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BRITISH FERNS AND THEIR VARIETIES

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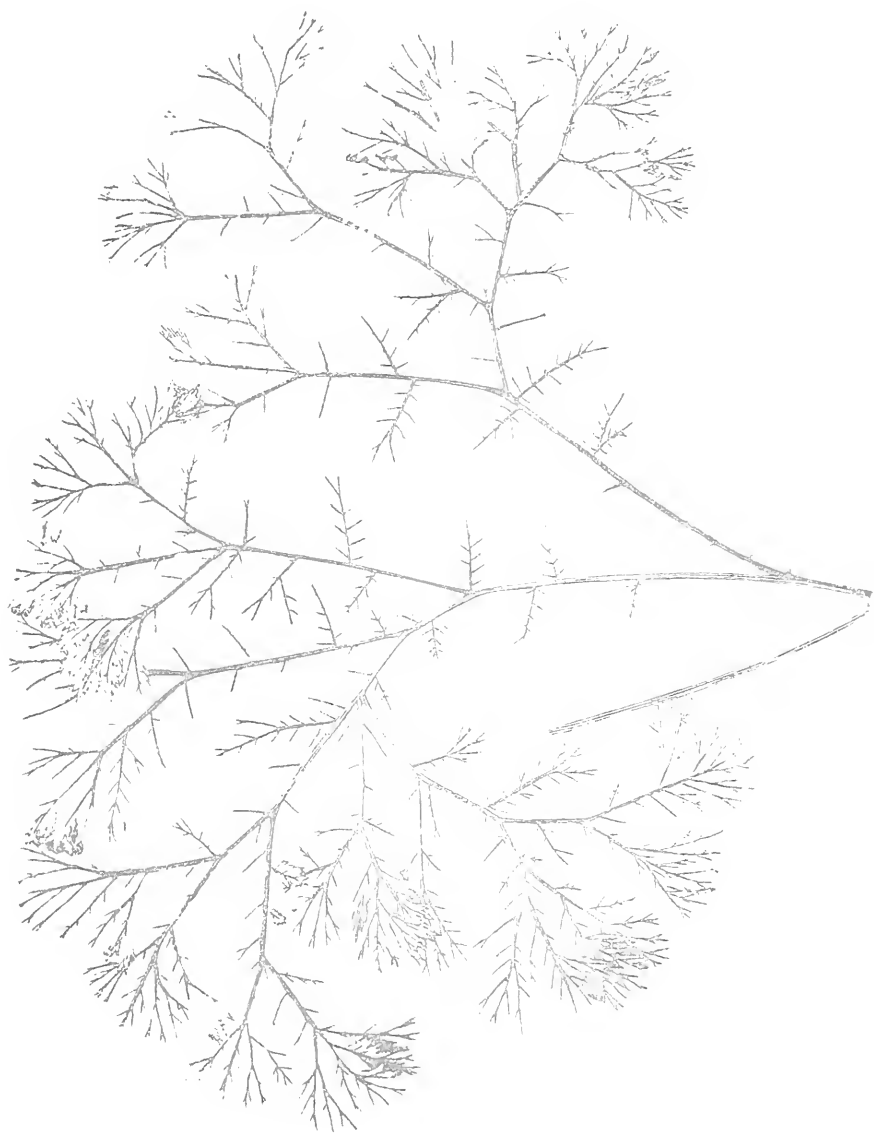


PLATE I.

BRITISH FERNS

AND

THEIR VARIETIES

BY

CHARLES T. DRUERY, F.L.S., V.M.H.

(VICTORIA MEDAL OF HONOUR IN HORTICULTURE)

AUTHOR OF "CHOICE BRITISH FERNS," "THE BOOK OF BRITISH FERNS," ETC.

Illustrated with 40 Coloured Plates

96 Nature Prints, and 319 Woodcuts and other Illustrations



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The Varieties as well as the Species are arranged in alphabetical order, thus precluding the necessity for a special varietal index

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BRITISH FERNS

INTRODUCTION

ALTHOUGH the species of Ferns indigenous to the British Isles are comparatively few in number, contrasted with the multiplicity of those found in tropical and sub-tropical regions, where the necessary conditions of warmth and moisture prevail, and although these selfsame species are in no instance confined to Britain, most of them being widespread and as abundant in many other countries, or even more so, than here, yet for some reason, difficult to explain, they stand far and away above all outside Ferns, even those of their own species, in the varietal phenomena they have exhibited. That this is so may be judged by a comparison of the list of varieties compiled in 1891 by Mr. E. J. Lowe in his *British Ferns, and Where Found*, the wild finds of which, described and recognized as distinct, number no less than 1119, to which may undoubtedly be added a considerable number of others, as fresh ones are continually turning up, and it is incredible that even Mr. Lowe, with the aid of his many Fern-loving friends, could have become aware of many casual finds which have fallen to the lot of outsiders. Be this as it may, the number mentioned suffices to show that under purely wild and unsophisticated conditions, in our shady lanes, woods, and glens, and in our roadside hedges, hedgebanks, old walls, and creviced rocks, our native Ferns have a most remarkable faculty for departing from the normal type, adopting new ones on most diverse lines, and, in point of fact, by their constancy and capacity for transmitting their peculiarities through their spores to their offspring, of fulfilling all the definitions of fresh species. Exotic Ferns, it is true, have afforded a number of wild sports, but the great majority of those which we see at our shows and in our botanical gardens have varied under cultivation on selective lines, and it is a remarkable fact that we have numerous types of variation in our native species, to which no approach whatever has been made by the exotic sports, of which the majority belong to the crested section, a few to the plumose or extra feathery section, while outside these there are few or none. One very feasible explanation of

this difference of yield at home and that abroad, and one which our own experience abroad tends to support to some extent, is that it is largely due to the fact that for more than half a century a continued coterie of gentlemen and some ladies, stimulated at the outset by successes in the first half of the nineteenth century, have made here a hobby of searching for abnormal forms among the common Ferns, while some of them have devoted themselves not only to such search and subsequent selective cultivation through the spores so obtained, but also to keeping up clear records of the discoveries, and even depicting them by nature prints. In this connection it is due to the labours of the late Colonel Jones, of Clifton, who prepared some 300 beautifully executed prints from the fronds themselves, that with the kind permission of his daughter, Miss Jones, we are enabled to enrich this volume by a selection, as an appendix, of about a hundred of the most striking forms, adhering almost entirely to the wild finds. The value of this selection is enhanced by the addition of Colonel Jones's contemporary notes, which will be of extreme interest to all students of our indigenous plants. It will need but a glance through these to appreciate the inventive power of Nature and the diversity of form which one and the same species is capable of assuming at her magical touch. Why this should happen is utterly unknown to us. Theories have been put forward that "sports" indicate a sympathetic response to environmental influences, but no observant Fern-hunter can agree to this, as the widest variations may be, and often are, found associated with the common forms, their roots and fronds intermingling, so that the environment is identical. Widely different forms, dwarf and congested, robust and lax, may be found on the same hillside, with the same aspect, soil, and general environment, so that the inducing cause of the change must be sought elsewhere, and so far has entirely baffled research. It is clear, too, from the character of such environments, that the "sports" cannot possibly be imputed to any change of conditions, another untenable theory. The theory, too, that the number of wild finds may be partly due to escaped spores from the collections dotted about the country must also be rejected, since not only have the great majority been found in localities far distant from such collections, but as a rule there are individual distinctions in wild "sports" which differentiate them from each other, and therefore from the progeny of the collected plants. In one instance, in the writer's experience, he visited a wood in the Lake District in which spores from a collection had been artificially introduced; several varieties were discovered, but all were distinctly referable to known forms in cultivation, which is practically never the case with wild finds. Spores, too, despite their minuteness, are solid, heavy bodies, unlike the much minuter, ubiquitous ones of the fungi. Hence they are little likely to travel far afield, and so mislead the hunter.

The literature of our native Ferns is very copious, but that of the early days of their study either makes no reference to varieties at all, or dismisses them as monstrosities, and consequently unworthy of serious attention. Moore's *Nature-Printed Ferns* was, we believe, the first work to deal with them on appreciative lines, both the folio and octavo editions containing a number of splendid plates printed from actual impressions of the fronds themselves in soft metal. Mr. E. J. Lowe followed with *New and Rare Ferns*, embracing a number of British varieties, and then, in 1876, published two volumes, *Our Native Ferns*, illustrated with a very large number of coloured plates and woodcuts depicting and describing all the numerous varieties, of which at that date he could obtain a record. Twenty years later he published an invaluable little handbook, *British Ferns, and Where Found* (Swan Sonnenschein & Co.), to which we have alluded above as dealing with nearly 2000 forms, including those raised by selective cultivation. In Britten's *European Ferns*, a few varieties are mentioned and figured. Mr. P. Neill Fraser, of Edinburgh, issued a list of varieties, and an interesting list of the Ferns of the Lake District was compiled by Mr. J. M. Barnes, and subsequently extended in a second edition by Mr. G. Whitwell, of Kendal. In 1888 the writer published *Choice British Ferns* (Upcott Gill), now out of print, describing and depicting a considerable number of the best types, and in 1901 he, in conjunction with a committee of the British Pteridological Society, brought the subject more up to date by *The Book of British Ferns* (Newnes), which described about 700 such.

In the interim, however, there have been still further developments and "finds," and it is our object in this work to bring the subject still more up to date, on more generous lines, and so far as is possible within the limits permissible to make it a complete compendium of existing records, a book of reference for culture, etc., but rather for the practical amateur than for the scientific botanist, though for the benefit of the latter we give footnote references to some of the most important scientific literature concerned with the discoveries which have resulted since scientific research has been brought to bear upon the inner phenomena presented by abnormal forms of Ferns. The generic and specific names given are also those generally recognized by British Fern-growers, and we have purposely steered clear of the terrible quagmire involved in the infinite number of synonyms, or different names for the same thing, resulting from varied and frequently mistaken views on the part of those botanists who make classification and nomenclature their study, many of whom, too, are constantly inventing new names for old friends, and thus turning confusion into chaos. The economical uses of our living native Ferns we have also ignored, as of too little practical importance in these days; but we should

be ungrateful to the tribe if we failed to remember that in point of fact the greatness of our Empire is largely based upon the post-humous wealth bequeathed to us by its ancient ancestors in the shape of our coal deposits. Finally, it may be as well to mention that a comparison of our lists with those published in the *Native Ferns* of Mr. E. J. Lowe will show many omissions. This, however, is due to the fact that many of the forms described and figured are now regarded as mere sub-varieties, or forms too irregular and defective to be worthy of cultivation. All such have been omitted to make room for a very large number of additions selected on far stricter lines, so that this work may be fairly considered as representing all the best known forms extant. Cultural remarks are made where needed in connection with the various species, and a chapter has been devoted to culture, treatment, and propagation for the more general guidance of our readers.

How far the beautiful varieties we treat of are worthy of places of honour in cool conservatories may be judged by our illustration (Fig. 1) of a collection by the writer, the whole of which, with the single exception of a *Woodwardia radicans* in the background, are of British origin.

CHAPTER I

BRITISH FERNS AS A HOBBY

THERE are hobbies and hobbies, and these may be divided into two kinds—natural hobbies, or those which deal with the products of Nature, and artificial hobbies, or those which deal with man's own productions, and of these two the palm must undoubtedly be accorded to the first. To the hobbies devoted to human work there is an inevitable limit, and many are governed by purely artificial tastes which not infrequently impute great value to really worthless things solely on account of their rarity or difficulty of acquisition. With the natural hobby, on the other hand, which deals with Nature's creations, every branch of study which is taken up is soon seen to be inexhaustible, and every thoroughgoing student becomes in time a specialist. Thus in Oliver Wendell Holmes's *Autocrat of the Breakfast Table* we find the so-called "entomologist" repudiating the term as far too comprehensive, and even confining his study of the beetle family to one section, claiming but to be a scarabæist. Turning again to the artificial hobby, apart from its inevitable shallowness, where is the "curio," the rare edition, rendered precious, perhaps, by a misprint, that can be multiplied *ad infinitum* if desired, as, to stick to our subject, a rare fern find can be, which, quite possibly, in addition may spontaneously endow the finder with "*editions de luxe*" as well under selective cultivation. The writer, to take a concrete example of the growth of a natural hobby, started some thirty years ago as a Fernist, owing to a stray spore of a *Doodia caudata*, a small growing exotic Fern, developing into a plant under a glass shade containing a fine specimen of *Sclaginella*, the study of which Fern was so interesting as to induce the acquisition of a few more exotics, and the provision of a Wardian case in which, by pure chance, a British crested Lady Fern appeared. Not long after that the specialist tendency induced the gift of all the exotics so far acquired to a friend, and, about that time, the British Fern fever was severely caught by an original find on Exmoor of a new variety of the Hard Fern, *Blechnum spicant concinnum Drueryii*. Spore-raising resulted in the discovery of prolific, or bud-bearing

seedlings, hitherto unrecorded, and the publication of this, bringing in fresh material for consideration, led step by step to greater and greater enthusiasm and careful research, rewarded by what have been considered to be very valuable discoveries, which, from that day to this, have formed the basis of research by a number of botanists of high standing, and have been the means of redeeming our British Ferns entirely from the stigma of being "monstrosities," and therefore outside the scope of the serious botanist's consideration. Now what the writer wishes, by this personal experience, to impress upon his readers is simply and solely the fact that any amateur could do the like, and that these results were attained entirely by close observation, "poking and prying and taking notes" in a comparatively small collection of plants. In this connection, indeed, it is by no means certain that a very large collection is an unmixed boon, since attention is apt to be too much distributed, and this consideration leads us to point out that the British Fern hobby is peculiarly a hobby fitted for all capacities of the pocket or of space available. In the Midlands we may see very charming specimens in the cottage windows, a number of good varietal collections are found in back gardens, and, as we may see in the great collection at Kew, splendid effects may be attained where available funds permit of well-constructed rockwork in the open or unheated houses or frames. With one or two exceptions all the species are perfectly hardy, and hence there is no expense required for winter protection, as is the case with many plants. The ease with which British Ferns can be grown is abundantly evidenced by the thousands of suburban gardens in which the common species are grown by scores and hundreds in individual cases, and among which one may search in vain for any of those far more beautiful varieties, the introduction of which we advocate, and which would transform an uninteresting monotony into an extremely interesting diversity, plus greater decorative effect. There are, too, innumerable conservatories so situated as to receive little or no sunshine, and in which, as a consequence, flowering plants become drawn, verminous, and unsatisfactory. In such places our hardy Ferns would be perfectly at home, and, by a judicious admixture of the evergreen species, could be a source of pleasure the whole year through. All that is necessary is to pay some little attention to their requirements, as set forth in our chapter on culture. Another interesting feature in the British Fern hobby, as a branch of horticulture, is the fact that from the patriotic point of view it is unique. We cannot take up any other branch without exotic aid, either in the form of foreign origin of the plants themselves, or of foreign varietal culture in addition to our own. In a British Fern collection, on the other hand, we deal absolutely and entirely with home produce, purely native plants, whose varieties are either due to Nature's inventions

in our own Ferny districts, or to selective raisings from these within the area of the British Isles. The hobby also embraces the charm of a definite object in country rambles at holiday times, forming an incentive to research in the most picturesque districts of Britain, the hills and dales, mountains and giens, breezy moorlands, shady lanes, and, in short, the thousand and one lovely spots in which Ferns revel, the delight of such wanderings being always enhanced by the chance of a good find and the consequent addition to one's collection of a most interesting "souvenir." Many such places, unhappily, have been depleted of their ferny attractions by the raids of vandals of various kinds. The impecunious villager collects all the seedlings within easy walking distance, and disposes of them by advertisement; the peripatetic tramp "lifts" the larger specimens, and sometimes, on a wholesale scale, attacks a ferny resort, and, with the aid of horse and cart, leaves desolation behind him, finding an outlet for his literal "spoil" in Spitalfields or Covent Garden, while a third grade is found in the heedless trippers who fill baskets and bags with the wayside Ferns as souvenirs, of which not one in a hundred probably survives subsequent neglect *en route* and at home.

To these several types of vandals we fear we must add another. Once, in Scotland, we were informed of the habitat of a rare Fern, *Cystopteris montana*, we believe, and made a pilgrimage to the spot, but not a vestige of a fern could be found, and we were reliably informed that this was due to the fact that a Professor and a body of students had visited the place some few days previously. In an American publication devoted to ferns, a correspondent proudly reported his discovery of an extremely rare species in the shape of one plant, to celebrate which he entirely denuded it of its fronds as herbarium specimens, and, not content with this, sent a friend there in the autumn, who depleted it again of the few it had thrown up in the interim, which, as every Fern-grower knows, was tantamount to its destruction. The Fern-hunter proper, on the other hand, would have carefully secured the prize, cultivated it, sown it, and, in that sensible way, would have secured not only its continued existence, but have provided a limitless amount of material for herbarium purposes as well. It would, indeed, be interesting to know how many rarities have found a grave in the herbarium cemeteries of the world, owing to this sort of unintended but thoughtless and culpable vandalism.

Happily, of late years local laws have been put into force to mitigate these evils; but it is beyond a doubt that the most efficacious remedy would be a general appreciation of the fact that these common forms are greatly inferior compared with the beautiful varieties which they have yielded, and which alone are worthy of cultivation as pet plants. Since the reproach of "vandalism" has been, perhaps more jocularly than seriously, hurled

at the variety hunter, it may be well to point out the difference that exists between the indiscriminating raiders above described, and the fortunate variety finder who bags a single plant, and by propagating it freely, possibly by the hundred, enriches his own and his friends' collections, and thus, instead of destroying, adds definitely to the ferny wealth already accumulated.

CHAPTER II

THE LIFE HISTORY OF FERNS

FERNS, as compared with flowering plants, are inconceivably older, since, in very similar forms to those of our present species, they existed in those far-distant times when our coal measures were formed, the evidence of which is incontestable, since the great bulk of such coal consists of the debris of Ferns and their allies, the mosses and Equisetums of that day, the recognizable remains of which are frequently clearly preserved in the coal itself. There is, practically, no doubt whatever that these old Ferns were evolved from sea-weeds ; but, judging by the very material difference between the two tribes of plants, even in the carboniferous age, it must be assumed that another immense period of time must have elapsed during the evolution of the one into the other, so immense, indeed, that, as in the case of the subsequent evolution of flowering plants from Ferns and their allies, the mind entirely fails to grasp it. Modern evolutionary scientists are practically unanimous in assuming that life must have begun in the shape of some very simple type of organic cell, engendered, how we know not, in the originally warm ocean waters.

Simple, however, as this must have been, it was yet endowed with some subtle power of modification and adjustment to its environment which, in course of time, led it to assume many shapes, varying from that of a simple crawling cell, like our present-day Amœba, to ciliated ones, capable, by means of motile hairs, of swimming actively about in search of food. Then the cells, instead of dividing and separating into distinct unicellular individuals, must have retained their union and built up compound bodies on varied lines, and with definite vital organs, so as to fit them for varied conditions and environments ; and at this point we may assume that the two great branches of the organic tree of life, the plants and animals, began to diverge and to evolve on separate and distinct lines. We may, then, in imagination, view a warm ocean, peopled with marine animals of many forms, and weeds of perhaps equal diversity. The land, however, has not so far settled down to stable or fairly stable conditions ; but in time we see

this ocean beating upon more permanent shores, admitting of life in the air; and again, in imagination, we may see some of the sea-weeds adapting themselves to existence, first of all within the

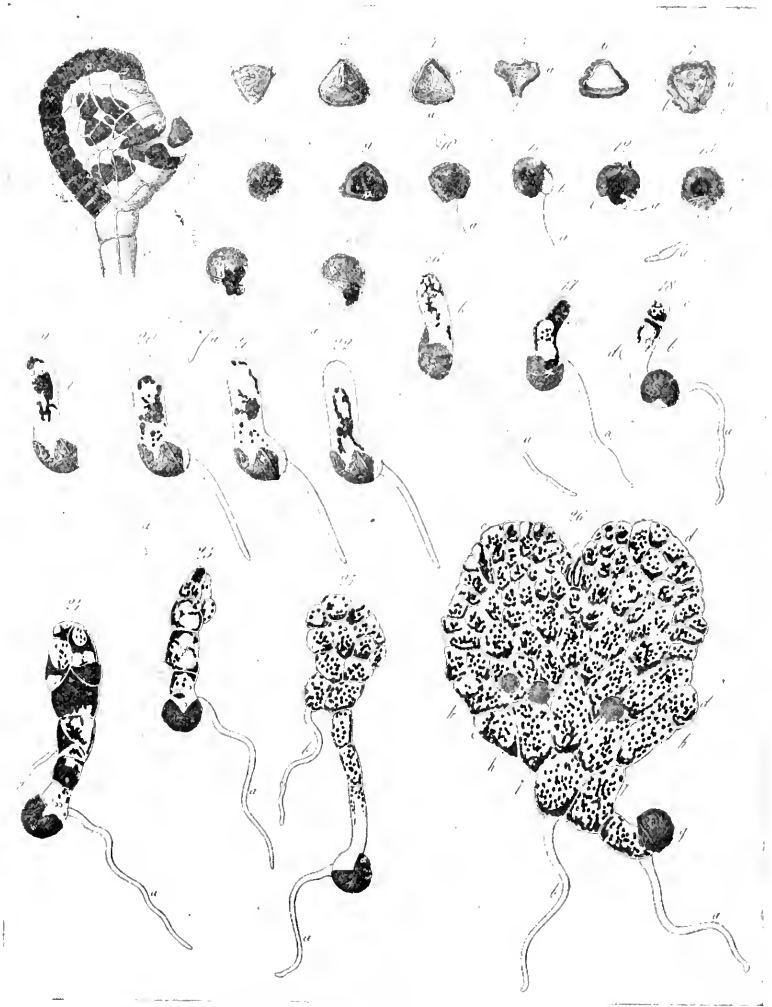


Fig. 2.—Details of development of Prothallus from spore.

area between high and low tides, or within reach of the spray, and eventually fringing the shores with vegetation, independent of the water save that afforded by the rain-giving clouds. This

change of environment, however, involves more than a mere change of form and texture. The foliage in the water requires no support; it simply floats, and it is probable that at first the

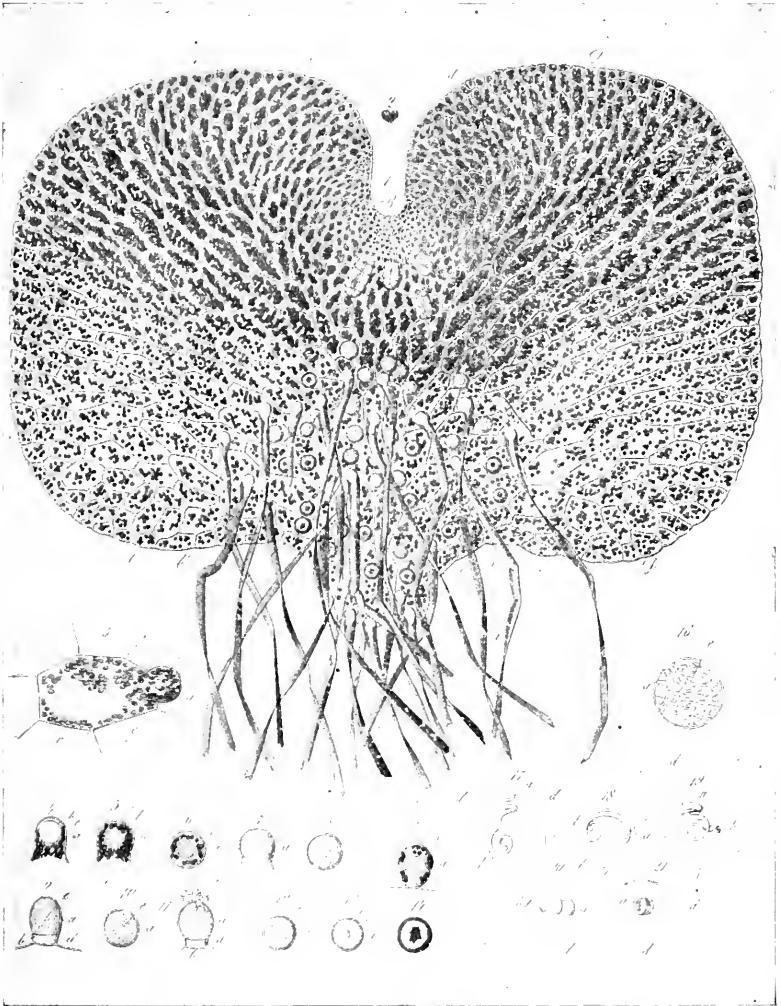


Fig. 3.—Developed Prothallus, Antheridia, and Antherozoids.

modified land plants got over this difficulty by being merely adherent to surfaces, as is still the case with our *Marchantias*, or *Liverworts*, and *Lichens* of to-day. The next thing, however, was the evolution

of internal structural supports, and means of conveyance of sap from the roots, which had now become feeders instead of mere anchors, so to speak, and so in time we come to the Ferns and their allies, the so-called Vascular Cryptogams, evolved with elaborate systems of veins and branches which enabled them to assume greater elevation, and to expose more and more of surface to the vivifying sunshine and the air. With all these wonderful alterations, however, one fundamental feature still persisted to characterize both sea-weed and Fern, and that was their reproduction by spores, the seed still remaining to be evolved, which spores, in order to produce a second generation, still required, at the critical period of fertilization, the agency of water. In the flowering plants, as we know, fertilization is effected by means of pollen grains, which may be transferred by insect agency or the wind from their place of origin to the vicinity of embryo seed elsewhere, which they then fertilize by transmitting the fertilizing material to it, by means of a tube. In the sea-weeds, Ferns, and similar spore-producers, or "Cryptogams," the fertilizing medium is in the form of a free-swimming antherozoid, a microscopic body provided with fine cilia, or hairs, by means of which it steers itself towards and reaches a body equivalent to an embryo seed, which, being fertilized, perfects itself to perform the same office and produces a plant. Obviously this need of immersion in water at the critical period of fertilization is a great handicap for a land flora, and, in point of fact, must have restricted it to regions where moist conditions prevailed, such as must have been the case on the sites of the primeval Fern forests which now form our coal seams. Hence, as the land presumably became more stable and more elevated, vast regions would have remained sterile, unless plant evolution took a direction which removed this difficulty, and so in course of time flowering plants came into being by subtle modifications of the reproductive agents until the dry pollen grain took the place of the swimming antherozoid, and eventually even the driest regions were provided with plants enabled to live in them. Meanwhile, as the plant world was evolved, the animal world was doing the same, on correlated lines. The flowers, at first small and insignificant, were stimulated to improve by the increased visits of the insect world, attracted by brighter colours, stronger perfumes, or richer nectaries, and eventually by virtue of such stimulus and response thereto, the world became enriched by the wonderful wealth and multiformity of flowering plants that we now possess. In this connection it is a curious fact that owing to the interrelations of the animal and vegetable worlds in the case of flowering plants, the seed has taken an all but infinite variety of forms, ranging from those of almost microscopic size to huge ones larger than a man's head, while, deprived of such interrelations, the Ferns present but very minute differences in their spores, and very little in their primary stages when fertilization

takes place, so that although in size an adult Fern may be as small as a tiny tuft of grass or, on the other hand, rival a majestic Palm, by its tall trunk and widespread plume of frondage, at the outset

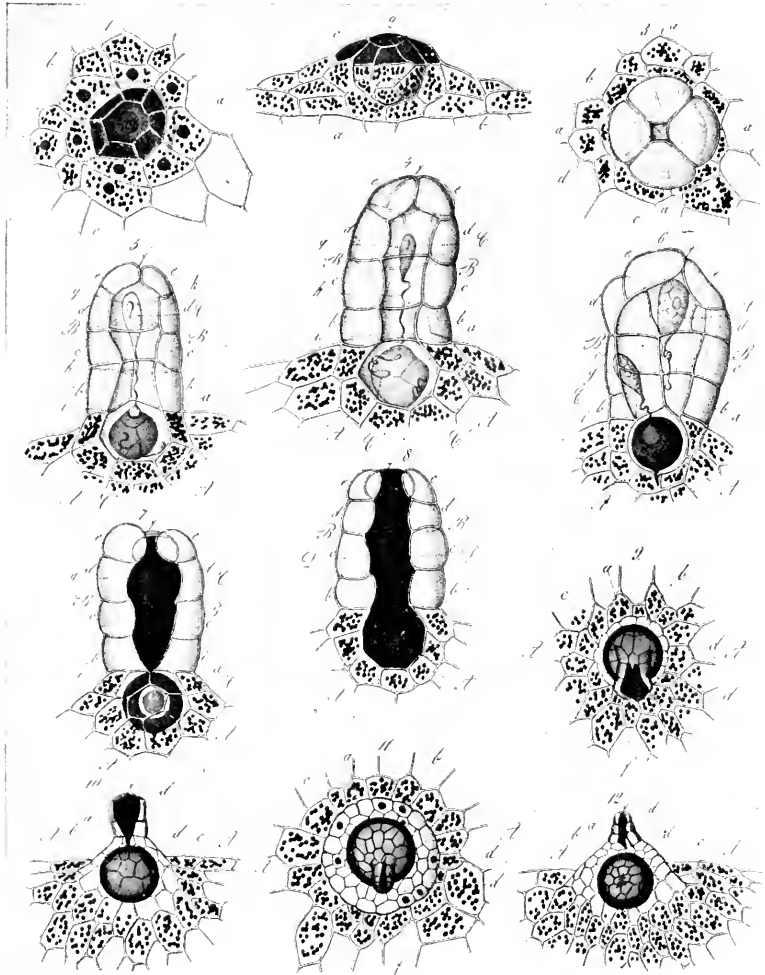


Fig. 4.—Development and fertilization of Archegonia.

they may be quite indistinguishable, and the spores in every case are microscopic in size.

With these preliminary remarks indicative of the past history

of the Fern, we may now proceed to consider the normal life cycle peculiar to Ferns generally as distinct from that of flowering plants. In the latter it is much shorter as regards the several steps or stages involved. Starting with the seed as sown, on reaching a congenial spot where there is sufficient warmth and moisture to induce germination, its husk swells, bursts, and emits first a root which enters the soil, and then a primary leaf or two leaves, according as it belongs to one or other of the two great plant divisions of Mono-

cotyledons and Dicotyledons, at the base or in the angle of which there is a bud. This bud produces more leaves, and without further circumlocution the young plant is produced. With the spore, on the other hand, when sown under congenial conditions, although it bursts its husk and produces an outgrowth, this outgrowth does not consist of a root proper and an associated leaf or leaves, but forms a small green semi-translucent scale, more or less heart-shaped, which is attached somewhat closely to the soil

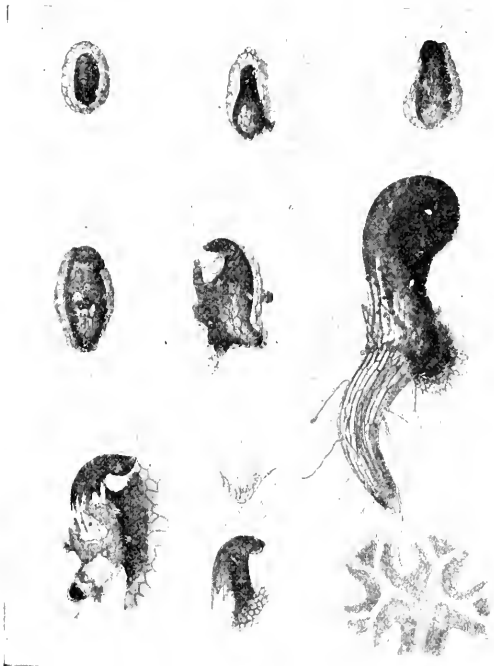


Fig. 5.—Development of young Fern.

by means of a number of root-hairs. This scale starts with a short row of cells from which protrude the first few root-hairs as the row lengthens by cell fissure and multiplication; but very soon the cells multiply laterally as well, until the heart-shape in question is visible, which then increases in size until it is perhaps a quarter of an inch in diameter, the two rounded lobes being fairly free of the soil, while the abundant root-hairs are clustered at the other end. At this stage, if this scale or prothallus be detached and its under-side examined with a good lens, it will be seen that among the root-hairs there are a number of rounded, pimple-like projections irregularly scattered, and that close to the indentation of the

heart, where the scale is obviously much thickened, there is a cluster of teat-shaped, projecting tubular bodies, called archegonia, and it is in these two kinds of bodies that we find what are essentially the flowers of the Fern, and it is through the conjunction of their contents that the young Fern is engendered. The rounded projections, termed the antheridia, contain a number of extremely minute, coiled-up organisms, termed antherozoids, and under proper conditions of moisture, which determines the presence of a

dew-like drop of water adherent to the under-side of the scale, the antheridium bursts, and the antherozoids, being freed, proceed to swim about actively by means of the motile cilia, or hairs, with which they are furnished. At this juncture the archegonia, clustered together as described, each of which has an incipient seed embedded in the scale at its base, are prepared for fertilization, which is effected by one of the antherozoids passing through it and reaching the incipient seed, which then becomes practically a seed proper, and eventually produces a young Fern, the scale acting as nurse by supplying nutrition at the outset, as a sort of substitute for the nourishment which is usually stored up in the seed itself with this object. It is a very remarkable fact that, minute as these antherozoids are, and truly vegetative as they must be, they obviously are not only endowed with locomotive power, but also with volition, since, when freely swimming, they will definitely travel towards a minute touch of malic acid applied to the scale, and it has been shown that the archegonia, when ready for fertilization, exude this acid, and thus attract the antherozoids in the right direction.

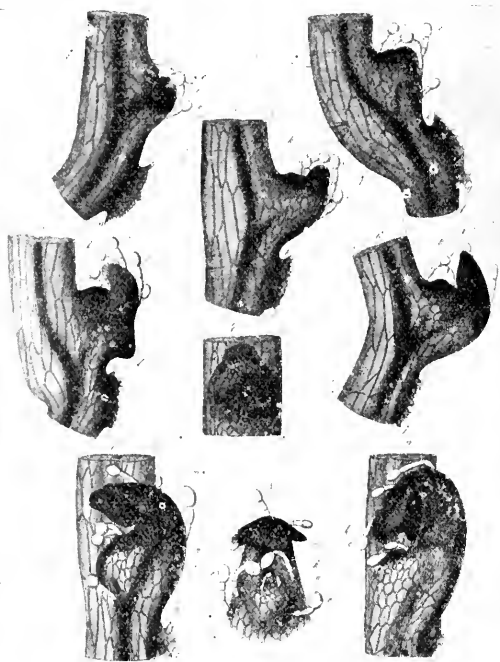


Fig. 6.—Further development of young Fern.

We have stated above that there is a cluster of archegonia, each with an embryo seed at its base, and although usually only one of these produces a plant, the vital energy of the prothallus becoming concentrated upon, presumably, the first embryo fertilized, this is not always the case, for in one instance in our experience a prothallus produced no less than seven plants, happily of an entirely new variety (*A. f. f. Kalothrix cristatum*). If, too, a prothallus be severed through the cluster in question, the severed

sections are capable of independent reproduction. Furthermore, despite the wonderful fecundity of Ferns as regards the number of spores, it has been noted that with some species, *Osmunda regalis* to wit, the first formed prothallus will bud out at the edges into others, each capable of performing its reproductive office, so that numerous plants may spring from a single spore.

It is clear, from our description of the process of fertilization, and the small size of the scale upon which the varied organs

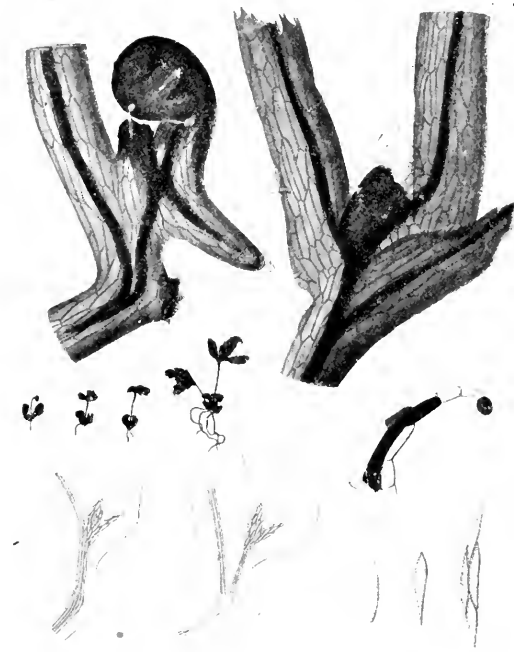


Fig. 7.—Young Fern fairly established.

exist, that it is carried through entirely on microscopic lines, and it is due to this fact and the lack of any recognized association between the observed scales and the resulting ferns that the botanists were baffled in their attempts to follow through the life history of the Fern until nearly the middle of the nineteenth century, that is until 1846, when Count Suminski discovered the final link in the chain by determining the nature of the archegonia, or female organs of the Fern, Naegeli preceding him by discovering and describing the antheridia and the antherozoids, and assuming the office they performed. The report of Suminski's triumph was accompanied by a magnificent elucidatory set of drawings, which we reproduce

(Figs. 2, 3, 4, 5, 6, 7), and which explain themselves in the light of our description.

We thus see that while the life cycle of a flowering plant is seed, plant, flower, and seed again, that of a Fern is spore, prothallus, antheridia, archegonia, embryo-seed, and fern, an intermediate stage, the prothallus, being thus interposed between spore and fern to provide for the reproductive system existent in the flower, but not in the Fern proper, and which, as a general rule, is essential in all the higher organized plants and animals for their continued existence. Nature, however, is not content with pursuing always the same lines, and, as is peculiarly evidenced in our native Ferns, is apt to depart from the normal or usual ones, and not only to vary her plans of structure on very wonderful lines, as this work demonstrates, but also to vary her modes of reproduction, and in this direction it is a remarkable fact that the study of the abnormal forms, i.e. the wild "sports" of British Ferns, has, in the hands of eminent scientific investigators, proved that the normal life cycle can be, and has been, varied in every possible way. In point of fact, every one of the stages of the life cycle above indicated has been proved to be needless to secure continuance of the race, as we will now demonstrate. In the earliest days, when these wild "sports" were discovered, they were stigmatised by scientific botanists as "monstrosities," and being regarded in the light of mistakes on the part of Nature, were entirely ignored as subjects for study. In the early eighties, however, the writer having been fortunate enough to discover an entirely fresh form of Fern reproduction (apospory), of which some particulars are given below, he advanced the opinion that Nature was far more likely to betray her secrets in her abnormalities or divergences from the beaten track than in her normal productions, and this led to investigation by Professor F. O. Bower of the Glasgow University, and eventually by others, of a number of British Fern varieties, with the astounding result that it was found that :

1. The spore was needless, as the fern frond was capable of producing prothalli by direct outgrowth (apospory¹), either by transmutation of spore-producing energy and consequent transformation of aborted spore capsules into prothalli on the sites of the spore heaps (soral apospory), or by mere outgrowths of the terminals of the frond divisions into true prothalli (apical apospory, discovered by Mr. G. B. Wollaston, of Chislehurst). Dr. F. W. Stansfield also demonstrated that apospory could be induced by close treatment from the crests of a Lady Fern, a very curious case.²

¹ Professor F. O. Bower, F.L.S., on "Apospory and Allied Phenomena," Linn. Trans., vol. 2, part xiv. July, 1887.

² Dr. F. W. Stansfield, on "The Production of Apospory by Environment in *A. f. uncoaglomeratum*," Journal Linn. Soc., vol. 34, No. 227, pp. 262-7.

2. That, given a prothallus, the fern might be produced by the aid of a sexual bud, formed in the same place on the scale as a sexual one, instead of by the normal interaction between antherozoids and archegonial seed embryo, and thus eliminate both of these (apogamy, previously discovered by Prof. Farlow).

3. That the prothallus itself was capable of bearing spores, so that the frond-forming generation was eliminated, and given the power of these spores to perfect and produce offspring of like capacity, the frond stage of the fern itself, as we know it, might be replaced by a minute Marchantia-like growth of small green scales, a reversion, in fact, to one of the primary forms of vegetation. This fact was demonstrated by Dr. Lang,¹ but so far these prothallial spores have not germinated.

4. As regards the elimination of the prothallus, this is evidenced by innumerable cases of bud or bulbil reproduction, by which young plants are produced by excrescent growths on the fronds and elsewhere, such as we see in the familiar *Asplenium bulbiferum* in which the fronds are profusely dotted with young plants.

To illustrate these various short cuts we reproduce Professor F. O. Bower's diagrams in Fig. 8; but it must be borne in mind that all these peculiar vagaries have been noted in connection with varietal forms of Ferns, that is, such as present marked divergencies from the ordinary form of frond, which has led to special study of their behaviour in the prothallus stage, with these remarkable results. It is therefore seen that the life cycle of a Fern is not only more complicated than that of a flowering plant, but that it is capable of being varied in so many ways, that every individual phase of the normal process may be omitted and reproduction yet be successfully effected.

Finally, our description of the Life History would be incomplete did we omit a reference to the wonderful arrangement by which the spores are scattered when ripe. On examining the heaps of spore capsules, we shall find them in most species—the exceptions we may ignore—to be beautiful oval, shining brown bodies, supported on short ribbed stalks, and that these ribs extend right over the top of the capsule, like the ridge of a fireman's helmet, only stopping half-way down the opposite side (Fig. 2). When the spores are ripe, this ribbed portion contracts, and eventually exercises such a strain that a crack appears at the point where it ceases; this slowly widens, exposing some of the spores, and after a wider and wider yawn, the whole of the top flies back with such violence as to jerk the spores in all directions. A tiny pinch of capsules, placed on a glass slip and watched under a microscope in a warm room, is a

¹ W. H. Lang, M.B., B.Sc., on "Apogamy and the Development of Sporangia upon Fern Prothalli. Phil. Trans. Royal Society, vol. 190 (1898), pp. 187-228.

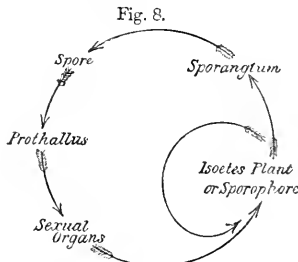
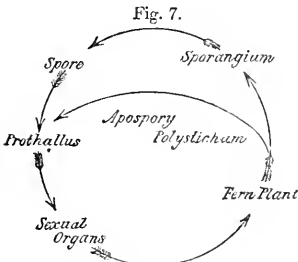
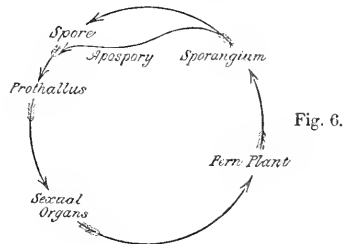
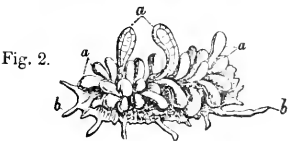
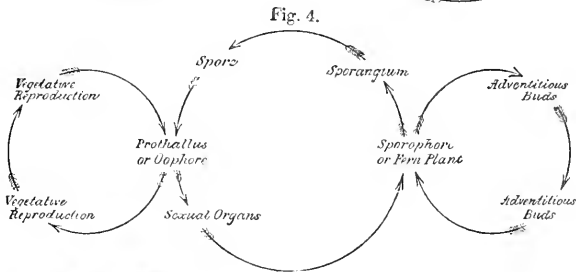
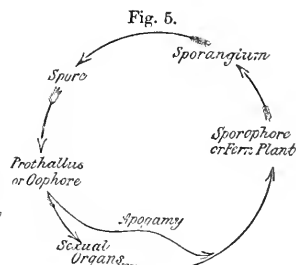
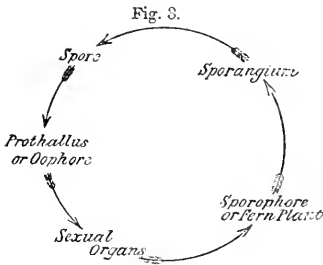


Fig. 8.

Fig. 1. Aposporous growths first observed on *A. f. Clarissima* (magnified).

Fig. 2. Growths of following year, and subsequently, markedly different, but yet producing prothalli on similar lines.

Figs. 3-8 show the normal life cycle (Fig. 3), and variations of same and practically explain themselves,

really amazing sight. First there is a general twitching as the gaping commences ; the twitching becomes more and more marked, and then, without the slightest premonition, the whole heap will possibly spring away from the field of view, upon which will be noted a miniature hailstorm of spores upon the vacant space.

CHAPTER III

FERN PROPAGATION AND CULTURE

IN the previous chapter we have described the normal and abnormal modes of Fern reproduction which have been discovered in connection with the spore; but inasmuch as propagation by the spores of varietal forms cannot be relied upon to produce precisely identical types, to secure such other methods of propagation are preferable, and fortunately Nature has endowed most Ferns with sufficiently superabundant vitality to permit of such being adopted. To prevent misconception it is necessary to state that the spores of thoroughbred constant "sports" as a rule produce offspring fairly true to the parental type, but apt sometimes to vary in the extent to which that type is displayed. This capacity, as we shall see elsewhere, is very valuable to the selective cultivator, since, by virtue of it, more and more enhanced types may be acquired accompanied by increased beauty. Many Ferns, and particularly varietal ones, are gifted with the faculty of producing buds in various ways, and it is by these buds that we are fairly certain of acquiring fresh specimens absolutely identical with the parental form, since they are, in point of fact, actually parts of it, and not therefore subject to those subtle varying influences which accompany sexual reproduction by the spore. As with probably all plants, however, bud-variation may and does occur, but so rarely that it may be practically ignored. In those Ferns which form a crown, around which arise a cirlet of fronds, shuttlecock fashion, such as the Shield Ferns (*Polystichum*), Buckler Ferns (*Lastrea*), and others, there is a tendency to produce lateral buds at the base of the fronds, close to the soil, and these in time develop independent roots and become full-sized associated plants, thus forming a sort of bush. In such cases these offsets can be prised away from the main caudex or crown with a blunt trowel or similar instrument, and will then come away with their own fascicle of roots, and only need planting to become independent specimens. In this connection we may remark that this operation is highly advisable if the full development of a fine variety is aimed at, since the unchecked development of such lateral growths tends

not only to dwarf the central one by competition at the roots, but spoils the graceful effect afforded by an individual centre, owing to the intermingling and consequent distortion of the frondage. In addition to these offset-forming buds, a number of our abnormal Ferns, and especially the soft Shield Fern (*Polystichum angulare*), produce bulbils, or small plants, on their fronds. In most instances these are confined to the lower part of the frond, where they appear as brownish scaly knobs within, or close to, the axils of the lowest side divisions or pinnæ. In some instances, however, as in the "*proliferum*" section of this species, such bulbils are produced in profusion, even to the very tip of the frond, and for some distance up the lateral pinnæ as well, so that a dense, moss-like growth occupies the centre of the frond, and consists of many scores of young plants. Each of these bulbils, while still attached, is nourished by the parent plant; but if such a frond be detached, pegged down on good compost, either in its entirety or in short sections, and kept close, the bulbils will root into the soil and produce fresh fronds, and in course of time the connecting midrib may be cut apart by scissors or a sharp knife, and a large batch of independent plants thereby secured. Where such bulbils are few and close to the base, it is better to peg down the frond which bears them and let them root in *in situ*, only removing them when well established. In some rare cases bulbils are produced on the frond backs in association with the spore heaps; but although this occurs as a specific character in one exotic, *Lastrea prolifera*, it has so far only been noted as a varietal feature on several plumose Lady Ferns, *Athyrium filix fœmina plumosum divaricatum*, *Axminstrense*, and its progeny, the *superbum* section (see chapter on "Fern Selection," p. 29), and some others of the same class, and also in one or two cases referred to hereafter. Here, however, we are dealing with deciduous Ferns, the fronds of which perish in the autumn, and hence such bulbils can only occasionally be induced to persist long enough to root when layered as described. Much depends on the season. In some years these bulbils have appeared so early that by the autumn their fronds have formed an obvious fringe to the parent ones, and were easily rooted before the latter began to fade. *Polypodium vulgare elegantissimum* also, under very favourable circumstances, produces bilbil plants also in conjunction with its spore heaps, but only on its most finely cut fronds, and as a secondary growth in the second year. *Adiantum capillus veneris* vars. *daphnites* and *imbricatum* both produce bulbils by spore transformation on the frond margins, and with a little warmth can be easily propagated by their means. Several forms of the Hartstongue (*Scolopendrium vulgare*) are prolific, sometimes, as in *S. v. cristatum viviparum O'Kelly*, the surface of the frond is dotted with little clusters of young plants. In *S. v. Wardii*, *Coolingii*, *Kelwayii*, and *Cousensii*,

bulbils appear freely on the edges of the conglomerate, or infinitely branched fronds, and in a recent find by the writer at Torquay the crested fronds are viviparous, quite on *Polystichum* lines, at the juncture of the stalk with the frond proper, and even in the angles of the ramose divisions. Such bulbils easily lend themselves for propagation, if severed with a small piece of frond, layered, and kept close.

In all these cases the bulbils are obvious to the naked eye; but it has been found that where none actually exist, nor indeed would exist, without artificial treatment, they can be induced to form, and often do so very freely. The caudices, or rootstocks, of many Ferns are built up of the persistent bases of old and long dead fronds, dead, that is, so far as their leafy portion and most of their stalks are concerned, but at the very bottom there is an inch or two of fleshy base which retains vitality for years, and it has been found that when the central growing part of the fern is damaged or destroyed the innate vitality of the remainder is apt to find vent by the formation of buds, which in time restore the plants. Under natural conditions, however, where central growth has stopped owing to the lengthening caudex having grown so far out of the soil as to be impoverished by drought and over-exposure, the still living portion we have described is buried in dead and rotting matter, and as the first essential of such incipient bulbil growth is access to light for their fronds, and to fresh soil for their rootlets, artificial treatment is alone likely to afford them the needful chance. This treatment consists in digging up the old caudex and removing with a sharp knife all the dead matter, roots and all, until the still green or sappy vital part is reached. This is then well washed and potted up in good compost in as small a pot as possible. If then kept close under a tumbler, in a few weeks bulbils are almost sure to appear as little white excrescences, and possibly a very valuable plant is not only saved, but freely multiplied. In our own experience with one of the oldest and finest collections of British Fern varieties in the country, the great bulk of which had apparently joined the majority, the plants were removed and thus drastically treated, with the result that not only was there hardly a failure whenever a spark of life was left, but many precious original wild finds, instead of being solitary specimens, may now be reckoned by the dozen or more. The common Hartstongue (*Scolopendrium vulgare*) affords a perhaps still more remarkable instance of this innate vitality. The old caudex, as already described, consists of old persistent bases, many scores of which can be pulled off if a plant be unearthed and the pulling off process commenced at the bottom. These bases are hard, dark green, sausage-shaped, and vary from half an inch to an inch in length, according to the robustness of the plant concerned. The larger ones can be cut across into two. Each will bear a little bundle of roots, which should be cut

off, and the base well washed. All that is necessary to do now is to put a couple of inches of well-washed silver sand into the bottom of a glass jar ; just moisten this sand, drop the bases evenly over the surface, cover close with a glass slip, and stand in a well-lighted but shady corner of a room, conservatory, or elsewhere. In a few weeks in the growing season, or if a little warmth be afforded, little white pimples will appear on every piece, and in time each pimple will become a plant, only needing to bring on in the usual way to become a specimen. By actual count we have found thirty-six such plants on one inch-long base. In this species the finest forms, i.e. the *Crispum*, or frilled ones, bear no spores at all, and hence this faculty of basal propagation is particularly welcome in their case, though applicable to all. With regard to the non-crown-forming Ferns, that is, those which have creeping rootstocks, like the various *Polypodiums*, *Cystopteris montana*, *Lastrea thelypteris*, and also the common Bracken *Pteris aquilina*, all, with the exception of the last, can be multiplied independently of their spores by severing portions of their travelling rootstocks, taking care to secure a frond or two and growing tips provided with roots. These, inserted in open leafy soil, will soon take hold and afford specimens in time. *Pteris aquilina* roots so deeply, and has such brittle rootstocks, that it is practically impossible to multiply it in the same way, the only method being to dig out, in the winter, a large, solid mass of soil containing its dormant roots, and transfer this *en masse*, on the then probable chance of survival. Incidentally we may remark that *P. aquilina* has afforded some very fine varieties which render these hints of value.

SPORE PROPAGATION

Having considered the non-sexual methods and opportunities for propagation of which Ferns permit, we may now turn to those connected with Nature's primary reproductive material, viz. the spores. In our chapter on the Life History of Ferns we have shown how such reproduction is brought about, and a consideration of that will help in the comprehension of what follows. The spores of Ferns are borne usually upon the frond backs, but are sometimes borne on modified fronds, or parts of fronds, devoted to spores alone. This we may see in the frond tips of the Royal Fern *Osmunda regalis*, the so-called Flowering Fern, because the spore clusters bear a faint resemblance to somewhat withered *Spiræa* blooms, in the little Ferns, *Ophioglossum vulgatum* and *Botrychium lunaria*, and as a sort of intermediate grade in the contracted fertile fronds of the Hard Fern, *Blechnum spicant*, and the Parsley Fern, *Allosorus crispus*. In the other species they are seen to be arranged in dots, lines, or marginal patches, and it is according to these arrangements that Fern genera are classified, since they are found to constitute the

most definite character, and the one best fitted to that end. Since, however, the description of each species we deal with will embody this, we may dismiss the subject here. One very remarkable fact in connection with these spores is their enormous numbers; on a fair-sized Fern, a Lady Fern, the annual crop may be by actual computation over one thousand millions, and even in the smaller species hundreds of thousands are concerned. We mention these figures because in spore sowing there is a valuable lesson to be drawn from them, and that is the absurdity of the amateur sowing, as he is apt to do, too thickly. To collect the spores is easy; the best time to sow is as soon as they are ripe, say in June or July. Ripeness is indicated by a deep brown or almost black colour in most species, but in *Osmunda* they are a dark olive-green, and in *Polypodium vulgare* a bright orange-yellow. If a small portion of a frond be detached and laid in a dry room on glazed paper or, as we prefer, on a glass slip which enables examination under a low-power microscope, in a few hours the spore pods (sporangia, Fig. 2) burst, and the spores may be collectively seen as a fine powder, and under the lens aforesaid will be distinguished as more or less definitely oval bodies, bearing in some species small ridges or projections. These bodies will probably cover the field of view, and will be mingled with the remains of the exploded capsules. Slightly breathing on the glass, immediately followed by a smart puff, will eliminate most of this debris, and leave the spores adhering to the glass, and clear of rubbish. Obviously, with plants which produce spores by the million, such spores must be terribly handicapped somehow, or the world would be overrun by them, and in this case the handicap is the minuteness and delicacy of the initial reproductive operations. Worms, insects, fungi, mosses, heavy rain, etc., etc., are all liable to upset them, and some of these adverse factors will do the same with our cultures unless we forestall them. Our own plan is, therefore, this. We take a small pot or pan, put in the usual crocks for drainage, and fill it nearly full of good fern compost, loam, leaf mould, and coarse silver sand (2, 2, 1); we press this flat and sprinkle some crumbs of loam or crushed flower pot over the surface, on which we then place a piece of paper to prevent disturbance, and thoroughly saturate the soil with *boiling* water until the pan is too hot to hold. All inimical worms, germs, or spores are thus killed, and hence, when the soil is cold, and the spores scattered *very thinly* and evenly over the surface, they have a fair field, and we may fully expect that all will develop. We finally cover the pot or pan with a glass slip, stand it in a saucer in a well-lighted place, but out of sunshine, until in time, a few weeks, the green scales described elsewhere cover the soil. No watering overhead should be afforded, a little kept in the saucer will suffice. If not too thickly sown, a month or so more will show the tiny fronds emerging to the light, and the crop

will then only need pricking out and bringing on. If, on the other hand, our warning has been neglected, and a dense mass of tiny prothalli is engendered thereby, a larger pan can be prepared and sterilized as described, and tiny patches, pill-size, of these prothalli may be pricked out and inserted an inch apart and kept close with, probably, success, since room is thus afforded. When a number of sowings is in question, a good plan is to sow in small pots and embed these closely together in cocoanut fibre in a larger pan, covering the whole with one pane of glass. It will then suffice to keep the fibre moist until the plants appear. All sowings should be numbered and registered in a book kept for that purpose.

CHAPTER IV

FERN SELECTION

HAVING in the last chapter given advice as to how to propagate by buds, patent or latent, and by spores, we may now consider what is the best material, especially in the latter connection, to be used, in order to improve quality and enhance the charm, in which direction so much has been done in the past, and so much may be done in future. It is a curious fact that once a Fern, or indeed any other plant, has departed from the beaten track, i.e. the normal or common form, and as a "sport" has adopted a different habit of growth, shape of foliage, or other practically new character, it is apt to display these same characters in its progeny, i.e. breed fairly true, and sometimes entirely true, throughout the brood. In many instances, however, careful examination of the seedlings or sporelings will show divergences, some in the direction of the normal form, i.e. reversion, though very rarely entirely, and others in a forward direction, showing the "sport" character more markedly, and it is, of course, in this direction that the judicious spore sower should steer. Given improved seedlings (we prefer seedling to sporeling, even in Ferns, since practically a seed precedes the young Fern) of this class, the probability is that their offspring will vary still more, and we may, in this connection, point especially to the immense number of beautiful Hartstongues which are now exhibited at our chief floral shows, as examples which, if sown from, would probably yield no two plants exactly alike, though all would be on similar lines. In fact, the great majority of them exemplify this in themselves. To propagate such truly we must resort to division or the induced bulbils already described. Ferns which present any signs of inconstancy, such as partial reversion, or any irregularities of form, defective pinnæ, etc., should be strenuously avoided by the spore sower, since defects are almost invariably transmitted, and there is nowadays such a wealth of unexceptionable material that it is waste of time to attempt reformation of what are known in Fern language as "rogues." Thoroughbreds, on the other hand, i.e. perfectly symmetrical and constant forms, may be relied on, and in some instances, three especially, with

which we deal in detail, have given really astounding results. These three are the beautiful Todea-like section of Soft Shield Ferns (*Polystichum*), known as the Jones and Fox *plumosum*, the marvellous crested and non-crested "*superbum*" section of the writer's Lady Ferns (*Athyrium filix fœmina*), and last, but by no means least, the extraordinary batch of Hard Shield Ferns (*P. aculeatum*) raised jointly by Mr. C. B. Green of Acton and the writer, and known as the "*gracillimum*" and "*plumosum*" section of that species. As no greater encouragement to the amateur Fern cultivator can be given than such records as these, we make no apology for giving them in detail, especially as such extraordinary departures from the normal

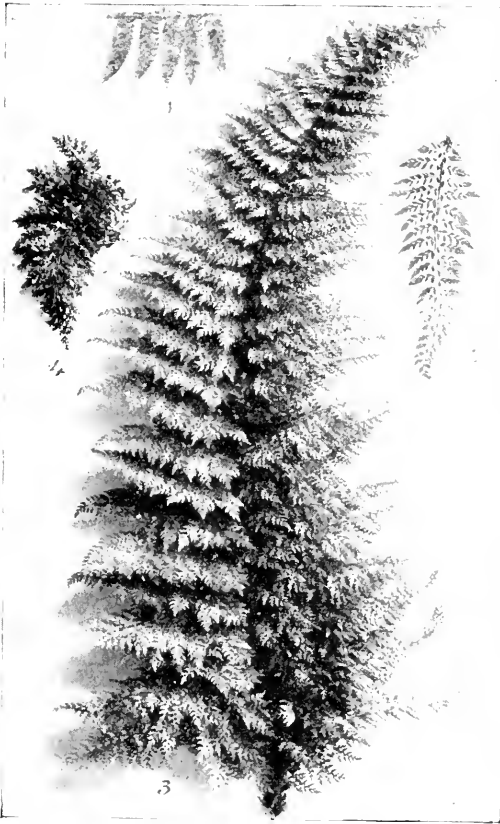


Fig. 9. *Polystichum angulare*, var. *plumosum densum* (Jones and Fox).

1. Normal form of species.
2. Wild find, South Devon.
3. Frond of offspring.
4. Pinna of *imbricatum*, raised from bulbil of *densum*.

in one or two strides possess also great interest for the evolutionary biologist. Like all cases of the kind, we must begin with a wild "sport," a purely natural one, and in the Jones and Fox case a find of this description was discovered in 1875 in S. Devon by Mr. J. Moley (*P. ang. decompositum splendens*), in which the normally bi-pinnate, or twice-divided Fern, was modified into a tri-pinnate, or thrice-divided one. Col. Jones and Dr. Fox sowed spores of this, which sowing resulted in a batch of Ferns with fronds so much divided, and with such overlapping, heaped-up moss-like foliage, as to constitute a perfectly new section, rivalling even the New Zealand *Todea superba* in beauty. So unexpected was this, that both the raisers were forced to doubt the

parental connection, but a fresh sowing giving similar results, they were compelled to accept it, together with the fact that this immense advance had occurred in two generations from the normal. The



Fig. 10.

A. f. f. plumosum elegans (reared from wild find).

Normal at top.

A. f. f. plumosum Drury.

Axminster plumosum (found wild).

A. f. f. superbum.

N.B.—Pinnæ only throughout.

plants so obtained varied, but all were extremely beautiful, and one named *Baldwinii* excelled by having its ultimate divisions almost as fine as hairs. This section still exists, and is embraced in the varietal list given elsewhere. Fig. 9 shows the pedigree of this section very

clearly. The second case is in some respects even more extraordinary. In 1863 a plumose or extra feathery Lady Fern (*A. f.f. plumosum Axminsterense*) was found by Mr. J. Trott near Axminster. Its spores usually produced the parental form, but eventually an improved one was raised (*A. f.f. p. elegans Parsons*) which was more finely cut. This, showing dorsal bulbils as already described, a pinna or side division was sent to the writer for inspection, and as there were also spores, and the form was a fine one, a sowing was made. The astounding result was only two plants of the parental form, and about a hundred of tasselled forms (a feature entirely absent in the parent), only two of which were free from defects, gaps, and irregularities of make. The two in question were, however, perfect, but one (*superbum*) was much more beautiful in its cresting than the other. This in itself formed a unique experience as the offspring of a non-crested parent, to say nothing of its scores of defective but crested sisters. Naturally, when this bore spores, a sowing was made at once, and again the unexpected happened, for its abundant offspring turned out to constitute two sections, the one entirely uncrested but extremely refined editions of the grandparent, and the other magnificently crested, even in some instances to the fourth degree the pinnulets being distinctly tasselled, one and all being great improvements on the immediate parent. The best of the non-crested section (*A. f.f. plumosum Druery*) is far and away the finest plumose Lady Fern extant, and the whole of the two sections stand alone. This case, as will be seen, eclipses the first one, by culminating in two distinct sections, crested and uncrested, all derived in the fourth generation from the normal, and the third from the wild Axminster find. Fig. 10 shows the pedigree of *A. f.f. plumosum Druery*, in studying which it must be borne in mind that each step shown represents the equivalent portion of a frond, viz. only one pinna or side division, and on the same scale, though the centre might well be taken for a frond. The third case of *Polystichum aculeatum* is equally astounding as representing a sudden metamorphosis of type, and is peculiar as affording such results after many years of reputed sterility. In 1876 there was found by a farm labourer, in a Dorsetshire hedge, a very fine form of the Hard Shield Fern, which he took to Dr. Wills, one of our most successful collectors in the locality, who named it "*pulcherrimum*," on account of its peculiar beauty. It was apparently an entirely barren Fern, but eventually found its way into many collections by virtue of offsets which it freely produced. This reputation for sterility it maintained until a few years ago, when upon a robust plant in Mr. Green's collection, a well-grown offset from the writer's specimen, given him many years ago by Mr. G. B. Wollaston, a few spores were discovered, one or two sporangia occurring as minute dots on several of the pinnæ. These were naturally collected, and sown both by Mr. Green and the writer,

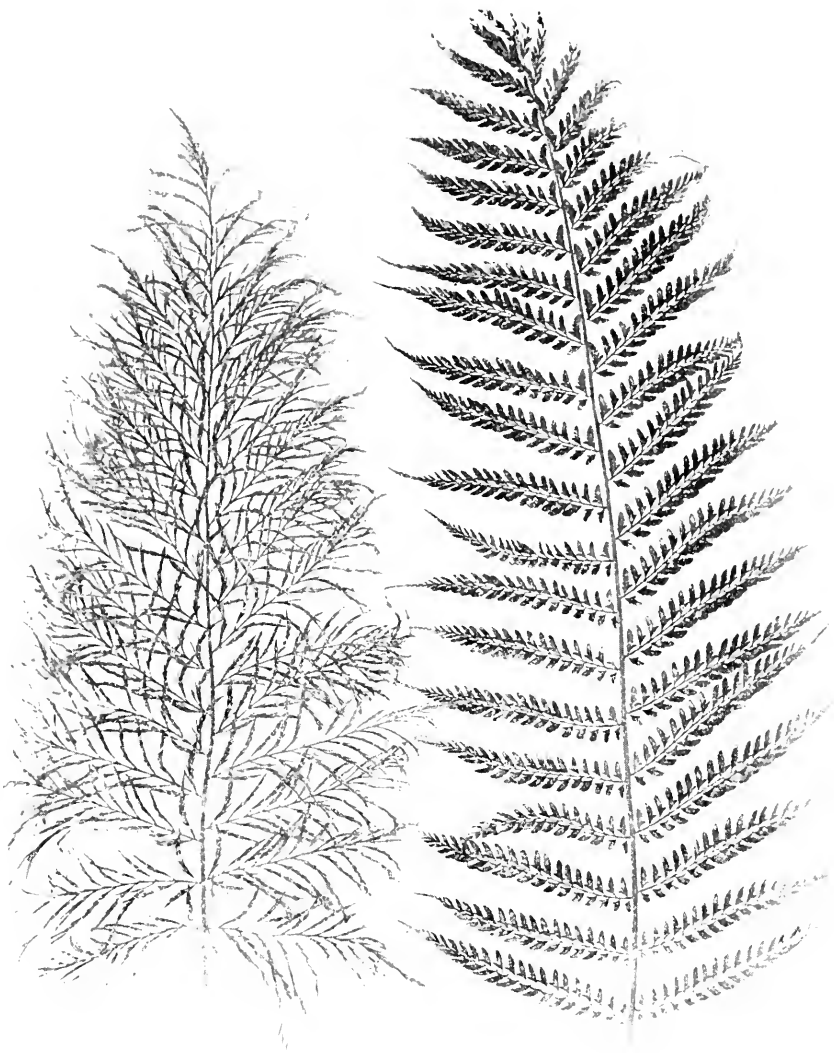


Fig. 11. *P. aculeatum gracillimum* (raised),
showing alteration in one generation.

Fig. 12. *P. aculeatum pulcherrimum*
(wild fin l).

and about a hundred plants resulted. As these developed it was noticed that in about a score of them, the fronds appeared to be much slenderer than in the rest, and particular care being paid to these as they grew on, they assumed more and more remarkable forms, until eventually they became extremely handsome specimens, on somewhat varied lines, of an entirely different type, the parental half-inch pinnules being in some cases nearly three inches long, and the fronds being thus of almost hair-like tenuity, while several plants displayed expanded tips to these subdivisions somewhat akin to tassels. A glance at Figs. 11, 12, and 13 will give a far better idea than any words of the marvellous difference between parent and progeny originating at one bound. It is interesting to note that the rest of the batch consisted of fairly true replicas of the parental form, and two or three plants which approached the normal *P. angulare* rather than *P. aculeatum*. There is only one of the batch which is fairly intermediate between the parental type and the "*gracillimum*" type, while another in Mr. Green's possession has varied in a different direction, viz. in that of the beautiful *P. angulares* of Jones and Fox, above described. The mere possibility of obtaining such results as these by sowing from thoroughbreds should be sufficient to discourage unsystematic sowing from inferior forms. Apart from these exceptional cases there are a great many in which great enhancement of the original type of the wild "sport" has been attained by careful selection, as may be judged by the "raised" varieties which figure in our list appended to each species. There is, however, one warning in connection with this subject which should be borne in mind, and that is that if a seedling displays faults, it should be destroyed, as should all inferior types when they declare their character. We have seen collections embracing valuable plants absolutely ruined because the tender-hearted raiser would give inferior seedlings a chance, and as such are often more robust growers than their superiors, as a consequence a jungle of mongrels has resulted, in which the true forms were practically smothered out of existence. The successful Fern-raiser must, in short, be a flinty-hearted Herod as regards ineligible innocents, or he will rue his clemency later.

As further details may be welcome regarding the question of Hybridization and Crossing, we refer to the next chapter in this connection.

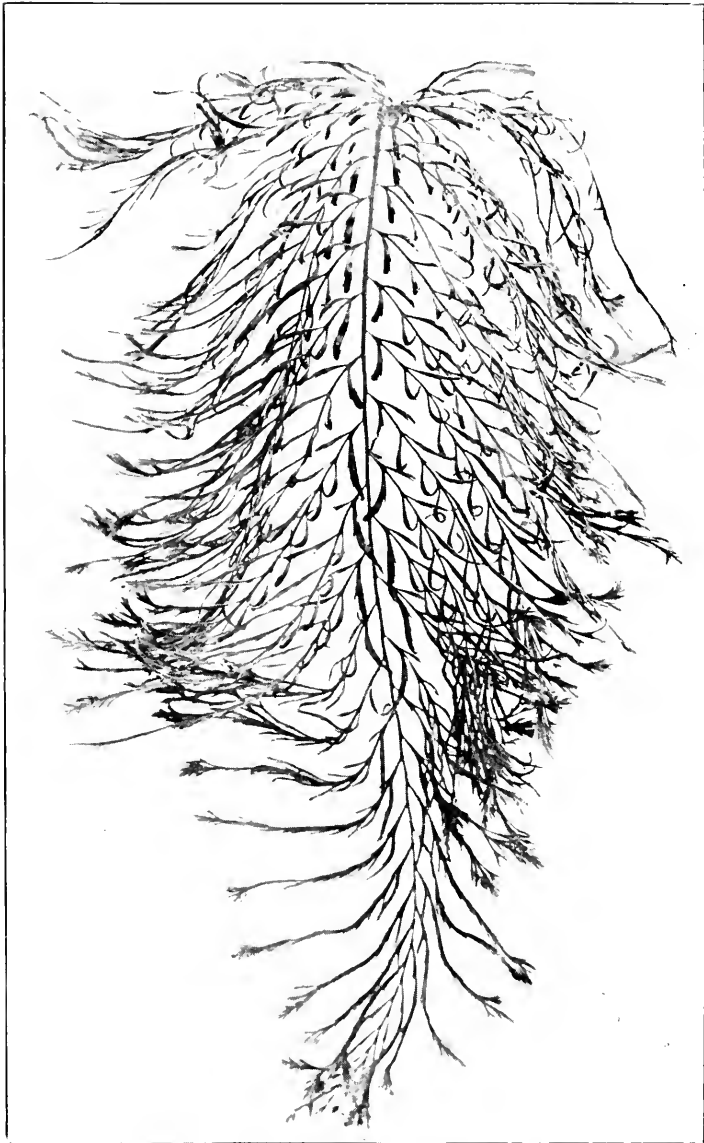


Fig. 13. *P. aculeatum gracillimum cristulatum*.

CHAPTER V

FERN CROSSING AND HYBRIDIZING

THE possibility of crosses being effected between different species or different varieties of Ferns was long doubted by botanists, even after the final steps completing the knowledge of the life cycle of Ferns were taken by Naegeli and Suminski, which demonstrated that the reproduction of a Fern through its spores resulted, as with flowering plants, from the coalition of two sexual elements, formed separately and brought together in the act of fertilization, these eventually producing an embryo seed by their conjoined influence. The difficulty of the scientist in accepting the cross fertilization of Ferns as a demonstrated fact arose from the circumstance that owing to the microscopic nature of the organs concerned, and still more of the operation involved, it was impossible to make experiments on the same easy lines as is practicable with flowering plants, whose pollen could be transferred from one flower to another by hand, and precautions taken to prevent fertilization from alien sources, or self-fertilization, so that eventually if seed be formed and plants result of mixed character, it is scientifically safe to say that such plants are crossbred and are not merely independent "sports." Hence when Ferns were found or raised displaying mixed characters, there was no absolute evidence available regarding their mixed origin, and it could only be assumed from the joint features displayed. It was due to Mr. E. J. Lowe to produce convincing evidence, which the botanist was compelled to accept, since he intentionally sowed together the spores of *Polystichum aculeatum densum*, a distinctly congested variety of that species, with those of *P. angulare Wakeleyanum*, a variety in which the pinnae were set on in pairs at obtuse angles to each other, so that with the opposite pairs so characterized, a cross was formed, a rare feature and entirely unknown in *P. aculeatum*. The result was several plants in which distinctly *aculeatum* characters were associated with the cruciate or cross-forming pinnae of *P. angulare*. A close study of the mode in which fertilization occurs shows that although, under ordinary circumstances, self-fertilization must be the rule, cross-fertilization was by no means an impossibility, and might even be facilitated by artificial means, if not to the actual extent of conveying the one element by hand to the other. The spore, under congenial circumstances, forms, as we have seen in our

chapter on the Life History of a Fern, a small green scale. On the under side of this, two sets of organs, male and female, are formed, while at the base of the latter an embryo seed lies embedded. When mature a number of antherozoids, tiny motile bodies provided with cilia, swim in the dewdrop beneath the scale to the archegonium under which the embedded seed lies, and by passing into this effect the fertilizing process. Now it is obvious that normally there is practically no chance of an antherozoid crossing the comparatively wide gap which lies between one prothallus or scale and another, and although it has been mooted by Mr. Lowe, and is indeed quite probable, that minute insects like the *Podura* or Skipjack and others may convey antherozoids from one prothallus to another, this obviously cannot be profited by for systematic crossings, and hence other methods are adopted. The microscopic character of the spores creates an initial difficulty in sowing since it is essential, so far as practicable, to know what is being sown, and it is in the experience of all Fern-raisers that stray spores, shed and scattered broadcast from other Ferns, are apt to develop in conjunction with the desired ones and thus introduce an uncertain factor into the experiments. To avoid this, spores should be collected as soon as ripe and as early as possible in the season, thus reducing this risk to a minimum. Having secured as far as possible a pure sowing of each kind intended to be crossed and taken the precautions mentioned in our chapter on Propagation, the two kinds should be thoroughly mixed and sown rather more thickly than usual, so as to ensure close proximity of the resulting prothalli, or they may be sown separately, each on relatively thinner lines, the one after the other. Here it may be remarked that some spores germinate and develop far more rapidly than others, and in that case two separate sowings at relatively distant periods may be made, the slower germinator first and the faster later on. Which is which can only be determined by experience, and the above remark applies mainly to hybridizing where different species are concerned; with varieties of the same species it may be ignored. The prothalli having reached full size, the time will have arrived for facilitating the transference of the antherozoids of one prothallus to another. These antherozoids have a free-swimming period, and then make their way to the archegonia. Clearly if at this time we can judiciously flood the prothalli, there is a fair chance of a general distribution of the fertilizing antherozoids, and that the chances of cross alliances are greatly increased. Lowering the pot or pan very gently into warm water until this percolates from below and just bathes the prothalli without entirely submerging them gives this chance, time, say half an hour, being afforded for the stimulus of the warmth to rupture the antheridia and launch the contained antherozoids upon their wedding trip. As a theoretical possibility the following plan has been advanced.

The archegonia, or seed-vessels, are as a rule situated just within the indentation of the heart-shaped prothallus, and the antheridia or equivalents of pollen masses among the root-hairs covering the larger and other half of the prothallus. The prothallus is most retentive of life, and will bear with impunity almost any amount of cutting up. We will therefore suppose two pans of thinly sown spores, each one of a different variety or species; as soon as the prothalli are half grown, i.e. before any fertilization is likely, we take a keen razor and cut each prothallus across just below the indentation. We do this in both pans, carefully removing the male halves in each and neatly embedding them in the soil, just touching the archegonial portions of the other variety or species which have been left *in situ*, and which if deprived of root-hairs by the operation will certainly develop more if gently pressed into the soil and kept close. In this way the chances of self-fertilization would be reduced to a minimum, and those of a cross increased to a maximum, as the subsequent growth of both halves would bring them into extremely close juxtaposition. There is, however, a good deal of irregularity in the arrangements of the organs on the prothallus, and hence this sort of division cannot be depended upon absolutely as separating the sexes.

To Mr. E. J. Lowe, as we have said, must certainly be accorded the merits of the first most striking hybrid, viz. that effected by him between a cruciate form of *Polystichum angulare* and a dense form of *P. aculeatum*, the result being a cruciate *aculeatum*, and we may here remark that it is only where absolutely distinct forms such as these are crossed that we can be sure that the progeny is a cross at all, because once a Fern or other plant has broken away from the normal plan of growth, its progeny is apt to vary again, probably more or less on the same lines, but not necessarily so. Fortunately, however, numerous crosses have been effected under circumstances of choice which eliminate this doubt. Mr. Clapham, for instance, sowed the finely cut form of *Polypodium vulgare*, known as *elegantissimum*, with another form known as *P. v. bifido-cristatum*, an attenuate crested form. *Elegantissimum* has a peculiar knack of partial reversion to the normal. The offspring of the cross was not merely a more or less tasselled form of *elegantissimum*, which might have been a secondary sport *per se*, but when it tried to get back to normality it produced a frond of the true type of *bifido-cristatum*.

Mr. Schneider, in his marvellous hybrid between this same *elegantissimum* and the huge exotic *Phlebodium aurcum*, finds the hybridism confirmed by precisely the same character of partial reversion. In another cross between *Athyrium filix fœmina Victoriae*, the most remarkable Fern yet found, bearing percruciate and tasselled fronds, and *A. f. f. setigerum* with translucent, bristly excrescences all over it, the result is *A. f. f. Victoriae*, true to type, but bristling throughout with the *setigerum* character. Crosses and hybrids of this class

bear their certificates of origin upon their fronds: in each case the parents are pure-bred original finds, and in their offspring the strong parental marks are distinctly brought out. At Kew there are a great number of marked instances among the *Polystichums* raised by Colonel Jones and others by crossing his polydactylous find of *P. angulare* with many other varieties. In this Fern there must have been some special prepotency, for the crosses were innumerable, but in every one that we have seen as yet they are earmarked by the parental defect of producing here and there non-polydactylous divisions and irregular furcation to boot. One and all present this feature, which establishes the dual origin convincingly, but spoils the plants.

