and very thorny. Pinnæ confluent at the tips, cruciate; pinnules large and cruciate. 28 × 4 inches.

34. trapezippinulum, *Lowe*. Offspring of *hybridum* and *touchitis*. Raised by myself. Fronds concave and deep green. Tips of pinnæ confluent. Pinnules large, trapeziform, and strongly dentate. A distinct hybrid. 16 × 4 inches.

ASPIDIUM ANGULARE.

A. 1. β. GRANDICEPS.

21. coronale, *Lowe*. Raised by Mr. E. F. Fox. Distinct, erect, with very dentate subrotund pinnules, and a much-branched, spirally-twisted, compact head. 20 × 4 inches in middle (only 1 inch at base).

22. euprepes, *Lowe*. Raised by myself. Capitate.

23. surculosum, *Lowe*. A narrow, erect, capitate form, in Mrs. Grant's fernery, having conspicuous lobes. 30 × 6 inches in middle (only three inches at base).

A. 1. δ. POLYDACTYLUM.

14. excellens, *Lowe*. Raised by the late Colonel Jones. A narrow, polydactylous variety, compactly well branched. Pinnules simply lobed. 26 × 6 inches in middle (only 3 inches at base).

15. Foxii, *Lowe* (*remoto-decurrans polydactylum, Stansfield*). A polydactylous form, raised by Mr. E. F. Fox.

16. notabile, *Lowe*. Raised by the late Colonel Jones. A narrow, lax, crested form. Pinnules more divided than in *excellens*. 27 × 6 inches in middle (4½ at base).

17. splendens, *Lowe*. Differing from *notabile* in having thick round crests. Raised by the late Colonel Jones. 24 × 6 inches in centre (only 3 at base).

A. 1. ξ. CRUCIATUM.

11. pretiosum, *Lowe*. Raised by myself. Narrow, cruciate, dark green, with acute pinnules. 24 × 2 inches.

12. rectangulare, *Jones*. Found by Mrs. Wilson. Large, lax, cruciate, and capitate. Pinnules in lower half merely lobate. 26 × 6 inches.

A. 3. a. FLEXUOSUM.

9. deforme, *Lowe*. An ugly variety, found by Mr. Moly. A tortuose *linearis*, with scarcely anything but the midribs of pinnæ and pinnules. Length of frond 25 inches, but only 10 inches high.

10. prosternare, *Lowe*. A very distinct, slender, pendulous, flexuose, depauperate and lax variety, raised from *inaequale-sarcans*. 9 × 1 inches, branching head, 1½ inches.

11. torquere, *Lowe*. A very flexuose form. Found by Mr. Moly. 26 × 4 inches.

12. tortum, *Lowe*. A narrow twisted variety. Found by Mr. Moly. 30 × 3½ inches.

B. 1. a. PLUMOSUM.

12. penna, *Lowe*. A plumose form raised by myself in 1887. Tips of pinnæ curling over and polydactylous. 24 × 7 inches.

B. 1. δ. MACROPINNULUM.

9. lucidum, *Padley*. Large pinnules, and shining, pale-green fronds.

B. 3. a. DECOMPOSITUM.

18. pluma, *Lowe*. A very plumose form of Mr. Padley's *tripinnatum*. Raised by the late Colonel Jones. 24 × 8 inches.

19. pteron, *Lowe*. A narrow plumose form of Mr. Padley's *tripinnatum*. Raised by the late Colonel Jones. 26 × 4½ inches.

20. venustum, *Lowe*. Raised by myself. A tripinnate divisolobe, narrowing to the apex. 40 × 10 inches (at base).

B. 3. β. ACUTILOBUM.

26. Germinere, *Lowe*. Raised by the late Colonel Jones. A distinct narrow *acutilobum*. Frond equal in width. Pinnæ so much branched as to be broader than long. 14 × 3½ inches.

27. invincere, *Lowe*. Raised by Mr. E. F. Fox. A grandly polydactylous *acutilobum*. 23 × 9 inches (at base).

28. Trevellyanæ, *Lowe*. Found in Somerset, by the late Mr. Elworthy. Pinnæ overlapping; pinnules long, narrow, and lax. 30 × 9½ inches.

29. viviparum, *Lowe*. An *acutilobum* with plants along the rachis. In Mrs. Grant's fernery. 16 × 5 inches (at base).

B. 4. a. ROTUNDATUM.

16. circulare, *Lowe*. Raised by the late Colonel Jones. Distinct, subrotund form with lax pinnules. 25 × 3½ inches (in middle), only 2½ inches at base.

17. exile, *Lowe*. Found by Mrs. Grant. A *gracile*-looking, conspicuously lobed variety, with lax pinnules. 27 × 9 inches (in middle), only 4 inches at base.

B. 4. γ. LACINIATUM.

26. bellulum, *Lowe*. Found by Mr. Moly, in Dorset. Not unlike a narrow *remotodecurrens*. 23 × 4 inches.

27. caudatum, *Lowe*. Raised by myself in 1887. A distinct caudate *grandidens*. 16 × 4 inches at base, and only 1 inch near the tip.

C. 2. a. ANGUSTATUM.

5. arctum, *Lowe*. Found at Uplyme, by Mr. Moly. A pretty, narrow, dark-green form, with blunt-ended, imbricate pinnules. A bird's-nest-like habit.

D. 1. a. VARIEGATUM.

16. autumnale, *Lowe*. Raised by Mr. Fitt. Not unlike Mr. Parson's *foliosum*, but green and gold. 20 × 6 inches.

NEPHRODIUM FILIX MAS.

*53. Festingii, *Thompson*. From the South Kensington collection.

54. revolvere, *Lowe*. Found by Mrs. Grant. A revolved *Stableri*. 29 × 5 inches.

NEPHRODIUM PALEACEUM.

41. grandescere, *Lowe*. A very refined yet giant form, having embossed pinnules. Found by Mr. Moly. 52 × 10 inches in centre: only 2½ inches at base.

42. ornamentum, *Lowe*. A neat variety with dense pinnæ. Found by Mr. Moly 44 × 7 inches.

NEPHRODIUM SPINULOSUM. (Subsection dilatatum.)

18. diversopinnulum, *Lowe*. Found by Mr. Moly. A distinct, pretty, very lax, depauperate form. 32 × 14 inches (stipes 15 inches).

POLYPODIUM VULGARE. (Subsection semilacerum.)

15. Tinternense, *Lowe*. A plumose form, obtained in 1847, on the ruins of Tintern Abbey, by Colonel Randall, and independently, some 30 years ago, by Mr. Cowburn. It is not now however to be found there. A large, graceful variety, much divided in the centre of the pinnæ in a regular manner. 23 × 6 inches.

The above additions increase the list as follows:—

VARIETIES.		VARIETIES.	
Pteris Aquilina	17	Aspidium angulare	394
Adiantum Capillus Veneris	34	Nephrodium Filix Mas	54
Asplenium adiantum nigrum	16	" paleaceum	42
" filix fœmina	313	" spinulosum	47
Scolopendrium vulgare	450	Polypodium vulgare	75
Aspidium aculeatum	34		

The number of varieties described in this Handbook is 1859.



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