Among hybrids between species, we must not omit to mention Mr. Lowe's indubitable cross between *Scolopendrium vulgare* and *Ceterach officinarum*. On examination of the fronds it is seen that they are of *Ceterach* pinnation, though confluent at the tip and quite scaleless, while the fructification can be detected on the basal pinnæ as in faced pairs, i.e. *Scolopendrium* fashion, and further up, as single lines, i.e. in the character of the Spleenworts. We do not know whether this plant is still alive, but the fronds *per se* establish its hybrid character and determine both parents with certainty. Fortunately, whether alive or dead, fronds are in the writer's possession as confirmation of its occurrence and of the description here given. In *European Ferns*, page 137, a presumed natural hybrid between the same two species is figured, but considering the great varietal capacity of *Scol. vulgare*, and the existence of numerous pinnatifid forms, the hybridism in that case is, to our mind, very doubtful, especially as it is fully fertile.

Having thus cited a few of the conclusive evidences of the possibility of crossing, not merely varieties, but also widely different species, and given a few hints as to the *modus operandi*, the next thing is to give some idea of the directions in which this possibility may be utilized to the best advantage. *Polypodium Schneiderii* is, we think, eloquent with two possibilities of extreme value. The one is that of enhancing the simple beauty of many exotics by alliances with the highly ornate forms which our British hardy species have assumed, both under purely natural conditions as wild finds and under selective culture of the progeny which they have yielded. The other is the increased capacity of exotics, so hybridized, to withstand low temperature, due to the infusion of hardy blood. In Ferns, thanks to the curious fact that the prothallus, or green scale upon which the flower homologues are produced, is almost constant in size throughout all species except the Filmies, the minutest species and the largest Tree Fern commence their career under practically identical conditions, and crossing and hybridization therefore are not limited as in flowers by incompatibilities between length of stigma and size of pollen.

Hence, so far as size is concerned, there is no bar, and the smallest may be allied with the largest if specific or generic differences be not too great. Consequently, though our British Spleenworts are all of comparatively small growth, their varietal forms may presumably be imparted to many of the grand large-growing exotics, and the task is the better worth attempting, as the genus is peculiarly exempt from the tendency to form tasselled or crested varieties, though examples of such occur among our native species, and thus afford fair starting-points for hybridizing purposes. *Scolopendrium vulgare*, curiously enough, though extremely closely allied to the *Asplenium*, and capable, as we have seen, of a definite alliance with them, is, on the other hand, one of the most variable Ferns in the world, and hence, taking the varieties of this species and the tasselled forms of *Asplenium trichomanes* and *A. adiantum nigrum*, we would suggest systematic admixtures of the spores of these with a number of the plain-fronded exotic *Asplenium*, and particularly with *A. nidus avis*. This last has recently given us one curious wild semi-cristate sport, *A. n. a. multilobatum*, indicating great capacity for variation; and considering its extremely close agreement in structure with *Scol. vulgare* and the alliance above cited of this latter with *Asp. ceterach*, we feel confident that with perseverance we might not only obtain handsomely tasselled Bird's-nest Ferns, but also, in conjunction with some of the fertile forms of *S. v. crispum*, frilled ones as well. That beautiful Hartstongue, for instance, *S. v. lucratum*, with broad sagittate, tasselled basal lobes, deeply cut pinnatifid fronds, tasselled heavily at their terminals, would be a splendid mate, and the hybridist who mated the twain would certainly not repent the trouble taken. This field is a very wide one, but care would have to be taken to avoid all but thoroughbred symmetrical forms, since faults are almost certain to be transmitted and the progeny marred.

Asplenium trichomanes has, so far as we know, never yet been crossed or hybridized. *A. t. confluens*, Stabler, an asserted hybrid with *A. marinum*, does not bear the test of investigation, as *A. marinum* did not grow near the locality of origin; and although its spores are always imperfect, this is not enough to establish hybridity by itself. *A. trichomanes cristatum*, however, would be well worth sowing with other *Asplenium*, many of which are obviously very closely allied indeed. Our *Blechnum spicant* has given us some charming forms, crested, dissected, and otherwise varied. *B. s. cristatum*, *B. s. ramosum*, Kinahan, *B. s. trinerviocoronans*, Barnes, *B. s. concinnum*, Druery (strings of emerald scallop shells), *B. s. plumosum*, Airey, and others, one and all might find fit mates among exotic *Blechnums* and *Lomarias*, to many of which new charms would certainly be imparted, the twofold character of the fertile and barren fronds emphasizing greatly the varietal features. Our *Lastreas* or *Nephrodiums* and the exotic ones afford another

field for combination, as well as our marvellous *Polystichums*, of which the best plumose divisilobes are often sufficiently fertile to afford material. *P. setosum* especially should be tried with some of the best. Could thorough alliances be effected between this lovely lucent hard-fronded evergreen Shield Fern and such gems as *P. a. cristatum* (Wollaston No. 10), *P. a. cristato-gracile*, Moly, and some of the divisilobe *plumosums* of Jones and Fox, Pearson and Esplan, the results could only be gems of first water. Then there are our *Osmunda regalis* and *Osmunda japonica cristata* to act as suitors to *O. cinnamomea*, *O. interrupta*, and *O. gracilis*, and finally there are our lovely forms of *Polypodium vulgare*, *P. v. cristatum*, *grandiceps*, Fox, Forster, and Parker, *bifido-cristatum*, and *pulcherrimum*, to say nothing of *P. v. elegantissimum*, the British-born parent of *P. Schneiderii*, all waiting for chances of the introduction which they certainly merit to the aristocratic Fern circles of their more stately foreign relatives. The field indeed is all but virgin, and we are confident that careful cultivation of it would yield a host of new and charming novelties, provided—always provided—that it be done on right lines.

Into the question of simple crosses between varieties we do not propose to enter, space prohibiting, though to us and to British Fern specialists generally there is a wide and fertile field still but partly cultivated. We have, however, framed our chapter rather for the benefit of the more numerous raisers of exotics, who are too apt to ignore the merits of our home Ferns altogether, and only here and there recognize their value in the direction we have endeavoured to indicate.

In conclusion we may mention that there is one point in connection with Fern crossing which has no parallel in flowering plants, and that is the possibility of attempts being frustrated by apogamy. In numerous Ferns it has been found that the young plants are asexually generated in the prothallus, a simple bud arising on the spot usually occupied by archegonia. *Pteris cretica*, *Lastrea pseudo-mas cristata*, *Cyrtomium jalcatum*, and others present this peculiarity in nearly every case, and of course under such circumstances no crossing is possible, unless in exceptional cases, where the normal process may obtain. As *Cyrtomium* and *Lastrea*, for instance, are closely related, and no crested *Cyrtomium* had been found, we sowed *Cyrtomium jalcatum* and *C. fortunei* thickly with *L. p.-mas cristata*, obtaining a pure crop of both, a result we should have expected had we not forgotten the apogamous character of both members of the desired alliance. This, then, constitutes a hidden hindrance peculiar to Fern crossing. There are, however, a number of varieties of *Lastrea p.-mas* which afford extremely strong evidence of crossing, and we are therefore inclined to believe that apogamy in the species is by no means without exceptions, and that normal sexual reproduction frequently occurs.

CHAPTER VI

MULTIPLE PARENTAGE

SINCE the possibility of combining the characters of more than two varieties by crossing has been advocated by the late Mr. E. J. Lowe, and a mass of presumed confirmatory evidence put forward in his interesting work, entitled *Fern Growing*, we think it only right to give equal publicity to the reasons which, in our opinion, controvert this possibility. In the first place must be considered the fundamental simplicity of the operation of fertilization. That operation consists in the fusion of two sexual principles, one contained in an ovarial cell, the other in a sperm cell, each of which has been previously prepared by Nature for coalition by the removal of one-half of the vital nucleus, so that, by itself, it is incapable of performing the work of a perfect cell, viz. self-multiplication and contribution thereby to the needful vital work of building up the plant concerned. Nature has provided many modes of bringing these two half-cells together, and it is clear from all biological experiments that when they are brought closely adjacent, the sperm half-cell makes its way to the ovarian half-cell, with which it coalesces, thus constituting one perfect cell by union of the vital half-nuclei, and this done the completed cell proceeds to multiply itself in the usual way, and to build up a now fertilized seed. Obviously with such an arrangement there is absolutely no room for a second sperm cell, much less for several, to operate, the combination is effected, and it is precisely as if a lid had been fitted on to a pill-box and an attempt were made to fit on one or more lids afterwards. The fact that a very much larger number of sperm cells are formed than there are ovarian ones is simply and solely one of those many securities which Nature provides for the permanence of a race, regardless apparently of cost of material.

With reference to the many combined forms of variation which were produced by Mr. Lowe, by mixtures of spores of Ferns displaying different types, we have carefully studied these, and find that in many cases the forms sown were more or less of a protean character, and likely, by themselves, without any cross-

ing at all, to yield very diverse progeny, displaying several characters in an erratic fashion, which might be imputed to other varieties sown in conjunction. To take a concrete case, in Experiment No. 6, page 84, "the spores of eight varieties were mixed and sown together. These were *multifidum* (crested), *Victoria* (cruciate), *uncum* (lax), *Frizellæ* (lunulate), *truncatum* (truncate), *proteoides* (a cruciate with projecting pinnae), *crucipinnulum* (cruciate in the pinnules), and *ramosum* (branched)." Now, in point of fact, "*proteoides*," as its very name implies, would, *per se*, produce offspring of precisely the character depicted on pages 85 and 86, which are claimed to show the characters of seven out of the eight varieties shown, and thus to demonstrate their multiple parentage, that is, that seven half sperm cells had contrived to combine with one half ovarial cell, a biological impossibility. In point of fact, instead of seven combined characters there are only signs of two in the truncate form, and of "*proteoides*" alone in the other, while the crested characters of *multifidum* and *Victoria*, the branched character of "*ramosum*," and the ball-like pinnae of "*Frizellæ*" are entirely absent. We have taken this instance as a typical one of many. Turning now to the extraordinary combinations Mr. Lowe produced in the Harts-tongues, he sowed *undulatum* (a wavy fronded Fern), *spirale* (a dwarf variety with a spirally twisted apex), *muricatum* (a muricate form), and *keratoides* (a branching, crested form), and he claims that four resulting plants, depicted by him, one of which is named "*quadriparens*," showed unmistakably the influence of four parents, but here "*undulatum*" and "*spirale*" are closely akin, the latter a dwarf form of the former, and the great vitiating factor in all such experiments is lost sight of, viz. that once a Fern has departed from the normal, its progeny may vary greatly without any crossing, and may even spontaneously produce crests, as has occurred over and over again. Another point is that if such crossing experiments be continued for years under glass it is practically an impossibility to make pure sowings, and a few strange spores may produce plants which lead to entirely mistaken conclusions, since they may already be the result of a cross, and, becoming crossed again, produce four combined characters, instead of two. It is, however, rather the fundamental simplicity of the fertilizing process which we have described, upon which we rely as controverting the theory of multiple parentage, and we put it forward here merely that the opposing views should be grasped by fern-growers, and not in the very least as detracting from the great services which Mr. Lowe rendered in connection with our native Ferns by his publications and experimental work, since it was indubitably he who first convinced scientific botanists that hybridization was possible. A secondary object is to point out to students and experimentalists in this line of research that it is unwise to sow mixtures of spores

containing erratic and indefinitely varied forms, and that the best plan is to select two, and only two, quite distinct varieties, whose character may be clearly distinguished if a cross occurs. Owing to the practical impossibility of securing a cross by hand, as is easily done with flowers, it is only by such selection that practical certainty can be eventually secured.

CHAPTER VII

ROCKERIES, FRAMES, AND WARDIAN CASES

GIVEN such protection from wind and burning sunshine as we find prevailing in those spots where Ferns best luxuriate in their native habitats, properly constructed rockeries in the open are admirably adapted for their culture. It is always, indeed, in broken, rough, and rocky soils that we find Ferns at their best, provided that shade-giving trees shelter them both from the rough breeze and the too ardent sunbeams, and that moist conditions prevail. When, therefore, the construction of a Rock Fernery be considered, a position and aspect should be chosen which tallies as nearly as possible with the conditions aforesaid. The main slopes of the rockwork should face north or east, and, of course, if a belt of trees or tall shrubs can be utilized as a wind-screen so much the better, since the fronds can never display their natural delicacy and grace if unduly exposed to rough breezes. Ferns, although fond of moisture, are averse to stagnant wet conditions, and the loose nature of the soil we have described indicates good drainage. Having, therefore, chosen the site for a rockery, it is best to begin the mound, if such has to be constructed, by making a heap of loose brick, or other open and lasting material, some feet deep, covering this with good garden soil, avoiding stiff clayey material, which soil should be heaped high enough to provide for considerable settlement. The mound being made of the required shape and size the placing of the rockwork should begin, and for this purpose porous sandstone should be used if procurable, though good effect may be attained by the use of brick burrs, or the misshapen masses of spoilt bricks which accumulate at most brickfields. This material is very congenial to Ferns owing to its porous nature, and if the burrs be carefully selected, and all corners knocked off, they answer the purpose exceedingly well, and do not offend the eye by an appearance of artificiality. Clinkers should be strenuously avoided ; we do not see clinkers in nature, and natural effects are what we aim at. Shells, corals, and similar things we have seen associated with rockeries, much to the disgust of any well-constituted mind. Having the material ready, the placing should commence at the bottom of

the mound, holes being dug sufficiently deep to embed the pieces firmly on their centres of gravity, soil is then worked well in behind them, and it is advisable that this soil be a good compost of friable loam, leaf mould, and coarse silver sand (2, 2, 1), since it is this into which the Ferns will have to be planted later. Regularity of position or size should be avoided as far as possible, and the stone should be so arranged on similar lines of firm bedding, as to form, as the work proceeds, pockets, nooks, and crevices such as ferns delight in. The construction finished, the whole should be well watered and allowed to settle for a few days, when planting may be done. Planting can, of course, be done as the work of construction proceeds, but we prefer to do it separately, to preclude the risk of damage by local settlements and dislodgements. Ferns vary as to their requirements of moisture in the soil. *Osmunda regalis*, the Royal Fern, is naturally a bog Fern, and so is *Lastrea thelypteris*. *Blechnum spicant*, the Hard Fern, *Athyrium filix femina*, the Lady Fern, and *Lastrea montana*, the lemon-scented Fern, all prefer moist soil, and hence should be planted low down, while the other species may be distributed at higher levels, the Spleenworts being inserted in the chinks and crevices contrived for them. The various Polypodies should have special stations filled with leafy soil in which their travelling roots can spread, and if the Limestone Polypody is planted, some old mortar, chalk, or other limy material should be mixed with the soil. The size of the Ferns used must also be considered in arranging them, and it is better that at the outset the rockery should look a little bare, than to cover it with plants which almost immediately invade each other's domain, mix their fronds together, and hence lose all charm, while the smaller species probably perish by the overgrowth of their neighbours. Ferns of the shuttlecock form of growth should be planted as single crowns; if they are in clumps of several, it is quite easy to part the individuals by pulling asunder or prising off with a blunt trowel. If connected by a stout neck, a cut in this with a sharp knife will facilitate division, and each crown will come away with its own roots.

Although rockeries are undoubtedly more effective than flat beds when occupied by Ferns, they are by no means essential for garden culture as regards a number of species. The Lady Ferns, Shield Ferns, *Lastreas* of several species, Hard Ferns, the Common Polypody, the Hartstongue, all will do very well on the flat if good open leafy, loamy soil be available, and water be supplied in cases of extended dry weather. We are assuming an annual rainfall of about twenty-five inches, but in places where this is exceeded there is very little risk of damage by drought at all, especially if masses of porous rock, or the burrs aforesaid, are scattered over the soil, and thus prevent general evaporation. The best place for a Fern is under the north or east side of a large piece of rock, which shelters

the crown from the noonday sun. The best time for rockery construction and planting Ferns is in the early spring, after a long winter rest, and before the new fronds are actually rising ; at this period they will stand dividing and shifting almost with impunity, and with the minimum risk of damage to the growth of the coming season. The next best time is the autumn, just when growth has ceased.

FRAME CULTURE.—We have seen some very charming collections of the smaller growing species in cold frames, the species being kept separate. In this case, in the area of the frame, the ordinary soil is excavated for a foot or eighteen inches, such soil being replaced with the compost already mentioned. If, however, the local soil be good garden material, a thorough digging and intermixture with leaf mould, or whichever material is lacking, will suffice. Into this the varieties are planted, sufficiently widely apart to permit them to assume full size, and with the needful watering or exposure to rain in wet spells, they will take care of themselves. The frame itself should have sliding or hinged lights, and be two feet or more high at back by six inches less in front, according to the species to be accommodated. The length may be anything, but the width should not be a hindrance to easy reach. It must be shaded from hot sun but not deprived of top light. Its slope should be northward or eastward. A thin scrim blind is advisable for use in case of need. The varieties of *Polypodium vulgare*, *Blechnum spicant*, and the smaller forms of the Hartstongue are peculiarly fitted for frames. Serviceable pockets, or rather troughs, for seedlings may be made along the sides of the frame by driving in a row of nails obliquely, at an angle of forty-five degrees, upon which may be rested the lower edges of the ridge slates used on roofs, which are several feet long by six inches wide. Holes can easily be bored through these near the upper edge, and copper wire can be passed through and looped over another row of nails where necessary, suspending the slates at an angle of forty-five degrees, which thus form a continuous trough.

WARDIAN CASES.—The simple invention by Mr. Henry Ward in the first half of the last century, consisting of an approximately air-tight glass covering to a shallow box, capable of containing plants, turned out to be one of immense importance in connection with the transport of living plants from far distant parts of the world with safety, and it also permitted of the culture of delicate plants, demanding a constantly humid atmosphere in ordinary rooms, which previously had been an impossibility. The typical form of case is composed of a metal box about a yard long, half as wide, and about six inches deep, provided with a rectangular glass cover, with a semi-cylindrical top, with a narrow opening along the

centre for ventilation if needed, and swing glass doors at both ends, permitting of easy access, but closing tightly. The box has, or should have, a zinc bottom, provided with a tap for withdrawal of surplus water. To prepare it for use, a good layer of broken flower pots should cover the bottom, over which should be laid a mass of fibrous material, moss, or coarse peat fibre, to prevent the soil from choking the drainage, and upon this is spread sufficient peaty, sandy, open compost to more than fill the box, a heap being made some inches higher than its edges. Upon this a small rockery of porous stone may be made with advantage, and planting may then be begun. Undoubtedly the best Ferns for such a case are the delicate Filmy Ferns, *Trichomanes radicans*, *Hymenophyllum Tunbridgense* and *unilaterale*, and small plants may be used of the charming New Zealand and Australian *Todeas*, *T. superba* and *T. pellucida*. The *Hymenophyllums* are small-growing moss-like Ferns which form mat-like masses, and these must be planted by being pegged down on the surface of the soil, then mulched with, or rather buried beneath, a handful or so of the sandy compost, which must then be washed in until the fronds reappear. *Trichomanes radicans* must be planted in like fashion, except that its creeping rootstocks, after pegging firmly to the soil, need only the mulching and washing process, the fronds being much larger. The *Todeas* form crowns and do not travel and hence should be planted in the ordinary way, on the top of the raised soil. In the chinks of the rockwork, if such be used, *Asp. trichomanes* will grow well, provided the fronds are not wetted. The planting done, a good watering should be given to settle the soil, and then if the case be kept closely shut, the Ferns may be left alone practically for months. The case should be placed where it gets plenty of light but no sunshine, a north window suits it well. After the installation and subsequent watering, the surplus water should be drawn off by the tap, as if left, it is apt to breed sourness in the soil. If other Ferns than Filmies are used, they must be selected from the dwarf forms, or smaller species, air should occasionally be admitted, and morning or evening sunshine will do no harm. The stronger the light and the nearer the case is to the windows, the less they will become drawn. To plant small specimens of robust growers is a mistake, since they will inevitably lead to overcrowding and distorted fronds. The Wardian Case is also extremely useful to accommodate spore pans or pots, or young Ferns prior to potting on. The still, humid conditions are ideal ones for Fern growth, and the risk of drought is reduced to a minimum. Returning to the Filmy Ferns, we do not advocate repeated waterings overhead; if the soil be moist, the air is always damp enough to keep the fronds in good condition, and promote healthy growth; in fact, if the soil is seen to be moist, the more they are left alone the better. Bell glasses and receptacles are practically the same thing as Wardian Cases, and require the

same preparation and treatment. As the Ferns named are quite hardy, even the *Todeas*, frost does no harm whatever, and need not be provided against. Out of doors, the Filmy Ferns, being hardy, will do very well indeed in pits, provided with compost, as described, and close-fitting frames of sufficient depth to provide room for full-sized *Todeas*, say three feet from soil to glass. As the pit may be a foot or more below the general surface of the soil, the frame may be correspondingly shallower. A brick-walled pit, covered with a light or lights, and situated in some corner which gets no sun at all, or so obliquely as not to reach the plants, is an ideal provision for Filmy Ferns. The use of ground or rolled corrugated glass will permit of a sunnier position for the frame, but coolness is an absolute essential for successful culture.

COOL CONSERVATORY AND ROOM CULTURE.—In this connection there is little to be added to our cultural remarks anent watering, etc., but in rooms, it must be remembered that shade-lovers as Ferns may be, they get plenty of light under natural conditions, and, if deprived of it, become drawn and unhealthy. They should therefore be placed as near to the windows as practicable, top-light being always beneficial. Another point, and a material one, is that a pot Fern *will* grow towards the light, and as its fronds develop they arrange their surface to catch the maximum amount of it. Hence a mark should be made on a pot to secure, when it is shifted, that it is replaced as previously, and not turned one way to-day and the opposite way to-morrow, which is certain in a growing plant to result in a twisted and ugly one, since the fresh growth stiffens as it proceeds, and hence a kink is formed at every shift. No variety, even of a British Fern, has yet been provided with swivel roots.

CHAPTER VIII

WILD "SPORTS" AND HOW FOUND

HAVING now considered the treatment of Ferns when acquired, we may next consider how and where the raw material is obtained.

There is a very general tendency in botanical and also in horticultural literature to refer to the many varieties of Ferns as "garden varieties," ignoring thus entirely the fact that the majority of them were discovered as perfectly wild plants absolutely disassociated from garden culture, so that the term, in this case, is altogether misplaced. It is, of course, true that many now in commerce are the outcome of selective culture; but even in these cases, in the vast majority of instances, they have sprung from a marked typical form found under wild conditions from which they have varied by virtue of the rule that once a plant diverges from the normal path, it is eminently likely to vary again, so that the divergence can hardly fairly be imputed to garden influence, but was already inherent in the wild find. In any case the term "garden varieties," as applied to the original wild "sports" or "mutations," is a misnomer. Still worse in our opinion is the term "monstrosity" as applied to marked abnormal forms generally, however beautiful they may be and however much, as in the case of the "*plumose*" or extra feathery Ferns, their greater charm may be entirely due to mere extension of Nature's normal plan of subdivision. This term, however, is falling more and more into disuse. Despite the great number of distinct forms which have been discovered by persevering Fern-hunters in the ferny localities of Britain, it must be borne in mind that our present wealth of these is the result of more than half a century of persistent search by some scores of amateur experts, so that it is obvious that the proportion of "sports" to normals must be but one to very many thousands. So rare indeed are they comparatively, that it is quite a common remark by people who have been induced to search in ferny districts by a visit to a collector and a sight of his acquisitions, that "there were heaps of Ferns, but only the common ones," apparently assuming that the uncommon ones were obvious features in other localities. In point of fact, it is rarely the case that "sports" are found otherwise than as single individuals or, where more than one

is discovered, it is usually obvious that they are of common origin, that is, due to local propagation. Their discovery is also handicapped by the fact that they are often found intimately mingled with, and either partially or entirely hidden by, the common forms of the same species, or it may be by robust specimens of other species, and hence a merely superficial glance may easily miss a prize. The Fern-hunter's motto, however, is that "wherever there are Ferns there is a chance"; but it by no means follows that abundance of normals means increased possibilities. In our own experience the ferny jungles through which we wade waist-deep in vigorous plants, are less likely to yield a prize than rough broken ground bearing scattered specimens. This we impute to the fact that as a rule varieties are less in size, that is, lose in height what they gain by extra development by plumes or crests, and that hence in the young stage, under jungle conditions, they stand a less chance of survival than under more open ones, and even if present are less likely to be seen. Thus in Cornwall and Devon, where the Hartstongue may monopolize the soil and carry yard-long fronds, in such places we have always failed to find a "sport," while on old walls and hedge-banks, where the plants were smaller and more individualized, we have found a fair number of distinct varieties. In short, old walls, stone dykes, and rough and rocky ground generally on hill-sides and elsewhere form, in our opinion, the best hunting-grounds. It would be idle to specify likely localities, the records show that wherever an expert has resided in a ferny region, he has gradually accumulated a collection within the range of his travels, and the late Mr. J. Moly, one of our most noted pioneers, a resident near Lyme Regis in Dorset, has some six hundred distinct finds to his credit, as the result of many years' search, while the late Dr. Wills, his neighbour at Chard, found in the same district a considerable number also distinct. The writer, whose research is confined to annual holidays, has nevertheless found over seventy varieties, so that it is clearly worth the while of any Fern-loving amateur to devote attention to the Ferns of the wayside, woodland, and glen with a view to acquisitions of this class, and so derive the double enjoyment of charming country rambles plus a definite natural object of study. The absolutely essential point is concentrated attention upon and examination of every Fern met with. It is, we are certain, the diverted attention to other plants, with which the hunter is acquainted, which accounts for the fact that the general botanist is rarely a successful Fern-hunter. For the beginner the first essential is, of course, a familiarity with the normal forms of the various species, and of these our coloured plates will give a clear idea, while if he is successful in finding a variety, he will in all probability discover its prototype among the other illustrations, and if it be a good symmetrical one and is neither figured nor described, there

is a fair chance that he has discovered something quite new, always, we may add, a possibility in this connection. We may now turn to the needful equipment of the Fern-hunter, and the provision for the preservation of his finds in a living state until he can instal them at home. The orthodox equipment is a strong trowel, and a vasculum or oblong metal box provided with a lid and means of suspension over the shoulders; but our experience shows that when clambering about rough declivities at steep angles this apparatus is apt to be a nuisance, and our own personal equipment consists merely of a ball of string, a few newspapers, a stout reliable hooked stick, and the inevitable trowel, most of which will go into one's pockets, and thus constitute absolutely no impedimenta. Given a find, we extract it carefully with as much of the root as possible, wrap the roots in moss or grass, which can be usually obtained close by, and roll the straightened fronds lightly up in paper, secured with string. The parcel can then be either pocketed if small, or slung over the shoulders if large, the earliest opportunity being taken of giving the roots a soak in water, for if these get dry, it is a great check upon the plant. Ferns so treated will stand for a week or two without detriment to their vitality, if packed upright in a box with moss between them. Of course, it occasionally happens that the successful hunter is confronted with difficulties which will tax his inventive powers to overcome. One of the writer's finds on Dartmoor weighed about $1\frac{1}{2}$ cwt., a huge mass of a splendidly tasselled *Lastrea montana*, which was obviously not amenable to extraction by a pocket trowel or transport in paper and string. A labourer and a fork and spade were obtained from a neighbouring village, but even they did not suffice, and the services of a man in a quarry cart had eventually to be enlisted to convey the mass on the first stage of its journey to London. On another occasion a very desirable Hartstongue was noticed just over the arch spanning a Devonshire stream, and only just within reach of the trowel lashed to the stick aforesaid. If so dislodged, however, it would inevitably fall into the rapid stream below and be lost. This problem was solved by the fortunate presence of an umbrella, which being opened and suspended under the arch by a string, eventually received the prize when dislodged. A second similar bridge difficulty with a variety of *Polypodium vulgare* was met differently; the umbrella could not be used as the wall was sheer, but by means of a loose slip-knot of string, the fronds were lassoed, and when the root was dislodged, the plant was drawn up and bagged in the usual way. In another instance a finely crested Hartstongue was seen about ten feet up a high wall, quite out of reach, and this was got at by hoisting a village lad upon our shoulders and instructing him what to do. This find, by the way, turned out to be something new even in that protean species. To conclude, we cannot refrain from reverting to the

enjoyment incidental to Fern-hunting apart from the quest itself. We have innumerable pleasant memories of brilliant days spent in the Devonian combes and shady lanes, on the rugged flanks of the Lakeland mountains, in Scottish glens, on breezy moors, and, in short, in innumerable lovely localities to which we were led primarily by our love for the Ferns and the chances of adding to the number of their wonderful variants.

CHAPTER IX

TYPES OF VARIATION

IN the foliage of flowering plants there is immense diversity of form, both specific and varietal, but in Ferns it would almost appear that, prevented by their absence of obvious flowers from displaying their powers of variation in that direction, they have made up for it by doing so in a very wonderful and surprising fashion in their foliage. Between the forms of fronds of diverse genera we naturally find great differences, but it is in the case of our native Ferns especially that one and the same species has proved itself capable of assuming hundreds of different types of fronds, and this not due to any human selection at all, but solely to some natural impulse to which we have absolutely no clue. Naturally the study of these types, despite their multiformity, shows them to permit of some classification, and they may be broadly divided into two sections, viz. those in which the terminal points of the fronds and subdivisions branch in such a way as to form tassels or crests (cristate), and those in which the normal extent of subdivision is increased or diminished. Thus a once divided or pinnate form may possibly yield a quadri- or quinque-pinnate one, i.e. four or five times divided, in this way, practically losing all similarity to the specific and simpler type, while in rarer cases a normally divided frond may not be divided at all, but become simply strap-shaped. The formation of terminal tassels is the most prevalent type of abnormality, and has been found to occur in a very large number of species both native and exotic. No cresting proper has been remarked in the foliage of any flowering plant. In the *Celosias*, or Cockscombs, and many other cases of fasciation, there is a similarity, but also a fundamental difference. In fasciation we find a multiplication of growing points, which develop so closely together as to coalesce, a normally round stem thus becoming a flat, or almost ribbonlike one, or, as in the Cockscomb, a dense Cactus-like mass built up of innumerable conjoined branches and flower stalks massed solidly together. The typical Fern crest, on the other hand, commences to develop on what may be considered a normal stalk or midrib, the growing point of which, at a certain stage in this development, and

not at the outset, multiplies itself, and forms as many independent tips which radiate, and may or may not divide again and again, but there is no cohesion, the tendency is always to grow apart. This tendency to multiply the terminal points extends, in some cases, to the fourth degree of subdivision; that is to say, the tip of the frond bears a tassel, the pinnæ, or primary side divisions, bear smaller ones, the pinnules, or secondary side divisions, do the like on a still smaller scale, and finally, the minute subdivisions of these, or pinnulets, are distinctly fanned, showing that the same tendency prevails throughout. Since, however, these tassels only occur at the tips, i.e. after a definite growth of the midribs primary, secondary, or tertiary, on single or normal lines, we have the singular fact that at a certain definite point of growth in many thousands of cases in such a subdivided plant, the midrib suddenly adopts a different plan of growth, and commences to split up and multiply itself to form a tassel. This tendency evinces itself in very varied ways. The terminals may divide on fan-like flat lines to form radiating points, these radiating points may divide again, or again and again, to form heavy pendulous flat tassels, or the division may occur on other radiating lines so as to produce bunches, also of single points or multiplied ones, so as to form corymbs or round masses. It is clear that many forms of tassel may result in this way, and hence the "cristate" section is a large one. Allied to this are those Ferns which branch irregularly, their frond stalks commencing to branch near the base and doing so repeatedly, the leafy portion being carried by branching midribs, and only assuming the strap or leafy specific form if a sufficient cessation of the branching occurs. Such forms are in some cases associated with regular crests (see Appendix) with fine effect. In extreme cases of this type the whole Fern resembles a ball of moss, as is seen in the Hartstongue (*Scol. v. densum Kelwayii*) and in the Lady Fern (*A. f. j. unco-glomeratum* and *A. f. j. acrocladon*.) The second main section, in which the fronds are divided to a greater extent than the normal one (the opposite cases are too rare to be considered here), undoubtedly embraces a large number of the most beautiful forms existing. This type of variation would appear to depend very much, if not entirely, upon a primary simplicity of the vein system of the Fern concerned, the little veins which carry the cell tissue must be mostly free, that is, not forming a network, as we see in most flowering plants and many Ferns, but starting from the midrib, run out to the extreme edge of the frond, and to the points of the subdivisions. In such case, if they, by virtue of "sporting," continue to grow beyond normal lines, they, as tissue-forming feeders, carry the tissue with them, following the specific tendency, and in this way, for instance, a Common Polypody (*Polypodium vulgare*) with normally smooth-edged pinnate divisions, but with free veins terminating at the smooth

edge, may vary into "crenate," with slightly projecting lobes, "serrate," sharp and obvious ones, and so on through bi-pinnate, or twice-divided fronds, away into such finely dissected or much-cut forms as we see in *P. v. Cornubiense*, or in the various forms of the Welsh Polypody (*P. v. cambricum*) (see Appendix for numerous examples). In numerous Shield Ferns (*Polystichum*) we see this same principle carried out, often in association with extremely varied shapes of the pinnules, altering greatly the aspect of the plant. By virtue of this tendency to greater division of a normally bi-pinnate or twice-divided species, we have tri-pinnate, quadri-pinnate, and even quinque-pinnate forms, and in most of these extreme cases the subdivisions, though becoming slenderer and slenderer, are still seen to adhere to the peculiar specific mitten-shaped form if closely inspected, i.e. like a fingerless glove, with the thumb projecting at an obtuse angle. In the extraordinary *gracillimum* section of *P. aculeatum* recently raised, it is, however, impossible to trace this form, the normal half-inch pinnule being lengthened to between two and three inches, and correspondingly narrowed (Figs. 11, 12, 13). In the Hartstongue the plain, undivided strap-like frond, when inspired by Nature to "sport" in the same direction, is somewhat baffled by its shape from taking it, but finds a way out by forming deep frills (*S. v. crispum*), its free veins, which fork once or twice normally on their way to the frond edge, forking over and over again as they approach it, carrying the tissue with them, the result being edges two or three times as long as the frond, and a consequent folding over, which renders this section a very handsome one, some of the members of which have invented a further outlet for their superabundant energy by providing the frills with fringes. Others of this species have not been baffled entirely in the ordinary direction of greater division, but have gone far in the direction of the pinnate Ferns by producing boldly-toothed and deeply-cut edges (*S. v. projectum*). The true plumose or extra feathery Ferns embrace the frilled Hartstongues, and such much-divided members of other species as are barren of spores, such as the *cambricum* Polypodies, *Asplenium trichomanes incisum*, *S. v. crispum* aforesaid, *Lastrea montana plumosa*, and others, to which must be added on the score of beauty a number of *Polystichums* and Lady Ferns treated of elsewhere, which, despite a certain amount of fertility in spores, rank with the most beautiful feathery varieties in the world. A very curious type of variation is seen in a number of the divided Ferns, which is presumably akin to the sagittate, or arrow-shaped Hartstongues. These forms are termed deltoid, or triangular, or brachiate, according to the extent to which the variation goes. In the Appendix, a number of marked forms of *Polypodium vulgare*, *Polystichum angulare*, and *Scolopendrium vulgare* are shown of this type, in which the lowermost divisions are greatly lengthened, widening the

base of the frond, and even in some instances converting these into lateral fronds, the whole representing a trident when they grow upwards at an acute angle to the main rachis or midrib. Congested and imbricate forms occur in several species. In these the midribs, main and secondary, are shortened so that the divisions of the frond are compressed, and sometimes densely overlap, the result being a great reduction in size, forming a dwarf section of very pretty Ferns. The above varietal sections are, as we have seen, mostly of a redundant type, exceeding the normal in development, or, at any rate, no part of the normal plan is missing, but there are others which vary in the opposite direction, and although these, as a rule, belong rather to the "curio" class than to the *élite*, this is not always the case, as will be seen in *A. f. j. Victoriae* (Appendix No. XIII), which is imputed to the non-redundant, because it is assumed that the twin pinnæ represent only the enlarged basal pinnules of the pinnæ proper, the rest of which is lacking. Whether this theory be correct or not is immaterial; in any case this wonderful Fern is a development of the phenomena of "cruciation," a small varietal section similarly characterized by twin pinnæ set on at an angle to each other, and thus, with the opposite pairs, forming crosses, whence the name of "cruciate."

As a section of truly non-redundants, we may mention the truncate and the *medio deficiens* forms. In the truncate we have, as it were, the converse type to the cristate, since, instead of the midrib multiplying itself, it suddenly leaves off before its work is finished, terminating with a projection like a thorn at the squared-off end of the frond and side-divisions. In *Lastrea montana* this is found so frequently as to be termed "the beginner's Fern" by Fern-hunters. This occurs also in the Lady Fern (*A. f. j. excurrens*), Male Fern, and in various forms in the Hartstongue (*S. v. perajerens*, *cornutum*, etc.) Why, in thoroughly healthy, robust plants, the growth should thus suddenly cease is a puzzle, and it is curious that in the Tulip Tree (*Liriodendron tulipifera*) the leaves should be square-ended on similar lines. In the *medio-deficiens* type, the subdivisions of the pinnæ, and sometimes of the pinnules, are aborted or reduced to rudiments next the midrib, leaving an open space, which in one form of Lady Fern found in Wigtonshire by the writer is so even as to render the frond pretty, and in the *lineare* section of Shield Ferns it imparts a graceful habit.

Another distinct type is that in which the fronds and side divisions are convexly curved "*revolvens*" or erratically twisted "flexuose," examples of which have been found in the Lady Fern, the Male Fern, the Hartstongue, the Hard Fern, the Soft Shield Fern, and the Common Bracken. A peculiarity of both these types is that the curving tends to contravene one of the laws of plant life, viz., that of the self-exposure of leaf surfaces to best advantage as regards light. The curving, rolling, or twisting tends to expose the

under surface instead of the upper, and there is no doubt, but that the tortuous twisting of the *flexuosum* and the spiral convolutions of the *revolvens* forms are largely due to endeavours to counteract this, the varietal tendency and the normal being in constant opposition.

Shortened side divisions constitute another section ; in the Lady Fern *A. j. f. Frizellia* (see Appendix No. VI) the pinnæ are merely round ball-like masses, the frond resembling a string of beads ; in *A. j. f. Pritchardii* we have a sort of intermediate between this and cruciate forms. In the Hard Fern, we have *Blechnum spicant concinnum Drueryii*, with fronds like strings of scallop shells, and in *B. s. lineare* the fronds are almost, and sometimes quite strap-shaped, the pinnæ being short and rounded, or even quite confluent. Conjoined with most of the above types are additional peculiarities of many kinds, and it is this fact which renders it so extremely difficult, if not impossible, to simplify the often long names given to the plants concerned. To those who take the trouble to learn what may be termed the Fern language, no such great task as it appears, these names are invaluable when the christening has been judicious, to which, unhappily, there are many exceptions, and no true Fern-lover would care to see new finds or raisings named without any indication of their character, as is perforce done in the floral world. In a choice of evils it is good policy to choose the less.

CHAPTER X

FERN FOES AND REMEDIES

As in every case where plants are grown under glass vermin of various kinds are sure to make their appearance, it is as well to devote a short chapter to the methods of dealing with them. The principal foes we have in our mind are Green-fly, *Aphis*, White-fly, *Aleyrodes vaporaria*, and the Weevil, *Otioryhncus sulcatus*, plus, in houses where artificial warmth is provided, Thrips. The presence of Green-fly is almost invariably due to insufficient ventilation or overshadowing, which induces a tenderness of growth and unhealthy conditions; healthy plants appear fully capable of resisting their attacks. The first remedy is therefore better ventilation, avoiding draughts, and an increase of light if possible. In this latter connection removable blinds are better than fixed ones, since the more daylight there is admitted the stronger the growth, and shading is really only necessary against blazing hot sunshine and during the warmest months of the year. The second remedy we shall come to later. The White-fly is a terrible infliction when once it is allowed to obtain a footing. This is a fly, really of a very light lemon colour, which flits about snipe fashion from plant to plant when disturbed, and has a clever knack of alighting on the under side of the fronds at a point distant from its apparent point of settlement. Its flight, too, is remarkably swift, and as we have indicated, erratic. This fly attacks both deciduous and evergreen Ferns, but only lays its eggs on the fronds, so that those laid on deciduous ones are eventually cleared away and the following season's brood only arises from those left on persistent ones. Its attack takes the form of a gnawing away of the epidermis or skin of the foliage, the result of which is tortuous lines of dirty white, which in bad cases pervade the fronds entirely and weaken the plants considerably. The eggs, in cold houses, hatch out about April, when the larvæ or immature flies may be found on the backs of the discoloured fronds as tiny whitish insects, already busy with their gnawing, and capable of creeping to fresh fields and pastures new on the same Fern even at this stage, though their wider excursions are deferred until May, when after a short chrysaloid

stage, the winged perfect insect commences to flit about. Keeping this fact in mind it is obvious that we have about a month in which, if attacked properly, we can absolutely clear all the plants without a chance of reappearance, unless other infected plants be introduced. Our remedy, which we have found to be exceedingly efficacious, is to use the liquid form of the "X L All" insecticide, which is vaporized by means of a small spirit lamp and an inexpensive apparatus, and, if used about the end of April, entirely kills out the larvæ which by that time will have all been hatched out. It is equally effective later on when the fly appears on the wing, but as some of these may be at that time in the short chrysaloid stage, and therefore dormant, these will escape the fumes and appear later on in sufficient numbers to re-establish the pest by fresh eggs, which they are not long in laying, thus rendering a second fumigation necessary. The same remedy is equally fatal to Green-fly, and should be applied directly that pest makes its appearance. The same remark applies to Thrips, of which the White-fly is really a species. When using it, all ventilators should be closed and everything done to prevent the intrusion of fresh air or escape of poisoned air during the operation. The comparative proportions of space to be fumigated are marked on the bottles in so many square feet, which are easily calculated by multiplying the width of the house by the length, and then by the height, the average height being taken of the sloping roof. When the lamp is lit, the house should be closed at once and not opened until the following morning, a calm evening being chosen.

The Weevil is a far more insidious foe and one much more difficult to deal with, since it is immune from all fumigatory remedies, and even defies to a large extent, and in its beetle form entirely, the other insecticides put on the market. This pest is far more drastic in its operations than those already mentioned, since starting with it in its grub form, a curved, fat white maggot, about half an inch long, it devours the very rootstocks and roots of the plants, in the soil of which the eggs have been laid the previous autumn, so that in the early spring we may find the Fern loose in the soil and probably entirely dead, or only to be resurrected by one of the processes we describe in our chapter on Propagation. The Beetle, an almost black insect, with an oval body, about a third of an inch long and with a long proboscis flanked by two antennæ half-way down it at right angles, emerges from the soil towards the end of April, and climbing up the fronds, preferring the rising young ones, eats pieces out of the edges, and as these gaps grow larger with the fronds the result is terrible disfigurement. Hartstongues are especially to their taste, but by no means exclusively so. Having described the two forms in which this pest appears and its different modes of attack, we may now consider the best means to frustrate its malignancy. The presence of the

grubs in the soil may be known in the winter, if any fronds are noticed as wilted, and when pulled come quite freely away from the caudex. The only way then is to turn the plant out of the pot, pick out the offenders, thoroughly wash the roots, to make certain none are actually embedded in the caudex, as they frequently are, and then re-pot what is left. Plunging the pot under water to drown them, as we have seen suggested, is no good at all, since we have submerged some for three weeks and found them survive. This process, however, will bring a few to the surface of the soil, but not those which are deeply embedded, and hence is only a partial remedy. Two remedies have recently been introduced, named "Kilogrub" and "Vaporite," both in the form of dark grey powders, which are applied by boring holes in the soil, filling them with the remedy and then tamping or stopping the hole with soil, which the fumes then penetrate, killing the grub but without injury to the plants. From reliable sources we have had good reports of these, but cannot speak from experience. The Beetle we have found does not travel as a rule far from its larder, and can usually be found hidden, if not caught in *flagrante delicto*, somewhere about the plant or the pot. If difficult to find, say in pans of seedlings which are seen to be attacked; plunging under water will bring the Beetles out in a few minutes, since they cannot long stand immersion as do the grubs. The Beetles are largely night feeders, but by no means exclusively so. They are very cunning, dropping to the earth at the slightest alarm and shamming death, so that as they match the soil in colour, they are difficult to find. If gently approached when feeding, they are easily caught by means of a little paper scoop, five or six inches long, tied to the end of a thin bamboo. The scoop being gently passed beneath them, a little tap will cause them to drop into it and thus be secured.

Sometimes an invasion of Caterpillars causes great havoc in the late summer, and can only be met by persistent hand-picking. As these, with the exception of such rambling species as the Woolly Bear, are generally the result of eggs being laid in the house itself, no pains should be spared to catch any moths which are seen in it, and it is well if the ventilators are screened with wire gauze or perforated zinc to prevent their entrance. The attack of a Caterpillar can always be discriminated from that of a Weevil, by the latter eating from the edge, the former as a rule making a hole to begin with. The above are the principal foes, but occasionally others present themselves. The Lady Ferns especially, in some seasons, are apt to be attacked by a fly which, when the fronds are of some height and still unfolding, pierces the stalk a few inches from the uncoiling top and inserts an egg or two. The immediate result is the wilting and dying of the uncoiling part down to the wound, which is imperceptible. The ultimate result is the hatching of the eggs into, usually two, light blue caterpillars or maggots,

which bore down the remaining midrib and stalk of the frond and eventually pupate in the soil near the caudex. We have never been able to discover this fly, but have been informed that it somewhat resembles a house-fly. The only remedy for this is to cut off the frond some inches below the wilted portion immediately the flagging is seen, thus, of course, removing the eggs and preventing development of the grub. Cases of similar attacks in the late summer have been reported to us, but with us they have been confined to the spring. A tiny black snail, *Helix alliaria*, so called from its pungent onion-like odour, is sometimes a nuisance, gnawing through the bases of even large fronds, which drop mysteriously and without warning in a very provoking fashion. Fortunately, this foe is not numerous. Slugs and snails generally should be sought for and killed when traces of them appear in the shape of slime ; but Ferns do not appear to appeal to them very strongly. Worms should be turned out of pots, if their casts are seen, as they tend to choke the drainage and sour the soil. Wood-lice should be kept in check as far as possible by destroying them in their haunts under the pots and elsewhere ; but as they are chiefly feeders on dead material they are not nearly so inimical to living plants as the other invaders named.



PLATE II.

Adiantum capillus Veneris

SPECIES AND VARIETIES OF BRITISH FERNS

ADIANTUM CAPILLUS VENERIS (THE MAIDEN-HAIR FERN)

Plate II

This very pretty and delicate species is a solitary member of a large genus as regards the British Isles, in which, indeed, it only exists, as it were, on sufferance, as a native, properly, of warmer climes. Hence it is only found on our warm coasts, and under culture requires a warm house, or at any rate one from which frost is excluded. Elsewhere it is widely distributed in many parts of the world where the climate is favourable, and moist conditions prevail, at any rate, locally. Fig. 14 depicts sufficient of a mature frond

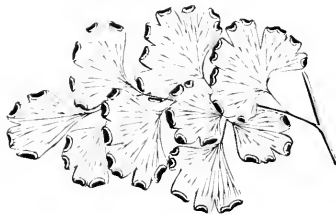


Fig. 14. *Ad. c. v.* (*pinna*).

to permit of easy recognition of the species, which, as will be seen, bears its fructification in short marginal patches, which are protected by the inturned edges of the rounded projections on the edges of the subdivisions of the frond. It forms very pretty pot specimens, planted in broken peat, silver sand, and a little loam, in which its black, creeping rootstock travels slowly, throwing up the fronds at short intervals.

Curiously enough, despite its limited area, several very marked varieties have been found, by far the handsomest of which is *Ad. c. v. var. Cornubiense*, a fairly exact imitation of that beautiful exotic, *Ad. Farleyense*, undoubtedly the most beautiful *Adiantum*

extant. This is figured in our Appendix (No. 1), and as this is on a reduced scale, it will be seen that it is not only its make, but to some extent its size, that justifies our parallel.

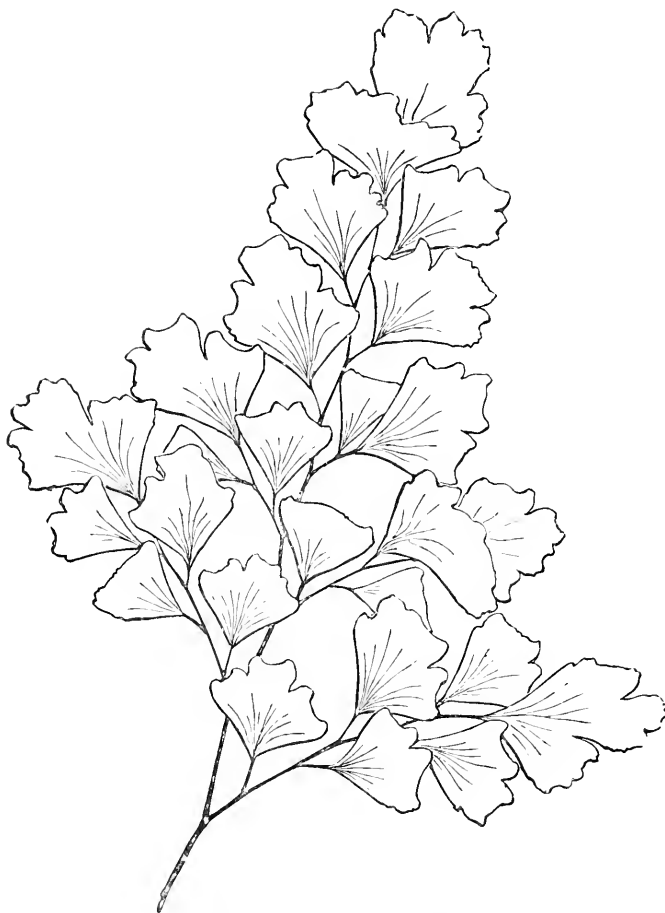


Fig. 15. *Ad. c. v. admirabile*.

ADMIRABLE (Fig. 15).—Raised by E. J. Lowe. ‘Very large and handsome.

DAPHNITES.—Raised by E. J. Lowe. A gem, somewhat on *imbricatum* lines, but not so dense.



Fig. 16. *Ad. c. v. imbricatum*.

IMBRICATUM, *Lowe* (Fig. 16).—A dwarf, imbricated form, presumably raised from *Cornubiense*; very beautiful, and bearing bulbils associated with the spore heaps, as does *daphnites*.

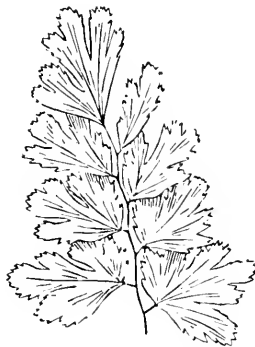


Fig. 17. *Ad. c. v. incisum*.

INCISUM, *Moore* (Fig. 17).—Found in Ireland by Dr. Allchin; pinnules with edges cut into small, acute lobes; very pretty.

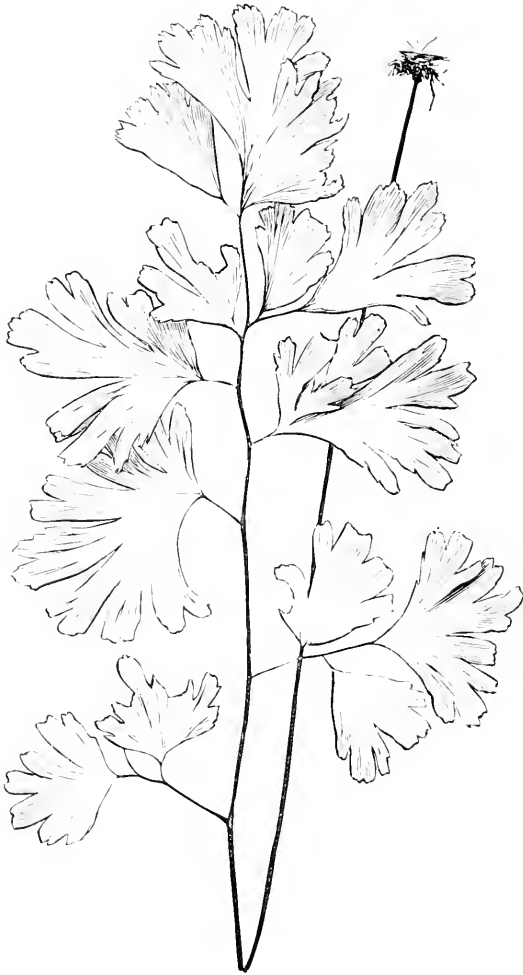


Fig. 18. *Ad. c. v. incisum Footii*.

INCISUM FOOTII, *Lowe* (Fig. 18).—This is another “sport” on somewhat bolder lines ; found in County Clare.

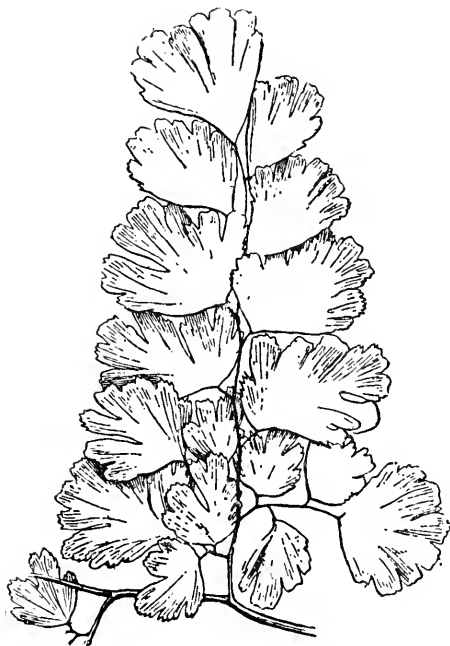


Fig. 19. *A. c. v. kalon.*

KALON, *Lowe* (Fig. 19).—A handsome foliose form, raised from spores.

MAGNIFICUM.—Found in County Clare. A very fine foliose form.

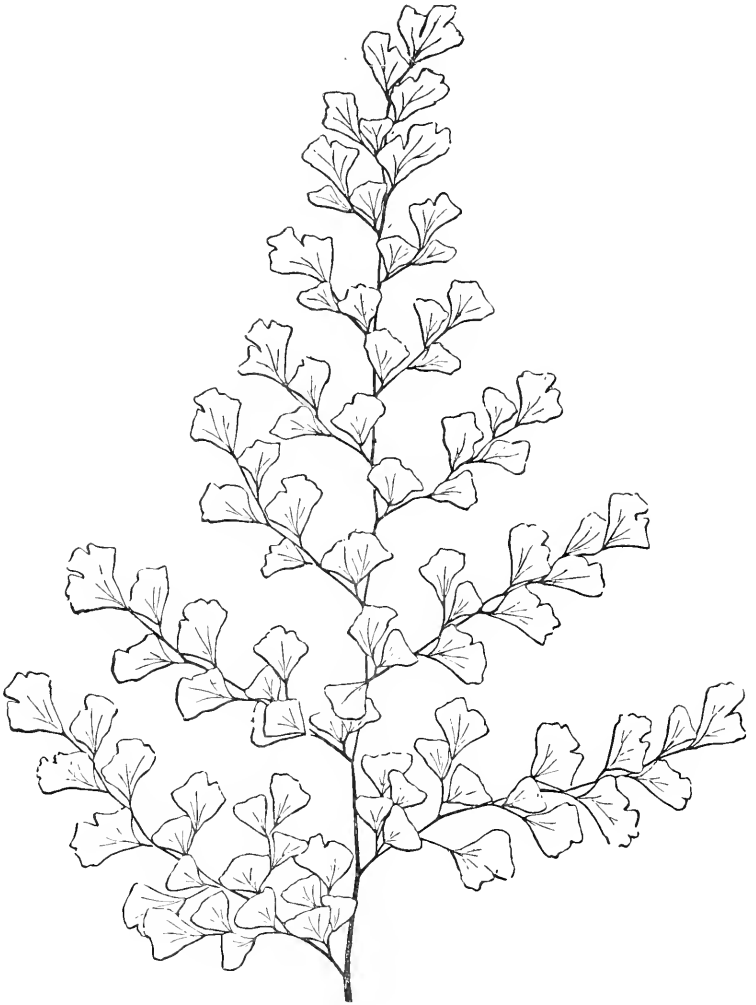


Fig. 20. *A. c. v. optandum*.

OPTANDUM (Fig. 20).—Raised by E. J. Lowe; a fine cuneate form.



PLATE III.

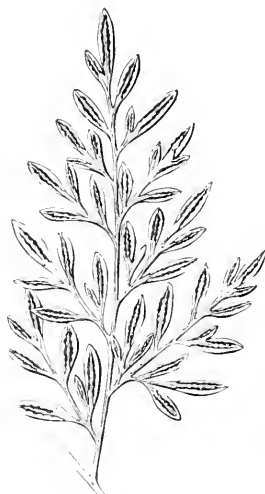
Allosorus crispus

Gymnogramma leptophylla

ALLOSORUS CRISPUS (THE PARSLEY FERN).

(Plate III)

The Parsley Fern is popularly so called from its resemblance, to some extent, to the familiar parsley of our kitchen gardens, a resemblance accentuated by its growing in dense patches of similar size. In its mountain habitats, for it is truly a mountain Fern, it is found in great profusion, mainly on the loose debris weathered down from above on the talus of steep gradients, whence, by virtue of scattered spores, it will also invade the chinks and crevices of the loose stone dykes common to such localities, and practically monopolize them. Its somewhat triangular fronds, which may reach nearly a foot in length, are three or four times divided, and vary in form according as they are barren or fertile. Fig. 21 shows a portion of a fertile frond of natural size, and Fig. 22 shows the diversity of form which the barren fronds are capable of displaying even in one and the same plant. As regards culture, ordinary pot or pan culture, or simply planting in the open on the flat, is little likely to succeed. Anyone collecting the Fern in its native habitat, on the slopes of loose, stony material, weathered down from above, will note that season after season the plant is apt to be buried by the sliding debris, and, in fact, has been so repeatedly, and that season after season the new fronds have pushed their way to the light, and rooted higher up to fit. Soil proper there is hardly any under such conditions, and however moist the rubble may be it is well drained. Studying these peculiarities, we have succeeded in maintaining the Parsley Fern in good condition for years, in a London garden, in this way. Digging a hole about a foot deep in a suitable position, we have filled this with rough brown peat and loam in equal parts, and well mixed with coarse sand and gravel. Upon this we have spread the matted root mass of the Fern, with its growing end towards the north; we have then buried it bodily with a spadeful of gravel, so that it was entirely covered to the depth of a couple of inches. Over the root mass, i.e. on the south side, we have then dumped a large brick burr, about two feet high, and nearly as wide, thus leaving the growing end of the Fern free, save of the gravel. Drenching the whole with water, we have then left the plant to its own

Fig. 21. *A. crispus* (pinna).

resources, and, doubtless regarding this cataclysm as a usual thing, it speedily pushed a host of fronds through the gravel, and grew, thenceforth, season after season, as if at Snowdon's foot itself.

As regards varieties, only one was found, a very pretty tasselled



Fig. 22. *A. crispus*. Varied forms of fronds on same plant.

one, but this unfortunately died, as did a large number of true seedlings which were subsequently raised by Mr. J. M. Barnes from soil collected at the spot whence the original plant was lifted, a spot presumably subsequently lost sight of, as no second attempt is recorded.

THE ASPLENIA (THE SPLEENWORTS)

The Spleenwort genus is represented in the British Isles by no less than ten species, viz. *Asp. trichomanes*, *Asp. viride*, *Asp. adiantum nigrum*, *Asp. lanccolatum*, *Asp. marinum*, *Asp. rutamuraria*, *Asp. septentrionale*, *Asp. germanicum*, *Asp. fontanum*, and *Asp. ceterach*, the last of which is usually known as *Ceterach officinarum*, but by all generic distinctions is a true Spleenwort. The allocation of *Athyrium filix-femina* to the Spleenwort family is, in every Fern-grower's opinion, too absurd to be discussed, as it

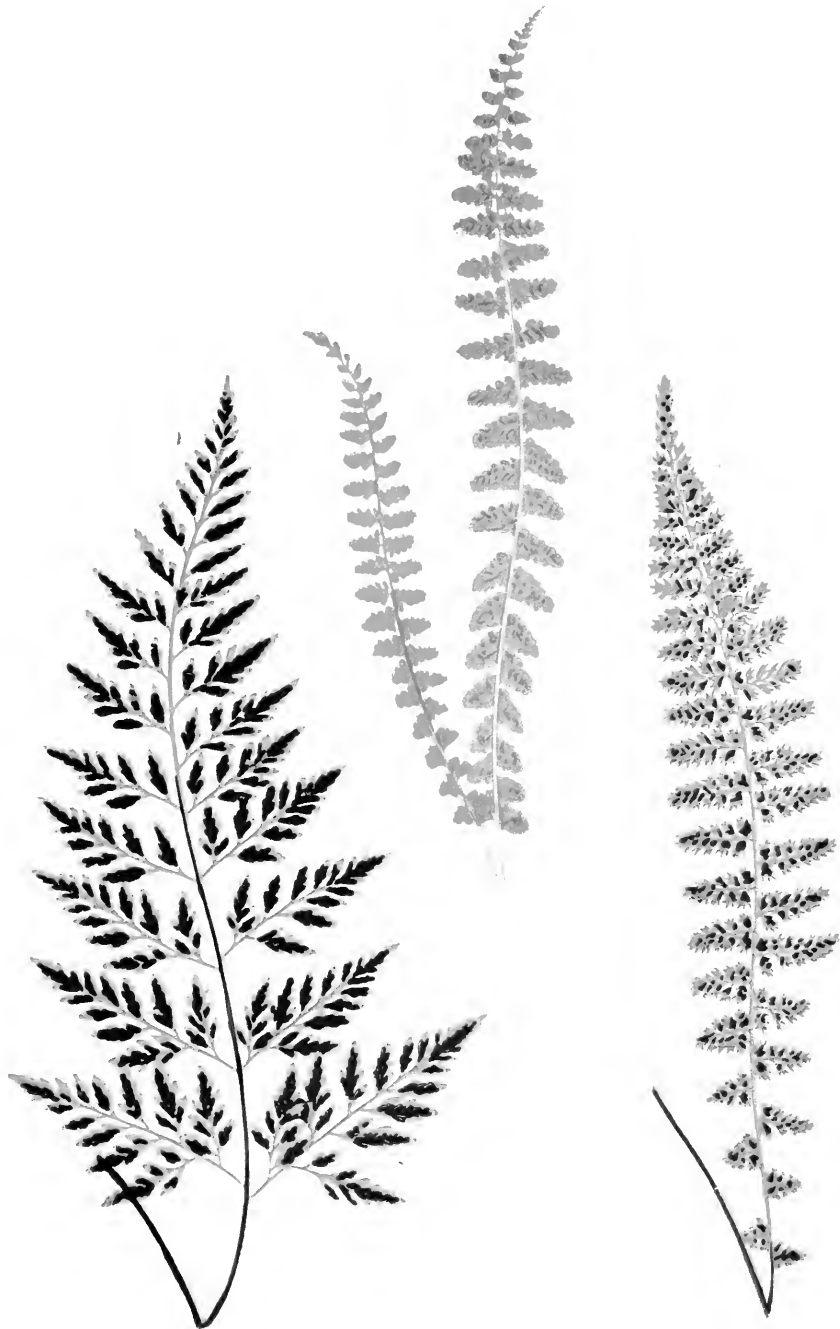


PLATE IV.

Asplenium adiantum nigrum

Asp. fontanum
var. *refractum*

Asp. fontanum

does not present a single character peculiar to that genus. The distinguishing fructification of the genus is the arrangement of the spore heaps or sori in definite lines, short or long, arranged herring-bone fashion on each side of the midribs of the divisions, resembling what we may see on a large scale in the Hartstongue (*Scolopendrium vulgare*), which is a near relation, but has the lines arranged in faced pairs, the two heaps coalescing into one when ripe. These linear heaps are provided when young with a transparent whitish cover, (*indusium*), springing from one side. By this character any fertile Spleenwort is easily recognizable. This arrangement is very clearly shown by Fig. 34. The Spleenworts are thoroughly evergreen, and are more at home in old walls, rock crevices, and stony dykes than in the soil proper, and, in fact, it is only in such positions that our native species occur. As regards variation, the genus generally is little prone to depart from normal types, and especially to assume tasselled forms, and it is therefore somewhat singular that several of our native species have done so on rather a generous scale; several, on the other hand, have not "sported" at all, or at any rate have done so on so indifferent a scale that we may well ignore the exceptions. Culture, as may be gathered from the nature of their habitats, involves perfect drainage, a rubbly, open compost, including some old mortar and porous stone, intermingled with leaf mould, and a little loam and sand. On rockwork they should be installed in chinks, and not in flat beds, and very close culture is not advisable. With these remarks we may now proceed to treat of the species *seriatim*.

ASPENIUM ADIANTUM-NIGRUM

(THE BLACK MAIDEN-HAIR
SPLEENWORT)

(Plate IV)

This member of the Spleenwort family is one of the commonest and most widely spread. It is found in abundance in many places, on old walls, in stone dykes, and in hedgebanks, in which the fronds are sometimes between one and two feet in length, including a very long stalk, such length being due to the Fern projecting its fronds from very deep chinks. For culture a larger admixture of leaf mould is advisable than for other Spleenworts, and Mr. G. B. Wollaston advised an admixture for

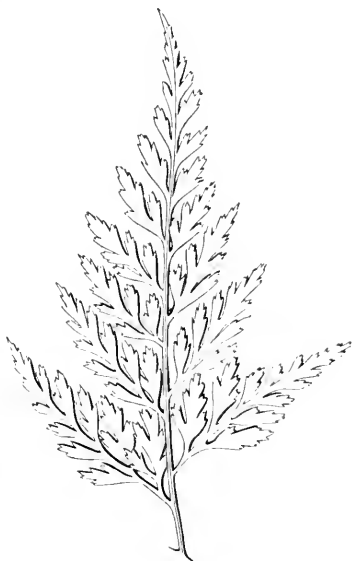


Fig. 23. *Asp. ad. nig.* (pinna).

this species of leaves rubbed down to dust with plenty of coarse silver sand. Its fronds spring from a tufted rootstock, and have a black, shiny stalk, whence the name. Its subdivisions vary considerably in the direction of greater obtuseness or acuteness, the latter appearing to depend to some extent on climate. The imported Fern fronds sold in our markets as the "French Fern" are of this species, and are always of the acute variety (Fig. 23). Several marked varieties have been found.

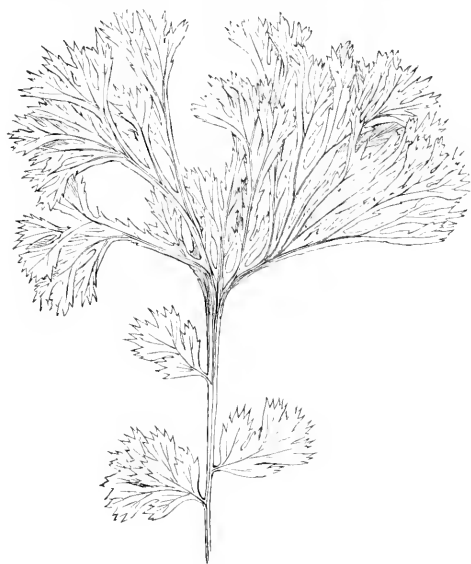


Fig. 24. *Asp. ad. nig. grandiceps*.

GRANDICEPS (Fig. 24).—Heavily crested at frond tip, and with fan-shaped, serrate pinnae. Found in Ireland by the Rev. R. Travers Smith. A similar form was found in Devon.

LINEARE.—A form found by the writer in Cornwall, with very narrow fronds and linear subdivisions.

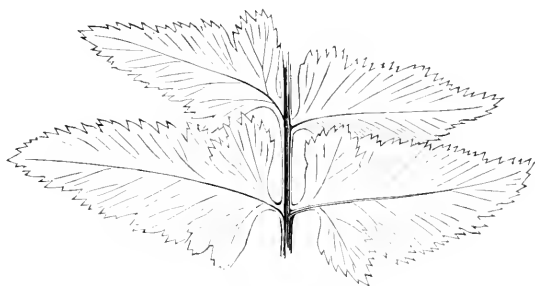


Fig. 25. *Asp. ad. nig. microdon*.

MICRODON (Fig. 25).—Found in Guernsey; is a counterpart of the variety of *Asp. lanccolatum* similarly named; it is presumably a plumose form, and is, we believe, barren, the spores, though apparently plentiful, being aborted.

RAMOSUM (Fig. 26).—Found by the Rev. C. Padley; is a well-crested form at the frond apex.

ASPENIUM CETERACH
(CETERACH OFFICINARUM)
THE SCALY SPLEENWORT
(Plate V)

This pretty and very distinct member of the Spleenwort family is found in many parts of the country, sometimes in great profusion on old walls in the company of other Spleenworts. It grows in little tufts, the thick, leathery fronds being usually four or five inches long, consisting of a short stalk and broad-based, blunt side-divisions, as shown in Fig. 27. The colour is of a peculiarly dark olive-green, and the frond-backs are densely clothed with brown scales, amid which the long, straight spore heaps of the Spleenwort type are quite hidden. It is a remarkable Fern, since it prefers the sunny sides of the walls it frequents, and is gifted with an extraordinary power of resisting drought.

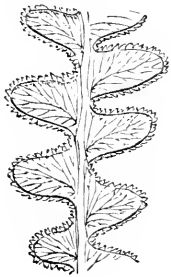


Fig. 27.
Asp. ceterach.
Part of frond.

CRENATUM.—Found repeatedly with the lobes cut into blunt teeth.

CRISTATUM, GRANDICEPS.—Both found in Ireland by Mr. O'Kelly, representing various grades of cresting.

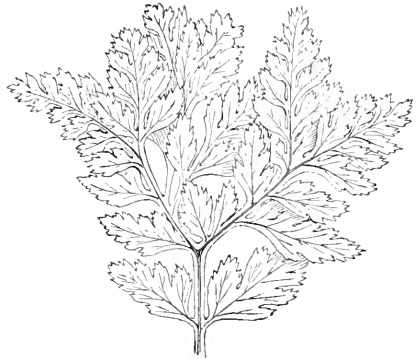


Fig. 26. *Asp. ad. nig. ramosum.*

known as *crenatum* in a village wall, near Smyrna, in Asia Minor, put the plant into an envelope, pocketed it, and forgot all about it until some months later it was discovered, as shrivelled and hopeless-looking as may be imagined. After a night's immersion in water, however, it appeared as fresh as when gathered, and when potted up started growing as if nothing had happened. It is not easy to cultivate, but sometimes succeeds in well-drained small pans, in well-lighted positions, if an open, porous, stony, limy compost be given, and well-rooted specimens be secured intact, not an easy task to start with. It has afforded a few varieties.

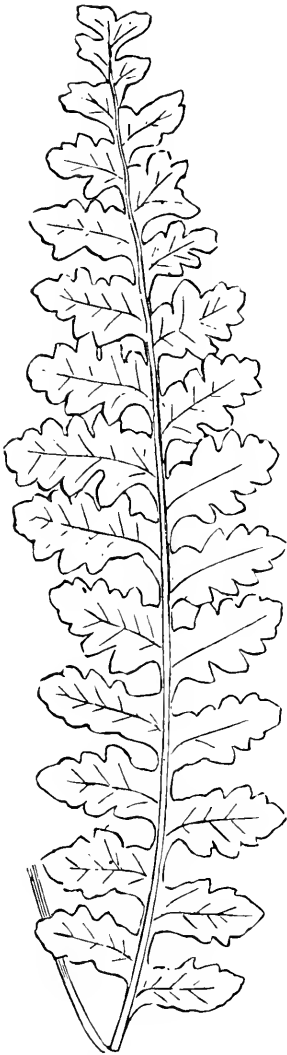


Fig. 28. *Asp. c. kalou*.



Fig. 29. *Asp. c. ramoso-cristatum*.

KALON (Fig. 28).—An extra fine form of *crenatum*, recorded by Mr. E. J. Lowe.

MULTIFIDO-CRISTATUM. Branched on good, constant lines.

RAMOSO-CRISTATUM (Fig. 29).—A branched, crested form, found in Ireland by Mr. Wise.

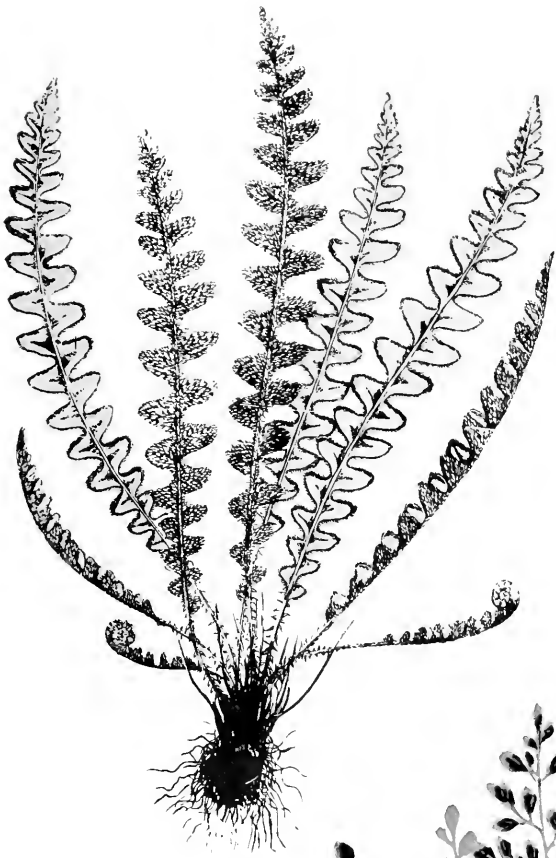


PLATE V.

Asplenium ceterach
(*Ceterach officinarum*)

Asp. ruta-muraria

ASPENIUM FONTANUM (THE SMOOTH ROCK SPLEENWORT)
(Plate IV)

Our plate (IV) and the illustration (Fig. 30) give a very good idea of the construction of this Fern, which is a very pretty one. It is very rare, but has been found in several places on rocks and walls, though none of such finds are of recent date. Several varieties have been raised, but it is extremely doubtful whether they are in existence, and we therefore ignore them. Culture is easier than with the two preceding species, good drainage and a porous soil of turfy peat with a little friable loam and plenty of coarse silver sand suit it well.



Fig. 30. *Asp. fontanum*.
(Part of frond.)

REFRACTUM (Plate IV).—Is a very marked variety, the fronds of which bear bulbils in the axils of the pinnæ. Its history, however, is obscure; reported to have been found in Scotland.

ASPENIUM GERMANICUM (THE ALTERNATE-LEAVED SPLEENWORT)
(Plate VI)

This is one of our rarest Ferns, and as will be seen by Fig. 31 and Plate VI, is of very simple make. It is a true rock Fern, and has been found in Cumberland, Wales, and Scotland, frequently



Fig. 31. *Asp. Germanicum*.

associated with the very similar Fern, *Asp. septentrionale*. It grows in small tufts, and has yielded no variety worthy of note. Its culture must imitate its conditions as far as possible; thorough drainage, porous sandstone mixed with the soil, and as dry conditions as are consistent with fern existence.

ASPENIUM LANCEOLATUM (THE LANCEOLATE SPLEENWORT)
(Plate VI)

This is by no means a widely spread species, being found as a rule only in the vicinity of the coast, where it occupies the chinks of stone dykes, the fissures of rocks, and similar habitats to those

tenanted by its near relative, the Black Maiden-hair Spleenwort (*Asp. adiantum nigrum*), from which it mainly differs in the narrower lance-shaped outline of its fronds, and the somewhat different cutting of its pinnae, which are more regular in size. It does not lend itself easily to cultivation. It partakes a little of the tenderness of its constant neighbour *Asp. marinum*, and is far more common abroad in warmer climates.

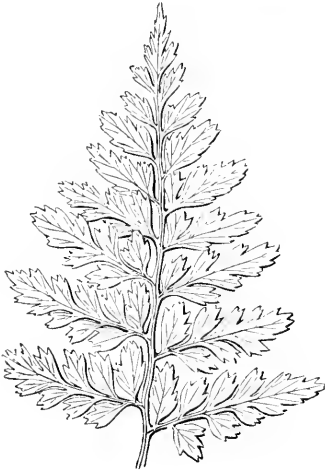


Fig. 32. *Asp. lanceolatum*.
(Tip of frond.)

Fig. 32 represents only the tip of a frond. It has not been generous in varieties, and although several are recorded, it is so doubtful that the majority of them are still in existence that we only mention *microdon*, which is a very fine and distinct form, imputed to *Asp. marinum* by Moore, and thought to be a hybrid by others, though probably a merely plumose "sport" of *Asp. lanceolatum*. Though apparently fertile, the spores appear to be aborted. A well-drained

compost of peat, loam, and sand (2, 2, 1) is essential, coupled with a mild temperature.

ASPLENIUM MARINUM (THE SEA SPLEENWORT) (Plate VII)

This species (Fig. 33) is very distinct from the other Spleenworts by reason of the thick, leathery texture of its fronds, as also by its strict confinement to the cliffs and caves of our warmer coasts,



Fig. 33. *Asp. marinum*. (Part of frond.)

or to immediately adjacent walls, practically within reach of the spray. It is properly a native of warmer climes than ours, as it will not stand much frost, and under warm house treatment, which

most of our species resent, it assumes a much larger size than in the open. In a vinery at Richmond we have seen a plant of it with fronds two feet long, forming a huge plant, a marked contrast to even the most vigorous plants we have found elsewhere. In congenial habitats it is abundant, filling the crevices on the cliff rocks, and lining the roofs of sea caves with rosettes of light green fronds, in positions where every tide must bathe them in sea water, a point worth remembering in its culture, which otherwise is that of rock Ferns generally, though protection from frost is essential in winter, and as we have seen, warm greenhouse culture greatly favours development. Although a number of varieties have been recorded, most of these are of rather indefinite or erratic character, the best being—

IMBRICATUM (Fig. 34), in which the fronds are congested, and the pinnæ overlapping.

PLUMOSUM.—A very beautiful, robust, bipinnate form, barren and rare.

RAMOSUM.—A very marked variety, with branching fronds, found in Dorsetshire by Mr. G. B. Wollaston.

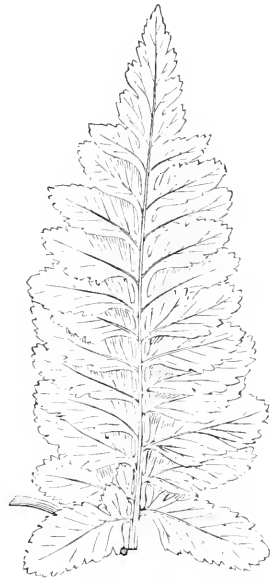


Fig. 34.
Asp. marinum imbricatum.

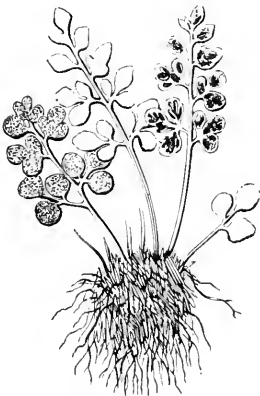


Fig. 35. *Asp. ruta-muraria.*
(A young plant.)

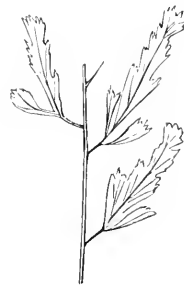


Fig. 36.
Asp. ruta-muraria cristatum.

ASPLENIUM RUTA-MURARIA (THE WALL RUE)

(Plate V)

This little Fern (Fig. 35) is common on old walls, bridges, etc., in association, frequently, with other Spleenworts, but often monopolizing all the chinks near the tops of the walls with its little tufts of diminutive fronds, which, even in favourable positions, rarely exceed four or five inches in length. It lends itself very unwillingly to culture, requiring a dry atmosphere, and, of course, good drainage, in stony, limy soil. Where found, it is almost invariably rooted in old mortar, with no soil at all. A number of varieties are recorded, even a

CRISTATUM (Fig. 36), found in several places, but it is open to doubt whether any have survived removal, and in any case they are all, with the above exception, erratic and depauperate.

Fig. 37. *Asp. septentrionale*.

ASPLENIUM SEPTENTRIONALE (THE FORKED SPLEENWORT)

(Plate VI)

Our figure (Fig. 37) so clearly indicates the difference between this and *Asp. germanicum* that a description is unnecessary, and as regards its habitats, etc., the remarks appended to that species apply exactly. No varieties.

ASPLENIUM TRICHOMANES (THE MAIDEN-HAIR SPLEENWORT)

(Plate VII)

This is one of the commonest, but to our mind the prettiest, Ferns, where old walls, stone dykes, and similar erections exist, and Ferns are generally plentiful, owing to a liberal rainfall. In such situations its pretty tufts, or rosettes, may be seen lining the chinks of the old walls by hundreds, both on the sunny and shady sides, and rooting obviously into the old mortar with no other appreciable admixture. Its fronds, usually about five or six inches in length, though in hedge dykes we have seen it over a foot long, are only once divided, and consist of a long black, hair-like stalk and midrib, whence the popular name, with a row on each side of oval pinnae, attached by all but imperceptible jointed

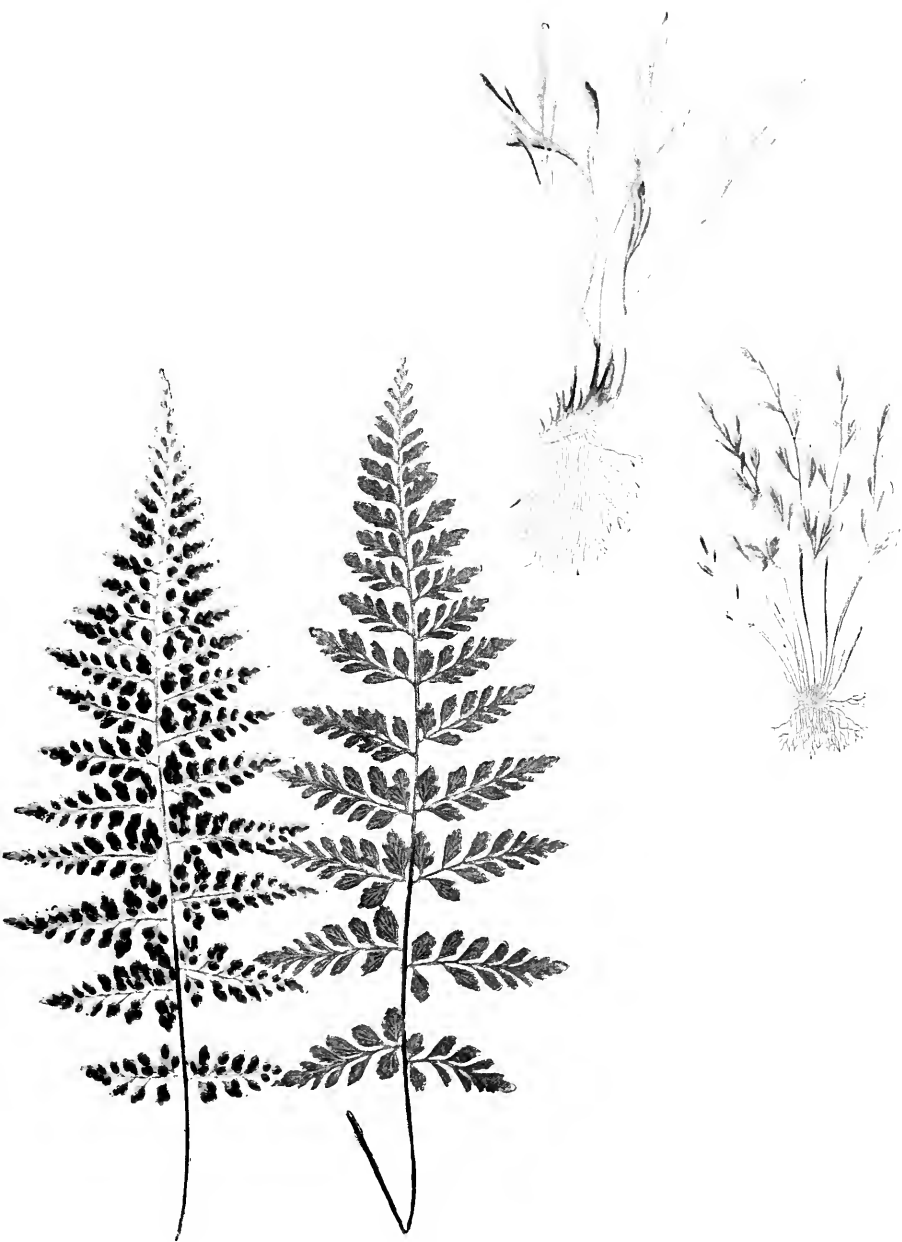


PLATE VI.

Asplenium lanceolatum

Asp. septentrionale

Asp. germanicum

stalks, and set at short distances from each other, which are of equal size all the way up until they taper off to a blunt tip. The same description applies fairly closely as regards form to its relative *Asp. viride*, but this has a green stalk and midrib, affects somewhat different habitats, and the side divisions are not jointed at the junction with the midrib, and therefore do not detach themselves, when their course is run, as does *Asp. trichomanes*. Its culture has already been indicated, but we may add that when protected, if the fronds are wet for any length of time, they turn black and rot, and so impoverish the plant, which, clearly enough, is a lover of fresh air. If, however, the fronds be not wetted, it will grow very well in a Wardian case, but only on that condition. The chief varieties are:—

BIPINNATUM.—This is a remarkable form, found by Mr. Roberts in Wales, and having true bipinnate fronds, the pinnæ in well-grown specimens being quite pinnate and resembling small fronds. A strong plant looks like one of the bipinnate exotics.

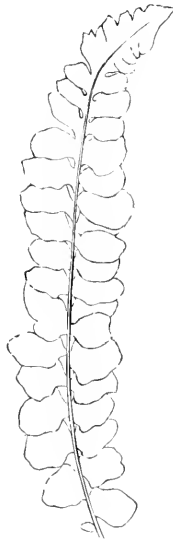


Fig. 38. *Asp. trich. confluens* Stabler.

CONFLUENS STABLER (Fig. 38).—In this remarkable variety, which is a robust form, the upper pinnæ are confluent, or non-divided, the texture is extra stout, and, although it is apparently abundantly fertile, the spores are abortive and dustlike. It has been regarded as a hybrid between *Asp. trichomanes* and *Asp. marinum*, but this is doubted, as no *marinum* grew or was likely

to grow in the locality ; hybridization with *Scolopendrium vulgare* is more credible. Similar forms are recorded in four places.

CORYMBIFERUM represents a similar type to *cristatum*, shown below, but on round, bunch-crested lines.

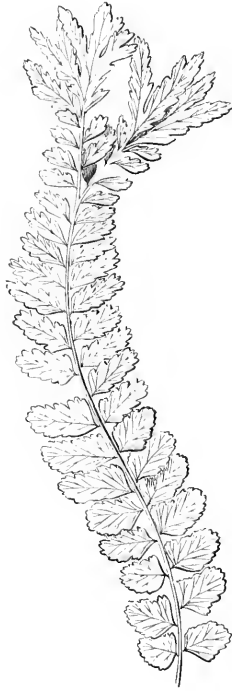


Fig. 39. *Asp. trich. cristatum*.

CRISTATUM, *Wollaston* (Fig. 39 and Appendix No. II).—A type which the writer has found on two occasions, and which, as figured, cropped up from a stray spore under cultivation.

HARROVII, *Moore* (Fig. 40), is a dwarf, slender form with small, serrate pinnæ, very pretty.

INCISUM, *Moore* (Fig. 41 and Appendix No. III).—This, which represents the plumose form of the species, and is precisely akin in character to the Welsh Polypody (*P. v. cambricum*) in presenting expanded and deeply cut fronds, accompanied by entire sterility, has been found in several places ; in one instance a fertile form is recorded, but as nothing appears to have resulted, we think this requires confirmation.

INCISUM CLAPHAMII (Fig. 42) is the best flat form, having pinnae as much as three-quarters of an inch long, and so deeply incised as to be almost bipinnate. This was found in 1859.



Fig. 40

Asp. trich. Harrovii.



Fig. 41.

Asp. trich. incisum.

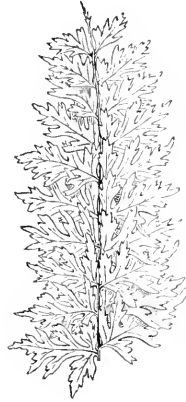


Fig. 42

Asp. trich. incisum Claphamii.

INCISUM TRIANGULARE, *Lowe*.—Found in 1863; is a good form on slenderer lines.

INCISO-CRISPATUM CLEMENTII.—Undoubtedly the finest *incisum* yet discovered. It was found in the wall of a mason's yard in Lancashire. The pinnae are beautifully cut, and deeply overlap, forming a unique variety; in Mr. H. Bolton's possession at Warton, near Carnforth.



Fig. 43. *Asp. trich. incisum laciniatum* (centre of frond).

INCISUM LACINIATUM, *Stansfield* (Fig. 43).—Found in Co. Clare by A. Stansfield; a lacinate *incisum*.

MOULEI.—Found in Devon; resembles *Harrovii*, but is more deeply cut.

MULTIFIDUM, *Moore* (Fig. 44), which is more on the lines of *ramosum* but somewhat more divided.

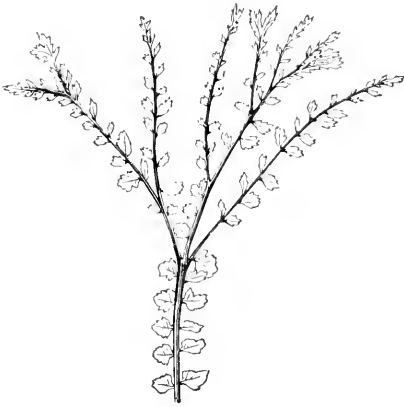


Fig. 44. *Asp. trich. multifidum*.

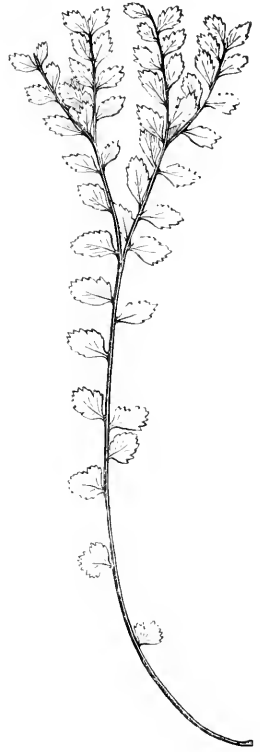
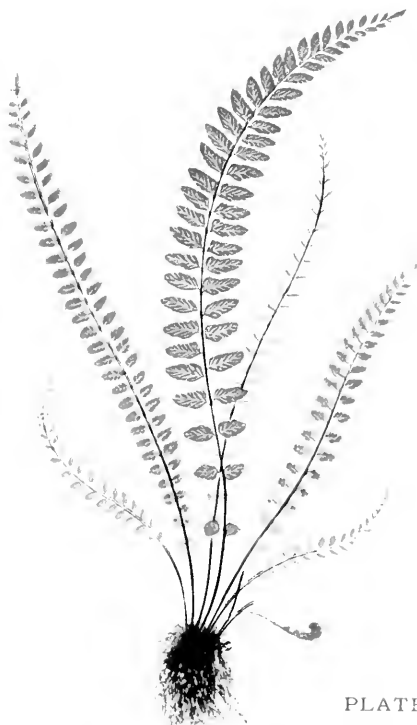
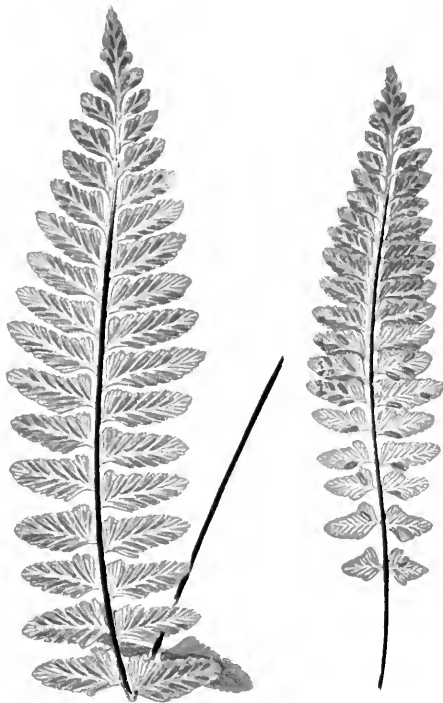


Fig. 45. *Asp. trich. ramosum*.

RAMOSUM, *Wollaston* (Fig. 45 and Appendix No. II).—A prettily branched form, the frond tip dividing into several. This belongs to the several forms of *cristatum*.

RAMO-CRISTATUM.—Several finds of this are recorded, in which the characters of *ramosum* and *cristatum* combine to form heavy-headed flat tassels of much beauty (see Appendix No. II).

TROGGYENSE, *Lowe*.—Found by Mr. Lowe in 1882; may be described as a fertile form on *incisum* lines.

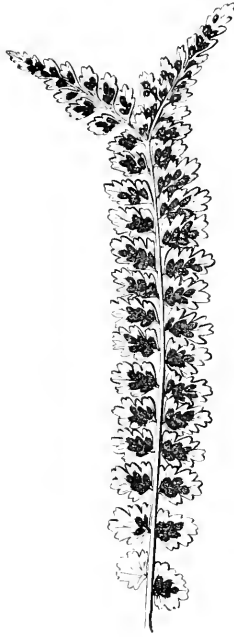


Asplenium trichomanes



Asplenium viride

PLATE VII.
Asplenium marinum

Fig. 46. *Asp. viride*.

ASPLENIUM VIRIDE (THE GREEN SPLEENWORT)

(Plate VII)

This Fern (Fig. 46) is very similar in make to *Asp. trichomanes*, but has bright green stalks and midribs instead of black ones, and the pinnæ are not jointed at the junction with the midrib. It is not usually found associated with *Asp. trichomanes*, but grows in rock crevices, in moist mountain districts, often at high elevations, even associating with the Holly Fern (*Polystichum lonchitis*), but is not, like that Fern, confined to high levels, since we have found it in the rocks on the banks of streams of little elevation. It is not easy to grow under cultivation, requiring cool air and moisture. Soil should be mixed with much broken porous stone, and well drained; usual size, five to six inches. A few varieties have been found, but none of value.



Fig. 47. *Athyrium filix-femina* (pinna).

ATHYRIUM FILIX-FEMINA (THE LADY FERN)

(Plate VIII)

This species, which ranks among the most beautiful of our native ones, was named by the old botanists long before the actual life history of the Ferns had been worked out and their peculiar method of reproduction ascertained. The botanical name given is a mixture of Greek and Latin, of which the popular name of Lady Fern, a polite equivalent of the Female Fern, is a true translation. Obviously the species was so christened owing to its greater delicacy of make and cutting as contrasted with its coarser companion, *Lastrea* (*Nephrodium*) *filix-mas*, the Male Fern, which, again, is a correct translation, but which, again, is a misnomer, since both species reproduce themselves on the ordinary lines as set forth in our chapter on the Life History of the Ferns, and as Ferns proper are not practically of any sex at all. Nature, however, curiously enough, has appeared to sympathize with the old botanists' idea of the lady-like character of this species by endowing it with the faculty of inventing and donning innumerable fashions, many of extra beauty, and many of as bizarre, quaint, and eccentric types as the most gifted *costumière* could devise in the way of laces,

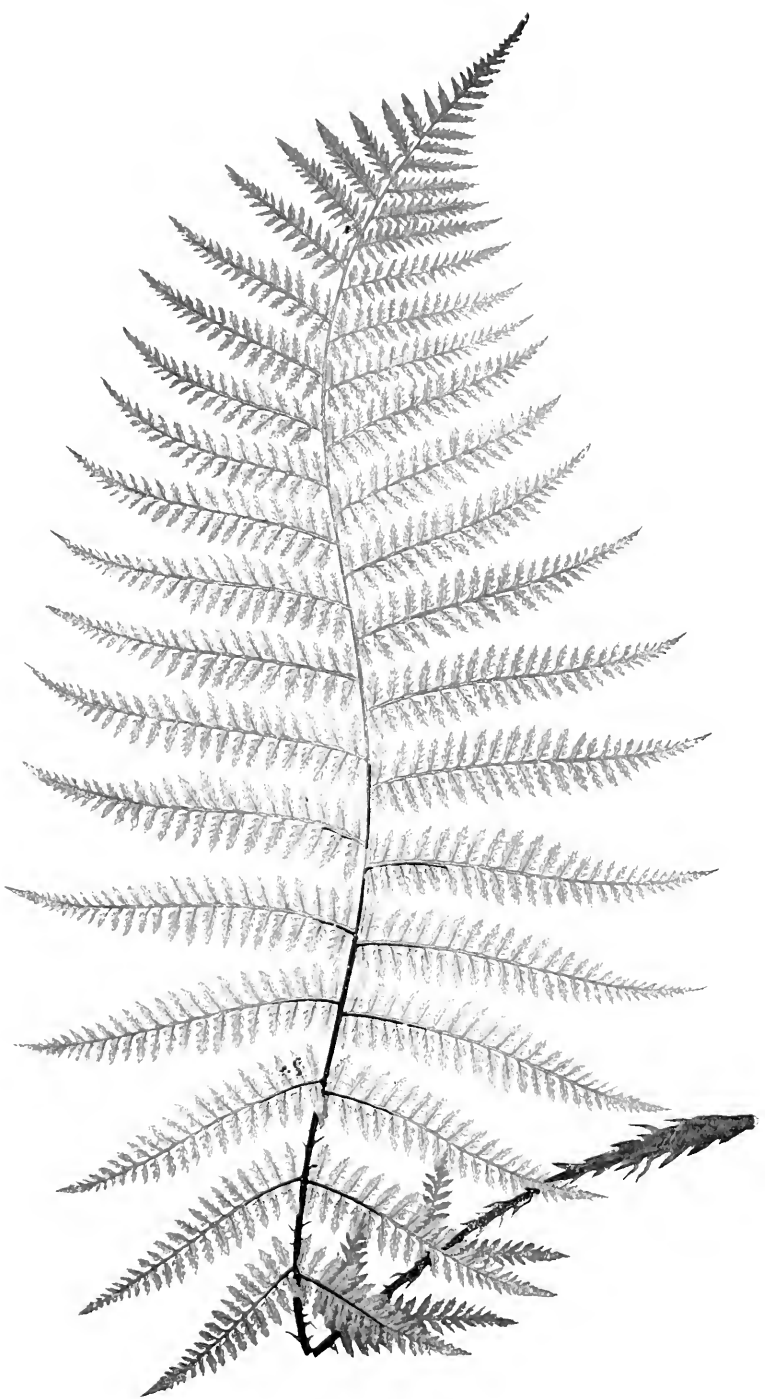


PLATE VIII

Athyrium filix femina

frills, fringes, tassels, and other decorative adjuncts. The Lady Fern, in what we may consider its simple rustic garb, is beautiful enough. Its fronds, which spring from erect rootstocks in tufts rather than circlets, and which in very favourable situations may reach a length of five feet, are usually nearly thrice divided; see Fig. 47, which represents the prevalent type. Independently of the very marked varieties, or "sports," with which we shall presently deal, it is so fertile in sub-varieties that if we examine a colony, say in a long roadside ditch, we shall often find it difficult to match exactly any two plants, so greatly will they vary in minor details, habit of growth, and so on. The Lady Fern affects very moist situations, and is perfectly deciduous, its fronds dying down in the autumn quite irrespective of frost. As usual, botanists have differed as to the genus to which this species belongs, no less than twenty-four different names and eight different genera figuring in a list of synonyms before us. This is accounted for to some extent by the fact that the fructification, i.e. the spore heaps, are indeterminate in shape, somewhat resembling a horseshoe, with a more or less ragged indusium or skin-like cover in the middle of it. It is thus differentiated from any other of our native species, but quite a number of eminent botanists have ranked it with the *Asplenium*, to the intense bewilderment of the British Fern specialist, since, in his eyes, there is not the faintest resemblance to that genus in any one of the characters. The Spleenworts are thoroughly evergreen, have more or less leathery fronds, are denizens of well-drained rocky habitats, and have their spore heaps in definite straight lines, which even when much shortened never approach a horseshoe form; their spores are dark-coloured, small and corrugated, and as a genus they are but little prone to "sport." The Lady Fern, on the other hand, is perfectly deciduous, has soft-textured fronds, grows in the soil proper in moist positions, has curved spore heaps, which are never straight, the spores are large and smoothly egg-shaped, and the species is one of the most variable in the world. The British Fernist's bewilderment is not, therefore, to be wondered at, and having expressed our own, we take leave of the subject. Culture is easy; the Fern is not dainty as to soil, and the compost already mentioned suits it well. Water must not be spared, and as the fronds are invisible in the winter, watering then, if the plants be in pots, must not be omitted, since under natural conditions the Lady Fern is bathed in moisture at that season, and if permitted to become bone-dry will probably perish. With established plants saucers are permissible.

ABASILOBUM (see *mediodeficiens*).

ACROCLADON (see Plate I and Appendix No. IV).—This extraordinary Fern was found wild by Mr. Monkman, by the roadside on a Yorkshire moor, as a small seedling somewhat like *crispum*,

but under culture it assumed a large size, forming a mass two feet high, and as much through. Although for some time reported to be barren, spores were eventually found, and a number of even more extraordinary forms were obtained from it. As will be seen it branches continuously from the base, until a more or less spherical mass of branches and crests is produced, the terminals dividing again and again *ad infinitum* during the growing season.

A. DENSUM.—A denser-growing seedling raised by Stansfield.

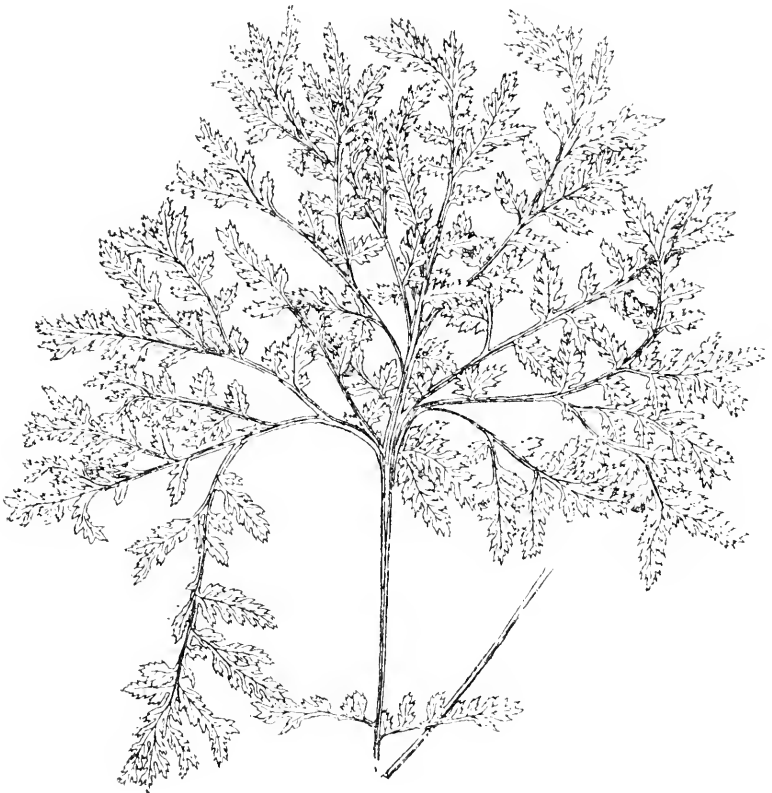


Fig. 48. *A. f. f. apioides*.

APIOIDES (Fig. 48).—A dwarf variety, with very large openly branched crests, borne on nearly bare stalks.



Fig. 49. *A. f. f. Applebyanum*.

APPLEBYANUM^m (Fig. 49).—Pinnæ rounded, frond tip branched. Obviously a cross with *Frizellia*, or a "sport" of same. Raised by Mr. Appleby.

APUÆFORME (Fig. 50).—Found in Yorkshire by Mr. J. Horsfall ; fronds prettily crested, and with fish-like outline.



Fig. 50. *A. f. f. apuæforme* (pinna).

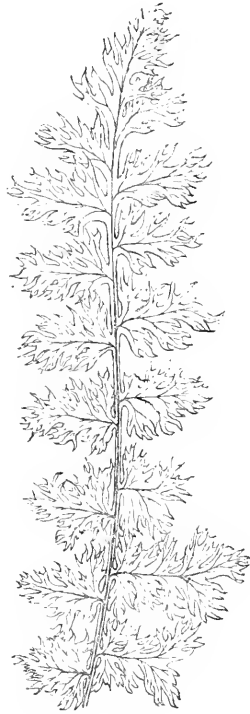


Fig. 51. *A. f. f. Barnesii*.

BARNESII (Fig. 51).—Found by Mr. Barnes, fronds eight inches by one ; short, wide, and much-incised pinnæ.

BLAKÆ.—A very beautifully crested plumose form, raised by Mr. Parsons, the nearest approach to the *superbum* section, but surface lucent.

CANALICULATUM.—Raised by Stansfield ; heavy *grandiceps* type.

CAPUT MEDUSÆ.—Raised by Mapplebeck ; dense, rounded head with twisted, snake-like segments.

† CATHEDRALE.—A dwarf-crested form, found over two hundred years ago on Lichfield Cathedral.

CLARISSIMA JONES.—A very remarkable Fern, found in N. Devon ; robust, and with slender pinnules, fronds over two feet wide. Apospory on frond backs first discovered on this. See Life History, chapter v, page 17. (See Appendix No. V)

C. BOLTON.—Found in Lancashire; smaller than *Clarissima Jones*, and finer cut. Aposporous at sites of sori and terminal points. Somewhat inconstant, progeny more so, and mostly worthless.

C. CRISTATUM GARNETT.—A lax, crested *Clarissima*-like variety, raised by Mr. Garnett, and also aposporous on frond backs.

CONGESTUM CRISTATUM, C. CRISTATUM FITT, C. CRISTATUM (FINDLEYANUM).—Dwarf, congested, and tasselled.

C. EXCURRENS.—Raised by Stansfield; dwarf, dense, and all tips abruptly terminating with a thorn.

C. GRANDICEPS.—An improvement on Fitts *C. cristatum*.

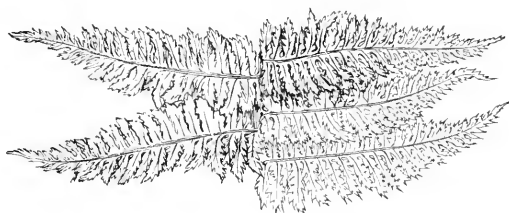


Fig. 52. *A. f. f. congestum minus* (pinnae).

CONGESTUM MINUS (Fig. 52).—This very beautiful dwarf and congested Fern, found by Mr. Riley in Ireland, was originally named *Edwardsii*, but it has been thought advisable to name it according to its character, Mr. Edwards not being the finder.

C. M. CRISTATUM, C. M. GRANDICEPS.—Crested seedlings of *C. minus*, on very charming dwarf lines.

C. PAUL.—Found by Mr. Paul in Cornwall; very congested and dwarf.

C. PHILLIPS, C. SIMPSON, C. WHITWELL.—All congested and dwarf, but varying somewhat in detail; the last is somewhat crispy.

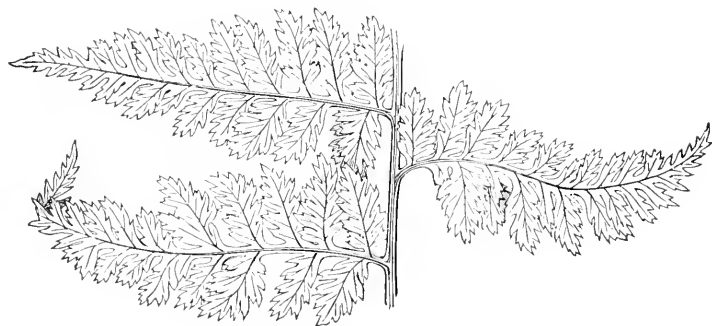


Fig. 53. *A. f. f. conioides*.

CONIOIDES (Fig. 53).—Although somewhat irregular in make this variety is worthy of a place in collections, owing to the peculiarly prickly, crispy character of its divisions. It was found at Cautly by Mr. T. Appleby.

C. CRISTATUM.—Raised by Stansfield; a prettily crested form with *conioides* character.



Fig. 54. *A. f. f. coronatum*.

CORONATUM (Fig. 54).—A small grower, with heavily crested head.

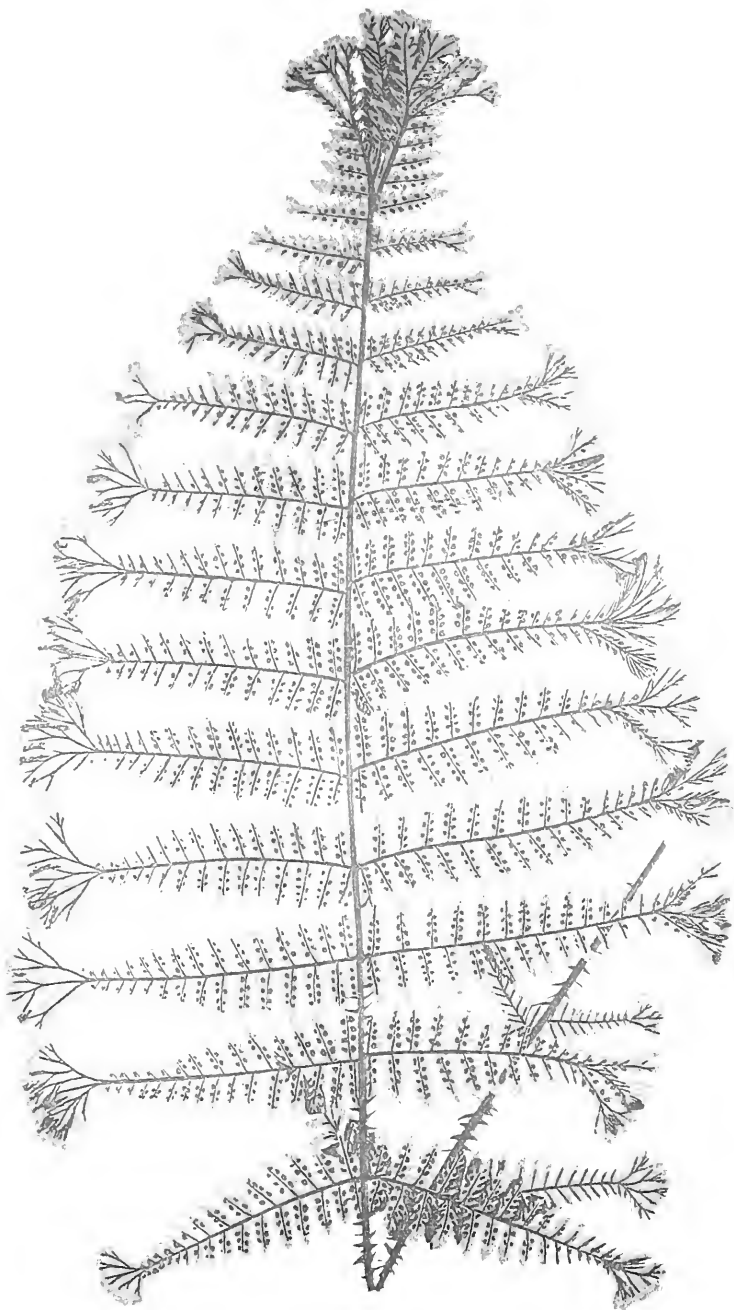


PLATE IX.

Athyrium filix femina
var. *corymbiferum*

CORYMBIFERUM JAMES (Plate IX).—A very fine form found by Mr. James in Guernsey. The tassels are spherical and very dense ; very distinct.



Fig. 55. *A. f. f. corymbiferum strictum* (crest).

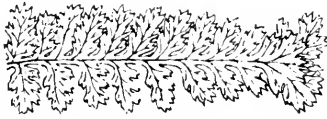


Fig. 56. *A. f. f. corymbiferum strictum* (middle pinna).

C. STRICTUM (Figs. 55 and 56).—Raised by Messrs. Stansfield ; fronds narrow ; a dwarfed *corymbiferum*.

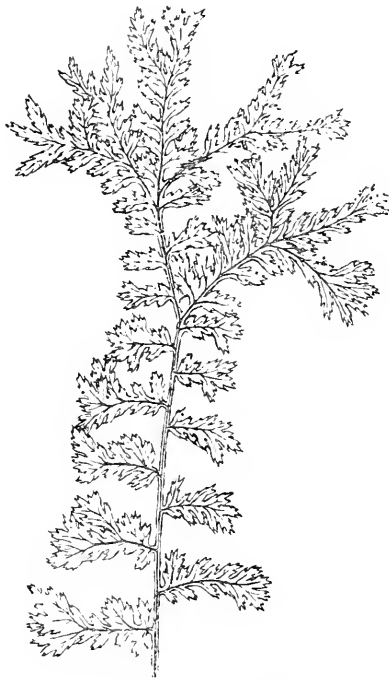


Fig. 57. *A. f. f. Craigii*.

CRAIGII (Fig. 57).—A crested form raised by Mr. R. Craig, Milnthorpe. We mention this as it belongs to a very erratic section, which comes so freely from spores as to form veritable weeds in collections under glass, mostly depauperate or crested on erratic lines.

CRISPATUM PAUL (GRANTLE).—Found by Mr. Paul in Cornwall; a fine imbricate, dense variety.

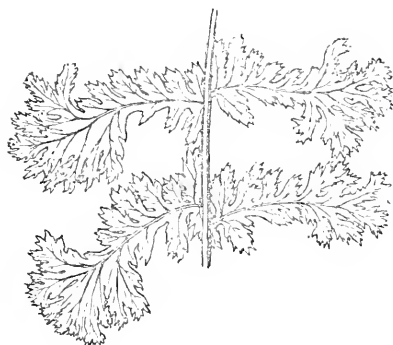
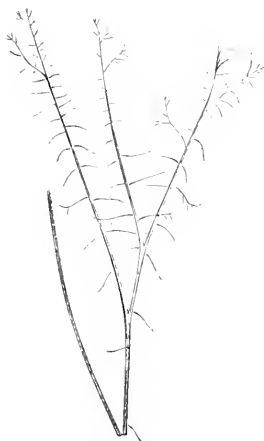


Fig. 58. *A. f. f. crispum* (plan of frond). Fig. 59. *A. f. f. crispum* (pinnae).

CRISPUM (Figs. 58 and 59).—Found on three occasions in Co. Antrim, Ireland, at Braemar, Scotland, and at Todmorden, in Lancashire. This is an interesting branched and crested dwarf, which creeps about and forms spreading patches about six inches high only.

C. CORONATUM (Fig. 60).—A somewhat robust *crispum* with heavier terminal tassels.



Fig. 60. *A. f. f. crispum coronatum*.

CRISTATUM.—There are many forms bearing tassels at tips of fronds and side divisions, which can only be classed under this name, having no other distinctive features.

C. KILRUSHENSE.—This is undoubtedly the most beautiful crested form yet found. Discovered by the writer at Kilrush, Co. Clare. The tassels of both frond and pinnæ are long and slender, and divided again and again as in *A. f. f. Victoriae*, an uncommon feature.

C. SMITHIES.—Found in Wastdale ; a pendulous polydactylous variety.



Fig. 61. *A. f. f. cristato-polydactylum*.

CRISTATO-POLYDACTYLUM (Fig. 61).—Raised by Messrs. Stansfield; a somewhat dwarfed *grandiceps* form, with heavy terminal crests to frond, and small ones to pinnæ.



Fig. 62. *A. f. f. cristulatum*.

CRISTULATUM (Fig. 62).—Raised by Messrs. Stansfield; a dwarf *grandiceps*.



Fig. 63. *A. f. f. curtum* (pinna).

CURTUM (Fig. 63).—Found by Mr. J. Wood at Bowness; pinnæ short and compact, hence fronds narrow.

CURTUM CRISTATUM.—Pinnæ short and oval, neat round crests

C. GRANDICEPS.—Pinnæ short and oval, heavy crests.

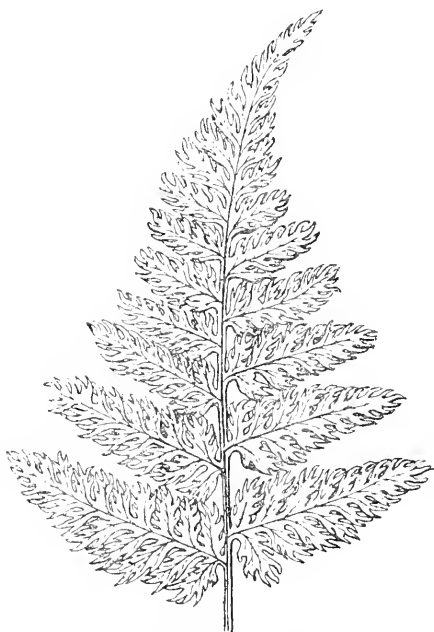
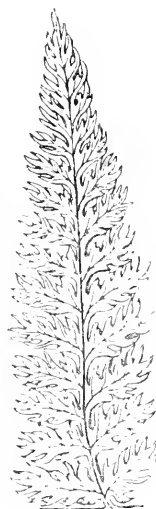


Fig. 64. *A. f. f. denticulatum*
(tip of frond).



BB&A Fig. 65.
A. f. f. denticulatum (pinna).

DENTICULATUM (Figs. 64 and 65).—Found by Mr. Barnes ; a small grower, of somewhat congested, stiff make, pinnules very finely cut, the edges resembling small teeth, whence the name, which means small-toothed. It is, however, the peculiarly pretty, crispy character which distinguishes it from the normal and renders it an acquisition.

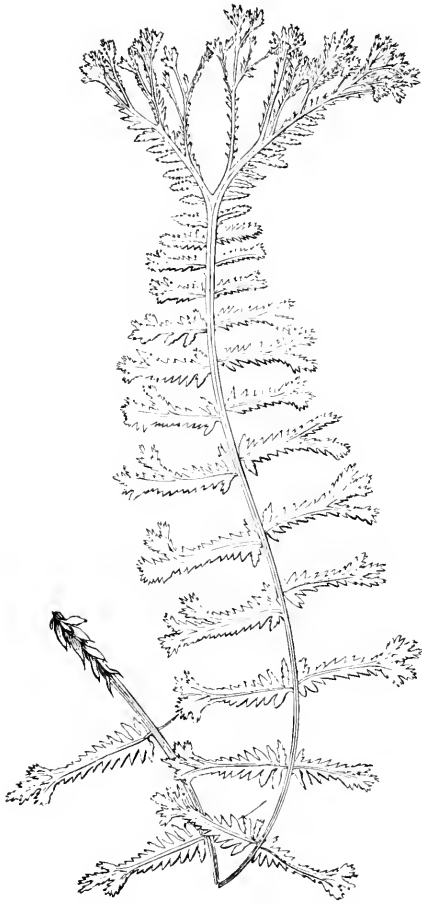


Fig. 66. *A. f. depauperatum*.

DEPAUPERATUM (Fig. 66).—Curiously misnamed, since it is a very pretty *cristatum*, of slender make, but not depauperate, i.e. defective, at all. Found in Sligo by Mr. J. Gunning.



Fig. 67. *A. f. f. depauperatum Edelsteini*.

D. EDELSTEINII (Fig. 67).—A reputed seedling of *Depauperatum*, it has much heavier terminal head, but the pinnae are irregular and really depauperate.



Fig. 68. *A. f. f. diadematum* (crest).

DIADEMATUM (Figs. 68 and 69).—Raised by Mr. Elworthy. A very dense and large corymbose head with tufted crests to pinnae.

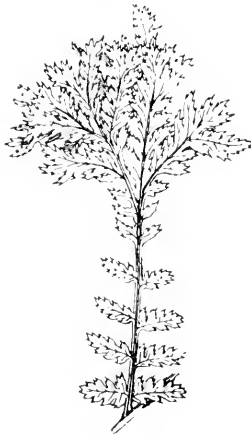


Fig. 69. *A. f. f. diadematum* (pinna)

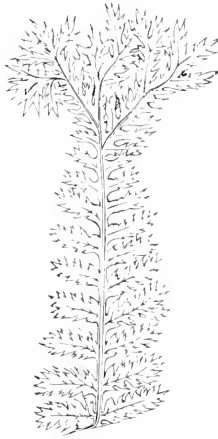


Fig. 70. *A. f. f. diffiso-multifidum* (pinna).

DIFFISO-MULTIFIDUM (Fig. 70).—A narrow-froned, pretty *cristatum*; found by Mr. C. Elworthy at Nettlecombe.

DOODIOIDES (Fig. 71).—Found in Sussex; a curious form with

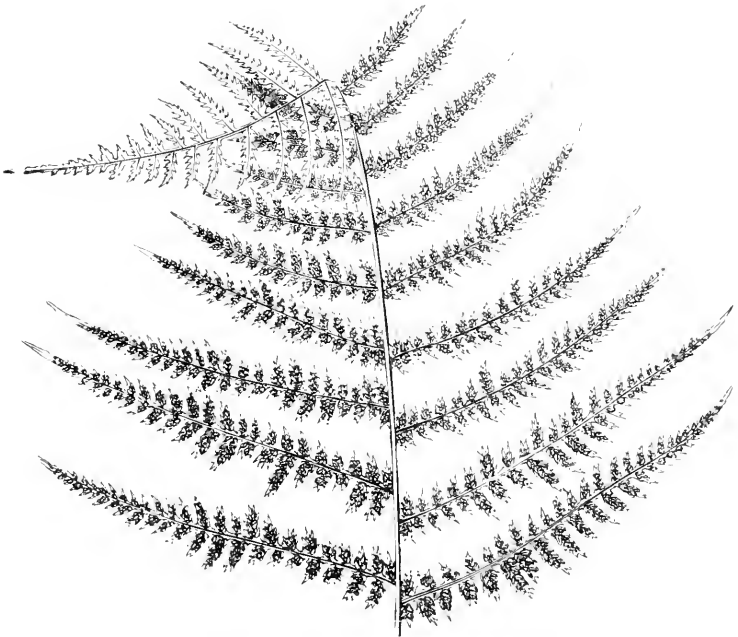


Fig. 71. *A. f. f. doodioides*.

very small, serrate pinnulets, the pinnæ being thus narrowed, but not shortened; frond of normal outline; so named from a resemblance of the pinnæ to a *Doodia* frond.

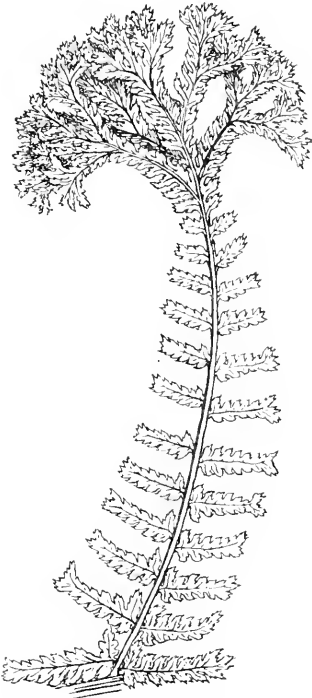


Fig. 72. *A. f. f. Elworthii* (pinna).

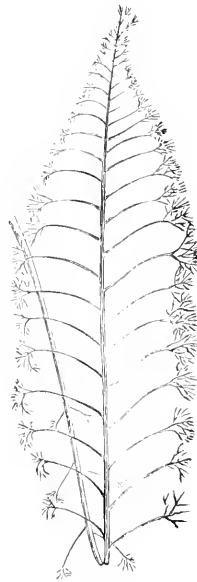


Fig. 73.

A. f. f. Elworthii (plan of frond).

ELWORTHII (Figs. 72 and 73).—A magnificently crested form found by Mr. Elworthy near Nettlecombe; robust, and even the pinnules crested (pericristate).

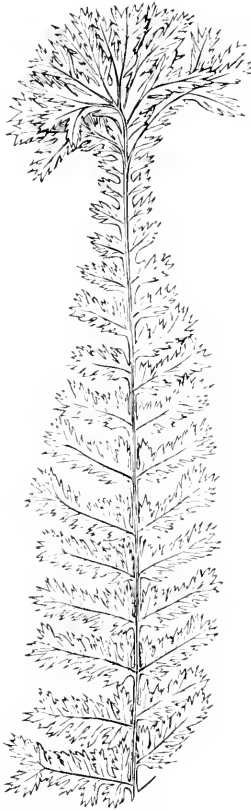


Fig. 74. *A. f. f. Elworthii splendens* (pinna).

E. SPLENDENS (Fig. 74).—A percristate form similar to *Elworthii*, found in the same locality by the same finder; but this has the pinnules more acutely serrate, and is, therefore, more delicate-looking.

EXCURRENS (*TRUNCATUM*).—All terminals, even of the pinnules, abruptly squared, and midrib projecting as a thorn.



Fig. 75. *A. f. f. Fieldæ* (pinnæ).

FIELDÆ (Fig. 75).—A very remarkable cruciate form with truncate, very narrow fronds, the short pinnæ being set on, sometimes in bunches and sometimes in pairs, at obtuse angles forming crosses with the opposite parts.

FLABELLI-PINNULA.—Found by Mrs. Wilson in Westmoreland ; a tiny dwarf, with star-shaped, spiky pinnæ.

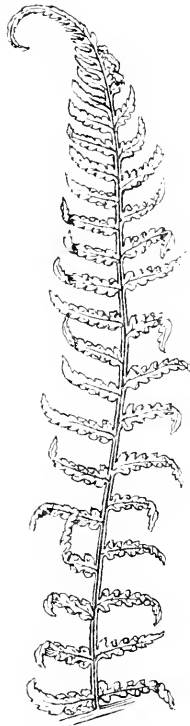


Fig. 76. *A. f. f. flexuosum* (pinna).

FLEXUOSUM (Fig. 76).—Found at Windermere by Mr. J. Huddart, and subsequently near there by Mr. Joe Edwards; all parts sinuously twisted.

FÆCUNDULOSISSIMUM DRUERY (*Woll.*).—A very curious, narrow-fronded *cristatum*, which bore bulbils on its primary fronds, and eventually did so on the much-divided crests; one of these has yielded a dwarf form, called

F. MINUS, whose fronds are shorter than its name.



Fig. 77. *A. f. f. formoso-cristatum*
(crest).

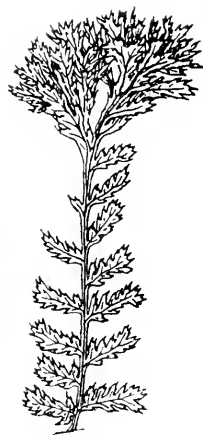


Fig. 78. *A. f. f. cristatum*
(pinna).

FORMOSO-CRISTATUM (Figs. 77 and 78).—One of a number of heavily tasselled forms raised by Mr. Elworthy; crests at frond and pinnæ tips corymbiferous.



Fig. 79. *A. f. f. Frizellie*.

FRIZELLIE (Fig. 79).—One of the most remarkable finds recorded. Found in Wicklow by Mrs. Frizell. Frond over a foot in length, very narrow, bearing round massed pinnæ, imparting an outline like a string of beads (see Appendix No. VI).

F. CAPITATUM (see Appendix No. VI).

F. CRISTATUM (Fig. 80).—Narrow-beaded fronds, like *Frizellia*, tipped with a branchy, tufted crest.

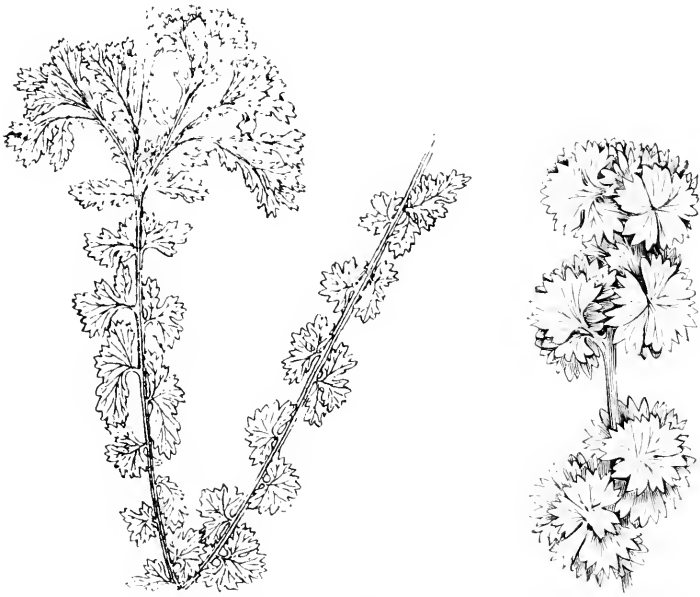


Fig. 80. *A. f. f. Frizellia cristatum.*

Fig. 81. *A. f. f. Frizellia nanum.*

F. c. CONGESTUM.—A dwarf, congested form, very good.

F. MULTIFIDUM (see Appendix No. VI).

F. NANUM (Fig. 81).—A dwarf form, about eight inches, but rounded pinnæ larger.

F. RAMOSISSIMUM.—A dwarf form ; fronds ramose from base.

F. RAMOSUM (see Appendix No. VI).

GIRDLESTONEI (see Appendix No. VII).—Found in Ross by Canon Girdlestone ; a magnificent form when it can be grown, but of very delicate constitution ; rarely thrives.

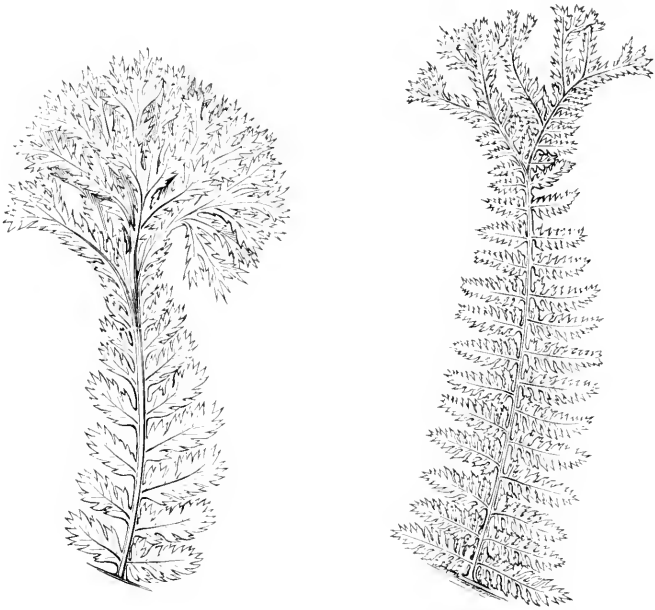


Fig. 82. *A. f. f. glomeratum* (pinna). Fig. 83. *A. j. f. inciso-digitatum* (pinna).

GLOMERATUM (Fig. 82).—Raised by Mr. Ivery, Dorking. Fine form, with dense, rounded crests to frond and pinnae.

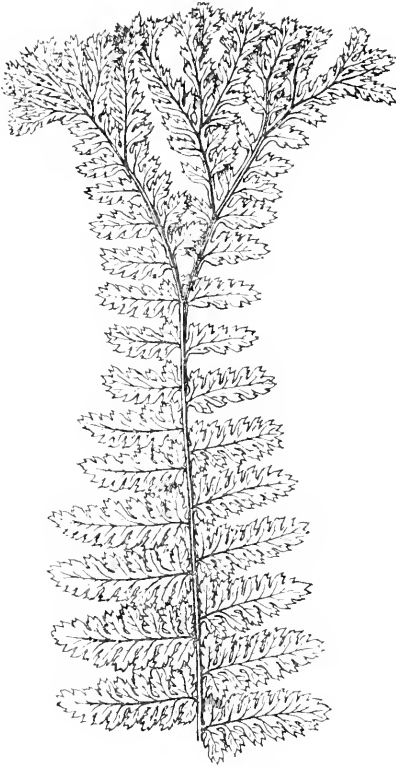
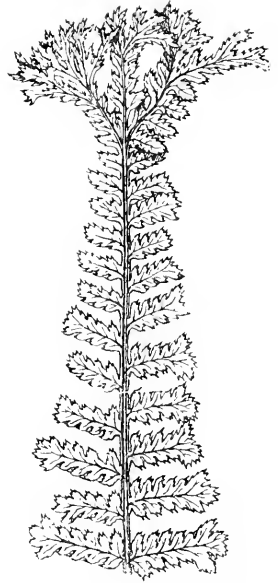
GRANDICEPS.—Found near Nettlecombe by Mr. C. Elworthy, and near Wiveliscombe by Mr. J. Morse, and raised by others. A very heavy and wide terminal crest; pinnae crests small.

G. KILRUSHENSE.—Raised by the writer from *C. Kilrushense*, and with heavier tassels on *grandiceps* lines.

HOWARDIÆ.—Raised by Mr. Craig; one of the *Craigii* section, but very good and well crested.

HUCKII.—Found on West Steddale by Mr. Huck. Beautiful long, crispy, crested pinnules.

INCISO-DIGITATUM (Fig. 83).—A pretty *cristatum* raised by Mr. Lowe.

Fig. 84. *A. f. f. Jamesii* (pinna).Fig. 85. *A. f. f. Kalon* (pinna).

JAMESII (Fig. 84).—A very fine, flat, crested form raised by Mr. James from his *corymbiferum*.

KALON (Fig. 85).—Another handsome form raised by Mr. James from *corymbiferum*; this has the pinnules crested.

KALOTHRIX.—One of the loveliest British Ferns; fronds cut into very slender, almost hair-like, subdivisions of silky lustre, whence the name, which means "beautiful hair." Separately raised by M. M. Howlett and Sim from a plumose form in Oxford Botanic Gardens, but an identical form figures in the Herbarium there as found wild, many years previously, in the Mourne Mountains in Ireland; a photo of this frond was kindly sent by Dr. Masters to the writer. All plants we have seen have a slight tendency to revert, sometimes entire fronds, but more usually parts of pinnae only, to a plumose form, presumably the parental form, which, from the fact that *Kalothrix*, when sown, yields true progeny

and also the plumose type, indicates the possibility that the Oxford parent might have arisen from the original Irish find, though of course this can only be surmised.

K. CRISTATUM.—A remarkably pretty, but so far small, crested form, raised quite accidentally by the writer, several years after vain attempts at a cross. The prothallus bore no less than seven plants, six of which survived separation. All are exactly alike, true *Kalothrix*, plus crests, and with the same tendency to slight partial reversion.

K. FOLIOSUM.—Divisions wider than in *Kalothrix*, and when it reverts, it does so to the normal.

K. LINEARIS.—A distinct form raised by H. Stansfield; subdivisions longer.

K. PLUMOSUM.—This is the plumose form above referred to as raised from *Kalothrix* by Messrs. Stansfield.

LACINIATUM.—Very fine divisions.

L. ELEGANS, L. RAMULOSUM.—These are crosses made by Messrs. Stansfield between *Craigii* and the Horsfall *plumosum*; *elegans* has cruciate pinnules and no crests, but *ramulosum* is practically a multifid Horsfall.

LAXO-CRISTATUM.—Found by W. H. Phillips in Co. Down; long lax pinnules, crests small.

LUNULATUM.—A synonym for *Frizellie*.

MAGNI-CAPITATUM.—Raised by Stansfield from *acrocladon*; fronds flat, but otherwise branched like parent; a splendid form.

MEDIO-DEFICIENS (ABASILOBUM).—Characterized by abortion, partial or entire, of subdivisions adjacent to mid-ribs of frond and pinnæ, an open space being thus left. In a form found by the writer, near Wigton, N.B., this is so regular even in the pinnæ that the Fern is very pretty, but as a rule it is irregular in the many finds so named, and hence they are of little value.

M. CAUDICULATUM.—Found in Ireland by W. H. Phillips. Besides the above character, the tips of the pinnæ run out into inch-long even tails, prettily set with bristles.

MESEMBRYANTHEMOIDES (Fig. 86).—Found by Mr. Clapham; a dwarf form, with heavy bunch crest to frond. A small *grandiceps*.

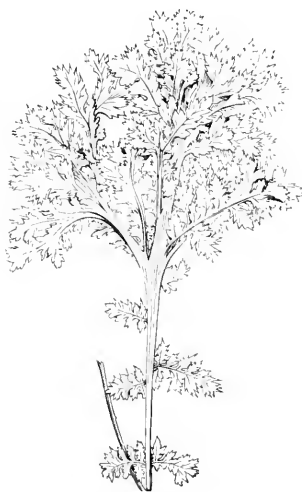
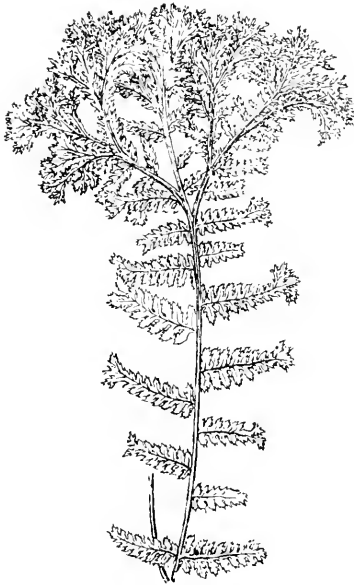


Fig. 86.

A. f. f. mesembryanthemoides.

Fig. 87. *A. f. f. Moorei*.Fig. 88. *A. f. f. multiceps* (pinna).

MOOREI (Fig. 87).—Found in the Channel Islands by Mr. James ; a dwarf *grandiceps*.

MULTICEPS (Fig. 88).—This very fine variety was found near Truro, in Cornwall. It bears crests at all terminals on *multifidum* lines, but the tassels are more finely cut.

MULTIFIDUM (Plate X).—This very fine form has been found in several places, though differing slightly in detail as independent wild finds always do. Our plate obviates detailed description.

M. COOLINGII.—A prettily crested form raised by Mr. Cooling.

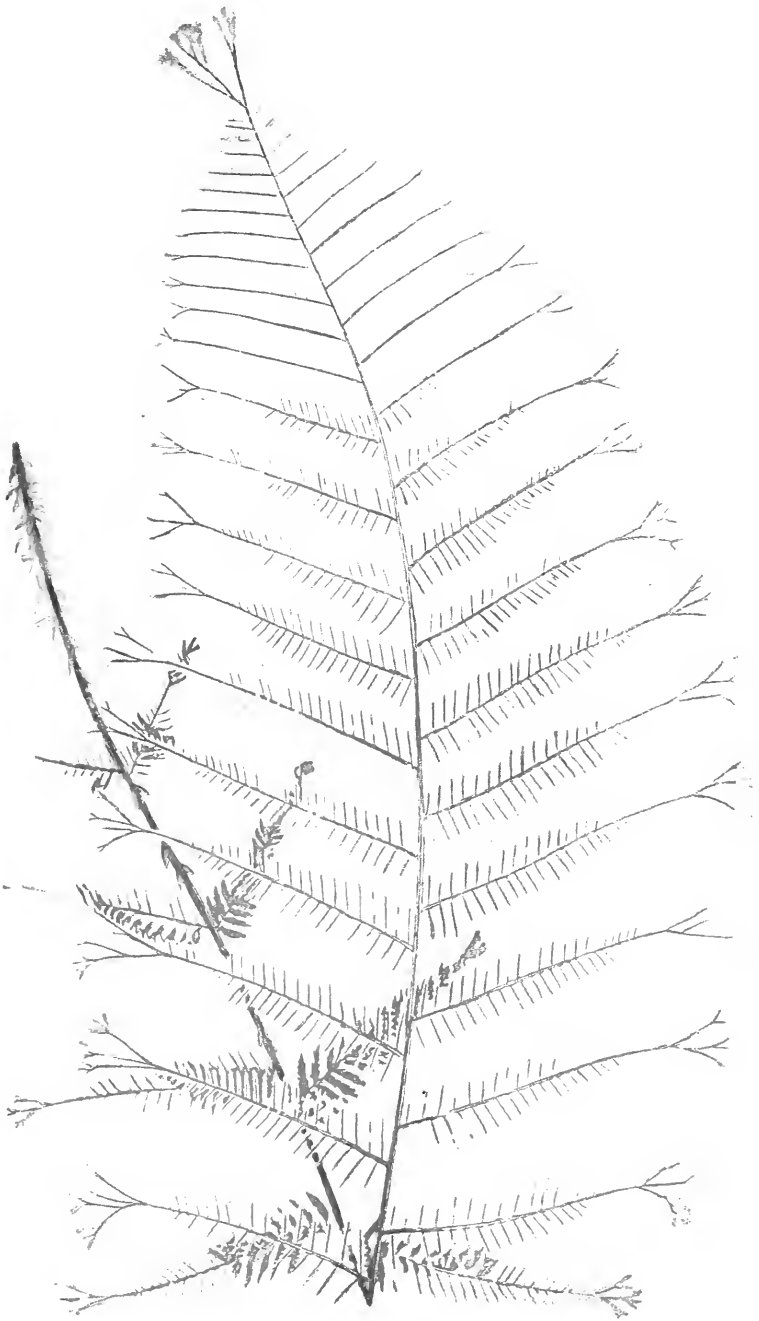


PLATE X.

Athyrium filix femina
var. *multifidum*.

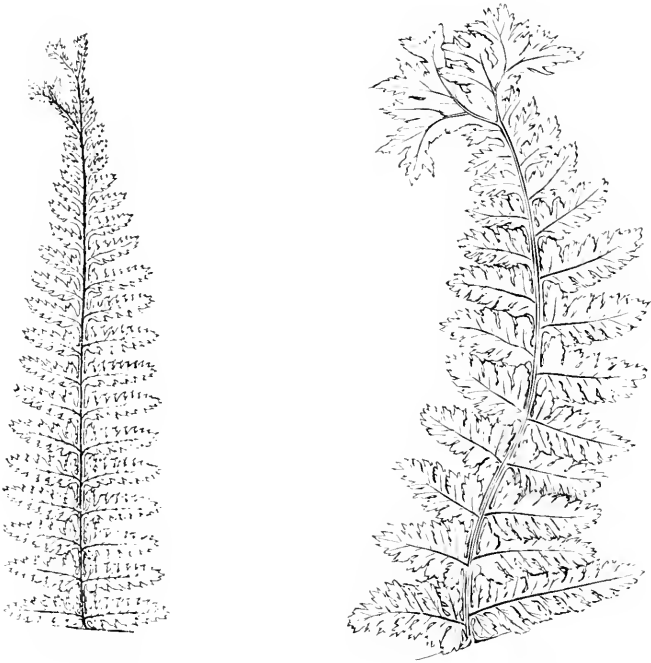


Fig. 89. *A. f. f. multifidum tenue* (pinna). Fig. 90. *A. f. f. multifurcatum* (pinna).

M. TENUE (Fig. 89).—A dwarf, slender form found by Mr. J. James in the Channel Islands.

MULTIFURCATUM (Fig. 90).—A fine foliose *cristatum* found near Ruthen by Mr. T. Pritchard. A different form, with wide-branching terminal crests, was found in Westmoreland by Mr. Mapplebeck.

NODOSUM.—Another name for *Frizellia*.

NUDICAULE CRISTATUM.—Raised by Mr. Mapplebeck; stalk bare, heavy head.

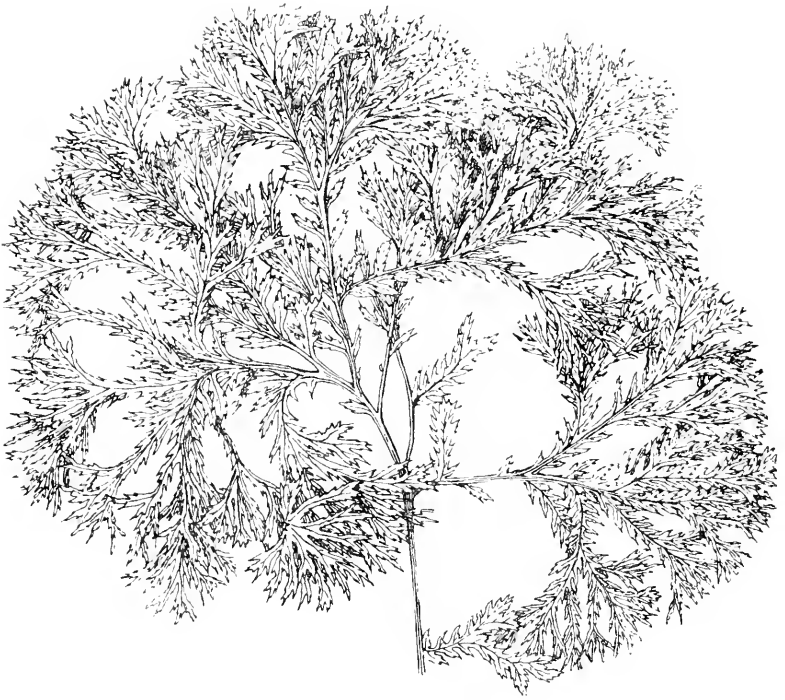


Fig. 91. *A. f. f. orbiculatum*.

ORBICULATUM (Fig. 91).—Raised by Mr. Elworthy; huge spherical crest, composed of numerous much-divided branches.

PARVICEPS (Fig. 92).—A dwarf, compact form, with small crests ; found by Mr. Barnes.

PERCRISTATUM COUSENSIS.—Raised at Snaresbrook by Mr. J. S. Cousens ; a fine typical form. The term *percristatum* is properly applicable to all crested forms in which the pinnules crest.



Fig. 92.

A. f. f. parviceps (pinna).

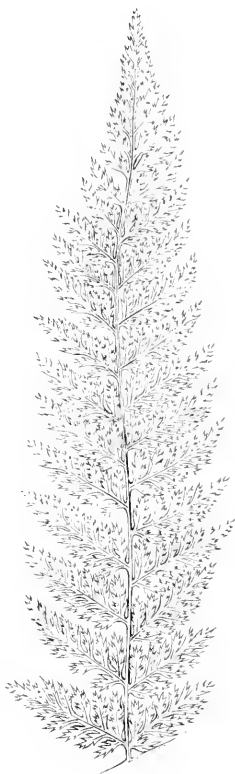


Fig. 93. *A. f. f. plumosum Barnesii* (pinna).

PLUMOSUM AXMINSTER.—Found in 1863 by J. Trott. A fine plumose form and progenitor of the beautiful *superbum* strain raised by the writer. (See chapter on Fern Selection, page 27).

P. BARNESII (Fig. 93).—Found wild at Milnthorpe, and named after the finder.

P. DIVARICATUM.—Found by M. Morris in Lancashire ; one of the finest wild *plumosums*, robust and beautifully feathery.



Fig. 94. *A. f. f. plumosum* Drury (young frond).



Fig. 95. *A. f. f. plumosum* Drury.

P. DRUERY (Fig. 94, young frond ; Fig. 95, plant).—Raised by the writer from *p. elegans*, the direct offspring of *p. Axminster*.

P. ELEGANS PARSONS.—A more finely cut *p. Axminster*.

P. HODGSONÆ.—Found by Miss Hodgson at Ulverston ; a very delicate and distinct *plumosum*.

P. HORSFALL.—Found at Skipworth by Mr. Horsfall ; a fine, slenderly cut, and very distinct form ; one of the best.

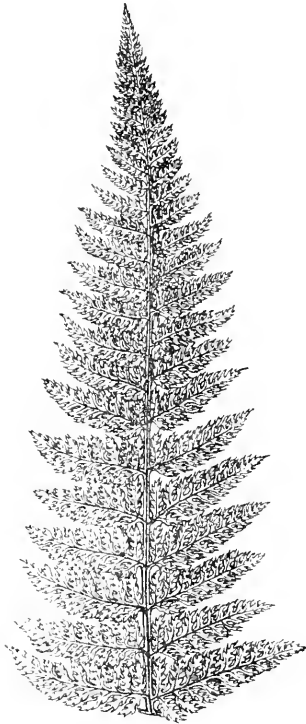


Fig. 96. *A. f. f. plumosum Jervisii* (pinna).

P. JERVISII (Fig. 96).—Found wild at Stone, Staffs., and named after the finder.

P. JONES.—Large and elegant.

P. POUNDEN.—Found Co. Antrim by Rev. Mr. Pounden, an erect, distinct variety.

P. STANSFIELD.—See *Kalothrix plumosum*.

P. STANSFIELDII (Fig. 97).—Found wild at Todmorden, and named after the finder.



Fig. 97. *A. f. f. plumosum Stansfieldii* (pinna).



Fig. 98. *A. f. f. superbum* and normal for comparison.

P. SUPERBUM (Fig. 98).—A section raised by the writer (see chapter on Fern Selection, p. 27). A fine, flat-crested *plumosum*; parent of *plumosum Druery* and the following, also a number unnamed so far.

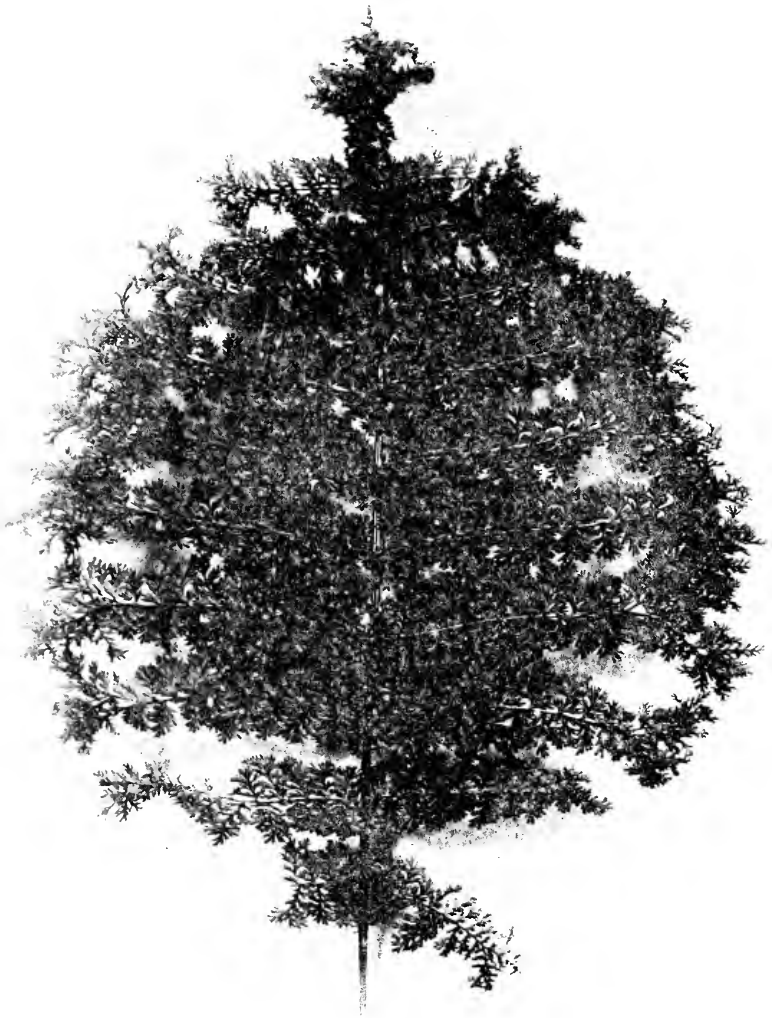


Fig. 99. One of the *pericristate superbums*.

P. S. CRISPATUM, P. S. DISSECTUM, P. S. FOLIOSUM, P. S. GRANDICEPS, P. S. KALON, P. S. PERCRISTATUM.—Their special characters are indicated by these names; the last-named is by far the finest crested form extant, even the pinnulets being distinctly and evenly fanned at tips.

P. WILLS.—A grand robust find by Dr. Wills in Dorset.

POLYDACTYLON (Fig. 100).—Found under somewhat different forms in various places ; an inferior type of *cristatum*.

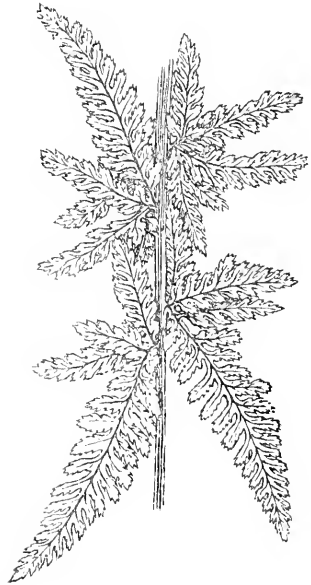
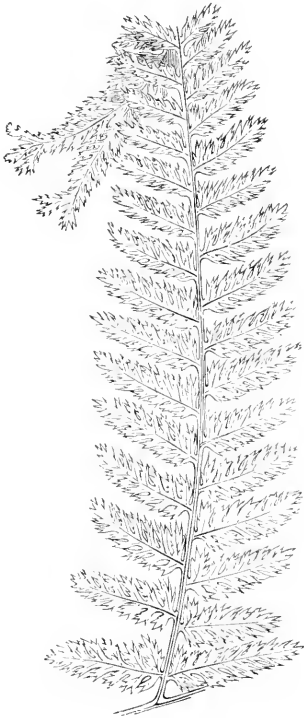


Fig. 100. *A. f. f. polydactylon* (pinna). Fig. 101. *A. j. f. Pritchardii* (pinnae).

PRITCHARDII (Fig. 101).—Found near Ruthen by Mr. T. Pritchard. It somewhat resembles *Fieldia*, being a cruciate form with short-bunched pinnae, very long and slender fronds.

PULCHERRIMUM (Fig. 102).—A finely cut plumose variety on otherwise normal lines, very pretty.

P. CRISTATUM.—A crested form of same character.

P. JACKSON.—More foliose than the last.



Fig. 102. *A. f. f. pulcherrimum*
(tip of frond).

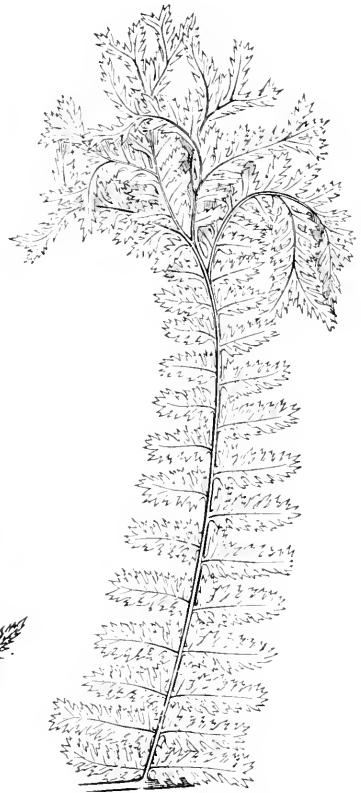


Fig. 103. *A. f. f. ramo-cristatum*
(pinn.).

P. WALKER.—A dwarf, pretty form, pinnules long and serrate.

PULLERII.—Found in Isle of Skye by Mr. Puller ; pinnules short and rounded like pinnæ of *Frizelliæ*, but closer.

RAMOSUM FORSTER.—Found at Woodhead ; branched.

RAMO-CRISTATUM (Fig. 103).—Raised by Sim ; a fine form, the large tassels being loosely branched.

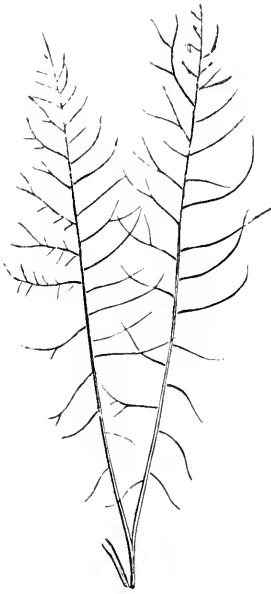


Fig. 104. *A. f. f. ramo-thyssanotum*
(showing branching).

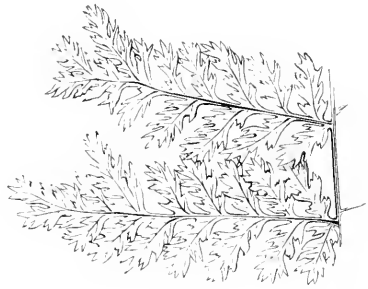


Fig. 105. *A. f. f. ramo-thyssanotum*
(pinnæ).

RAMO-THYSSANOTUM (Figs. 104 and 105).—Raised by Mr. C. Monkman ; a branched form of it ; pinnulets deeply cut.

RAMULOSISSIMUM.—Fronds ramify from base and all tips crested ; very distinct and pretty.

R. MAPPLEBECK.—Similar, but larger.

R. LINEARE.—Raised by Edwards ; very slender.

RECTANGULARE.—Found in Westmoreland by Mrs. Wilson ; divisions so slender that spore heaps are seen from front ; very distinct.

REGALE.—Raised from *splendens* by Mr. Barnes ; a splendid sub-plumose and crested form (see Appendix No. XI).

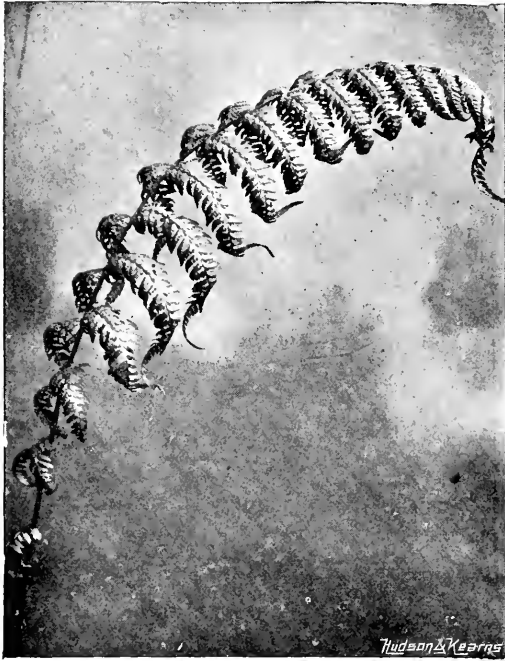


Fig. 106. *A. f. j. revolvens*.

REVOLVENS (Fig. 106).—Found in Strathblane by writer ; fronds and pinnae rolled up convexly, frond curved and terminating spirally, pinnae like ringlets.



Fig. 107. *A. f. scopæforme*.

SCOPÆFORME (Fig. 107).—Raised by Mr. Elworthy; on *grandiceps* lines, but with wedge-like outline to head.

SETIGERUM.—Found in Lancashire by Mr. Garnett; normal outline finely divided and segments very bristly; yields crested forms of very diverse and beautiful types, but with tendency to revert.

S. CORONATUM, *S. CORYMBIFERUM*, *S. CRISTATUM*, *S. GRANDICEPS*, *S. PERCRISTATUM*.—All raised by Birkenhead and others, and the names indicate character; but there are innumerable linking forms.

S. VICTORIÆ.—Is a very successful cross with *A. f. f. Victoriæ*, the result being a true *Victoriæ* plus the bristly character of *setigerum*. The spores of the cross yield true progeny showing the two characters.

SPLENDENS.—Raised by Craig; a splendid form, the parent of *regale*.

SUPERBUM.—See *plumosum superbum*.

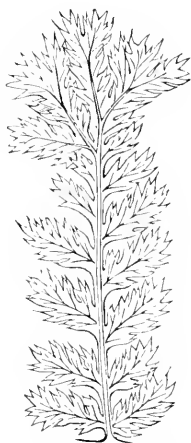


Fig. 108. *A. f. f. thyssanotum* (pinna).

THYSSANOTUM (Fig. 108.)—Found in Guernsey by Mr. James; a very handsome form of *cristatum*, with finely and deeply toothed subdivisions. (See also p. 118.)

TODEOIDES.—Prettily cut but not *Todea*-like.

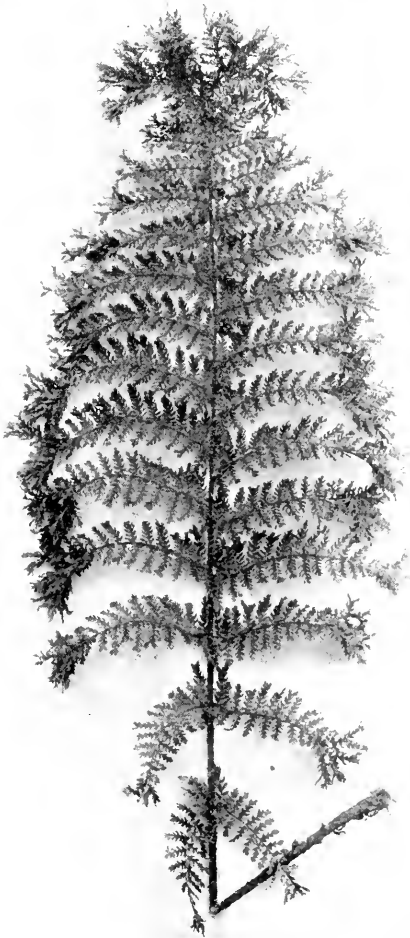


Fig. 109. *A. J. f. todeoides cristatum*.

T. CRISTATUM (Fig. 109.)—A beautiful crested form raised by Mr. Troughton of Preston.

UNCO-GLOMERATUM.—A wonderfully divided form raised by Stansfield from *acrocladon*; looks like a ball of green coral; the tips persist in growing if layered in the autumn, and eventually become aposporous and proliferous in the succeeding season.

VELUTINUM.—A dwarf *acrocladon*, raised therefrom.



Fig. 110. *A. f. f. Vernoniæ* (pinnae).

VERNONIÆ (Fig. 110).—A very prettily crisped form found by Miss Vernon, somewhat on the lines of *conioides*. Our illustration hardly does it justice.



Fig. 111. *A. f. f. Vernoniæ cristatum* (pinnae).

V. CRISTATUM (Fig. 111).—A very pretty crested form of *Vernoniæ* raised by Messrs. Stansfield.

VICTORIÆ (Figs. 112, 113 and Appendix No. XIII).—This extraordinary Fern represents the most remarkable composite "sport" yet discovered, as our illustrations show, being a combination of the perfect cruciate, or cross-forming character, and that of *cristatum*, or tassel-forming. It was found as a robust plant of several crowns, growing in a cart road off the high road at Drymen, in Stirlingshire, by Mr. James Cosh, a Scotch student, who, jumping over the stone dyke into this road, nearly alighted on the clump, the nature and value of which he immediately perceived. In Mr. E. J. Lowe's records, it is stated that the Fern was left undisturbed for about two years, and as this struck the writer as a singular fact, if it were a fact, he made a pilgrimage some years back to the cart road in question, and was introduced to the identical farmer, Mr. Buchanan, who was engaged cutting the grass in it at the very time of the discovery, and was asked by Mr. Cosh to take care and not damage it, and also to look after it until the next day, when he would return. On the next day, and not two years later, the Fern was lifted and divided by Mr. Cosh himself, part being left at Buchanan Castle, the seat of the Duke of Montrose close by, and the rest sent, we believe, to Edinburgh, to Mr. Cosh's friends. The writer being related to the Duke of Montrose's factor, not only had every opportunity of ascertaining the actual facts of the case on the spot and, as it fortunately happened, from one who was actually present when the discovery was made, but also became the possessor of an actual division of the original plant. This remarkable Fern comes quite true from spores as regards its cruciate and cristate character, but we have never seen a seedling the size of the original, the fronds of which we have had over a yard long.

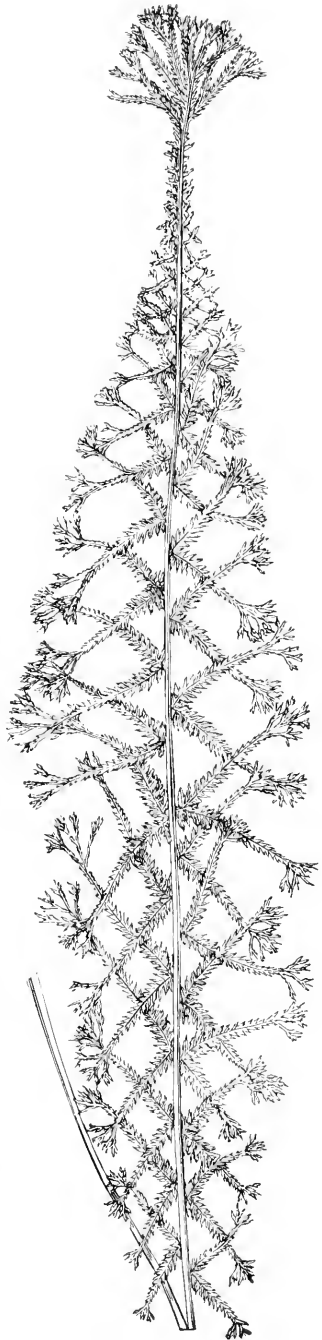


Fig. 112. *A. f. f. Victoriæ.*



PLATE XI.

Ophioglossum vulgatum

Cystopteris montana

Botrychium lunaria

B. l. Moorei (incisum)

O. lusitanicum



Fig. 113. *A. f. f. Victorie* (plant).

V. ELEGANS, *V. GRACILE*, *V. MAGNIFICUM*, raised by Lowe and others.

BOTRYCHIUM LUNARIA (THE MOONWORT).

(Plate XI.)

Like the Adder's-tongue this (Fig. 114) grows in pasture land, but of a drier character, and is found at higher levels up to three thousand feet. If lifted it must be done *en masse* in a clod of soil with the grass, upon which it is considered to be in some way dependent. It has but two fronds, a sterile lobed one, with rounded, fan-shaped pinnæ *à la Adiantum*, but tough and fleshy, and a divided fertile one, like a little grape cluster. Two varieties are worth recording:—



Fig. 114.
Botrychium lunaria
(pinnæ).

INCISUM (Plate XI).—Found several times; the pinnæ are deeply incised instead of rounded, and merely crenate.

TRIPARTITUM.—Found by Dr. Kinahan in Co. Dublin; fronds deltoid and each frond resembling three normal ones.

BLECHNUM SPICANT (THE HARD FERN) (Plate XII).

This evergreen species is the only one representing in this country a very extensive genus which, though closely allied and very similar in appearance to the genus *Lomaria*, is so definitely differentiated from it in the particular feature upon which botanists most depend for generic determination, i.e. the form of fructification, that we cannot possibly class it therewith. Both produce two forms of fronds, one barren and one fertile, the latter growing erect and being very much narrowed in their divisions, these practically bearing merely modified pinnæ, only sufficiently wide to carry the two lines of spore capsules, while the barren ones are leafy and more or less decumbent or drooping. In *Lomaria*, however, the very edges of the modified pinnæ serve as protection to the spore capsules by turning backwards and in the young stage covering

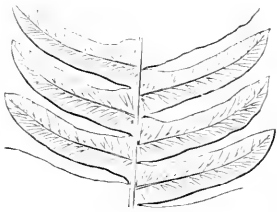


Fig. 115. *Blechnum spicant*
(pinnæ).

them. In *Blechnum*, however, this is not the case, the lines of capsules lie well within the margin, which is not reflexed to protect them, as there is an independent indusium or cover for that purpose. In one variety, *B. anomalum*, not very infrequently found, this difference is accentuated since all the fronds are wide and leafy, but in some the fructification is formed near the midrib, with a wide, leafy space between it and the pinna margin which could not obviously occur on *Lomaria* lines.

We have taken some pains to make this difference clear, because, curiously enough, some botanists of the highest standing name our native *Blechnum* " *Lomaria*," and the latter name still obtains at Kew on that account. Britten, in his *European Ferns*, gives clear illustrations of the difference, and the late Dr. Masters, to whom we submitted specimens in conjunction with a protest against an obvious misnomer, fully justified our contention, as indeed must every one who will ascertain the difference as accepted by the selfsame botanists, and then examine the plants themselves. The fronds of *Blechnum spicant* are deep green, very tough and leathery, whence the name of Hard Fern, and has only once-divided fronds in its normal state, *vide* Fig. 115 and other illustrations for this and general make. The erect fertile fronds range from a foot to nearly three feet in height, and the barren ones, about two-thirds the length, form a lax, spreading rosette, from the centre of which the fertile ones arise. It is a very common Fern in many districts, but affects moist habitats on hedgebanks, the vicinity of streams, damp woods, and also, in hilly districts, is found amongst the heather. Its pet antipathly is lime, and under culture rain water is an essential to successful growth. A compost of friable loam with a plentiful



PLATE XII.

B. s. subserratum *B. s. ramosum*

Blechnum spicant

A *B. s. heterophyllum*
 c *B. s. contractum*

B *B. s. imbricatum*
 D *B. s. contractum ramosum*

admixture of peaty or leafy material should be used. Owing to its tough nature it does well out of doors, in a northern aspect, as a rockery plant, provided it is not exposed to drought and is fairly shaded. In practice it does better in the open than under glass. It has been fairly liberal in "sports," the best of which are as follows:—

AITKINIANUM.—Found in Co. Clare by Mr. A. Stansfield; an irregular branched form of spreading habit.

ANOMALUM (Fig. 116).—See note above; we have, however, found much leafier fertile fronds, quite like barren ones until examined dorsally.



Fig. 116. *B. s. anomalum*.



Fig. 117. *B. s. biceps*.

A. MULTIFIDUM.—A crested form of *anomalum*; found at Rydal by Mr. Crouch.

BELLUM.—Found at Hutton Roof by J. J. Jones; normal outline, but neater in make.

BICEPS (Fig. 117).—Found near Marwood by Rev. F. Mules; very long toothed pinnæ, frond forked at tip.

BIFIDUM.—Found in several places; tips of frond and pinnae irregularly forked.

CAUDATUM (Fig. 118).—Found at Eastwood by Mr. Stansfield; frond tips reduced and undivided, forming a tail.

CONCINNUM.—Found in several places; a very narrow form, with toothed, rounded segments which, however, are sometimes irregular in size. In the best form—

C. DRUERY, found by the writer on Exmoor, the pinnae are regularly rounded and sharply and evenly toothed, the barren fronds being less than half an inch wide by nine inches long, and like a string of scallop shells; the fertile are merely beaded stalks.

CONFERTUM (Fig. 119).—Found by Mr. Clapham in Yorkshire. A dwarf, dense form with crowded pinnae, really an *imbricatum*.

CONFLUENS.—A form found by the writer in the Gap of Dunloe, on Dartmoor, and near Tintern Abbey, in which the pinnae are joined together towards the frond tip.

CONGESTUM.—A densely congested form found by Mr. Crouch in Wastdale.

CONTRACTUM.—Found in North Wales by Mr. J. Holmes; an extreme form of *Strictum*.

CONTRACTO-RAMOSUM.—Found in Scotland by Mr. Horsfall; a branched form of *contractum*.

CRENATO-CONGESTUM.—Found in Patterdale by Mr. W. Forster; pinnae densely congested and blunt-toothed.

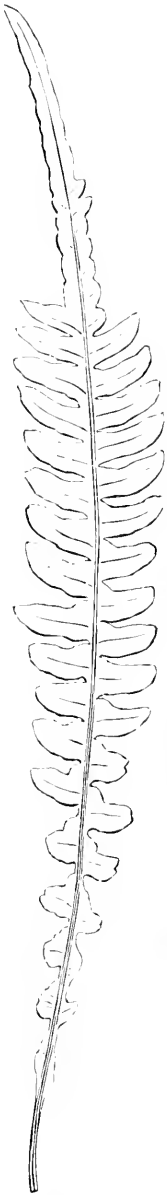


Fig. 118.
B. s. caudatum.



Fig. 119.
B. s. confertum.

CRISPATO-IMBRICATUM (Fig. 120).—A very pretty, crispy, imbricate form raised by Stansfield.

CRISPISSIMUM.—Raised by Mr. Hartley from *strictum*; a pretty, dwarf, dense form, only two or three inches high; quite unlike parent.

CRISPUM.—Found in Langdale by Mr. Barnes, and also by Mrs. Wilson on Blawith Moor; pinnæ broad and crispy.

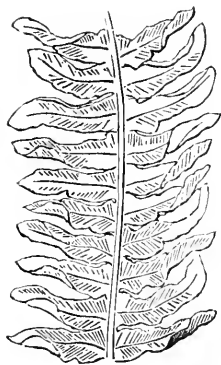


Fig. 120.

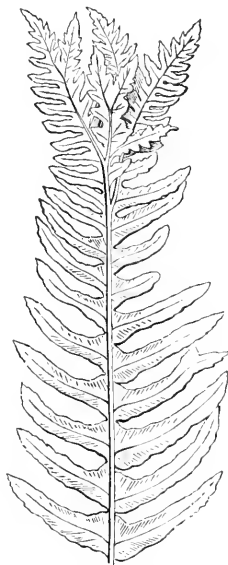
B. s. crispato-imbricatum.

Fig. 121.

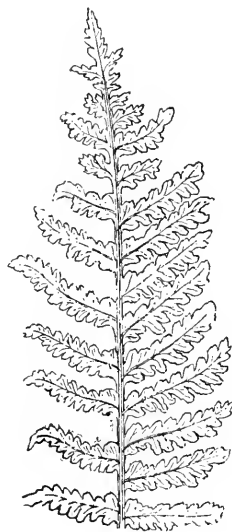
B. s. cristatum.

Fig. 122.

B. s. elegans.

CRISTATO-GRACILE.—Found at Red Bank by Mr. Crouch; narrow and crested.

CRISTATUM (Fig. 121).—Crested at tip of frond; found in several places.

C. BARRAUDE.—Found by Miss Barraud; small crests, pinnæ fanned.

C. HUDDART.—Fine crested form found Windermere.

CRUCIATO-PLUMOSUM.—A very fine, dense, foliose form raised by Mr. Forster, with cruciate pinnæ.

ELEGANS (Fig. 122).—Found in Scotland by Mr. Park; almost bipinnate, bluntly and deeply toothed.

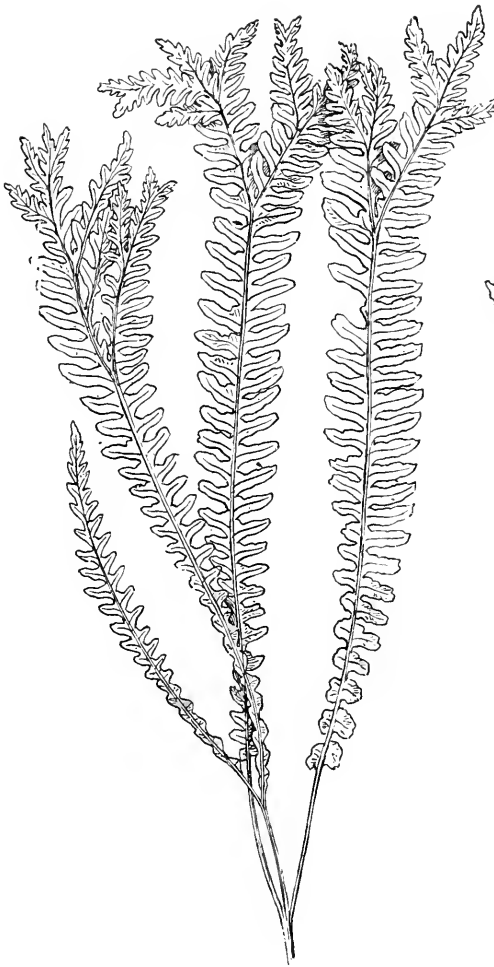


Fig. 123. *B. s. flabellatum*.

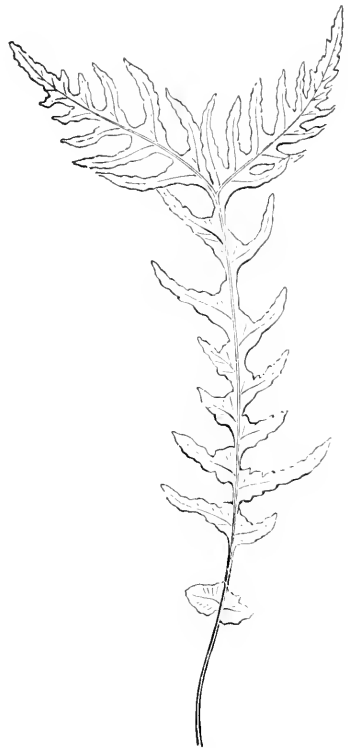


Fig. 124. *B. s. furcans*.

FLABELLATUM (Fig. 123).—A very fine form found by Mr. Monkman; really a fine *ramo-cristatum*, fronds branching repeatedly into crested secondary fronds.

FURCANS (Fig. 124).—A dwarf form with branching head.

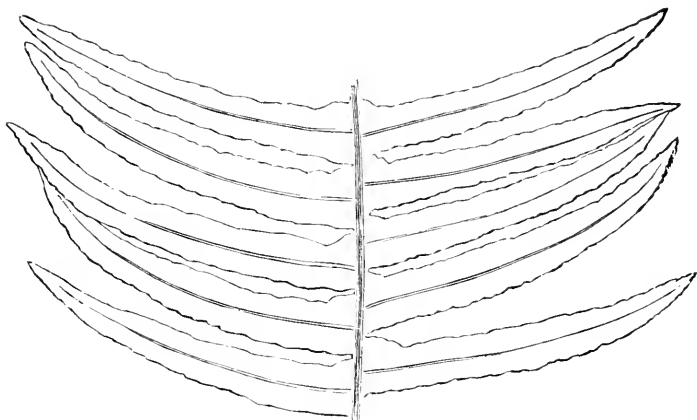


Fig. 125. *B. s. giganteum*.

GIGANTEUM (Fig. 125).—This would have been better named *latifolium* ; found by Mr. Edwards at Totnes.

GLOMERATUM.—Raised by Mr. Maunder ; a dwarf ball of cresting.

HETEROPHYLLUM.—Found by Mr. Wollaston, Mr. Stansfield, and Mr. Dadds ; an irregular, curious form.

IMBRICATO-ERECTUM (Fig. 126).—A very pretty form, with bluntly toothed pinnae, densely overlapping.

IMBRICATUM.—Found in numerous places ; side divisions set on very closely, and overlapping, growth erect, handsome and distinct.

LANCIFOLIUM (Fig. 127).—Found by Mr. G. B. Wollaston near Tunbridge Wells, and subsequently in Scotland, Wales, and elsewhere. Barren fronds, very narrow and undivided for nearly half their length, forming a sort of tail.

LINEARE.—Found on Witherslack by Mr. Barnes ; fronds evenly narrow and almost strap-like, i.e. undivided.

MAUNDERII.—See *glomeratum*.



Fig 126.
B. s. imbricato-erectum.

Fig. 127. *B. s. lancifolium*.Fig. 128. *B. s. Monkmanii*.

MONKMANNII (Fig. 128).—A leafy form with wide, flexuose pinnae, frond tip confluent, and divided into a semi-crest.

MULTIFURCATUM BARNES (TRINERVIO-CORONANS.)—Found in Langdale by Mr. Barnes; pinnae narrow and acute and fronds ramify at tip into many acute points; very distinct; occasionally the two lower pinnae are lengthened, whence second name.

M. SYMONS (Fig. 129).—Found in Cornwall by Mr. F. Symons, and in Lancashire by Mr. Stansfield; fronds branch irregularly into acutely pointed segments.

PADLEYENSE (Fig. 130).—Found at Exmouth by Rev. Chas.

Padley; both the stalk and the midrib are winged, i.e. bear a narrow, leafy portion on each side, from which, instead of directly from the midrib, the small, bluntly toothed pinnae spring; the very long stalk bears these wings alone for more than half the length of the frond, the pinnae then commencing abruptly; *vide* the illustration.

PARVICEPS.—Found at Ronstead Gates by Mr. Hodgson; small, star-like crests.

PARADOXUM.—No beauty, but too curious to omit, as it has a third row of pinnae on the upper side of the midrib; found at Ramsdale by Mr. G. Whitwell.



Fig. 129. *B. s. multifurcatum*.

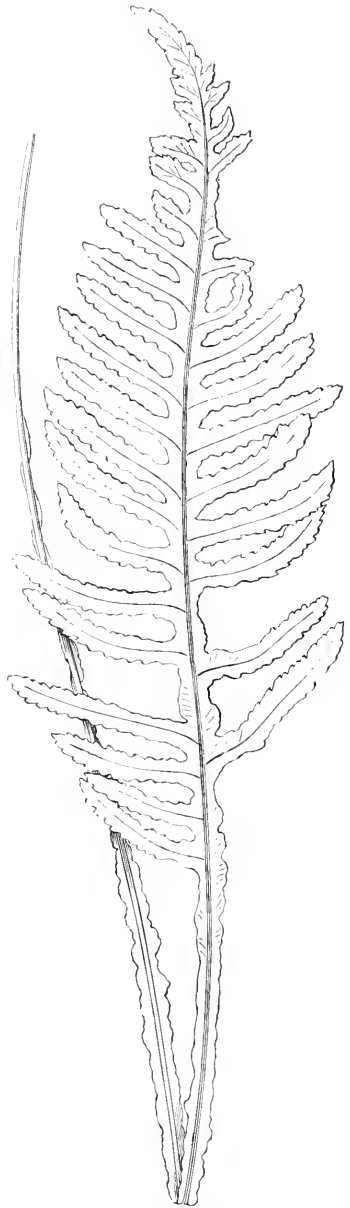


Fig. 130. *B. s. Padleyense*.

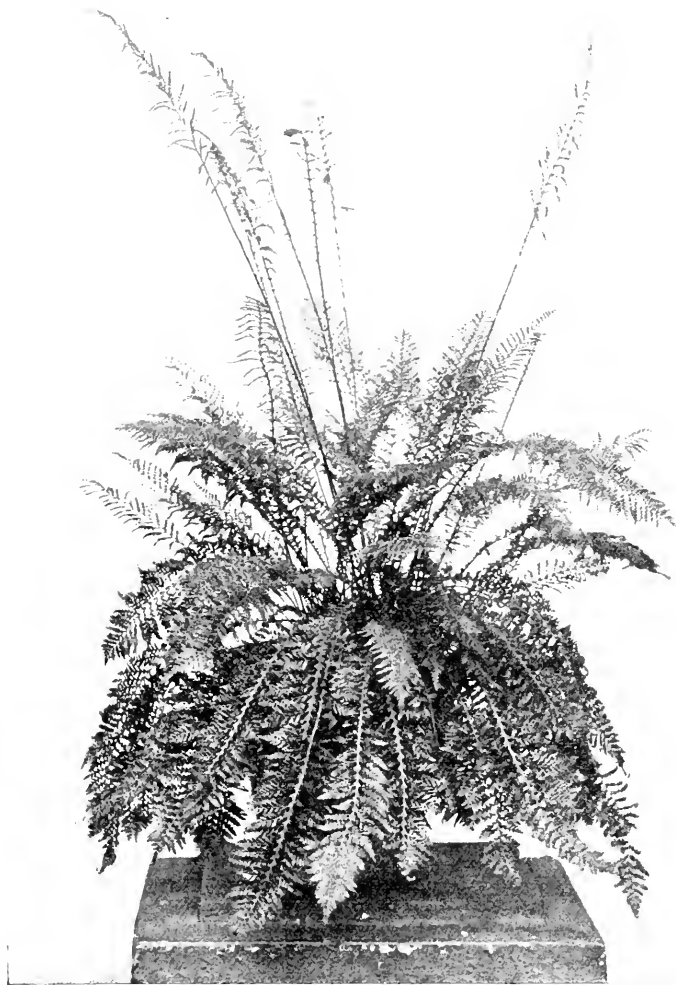
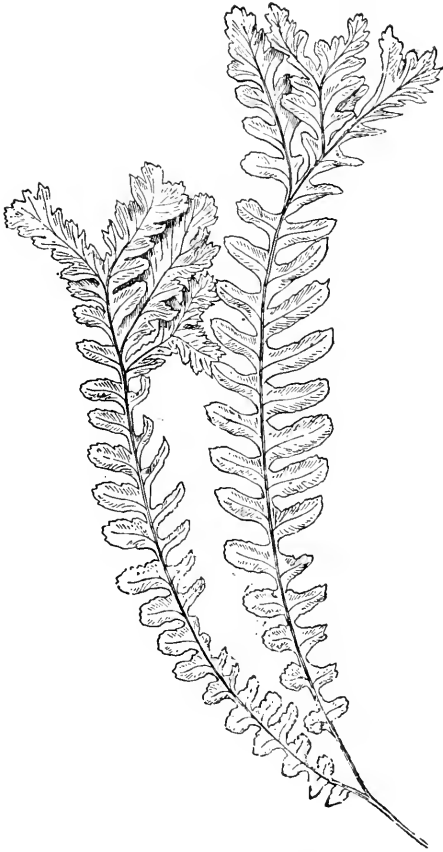
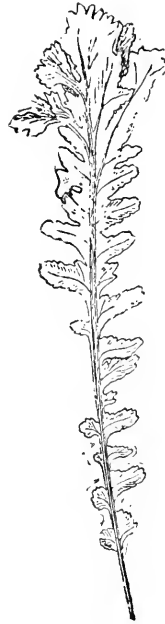


Fig. 131. *B. s. plumosum* Airey.

PLUMOSUM AIREY (Fig. 131).—Raised by Mr. Airey; decidedly the finest form of all; tripinnate and robust. The illustration is from the author's own plant.

Fig. 132. *B. s. ramo-cristatum*.Fig. 133. *B. s. ramosum Cliftii*.

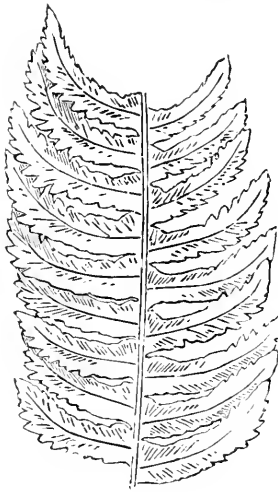
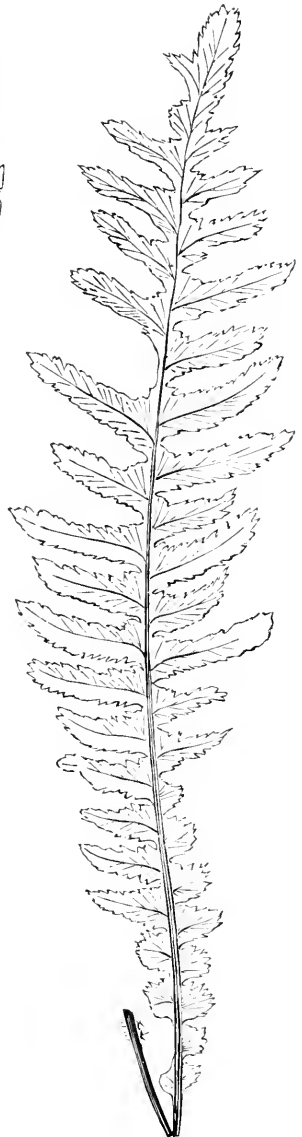
RAMO-CRISTATUM (Fig. 132).—Found in Yorkshire by Mr. Monkman; fronds twin-branched and well crested.

R. KINAHAN.—A branched and tasselled form originally named *ramosum*, which see.

RAMO-CRISTATUM SINCLAIR.—Found in Strathblane by Mr. Sinclair; a thoroughbred branched and tasselled form.

RAMOSUM (Plate XII and Appendix No. XV).—Found in England, Ireland, and Wales; a very fine form in which the fronds branch repeatedly, the branches bearing good crests.

R. CLIFTII (Fig. 133).—Found near Birmingham. A dwarf, pinnae small and irregular, becoming confluent towards frond tip, which is dilated into a confluent crest.

Fig. 134. *B. s. rotundatum*.Fig. 135. *B. s. serratum*.Fig. 136. *B. s. serrulatum*.Fig. 137. *B. s. strictum*.

ROTUNDATUM (Fig. 134).—Found by Mr. Clift ; pinnæ round and very small at base, fronds narrow, with occasional elongated pinnæ. A similar form, but with more even pinnæ for entire length, was found by the writer near Aberfeldy.

SERRATUM (Fig. 135).—Found by Mr. G. B. Wollaston and others ; a very fine form, with close-set, curved, and saw-toothed pinnæ.

S. AIREY No. 1.—The parent of *plumosum Airey* ; a markedly serrate form, but not tripinnate.

SERRULATUM (Fig. 136).—A prettily saw-toothed dwarf form.

STRICTUM (Fig. 137).—This has been repeatedly found, and is distinguished by saw-toothed side divisions, which are usually extra short near the base, and occasionally somewhat irregular in length ; not so robust as the normal.

SUBSERRATUM (Fig. 138 and Plate XII).—Found near Castle Howard by Mr. Monkman and near Todmorden by Mr. Stansfield ; in this the pinnæ are prettily blunt-toothed, especially on the lower side, the upper being often smooth.

TRINERVIO-CORONANS.—See *multifurcatum*.

TRINERVIUM.—Found in Wicklow by Dr. Kinahan and subsequently in considerable numbers in the Mourne mountains by Mr. W. H. Phillips ; the two lowest pinnæ are considerably elongated.

T. HODGSONÆ.—Found on Kirkley Moor by Mr. Hodgson ; the two lower pinnæ are developed into secondary fronds, so as to form a trident ; extremely distinct.

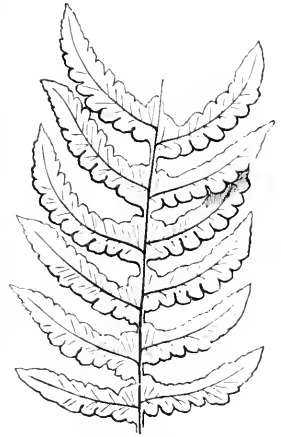


Fig. 138.
B. s. subserratum.

CYSTOPTERIS FRAGILIS (THE BRITTLE BLADDER FERN) (Plate XIII)

The Bladder Ferns (Fig. 139) derive their names, both popular and botanical, which are synonymous, from the fact that their



Fig. 139. *Cystopteris fragilis* (pinnæ).

small round spore heaps are covered by thin, domed skins, looking like little bladders, while the term brittle is well applied, since the

twice-divided fronds are very fragile, as are the slender stalks and their texture generally. They are perfectly deciduous with one exception, viz. *sempervirens*. It is widely distributed, but is most common in hilly districts in the north, where it is found sometimes in abundance in the chinks of rocks and stone dykes often associated with the Oak and Beech Ferns. It has a short, creeping rootstock, but does not travel fast like its companions in question, but forms its fronds in closer order. It needs moisture and shade. It may be cultivated in same sort of soil and conditions as suit the deciduous Polypodies, but is, unfortunately, extremely apt to turn brown and become unsightly very early in the season, and hence is not particularly to be recommended for culture. This remark does not, however, apply to a constitutional variety, found in Scotland and sent to the writer by the late Mr. R. Somerville, of Edinburgh, which is not merely evergreen under glass, but is practically ever-growing, though otherwise normal, except, perhaps, that it is of robuster growth; *vide sempervirens*. Several varieties are recorded, but we doubt very much whether the bulk of them are in existence; we, therefore, only mention the following:—

CRISTATA (Fig. 140).—This variety was raised from spores by Mr. C. Elworthy; frond and most of the pinnae crested.

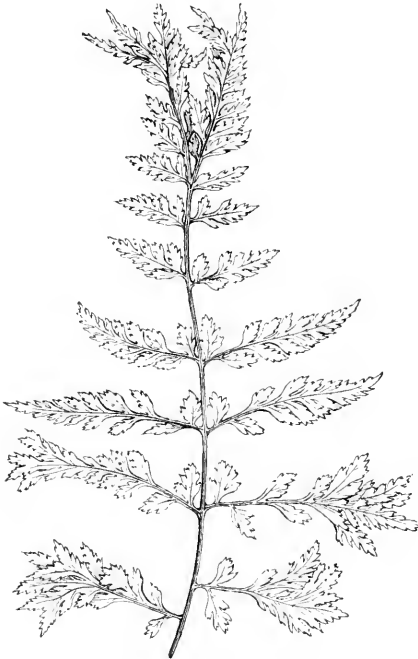


Fig. 140. *C. f. cristata*.

The writer received a crested form from Col. A. M. Jones which is imputed to the *sempervirens* or evergreen type, scarcely, perhaps, justifiably, though it is much more robust than the normal, and remains green much longer. It is peculiar in reverting sometimes to the uncrested type and then returning even to *grandiceps* forms.

DICKIEANA (Plate XIII).—Found in a cave near Aberdeen by Dr. Dickie, and subsequently in three other places in Scotland and Ireland; very distinct and far more beautiful than the normal, the pinnae being very broad and overlapping.

FURCANS.—Found in Scotland several times with all fronds forked at the tips, and occasionally the pinnae also.

SEMPERVIRENS.—Found in

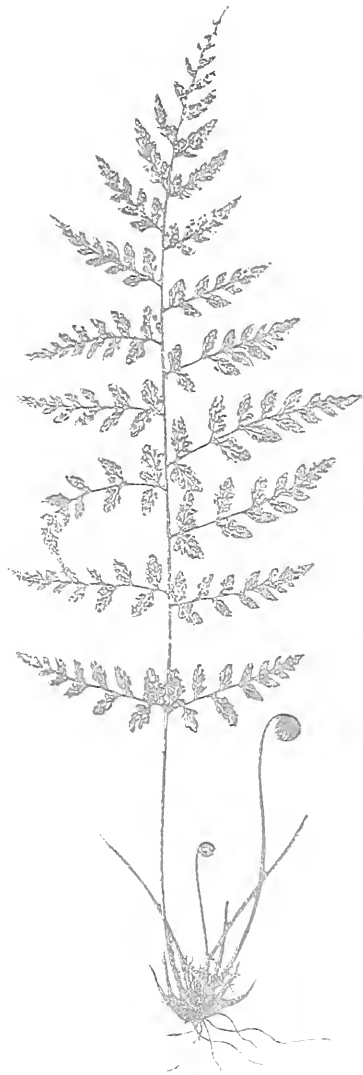


PLATE XIII.

Cystopteris regia
Cystopteris fragilis var. *Dickeana*

Cystopteris fragilis

Scotland about 1903 on Corrie Clannmor by Mr. William Young, of Kircaldy; previously, its British origin was doubtful, as it is properly a native of Madeira, but this find removes all doubt whatever. Under glass it is quite evergreen.

CYSTOPTERIS MONTANA (THE MOUNTAIN BLADDER FERN)

(Plate XII)

This species (Fig. 141) is very distinct both in form of frond and mode of growth from the other species described, resembling the Oak Fern somewhat in the tripartate form of its triangular fronds, and in the possession of a similar string-like travelling rootstock instead of a compact creeping one. It is by far the best adapted for cultivation, thriving in wide pots or shallow pans if treated similarly to the deciduous Polypodies with open, leafy sandy soil, plus some broken porous rock and good drainage. Dark green and perfectly deciduous, dying down early in September and rising at end of March. It has, we believe, only been found in Scotland, but there it has been discovered in several places. No varieties.



Fig. 141. *C. montana* (pinna).

CYSTOPTERIS REGIA (ALPINA) (THE ALPINE
BLADDER FERN)

(Plate XIII)

A colony of this Fern (Fig. 142) was found early last century on a wall at Low Leyton in Essex, but we very much doubt if it still exists as a wild plant in this country, and may be regarded rather as a foreign Fern than as a real native. The culture, if it were required, would be the same as for the other members of the family. The fronds are nearly thrice divided, but from the descriptions available it does, or rather did not, differ very markedly from *C. fragilis*.



Fig. 142. *C. regia*
(pinnae).

GYMNOGRAMMA LEPTOPHYLLA (THE SLENDER-LEAVED
GYMNOGRAM)

(Plate III)

This little Fern has only been found in Jersey, as it is a native of warmer climes than ours, and is rather an exotic than a British Fern



Fig. 143. *G. leptophylla*.

proper. It is a very small Fern, of comparatively simple make, as shown in Fig. 143, and, like the rest of the genus, a large one, boasting many very beautiful silver and gold exotics, the spores are simply scattered along the lines of the veins on the under side of the frond, eventually covering the backs entirely. The Fern, as found at one or two stations, occurs in moist places, associated with moss and lichens, but we have found it in the Orient, in company with *Ceterach officinarum*, a Fern of exactly opposite tastes, to which the conditions approached far more closely. It is one of the rare Ferns which are annuals, only lasting one season, and springing anew the next from the spores produced. Under culture, therefore, a bell glass or close case must be used, and moist conditions maintained, in which event it may re-establish itself season after season by self-sown spores. No varieties.

HYMENOPHYLLUM TUNBRIDGENSE

(THE TUNBRIDGE FILMY FERN)

(Plate XXXIX)

This is a very small and moss-like Filmy Fern, so named because first noticed at Tunbridge, in Kent, which grows also in moss-like masses in mountain glens on the rocks by stream sides, and is very generally distributed in England, Scotland, Ireland, and Wales, and adjacent islands where suitable habitats exist. Its slender fronds (Fig. 144) are nearly twice divided, and arise from almost threadlike creeping and branching rootstocks, which in favourable situations form dense mats on the rock faces, but only in such situations where the fronds are constantly bedewed with moisture. The spores are borne in receptacles, cup-shaped, with saw-toothed edges, as shown in Fig. 414. For culture see Wardian Case Culture (page 45). Forms have been found in which the fronds branch on somewhat cristate lines, but this adds nothing of decorative value to Ferns of this diminutive and massed class. Quite evergreen, the fronds lasting for years.

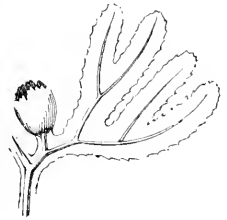


Fig. 144.
H. Tunbridgense.
(pinna and sporangium).

HYMENOPHYLLUM UNILATERALE (THE ONE-SIDED
FILMY FERN) (Plate XXXIX)



Fig. 145. *H. unilaterale*
(pinna and sporangium).

Somewhat more common than *H. Tunbridgensis*, and occupying precisely similar habitats. The only differences, indeed, are indicated in the name, as regards form of frond (Fig. 145), and in the shape of the spore receptacles, which in this species consist also of two valves, but differ in shape, as shown in Fig. 145; otherwise our previous remarks apply exactly.

THE LASTREAS (NEPHRODIUMS) (THE BUCKLER FERNS)

The *Lastreas* are also named *Nephrodiums*, and the latter name being descriptive of the kidney-shaped spore cover of the genus, we think it well to mention it, since as a distinctive name it is better than a merely personal one. The latter, however, *Lastrea*, named after a French botanist, is too familiar to dislodge from the British Fernist's vocabulary, and we are the very last to attempt to do so and thus contribute to the confusion already caused in that connection by would-be reformers. As we have said, it is the kidney-shaped indusium, or spore cover, which distinguishes this genus, and this is indicated in the popular name of Buckler Ferns, as distinct from the Shield Ferns, in which the cover is perfectly round. This, however, is by no means the only difference, since the Shield Ferns are of very different make, and are all easily recognizable by the peculiar mitten-shaped pinnæ, or pinnules, as well as by their texture.

There is considerable difference of opinion as to the number of our native species of this genus, owing to the fact that several of them run each other so close, and present so many linking or intermediate forms, as to render the drawing of a hard and fast line an impossibility. Several species, however, are beyond cavil, viz. *L. montana* (*oreopteris*), the Lemon-scented Fern, *L. thelypteris*, the Marsh Fern, *L. dilatata*, the Broad Buckler Fern, *L. rigida*, the Limestone Buckler Fern, and *L. æmula*, the Hay-scented Fern. These are accepted generally as unassailable species, though the late Mr. E. J. Lowe, in his *British Ferns and Where Found*, put forward the theory that *L. æmula* was merely a mountain form of *L. dilatata*, to which it was apt to revert under unfavourable conditions, an idea which we cannot possibly accept, as there are marked specific differences. Another species, the commonest of all, *L. filix-mas*, or the Male Fern, we have not ranked with the unassailables, since Mr. G. B. Wollaston discovered, and undoubtedly demonstrated, that this species fell into three sub-species, each with

sufficiently marked specific differences to determine them as such, if not as species proper. These three he named *L. filix-mas*, the Common Male Fern, *L. pseudo-mas*, which we will name the Hard Male Fern, and *L. propinqua*, a form distinct from either, and these three we will therefore treat of under separate headings. The disputable species, viz. *L. cristata*, *L. uliginosa*, *L. spinulosa*, we cannot help considering as varied forms of *L. dilatata*, and Dr. F. W. Stansfield, one of our foremost authorities on British Ferns, agrees with us in this view. He states: "*L. dilatata*, *spinulosa*, *uliginosa*, and *cristata* form a chain of sub-species in the order named; the extreme forms are as distinct as any two species in the genus, but the intermediate forms merge into each other. *L. cristata* is a real bog Fern, *dilatata* does not grow in bogs, though it is found on islands in bogs." *L. remota* must be judged by itself; we gravely doubt its actual specific distinction. We shall, however, with this reservation, treat of them separately, and illustrate their, as we consider, sub-variational differences. As there are material differences between the species, constituting the genus here, as to natural habitats and cultural requirements, deciduous nature, or otherwise, we will also reserve our remarks on these points in this introduction, as we cannot treat of them generally as with the other genera.

LASTREA ÆMULA (THE HAY-SCENTED BUCKLER FERN)
(Plate XXII)

This is a very pretty species, closely allied to *L. dilatata*, but distinguished from it, and from its recognized sub-species, by greater delicacy of make in the fronds, the segments of which are

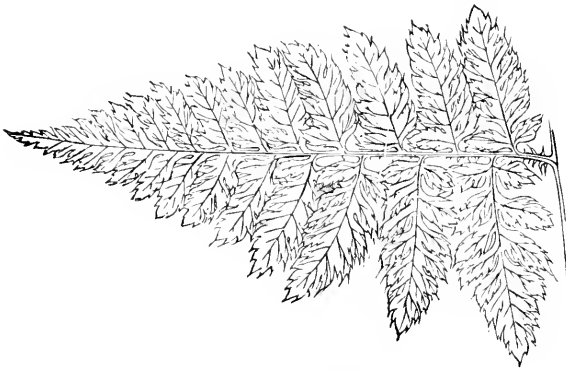


Fig. 146. *Lastrea æmula* (pinna).

prettily curled and crisped. A further difference is seen in the caudex, which is smaller and of a more tufted character, the whole plant, indeed, being more compact. The fronds (Fig. 146), too,

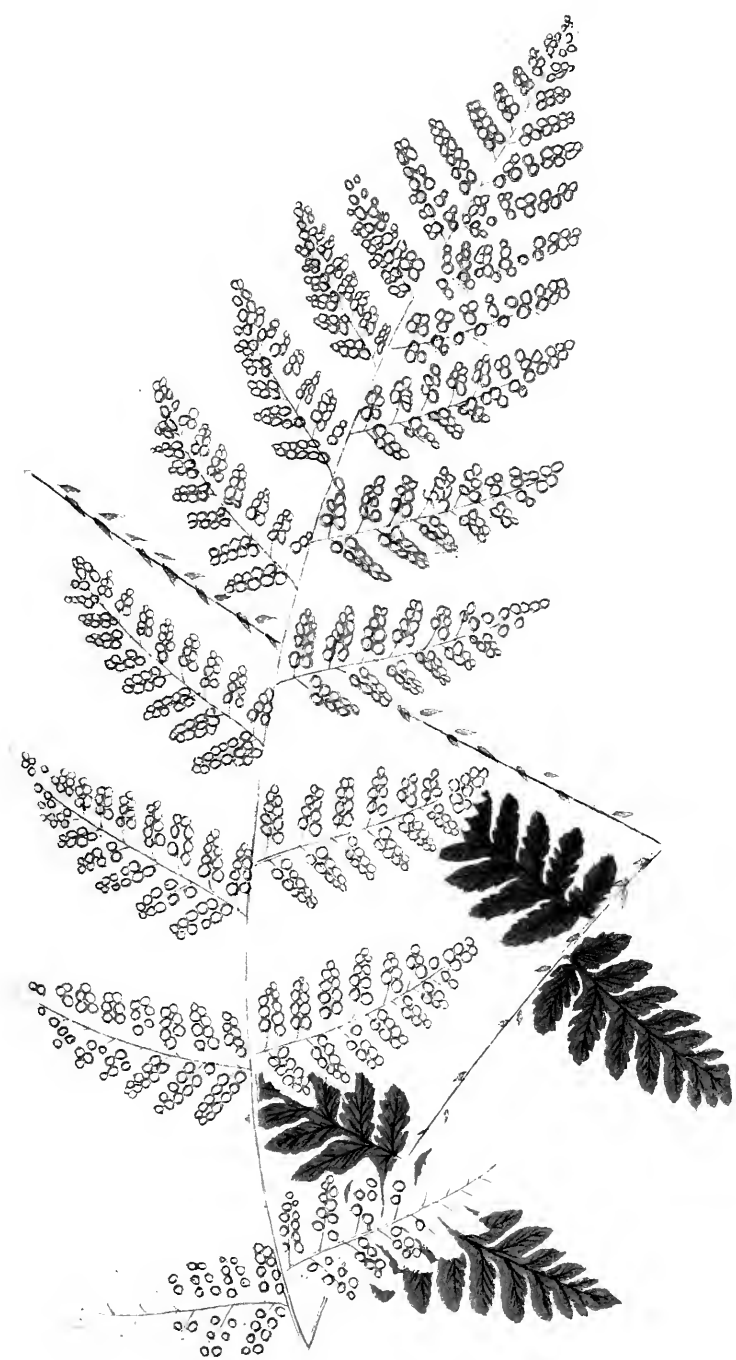


PLATE XIV.

Lastrea cristata

especially when fading, and even when dead, have a strong scent of new-mown hay or Tonquin bean. Culture requires moist, peaty soil and a damp atmosphere. It is not nearly so plentiful as *L. dilatata*, only appearing in very congenial Fern districts, and then rarely in abundance. One pretty variety was found in Devonshire.

CRISTATUM.—Very neatly and thoroughly crested. The original find was lost, but a seedling came up, a fertile frond of which was secured by Col. Jones and given to the writer, who, after eradicating two monopolizing batches of stray Ferns from the pan, secured as a third batch several hundreds of the *L. æmula cristata*, all true, many of which Col. Jones distributed. The Colonel's own sowing was placed in a greenhouse, and was frustrated by an invasion of exotic *Pteris*, etc., spores in similar fashion, which, not being eradicated as they appeared, gave the *L. æmula* no chance.

LASTREA CRISTATA (THE CRESTED BUCKLER FERN)
(Plate XIV)

This Fern (Fig. 147), as already stated in our introductory remarks concerning the *Lastrea* family, is considered by good authorities not to be a species proper, but one of the sub-species of the *L.*

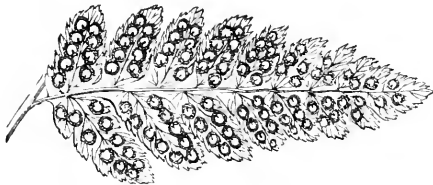


Fig. 147. *Lastrea cristata* (pinna).

dilatata section. In our plate it differs materially and is in any case an extreme form. Why it should have been named "*cristata*" we have never been able to discover; there is certainly no trace of a "crest" as the word is understood in Fern circles nowadays. Our illustration obviates description. As a bog Fern moist conditions must be afforded, and a peaty compost provided.

LASTREA DILATATA (THE BROAD BUCKLER FERN)
(Plate XV)

This is a robust-growing species which is very widely distributed, and affects moist woods, glens, ditches, and similar habitats where some shade is afforded, and an open leafy or peaty soil is found, though it is by no means dainty in this respect. It is made on very different lines to most of the other *Lastreas*, having dark green

thrice-divided fronds (Fig. 148), very broad at the base, and sometimes four or five feet long. They are of spreading habit, with bright green stalks of some length, and spring from a stout, erect caudex, but less compact than that of *L. filix-mas* and others, which send up their fronds in erect circlets. The round spore heaps are fairly large, and very plentiful and dark in colour, the kidney-shaped indusium obvious, but only partly covering them when ripe. Our plate gives a good idea of the form. It has "sported" fairly freely, and is a very variable fern in minor details, but a great many of the forms recorded are too erratic or indefinite to recommend for culture, and for that reason are probably not now in existence. These we ignore.



Fig 148. *L. dilatata*
(parts of pinna).

CRISTATA (Fig. 149).—Found near Doncaster by Mr. Appleby; prettily crested at frond and pinnae tips; a better form was found in Devonshire by Mr. C. Jackson, and another by Mrs. Thompson, also in Devon.

C. DRUERY.—Found by the writer at Clovelly; a very robust form with bunch crests of medium size.

C. OSCROFT.—Found near Bristol; a very finely bunch-tasselled form, somewhat crispy in make.

C. GRACILE ROBERTS.—A very pretty pericristate form, the pinnules being fanned. Unfortunately, though produced so freely from spores as to appear abundantly as strays under glass, all without exception have a tendency to partial depauperation, short pinnae occurring here and there.

FOLIOSA-CRISTATA, F. DIGITATA.—Although found in the Azores by Mr. Brown, and therefore best grown under

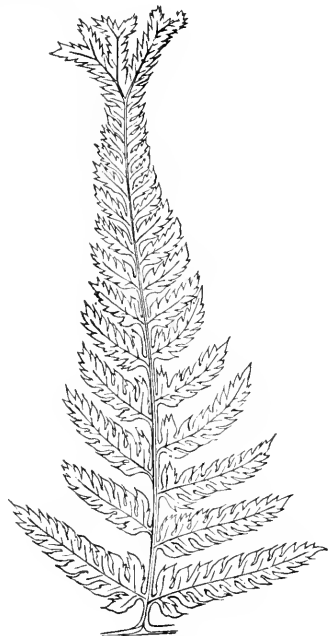


Fig. 149. *L. dil. cristata* (pinna).

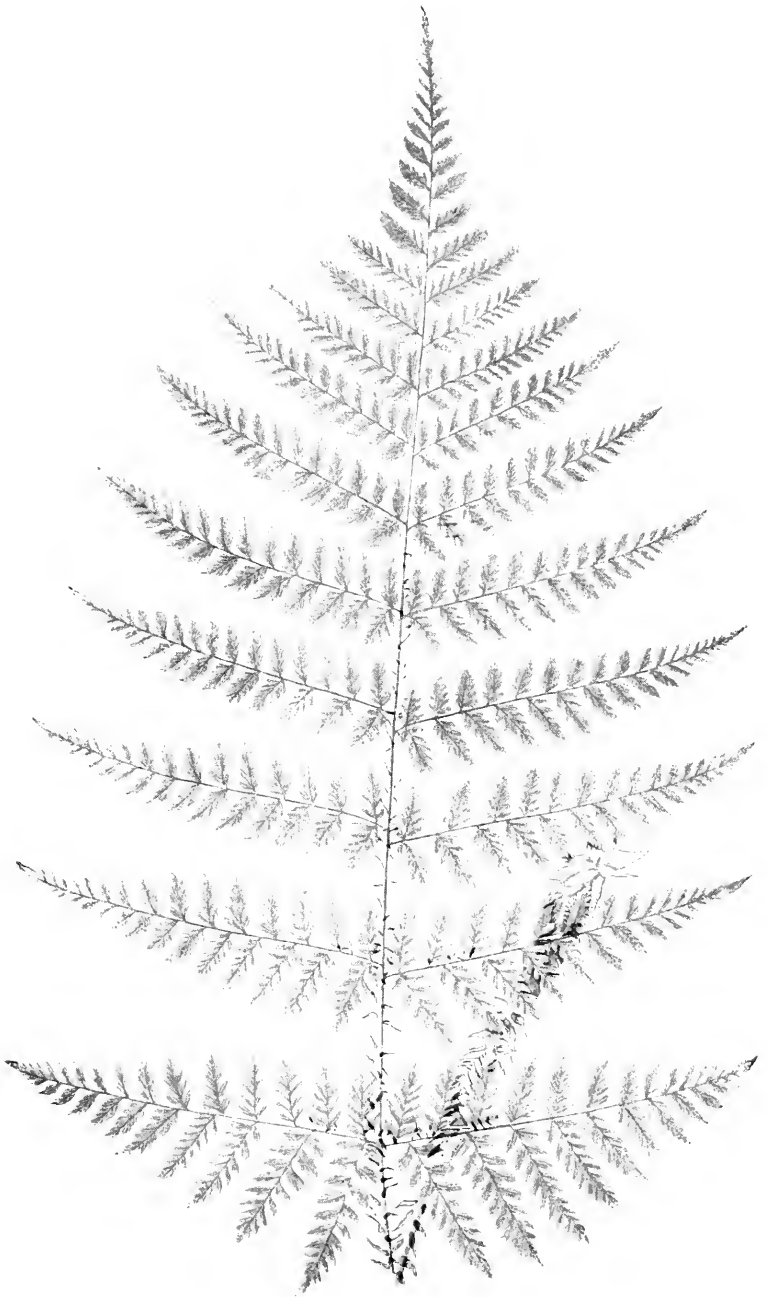


PLATE XV.

Lastrea dilatata.

warm conditions, though hardy under glass, we cannot omit these, since both are very beautiful in make and cresting, on slightly different lines.

GRANDICEPS BARNES.—A very heavily bunch-crested form, raised by Mr. J. M. Barnes ; a very fine variety.

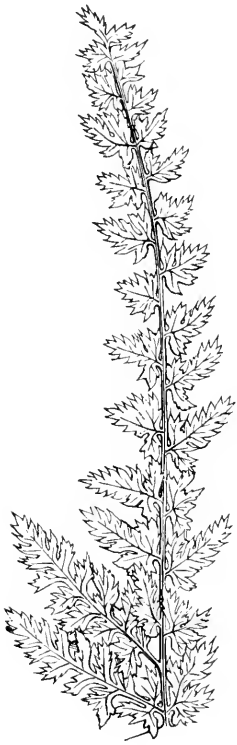


Fig. 150.

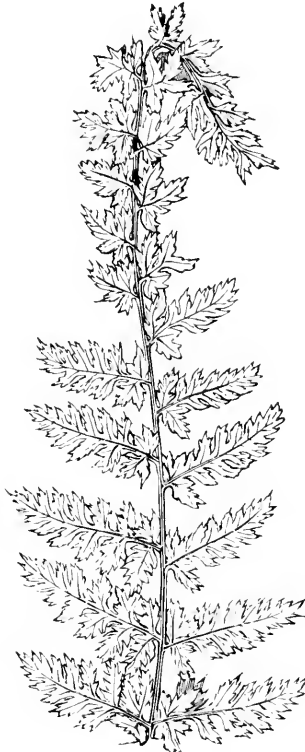


Fig. 151.

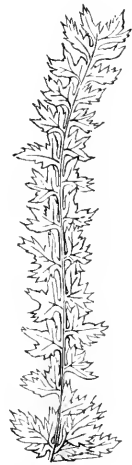


Fig. 152.

L. dil. Howardii (pinnæ).

HOWARDII (Figs. 150, 151, 152).—A very extraordinary form found at Castle Howard by Mr. Monkman and Mr. Stabler ; a robust grower with the pinnæ for the greater part of their length greatly reduced in width, owing to the pinnules becoming short and sub-cruciate ; a little on the lines of *A. j. j. Fieldia* ; unique. Six strong plants were found. The young fronds present little or no trace of the peculiar character, which is only assumed as the plants attain a fair size.

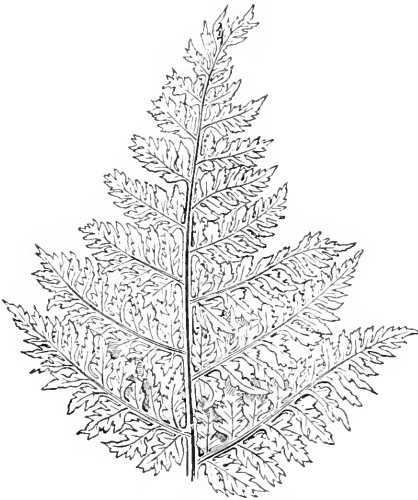


Fig. 153. *L. dil. hymenophylloides*
(tip of frond).



Fig. 154. *L. dil. hymenophylloides*
(pinna).

HYMENOPHYLLOIDES (Figs. 153, 154).—A dwarf, congested form, found by Mr. Dadds at Ilfracombe.

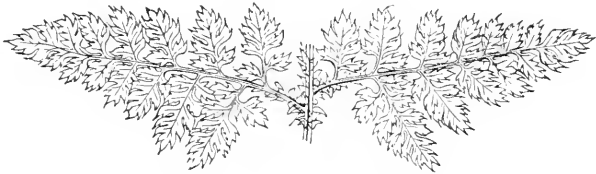


Fig. 155. *L. lepidota* (pinnae).

LEPIDOTA (Fig. 155, Plate XVI).—Said to have been found in Yorkshire; it is an extremely distinct and beautiful form, all the pinnae being contracted and narrow, giving the whole plant a very light and delicate appearance; it is very scaly, whence the name; the pinnae shown in Fig. 155 are rather more foliose than usual.

L. CRISTATA.—Presumably a cross, raised by Messrs. Stansfield; a true *lepidota*, with pretty crests throughout.

POLYDACTYLA TURNER.—With pointed crests at all tips.

RAMO-CRISTATA BARNES.—Another fine form raised by Mr. Barnes in which the fronds branch as well as crest.



PLATE XVI.

Lastrea uliginosa

Lastrea dilatata
var. *lepidota*



Fig. 156. *L. dil. Stansfieldii* (pinnæ).

STANSFIELDII (Fig. 156).—A small-growing form found in Cheshire by Mr. J. Lord; pinnules thick, leathery, and crispy.



Fig. 157. *L. dil. succisa* (frond tip).

SUCCISA (Fig. 157).—A markedly truncate form found by Mr. E. J. Lowe in Derbyshire; somewhat densely made; every frond terminates abruptly with a few bunched and truncate pinnæ.

LASTREA FILIX-MAS (THE MALE FERN)

(Plate XVII)

This is undoubtedly one of the most familiar Ferns with which we have to deal, since not only is it very common in many localities by the roadside and generally wherever Ferns abound, but it is one of those few species which are seen in thousands of suburban gardens, monopolizing space which would certainly be better devoted to varietal forms of this and other hardy species. It is a robust plant, and may practically be grown in any soil, so that cultural directions are hardly necessary, though we need hardly say that it and its varieties profit by specially favourable conditions. The fronds (Fig. 158) rise erectly in circles from a stout rootstock, shuttlecock fashion; they are twice divided, and of a lightish green. Before, however, we pronounce it to be deciduous or evergreen, we must advert to the fact mentioned elsewhere that it has, and we

consider justifiably, been split up into three sub-species, viz. *L. filix-mas*, *L. pseudo-mas*, and *L. propinqua*. Mr. G. B. Wollaston's definition of the differences we may render into popular language thus.

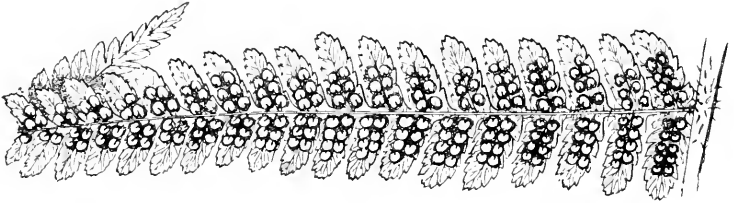


Fig. 158. *L. filix-mas* (pinna).

Lastrea filix-mas.—Partially deciduous, the fronds lying prostrate in winter (i.e. not dying absolutely in the autumn as with deciduous Ferns proper). Fronds lance-shaped, reaching five feet in length, pinnæ long and broad at base, once divided, pinnules oval, saw-toothed, lowest part the longest; spore cover, when young, does not cover the spore capsules, and later often drops off.

Lastrea pseudo-mas.—Sub-evergreen, fronds hard and leathery and do not drop in winter (and under glass are quite evergreen); fronds lance-shaped, twice divided, reaching five feet in length; pinnæ long and widest at base, once divided; pinnules with almost parallel sides, slightly saw-toothed, scarcely any difference in the length of the lowest pair; spore cover, when young, covers the spore capsules and does not fall off. (The colour is also a yellowish green.)

Lastrea propinqua.—Quite deciduous; not found at so great an elevation as the others reach; fronds ovally lance-shaped, twice divided, reaching rarely four feet in length; pinnæ once divided, pyramidal, i.e. of a long triangular form; pinnules doubly saw-toothed, crispy, and with a projecting ear-like one at the base, basal pair distinctly stalked and much longer than the rest; spore cover quite covers the capsules.

A little study will show that these are definite differences, and as all three types occur in many places, and retain these peculiarities, it is obvious that Mr. Wollaston, one of our oldest and most reliable authorities on British Ferns, was not a mere hair-splitter in making the division. In the varieties, however, these differences are, naturally, sometimes masked by other characters, and hence, although we class the varieties under separate heads, we do so under some reserve in several cases. All three have been fairly liberal in "sports," the best of which we will now indicate, ignoring, as usual, such as have been recorded but owing to defects, irregularities, or indeterminate character have probably fallen out of cultivation, and in any case deserve to do so. We may, perhaps appropriately,

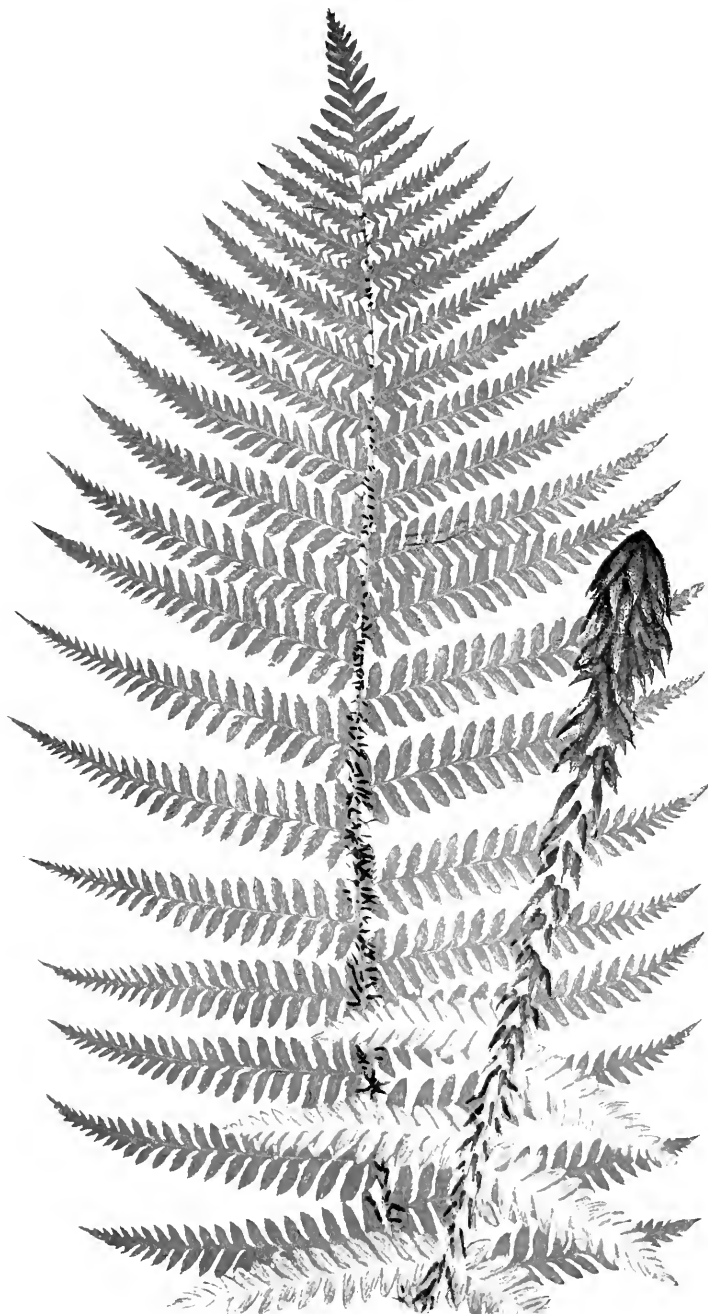


PLATE XVII.

Lastrea filix mas.

mention in this connection that in the early days of Fern-hunting, varieties presenting very trifling differences, such as we now ignore, were considered worthy of note and of a name, but as the catalogue of thoroughbred and distinct forms increased they became considered as mere sub-varieties, and ceased to attract attention. The Male Fern is peculiarly liable to "sport" into what are termed "rogue" forms, in which some of the fronds are irregularly foliose, forked, or depauperated, sometimes assuming, temporarily, so marked a character as to deceive even the expert, since when removed they always revert more or less to the normal. We are strongly of opinion that some of these figure in the old records of varieties proper.

LASTREA FILIN-MAS

ACROCLADON (Plate XVIII).—A beautifully crested form, but unfortunately named, as "*acrocladon*" is applied in other cases to much-branched, heavy-crested forms to which this does not approach.

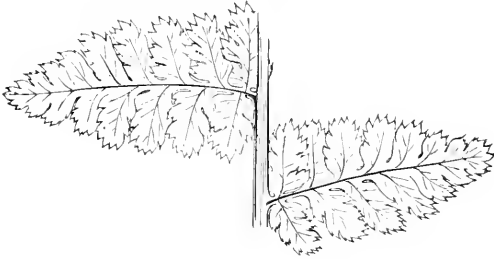


Fig. 159. *L. f. m. Barnesii* (pinnae).

BARNESII (Fig. 159).—Found in Lancashire by Mr. Barnes; a very distinct narrow-fronded form with short, wide pinnae, somewhat on the lines of *Pinderii*.

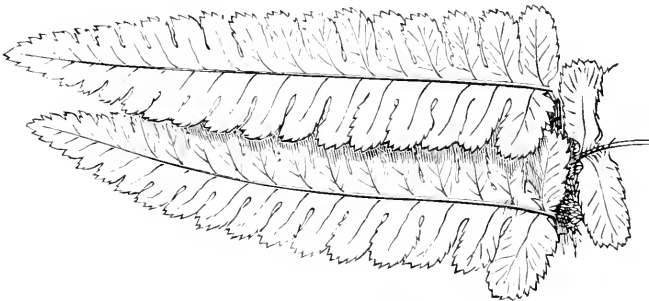
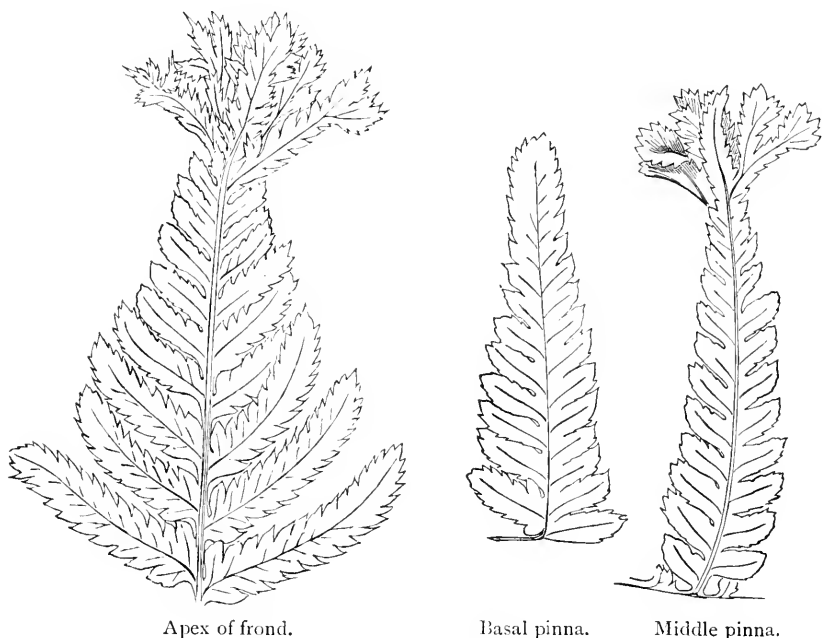


Fig. 160. *L. f. m. Beeverie*.

BEEVERIE (Fig. 160).—Found near Coniston by Miss Beever; somewhat resembles *Pinderii*, but more foliose and denser.

BOLLANDIÆ.—Found at Tunbridge Wells by Mrs. Bolland, and remarkable for being the only plumose variety found in this species; it is very foliose, and usually quite barren; dark green and handsome, but handicapped by occasional irregularities of make.



Apex of frond.

Basal pinna.

Middle pinna.

Figs. 161, 162, 163. *L. f. m. Clowesii.*

CLOWESII (Figs. 161, 162, 163).—Found at Bromsgrove in Worcestershire; this is a tasselled form which differs from *Jervisii* in bearing crisper tassels and deeper-cut pinnae; the tassels also vary in size, sometimes bunched and sometimes flat, and pinnae sometimes plain.

CONFLUENS.—Found by W. H. Phillips; subdivisions not entirely separated.

CRISPATA.—Found by J. K. Hodgson and others; a fine, compact, crispy variety.

CRISPATISSIMA (FLUCTUOSA).—A still more marked variety; very pretty. *Vide also Fluctuosa.*

CRISTATA.—Found by Mr. Crouch at Rydal; well tasselled.

C. ELLACOMBE, C. MARTINDALE, C. ROUTLEDGE.—All three very fine forms found by the gentlemen named.

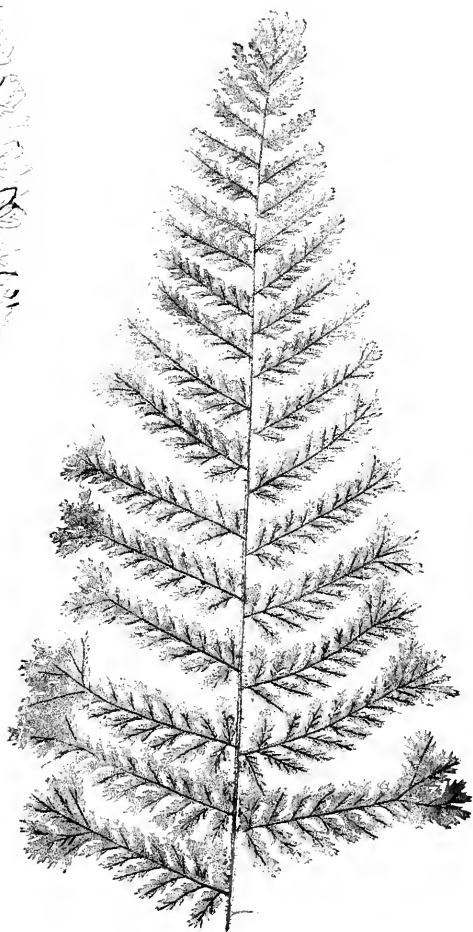
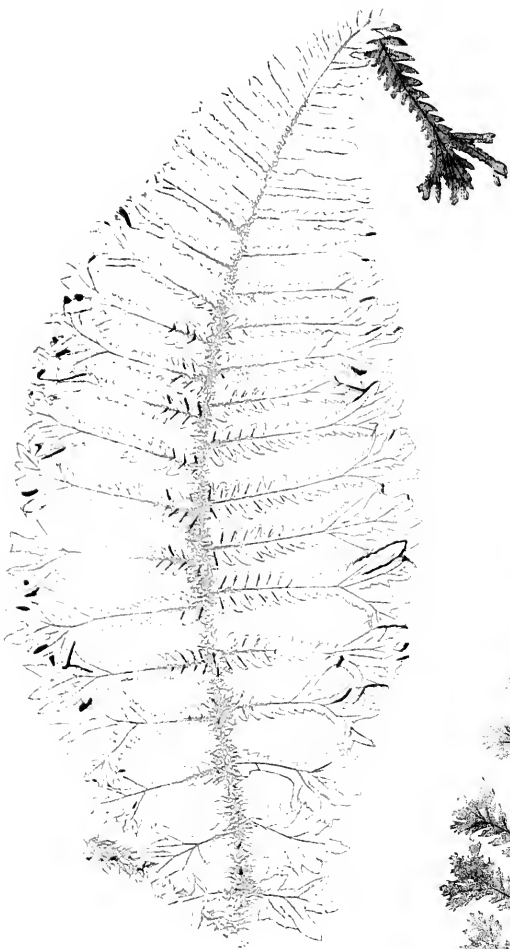


PLATE XVIII.

Lastrea pseudo-mas var. *cristata*

Lastrea filix-mas var. *acrocladon*

DECOMPOSITUM.—Very foliose ; found by Mr. Allchin in S. Devon.

DEPAUPERATUM.—Found by Mr. C. Padley on Exmoor ; too curious to omit, the subdivisions extremely slender and confluent.

DIGITATA.—Found by Mr. J. M. Barnes at Burton ; neatly crested.

D. STEWARDSONÆ.—Found at Lancaster ; similar but distinct.

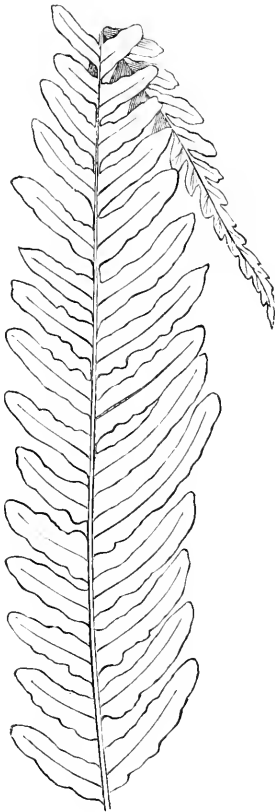


Fig. 164. *L. f. m. elongata* (pinna).

ELONGATA (Fig. 164).—Found in the Isle of Wight by Rev. W. H. Hawker and subsequently elsewhere ; large fronds, pinnae tapering into a tail, and pinnules plain edged.

FLUCTUOSA.—See *crispatissima*.

F. CRISTATA.—A beautifully congested and crested form, raised by Mr. T. Bolton, of Warton, near Carnforth.

GRANDICEPS.—Found by Mr. Wearing on Warton Crag, near Carnforth; a splendid robust, ramo-cristate variety, with heavy heads; forms a dense bush.

G. DADDS.—A heavier crested form, raised from *polyductyla Dadds*.

G. PADLEY.—Somewhat on similar lines.

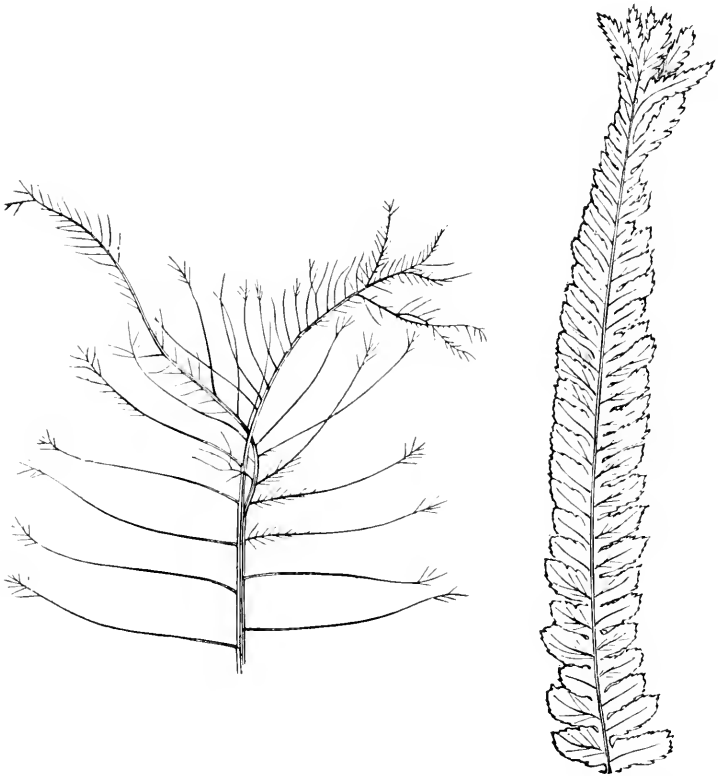


Fig. 165. *L. f. m. Jervisii* (frond tip). Fig. 166. *L. f. m. Jervisii* (pinna).

JERVISII (Figs. 165, 166).—Found in Staffordshire by Mr. Swynfen Jervis; a robust, tasselled form, but unfortunately handicapped by persistent partial depauperation; short and ragged subdivisions.

LINEARIS.—Pinnules very narrow and depauperate as found, but some better forms have been raised; very hard in texture, crispy in make, and well worth growing.

LUX LUNÆ.—Found in Yorkshire by Miss White ; variegated with white and constant.

MEDIO-DEFICIENS.—Found near Kenmore by the writer ; frond divisions narrow and pinnulets absent down centre of frond.

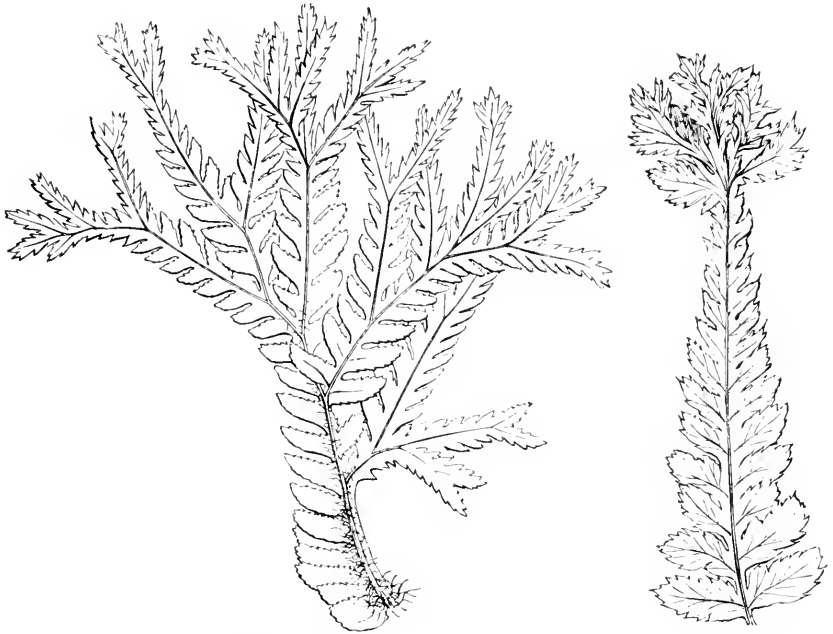


Fig. 167. *L. f. m. multicristata* (pinna). Fig. 168. *L. j. m. polydactyla* (pinna).

MULTICRISTATA (Fig. 167).—A very fine form raised from *cristata*, some of the pinnules forming tassels as well as the pinnæ tips.

POLYDACTYLA (Fig. 168).—A very prettily crested form, found at Bromsgrove, Worcestershire, also at Whitbarrow by Mr. Barnes.

P. DADDS.—A very finely tasselled form, imputed to *pseudo-mas*, but as it drops its fronds in autumn we place it here.

Willisonii (Plate XIX).—A neat, small deltoid form.

LASTREA PROPINQUA

ATTENUATO-CRISTATA.—Found at Clougha by Mr. J. Stewardson ; narrow tasselled form.

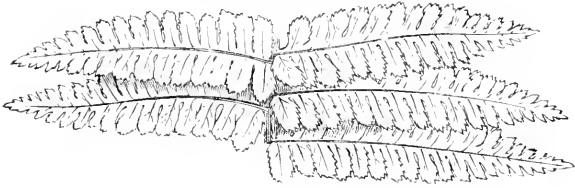


Fig. 169. *L. p. m. crispa*.

CRISPA (Fig. 169).—A dwarf imbricate form raised by Mr. R. Sim.

CRISTATA.—Found several times ; all prettily tasselled.

C. BARNES.—Extra finely tasselled.

C. COWARD, c. GOTT.—Small, neat crests.

GRACILE FORSTER.—Found in Mardale ; very narrow, finely cut subdivisions.

GRANDICEPS BARNES.—Found in Mardale ; large, spreading head.

MIKRA (Fig. 170).—A dwarf, neatly crested form.

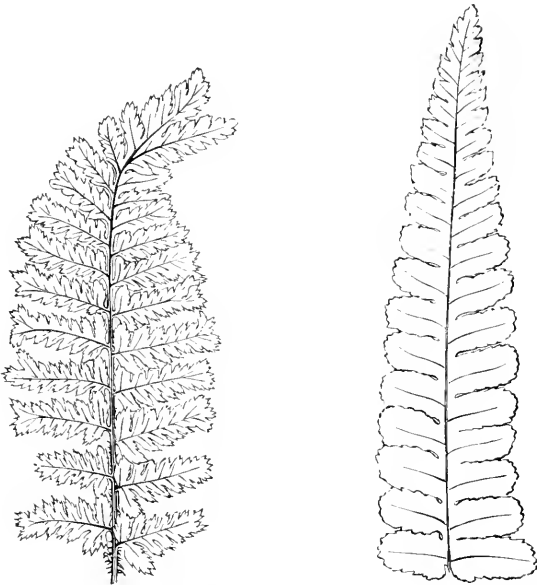


Fig. 170. *L. p. m. mikra*. Fig. 171. *L. p. m. Pinderii* (pinna).

PINDERII (Fig. 171).—Found in the Lake District by the Rev. G. Pinder, and also subsequently by Mr. M. C. Monkman and T. Stansfield near Walton ; a very marked form, erect and very narrow fronds, say three feet by six inches, tapering below and towards tip.

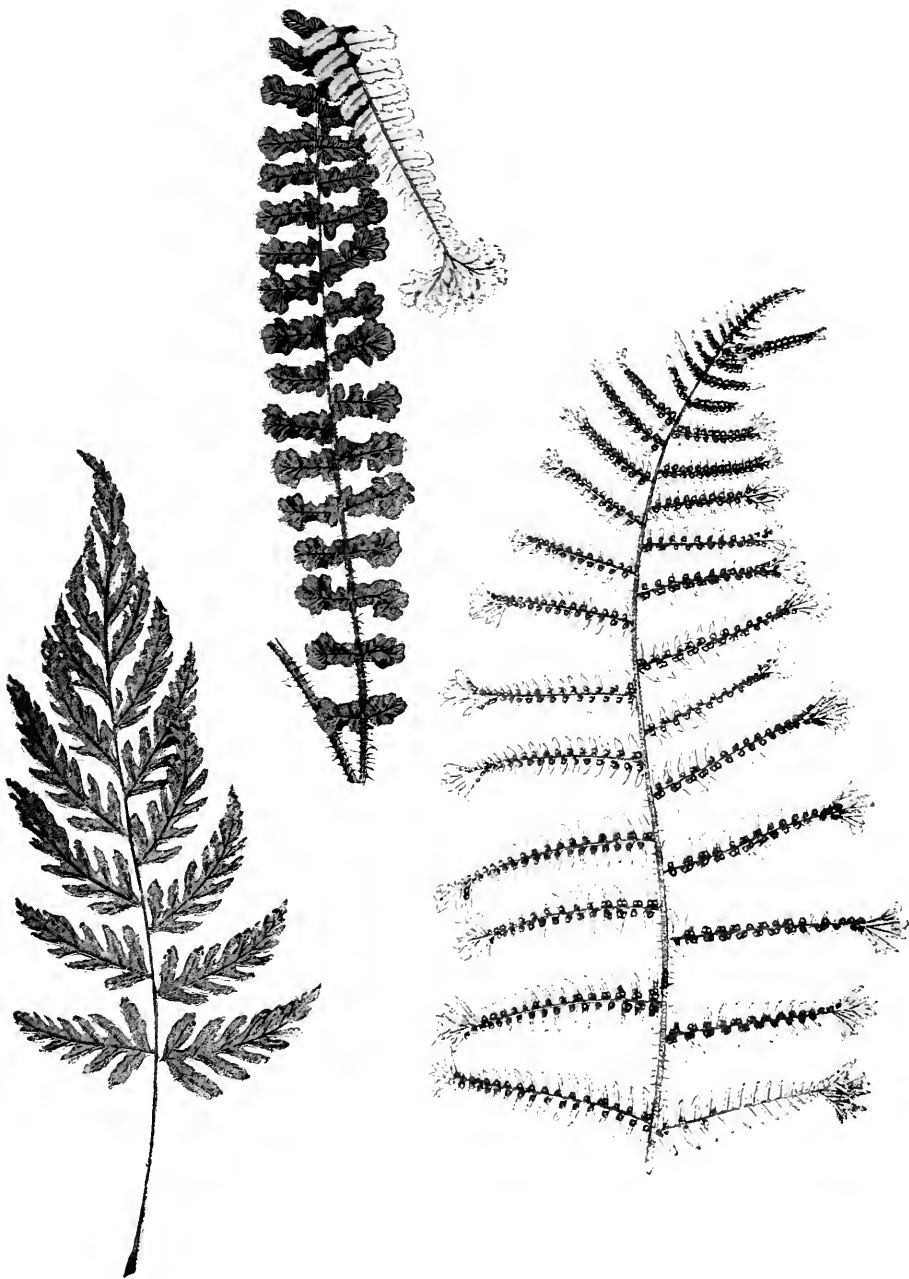


PLATE XIX.

Lastrea filix mas var.
Willisonii

L. p. m. cristata
angustata

L. f. m. abbreviata
cristata

PRODUCTA FORSTER.—Fine slender variety.

SMITHIESII.—A handsome robust, crispy, congested form, resembles *pseudo-mas* in its tough make and scaly character.

LASTREA PSEUDO-MAS

ABBREVIATA CRISTATA (Plate XIX).—Prettily crested ; found in Borrowdale, Cumberland, by Mr. R. D. Harrison ; a comparatively small grower, a foot to eighteen inches.

AOSPORA PERCRISTATA.—Raised by Mr. Cropper, presumably from *L. ps. cristata* ; a lovely small-growing Fern, with fine fimbriate and crested subdivisions ; any portion layered and kept close produces prothalli in abundance and young plants shortly after ; a unique variety, but unfortunately very delicate in constitution ; one of the most interesting varieties of all, since besides its beauty it is both aposporous and apogamous ; see Life History.

CONGESTA CRISTATA.—A dwarf gem raised by Dr. Lyell.

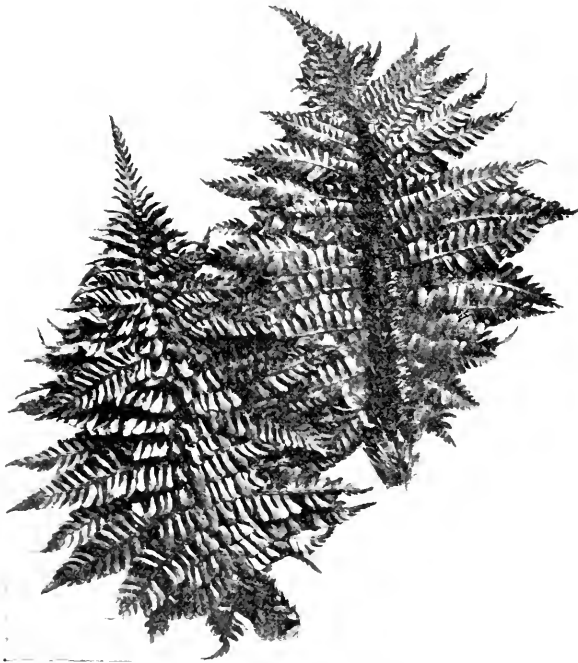


Fig. 172. *L. pseudo-mas crispa*.

CRISPA (Fig. 172).—Found in Wales ; dwarf and crispy.

C. GRACILIS.—A dwarf and pretty form raised by Dr. Lyell.

C. CRISTATA ANGUSTATA.—Raised by Messrs. Lang of Kirkcaldy ; a dwarf, congested form of *cristata angustata*.

CRISTATA (Plate XVII).—Found at Charleston, near St. Austell, in Cornwall ; this has well been termed the “ King of the Male Ferns.” A splendid robust evergreen, which, under certain treatment (see chapter on Culture), can become a tree Fern of great beauty. A peculiarity of this variety is that it reproduces itself from the spore by “ apogamic ” buds, no fertilization occurring. The plate obviates description as does the nature print (see Appendix No. XXV), which latter, however, is taken from a somewhat damaged frond, giving an irregular appearance which is not obvious in the growing plant.

C. ANGUSTATA (Plate XIX).—A narrow form of *cristata*, not growing so large.

C. WILSON.—Found in Langdale by Mr. Wilson ; fine pendulous tassels.

C. FIMBRIATA.—A beautifully fringed offspring of *cristata*, a sort of half-way type between *cristata* and *apospora percristata*, and probably the parent of the latter.

GRANDICEPS RANYARD.—A splendid heavily crested variety.

POLYDACTYLA DRUERY.—The parent form, when found near Kilmarnock, was a robust, splendidly polydactylous form, but proved to be a “ rogue ” ; one seedling, however, lost its bad character, and repaid the finder for previous disappointments.

P. JONES.—Found in Burton by J. J. Jones ; finely tasselled.

P. WILLS.—A magnificent rival to the “ King of the Male Ferns ” ; produces fewer fronds, but much longer and wider.

RAMO-CRISTATA FITT.—A small-growing, branched, and tasselled variety.

RAMOSISSIMA.—Found in N. Wales by R. Wright ; fronds branch repeatedly and terminate with heavy tassels, forming a ball of verdure ; very fine.

RAMULOSISSIMA.—Raised by Sim from *Schofieldii* ; a densely branched and tasselled gem.

R. GRANDE.—Raised by Mr. G. Whitwell, Kendal, we believe by a simple secondary “ sporting ” of a division of *ramulosissima*, which we believe is barren of spores ; a beautiful dark green bunch of cresting, nearly a foot high.

REVOLVENS.—Found at Troutbeck by Mr. Clowes, in a green-



Fig. 173. *L. ps. m. Schofieldii*.

house among a number of common ones collected by a gardener ; fronds almost tubular.

SCHOFIELDII (Fig. 173).—Found near Buxton by Mr. J. Schofield ; a very dwarf ramose form, not in itself very attractive, but it has produced a very beautiful dwarf *grandiceps ramulosissima*.

STABLERII.—Like *L. propinqua Pinderii*, but larger.

SUB-CRISTATA DADDS.—Tassels very small, but fronds peculiarly broad and handsome (see Appendix No. XX).

LASTREA MONTANA (OREOPTERIS) (THE MOUNTAIN BUCKLER
FERN—THE LEMON-SCENTED FERN)

(Plate XX)

This beautiful species is very widespread, and is not, as its name *montana* denotes, by any means confined to high elevations, though it is very abundant on hillsides in the lake districts of Wales and Scotland, covering large areas on the open moor, fringing the streams, and forming dense communities in the woods. It needs root moisture, but given that will well withstand both wind and sunshine. In form it has a superficial resemblance to the Male Fern, but apart from the yellower green of its fronds (Fig. 174), and

the lemon-like odour produced if these be handled, it will be found on closer examination that the side divisions commence close to the ground as round lobes which lengthen slowly at first, and then more rapidly, forming a lance-shaped outline with a gradual



Fig. 174. *L. montana* (pinna).

tapering off below, while in the Male Fern they start abruptly of some length a third of the way up the frond, the stalk below being bare. The spore heaps are small and numerous. It resents lime in soil or water, and grows best in moist, friable loam, in well-drained pots, or on the northern sides of rockeries. Curiously enough this species for a very long period had the reputation of being a very constant and "non-sporting" one, since, despite its abundance, no varieties turned up to reward the hunter's perseverance. Then, however, two or three varieties were discovered, and Mr. J. M. Barnes, of Milnthorpe, in the Lake District, devoted particular attention to the species, and found some very fine ones. Others followed, and at present *L. montana* figures as by far the most versatile species of the genus, over seventy varieties being catalogued as found in the Lake District alone, clearly due mainly to the residence there of a number of experienced hunters, since we have ourselves found several very choice and distinct forms in Devonshire and Scotland, and Dr. Stansfield recently found a magnificent plumose form in Wales. The following are the best.

APUEFORMIS.—Found at Swindale by Mr. Barnes; a multifid, branched terminal crest.

ATTENUATO-CRISTATA.—Found in Mardale by Mr. Barnes; a narrow, crested form.

BARNESII.—Found by Mr. Barnes; a remarkable variety, with short, oval side divisions set on to the midrib at right angles, like the steps of a ladder. Unique when found, and still distinct; but a number of very similar, narrow varieties have since been discovered by Mr. Whitwell and others.

CONCINNATA.—Found Loughrigg by Mr. Crouch; a narrow *revolvens*.

CONGESTA.—A number of very good congested forms have been found; the best we have seen is *crispatissima*, found by Mr. Gott near Troutbeck.

CRISPATISSIMA.—See note to *congesta*.

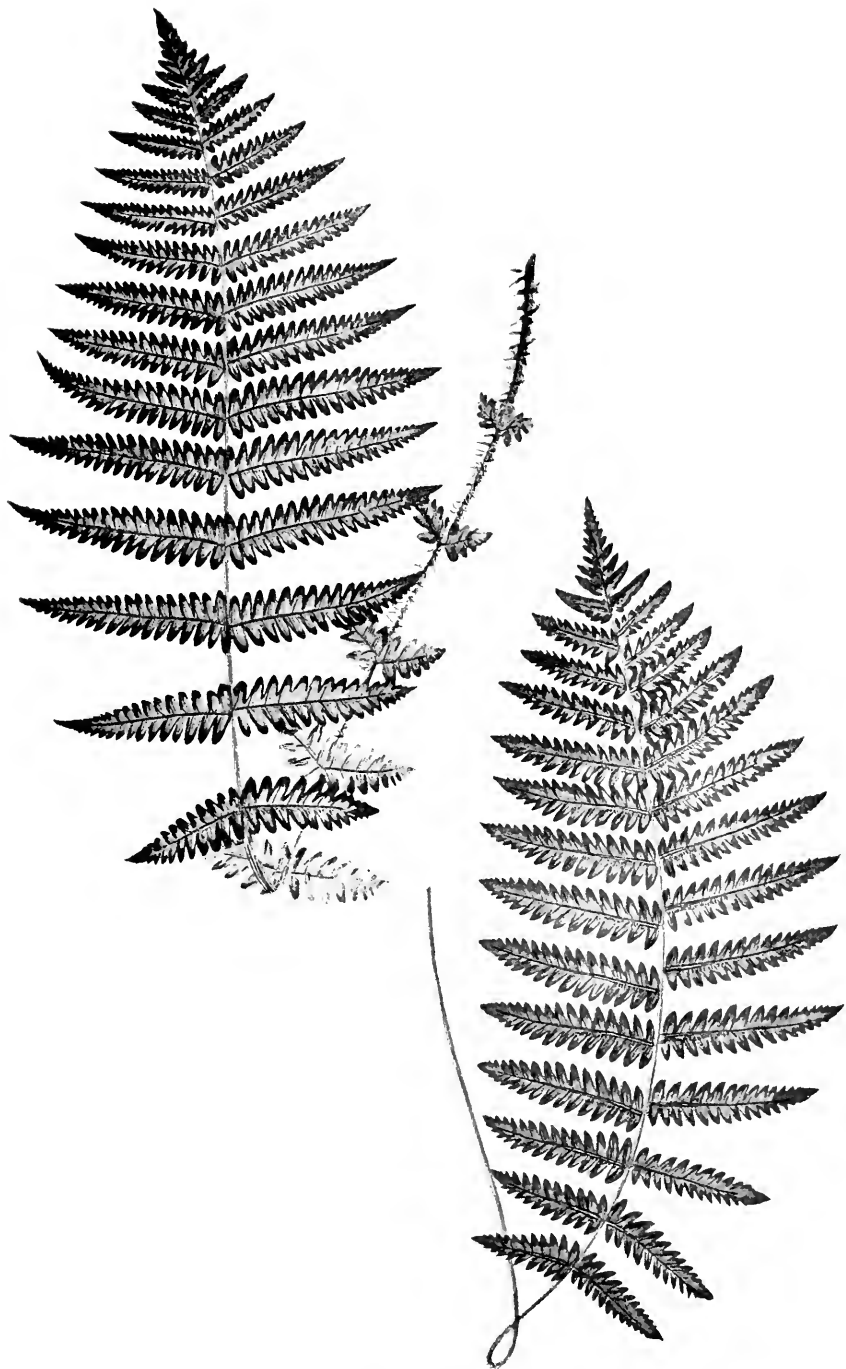


PLATE XX.

Lastrea montana (oreopteris)

Lastrea thelypteris

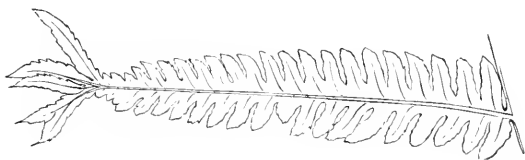
Fig. 175. *L. m. cristata*.

CRISTATA (Fig. 175).—Found in Monmouthshire by Mr. T. H. Thomas; frond heavily tasselled, pinnæ much less so; also by Mr. J. M. Barnes, a finer form.

CRISTATO-GRACILE DRUERY.—A very fine slender, crested form found at Sticklepath, Dartmoor, by the writer.

CURVATA.—A form with deflexed pinnæ, found several times.

FILIFERA.—Most remarkable forms raised by Mr. J. Wiper; pinnules deeply incised, and points extended into threads. Bulbiferous at base.

Fig. 176. *L. m. furcans* (pinna).

FURCANS (Fig. 176).—Found by Mr. Monkman at Bowness; fronds and pinnæ tips divided into several.

GRACILIS.—Found Hawkshead by J. Wiper; beautifully cut pinnules.

GRANDICEPS BARNES.—Raised by Mr. Barnes; very heavily tasselled.

G. SMITHIES.—A very fine form found in Long Seddale by Mr. Smithies, who had previously found a less marked form at Martindale.

NOWELLIANA (Fig. 177).—Found by Mr. J. Nowell and Mr. A. Stansfield in N. Wales; a very curious form with much reduced, saw-toothed, irregular pinnules, and long, acutely pointed and sometimes forked pinnæ.

PLUMOSA.—True plumose forms, very foliose, barren, and finely cut, have been found by Mr. T. Airey, Mr. G. Whitwell, Dr. F. W. Stansfield, and the writer. The finest of all is that of Dr. Stansfield, found in Wales, 1909 (see Fig. 178).

POLYDACTYLA.—Numerous finds, tips divided into pointed crests.

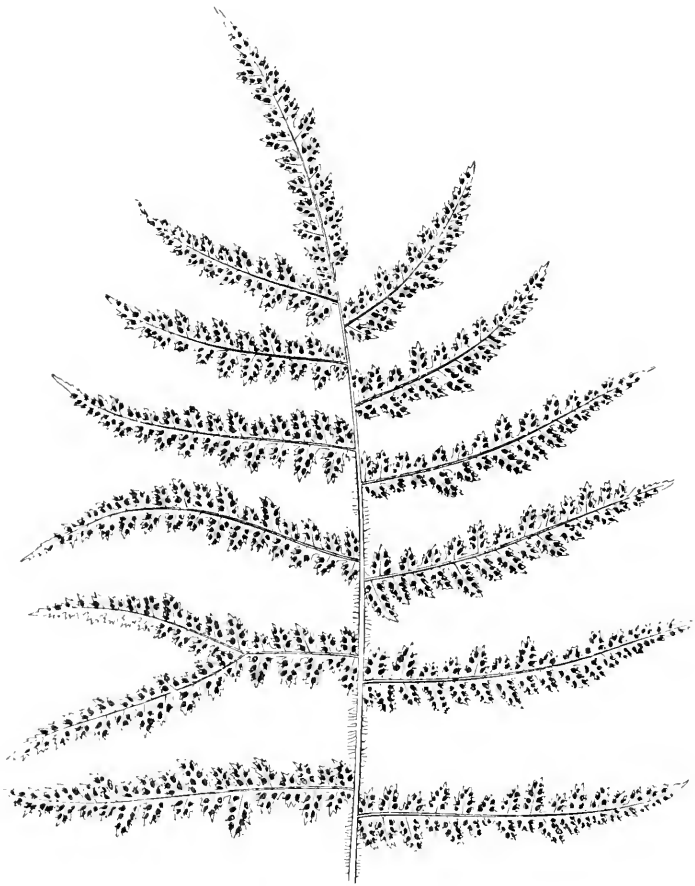


Fig. 177. *L. m. Nowelliana*.

RAMO-CORONANS, R. CRISTATA.—Both raised by Mr. Barnes ; splendidly crested and branched.

REFLEXA.—Found Coniston by J. Stewardson ; pinnae like ringlets.

REVOLVENS.—See *concinata*.

SIMPLEX.—Found by Mr. Barnes in Mardale ; fronds like *P. vulgare*, pinnae smooth-edged.

TRUNCATA (Fig. 179).—This very curious form, first found by Mr. G. B. Wollaston near Tunbridge Wells, has fronds of perfectly normal make, except that the tips of the frond and of the side



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Fig. 178. *Lastrea montana phymosa* (Stansfield).

divisions are prematurely and abruptly terminated squarely, the midrib projecting from the centre as a thorn or bristle; this form occurs so frequently that in the Lake District a Fern so characterized

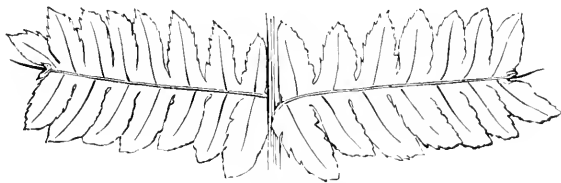


Fig. 179. *L. m. truncata* (pinnae).

is termed the "beginner's Fern," since it is nearly always the first thing which the young Fern-hunter comes across in the varietal line. We have found it repeatedly. Sometimes plants are found partly truncate and partly normal, but constant ones are not rare.

LASTREA REMOTA

(Plate XXI)

This Fern (Fig. 180) was first found in Westmoreland by Mr. F. Clowes, of Windermere, who regarded it as a form of *L. spinulosa*, but a frond being submitted to Mr. Moore, of the Chelsea Botanic

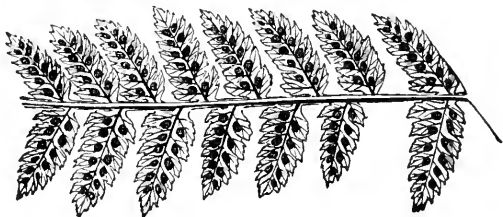
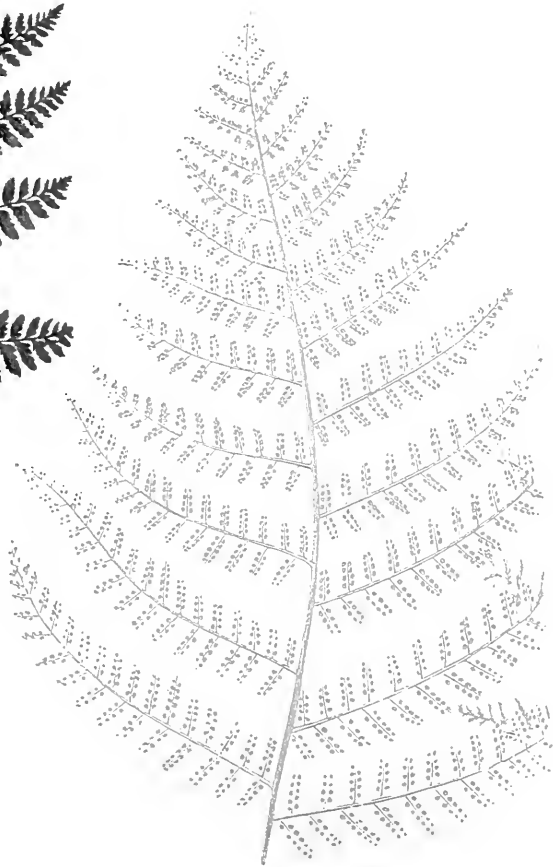


Fig. 180. *L. remota* (part of pinna).

Gardens, he pronounced it to be identical with a species native to southern Germany, and named *Aspidium remotum* (Braun), thus adding a new species to the British list. In view, however, of the variability of *L. dilatata*, and Mr. Clowes' own opinion at the time of the find, that it was a form of *L. spinulosa*, which we regard as one of its variants, we are hardly inclined to accept *L. remota* as a distinct species, but rank it rather with the other indefinite ones of the same section of *L. dilatata* forms. It is quite hardy, but deciduous, and grows to a considerable size.



Lastrea rigida



Lastrea remota (apex of frond)

PLATE XXI.

LASTREA SPINULOSA (THE SPINY BUCKLER FERN)
(Plate XXII)

For a description of this Fern, which we regard as a sub-variety or sub-species of the *L. dilatata* section, we cannot do better than

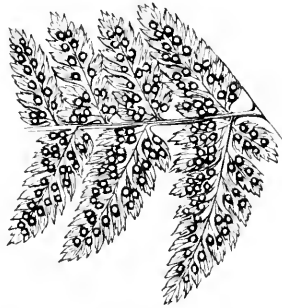


Fig. 181. *L. spinulosa* (part of pinna).

refer to Fig. 181 and Plate XXII. There are no marked varieties which can be imputed to it.

LASTREA RIGIDA (THE RIGID BUCKLER FERN)
(Plate XXI)

This *Lastrea* is entirely confined to Limestone districts of some elevation. It roughly resembles a somewhat small, stiff-growing Male Fern, and like that Fern the fronds (Fig. 182) arise in circlets

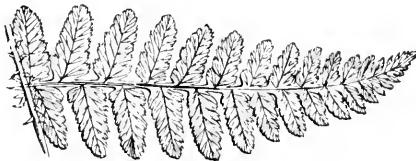


Fig. 182. *L. rigida* (pinna).

from an erect rootstock, but as its fronds have a somewhat mealy appearance, owing to numerous glands on their surface, it is easily distinguished. In cultivation, the usual compost may be used, but with an admixture of limestone. It is deciduous. The only constant variety, *cristata*, was found by Mr. F. A. Barraud, we believe near Ingleborough, Yorks; a thoroughbred, prettily crested at all tips, but, unfortunately, it is not now in existence, and is only mentioned to stimulate further search.

LASTREA THELYPTERIS (THE MARSH BUCKLER FERN)

(Plate XX)

This species is the only British one which actually grows in boggy, water-logged soil, and it differs widely from the other *Lastreas* in forming no definite crown, but in having a thin, creeping rootstock, almost on Polypody lines, these forming mat-like masses, whence the long, slenderly made fronds spring singly. These fronds (Fig. 183) are erect, and have very long, naked stalks, bearing somewhat distant pinnæ, very much on attenuate *L. montana* lines,

Fig. 183. *L. thelypteris* (pinna).

but without the short lobes commencing near the base which are characteristic of that species. They are of a delicate green, and tall, attaining in favourable situations over a yard in height. Its culture is easy if boggy, peaty conditions and plenty of moisture be provided. We produced a rampant specimen by planting a piece of the creeping caudex in peaty soil, over a good-sized glazed earthenware pan sunk in the ground and filled with pieces of broken brick, over which moss was laid to prevent admittance of the soil. Every rainfall or watering was caught by this pan, and obviously the roots proper of the thirsty Fern obtained admission to this supply, for the creeping rootstocks spread, and even emerged in all directions, and had eventually to be drastically checked to prevent monopoly of valuable space. Peaty soil, in pans, kept well watered, suits the Fern admirably, though owing to its tall growth and slender stalks it does not rank among the decoratives. No variety has been found in this country, but a very good crested form, *L. t. polydactyla* (Pufferæ), was found some years ago by a lady in the United States, and figures in our collection as, if not a British find, at any rate a "sport" of a British species, and there are some very promising *grandiceps* forms raised by the writer.

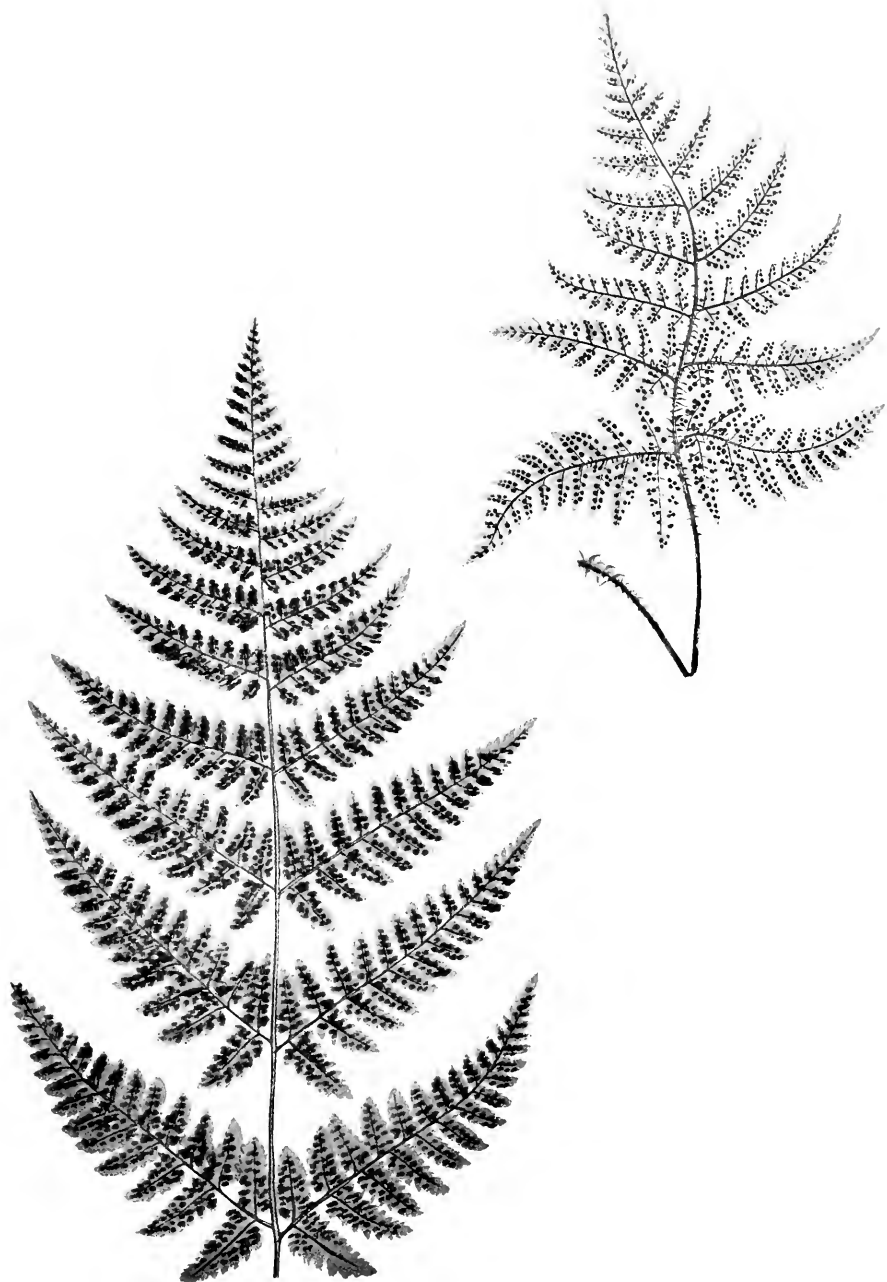


PLATE XXII.

Lastrea spinulosa

Lastrea gemula

LASTREA ULIGINOSA

(Plate XVI)

For this species we refer our readers to Fig. 184 and Plate XVI), for the reasons given in connection with *L. spinulosa*.

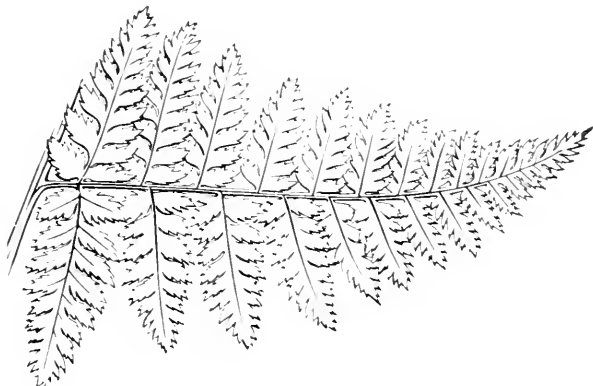


Fig. 184. *L. uliginosa* (pinna).

L. uliginosa is a denizen of boggy woods; it has afforded no varieties worthy of note.

OPHIOGLOSSUM VULGATUM (THE ADDER'S-TONGUE FERN)

(Plate XI)

This little Fern (Fig. 185) consists of a smooth-edged, lance-shaped, leathery, barren frond, minus any midrib, and a long, spiky, fertile one, the latter bearing a fanciful resemblance to a

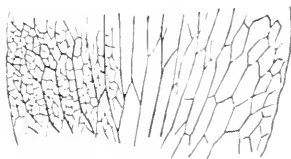


Fig. 185. *O. vulgatum* (part of frond).

serpent's tongue, though not forked. It is probably far more plentiful than is supposed, since it frequents open, moist, pasture land, and might be easily mistaken for plants of the common plantain weed, both as to its barren frond, which resembles the leaf, and the fertile spike, which resembles the seed spike. Deciduous. It has a creeping rootstock, and if lifted *en masse* in a clod of earth,

and transferred to a garden, will continue to grow year after year. It has no decorative value at all. A diminutive form has been



Fig. 186. *O. lusitanicum*.

found in Guernsey, which is considered to be a distinct species, *O. lusitanicum* (Fig. 186).

OSMUNDA REGALIS (THE ROYAL FERN)

(Plate XXIII)

This grand Fern stands alone as a species in this country, and attains a great size, ten or eleven feet high, and in the upper reaches of the Dart we have seen it so robust and abundant as to resemble coppices at a short distance, the ground being a solid mass of the massive rootstocks, clothed densely with aerial rootlets like huge sponges. It exists in many places where moist and almost boggy

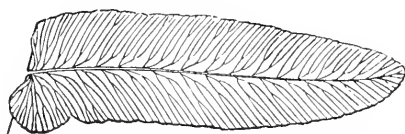


Fig. 187. *Osmunda regalis* (pinnule).

conditions prevail, and attains its largest size on the banks of streams, on islands in the lake districts, and similar habitats where its feet, so to speak, are bathed in moisture. Its huge fronds spring in clusters from definite centres of the rootstocks described, and are twice or thrice divided into pinnae as shown in Fig. 187, the fructification being confined to the tips of the fronds where the leafy portion disappears, and is replaced by branched masses of uncovered spore capsules which, when ripe, are of a brownish tint,

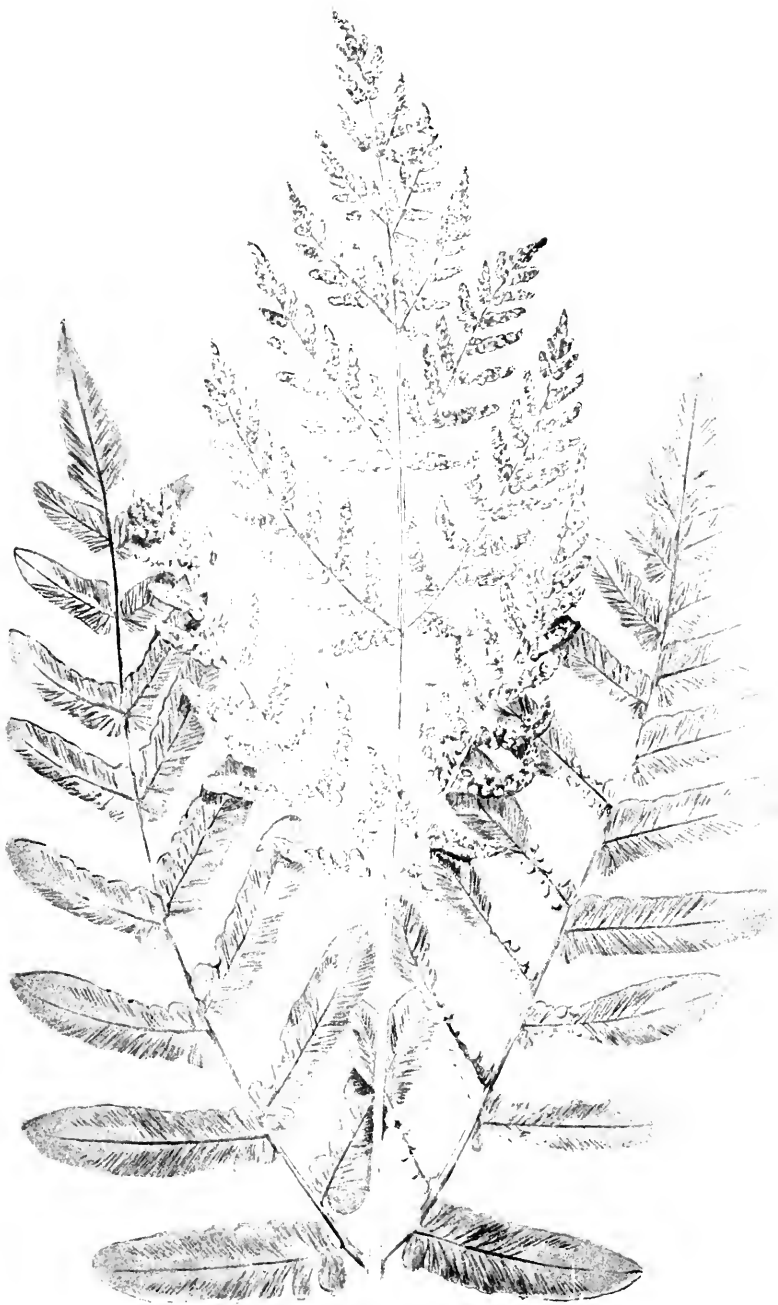


PLATE XXIII.

Osmunda regalis

the contained spores being a bright green. This form of fructification, having some resemblance to faded *spiræa* flowers, has given the popular name of the Flowering Fern to this species, though we need hardly say it is a misnomer. The character of its habitats must be remembered in its culture ; the soil should be spongy peat, and kept constantly moist. Given such a supply of root moisture, the fronds stand exposure to sun and wind with impunity. The young fronds are covered with a brownish wool, which, however, is detached as they rise. It is perfectly deciduous, despite its tough texture. It has afforded several varieties.

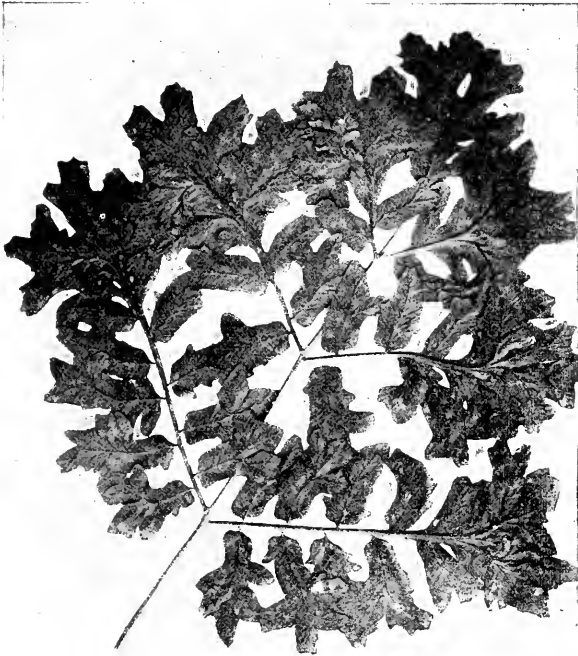


Fig. 188. *O. regalis cristata*.

CRISTATA (Figs. 188, 189).—A very beautiful crested form which was accidentally acquired from a hawker in the winter, when dormant, by Messrs. Osborn & Sons, of Fulham, and discovered in their nurseries, when it developed, by Mr. G. B. Wollaston, who at once offered a good round sum for it, but failed to acquire it, a rather tantalizing fact under the circumstances.



Fig. 189. *O. regalis cristata* (pinna).

A bulbiferous form was raised from this by Mr. Clift, of Birmingham, bulbils being borne near the frond bases.

ROTUNDATA.—A round pinnuled form found in Ireland by Mr. M. H. Phillips.

DECOMPOSITA.—Found in Ireland by Mr. Alex. Cowan; fronds much more divided, and with saw-toothed pinnules, the fructification taking the form of detached bead-like masses instead of slightly crenate spikelets.

THE POLYPODIES

The *Polypodium* genus is represented in Great Britain by four species, viz. *Polypodium vulgare*, the Common Polypody, *P. dryopteris*, the Oak Fern, *P. phegopteris*, the Beech Fern, and *P. calcareum* (*Robertianum*), the Limestone Polypody. The name *Polypodium* signifies many-footed, the rootstocks travelling on or near the surface of the soil, and, as in the well-known Haresfoot Fern (*Davallia*), the growing tips resemble more or less hairy paws. In point of fact, however, many species, the *Davallias* themselves to wit, do the same thing, but belong to quite different genera, the actual generic distinction of the *Polypodium* family being a fructification, consisting of round or oval masses of spore capsules, quite destitute of any protecting cover, so that the generic name is another of those misleading ones which we have inherited from the old times when botanical knowledge was very imperfect.

POLYPODIUM CALCAREUM (ROBERTIANUM) (THE LIMESTONE POLYPODY) (Plate XXIV)

This Fern, as regards make of frond, may be roughly described as a slightly coarser and considerably larger edition of the Oak



PLATE XXIV.

Polypodium phegopteris

Polypodium dryopteris

Polypodium calcareum
(*Robertianum*)

Fern, but with a less delicate shade of green, while its developing fronds (Fig. 190) do not divide at the outset into three ball-like pendants, but form a crozier-shaped pendulous hook. It imitates

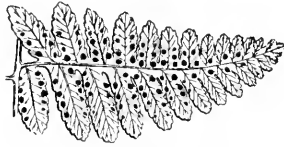


Fig. 190. *P. calcareum* (pinna).

the Oak and Beech Ferns exactly as regards its creeping rootstocks and general habit of growth, but differs from them in its confinement, as its name indicates, to limestone soils, which, under culture, necessitates an admixture of old mortar, chalk, or other form of lime, in the station assigned to it. Treated thus, it is equally easy to grow. It has yielded no varieties.

POLYPODIUM DRYOPTERIS (THE OAK FERN) (Plate XXIV)

This most beautiful little Fern, whose name is equally difficult to explain as that of the Beech Fern, and for the same reason, differs markedly in the make of its fronds from *P. phegopteris*, these being triangular in outline, and practically consisting of three branches, each of which is again triangular and pinnate. The

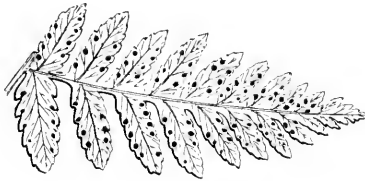


Fig. 191. *P. dryopteris* (pinna).

stalks are long and very slender, and the leafy portion of the frond is bent backwards at an angle at the junction of stalk and frond, the fronds (Fig. 191) thus spreading more or less horizontally. A curious feature in this species is that when the fronds commence to unfold, the three divisions loosen and fall apart in the shape of three round balls, exactly like a pawnbroker's sign. Another distinctive feature is the peculiarly delicate moonlight green of the fronds, which, and its general habit, render it one of the prettiest of our native Ferns. Its usual height is six to eight inches. As regards its habitats and cultural requirements, they are precisely those of the Beech Fern, and need not, therefore, be repeated.

So far, absolutely no variety, constant or even inconstant, has been noted in this beautiful little Fern, which Nature is apparently quite content to regard as a masterpiece, and therefore declines to meddle with in the way of "sports," which might mar, but could hardly improve.

POLYPODIUM PHEGOPTERIS (THE BEECH FERN)

(Plate XXIV)

This very pretty Fern, whose popular name of the Beech Fern is a translation of the botanical one, and equally difficult to explain, since there is no connection between the tree and the Fern, is far more restricted in its habitats than its robuster relative, the Common Polypody, being a denizen of moist woods in the vicinity of water, and also of loose stone dykes, or stone-faced earthen banks, where



Fig. 192. *P. phegopteris* (pinna).

humid conditions prevail. Its fronds (Fig. 192) of triangular outline, once divided, and with the two lowest pinnæ turned downwards, a very distinctive character of this species, are of soft, delicate make, supported on very slender, long stalks, their nature thus precluding them from withstanding similar conditions of exposure to wind and occasional spells of drought. When uncoiling the tips of the fronds turn over backwards, as do most of the Shield Ferns, an exception to the general rule. In sheltered woods we find it sometimes in spreading colonies, yards across, its fronds hanging pendulously from their stalks, and forming thus a sheet of beautiful light green. Its rootstocks are very thin, black, and string-like, creeping rapidly about in the loose, leafy debris in which it is most at home, and throwing up the fronds singly, at intervals, as they proceed. Its spore heaps also differ markedly from those of *P. vulgare*, being dark, dot-like, and very small. Under culture, especially under glass, it is easy to grow, all that is required being shelter from strong sun and wind, and a shallow, well-drained pan, filled with very leafy, loose, sandy compost, water not being spared. It rapidly spreads and is perfectly hardy. It is quite deciduous, the fronds dying down in the autumn and rising again about the middle of April. It must not be allowed to dry out in the winter. This species has been very chary of varieties.



Fig. 193. *P. phegopteris multifidum*.

MULTIFIDUM.—A multifid form was found by J. Jones at Burton with the tips slightly but constantly divided. A form under this name is recorded by Mr. E. J. Lowe (Fig. 193) but obviously is not correctly christened. This identical type, however, we have found more than once at Aberfeldy and elsewhere, but it has always proved to be inconstant, reverting to the normal under culture. We have dried fronds of even more marked cutting than our figure.

POLYPODIUM VULGARE (THE COMMON POLYPODY)

(Plate XXV)

P. vulgare, which is by far the most widely distributed species of this genus, differs very markedly from the other three. It has once-divided, tough fronds, consisting of a long stalk, continuing as a midrib bearing two rows of normally bluntly tipped side divisions,



Fig. 194. *P. vulgare* (pinna).

as seen in Fig. 194, forming a sort of double comb with well-separated broad-based teeth, the frond tapering gradually to a blunt point, or perhaps with pinnae set on endwise, even the normals varying somewhat in different districts. Its native habitats are on the tops of old walls or roofs, where dense colonies sometimes accumulate, along the hedges in the stony dykes which back them, in the forks of old trees, and even on the trunks, and in the woods on elevated masses of woodland debris and rocky detritus. Its fronds may attain a length of two feet under very favourable circumstances, but ordinarily are less than half that size. The spores are borne in very conspicuous round masses on the frond backs, and are of a brilliant orange yellow, the spores themselves being of similar colour, a solitary exception in British species. Both capsules and spores are also comparatively large, the spore heaps, under a lens, resembling heaps of oranges. The rootstocks branch and spread on the surface, not burrowing, as in the other species of the same family; they are also much thicker and fleshier, often as thick as one's little finger. The fronds spring from these singly, and do not form clumps. As their tree resorts indicate, leaf mould and good drainage are essentials to successful culture, and shallow pans, providing room for the travelling rootstocks, are preferable to pots. This species is perfectly evergreen, the fronds lasting well into the second season, until new ones arise to replace them. The other members of the family will be treated of under their respective headings. This species has been very liberal in "sports," many of which are of great beauty, as is seen by the nature prints in the Appendix.

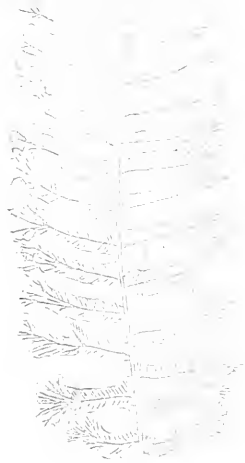
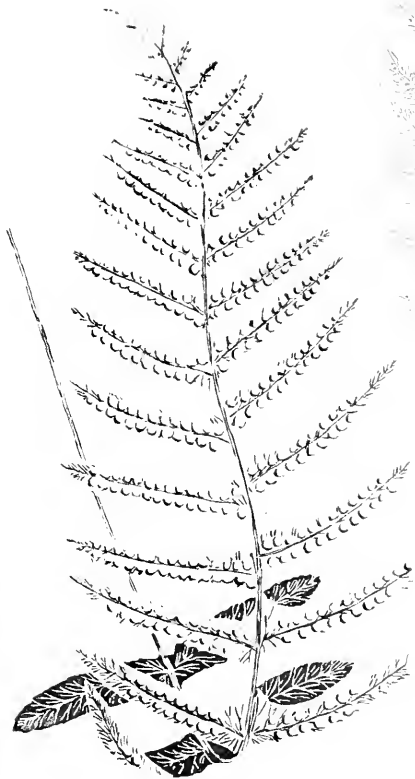


PLATE XXV.

Polypodium vulgare
var. *erisiatum*

Polypodium vulgare

Polypodium vulgare
var. *omnifacerum*

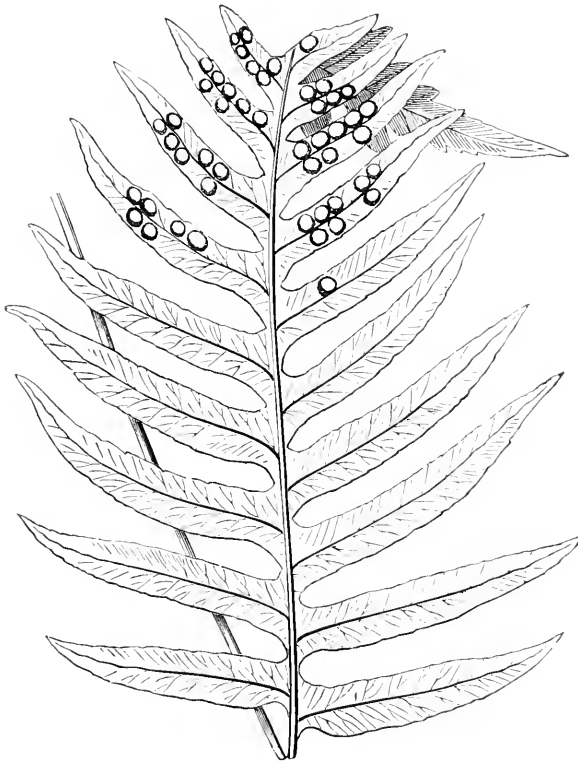


Fig. 195. *P. v. acutum*.

ACUTUM (Fig. 195).—A form with lengthened and pointed, smooth-edged side-divisions ; it has been found in various places, but is not common.

A. STANSFIELDII (Plate XXVI).—This is an extra fine form of *acutum* found by Mr. Stansfield, Mr. Barnes, and Mr. Clapham ; very fine.

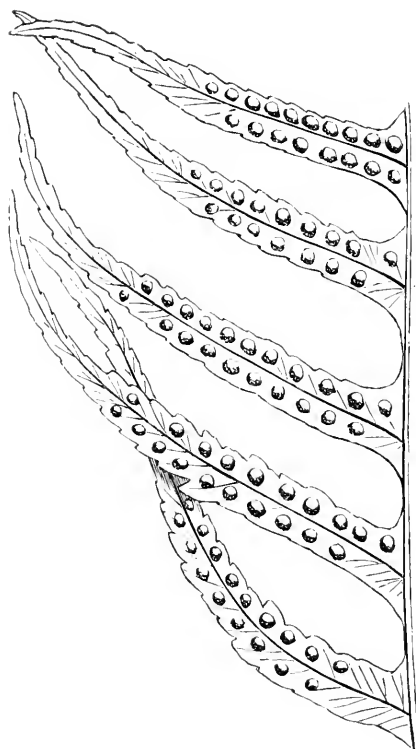


Fig. 196. *P. v. attenuatum*.

ATTENUATUM (Fig. 196).—Pinnæ still more elongated than in *acutum*, slightly toothed, fronds very wide.

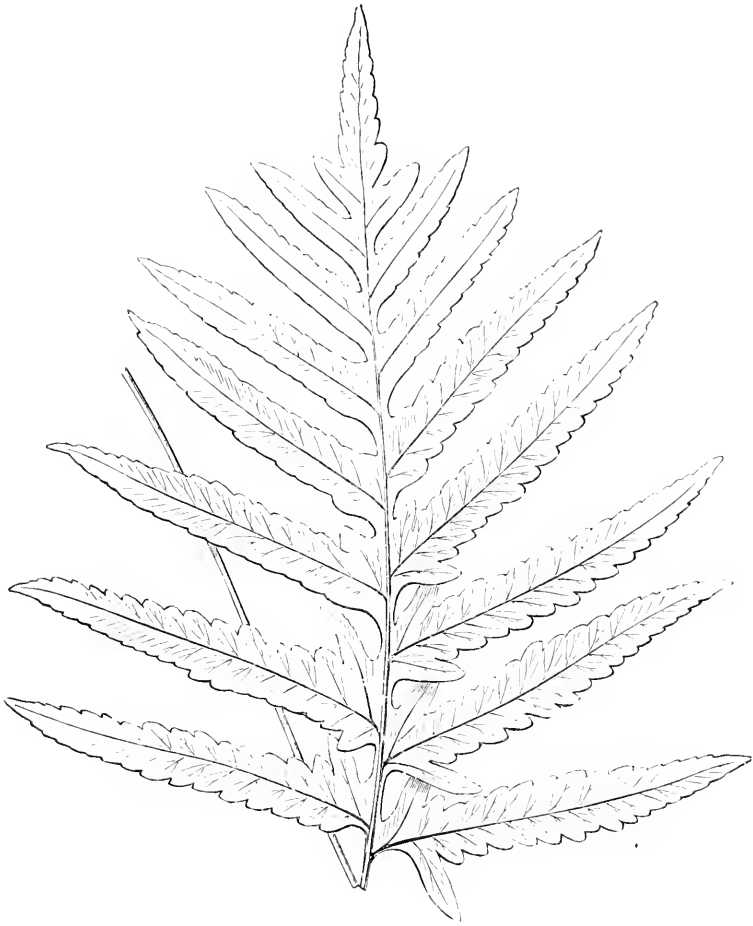


Fig. 197. *P. v. auritum*.

AURITUM (Fig. 197).—Found in several places, it is distinguished by longer pinnae, with bluntly toothed edges, and a pair of distinctly elongated lobes on each pinna next the midrib.

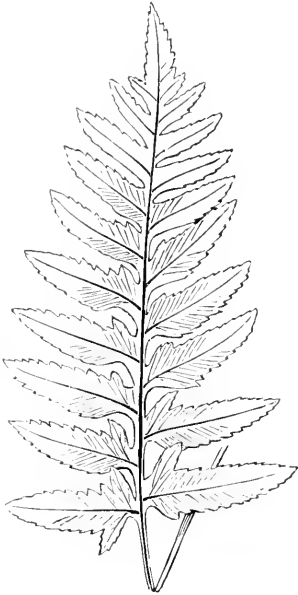


Fig. 198. *P. v. auritum dentatum*.

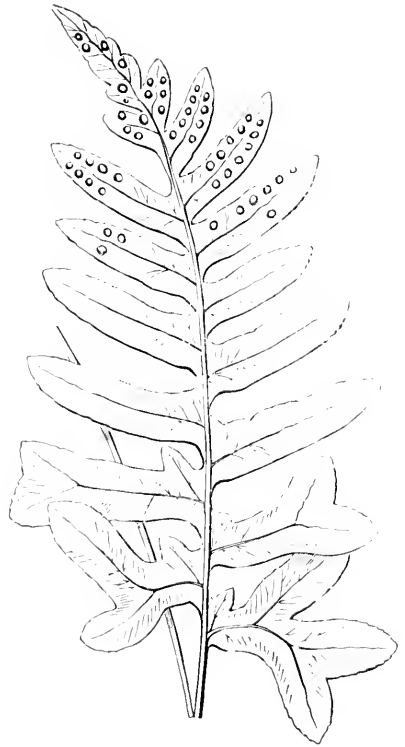


Fig. 199. *P. v. bifidum*
(obtuse form).

AURITUM DENTATUM (Fig. 198).—Found by Mr. C. Monkman near Boness; a form of *auritum* with saw-toothed pinnae.

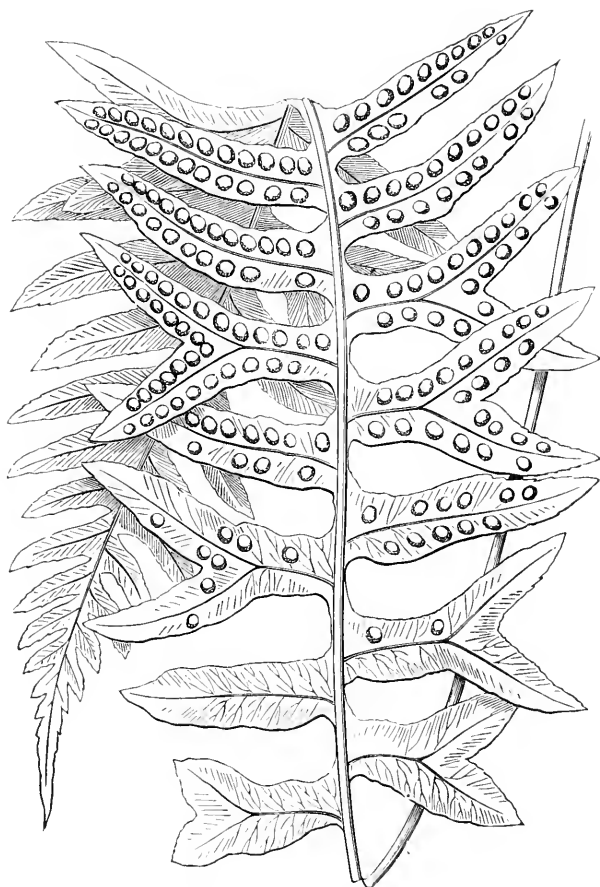


Fig. 200. *P. v. bifidum* (acute form).

BIFIDUM (Fig. 199, 200).—This occurs not infrequently; many of the lower pinnæ are bifid or trifid at tips; Fig 199 shows the usual form, Fig. 200 an acute one. No constant thorough form has been gathered.

BIFIDO-MULTIFIDUM.—Found at Grange by Mr. Walmsley; fronds long and narrow, all pinnæ bifid or trifid, and with a broad, branching, flat, terminal tassel.

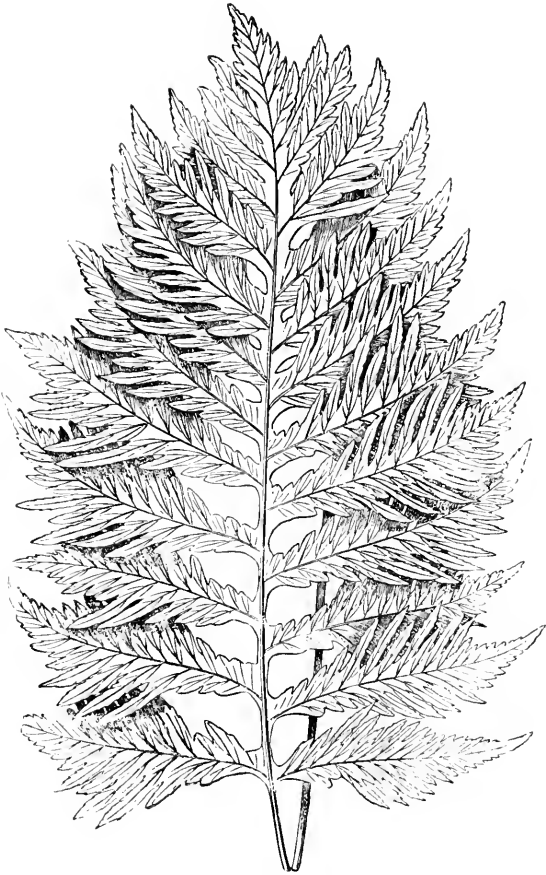


Fig. 201. *P. v. Cambricum.*

CAMBRICUM (Fig. 201 and Appendix No. XLVI).—This very beautiful form was originally found in Wales, whence the name which means Welsh, but it has subsequently been found in several other places, some superior forms of it having been found in the Lake District. As our illustration shows, the normal plain-edged lobes are transformed into very deeply cut ones, and so widened as to overlap each other considerably. The fronds, too, are of thinner, papery texture, and are always perfectly barren. This is really the true plumose form of the species.



Fig 202. *P. v. camb. Hadwinii*.

C. BARROWII, C. HADWINII (Fig. 202), C. OAKLEYÆ, C. PRESTONII (Appendix No. XLIV).—These are all quite distinct forms of *Cambricum*, and very beautiful; *Barrowii* is a robust grower with longer and more acutely pointed divisions than *Cambricum*, and *Prestonii* is much denser in make; *Hadwinii* is a narrow form with blunter divisions, and *Oakleyæ* a smaller grower than the others; all are perfectly barren.

CORNUBIENSE.—Found in Cornwall by Mr. White and others, as a result of which it has been also named *elegantissimum* and *Whiteii*, the first indicating locality, the next character, and the last one of the finder's names. It is one of our most curious varieties, producing indiscriminately three kinds of fronds, viz. perfectly normal ones, very finely cut ones consisting of tripinnate or even quadripinnate, very narrow segments, and a coarser type

of these ; one and the same frond may display all three types of cutting ; the spores invariably yield the same inconstant form.

C. FOLIOSUM.—Raised by Mr. Clapham ; shows mainly the intermediate type on somewhat leafier lines.

C. PLUMOSUM.—Raised by Mr. Barnes ; has broader and leafier fronds, but finely cut.

C. TRICHOMANOIDES.—In this, we believe by constant suppression of the normal fronds, an almost constant form has been arrived at by Messrs. Backhouse, of York, only showing the finest-cut type with very little reversion ; very beautiful.

CRENATUM (Fig. 203).—Found in several places ; a wide-fronded form, the subdivisions being bluntly toothed.

CRISTATUM (Plate XXV and Appendix No. XLVII).—Found in Ireland by Mr. H. S. Perry and others ; a very prettily tasselled form.

C. MORLEYII.—Similar to *cristatum*, but less markedly tasselled.

ELEGANTISSIMUM.—See *Cornubiense*.

GLOMERATUM.—Found in Dorset by Mr. Mullins ; a curious, ramose, and subcristate form, no two fronds alike, but no reversion to normal.

GRANDICEPS FORSTER, G. FOX (see Appendix Nos. XLII and XLVII).—The finest forms of *cristatum*, heavy bunch crests, but distinct.

G. PARKER.—Found in Somerset by Mr. Parker ; a splendid form, bearing heavy, much-branched heads on almost bare stalks, with the tips of the creasing prettily crisped ; the finest crested form of all.

HUTCHISONII.—Reported as found by Mr. Hutchison in Wales, but its history is obscure, and as it is so exact a replica of *Cornubiense* in all respects, we are inclined to doubt its wild origin.

LONGIPINNATUM.—Found by writer at Killarney ; very long and narrow pinnæ, fronds consequently very wide, six inches and more.

MACROSORUM.—A very fine deltoid form, with very long and pinnatifid basal pinnæ, the rest serrate, sori extra profuse and conspicuous ; found by writer at Minehead.

MACROSTACHYON.—Found in Ireland by Mr. O'Kelly ; fronds have wide lateral lobes, and terminate with a very wide and large one set on end, forming a broad caudate tip.

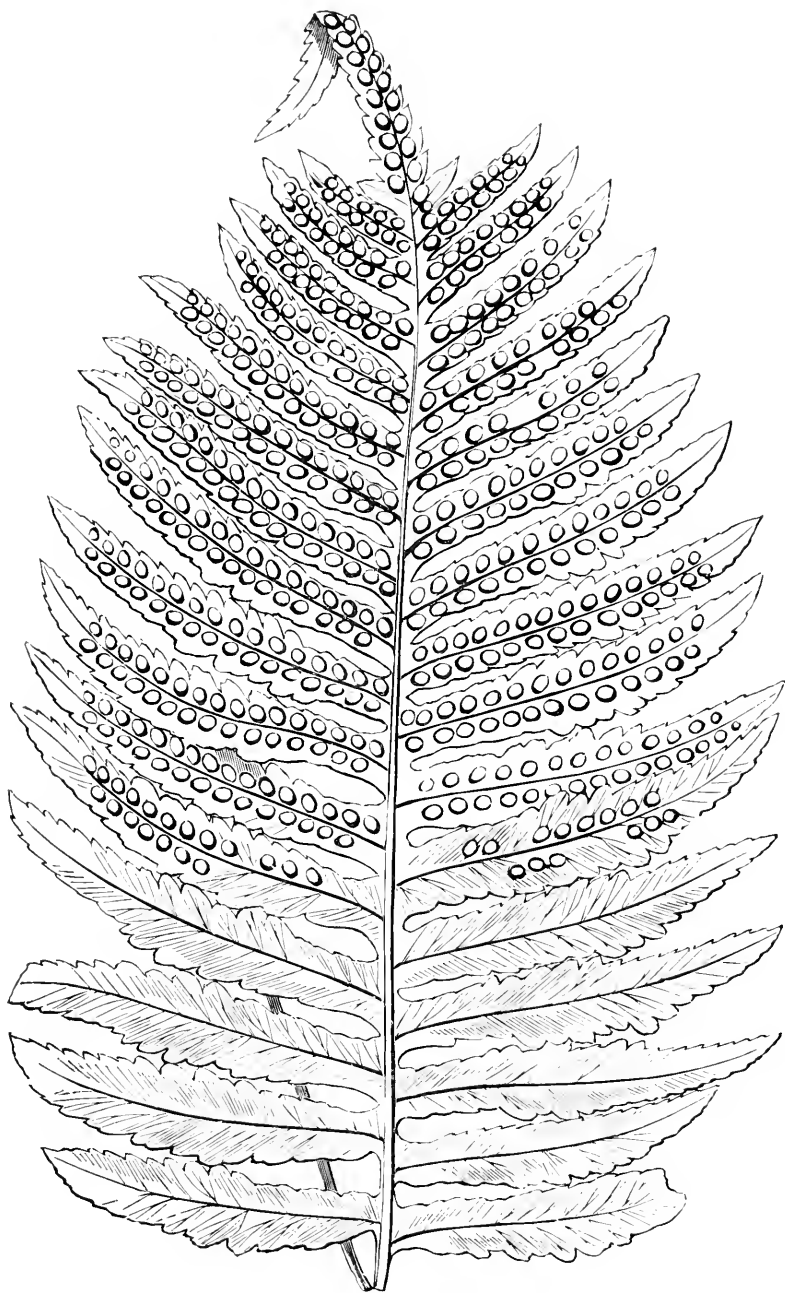


Fig. 203. *P. v. crenatum*.

MARGINATUM (Fig. 204).—Found in Kent by Mr. Wollaston and at Windermere by Mr. Clowes; the margins are irregularly broken up into pointed teeth, with a minute marginal ridge at the back. Fig. 204 represents Mr. Clowes' find, which is distinct, as shown; Fig. 212 Mr. Wollaston's.



Fig. 204. *P. v. marginatum*.

Fig. 205. *P. v. multifido-cristatum*.

MULTIFIDO-CRISTATUM (Fig. 205).—Found by Mr. Tasker, locality not stated; a very heavy-headed form, with long and almost bare stalk, sometimes quite so.

M. ELEGANTISSIMUM.—Raised by Mr. Clapham; *bifido multifidum elegantissimum*. More eccentric even than latter, both varieties, plus the normal, asserting themselves entirely or in patches.

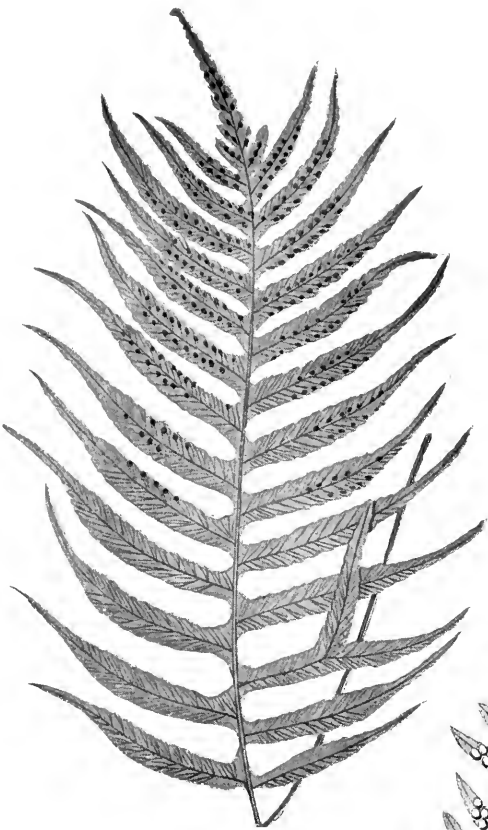


PLATE XXVI.

Polypodium vulgare var.
acutum Stansfieldii

Polypodium vulgare var.
semilacerum



Fig. 206. *P. v. multiforme*.

MULTIFORME (Fig. 206).—Found several places ; robust and very versatile, partaking irregularly of the characters of *semilacerum*, *truncatum*, and *serratum*.

OMNILACERUM (Plate XXV and Appendix No. XLV).—Found by Mr. E. T. Bennett in Ross, Herefordshire ; somewhat resembling a narrow *Cambricum* but fertile ; it only, however, assumes the forms illustrated when grown under peculiarly congenial conditions.

O. ALDRENI.—Found Milnthorpe ; splendid variety when in form, which is rarely the case.

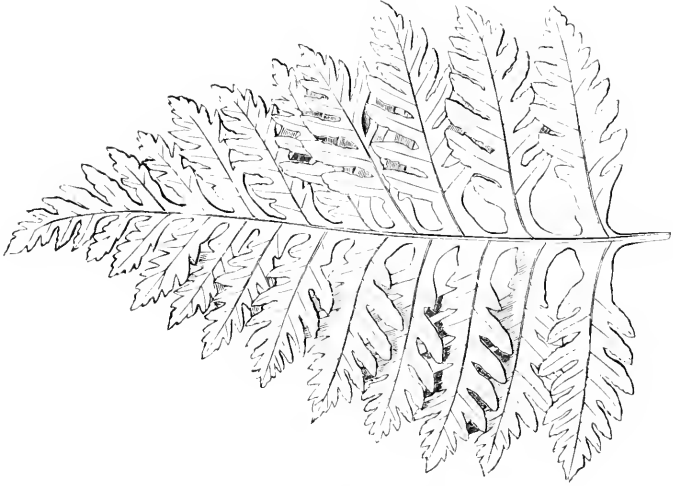


Fig. 207. *P. v. pulcherrimum*.

PULCHERRIMUM (Fig. 207 and Appendix No. L).—Found by Mr. Barnes near Milnthorpe; a splendid, robust form on *Cambricum* lines, but with less acutely pointed subdivisions, and of normally leathery texture, and fully fertile.



Fig. 208. *P. v. ramosum*.

RAMOSUM (Fig. 208).—A conspicuously bluntly toothed *bifidum* on thorough lines.

R. HILLMAN.—Found in Hampshire ; fronds branch repeatedly, very fine form.

SEMILACERUM (Plate XXVI and Appendix No. LII).—Known as the Irish Polypody, but found in many other places ; only assumes full character under generous cultivation.

S. GRANDE (Appendix No. XL).—Found in Wicklow ; a magnificent form, fronds almost circular in outline, finely cut and a foot across.

S. LOWEII.—Found by Col. Lowe in Athlone ; very imbricate.

S. TRUNCATUM.—Found at Levens by J. M. Barnes ; frond and pinnæ truncate and horned.

SERRA.—Found by Mr. Wilson in Lancashire ; a narrow *Cambricum* form, foliose, saw-toothed.



Fig. 209. *P. sinuatum Monkmannii*.

SINUATUM MONKMANNII (Fig. 209).—Found at Morecanibe Bay ; a curious dwarf form, displaying many characters on eccentric lines.

Fig. 210. *P. v. suprasoriferum*.Fig. 211. *P. v. Thompsonii*.

SUPRASORIFERUM (Fig. 210).—Found in Sussex by Mr. G. B. Wollaston; subdivisions narrow and irregularly toothed, *à la marginatum*; spore heaps often on upper surface at the edges, as well as on frond backs.

THOMPSONII (Fig. 211).—Found near Whitby by Mr. George Thompson; an obtuse, dense, almost imbricate form.

TRUNCATUM (Fig. 212).—Found in Ireland by Dr. Allchin, and at Windermere by Mr. Clowes; pinnæ minutely saw-toothed, fronds *sometimes* abruptly terminated, midrib projecting like a thorn.

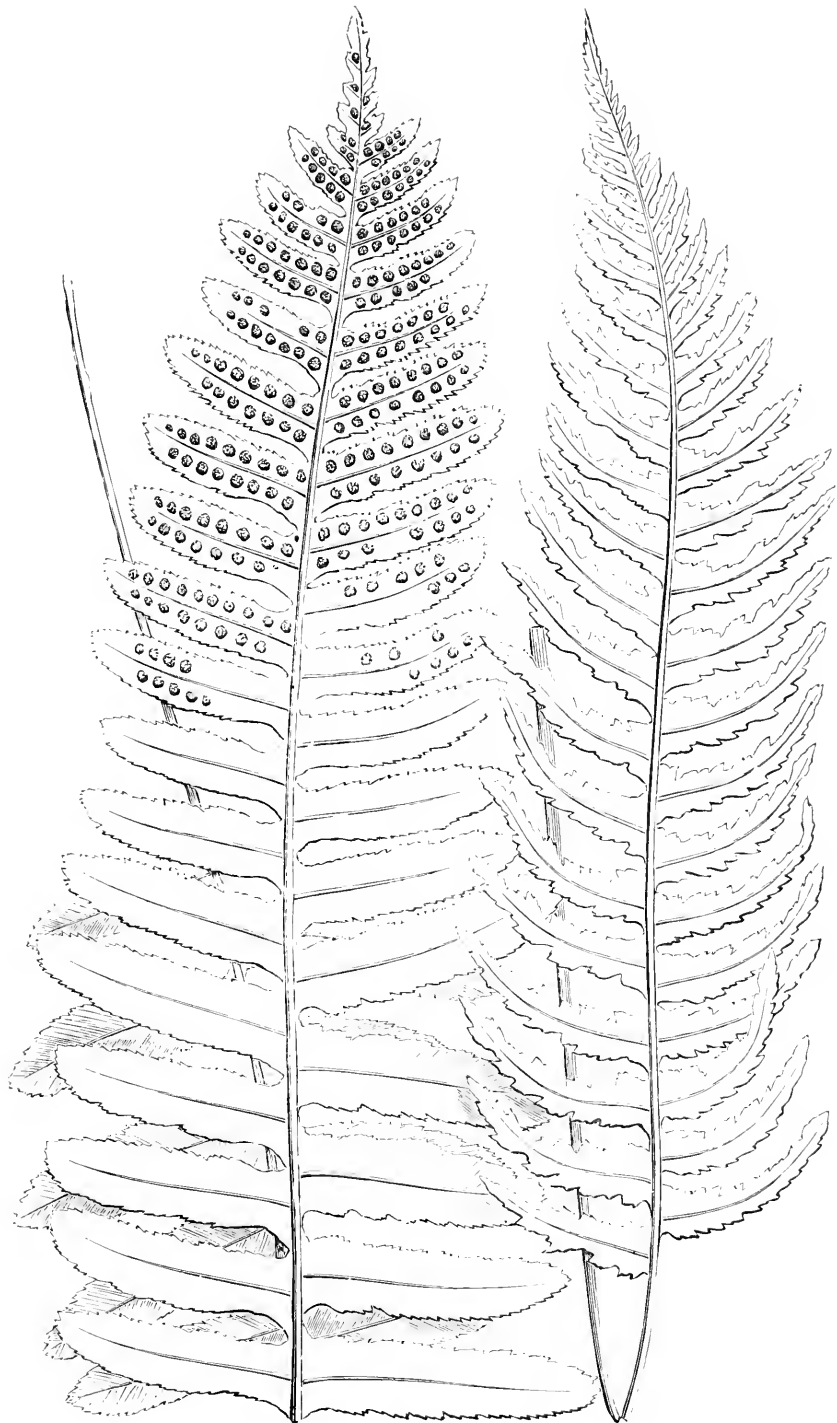


Fig. 212. *P. v. truncatum*.

F. v. marginatum.

THE POLYSTICHUMS (THE SHIELD FERNS)

The genus *Polystichum* is represented in this country by three species, viz. *P. aculeatum*, the Hard Shield Fern, *P. angulare*, the Soft Shield Fern, and *P. lonchitis*, the Holly Fern, all of which are similarly characterized by the peculiar form of the ultimate subdivisions, which are shaped somewhat like a fingerless glove, the thumb projecting at nearly right angles. Their edges are, however, sharply toothed and their terminals sharply pointed. This peculiarity is clearly seen in many of our illustrations, but, as will also be seen, especially in the case of *P. angulare*, the make of the frond and subdivision varies very greatly, so that sometimes it is both marked by partial suppression, or accentuated by lengthening of the segments. All three species are perfectly evergreen and hardy, and a further peculiarity by which they may be recognized, when the fronds are rising and unfolding in the spring, is that as the terminal coil develops and loosens, it falls over backwards, and hangs like a reversed crozier, an exception to the general rule. At this stage, too, the protecting scales, which are plentiful, are snow-white, only eventually becoming brown. The spore heaps of this genus are perfectly round, and are covered by a circular indusium, attached mushroom fashion by a short central stalk. This, having a resemblance to a shield, gives the popular name to the genus. The fronds are deep green, and with a shining surface, especially in *P. lonchitis* and *P. aculeatum*; their distinguishing characters, however, will be treated of under their respective names. All three species have yielded varieties, *P. lonchitis* a few, and *P. aculeatum* a fair number, but *P. angulare* has been far and away more generous, and ranks, indeed, with the four or five most versatile Ferns we possess. With these few introductory words we will now proceed to treat of them individually.

POLYSTICHUM ACULEATUM (THE HARD PRICKLY SHIELD FERN)
(Plate XXVII)

Polystichum aculeatum, or the Hard Prickly Shield Fern, is intermediate in texture between *P. lonchitis*, the Holly Fern of the



Fig. 213. *P. aculeatum* (pinna).

mountains, and *P. angulare*, the Soft Shield Fern of our warm lowland districts, and is also to some extent intermediate in its

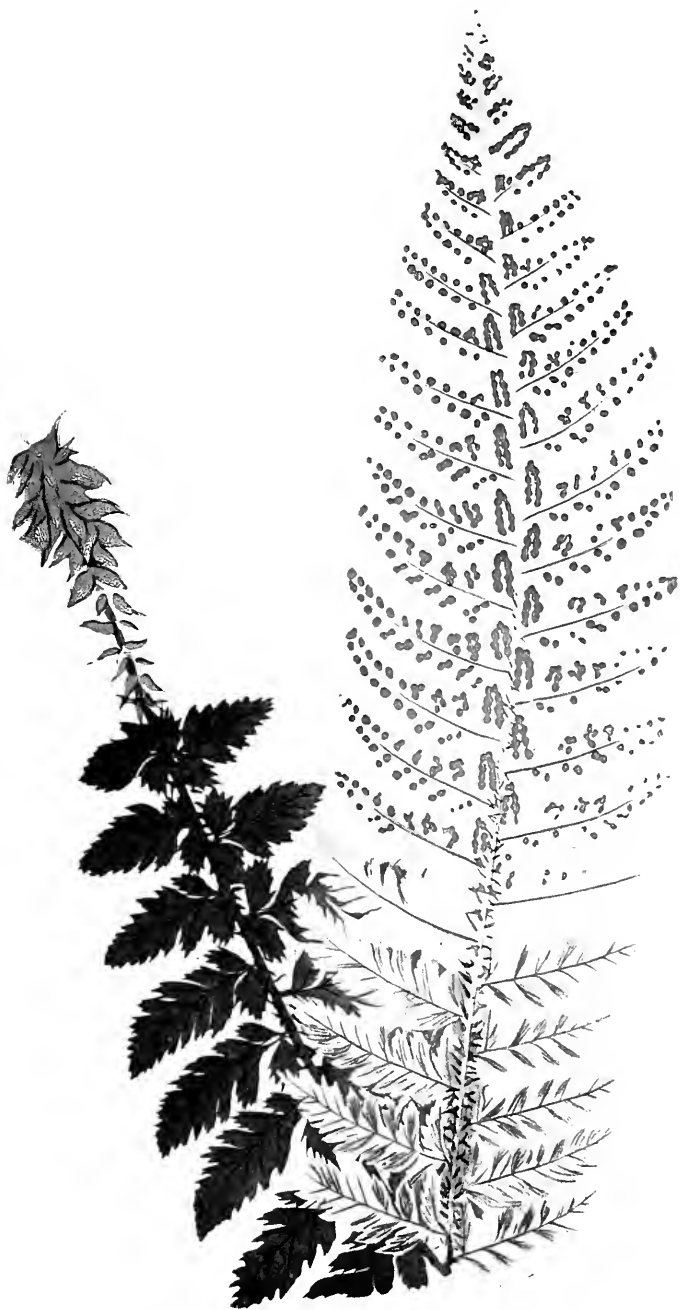


PLATE XXVII.

Polystichum aculeatum

habitats, since it extends far north into the Scottish glens, where *P. angulare*, its more delicate relative, exists but as a rare record. *P. aculeatum* is very widely distributed, and frequents hedgebanks, woods, and in the north and elsewhere is found in abundance in the rocky walls of deeply cut streams, where its handsome plumes of fronds may be a yard long in favoured spots. It is by no means a dainty Fern, and its culture is of the easiest. Like its relatives it is a thorough evergreen, and its bright, lucent fronds, see Plate, do not drop, unless by stress of weather, until the new set rises in the spring to take their place. In habit it is more erect than *P. angulare*, and its most persistent differentiating character is that in *P. angulare* the minor subdivisions have a distinct stalk, but in *P. aculeatum* they are wedge-shaped, and the attachment is by the point of the wedge, no stalk appearing. It forms a very stout caudex and carries its fronds in a circle, so that a well-grown pot plant is very handsome.

This species has yielded a fair number of varieties, some, as we shall see, of peculiar interest.

ACROCLADON (Fig. 214).—Found by Mrs. Thompson near Exeter ; as our illustration shows, it has a very beautifully branched and heavy terminal crest, the pinnæ being reduced in size and tasselled on regular, but smaller lines ; it is of rigid, erect habit and very ornamental.

ACULEATO-CRUCIATUM (HYBRIDUM) (Lowe).—A narrow cruciate form, interesting as being, we believe, the first intentional hybrid between two recognized species, viz. *P. aculeatum densum* × *P. angulare Wakeleyanum*, a cruciate variety, i.e. with most of the pinnæ in duplicate, and set on at obtuse angles to each other, thus forming crosses with the opposite pairs. Mr. E. J. Lowe effected the crossing. At first the hybrid was thought to be barren, bearing only aborted spores, but eventually numbers were raised showing the combined characters and resembling the immediate parent.

ACUTILOBUM.—Found by Mr. Allchin ; subdivisions narrow and acute, resembling the proliferous forms of *P. angulare*, and like those, proliferous ; lax habit.

CAPITATUM.—Heavy terminal crest.

CORYMBIFERUM.—Heavy bunch crest.

CRISTATO-GRACILE.—Found by Mr. Bolton ; very spiny, small-tasselled.

DENSUM.—Very foliose, pinnæ imbricate ; found by Mr. Jackson.

GRANDICEPS ABBOTTÆ.—Found by Mrs. Abbott ; a splendid form, somewhat on the lines of *acrocladon*.

PULCHERRIMUM.—Found by a farm labourer in Dorset, and given

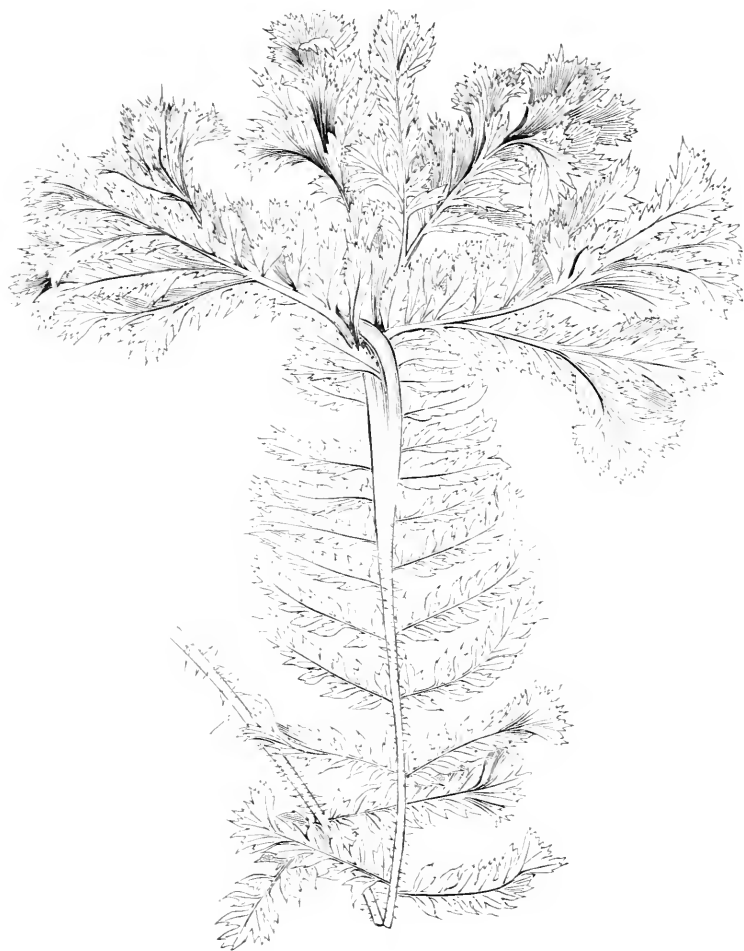


Fig. 214. *P. acul, acrocladon.*

to Dr. Wills ; a most beautiful Fern, of robust but graceful habit, slender pinnules, and with the pinnæ near the frond tip, turning inwards and overlapping to form a unique, long, slender termination ; reputedly barren until a few years ago when it yielded, in the hands of Mr. C. B. Green, of Acton, and the writer, a unique new section, for which we refer to our chapter on Selective Culture. Some of these we cite here. (Appendix No. LIII for type.)

P. DRUERYII, *P. GRACILLIMUM* DRUERY.—In these the half-inch pinnule of the parent is greatly lengthened, sometimes to nearly three inches, the whole Fern consisting of almost hair-like segments,

which tend in some cases to expand at the tips into fimbriate, fan-like tassels. See Figs. 11, 12, 13, illustrating chapter on Fern Selection.

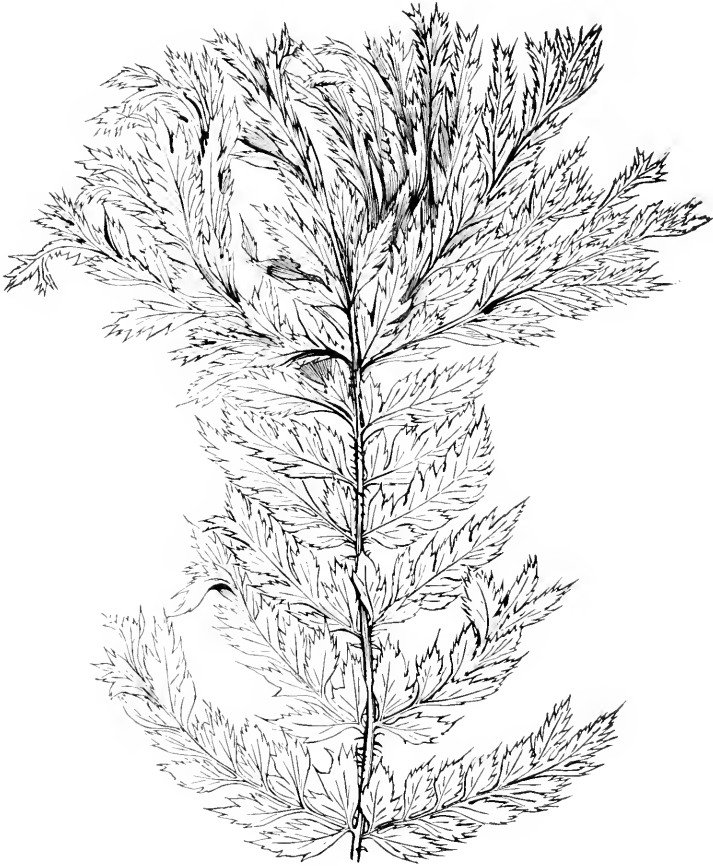


Fig. 215. *P. aculeatum pulchrum*.

PULCHRUM (Fig. 215).—Fine terminal crests, pinnules acute, and pinnæ usually subdivided at tips; found by Rev. C. Padley in Devon.

P. GRACILLIMUM CRISTULATUM. See Fig. 13.

P. PLUMOSUM GREEN.—This has varied on the lines of the finest *angulare divisilobe plumosum*s of Jones and Fox, but retains the *aculeatum* character, a very beautiful fern.

POLYSTICHUM ANGULARE (THE SOFT PRICKLY SHIELD FERN)
(Plate XXVIII)

This beautiful evergreen species is closely allied to *P. aculeatum*, the Hard Shield Fern, from which it differs in its softer texture, more delicate cutting, and the possession of definitely stalked

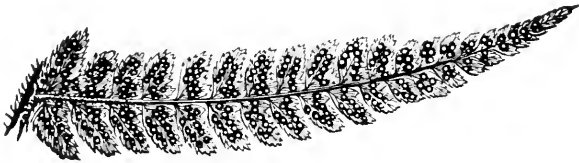


Fig. 216. *P. angulare* (pinna).

pinnules (Fig. 216), instead of wedge-shaped, stalkless ones. Although perfectly hardy, its natural habitats do not extend so far north as do those of *P. aculeatum*, and it grows with the greater luxuriance in our warmer western counties, and particularly in Ireland, while in Scotland it has been recorded in but a few of the lowland and western counties, the writer adding Perthshire to the list by finding a solitary small plant in a glen near Aberfeldy in association with a number of young *P. aculeatum*s. Some botanists consider it to be simply a form of *P. aculeatum*, but no British Fern-grower can accept this verdict, since the two species may be found growing side by side in the same hedge and yet preserving their distinguishing characters intact. It is true that intermediate forms are occasionally found, but to our mind it is far more reasonable to impute these to accidental crosses, owing to the intermingling of species so closely related, or to that remarkable faculty of variation which this species has evinced, and as a result of which the best authorities have sometimes differed as to which species particular "sports" belonged. With these remarks we will now describe such varieties as are best worthy of mention, ignoring a considerable number which have figured in previous works, but which are now only recognized as sub-varieties of little or no merit.

ACROCLADON (Fig. 217).—Found in Devon by Mr. Mapplebeck; a unique form in the species, fronds branch again and again, the branches terminating in bunch crests.



PLATE XXVIII.

Polystichum angulare



Fig. 217. *P. ang. arborescens*.

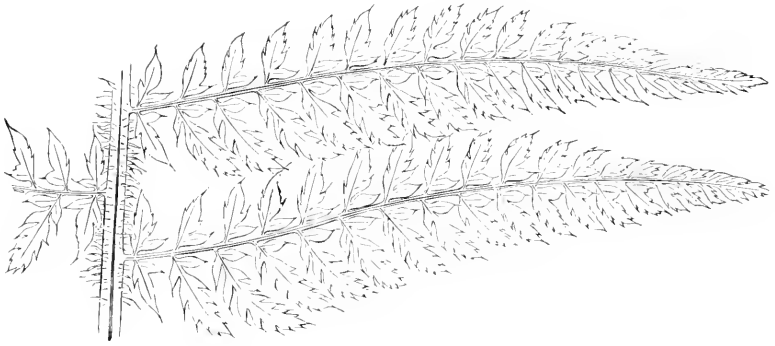


Fig. 218. *P. ang. acutilobum*.

ACUTILOBUM (Fig. 218).—Found near Barnstaple by Mr. C. Jackson; this represents a section, embracing a number of very fine forms, found by R. J. Gray, Mrs. Hartley, W. H. Phillips, G. B. Wollaston, Dr. Allchin, Mr. Choule, Mr. Dadds, F. Foot, and Mr. Wells; the pinnules are long and slender, and very acutely pointed, and the varieties are generally proliferous. The term "*acutilobum*" has been substituted for "*proliferum*," so many other forms bearing bulbils. (See Appendix No. LXXVI).

ACUTO-GRACILE (Plate XXIX).—Found near Ottery St. Mary by Mr. G. B. Wollaston; a dwarf form with acutely pointed pinnules.

ALATUM (Plate XXIX).—A remarkable form, the normal wedge-shaped bases of the pinnules being much widened at point of attachment so as to form a continuous wing connecting them.

BRACHIATUM.—Found in Devon by Mr. Hillman; this form is very wide at the base, the lower pinnæ expanding almost into fronds; several types of this have been found by others forming a very distinct section. (See Appendix No. LV and LVII).

BRACHIATO-CRISTATUM KEALL.—Fronds branch into three from the bottom, forming a trident, such terminal bearing a bunch crest.

CAPITOSUM.—Found by Mr. Moly at Tatworth; narrow-fronded *grandiceps*.

CONCHATUM.—Found by Mr. Moly at Hawkhouse; shell-like pinnules.

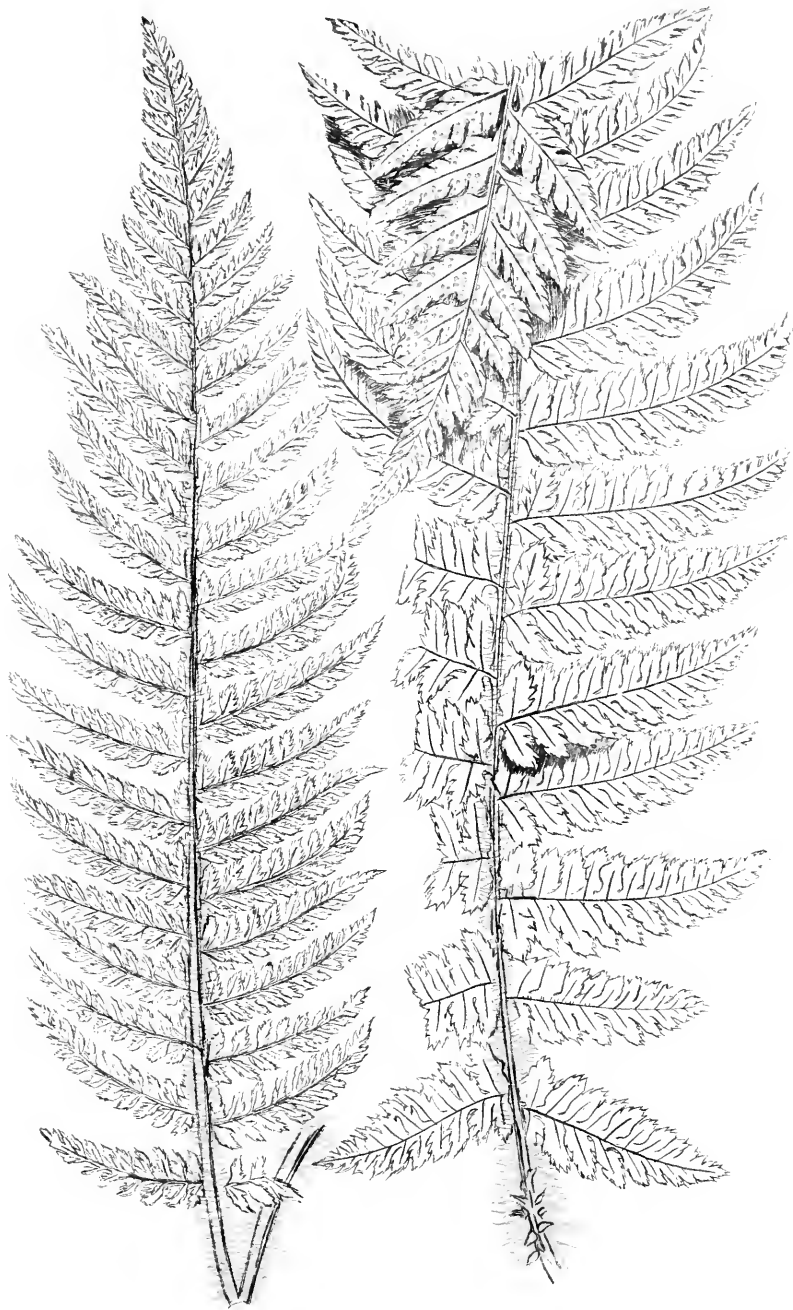


PLATE XXIX

Polystichum angulare var.
acuto-gracile

Polystichum angulare var.
alatum

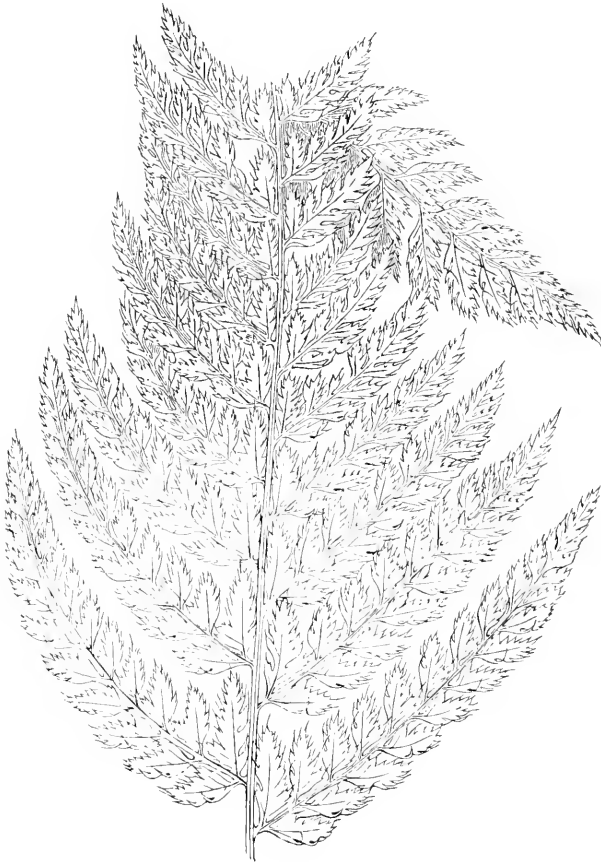


Fig. 219. *P. ang. concinnum*.

CONCINNUM (Fig. 219).—Found near Nettlecombe by Mr. C. Elworthy; a very prettily cut variety with evenly long-spined pinnules of extra length.

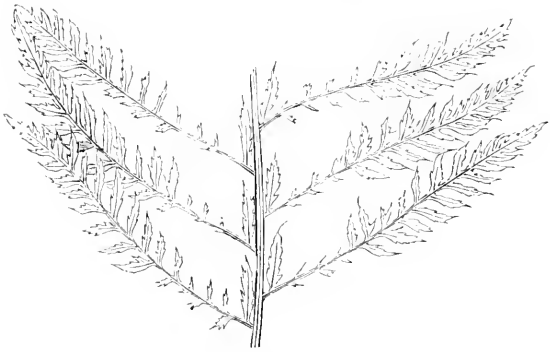


Fig. 220. *P. ang. confluens.*

CONFLUENS (Fig. 220).—Found in Ireland and Somerset by Mr. S. Foot and Mr. C. Elworthy; this really represents the *linearis* type, with which the confluent character is usually correlated.

CONFLUENS MOLY.—Found in S. Devon; marked form of type.

CONGESTUM GRANDICEPS.—Raised by Birkenhead; dwarf, dense, and heavy terminal tassel.

C. LYELL.—Raised by Mr. Lyell; a dwarf, congested beauty.

C. PADLEY.—Found in S. Devon; densely congested.

C. WILLS.—Fine dwarf, imbricate form.

CONSPICUILOBUM.—Found by Dr. Wills in Dorset; the “thumb” of the pinnule very conspicuous (see Appendix No. LIII *re* section).

CORYMBIFERUM.—Found at Whitby by Mr. Willison; heavy bunch crest at frond tip; pinnate tips forked only.

CRISPATA FOLIOSUM PARSONS.—Raised; very handsome small-growing form, with bristly, crispy, imbricate divisions.

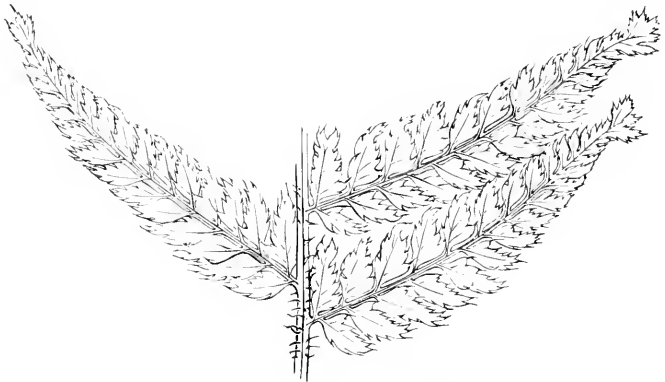


Fig. 221. *P. ang. cristato-gracile.*

CRISTATO GRACILE (PERCRISTATUM) (Fig. 221).—Found at Ottery St. Mary by Mr. C. Jackson, and also by Mr. R. J. Gray ; it has delicately cut pinnules and small terminal crests to fronds and pinnæ ; another form, however,

C. G. (PERCRISTATUM) MOLY, found by Mr. Moly, has the pinnules also regularly fanned at the tips as well.

CRISTATUM (Plate XXXI).—First found near Bristol by Mr. Hillman ; the tips of the fronds and of the pinnæ are neatly tasselled ; subsequently, however, a number of cristate forms were discovered on varied lines.

CRISTATUM WOLLASTON No. 10.—Found in Somerset by Mr. G. B. Wollaston ; a very fine form : fine fan-shaped tassels to fronds, and small ones to pinnæ.

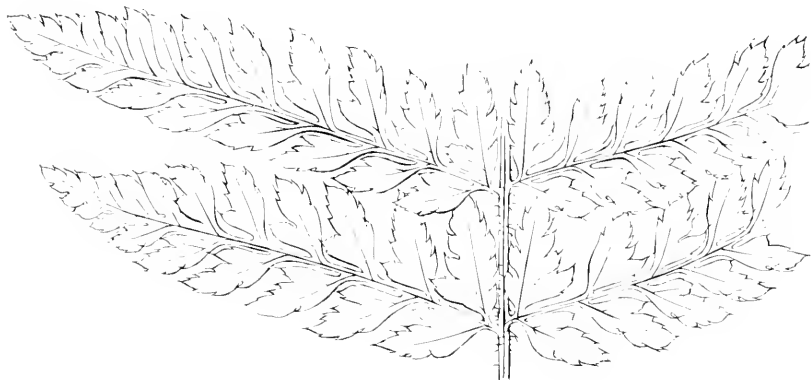


Fig. 222. *P. ang. decurrens*.

DECURRENS (Fig. 222).—Found by Mr. Elworthy in Somerset ; a fine form with large pinnules attached not by plain stalks, but by a narrowed, leafy portion of the pinnule itself (alate or winged).

DECOMPOSITUM GRANDE JONES.—Found Torquay ; very bold, finely cut variety.

D. MAGNIFICUM JONES.—Similar, but distinct.

D. PHILLIPS.—Found Co. Down ; finely divided.

D. SPLENDENS MOLY.—Found S. Devon ; parent of the wonderful plumose strain raised by Col. Jones and Dr. Fox.

DELTOIDEO-DECOMPOSITUM.—Found by Moly, S. Devon fine, broad-based, decomposite form.



Fig. 223. *P. ang. depauperatum.*

DEPAUPERATUM (Fig. 223).—Interesting as an extremely dwarf and slender form of the species ; prolific.

DIVISILOBUM (see Appendix No. LXIX).—This constitutes one of the finest of the much-divided sections ; distinct forms have been found by Elworthy and J. Bagg in Somerset, J. Plimsoll, Moly, and Miss Seymour in S. Devon, and Padley in N. Devon, and it also embraces a number in which its special character is combined with others.

D. ACUTUM.—Found by Padley in S. Devon ; lax and very fine.

D. CRISTATUM IVERY.—A beautifully crested variety, raised.

D. CRAWFORDIANUM.—Found in Ireland by Mr. W. H. Phillips ; a prolific form, more properly an *acutilobum*.

D. DECORUM.—Raised by Col. Jones ; very finely cut.

D. D. POLYDACTYLUM.—Raised by Stansfield ; finely cut and crested.

D. DENSUM.—Stansfield ; resembles some of the plumose divisi-lobes.

D. ELEGANS.—Raised by Birkenhead.

‡ D. FALCATUM.—Found by Moly ; long, lax, falcate pinnæ and pinnules.

D. FOLIOSUM.—Raised by Birkenhead ; very leafy.

D. GRANDE JONES.—Very fine form.

D. G. STANSFIELD.—Broad triangular fronds.

D. GRANDICEPS CARBONELL.—Heavy crested head.

D. IMBRICATUM BIRKENHEAD.—Very dense, congested fronds.

D. LAXUM PHILLIPS.—Found in Ireland by W. H. Phillips ; fine lax variety.

D. L. WILLS.—Found S. Devon by Dr. Wills ; similar but distinct.

D. LONGIPINNATUM CARBONELL.—Lower pinnules very long ; slender, graceful plant.

D. PERFECTUM JONES.—A lovely form ; well named.

D. PLENUM JONES.—Very fine foliose form.

D. PRODUCTUM FOX.—Very fine form.

D. QUADRIPINNATUM JONES.—Extra finely divided.

D. ROBUSTUM MOLY.—Found S. Devon by Moly ; a grand plant, perhaps the largest of all.

D. STIPULATUM CARBONELL.—A beautiful imbricate form, ultimate divisions plainly stalked.

FLABELLI-PINNULUM.—Found in Dorset by Dr. Wills ; pinnules curiously fan-shaped, and when in form, the Fern is unique, but it is apt to revert somewhat at times.

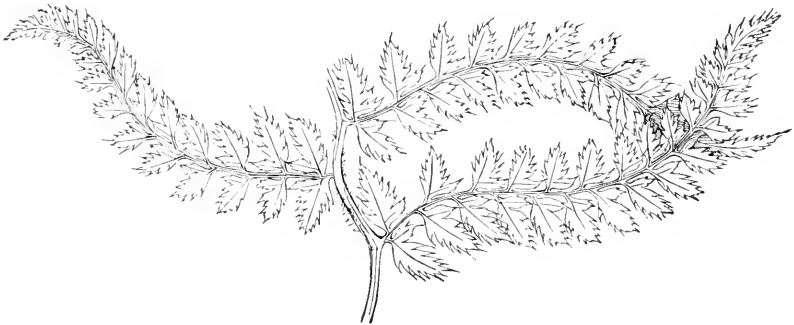


Fig. 224. *P. ang. flexuosum.*

FLEXUOSUM (Fig. 224).—Found in Devon by Mr. C. Jackson ; very erect, the fronds and pinnæ very sinuously twisted ; pinnules acutely serrate ; a more marked form was found by Mr. Wollaston in Somerset.

FOLIOSO-LATIPES.—Found by Parsons in Devon ; fine foliose, broad-based form.



Fig. 225. *P. ang. foliosum*.

FOLIOSUM (Fig. 225).—Found by Mr. G. B. Wollaston in Hampshire; a very fine, leafy form with large pinnules and somewhat overlapping pinnæ.

FRONDOSUM JONES.—Densely foliose.

F. BULBIFERUM JONES.—Densely foliose and bulbiferous.

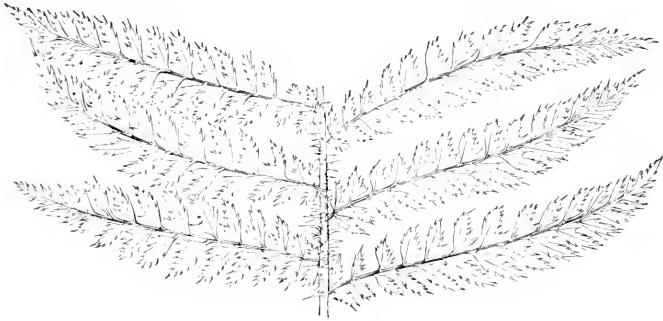


Fig. 226. *P. ang. gracile*.

GRACILE (Fig. 226).—Found by Mr. G. B. Wollaston in Devon, pinnules very slender and acutely cut; resembles *lineare*, but minus the reduced pinnules of that section; frond terminal narrowed and caudate. Mr. Padley found a similar form, and also Mr. R. J. Gray in S. Devon.

GRANDICEPS (Fig. 227).—Origin obscure; one of the finest heavy-crested forms known; a fine, symmetrically branched terminal crest and pinna, short and evenly small-crested, and only sub-bipinnate, the lobes being confluent.

G. BARRAUD.—Heavy terminal crests; found near Barnstaple.

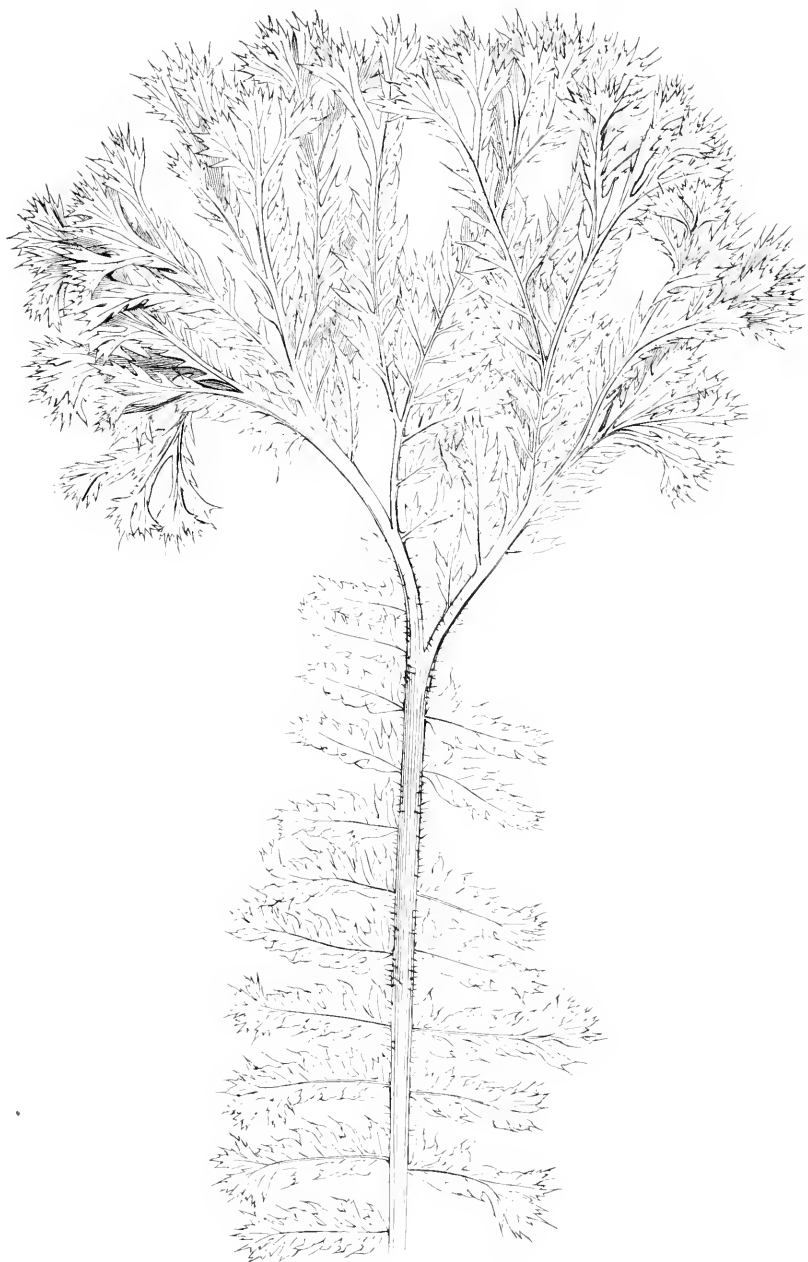


Fig. 227. *P. cng. grandiceps*.

G. BRADBURY, G. J. JONES, G. MOLY, G. TALBOT.—Found at various places ; finders' names attached ; all are very fine forms ; fronds more or less narrowed, pinnæ small, tasselled, and fronds bearing heavy, much-divided crests. (See Appendix No. LX).

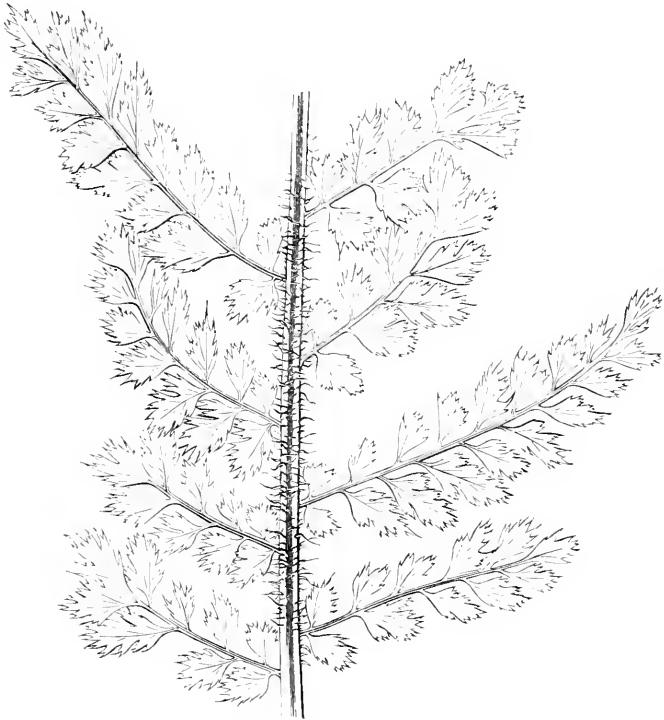


Fig. 228. *P. ang. grandidens* (centre of frond).

GRANDIDENS (Fig. 228).—This form has been repeatedly found, and although marred by irregularities, its subdivisions are so deeply toothed and peculiar, that it figures in all collections ; the most remarkable form of it is

G. PEARSON, in which the pinnulets are cut into very fine segments ; this was raised by Messrs. Pearson, of Nottingham, a percentage of it, singular to say, always occurring in sowings of a very fine symmetrical decomposite form, *decompositum Pearson*, in association with a far superior plumose form (*plumosum Pearsonii*), a fair rival to the Jones and Fox *plumosums*.

HIRONDELLE.—Found in Dorset by Dr. Wills ; pinnules, with swallow-like outline, whence name ; pretty.

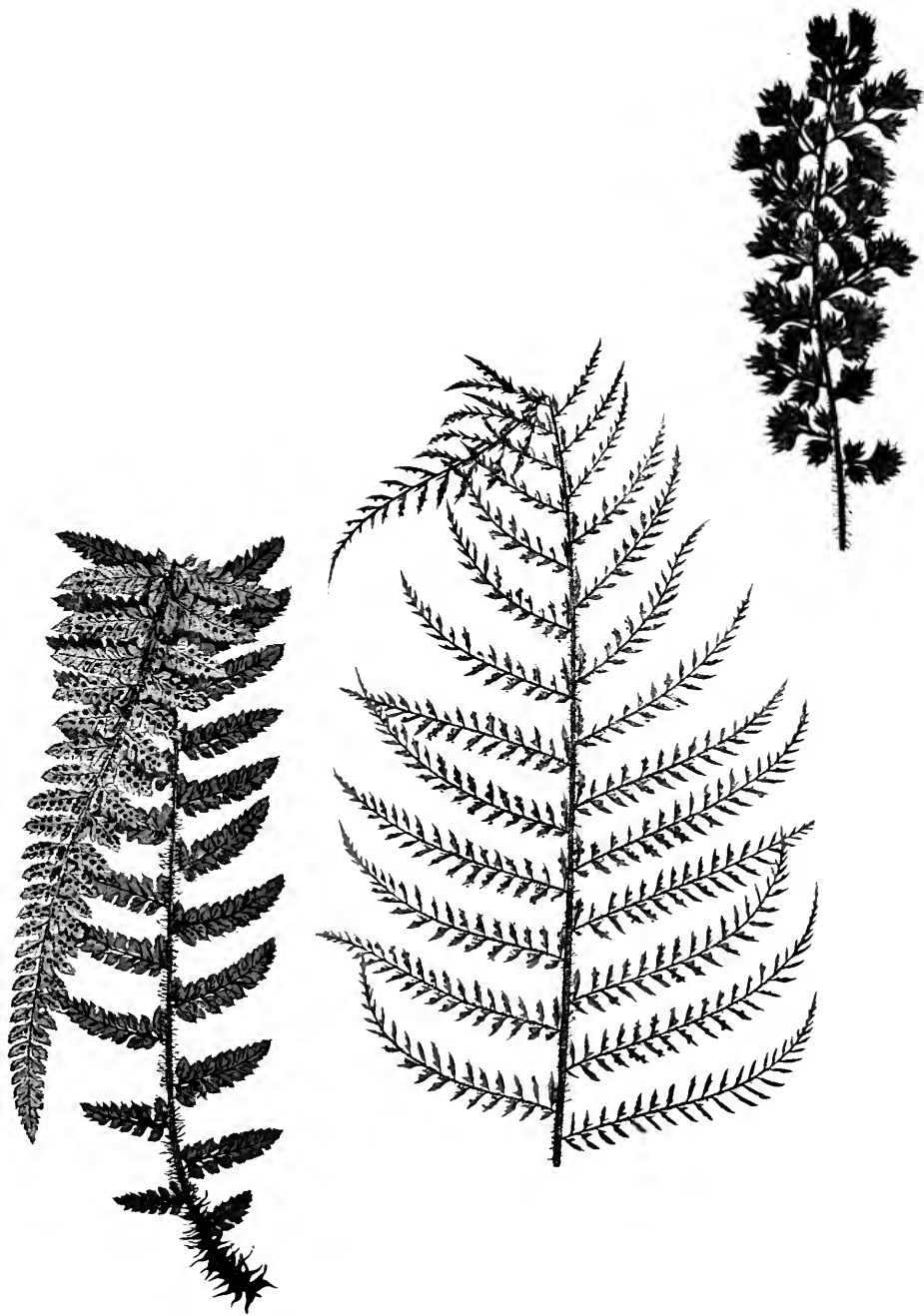


PLATE XXX.

Polystichum angulare var.
imbricatum

Polystichum angulare var.
lineare

P. ang. var.
truncatum

IMBRICATUM (Plate XXX).—Found in Somerset by Mr. Elworthy ; fronds narrow, pinnæ blunt, and pinnules dense and overlapping ; bulbiferous.

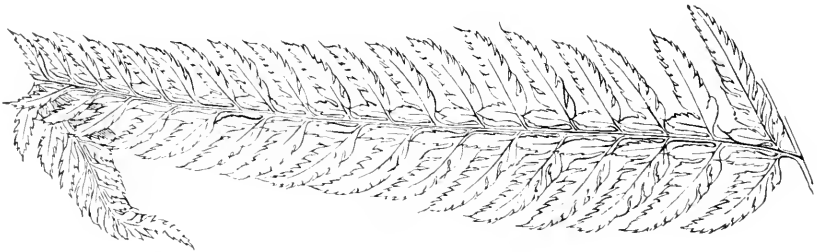


Fig. 229. *P. ang. inciso-acutum*.

INCISO-ACUTUM (Fig. 229).—Found in Lancashire by Mr. A. Stansfield ; a robust form, with long, falcate pinnules, deeply cut.

INEQUALE VARIEGATUM.—Nearly normal in make, but distinctly speckled with pure white, the tissue being somewhat contracted when white, but not enough to disfigure the plant.

I. v. POLYDACTYLUM.—A cross obtained by Col. Jones with a polydactylous form to which the variegation was exactly transmitted.

KITSONÆ (Fig. 230).—Found at Torquay by Miss Annie Kitson ; a very distinct form, somewhat resembling a grandiceps, but with less-developed tassels. Pinnules very small and frond terminal much branched ; its chief peculiarity is a tendency on the part of the pinnulets to form tassels.

LATIFOLIUM.—Found by Mr. Moly in S. Devon ; very fine, long lower pinnules.

LATIFOLIO-GRANDICEPS.—Raised by Col. Jones ; broad, heavily crested fronds.

LATIPES PARSONS.—Fine foliose form.

LAXO-CRISTATUM PRAEGER.—Found Castle Dobbs ; lax habit and crested.

LINEARE (Plate XXX).—Found in Jersey by Mr. James and elsewhere by Moly, Tait, and Wells, but on varied lines ; the peculiarity of the section is the great tenuity of the subdivisions, which are more or less suppressed or reduced to rudiments at the centre of the frond ; the terminal subdivisions are indistinctly separated or confluent ; very distinct.

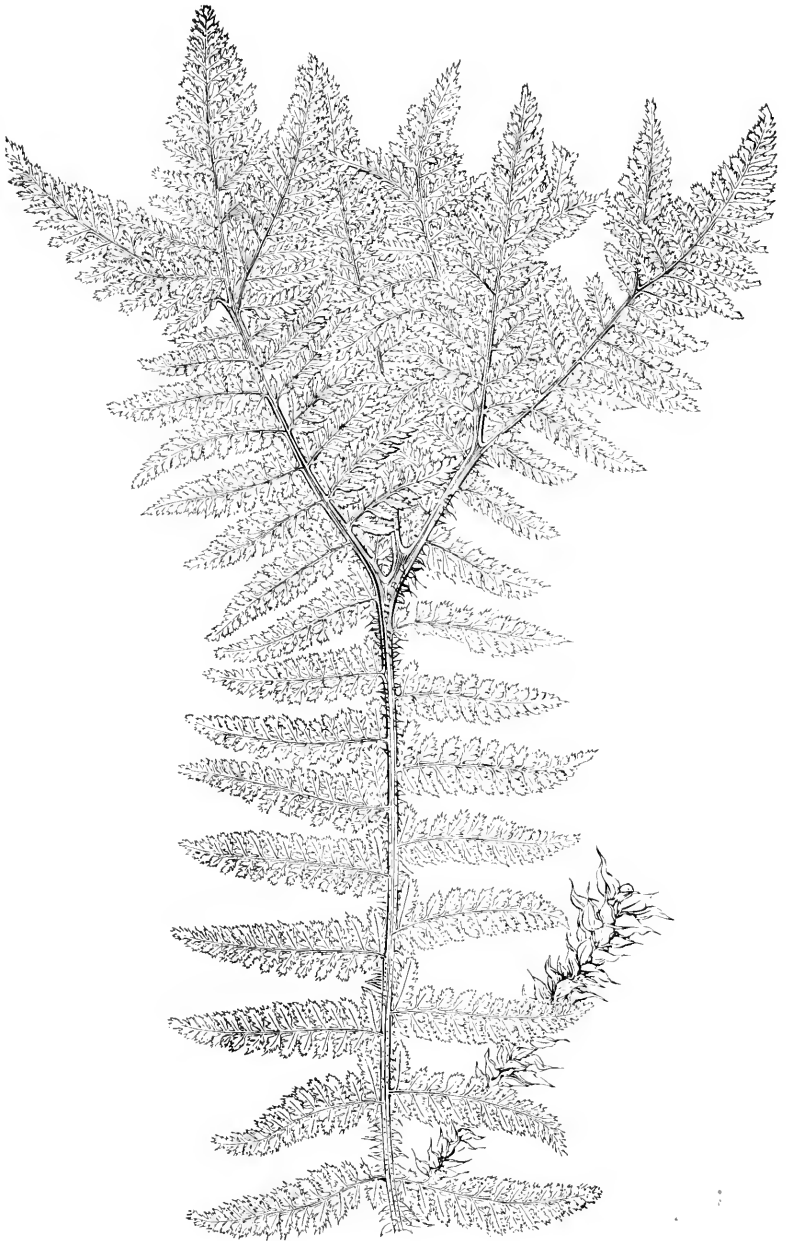


Fig. 230. *P. ang. Kitsonæ*.

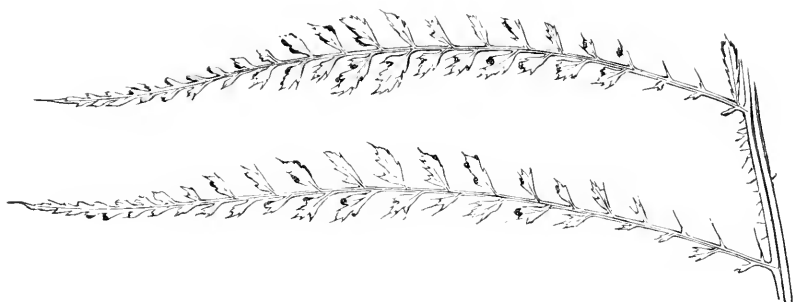


Fig. 231. *P. ang. lineare*.

L. PROLIFERUM (Fig. 231).—Found in N. Devon by Rev. C. Padley; our illustration gives a good idea of the *lineare* section generally, though on rather extreme lines.

MANICA-INFANTIS.—Found by Moly; so named, pinnules being like a baby's glove; really a conspicuolobe.

MULTIFIDUM (Fig. 232).—Apex of frond divided into several, and pinna tips also.

MULTILOBUM (Fig. 233).—This really constitutes a section of prettily divided Ferns, for a description of which we refer to Appendix, p. 417.

MULTILOBUM.—Found by Gray in S. Devon; a fine tripinnate form.

M. ATTENUATUM, **M. DECORUM**, **M. DENSUM**, **M. IONA**, **M. LAXUM**, **M. OVALE**, **M. PLUMOSUM** **MAGNIFICUM**.—All these are fine tripinnate forms on somewhat varied lines, as conveyed approximately by their names; besides Gray, we are indebted to Col. Jones and Mr. Padley for independent finds, and to Mr. Birkenhead for the last-named; a very fine raised variety.



Fig. 232. *P. ang. multifidum* (frond tip).

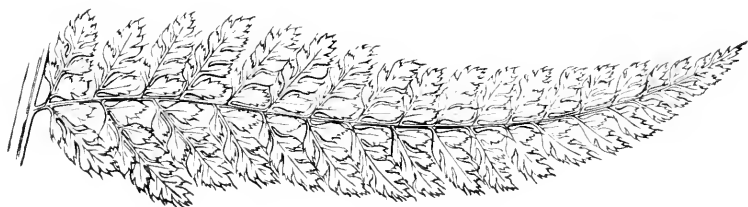


Fig. 233. *P. ang. multilobum* (pinna).

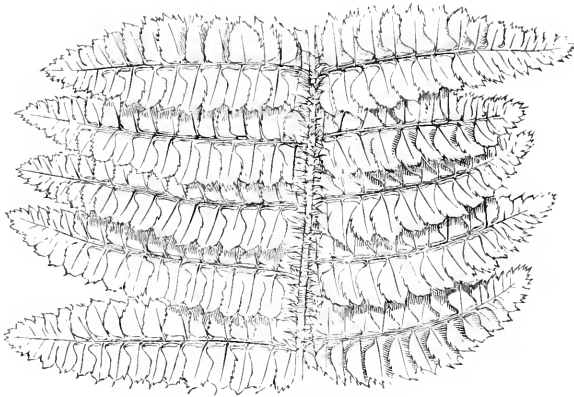


Fig. 234. *P. ang. obtusissimum*.

OBTUSISSIMUM (Fig. 234).—Found at Ottery St. Mary by Mr. G. B. Wollaston ; a very beautiful imbricate form with oval pinnales, also imbricate, with very small spines.



Fig. 235. *P. ang. oxyphyllum*.

OXYPHYLLUM (Fig. 235).—Found near Nettlecombe by Mr. Elworthy ; an intermediate form between *plumosum* and *acutilobum*, but nearer the latter.

PARVISSIMUM.—A very pretty, small, compact form raised by Veitch, of Exeter ; misnamed, as others are smaller.

PENDENS WILLS.—A handsome, broad-fronded, pendulous variety.

PERSERRATUM BAYLÆ, **P. PATEY**, **P. WOLLASTON**.—These three forms are similar, but distinct, the subdivisions are deeply cut and very bristly ; medium growth.

PLUMOSO-DIVISILOBUM, **P.-D. GRANDE FOX**, **P.-D. TENUE FOX**, **P.-D. BALDWINII JONES AND FOX**, **P.-D. DENSUM JONES AND FOX**, **P.-D. IMBRICATUM JONES AND FOX**, **P.-D. LAXUM JONES AND FOX**,

P.-D. ROBUSTUM JONES AND FOX, P.-D. DISSECTUM PEARSON, P.-D. FOLIOSUM PEARSON, P.-D. PEARSON, P.-D. GRIMMONDII, P.-D. ESPLAN.—This section represents absolutely the *élite* of the plumose Shield Ferns ; one and all are splendid, but each one has its distinguishing character. *Baldwinii* is the finest cut of all. The Jones and Fox group were raised directly from a decomposite find of Mr. Moly's ; see chapter on Fern Selection.

PLUMOSUM ELWORTHY.—Found by Mr. Elworthy in Somerset ; very beautiful, as indeed are all the *plumosums* proper.

P. MOLY.—Found in Dorset ; very foliose, reputedly barren.

P. PATEY.—Found in Dorset ; thin papery finely cut fronds.

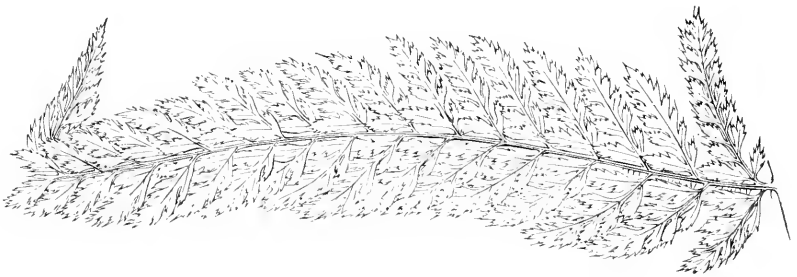


Fig. 236. Middle pinna.



Fig. 237. Lower pinna.

P. ang. plumosum Wollaston.

P. WOLLASTON (Figs. 236 and 237).—Robust and fertile.

P. GRANDE FOX, P. PERFECTUM, P. SPLENDENS.—Very robust, splendid forms.



Fig. 238. *P. ang. plumosissimum* (Birkenhead).

PLUMOSISSIMUM (Fig. 238).—A most extraordinary development, as our figure shows, raised by Mr. Birkenhead, the fronds representing dense masses of moss-like verdure, growth hardly seeming to be able to cease; the plant still exists, but requires extremely favourable conditions to equal its portrait, preferring, as a rule, to remain as a prettily divided *plumosum*.

POLYDACTYLUM WOLLASTON.—Found Somerset; pinnæ small crested, fronds heavily tasselled.

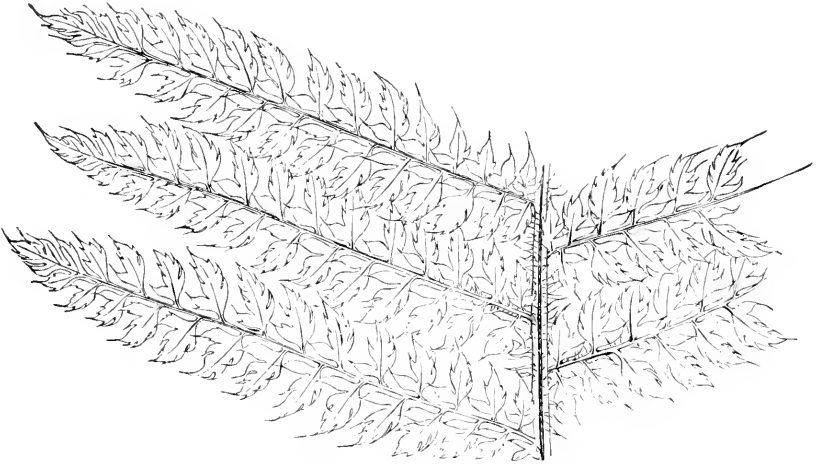


Fig. 239. *P. ang. proliferum*.

PROLIFERUM (Figs. 239 and 240).—This constitutes a section in which the subdivisions are very narrow and acutely pointed, for which reason it is also termed *acutilobum*, a character which appears

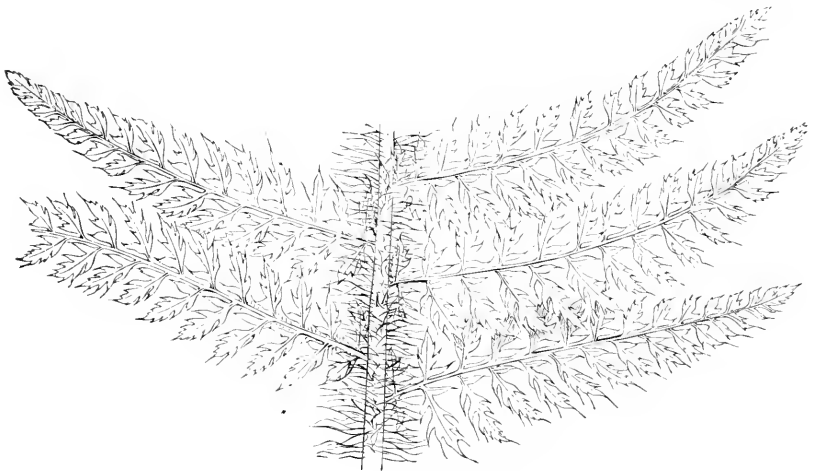


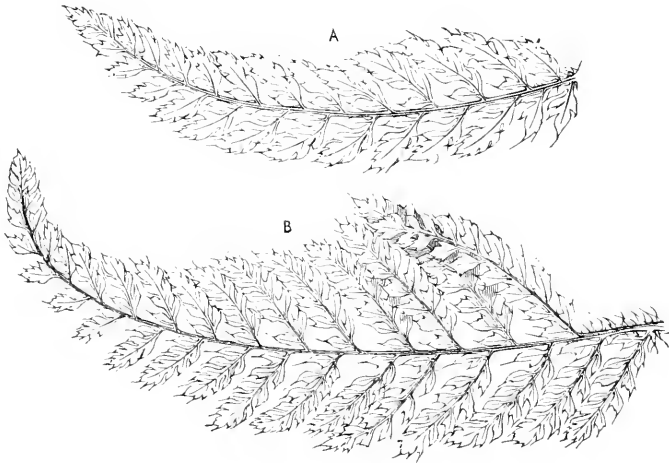
Fig. 240. *P. ang. pro. Wollastonii*.

to be generally correlated with proliferation, bulbils appearing in the axils of the pinnae and even of the pinnules so profusely, sometimes, that the whole centre of the frond presents a mossy appearance ; the fronds are long, and of lax-growing habit.



Fig. 241. *P. ang. prolif. Crawfordianum*.

P. CRAWFORDIANUM (Fig. 241).—Found by Mr. W. H. Phillips ; similar to other acutilobes, but distinguished by wider pinnules ; a handsome form.



Figs. 242, 243. *P. ang. prolif. Footii* (A, pinna ; B, frond tip).

P. FOOTH (Figs. 242 and 243).—Found in Co. Clare by Mr. F. J. Foot ; a somewhat dense acutilobe with broader fronds than usual in that section ; handsome and abundantly proliferous.

P. PADLEYANUM.—Another distinct *acutilobum*, found in Devon by Rev. C. Padley.

PULCHERRIMUM, *P. PADLEY*, *P. THOMPSON*, *P. WILLS*, *P. VARIEGATUM MOLY* (see Appendix No. LXVI).—This section is of peculiar interest, since in its best form it produces long, slender, falcate pinnules with deeply cut sections, and most of the points run out into slender threads which bear prothalli at their tips (apical apoc-

pory; see chapter on Life History); unfortunately, however, all but Moly's *variegatum* are inconstant, and we believe that this is the only one now existent and showing the aposporous character. The prothalli, if layered, yield young plants, but almost invariably of ragged and depauperate form. The names attached are those of the finders.



Fig. 244. *P. ang. ramulosum* (frond tip).

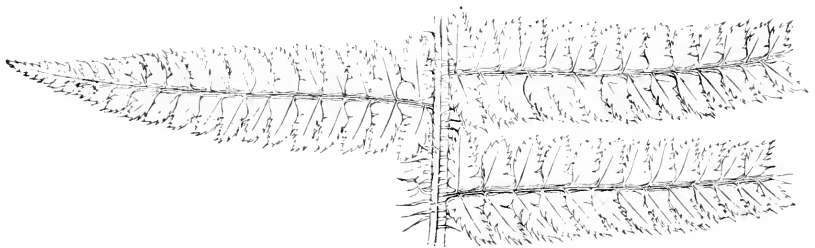


Fig. 245. *P. ang. ramulosum* (pinnae).

RAMULOSUM (Figs. 244 and 245).—Found near Belfast by Mr. J. Stansfield; frond tips branch into many, and generally turned backwards; pinnae plain.

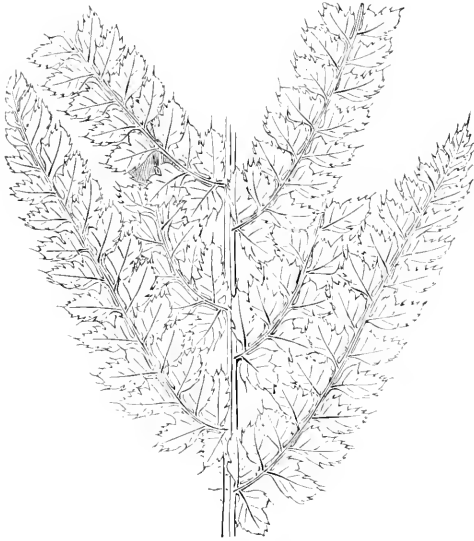


Fig. 246. *P. ang. retroflexum* (centre of frond).

RETROFLEXUM (Fig. 246).—Found by Mr. C. Jackson in Devon ; many of the pinnae bent sharply backwards, clasping the stem.

REMOTO-DECURRENS PADLEY.—Found in S. Devon ; broad, confluent pinnules, spiny.

REVOLVENS.—Wills and others ; fronds of normal make, but rolled symmetrically almost into tubes, very pretty.



Fig. 247. *P. ang. rotundatum*.

ROTUNDATUM (Fig. 247).—Found near Nettlecombe by Mr. Elworthy, and, later on, by Mr. W. H. Phillips in Ireland ; very distinct, the pinnules being almost round, and the serrations minute ; both frond and pinnae terminals are rounded also.

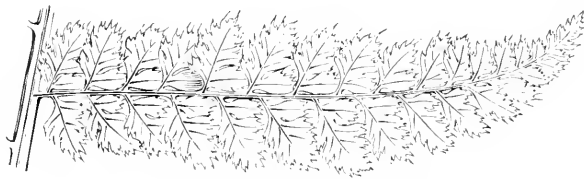


Fig. 248. *P. ang. rotundilobum*.

ROTUNDILOBUM (Fig. 248).—Found near Nettlecombe by Mr. C. Elworthy ; a spiny *rotundatum*.

SETOSO CRISTATUM.—Found in S. Devon by Moly ; crested very bristly ; fine form.

S. CUNEATUM.—Found Ireland by W. H. Phillips ; very delicate and beautiful, proliferous at base of fronds.

STIPITATUM CARBONELL.—Beautifully divided, long, slender pinnules.

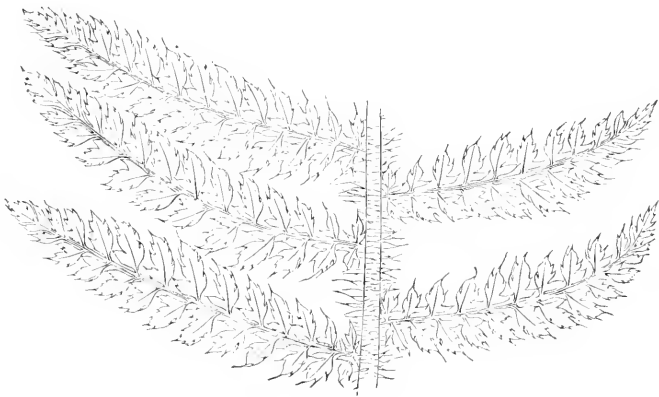
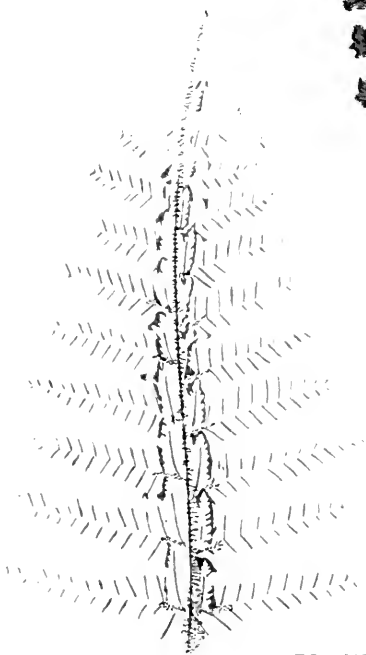


Fig. 249. *P. ang. tenue*.

TENUE (Fig. 249).—One of the *proliferum* or *acutilobum* section, but only sparsely proliferous.

THOMPSONIÆ (Fig. 250).—Found at Lynmouth ; very fine terminal crest to frond, almost a *grandiceps*, pinnae forked at tips ; pinnules à la *P. aculeatum*.



Polystichum angulare var.
tripinnatum



Polystichum angulare var.
cristatum

PLATE XXXI.

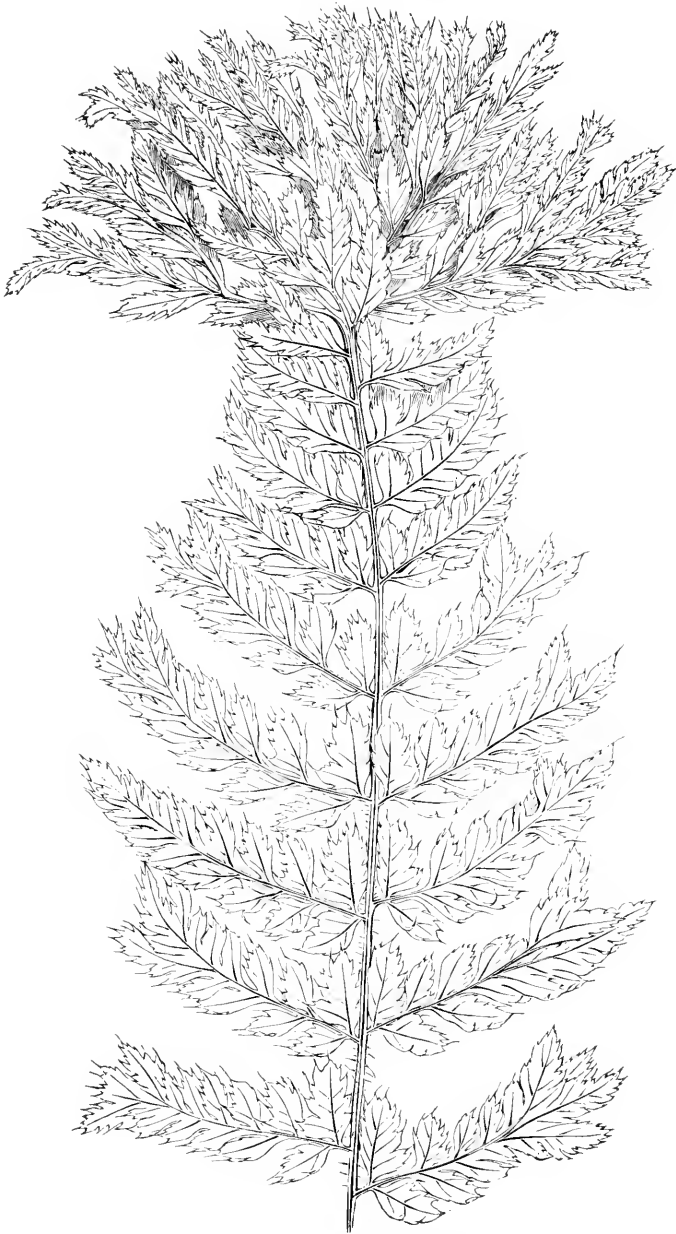


Fig. 250. *P. ang. Thompsoniæ*.

TRIPINNATUM (ACURODES) (Plate XXXI).—Found by Mr. E. J. Lowe in a batch of normal seedlings sent from Cornwall; it is described as of erect habit, with the pinnæ set on horizontally like the steps of a ladder. As the name indicates, the pinnules are subdivided into pinnulets constituting a tripinnate or thrice-divided form.

T. GILLETT (see Appendix No. LXXVII).—Found near Yeovil; a very fine form indeed.

T. MILLETT, T. PADLEY.—Similar to those above described, but distinct.

TRUNCATUM (Plate XXX).—Found in Ireland; fronds and pinnæ terminate squarely and abruptly, the fronds being thus reduced in width and length.



Figs. 251, 252. *P. ang. vestitum*. A, apex showing bulbil; B, middle pinna.

VESTITUM (Figs. 251 and 252).—Found in N. Devon by Rev. C. Padley; peculiarly fertile and distinguished by the fronds bearing a terminal bulbil resembling an exotic form.



PLATE XXXII.

Polystichum lonchitis

WAKELEYANUM (CRUCIATUM).—Found in S. Devon by Mrs. Wakeley; pinnae set on in pairs at right-angles, forming crosses with opposite pairs; one of the parents of Mr. E. J. Lowe's *hybridum aculeatum*.

POLYSTICHUM LONCHITIS (THE HOLLY FERN)
(Plate XXXII)

This Fern has been named the Holly Fern, owing to the hard, leathery texture of its fronds, and the shape and prickly edges of the pinnae or subdivisions. It is purely a mountain Fern, and in Great Britain is never found wild at a lower elevation than 1100 feet, most of its habitats being far above that limit, 2000 to 3000 feet. It grows in the chinks of the weathered rocks, or in the short grass or other growths under their lee. At the 1100 level, near Aberfeldy, we found numerous large plants in rocky soil among the heather, where, at a distance, the projecting, erect fronds were at first taken for the fertile fronds of the Hard Fern (*Blechnum spicant*), and, but for the guidance of the Rev. Mr. Maclean, of Aberfeldy, who had previously discovered the station, we should certainly have overlooked it, since it occurred on level ground, close to the road. It has been found in England, Scotland, Wales, and Ireland, where mountains of sufficient elevation have encouraged the search. It is distinguished from the other two species by being persistently only pinnate, that is the pinnae are never divided to the midrib, see Fig. 253. Reported finds of the Holly Fern at lower levels are not infrequent, but are invariably found to be young forms of *P. aculeatum*, by the fact that apart from their less rigidity, the lowermost pinnae are invariably divided.

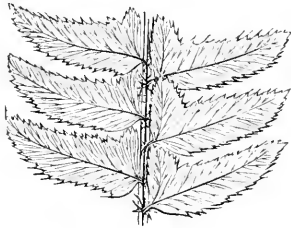


Fig. 253. *P. lonchitis*.

The separation of the species from *P. aculeatum* is entirely justified; it is not merely a mountain form of that, compressed and dwarfed by exposure to hardening influences, and when the spores are sown,

the parent form is truly reproduced. Furthermore, plants collected and brought down to lower levels do not respond to milder conditions by larger growth, or the assumption of *aculeatum* characters, but are difficult to grow, requiring pure air and cooler conditions. We have, however, seen very decent specimens in the open where fairly congenial conditions exist, say in rockeries with stony soil, constituting a fair approach to their natural environment. The different pressure of the air is by some considered as constituting a difficulty, but we hardly share this view. We have expressed the opinion that the species is justifiably set apart from *P. aculeatum*, but may mention that several peculiar cases of the latter species have mysteriously appeared among sowings of *P. lonchitis*, to-

gether with intermediate types, which have raised in some minds a little doubt as to their absolute distinctness. *P. aculeatum*, however, frequents mountain glens to a great elevation, so that the possibility of wind-borne spores must be admitted. The Holly Fern, too, is open to variation, and, obviously, if it "sported," as both its relatives do, in the direction of increased subdivision, its main difference from *P. aculeatum* would disappear. A bipinnate "sport" of *P. lonchitis* would infallibly be ranked as *P. aculeatum* unless its pedigree could be certainly determined. The writer, indeed, found on Ben Lawers, near the top, amongst a numerous group of the Holly Fern, an apparent plant of *P. aculeatum*, which, however, failed to survive removal, though that species is usually very easy to re-establish. These points we merely record for the guidance of future students, who may observe similar cases and follow them up. *P. lonchitis* has not varied very much; we can only mention two instances.

CRISTATUM.—This is a very good crested variety, found on Ben Qui, in Scotland, by Dr. Craig, and we believe by others elsewhere.

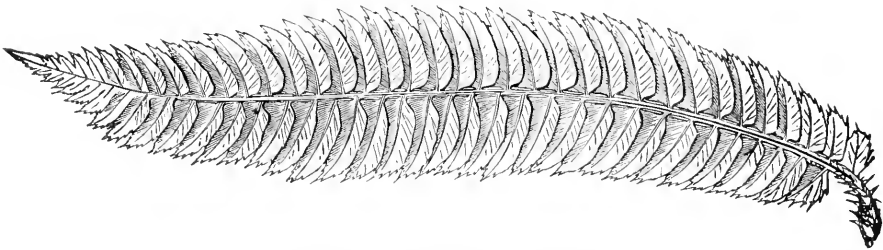


Fig. 254. *P. lonchitis imbricatum*.

IMBRICATUM (Fig. 254).—An imbricate, dense form recorded as the Irish type of the species, but which we have found on Ben Lawers, in Scotland; Mr. Boyd has also found it in both countries.

PSEUDATHYRIUM ALPESTRE (THE MOUNTAIN LADY FERN)

(Plate XXXIII)

This Fern with numerous botanists ranks as a member of the Polypodium family on account of its dot-like fructification and the apparent absence of any cover. No one, however, who is acquainted with the Fern in its growing state can accept this classification, since it agrees in size, make, and general character so closely with *Athyrium filix-femina*, the Lady Fern, as to compel the belief that it is really a mountain form, if not of that identical species, at any rate of the same genus. It is only found at high levels on our Scottish mountains, above the levels at which the Lady Fern

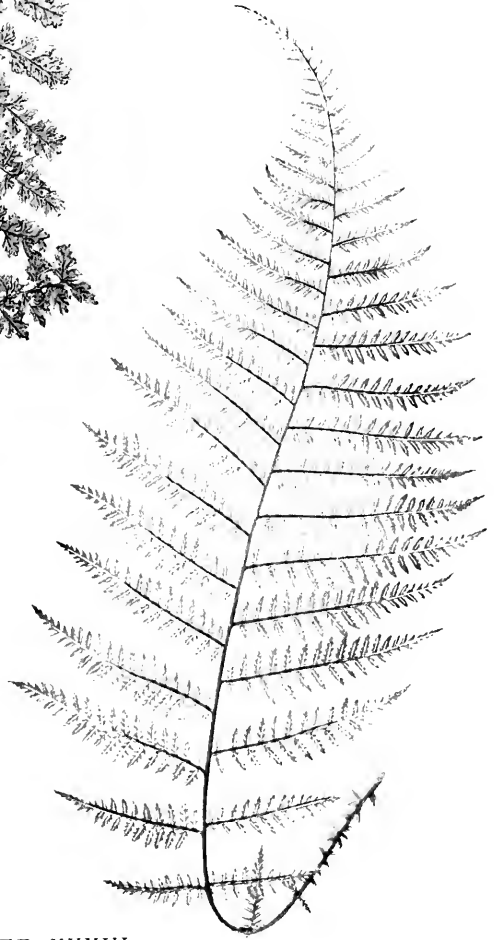
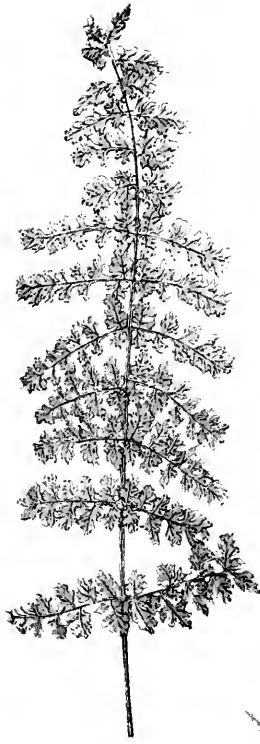


PLATE XXXIII.

Pseudathyrium
alpestre
var. *laciniatum*

Pseudathyrium alpestre
var. *flexile*

Pseudathyrium alpestre

is found. Its fronds (Fig. 255) are deep green, and grow to two or three feet long from a caudex, *à la* Lady Fern, which, as we have said, it closely resembles, the chief difference being in the very small spore heaps, which, however, despite their resemblance to those of the *Polypodium* family, sometimes display a rudimentary cover or indusium, which the true Polypody never does, and what is more to the point, some of the recognized varieties of Lady Fern, the Horsfall *plumosum* to wit, have spore heaps of precisely similar nature. Despite its mountain habitats, where it grows among the rocks and is often in the clouds, it does quite well under culture, treated like the Lady Fern, and not allowed to get dry. Several varieties are recorded, viz. :



Fig. 255. *P. alpestris* (pinna).

FLEXILE (Plate XXXIII).—A narrow form with short pinnae and more distant pinnules, deeply toothed, very distinct, found on the Cliva Mountains by Mr. Backhouse, and in Ben Lawers by Mr. Donald Haggart.

LACINIATUM (Plate XXXIII).—A distinct form of *flexile* raised by Messrs. Stansfield; see illustration.

CRISTATUM.—A thoroughbred, pretty *cristatum* found by Mr. Alex Cowan, of Penicuik, finely tasselled.

PTERIS AQUILINA (THE COMMON BRACKEN) (Plate XXXVI)

The Common Bracken is probably the most widely spread species of Fern, since it is found nearly all over the world in more or less modified forms. In this country it covers large areas up to a level of about two thousand feet, monopolizing in many places heaths, commons, and woodlands, and in the latter especially producing immense fronds eight or ten feet long, and, despite its commonness, of great beauty. Its botanical name means the eagle's wing. Fig. 262 shows a colony of a crested form of this species, and is peculiarly interesting as a rare example of a variety extending over a large area to the entire exclusion of the normal. The illustration shows that all the plants are tasselled, and Fig. 261 shows the character to be well marked, and also depicts two other abnormal varieties found some fifty yards away on the same ground. In point of fact this Fern varies considerably, and given a fair acreage of it, we may be practically certain of finding three forms, the normal, a much leafier type, and a stiff, leathery, crispy form, much narrowed and of a darker green. The *Pteris* family, which is a very large one, has its spore capsules arranged in unbroken lines, immediately next the margin of the subdivisions, such margin

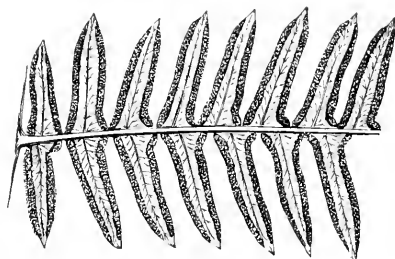


Fig. 256. *Pteris aquilana* (part of pinna).

being rolled back so as to form an indusium, or protecting cover. *P. aquilina* has a fleshy, travelling, underground rootstock, which sometimes penetrates very deeply into the soil, and produces its fronds at a considerable distance from each other. As a result of this, it is all but impossible to remove a plant successfully in the growing season, and the only way is to lift it in the winter, by digging up a good mass of soil pervaded by these rootstocks, and without disturbing them by breaking the mass, drop the latter *en bloc* into a peaty station provided where a plant is desired. The spores, however, germinate very freely, and the resulting plants rapidly assume a good size, so that where valuable varieties are concerned they are easily propagated in this way. Curiously enough, however, despite its reputed hardiness, and wide distribution as a hardy plant, in the seedling state hard frost is often fatal, especially if the youngsters have been raised under glass. We have been successful in raising very fine varieties from spores in small pans, and transferring them to the garden by sinking the pans containing young plants with five or six inch long fronds, into prepared peaty stations in the late summer, at a depth permitting a mulch of about two or three inches of similar soil. The travelling rootstocks will then climb over the pan edges, and plunge into the adjacent soil sufficiently deep to be safe during the winter, and the following season they will establish themselves so strongly as to commence to exercise their usual monopolizing tendency at the expense of the plants in the vicinity. We have seen splendid specimens grown in sunken tubs, which have been adopted to check such invasions. Obviously, indoor culture for so robust a Fern is a mistake, nor should it be installed outside unless there is ample room for it to spread. An exception to this remark is *P. aq. congesta*, which see. The most marked varieties are :—

CONGESTA.—A very beautiful, densely congested form, which grows about two feet high and travels very slowly; is adapted, therefore, for pan culture; a gem.

CRISPA.—This thick, dark green, leathery, crispy form is, as we have said above, not uncommon in association with the normal; it is very pretty.

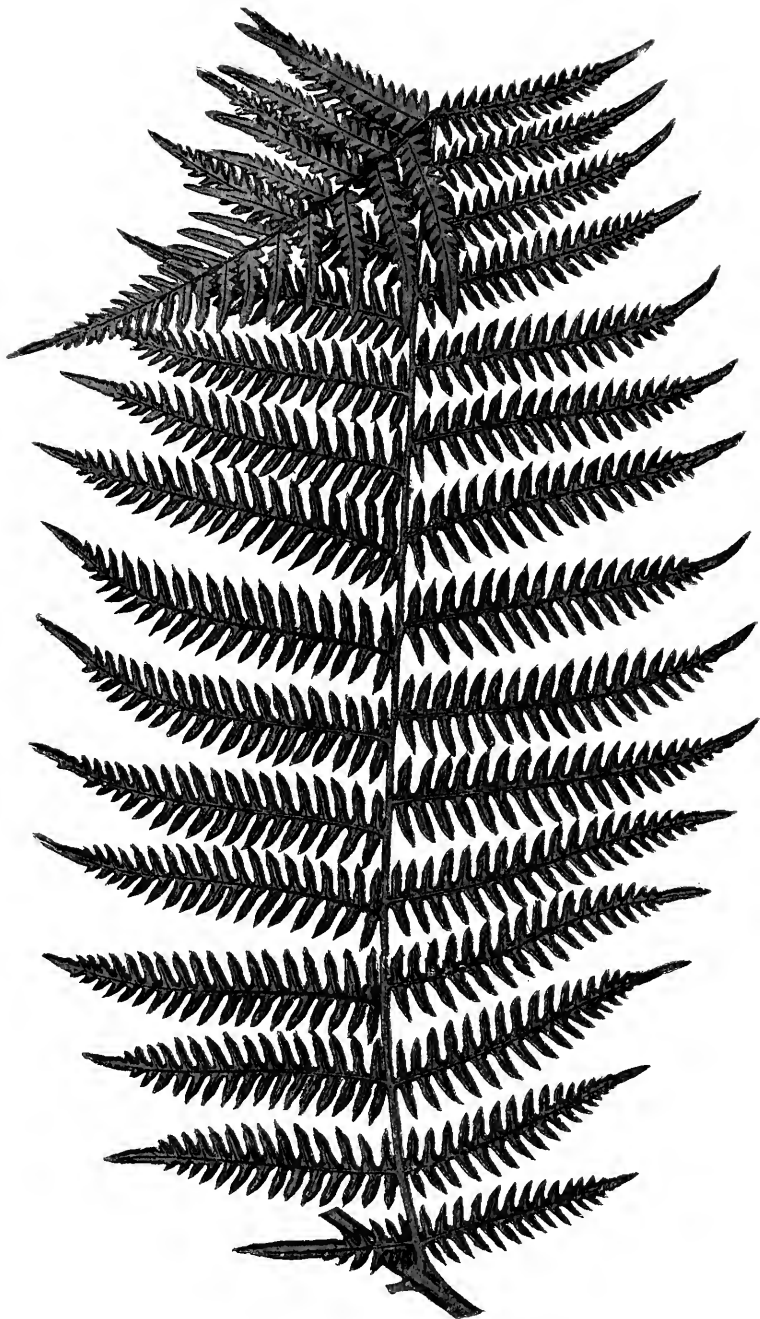


PLATE XXXIV.

Pteris aquilina (pinna)

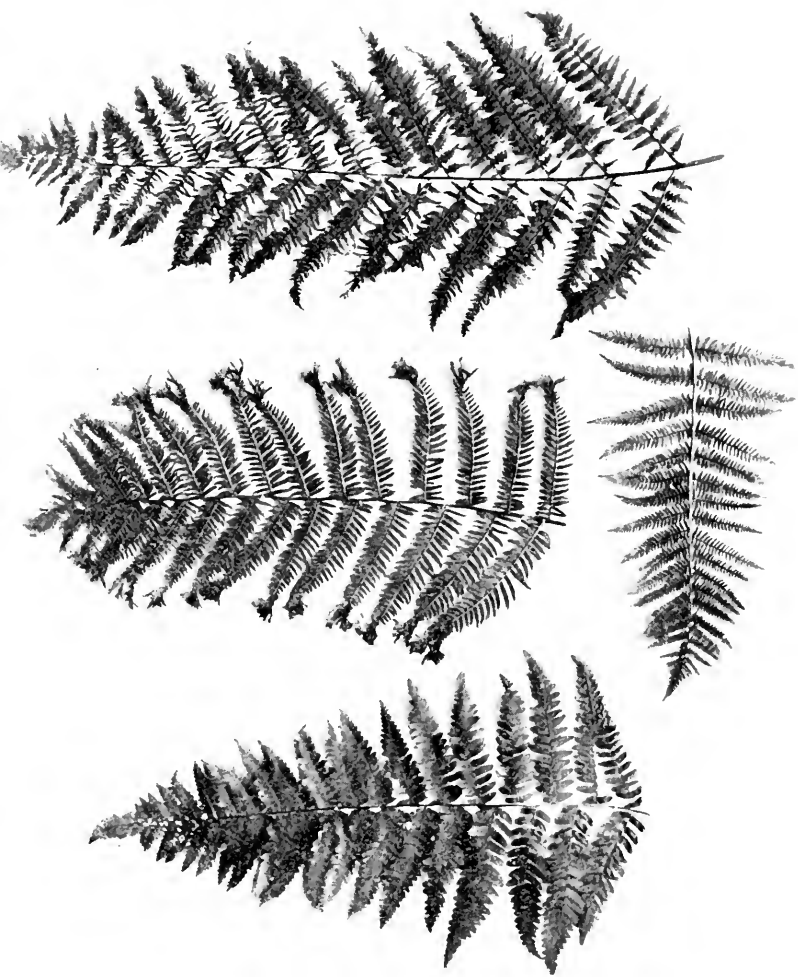


Fig. 257. *P. aq. crispa-cristata* Druey.

CRISPA CRISTATA DRUEY (Fig. 257).—This splendid variety was found near Pitlochry by the writer, in the shape of a single frond about three feet high, and as much across, and evidently from a well-established plant, yet no other could be found. It was barren, this frond, as shown in our figure (Fig. 257), constitutes the only record.

CRISTATA GREEN (Figs. 258, 261 top centre).—Found at Faysussex by Mr. C. B. Green, as covering a large area (see p. 2).

CRISTATA.—A great curiosity, all the tips curl up tightly into ball-like knots; found in Westmoreland, where the finder described it as resembling bunches of grapes hanging down the slope.



Figs. 258, 259, 260, 261. *P. aq. cristata* (Green), centre top. Normal centre below; left, and right, two distinct varieties found close by.

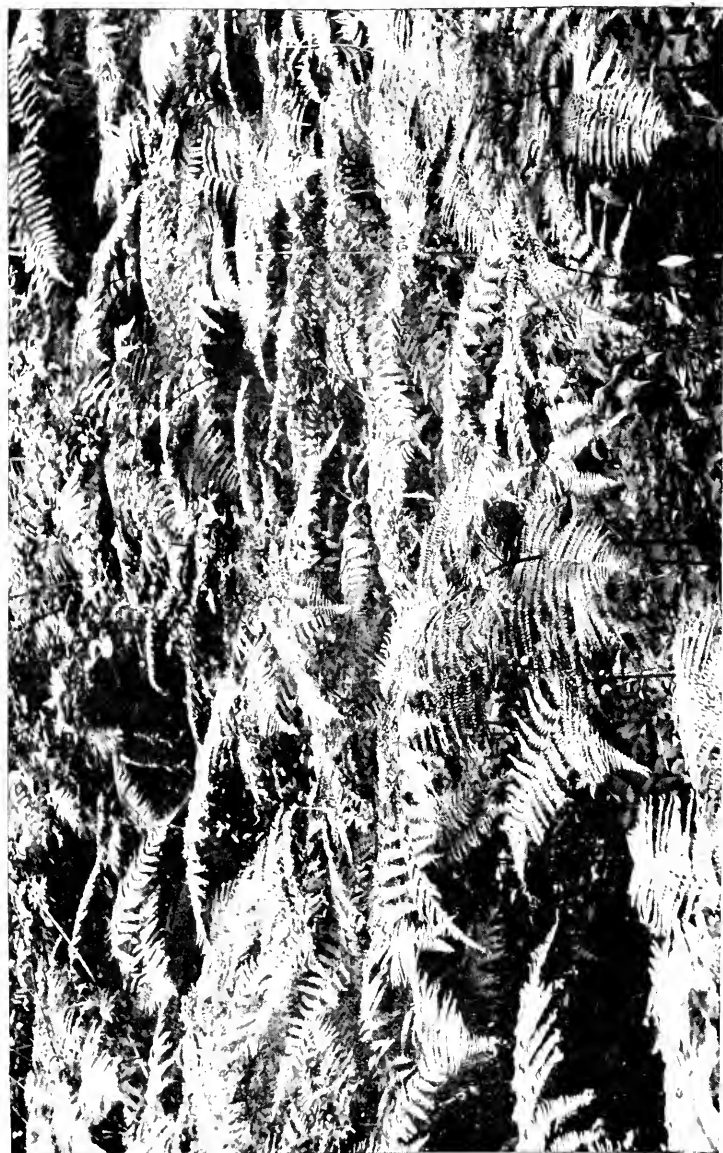


Fig. 262. Colony of Crested Bracken at Faygate, Sussex.

Col. Jones raised a cross between this and *cristata*, but as the resulting tassels were hidden within the knots, and thus invisible, the cross has been lost sight of, and does not, we think, now exist.

GRANDICEPS.—See note to *percristata*; this form is always barren, and can only be raised indirectly.

PERCRISTATA.—A far finer crested form, found in the Lake District; bearing heavy tassels at all tips and with even the smaller divisions distinctly fanned. The spores of this when sown yield two very distinct forms; viz. the parental, true *percristata*

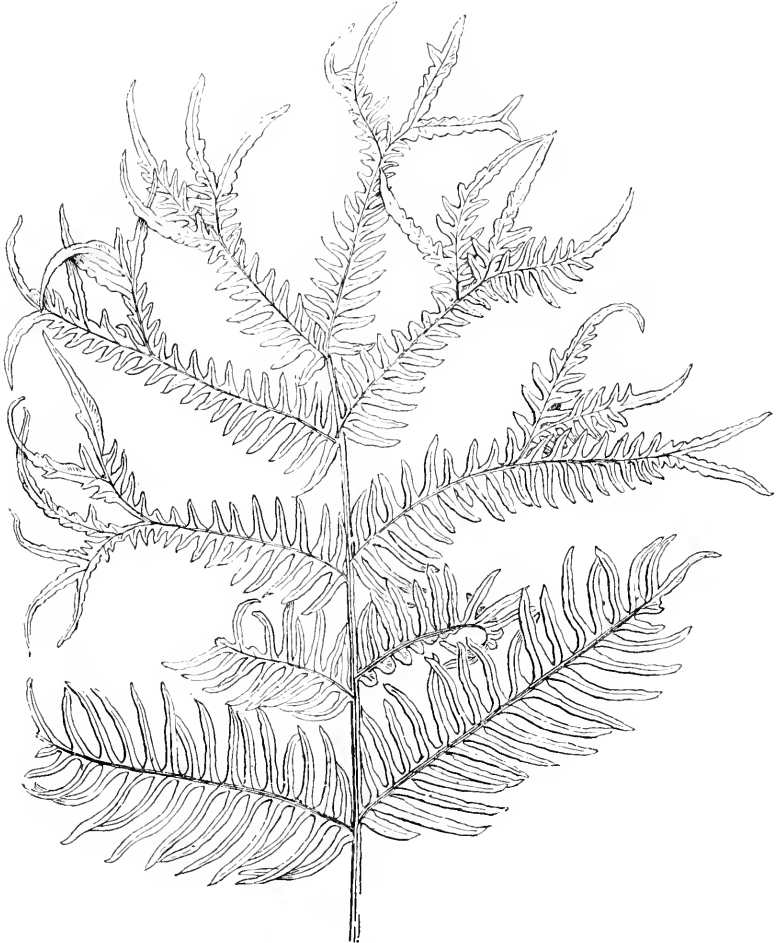


Fig. 263. *P. aquilina polydactyla*.



PLATE XXXV.

Scolopendrium vulgare

and a heavy-headed *grandiceps*, with large bunch crests; the fronds indeed being a collection of such, and connecting bare stalks. The latter only grows about two feet high, the former four or five.

POLYDACTYLA (Fig. 263), in which the terminals of the subdivisions are branched into numerous slender points.

REVOLVENS.—Found at Windermere and near Chepstow by the writer; a robust, handsome form, with fronds convexly curved and tips and side divisions terminating spirally.

SCOLOPENDRIUM VULGARE (THE COMMON
HARTSTONGUE)
(Plate XXXV)

With the exception of the little Adder's-tongue Fern (*Ophioglossum vulgatum*), the Hartstongue Fern is the only British species in which normally the fronds are quite undivided. In the Hartstongue they consist of a stalk of about one-third of the whole length, surmounted by a long, leafy portion, commencing with two rounded lobes of a semi-heart shape, whence the frond continues with smooth parallel edges for some distance, finally narrowing and terminating in a bluntish point. In robust specimens the fronds may be between two and three feet in length by three or four inches in width. The Fern is perfectly evergreen, and its fronds are of a dark, shining green and fleshy texture. Its fructification is peculiar, as is shown by Fig. 264, consisting of two rows, arranged herring-bone fashion on each side the midrib, of long, sausage-shaped masses of capsules, each mass on close examination being found to consist of two lines, distinct when immature, but confluent when ripe. Each line is exactly of the Spleenwort type, and has the same translucent skin-like cover or indusium, but in *Scolopendrium* these covers are situated on the outer edge of each pair, and turn inwards towards each other, so that in the early stages of growth their opposed free edges meet, but are subsequently forced asunder as spore growth proceeds. This peculiarity distinguishes the genus *Scolopendrium* from the *Asplenium*, to which, however, it is very closely allied, so closely, indeed, that hybridization has been effected (*S. vulgare* × *Asp. Cetrach*) by Mr. E. J.

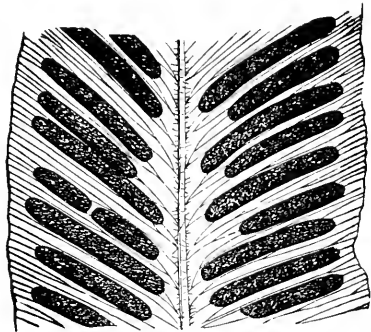


Fig. 264. *Scolopendrium vulgare*
(part of frond).

Lowe, and similar twin and faced clusters of capsules occasionally occur in true Spleenworts. The genus derives its name of *Scolopendrium* from a fanciful resemblance of the lines of spore heaps to the legs of a centipede (*Scolopendra*). As regards its natural habitats, it is very generally distributed wherever moist climatic conditions prevail, but is somewhat rare in Scotland. It is peculiar in the fact that while associating with the Spleenworts as a tenant of old walls and rock chinks as comparatively small plants, it is equally at home as much larger ones in hedgebanks, woods, and other places where there is plenty of good soil and a shady, moist environment. Its presence in the chinks of old walls, and its abundance in limestone formations would seem to indicate a preference for lime, but as it grows with equal vigour under other conditions, lime is obviously not an essential, though probably beneficial. Loam, peat, and sand (2, 2, 1) suit it well with good drainage. Its fronds spring from a definite caudex or rootstock on shuttlecock lines, but not quite so definitely as with the *Lastreas*, etc. The rising fronds are densely clothed with snow-white scales. Coming now to its varieties, it is absolutely safe to say that the Hartstongue stands pre-eminent among all the Ferns of the world as regards the diversity of form which it has sportively assumed. Normally, as we have seen, of the simplest construction, a plain-edged, undivided, smooth-surfaced frond, resembling in shape a two-edged carving knife, Nature, in some subtle fashion, has played as it were fantasias upon this simple theme to an absolutely bewildering extent; not a feature but has been varied in not one but many ways. We may begin with the tapered tip; no long search in localities where the Fern is plentiful is ever needed to find this tip expanded into several (*S. v. lobatum*), and in this direction there are innumerable types of crests and tassels, flat and fan-shaped, round and bunched, radiating points or repeated divisions, and so on, one and all multiplications of the tapered tip. As a converse variation of this, there are numerous forms in which the taper tip is replaced by an abrupt termination of the frond, the midrib suddenly stopping short, and ending as a projecting thorn in the centre of a frilled pocket, or projecting from the chord of a semicircular end, with the spore heaps arranged like the figures of a clock. The pocket may be in front or at the back, and in one instance, raised by ourselves, there are pockets in the rounded lobes at the junction of the stalk (*S. v. perajero-sagittatum*), which a jocular friend named "breeches-pocketum." Turning to the stalk, this may be multiplied by branching so as to carry many fronds instead of one, and this branching may be carried to such an extent that the end result is a ball of apparent moss (*S. v. densum Kelway*). The plain edge is varied in all sorts of ways, blunt-toothed, saw-toothed, deeply cut, fringed and frilled. The semi-heart base, where the frond proper commences, has been lengthened to form arrow-shaped

fronds, or even extended and divided at the tip, transforming the frond into a trident, with or without tassels at the points (*S. v. sagittatum*). The smooth surface has been broken up in all sorts of ways, roughened (rugose, muricate, etc.), ridged above or below, and so on, and even the spore heaps, in one variety, *gymnosorum*, have lost their Spleenwort character and been resolved into an irregular scattering of capsules on the frond back, without any indusium or cover at all. To crown all, in many forms two or more of these peculiarities are combined, so that the possibilities are inexhaustible.

With this prelude, which, as will be seen, amply justifies our claim on behalf of our familiar Hartstongue as the most variable Fern in existence, we will now proceed to figure and describe some of the most marked types extant, excluding those which are merely eccentric, inconstant, or defective. Where the figures show the variety clearly, we have refrained from needless description.

BIMARGINATUM.—Found at Ulverston by Mr. Hadwin; narrow form, with marginal excrescence on both sides of the frond.

BIMARGINATO-MULTIFIDUM (Fig. 265).—Fronds consist of a midrib fringed with irregular, toothed projections, and bearing a branched head of somewhat leafier character, but all very narrow.

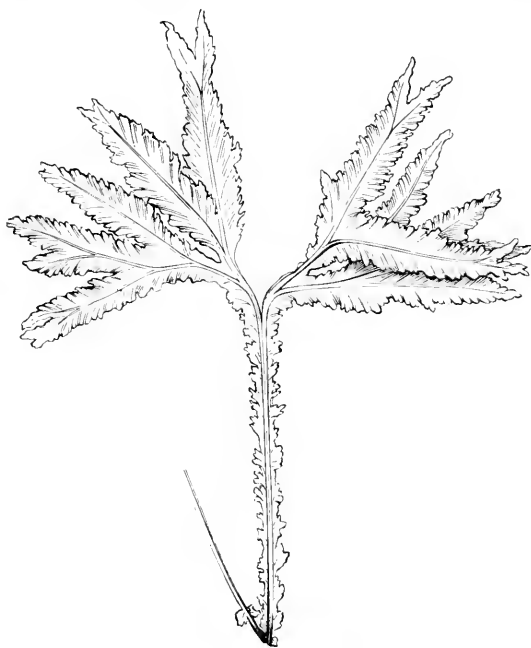


Fig. 265. *S. v. bimarginato-multifidum*.

BIMARGINATO-RAMOSUM.—Same, with multifid tips.

CAPITATUM.—Found by Mr. Stewardson ; very heavy crests.

C. FORSTER and STUDDART have a touch of *marginatum* in both finds.

C. PROJECTUM.—The fronds are sagittate, otherwise like the preceding.

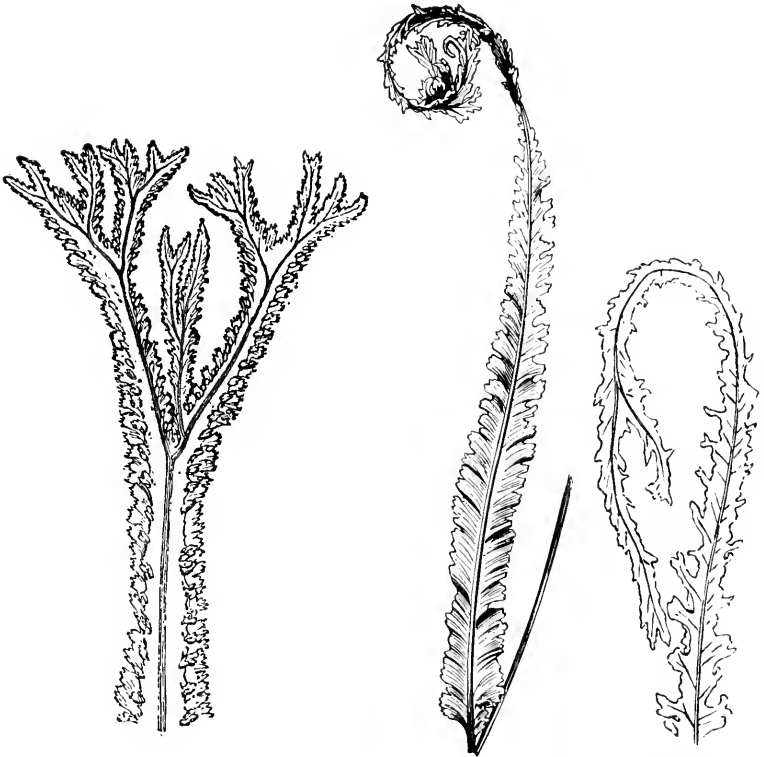


Fig. 266. *S. v. cervi-cornu*.

Figs. 267, 268. *S. v. circinatum*.

CERVI-CORNU (Fig. 266).—One of the marginate section, the margin half-way to the midrib being cut into rough projections, while the frond tip branches and re-branches like a stag's horn, whence the name.

CIRCINATUM (Figs. 267 and 268).—Raised by Mr. Clapham ; a very curious, narrow-fronded, marginate form, with crozier-like crests.

CLIFTII.—Found in N. Wales ; multifid, foliose crests.



Fig. 269. *S. v. con. arvo-ramosum*.



Fig. 270 *S. v. conglomeratum*.

CONCAVO-RAMOSUM (Fig. 269).—Raised by Mr. Clapham ; frond stalk branches, each branch bearing a crested frond with leafy portion folded inwards.

CONGLOBATUM.—Found by H. Bull, St. Pierre ; a finely crested *sagittato-projectum*.

CONGLOMERATUM (Fig. 270).—Found at Truro by Mr. Dadds ; a naked, stalked, heavy capitate form.



Fig. 271. *S. v. congregatum*.

CONGREGATUM (Fig. 271).—A fine form of *ramo-cristatum* with heavy, branching head.



Fig. 272. *S. v. conjugendum*.

CONJUGENDUM (Fig. 272).—Found by Rev. F. Miles in Devon ; twin, very narrow fronds, branching into broad, flat, digitate heads.

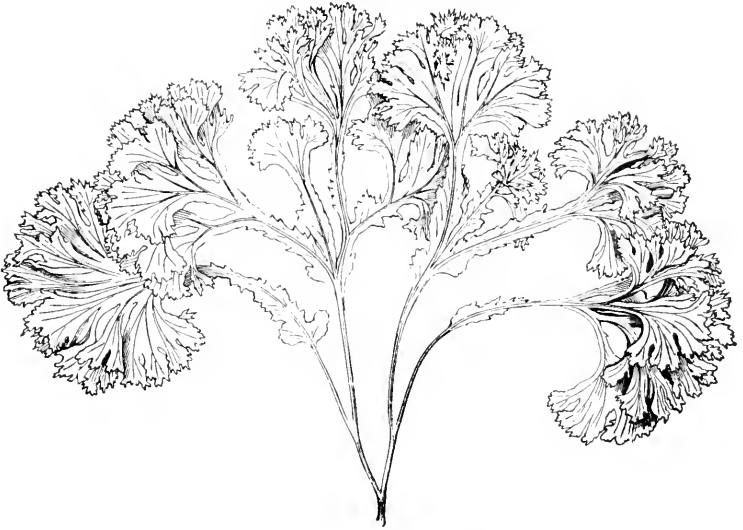


Fig. 273. *S. v. constellatum*.



Fig. 274. *S. v. Coolingii*.

CONSTELLATUM (Fig. 273).—Raised by Mr. Glave ; a very handsome raino-cristate form with corymbiferous crests to branches.

COOLINGII (Fig. 274).—A fine conglomerate form, closely akin to *Wardii*, and also proliferous.



Fig. 275
S. v. cornutum.

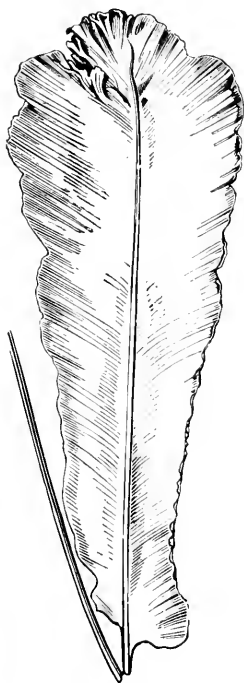


Fig. 276.
S. v. cornuto-abruptum.

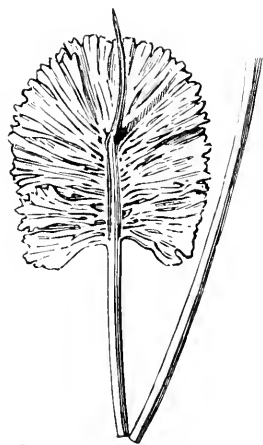


Fig. 277.
S. v. cornuto-superbum.

CORNUTUM (Fig. 275).—Found in Yorkshire and elsewhere ; fronds end semicircularly, with projecting midrib in centre.

CORNUTO-ABRUPTUM (Fig. 276).—Raised ; this belongs to the *periferens*, or pocket-bearing forms, distinguished by abrupt termination of the midrib, which projects as a thorn.

CORNUTO-SUPERBUM (Fig. 277).—Raised by Mr. Elworthy ; a long stalk bears a fleshy frond of beehive-like outline, with crenate edges, near the centre of which the midrib projects as a long thorn.

CORONATUM.—A fine corymbiferous form,

CORYMBIFERUM DRUERY.—Found Sidford ; round, mossy crests.

COUSENSII.—Found at Torrington by Mr. J. Schott Cousens, of Wanstead ; this is the finest of the conglomerate forms, the fronds

branching from the base upwards into an infinity of rounded lobes, at the edges of which small plants are formed ; it is on the lines of *Wardii*, *Coolingii*, and *Kelwayii*, but more divided.



Fig. 278. *S. v. crispum*.

CRISPUM (Fig. 278).—This name applies to a number of beautifully frilled, barren forms which vary somewhat in length of stalk, width and depth of frill, and other details, but are all handsome ; the best are those known as *Bowdenii*, *Cowburnii*, *diversifrons*, *grande Wills*, *Grey*, *latum Jackson*, *majus Moses*, *Robinsonii*, *robustum*, *Roundstone*, and *Stableræ* ; all these have been found wild in different places, and must therefore, owing to their barrenness, have been of quite independent origin.

CRISPUM CRISTATUM.—The above are uncrested, but *Kitsonæ*, *capitatum*, and *adornatum* bear tassels at their tips, and the section of

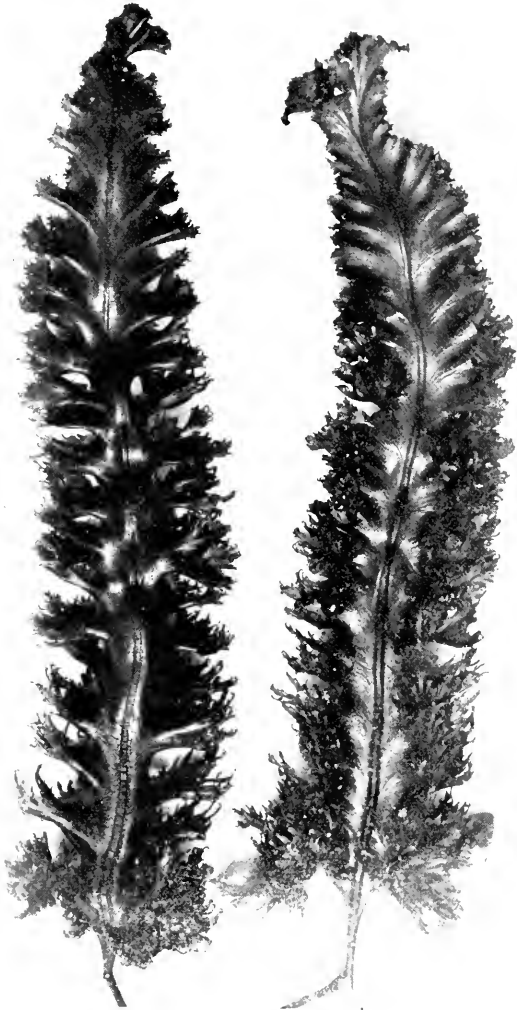


Fig. 279. *S. v. crispum fimbriatum*.

C. FIMBRIATUM (Fig. 279), embracing Stansfield's and Cropper's, are beautifully fringed, while



Fig. 280. *S. v. crispum fimb. cristatum.*

C. F. CRISTATUM (Fig. 280), of Stansfield and Cropper, and

C. DRUMMONDÆ, found by Miss Drummond at Falmouth, are both fringed and tasselled, the latter ranking as one of the most remarkable, having two sorts of fronds, one very long, narrow, and frilled, with plain edges and very broad, branched crests, and the other on like lines, but beautifully fringed, the tips of the fringes, if layered, yielding plants by apospory (see page 17).

C. D. SUPERBUM.—Has no plain-edged fronds, all are fringed.

C. D. GRANDICEPS.—Raised by Mr. H. Bolton, of Carnforth; has extra heavy tassels.

C. FERTILE.—Varieties of the frilled type have been found which are partly fertile; as seedlings they are fully equal to the barren forms, but when they begin to bear spores, the frill is defective, the frond apparently being incapable of bearing spores and completing the frill. By virtue of this fertility, crosses have been effected with good results.

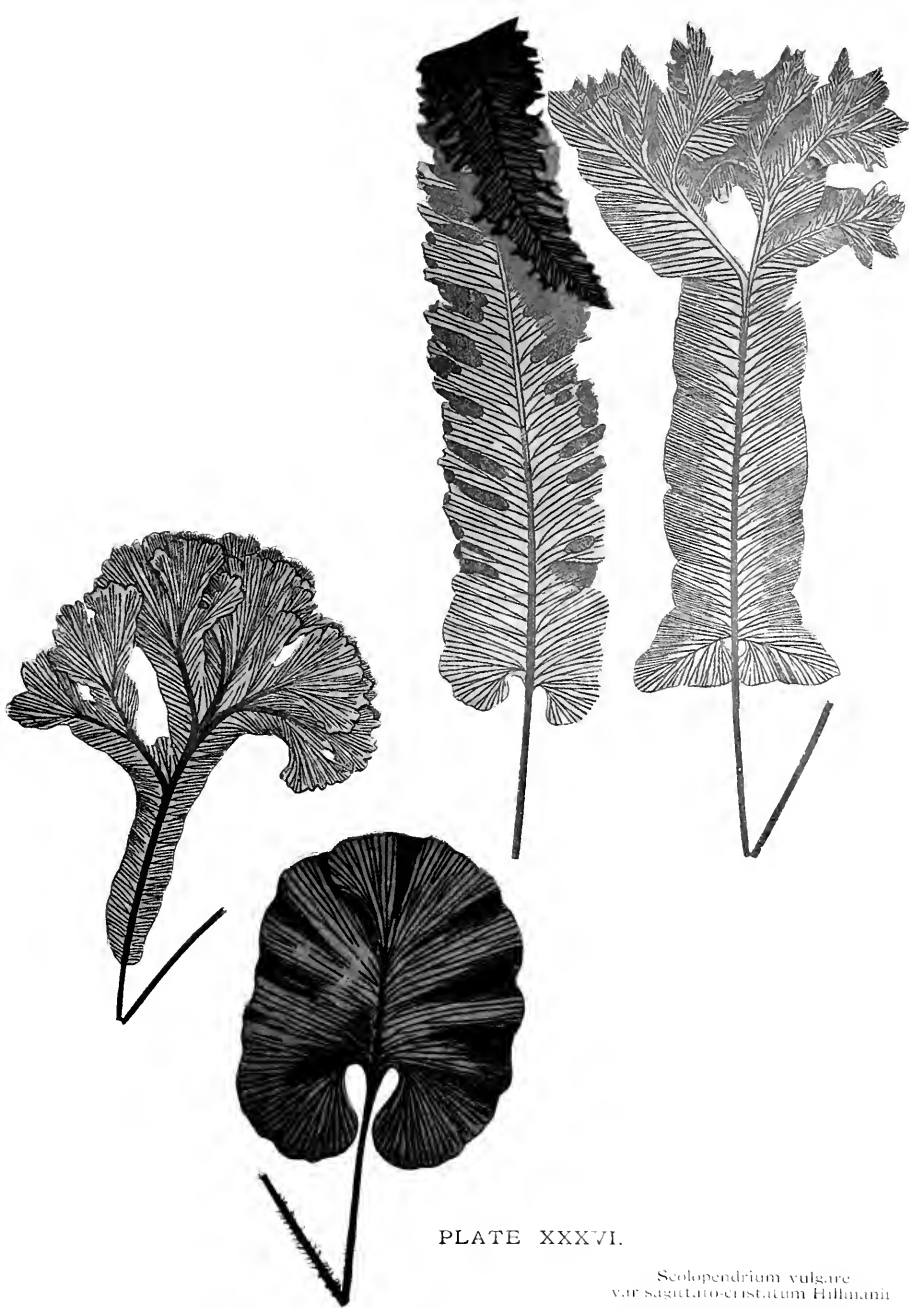


PLATE XXXVI.

Scolopendrium vulgare
var. *cristatum*

Scolopendrium vulgare
var. *reniforme*

Scolopendrium vulgare
var. *sagittato-cristatum* Hillmanii
Scolopendrium vulgare
var. *subincato-striatum*

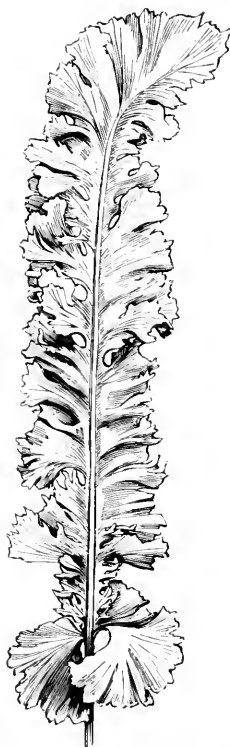


Fig. 281. *S. v. crispum grandidens*.

C. GRANDIDENS (Fig. 281).—Found in N. Wales by Mr. Clift ; fronds frilled and cut into pinnatifid, crenate lobes.

C. LATUM (Fig. 282).—Found at Barnstaple and Nettlecombe by Mr. C. Jackson and Mr. C. Elworthy ; a robust form with fronds three to four inches wide, doubly frilled, as shown.

C. MURICATUM.—With rough surface projections, a cross with *muricatum*.

CRISTA-GALLI.—Found by Mr. Moule ; resembling a cock's comb.

CRISTATUM (Plate XXXVI).—This represents a typical form of which there are many variants.

C. PROLIFERUM DRUERY.—Found by writer at Babbacombe ; bears bulbils on the basal lobes, and in the angles of its branching fronds ; prolific on the lines of *Polystichum angulare* ; distinct.

C. VIVIPARUM O'KELLY.—Found in Co. Clare ; peculiar in producing young plants freely on the surface of the fronds ; neatly crested with slightly sagittate base.

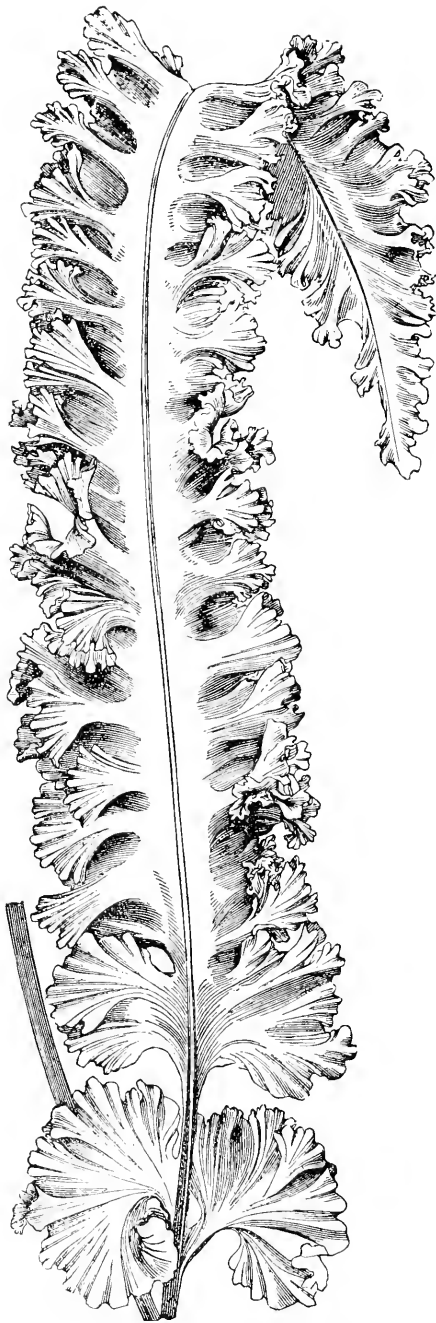


Fig. 282. *S. v. crispum latum*.

CRISTULATUM.—Raised by Stansfield ; beautiful, round, com-
minuted crests.

DENSUM KELWAYI.—Like a ball of moss, so much is it branched ;
proliferous edges.

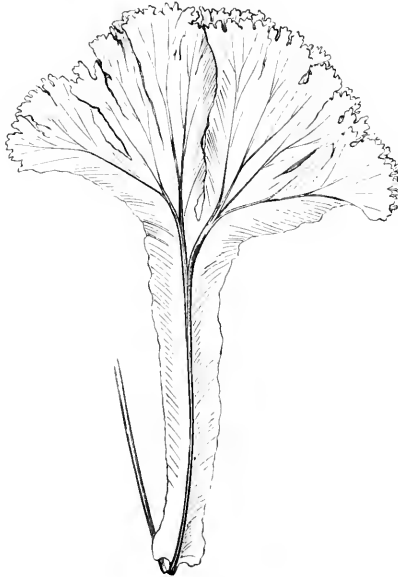


Fig. 283. *S. v. digitatum.*

DIGITATUM (Fig. 283).—Raised by Mr. G. B. Wollaston and
subsequently found in Essex by Miss Lucy Moss, and in Cork by Mr.
Crossfield ; forms fine, dense, fan-shaped crests, extremely divided
at edges ; generally the fronds are branched as well.

DIMORPHUM BARNES.—A curious form, some fronds normal
width, but tasselled, like *lobatum*, and others with very narrow
linear fronds with fan-like crests.



Fig. 284. *S. v. Edwardsii*.

EDWARDSII (Fig. 284).—A dwarf form of *ramo-cristatum* found in Devonshire by Mr. Edwards.



Fig. 285. *S. v. flabellatum*.

FLABELLATUM (Fig. 285).—Found by Mr. Elworthy near Nettlecombe; a form of *ramo-cristatum* with wide, branching heads.

FLEXUOSUM.—Found several times; a curled variety.

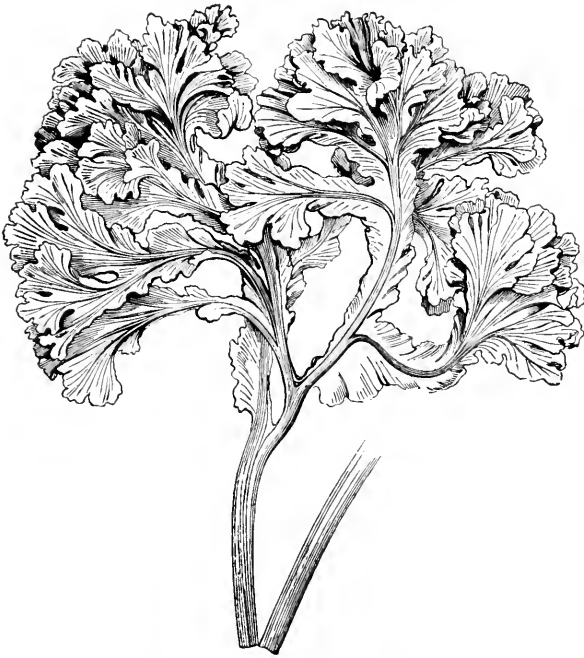


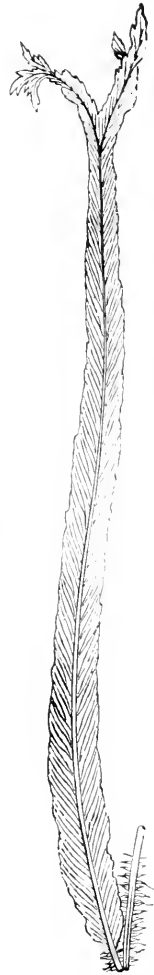
Fig. 286. *S. v. glomeratum*.

GLOMERATUM (Fig. 286).—Found in Jersey by M. Piquet.

GLOVERII (Fig. 287).—A ramo-cristate form with very rounded outline to crest divisions, not unlike *glomeratum*.



Fig. 287. *S. v. Gloverii*.

Fig. 288. *S. v. grandiceps* Cousins.Fig. 289. *S. v. gymnosorum*.

GRANDICEPS COUSINS (Fig. 288).—Fronds heavily crested.

GYMNOSORUM (Fig. 289).—Found near Minehead by Mr. M. Bowden, and by the writer at Kiltrush, Ireland; a dwarf, very narrow form, with scattered, naked spore heaps.

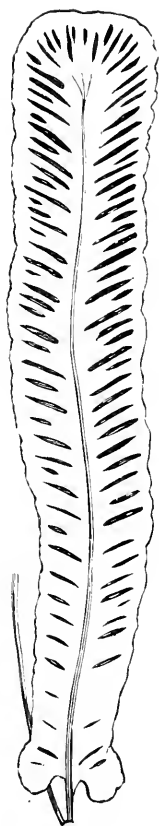


Fig. 290. *S. v. hebetatum*.



Fig. 291. *S. v. Hendersonii*.

HEBETATUM (Fig. 290).—Fronds end almost squarely, but with rounded angles, the spore heaps behind radiating like the spokes of a wheel.

HENDERSONII (Fig. 291).—Found near Whitly by J. Henderson ; a dwarf form, but peculiarly pretty, the frond stalk dividing and re-dividing, all the divisions ultimately bearing definitely stalked and similarly fan-crested fronds ; a robuster form on similar lines was found by the writer at Penrhyn, Cornwall, in 1906.

HOOKEII (Fig. 292).—Raised by Mr. Lowe, probably from *laceratum*; fronds bluntly triangular in outline, consisting practically of one large crest, flat but overlapping.

KELWAYII.—Found in Somerset; a dense conglomerate form, similar to *Coolingii* and *Wardii*, parent of *densum*; proliferous.



Fig. 292. *S. v. Hookeii*.



Fig. 293. *S. v. keratoides*.

KERATOIDES (Fig. 293).—Very narrow fronds with deeply cut margins branching into a staghorn-like cresting; raised by Mr. Clapham.

LACERATUM (ENDIVÆFOLIUM) (Fig. 294).—A very beautiful form found at Taunton by Mr. J. Young; finely crested and frond edges deeply cut on pinnatifid lines (see Appendix No. LXXXIX for better illustration).

LIMBOSPERMUM CRISTATUM.—Found in Somerset by Mr. Elworthy; narrow, serrate-edged fronds with lace-like tassels.

LONCHOPHORUM.—Found in Lancashire by Mr. Preston and Mr. Hodgson; a form of *marginatum*.

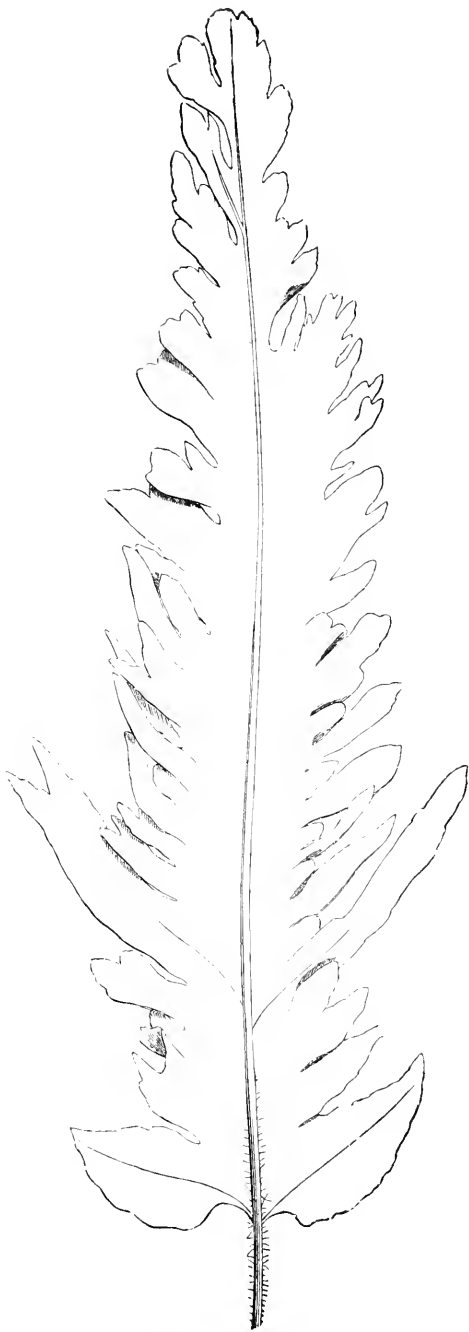


Fig. 294. *S. v. lacertum*.

MARGINATUM (Fig. 295).—A form frequently found in which the frond is narrowed, the edge slightly frilled, and at the back is more or less ridged just within the margin.

MARGINATO-CRISTATUM.—Found by Mr. J. M. Barnes ; marginate and crested.

M. FIMBRIATUM.—Marginate, edges fimbriate.

M. IRREGULARE (Plate XXXVIII).—Raised by Mr. C. Clapham.

M. UNDULATUM.—Marginate and undulate.

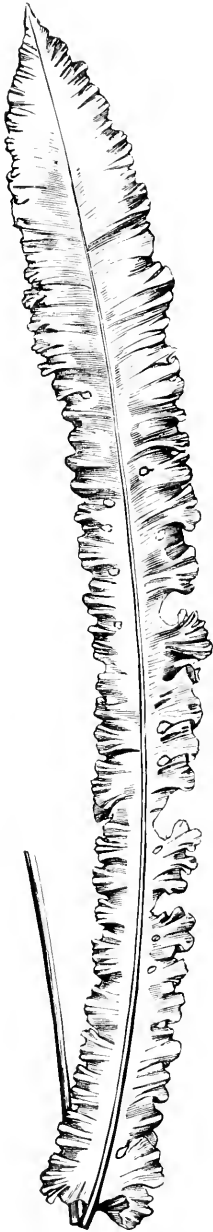


Fig. 295. *S. v. marginatum*.



Fig. 296. *S. v. multifidum nanum*.

MULTIFIDUM NANUM (Fig. 296).—A dwarf form found in Devon by Mr. W. Edwards ; twin-fronded, bare stalks bearing fine, spreading crests.

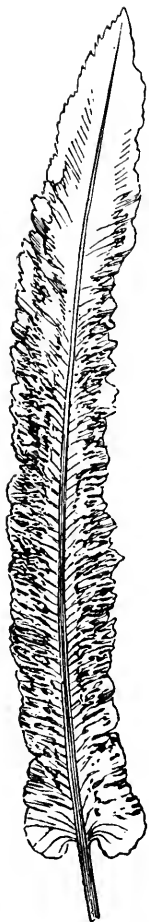


Fig. 297.
S. v. muricatum.



Fig. 298.
S. v. omnilacerum.



Fig. 299.
S. v. papillosum.

MURICATUM (Fig. 297).—Found in several places ; fronds narrowed and very rough-surfaced.

NUDICAULE CAPITATUM FORSTER.—Spherical, dense crests on bare stalks.

OMNILACERUM (Fig. 298).—Raised by Mr. Glave ; fronds narrow and cut into lobes almost to the midrib, the lobes fanning and forking at tips.

PAPILLOSUM (Fig. 299).—Found in Guernsey by Mr. Jackson ; a narrow, supralineate form.

PECTINATUM JONES.—Marginate, with comb-like edges.

PERAFERENS.—Found in several places with slight variations ; truncate fronds terminating in a pocket and thorn.

PERAFERO-SAGITTATUM DRUERY.—Frond and basal lobes terminate abruptly with pockets and projecting midrib.

RADIOSORUM.—Fronds normal, but with rounded ends, where the sori are arranged like the figures of a clock ; a form of *truncatum*.

RAMO-CRISTATUM.—Fronds branch repeatedly, bearing crests at terminals on lines of *ramo-marginatum*, but leafier and non-marginate.

R.-c. MOLY.—A splendid form (see Appendix No. LXXXVI).

RAMO-CRISTULATUM STANSFIELD.—A branched form of *cris-
tulatum*.

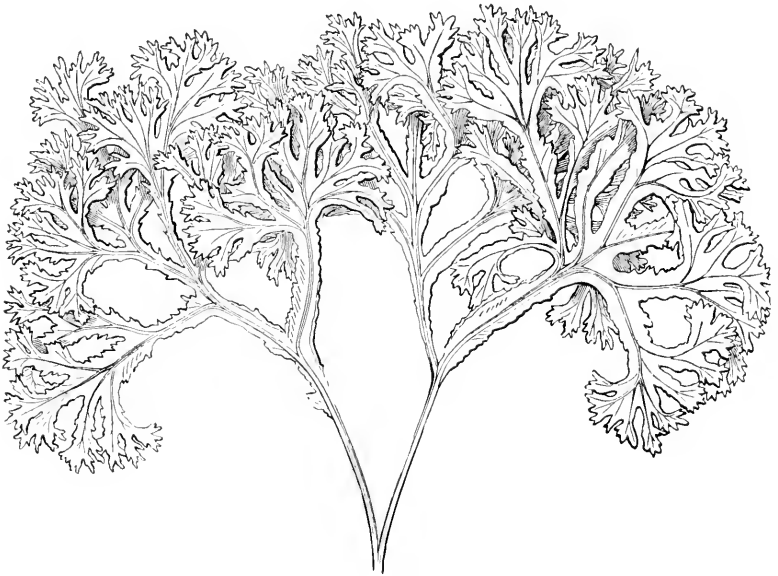


Fig. 300. *S. v. ramo-marginatum*.

RAMO-MARGINATUM (Plate XXXVII, Fig. 300).—A magnificent branch-crested form, narrow and marginate, and repeatedly branching until a wide and beautiful crest is developed.



Scolopendrium vulgare
var. *ramosum majus*



Scolopendrium vulgare
var. *ramo-marginatum*

RAMOSUM (Fig. 301).—Found at Ilfracombe and in Guernsey ; has broad, dense, fan-shaped crests, many times divided.

R. MAGUS (Plate XXXVII).—A large branched form

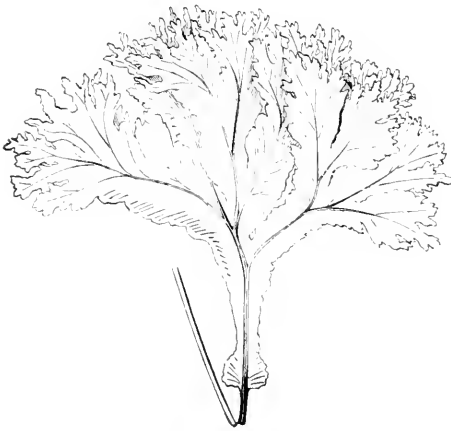


Fig. 301. *S. v. ramosum*.

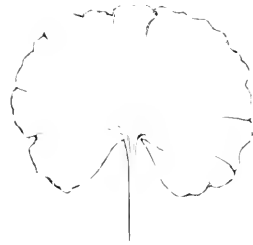


Fig. 302. *S. v. rotundifolium*.

RENIFORME (Plate XXXVI).—Kidney-shaped fronds.

ROTUNDIFOLIUM (Fig. 302).—Similar, but smaller.

RUGOSUM.—Surface of fronds roughened with blunt excrescences.

SAGITTATO-CRISPUM.—Found in Dorset by Mr. Coleman ; a sagittate, narrow *crispum*, somewhat on *Drummondæ* lines ; others found in Devon and Ireland by G. B. Wollaston and Mr. Forster.

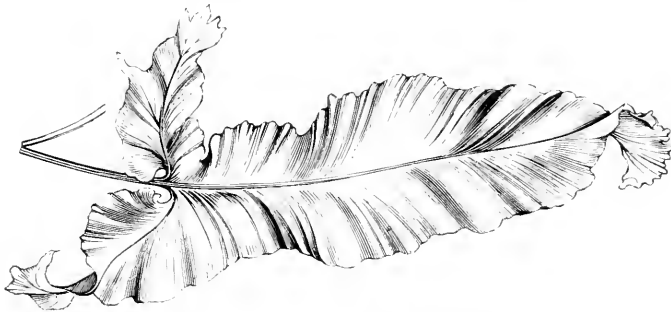


Fig. 303. *S. v. sagittato-cristatum*.

S.-CRISTATUM (Fig. 303).—Found in abundance near Scarborough by Mr. Clapham ; and also found elsewhere by Mr. Hillman and Mr. J. Welman ; a very fine form was also raised by Mr. Hankey ;

a dwarf form, shaped like a trident, was found in N. Devon by Mr. Dadds.

S.-C. HILLMANII (Plate XXXVII).—Fronds arrow-shaped, with crested barbs, and heavy terminal crest to frond.

SAGITTATO-GRANDICEPS.—Raised by the writer from a wild find of *sagittato-lobatum*; basal lobes densely and heavily crested, as is also the frond tip, each frond consisting of three close-set bunches, with bulbils on leafy portion.

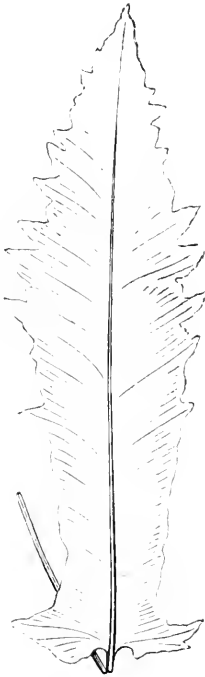


Fig. 304. *S. v. sagittato-projectum*.

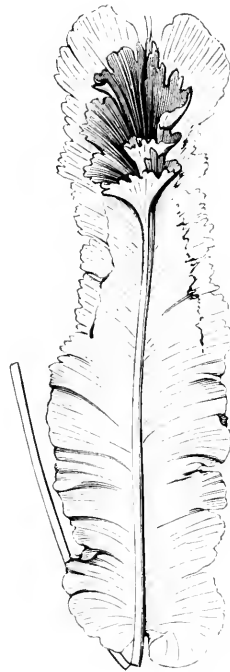


Fig. 305. *S. v. sinum*.

S.-PROJECTUM (Fig. 304).—Found Tiverton by Rev. C. Padley, and subsequently several very fine forms were found by Mely in Dorset, Sclater in Sligo, Smithies in Westmoreland, Westropp in Co. Clare, and Whitwell near Kendal; the last-named is shorter and muricate.

SCALPTURATUM.—In this the surface is roughened like *rugosum*, but on sharper and more file-like lines.

SINUM (Fig. 305).—Really a form of *perajerens*, the frond ending abruptly with a pocket and projecting thorn



Fig. 306. *S. v. sinuato-multifidum*.

SINUATO-MULTIFIDUM (Fig. 306).—Fronds semi-frilled and with twisted crests; found in N. Devon by Mr. C. Padley.



Fig. 307. *S. v. spirale*.

SPIRALES (Fig. 307).—Found in several places ; a dwarf, undulate form, twisted like a corkscrew, and with very thick, leathery fronds ; really a very congested, undulate form of the species.



Fig. 308. *S. v. sub-cornutum*. Fig. 309. *S. v. supra-lineato-multifidum*

STANSFIELDII (Plate XXXVIII).—A splendid form raised from spores of *S. v. undulatum rigidum* (see Fig. 314) ; fronds frilled and fringed, a most unexpected result from such a source.

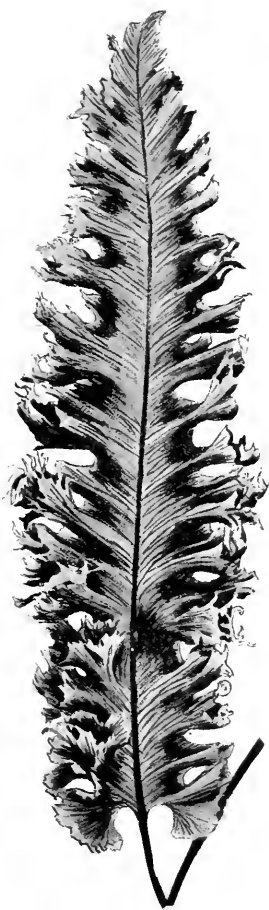


PLATE XXXVIII.

Scolopendrium vulgare var.
Stansheldii (crispum fimbriatum)

S. v. marginato
irregulare

SUB-CORNUTUM, SUPRA-CORNUTUM.—Applied to forms of the truncate section, according as the thorn projects in front or at back.

SUB-CORNUTUM (Fig. 308).—A marked form of the cornute, or horned section.

SUB-LINEATO-STRIATUM (Plate XXXVI).—Found in Devon by Mr. Hillman ; one of the *marginatum* section.

SUPRA-LINEATUM.—Found several times ; a form of *marginatum*, distinguished by an even ridge near the midrib on the upper side.

S.-L. CRISTATUM.—A branched, crested form, similarly characterized.

S.-LINEATO-MULTIFIDUM (Fig. 309).—One of the supra-lineate section, so called owing to the linear ridge each side the midrib on the upper side of the frond.



Fig. 310. *S. v. tortuoso-cristatum*.

TORTUOSO-CRISTATUM (Fig. 310).—Raised by Mr. Lowe ; broadly branched and twisted crests.



Fig. 311. *S. v. transverso-lobatum*.

TRANSVERSO-LOBATUM (Fig. 311).—Found in several places ; it bears double tassels which cross each other, and is a very pretty form.

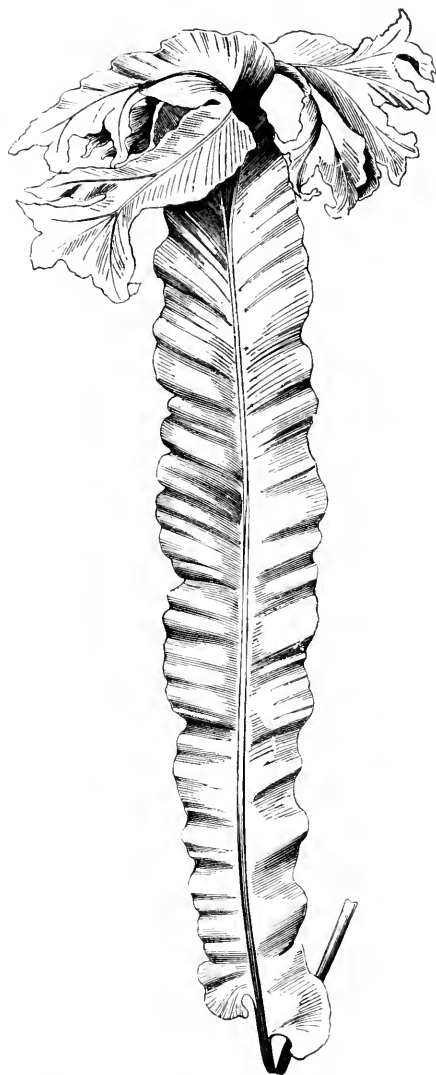
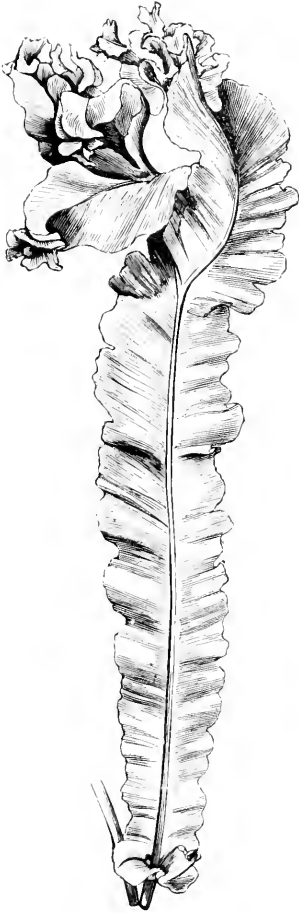
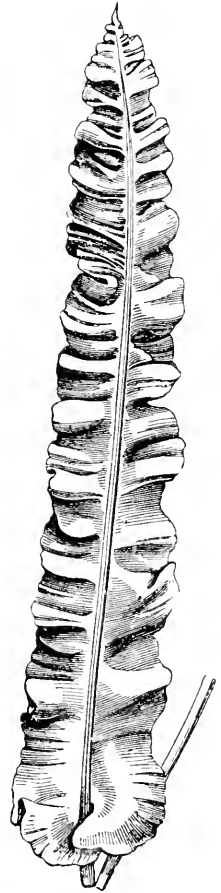


Fig. 312. *S. v. transverso-multifidum*.

T.-MULTIFIDUM (Fig. 312).—Found by Mr. Dadds near Ilfracombe; very similar to *transverso-lobatum*.

TRUNCATO-CORNUTUM.—Similar to *radiosorum*, but with projecting midrib at the chord of the semicircle; no pouch.

Fig. 313. *S. v. undulato-ramosum*.Fig. 314. *S. v. undulatum*.

UNDULATO-RAMOSUM (Fig. 313).—Found by Mr. Moly ; robuster than *sinuato-multifidum*, but on similar lines.

U.-RIGIDUM.—It was from the spores of this variety that Messrs. Stansfield raised their beautiful fimbriate *crispums* (see Plate XXXVIII) ; found by Mr. Edwards in Devon.

U.-SUPRA-LINEATUM.—A very fine form raised by Col. Jones.

UNDULATUM (Fig. 314).—Found in several places ; fronds undulate or semi-frilled *à la crispum*, but freely fertile.

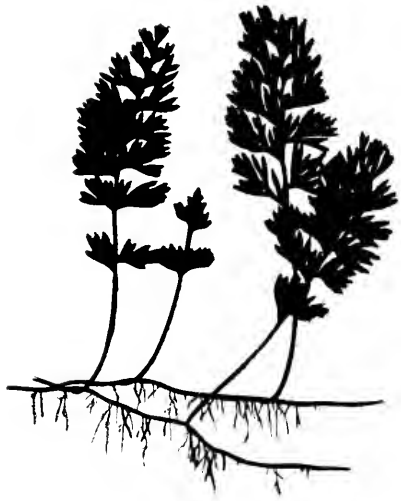


PLATE XXXIX.

Trichomanes radicans

Hymenophyllum Tunbridgense
Hymenophyllum unilaterale

UNGUICEPS.—A narrow form of the marginate section with divided tips which curve downwards like claws.



Fig 315. *S. v. Wardii*.

WARDII (Fig. 315).—A dense, conglomerate form, the whole plant becoming a mass with no indication at all of the normal strap; the frond edges bear bulbils; raised by Mr. Glave of Scarborough.

TRICHOMANES RADICANS (THE BRITISH FERN)
(Plate XXXIX)

Trichomanes radicans belongs to the small group of Filmy Ferns found in Great Britain, but which are abundant in tropical and subtropical Fern habitats where extremely humid conditions, both of soil and atmosphere, prevail. Their fronds (Fig. 316) are so thin and translucent as to be entirely dependent upon such conditions for their existence, since dry air shrivels them at once beyond recovery. In this country *T. radicans* has been reported as found in Yorkshire, but in Ireland it has been found so frequently as to have acquired the popular name of the Killarney Fern. Its name



Fig. 316. *T. radicans* (pinna).

given above, the Bristle Fern, is due to the peculiarity that the spore capsules are contained in little, urn-shaped vessels projecting from the margins of the frond divisions, and through these urns a vein is carried, and protrudes like a bristle from the orifice. Its natural habitats here are by the sides of mountain streams, in the vicinity, or actually in the spray of cascades, or in rocky hollows where the air is constantly at saturation point and no sunshine ever enters. *T. radicans* has a very tough, travelling rootstock, which creeps over the rock surfaces and into their crevices, into which the roots proper penetrate. The fronds, which are nearly thrice divided, are of a deep, lucent green and translucent, but by no means fragile. They are quite evergreen, and last for several years. For the culture of this species we refer to our chapter on Culture, under the head of Wardian Cases, since no Fern is better adapted, or lends itself more admirably to case culture than this. Several varieties have been found.

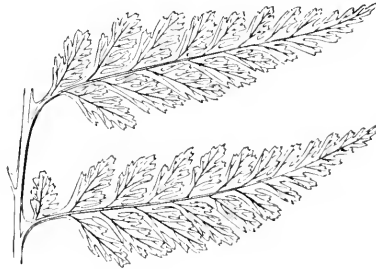


Fig. 317. *S. v. Andrewsii*.

ANDREWSII (Fig. 317).—Found in Ireland; has narrower, more lance-shaped fronds, with longer stalks and more widely separated pinnae.

DILATATUM.—A very handsome, broad-fronded form introduced from Ireland by Messrs. Backhouse, of York.

PROLIFERUM.—A small-growing form, sent the writer many years ago by Mr. Burbidge, of Dublin, as bearing bulbil plants on the fronds, *à la Asplenium bulbiferum*. Young plants were raised from these, but the parent eventually refused to develop more.

ALATUM.—Found in Ireland; conspicuously winged stalks.

BACKHOUSEII.—Intermediate between *dilatatum* and *Andrewsii*.

CRISPUM.—Found Killarney by Col. A. S. H. Lowe; crispate and irregularly branched.

DISSECTUM.—Finely cut, beautiful form.



Woodsia ilvensis



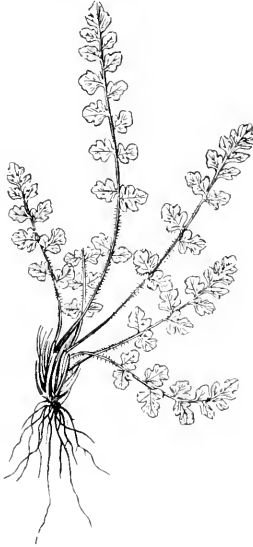
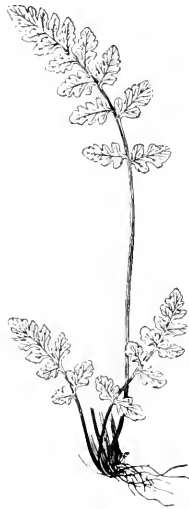
Woodsia alpina

PLATE XL.

WOODSIA HYPERBOREA (THE ALPINE WOODSIA)

(Plate XL)

The Woodsias, of which there are two species indigenous to Great Britain, *W. hyperborea* and *W. ilvensis*, are both small-growing Ferns, rising from small, definite rootstocks in tufts. Our figures (318, 319), show both size and make, and obviate description, except that the fronds are somewhat hairy, and the spore capsules, which are in small round heaps, are protected by a fringed indusium,

Fig. 318. *Woodsia hyperborea*.Fig. 319. *Woodsia ilvensis*.

quite distinct from any other genus. The species is rare; it has been found in Wales, but like *W. ilvensis*, which is the commoner of the two, most of the recorded finds have been in Scotland, and we have ourselves found it on Ben Lawers in Perthshire. Culture must be on the lines of the rock-loving species, with some broken porous stone mixed with open, well-drained soil. No varieties.

WOODSIA ILVENSIS (THE OBLONG WOODSIA)

(Plate XL)

Regarding this species, we have practically nothing special to add to our foregoing remark on *W. hyperborea*, since the difference is indicated by the plates and illustrations.

APPENDIX

NINETY-SIX NATURE PRINTS OF FINE VARIETIES OF BRITISH FERNS

Selected from some three hundred printed from the fronds by the late Colonel A. M. Jones, of Clifton, and, by kind permission of his daughter, reproduced on a reduced scale, together with his notes and descriptions.

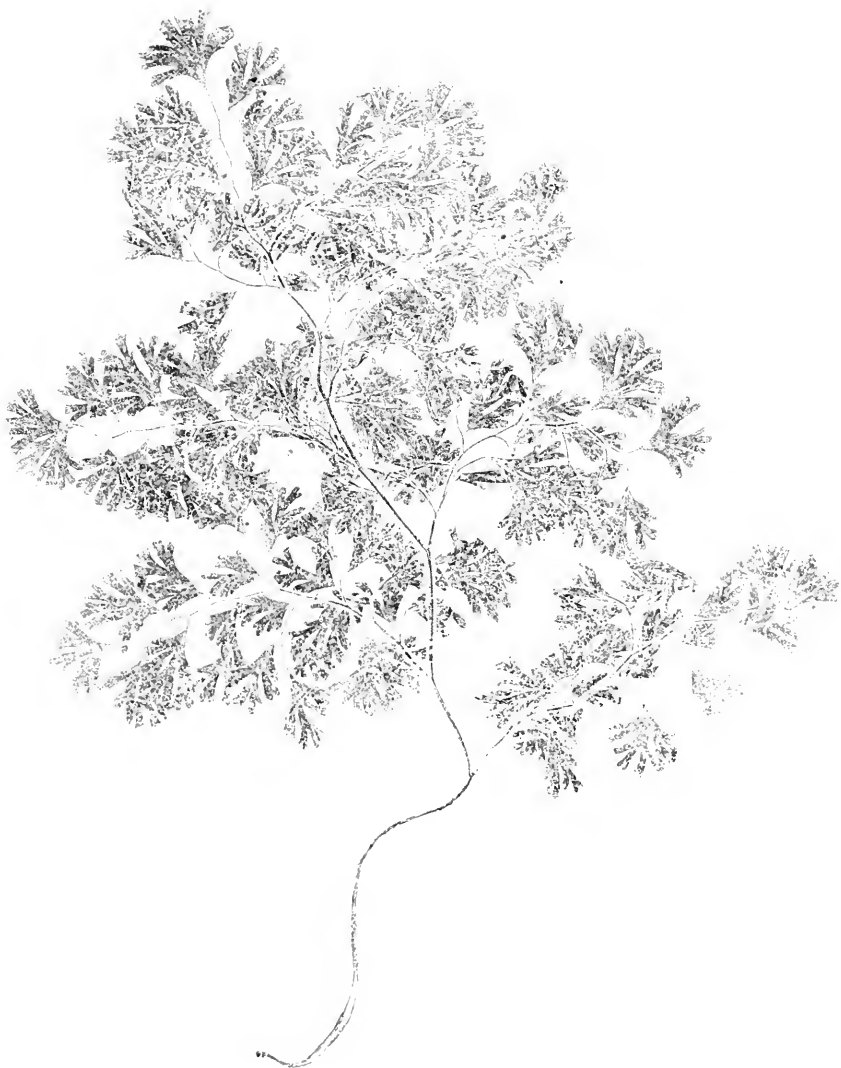
I

ADIANTUM CAPILLUS VENERIS, *var.* CORNUBIENSE (*Moore*)

Mr. H. H. Trevethick, Tolray, Hayle, Cornwall. 1868.

1 ft. 2 in.

“I found it in a high cliff on Showheld in this town” (Hayle).
Note by Mr. Trevethick.



I

ADIANTUM CAPILLUS VENERIS, var. CORNUBIENSE (*Moore*)

II

ASPLENIUM TRICHOMANES

1. CRISTATUM.

2. DENDROIDEUM.

Mr. Wollaston. Westmoreland. 1872.

Syn. RAMOSISSIMUM.

3. RAMO-CRISTATUM.

Mr. W. H. Sergeant, Lukenham, Cornwall. Cornwall. 1861.
2 in.

4. RAMO-CRISTATUM.

Mr. Patey. Cardigan. 1873.
3 in.

5. A. RAMOSUM.

Rev. C. Padley. South Devon. 1864.
3½ in.

1. By Mr. Wollaston.

2. By Mr. Stabler. The only plant of this remarkable variety in the possession of Mr. Stabler.

2. Found in a slate quarry; and within a yard of the spot the variety *incisum* fell to the lot of the same fortunate discoverer.

3. Found on an old wall, which was covered with crested forms of the species.



III

ASPLENIUM TRICHOMANES, *var.* INCISUM

Mr. A. Clapham. Yorkshire. 1859.

6 in.

Syn. PLUMOSUM (*Woll.*)

The plumose form of the species. First noticed in the *British Herbal*, 1743, without name of discoverer or place of discovery. Mr. Wollaston considers that the first recorded discovery was in Jersey, by Sherard. The following discoveries are also recorded: In Yorkshire by Mr. Clapham, 1859, and previously by Mr. J. Tatham; Cumberland, Miss Wright; Westmoreland, Mr. Wollaston, 1870; Lancashire, S. Gibson; Devonshire, Rev. W. S. Hore and R. Moule, 1869. The most remarkable "find" was that of Miss Wright in Borrowdale, where it is described by Mr. Wollaston as having been seen by him growing in a granite fissure, and extending nearly a yard in four or five elongated tufts, containing at least two hundred crowns.



III

ASPENIUM TRICHOMANES, *var.* INCISUM

IV

ATHYRIUM FILIX-FEMINA, *var.* ACROCLADON (*Moore*)

Mr. Monkman. Yorkshire. 1860.

Syn. RAMO-CRISTATUM (*Woll.*)



IV

ATHYRIUM FILIX-FEMINA, *var.* ACROCLADON (*Monkman*)

V

ATHYRIUM FILIX-FEMINA, *var.* CLARISSIMA (*Jones*)

R. Moule. North Devon. 1868.

Under glass by Captain Jones. It has been thought desirable to print another frond of this variety to show the development of which it is capable. Though barren it produces an infinity of abortive spore cases.*

* N.B.—It was upon this fern that the phenomenon of "apospory" was first discovered by the author (*vide* "Life History of Ferns").



V

ATHYRIUM FILIX-FEMINA CLARISSIMA (*Mouté*)

VI

20. FRIZELLÆ (*Moore*)

Mrs. Charles Frizell, Castle Kevin, Co. Wicklow.

Co. Wicklow. 1857.

1 ft. 3 in.

Syn. LUNULATUM (*Holl.*)

21. FRIZELLÆ RAMOSUM (*Lowe*)

Mr. E. J. Lowe. (Raised) 1874.

1 ft.

Syn. RAMO-LUNULATUM (*Holl.*)

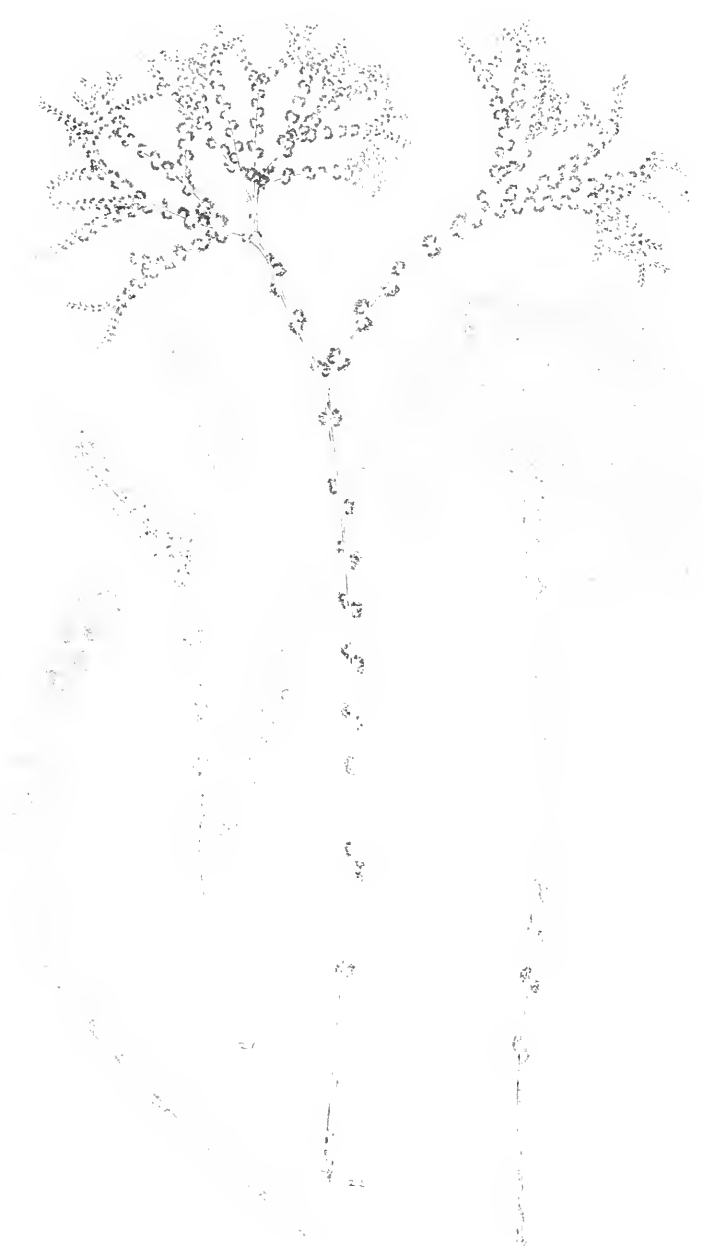
22. FRIZELLÆ MULTIFIDUM.

Syn. LUNULATO-MULTIFIDUM.

23. A similar form has been raised by Glave, of Scarborough.

Mr. Phineas Riall, of Old Conna Hill, Bray, writing on the same subject, says:—"Mr. Bain, of the College Botanic Gardens, raised quantities from spores, and about five years after he got it gave me a young plant which crested beautifully, the original plant being quite plain. I had many seedlings—some wonderfully crested."

The following definition of the peculiarities of *Ath. f. f. Frizellie* is from Mr. Edwin Fox:—"In *Frizellie*, the secondary rachis aborts at 1st, 2nd, or 3rd pair of pinnules, generally at 2nd, but then the tertiary rachis on which they are situated aborts also, and to that degree that the pinnules are crammed, or superimposed, as it were, on the top of one another, the posterior imbricating and half covering the anterior. The lamina of the pinnules partakes of the abortion and becomes, in some specimens of *Frizellie*, so congested as to appear warty or nodose,—the edges of the laminae are dentate and revolute. The anterior pinnule projects backwards in a plane posterior to the rachis, the posterior pinnule



VI

ATHYRIUM FILIX-FEMINA, var. *FRIZELLÆ*

projects downwards and forwards in a plane anterior to the rachis, and both are somewhat contorted—so as to embrace between them the rachis and to give the appearance of a twisted cable running up the rachis from below upwards.”

Perhaps the most remarkable sport of the cruciate class, and it is remarkable that after an interval of twenty years, precisely the same variety should have been found in another part of Ireland. Mrs. C. Frizell has kindly supplied the following interesting account of the original discovery. “I found it on our own property in a most beautiful reach of the Avonmouth river, which runs from Lough Dan, through this place (Castle Kevin, Co. Wicklow.) It was in the year 1857; it grew between two large boulders so fast and with apparently so little soil, that it was with great difficulty my husband removed it. I don't think I ever saw any plant of the *Frizellie* so perfect as the original; there were about eight fronds, none of them with those sports and irregularities one has since seen on it. I watched it for two years by the river-side, and it never had any appearance of seed, so we gave it to Mr. Bain, of the College Botanic Gardens, who put it into the hot-house, where it seeded immediately.”

The following account of the second discovery has been supplied by Dr. Moore, of Glasnevin.

“This variety has been again found this year in the Co. Donegal, near Letterkenny, by Henry Chichester Hart, Esq., son of the Vice-Provost, Trinity College, Dublin, who accompanied the last Arctic Expedition as Naturalist. The two finds were exactly similar in form in every way. A wild frond from Mr. Hart's plant was sent to Mr. Moore, of Chelsea.” Mr. Moore, of Chelsea, writing in the *Gardener's Chronicle* with reference to this frond, says that he has no hesitation in identifying it with *Ath. f. f. Frizellie*.

Mr. Hart states that “there were several fronds on the plant, all perfect, and similar to that sent to Chelsea, which was faultlessly typical.”

Probably no form has been more productive of varieties by seed than *Frizellie*. Mr. Glover, whose experience in this direction is

perhaps the largest, writes, " Mr. Clapham sent me a frond of the original in fine fructification, from which I raised several hundreds of plants. The second year I observed one showing a small crest, with spores, from which crest I obtained many curious varieties, and all the varieties subsequently obtained emanated from this source."

VII

GIRDLESTONEI (*Very*)

The Rev. Canon W. Harvey Girdlestone, Gloucester. Rosshire.

1866. 1 ft. 9 in.

Syn. LINEARIS (*Holl.*)



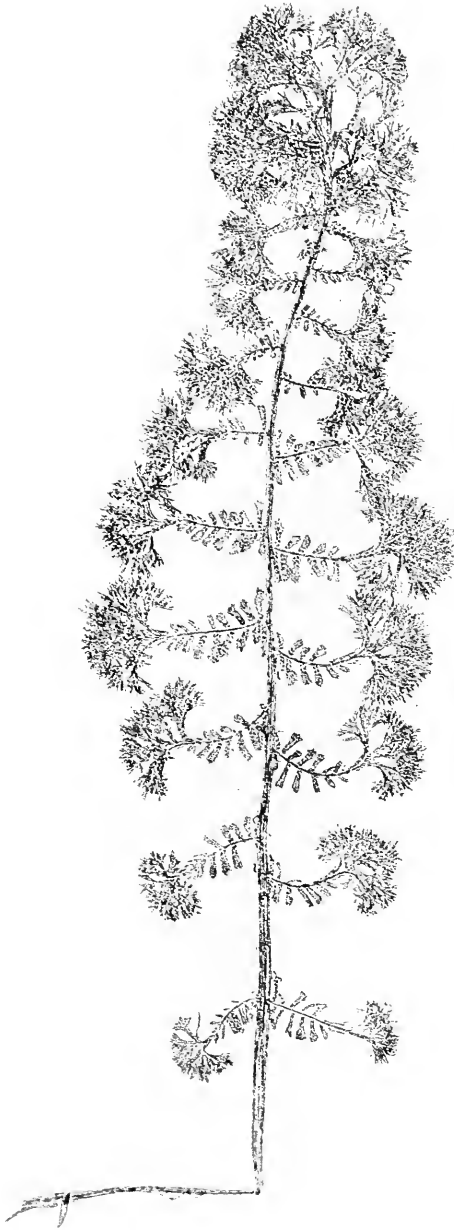
VII

ATHYRIUM FILIX-FÆMINA, *var* GIRDLESTONEII

VIII

ATHYRIUM FILIX-FEMINA, *var.* GLOMERATUM (*Levy*).

Raised.



VIII

ATHYRIUM FILIX-FÆMINA, *var.* GLOMERATUM

IX

PLUMOSUM (*Moore*)

James Horsfall, in the employ of Messrs. Stansfield, The Vale Nurseries, Todmorden. Yorkshire. 1860.

2 ft. 9 in.

Besides the form here figured, varieties of *plumosum* have been found by R. Moule in N. Devon in 1865, and by Mr. Wills in Dorsetshire in 1869. There is also the Axminster form, found in 1860 by John Trott, a working farmer, a tenant of the Rev. Z. Edwards, and the Scotch form found in Lanarkshire in 1863 by Mr. M. Campbell, a nurseryman of Blantyre. The three last are more frondose than the others that have been mentioned, but much less so than *plumosum divaricatum* of Messrs. Stansfield (found in 1872 in Lancashire, by Wm. Morris, a fern collector). *Plumosum elegans* (*Moore*), a seedling of Mr. Parsons, from the Axminster variety, is perhaps the most beautiful of the true *plumosums*.



IX

ATHYRIUM FILIX-FEMINA, *var.* PLUMOSUM HORSFALL

X

KALOTHRIX (*Loze*)

Mr. Howlett, County Court House, Oxford. (Raised) 1870.

Mr. Sim, Foot's Cray, Kent. (Raised) 1874.

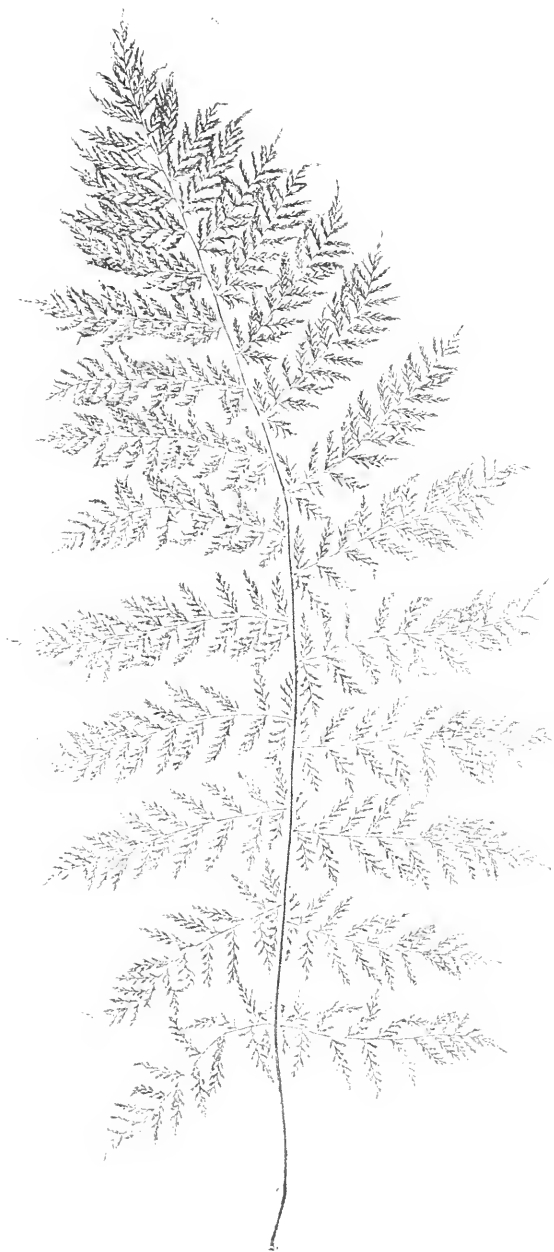
1 ft. 6 in.

It was thought for some time that this was an Irish form of *plumosum*, but Mr. Baxter writes that it came from the Chelsea Botanic Gardens. With reference to this point Mr. Moore adds that it must have been in this case a division from Stansfield's original plant, half of which having been exhibited for a certificate at S. Kensington soon after its discovery, was sent by Messrs. Stansfield to Chelsea. It is strange, however, considering the very marked tendency in the seedlings from the Oxford plant to run in the *Kalothrix* strain, that no similar trace of this strain should ever have been detected among the thousands of seedlings raised by Messrs. Stansfield and others from the Yorkshire plant. The nearest approach to an analogous form is in *A. f. f. acuminatissimum* of Stansfield (a seedling of *plumosum*), but the distinction is so marked as rather to be an argument in favour of a different parentage.

The original plant was raised by Mr. Howlett from a form of *plumosum* growing in the Oxford Botanic Gardens. Stimulated by this result, Mr. Sim obtained a division of the Oxford plant, also a seedling *plumosum*, raised by Mr. Howlett from the same source, and from one of these (he is not certain which) he states that he obtained at the first sowing some hundreds of plants, of which about ten or twelve per cent. were *Kalothrix*, the remainder varying between *plumosum*, *sub-plumosum*, and normal purple-stemmed *filix-femina*.

In the Sherardian Herbarium, Oxford Botanic Gardens, is to be seen a wild frond gathered many years since in the Morne Mountains, almost identical with *Kalothrix*.

This variety requires extreme care in cultivation, strong light being fatal to its beauty. When well-grown it is perhaps the most delicately beautiful of British Ferns. Some of the happiest results have been obtained under treatment suited to filmy ferns, to which indeed in appearance it bears no slight resemblance.



X

ATHYRIUM FILIX-FÆMINA, *var.* KALOTHRIX

XI

REGALE (*Barnes*)

Barnes. (Raised) 1867.

2 ft. 6 in.

Raised by Mr. Barnes from *splendens*, and worthy of its name,—the nearest approach to a real crested *plumosum*,—though it bears spores ;—in colour a clear golden green,—some of its seedlings promise to be even better than the parent, if that be possible.

There is something in the cresting of *Athyriums* which seems destructive of the true plumose character,—perhaps it is that a Fern cannot think of too much at one time,—however, the fact remains that hitherto, in spite of the efforts of all the most skilled manufacturers, the two characters, in their perfection, have not yet been combined. J. Wilson, of Bowness, can show seedlings from a plumose *Athyrium*, in every stage from simple *plumosum* to perfect *cristatum* ;—the plumose character being unmistakably visible when the plants are but slightly crested, but fading away exactly in proportion to the development of the cresting, and to a certain extent this change goes on in the same plant.



XI

ATHYRIUM FILIX-FÆMINA, *var.* REGALE

XII

GRANTIE (*Moore*)

Mr. Paul, Truro, Cornwall, 1865.

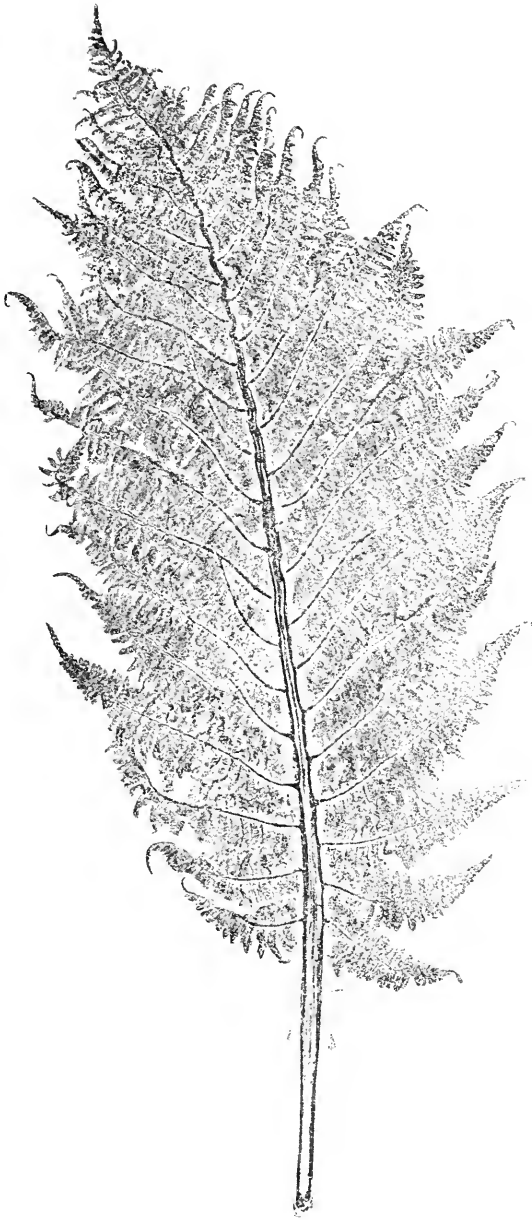
1 ft. 2 in.

Syn. CONGESTUM PAUL (*Holl.*)

By Mrs. Grant. The finest of the congested forms of *Athyrium*. There were two crowns when it was found, one of which came into Mrs. Grant's possession, the other found its way to Foot's Cray;—but whether they were from the first separate plants, or whether the crowns afterwards developed differently, it soon became evident that they had distinct characters—Mrs. Grant's plant being a *crispatum*, Mr. Sim's a *congestum*—subsequently the latter also came into Mrs. Grant's possession, and is now considered the typical form of *Grantie*.

A very similar form was found by Mr. Padley in N. Somerset. There are also two other congested forms—smaller in growth but very beautiful; *crispissimum* of Stansfield, renamed *Simpsoni* from its discoverer—and the form improperly named *Edwardsii*—which Mr. Biggs, curator of the Cambridge Botanic Gardens, believes to have originated in Ireland. This plant came from the Cambridge Gardens into the possession of Mrs. Riley, of Papplewick Lodge, Nottingham, among whose family it soon became known under the familiar title of “Little Mr. Biggs,” out of compliment to the donor. Some time afterwards a person whose individuality we think it only kind not to particularise further, and who had heard of its beauty, came to see it, and was so interested in it that he asked to be allowed to take another parting look at it. It was afterwards remarked that the plant seemed rather in a state of confusion, and that the soil had been a little agitated, but nothing more was thought of it, until a year or so later, when it became known that a plant exactly similar, and accompanied by a very promising family, had been exhibited at one of the Royal Horticultural Society's Shows as *Edwardsii*, and had received a 1st Class certificate.

Crested seedlings of this latter variety have been raised by Mr. Lowe.



XII

ATHYRIUM FILIX-FŒMINA, *var.* GRANTLÆ

XIII

VICTORIÆ (*Moore*)

Mr. James Cosh. Stirlingshire. 1861.

1 ft. 6 in.

Syn. CRUCIATO-CRISTATUM (*Holl.*)

By Mr. Wollaston, and from the original plant. It is difficult to conceive how such an extreme deviation from the normal form could have been produced in all its strange perfection without gradual development, yet it would seem to have sprung directly by seed from some common *Athyrium*.

Mr. Lowe has had his usual good fortune in his seedlings of *Victoriæ*, two of which have been figured and named by him *Victoriæ magnificum*, *Victoriæ gracile*.

Mr. Edwin F. Fox thus defines the peculiarities of this variety. "A cruciate and crested *Athyrium*. In it we observe abortion of secondary rachis at the first pair of pinnules, then an abnormal development of this first pair—which is really a tertiary rachis—upwards and downwards and away from the primary rachis, so as to cross the similarly developed pinnules above and below them:—apices of primary and tertiary rachides crested."



XIII

ATHYRIUM FILIX-FEMINA, *var.* VICTORIE

XIV

BLECHNUM SPICANT, *var.* TRINERVUM CORONANS (*Moore*)

Mr. J. M. Barnes. Westmoreland. 1872.

6 in.

Syn. BRACHIATO-CRISTATUM

Grows freely and with a neat, compact habit, and is perhaps the most marked and beautiful form of *Blechnum* yet discovered. The outline of the lower part of the frond varies considerably.



XIV

BLECHNUM SPICANT, *var.* TRINERVUM CORONANS

XV

RAMO-CRISTATUM (*Stansfid.*)

W. G. Maunder, gardener, Kidwelly, Carmarthenshire.

Carmarthen. 1876.

9 in.

By Messrs. Stansfield. "Found in the neighbourhood of Kidwelly, Carmarthenshire." Note by Mr. F. W. Stansfield.



XV

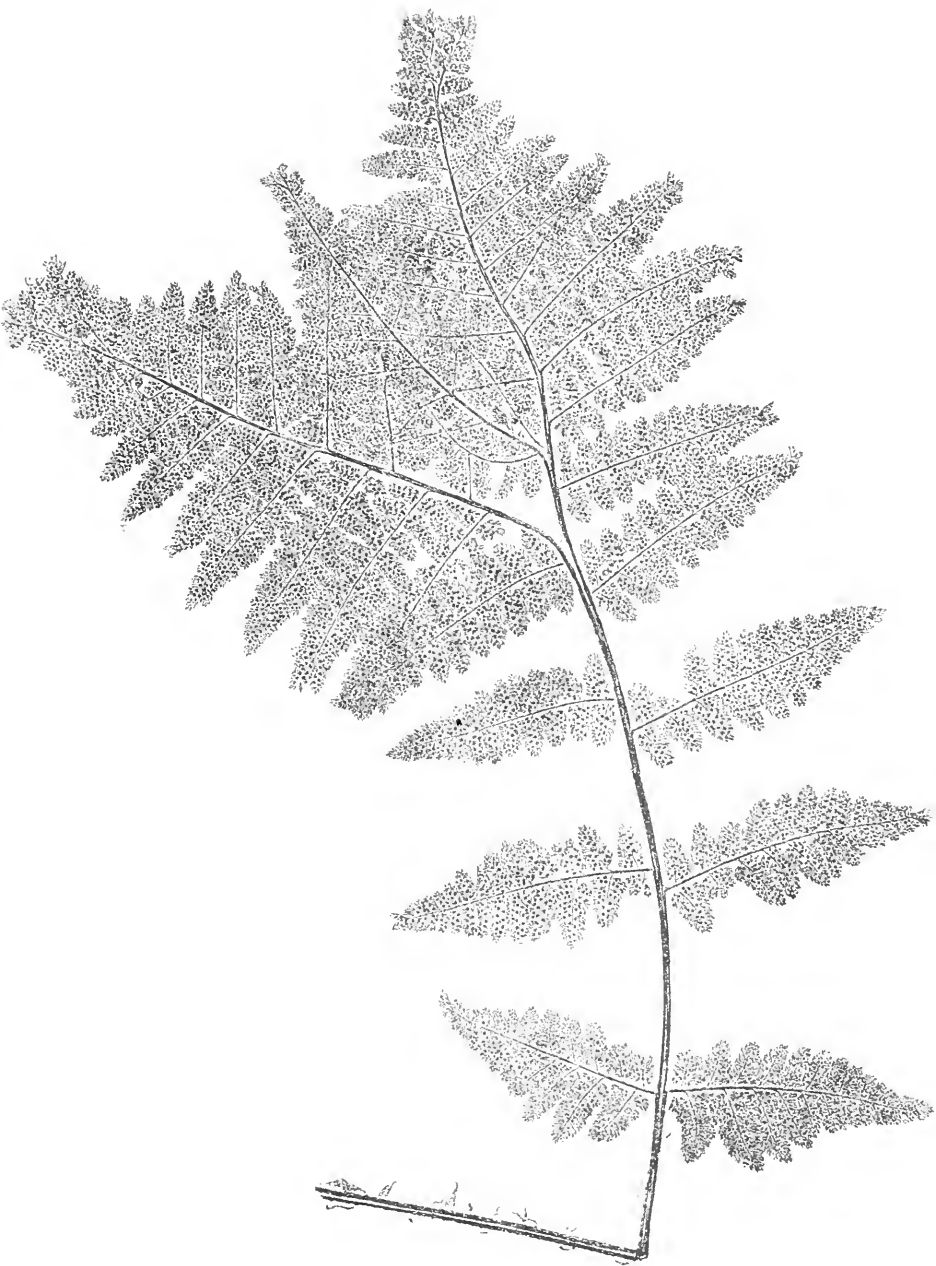
BLECHNUM SPICANT, RAMO-CRISTATUM

XVI

LASTREA DILATATA, var. CRISTATA OSCROFT (*Holl.*)

Mr. Jno. Oscroft, Fern Collector, Brighton. Somerset. 1873.
2 ft.

By Major Jones. Found within a few miles of Bristol, on the Somersetshire side.



XVI

LASTREA DILATATA, *det.* CRISTATA

XVII

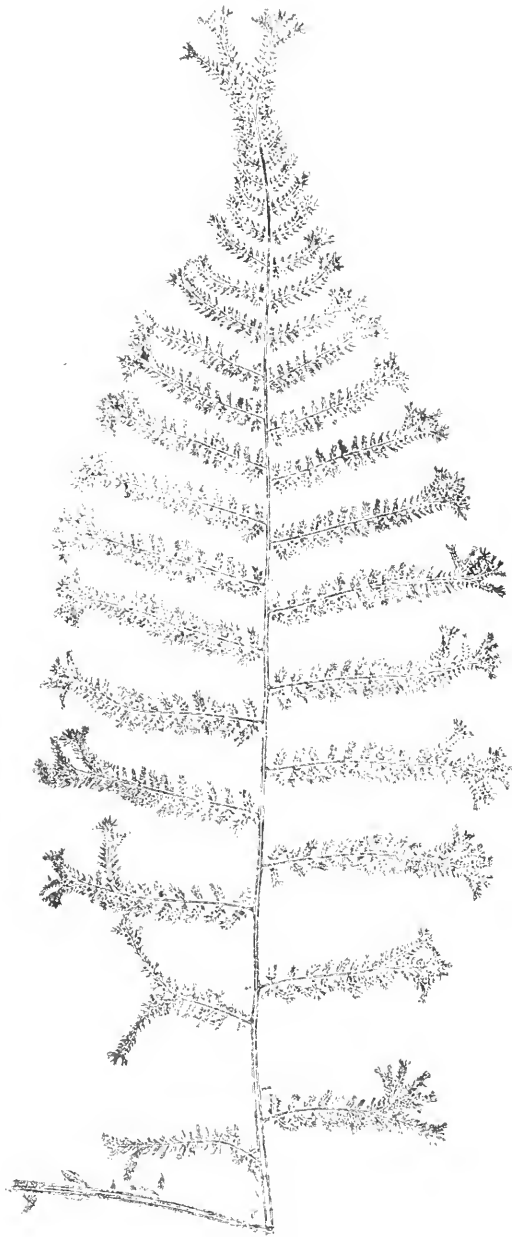
CRISTATA ROBERTS (*Holl.*)

Mr. Roberts, Llanberis. Carnarvon. 1870.

1 ft. 9 in.

Syn. CRISTATA-GRACILIS (*Jones*)

Under glass by Mr. Mapplebeck. Would be one of the most useful of British Ferns were it not for a partial depauperation that sticks to this variety and its progeny as persistently as it does to *L. f.-mas Jervisii*.



XVII

LASTREA DILATATA, *var.* CRISTATA ROBERTIS

XVIII

LASTREA PSEUDO-MAS, *var.* RAMOSISSIMA (*Moore*)

The late Mr. Robert Wright, Parkfield, Stone, Staffordshire.

N. Wales. 1864.

Syn. RAMO-CRISTATA (*Woll.*)

By Mr. Parsons. This variety has never been reproduced from seed. Mr. Parsons considers that he has raised the variety *cristata* from it, but probably like its counterparts in *P. angulare*, and with *A. f. f.*, viz., *acrocladon*, it is barren.

It is maintained by more than one good authority that *L. ps.-mas*—and that only—can be raised from spores of *L. ps.-mas ramosissima*. Plants in Mr. Wollaston's collection—said to have been raised in this way—seem certainly smaller and paler in colour than the common *cristata*.



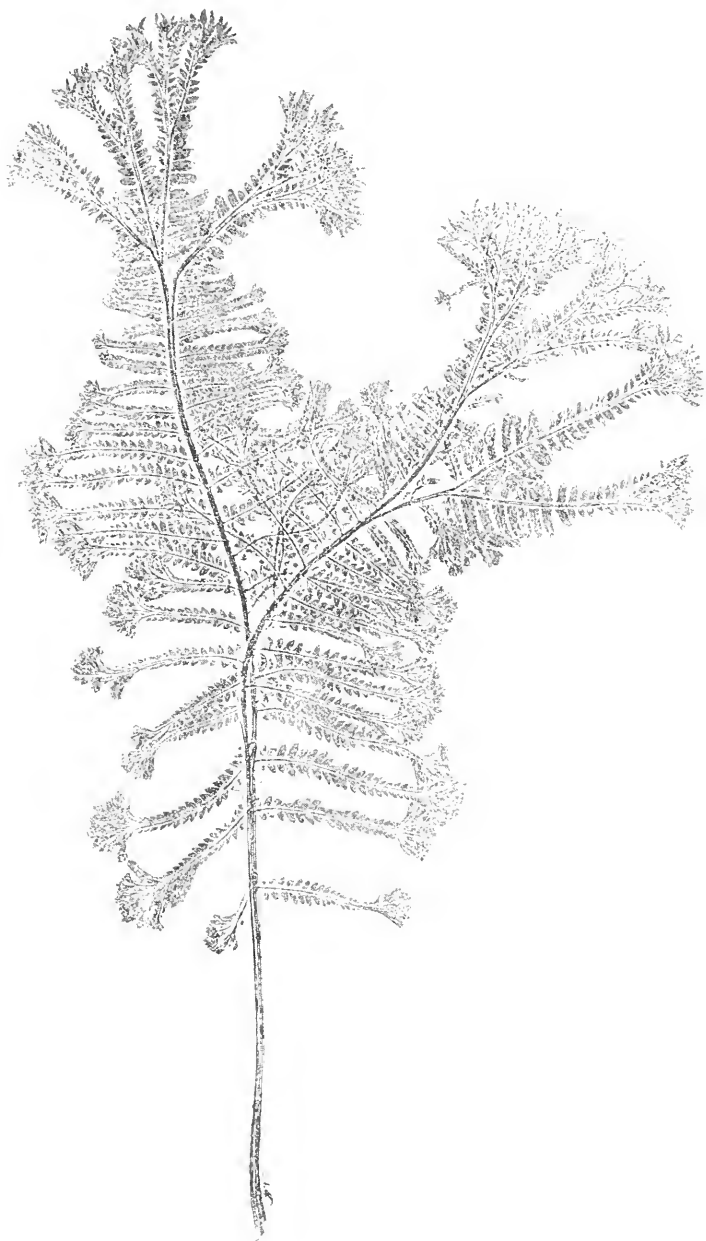
XVIII

LASTREA PSEUDO-MAS. *var.* RAMOSISSIMA

XIX

LASTREA FILIX-MAS GRANDICEPS

Mrs. Berry, Key Pit, Ilfracombe, N. Devon. 1870.



XIX

LASTREA FILIX MAS. *var.* GRANDICEPS BERRY

XX

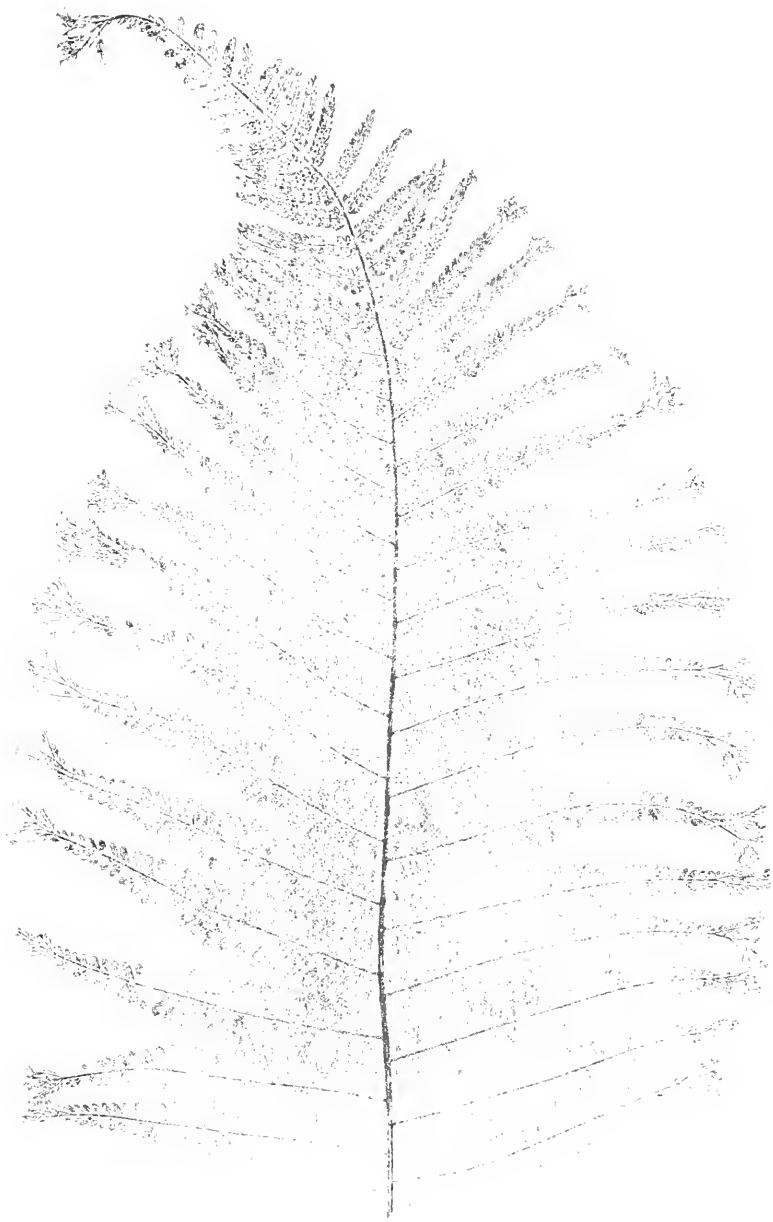
SUBCRISTATA DADDS (*Moore*)

John Dadds, Ilfracombe. N. Devon. 1861.

3 ft.

Syn. FURCILLATA (*Woll.*)

A grand Fern, scarcely as well known as it deserves ; a considerable colony of this variety had the audacity to establish themselves in a wood within sight of J. Dadd's house close to Ilfracombe, and soon met the fate such temerity deserved. Furcillate forms have been found by many, of these perhaps as good as any is the one found by Wilson.



XX

LASTREA PSEUDO-MAS, var. SUBCRISTATA DADDS

XXI

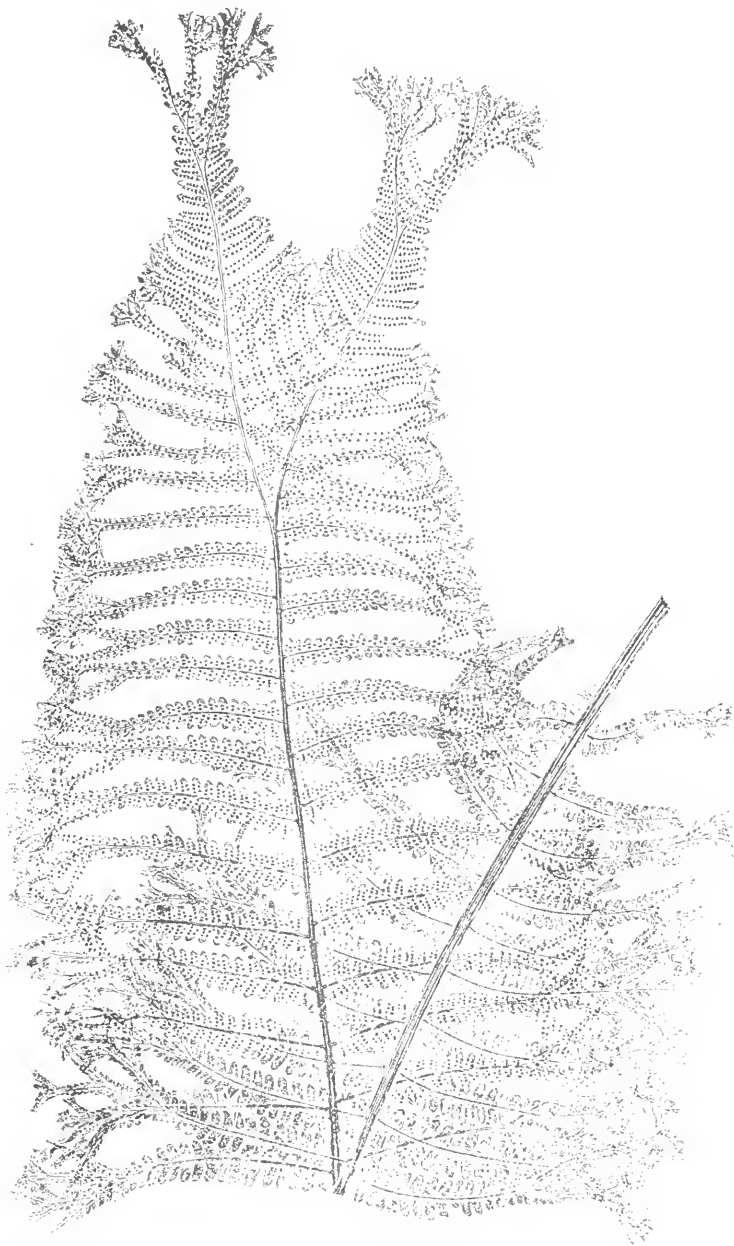
LASTREA PSEUDO-MAS, var. POLYDACTYLA MAPPLEBECK (*Woll.*)

Mr. J. E. Mapplebeck. Westmoreland. 1862.

2 ft. 9 in.

Syn. MAPPLEBECKII (*Moore*)

Another grand fern. It is remarkable that almost identically the same form—" *L. ps.-mas polydactyla Wills*"—should have been found a few years later, hundreds of miles away in S. Devon—perhaps Mr. Wills' form may be a shade the more robust of the two,—but it is very much a case of Cæsar and Pompey. Mr. Crouch's *polydactyla* found in Westmoreland is a fine form too, but more lax and scarcely as heavily tasselled.



XXI

LASTREA PSEUDO-MAS, var. *POLYDACTYLA* MAPPLEBECK

XXII

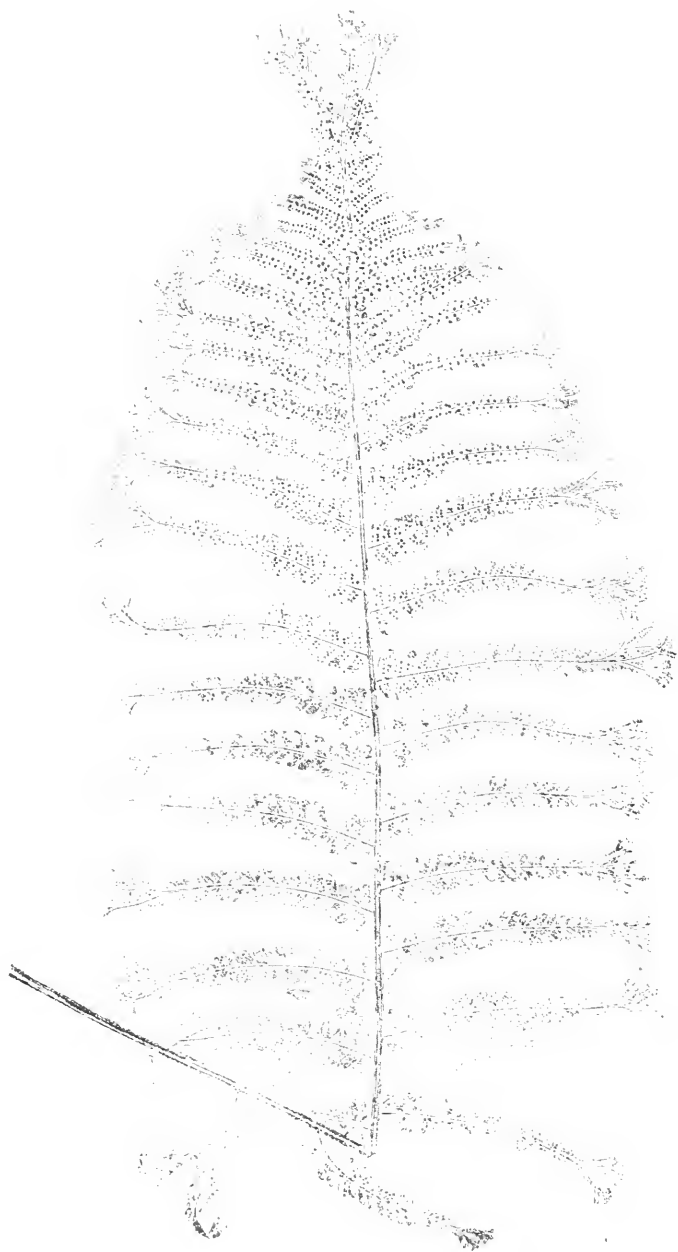
LASTREA FILIX-MAS, *var.* CRISTATA ELLACOMBE (*Holl.*)

The Rev. H. Ellacombe, The Rectory, Bitton, Somerset.

Pembroke. 1856.

2 ft. 3 in.

The finest and most symmetrical of the larger forms of *L. filix-mas cristata*;—that of Martindale found in the Lake District (and sent out as Iveryana) is not so large or it might otherwise run it closely;—*Jervisii* could do it if it chose, but it never can throw off the untidiness that disfigures it,—Mr. Padley has several forms, all good,—*attenuata cristata* perhaps the best. Dr. Allchin's crested form was found in N. Devon in 1870.



XXII

LASTREA FILIX-MAS, *var.* CRISTATA ELLACOMBE

XXIII

GRANDICEPS WILLS (*Woll.*)

Mr. John Wills. Dorset. 1870.

3 ft.

Towers above all other forms of *grandiceps*,—three forms have been found by Mr. Padley, all in N. Devon;—the original *grandiceps* was found by Wearing, a labouring man, on Warton Crag in 1862. It had four crowns, one of which soon found its way to Foot's Cray. Mrs. Berry's form was figured as No. 2, 2nd series. (See XIX.)



XXIII

LASTREA FILIX-MAS, *var.* GRANDICEPS WILLS

XXIV

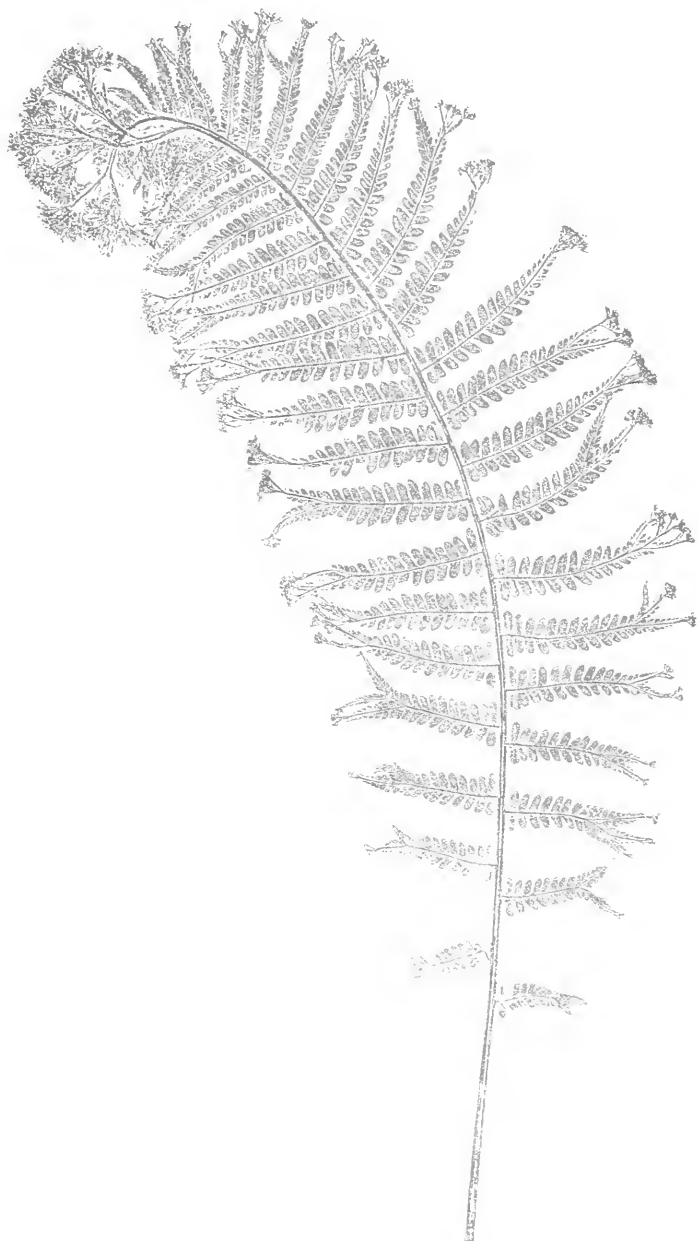
LASTREA PROPINQUA, var. CRISTATA BARNES (*Holl.*)

Mr. J. M. Barnes. Westmoreland. 1870.

2 ft. 3 in.

Syn. CRISTATA, BARNESII (*Moore*)

The best of the many forms of *propinqua cristata*. Mr. Barnes has noted three other crested forms;—the original *abbreviata cristata* (*Moore*) found by J. D. Harrison in Borrowdale, many years since;—*cristata Cowardii* (*Moore*) found at Ambleside in 1871, and *curvata cristata* (*Barnes*) found by Mr. Barnes at Swindale in 1863.



XXIV

LASTREA PROPINQUA, *var.* CRISTATA BARNES

XXV

LASTREA PSEUDO-MAS, var. CRISTATA (*Moore*)

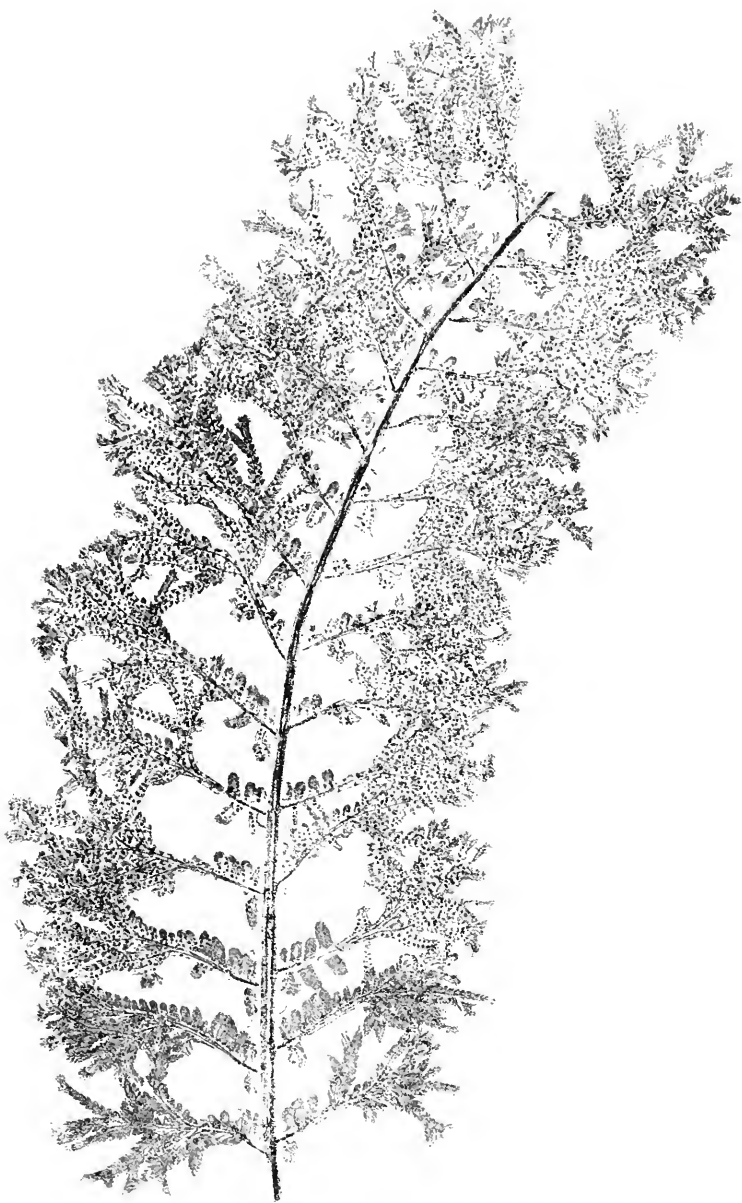
Cornwall. Before 1850.

3 ft.

Perhaps the grandest and most useful of British Ferns, and it is scarcely to the credit of Pteridologists that its history should still remain obscure;—all that is known is that it was found in the parish of St. Austell in Cornwall, in the grounds of Caerleugh, and that the plant was at Kew in 1850.

Dadds, of Ilfracombe, found in N. Devon a crested form of this species, differing however in character from this—and R. Moule of the same place, and whose statements are to be relied on, says that he found near Ilfracombe four plants apparently identical with the original.

More seedlings have probably been raised from this variety than from any other British Fern, yet it is remarkable how rarely has there been any marked divergence:—*angustata-cristata* is the most remarkable, and was reared by Mr. Sim from a batch of small fry given to him by Mr. Wollaston—*cristata elegans* of Mr. Wollaston, *cristata crispata* of Mr. Ivery, and *cristata intermedia* were, until lately, the only other sports from it worthy of note,—but a new form of *crispata cristata* has lately been raised by Mr. Gott, of Kendal, which promises to be a distinct and handsome variety.



XXV

LASTREA PSEUDO-MAS, var. CRISTATA

XXVI

POLYDACTYLA DADDS (*Holl.*)

John Dadds. Raised, 1872.

3 ft.

There are few Ferns grander, more distinct, and more graceful;—owing to its upstanding habit, the frond itself will not bend under the heavy crest,—so the latter has to bend down, which it does in a way and with a grace rarely seen. It is a dark-complexioned Fern, yet with a clear lustrous look, and the flat digitate endings of the pinnæ stand out in a way that is very striking. It is said to have been raised from *furcans*, to which it has, no doubt, some points of resemblance, but it must have better blood in it than that.



XXVI

LASTREA PSEUDO-MAS. var. POLYDACTYLA Dadds

XXVII

LASTREA FILIX-MAS PALEACEA (*Newman*)

Syn. L. PSEUDO-MAS (*Holl.*)

Var. RAMO-CRISTATA (*Holl.*)

Mr. Wilson, Bowness, Lancashire. 1871.



XXVII

LASTREA PSEUDO-MAS, var. *RAMO-CRISTATA*

XXVIII

LASTREA PSEUDO-MAS, var. REVOLVENS (*Woll.*)

Mr. F. Clowes, Windermere. Westmoreland. 1868.

1 ft.

It is remarkable that this very distinct variety should have been unconsciously introduced into a fernery (that of Mrs. Taylor at Iffotsholme Farm, Troutbeck Bridge, Windermere). "She wished," Mr. Clowes writes, "the gardener to ornament with ferns a sort of paved bank near the garden; he got a lot of ferns anywhere and this was one of them." It was there first noticed by Mr. Clowes, who adds that it was then a fairly tall-growing plant,—at least 2 ft. high,—but since its division it has adopted a much more dwarf habit, which as far as can be yet judged of, is shared by its seedlings.



XXVIII

LASTREA PSEUDO-MAS, var. REVOLVENS

XXIX

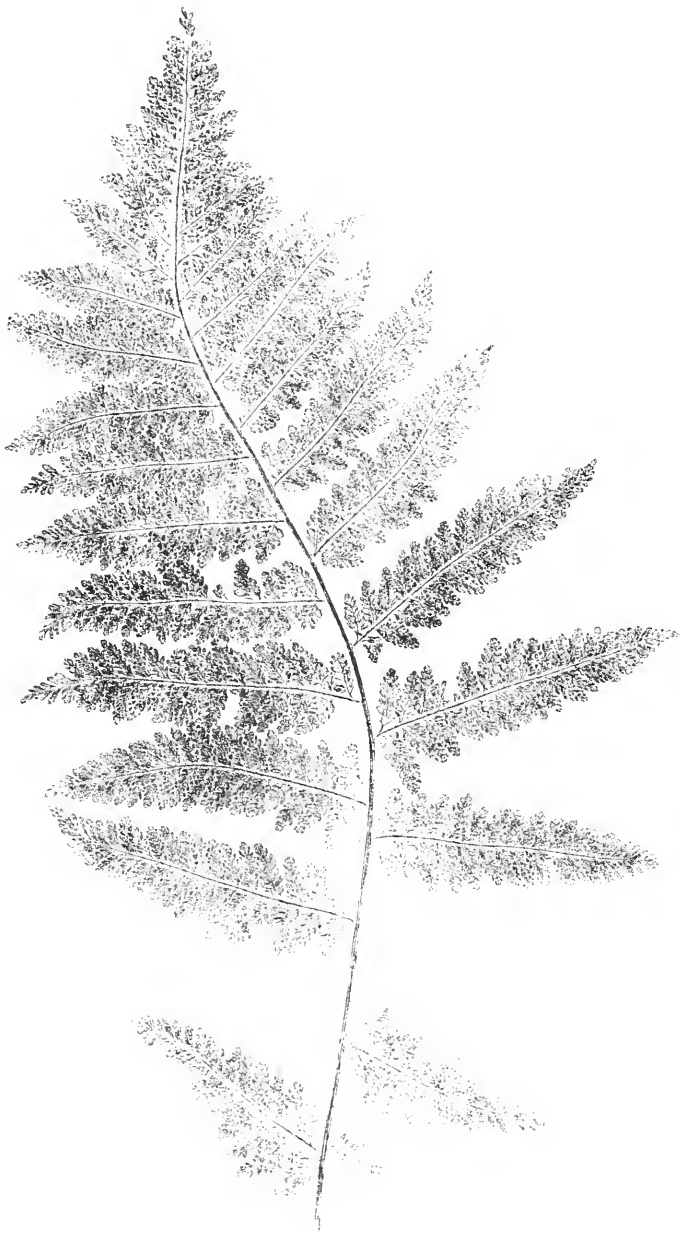
LASTREA FILIX-MAS, *var.* BOLLANDLE (*Moore*)

Mrs. Bolland. Kent. 1857.

3 ft.

Syn. PLUMOSA (*Woll.*)

By Mr. Clowes. The only plumose form of the species yet known. Mrs. Bolland states that she found it growing in a hedge entirely apart from other Ferns. As it occasionally bears a few spores, attempts have been made to raise a form free from the depauperation which always detracts more or less from its beauty. The most promising results have been obtained by Dr. Allchin, but the experiments are as yet too recent to be quite relied on.



XXIX

LASTREA FILIX-MAS, var. BOLLANDIÆ

XXX

LASTREA PSEUDO-MAS, var. CRISPA-CRISTATA (*Moore*)

Dr. Lyell. (Raised) 1866.

10 in.

Syn. CONGESTA CRISTATA (*Woll.*)

Under glass by Mr. Wollaston. Mr. Sim writes that the original plant of *L. ps.-mas crispa* was found by the late Mr. F. W. Salter, of London, in Wales, and given by him to the Hon. Mrs. Wrightson, of Warmsworth Hall, Doncaster. Mr. S. Appleby, of Balby, obtained a fertile frond, and raised a goodly batch, of which 200 went to Foot's Cray; these were all perfectly true to character, as were all that have since been raised at Foot's Cray or anywhere else almost. Dr. Lyell, however, had in his first batch of seedlings two remarkable deviations—*crispa cristata*, here figured, and *crispa gracilis*. Mr. E. J. Lowe has two other remarkable sports—one raised by Dr. Lyell which he has named *crispa linearis*, extremely narrow, and not erect in habit; the other a very beautifully crested form—a stray seedling, also quite distinct. Mr. Lowe did in a hasty moment propose a name for this, but it has been thought kinder to the Fern and to him to allow time for a little further consideration, so the Fern stands nameless though it is a very beautiful one.



XXX

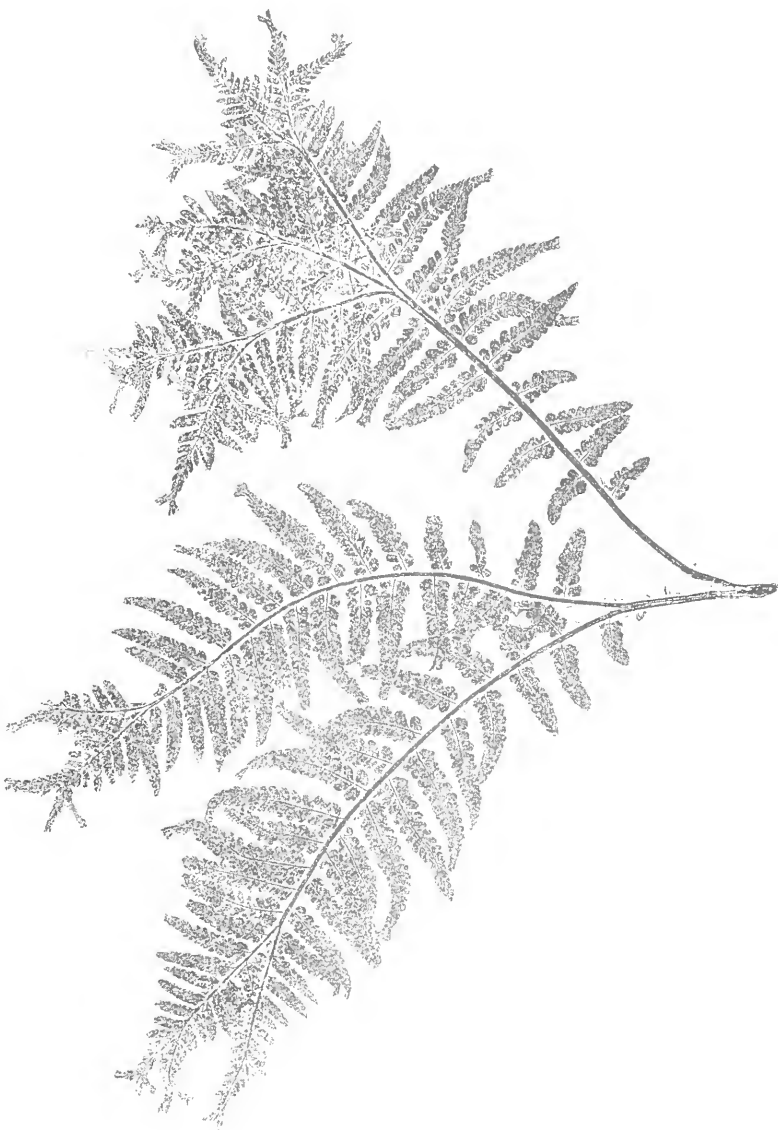
LASTREA PSEUDO-MAS, var. CRISPA-CRISTATA

XXXI

RAMO-FURCILLATA (*Woll.*)

Mr. J. Dadds, Ilfracombe. N. Devon. 1864.

Two plants of this variety were found, one more ramose than the other. The frond figured is from a seedling raised by Dadds.



XXXI

LASTREA PSEUDO-MAS, var. RAMO-FURCILLATA

XXXII

LASTREA FILIX-MAS, var. CRISPATA HODGSON (*Barnes*)

The late Mr. J. K. Hodgson, Ulverstone. Lancashire. 1864.

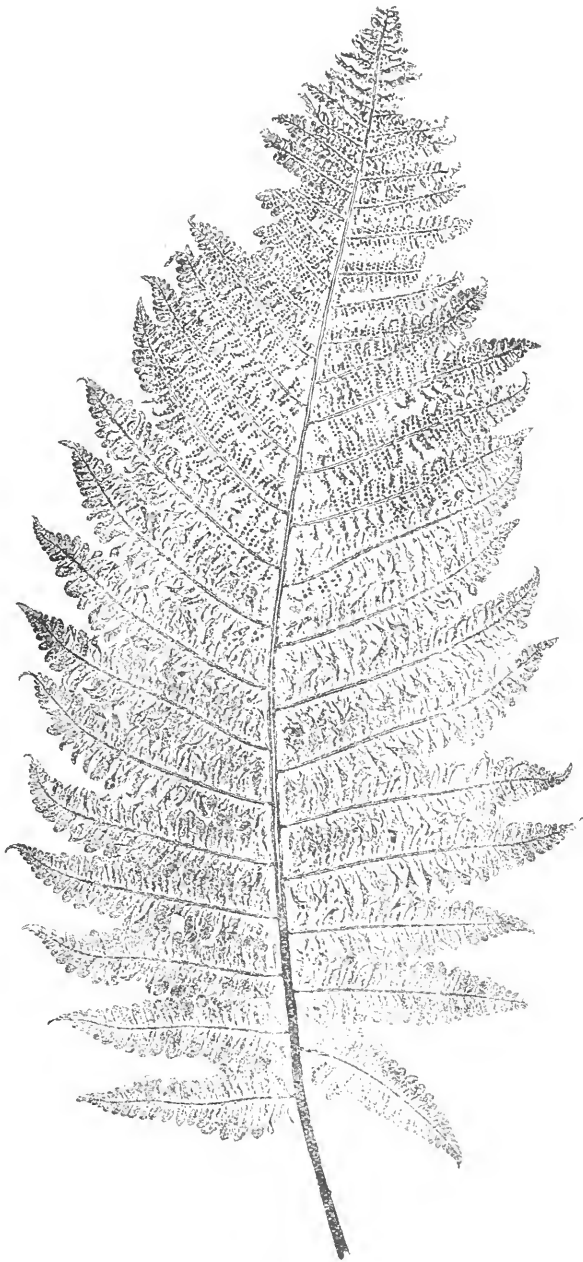
1 ft. 3 in.

Syn. CONGESTA (*Holl.*)

Syn. FLUCTUOSA (*Stansfield*)

Its dark green colour, crisped pinnules, and compact habit give to a well-grown plant of this variety a charming look.

A remarkable dwarf crisped form of *felix-mas* (now in the possession of Major Jones) was found by Canon Swayne, of Salisbury, in Carnarvon in 1874.



XXXII

LASTREA FILIX-MAS, *var.* CRISPATA HODGSON

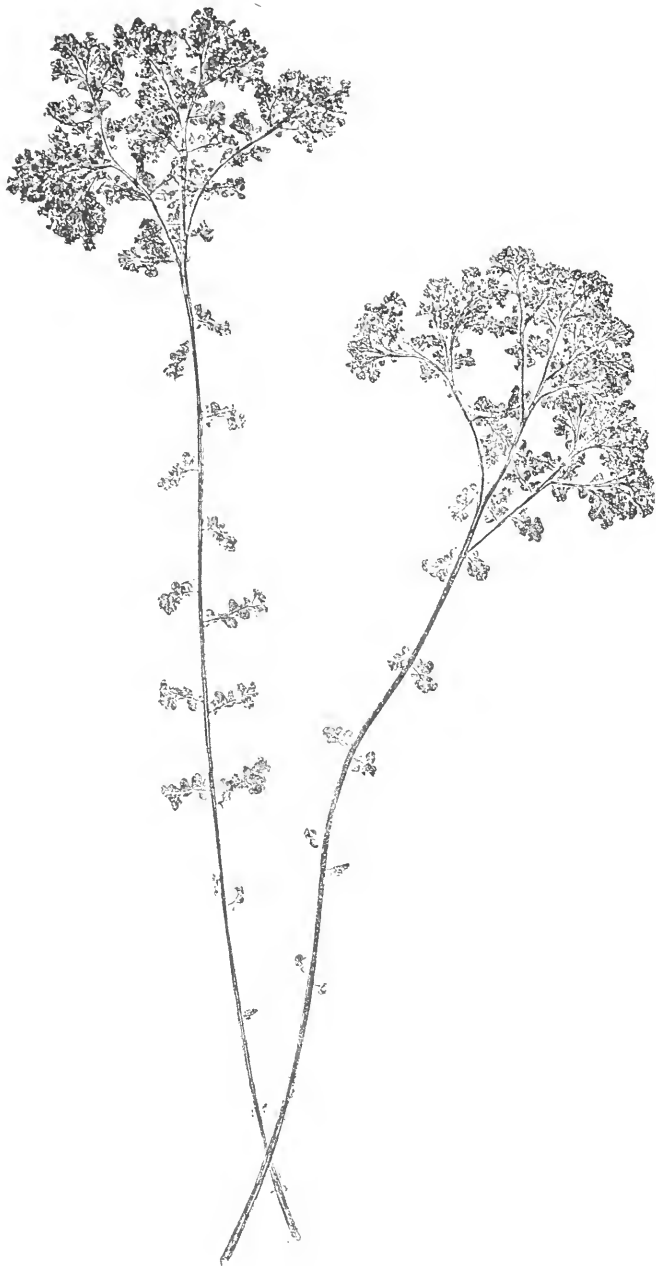
XXXIII

LASTREA MONTANA, *var.* GRANDICEPS (*Barnes*)

Mr. J. M. Barnes. (Raised) 1872.

1 ft. 6 in.

A seedling from *cristata* *Barnes*. (See note to No. XXXV.)



XXXIII

LASTREA MONTANA, var. *GRANDICEPS* BARNES

XXXIV

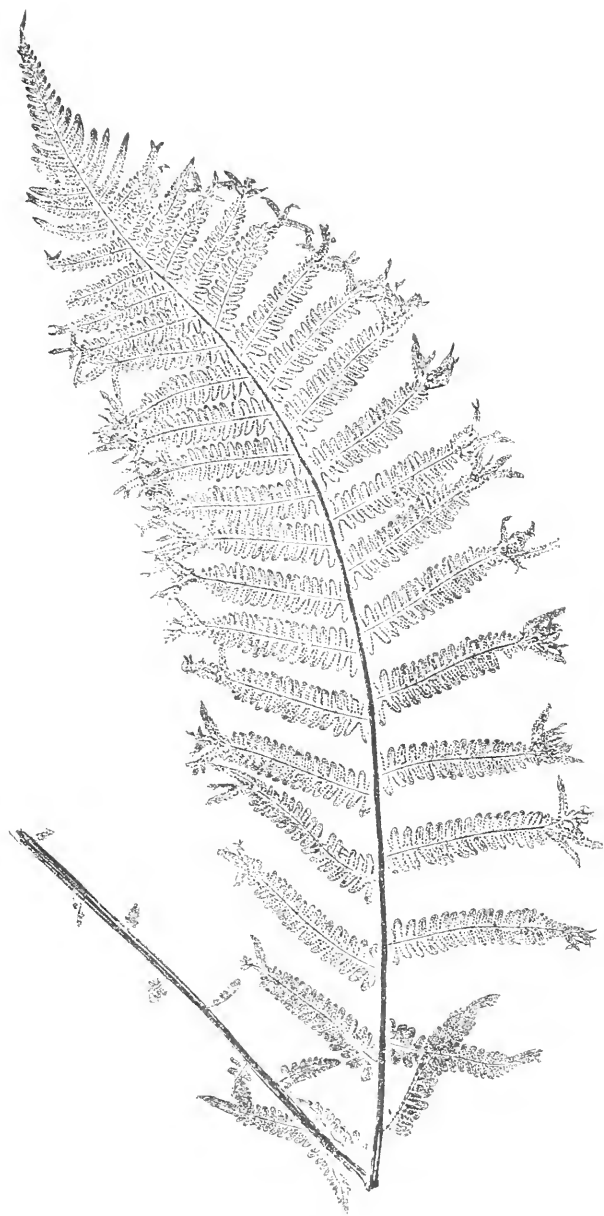
DIGITATA MRS. HODGSON (*Jones*)

Mrs. J. K. Hodgson, Ulverstone. Westmoreland. (Raised) 1875.

1 ft. 9 in.

It is clearly to the credit of this variety, that with such strong natural temptation to break out into extravagance—as is evident from the conduct of its pinnæ—the plant itself should never have lost its head—for the apex of the frond shows no signs of cresting or even of furcation. Mrs. Hodgson writes: “When found, it did not show any digitate character, only a few of the pinnæ were just bifid—but it was very young, only about eight inches high; it has gone on improving, but I don’t think it has ever had a frond divided at the apex; I found it in Langdale.”

Mr. Barnes includes under the name *polyductyla* the variety found nearly twenty years ago by Mr. Clarke, of the Glasgow Botanic Gardens, and long known in the trade as *cristata*; this, like polydactylous forms generally, is crested at the apex; also *cristata Clowes*, found by J. Huddart, long ago, near Windermere.



XXXIV

LASTREA MONTANA, *var.* DIGITATA

XXXV

CRISTATA BARNES (*Woll.*)

Mr. J. M. Barnes. Westmoreland. 1871.

2 ft.

The grandest discovery of recent years—it holds the same place among *montanas* that the old *cristata* did, and does, among the male ferns. One can hardly help feeling that it is just a *little* bit unfair that this and *montana Barnesii* (*vide* No. XXXVI) should have both fallen to the lot of one discoverer—at least, one would have been inclined to do so if it hadn't been Mr. Barnes—who writes: “It was but a small plant when I found it, with four or five fronds, but at least one of these had spores; these I sowed at once and in the following year three distinct forms appeared in about equal proportions, one-third being normal *L. montana*, one-third *cristata* and named by Moore *coronans*, and one-third *ramo-angustate* and wonderfully crested; these were named by Moore *cristata angustissima*; there would I think be about 150 plants in all,—say 50 of each of the three forms;—no two plants are just alike either in crestring or narrowness of frond, in the latter respect ranging from $\frac{3}{4}$ of an inch to 12 inches in width; there is only one plant out of the above seedlings that I call *grandiceps*, although there are three or four that come near it in the form of crestring and size of the head.”

Mr. Barnes records the following other crested forms,—*attenuata cristata* (Moore) found by Mr. Barnes at Mardale, in 1865, and *caudata cristata* (*Barnes*) found by Mr. Crouch at Rydal Head in 1863.



XXXV

LASTREA MONTANA, var. CRISTATA

XXXVI

BARNESII (*Moore*)

Mr. J. M. Barnes. Westmoreland. 1865.

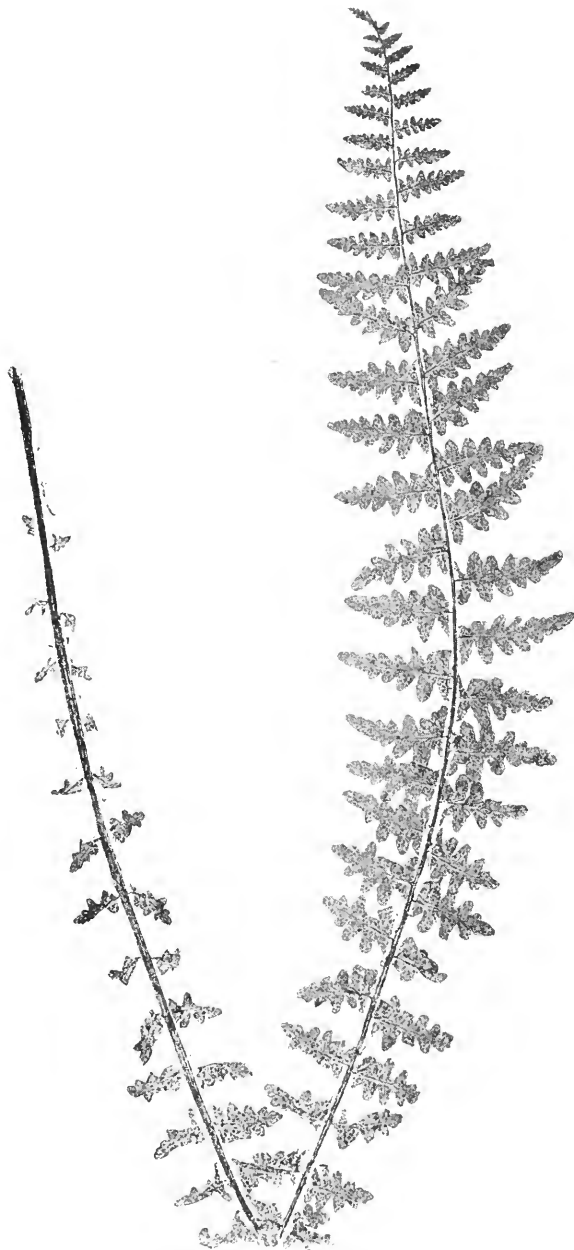
2 ft. 2 in.

Syn. ADPRESSA BARNES (*Holl.*)

One of the rarest and most beautiful of British Ferns;—its perhaps most marked characteristic,—the perfectly horizontal “lie” of the pinnules, which gives such an air of lightness, and makes it look like a very ladder of the Fairies,—is quite obliterated in a nature print.

Who will not read with the liveliest interest and sympathy Mr. Barnes’ account of its discovery! “*L. montana Barnesii* was found on a bare mountain side exposed to the north, it grew on a slightly raised breast or ridge of earth close to a spring of water; there were three or four separate and good-sized plants;—its aspect to any Fern-hunter would have been most startling, to me it was astounding; here, on a bleak mountain side, where other Ferns were stunted and starved, stood this marvellous-looking plant, with its bold, upright, narrow fronds two feet high, its dark green colour, its pinnules, standing in their peculiar way, and its robust habit, utterly unlike anything I had ever seen in creation; I believe my first feeling was that I must be in a dream,—the next that it must be a new species,—and when I found it to be a *montana* I sat down to admire it, feeling the happiest of Fern-hunters.

It is unfortunate this Fern prints so badly that no one can form any correct idea of what the plant is like from seeing either a pressed frond or a print.



XXXVI

LASTREA MONTANA, *var.* BARNESII

XXXVII

RAMO-CRISTATA (*Holl.*)

Mr. J. M. Barnes. Levens. (Raised) 1873.

Raised from a very fine crested form which was found by Mr. Barnes, in 1871, and which will be hereafter printed. The seedlings, thus raised, showed three distinct characters—those generally known by the names of *cristata*, *ramo-cristata*, and *grandiceps*. (*Vide* Nos. XXXIII and XXXV respectively.)



XXXVII

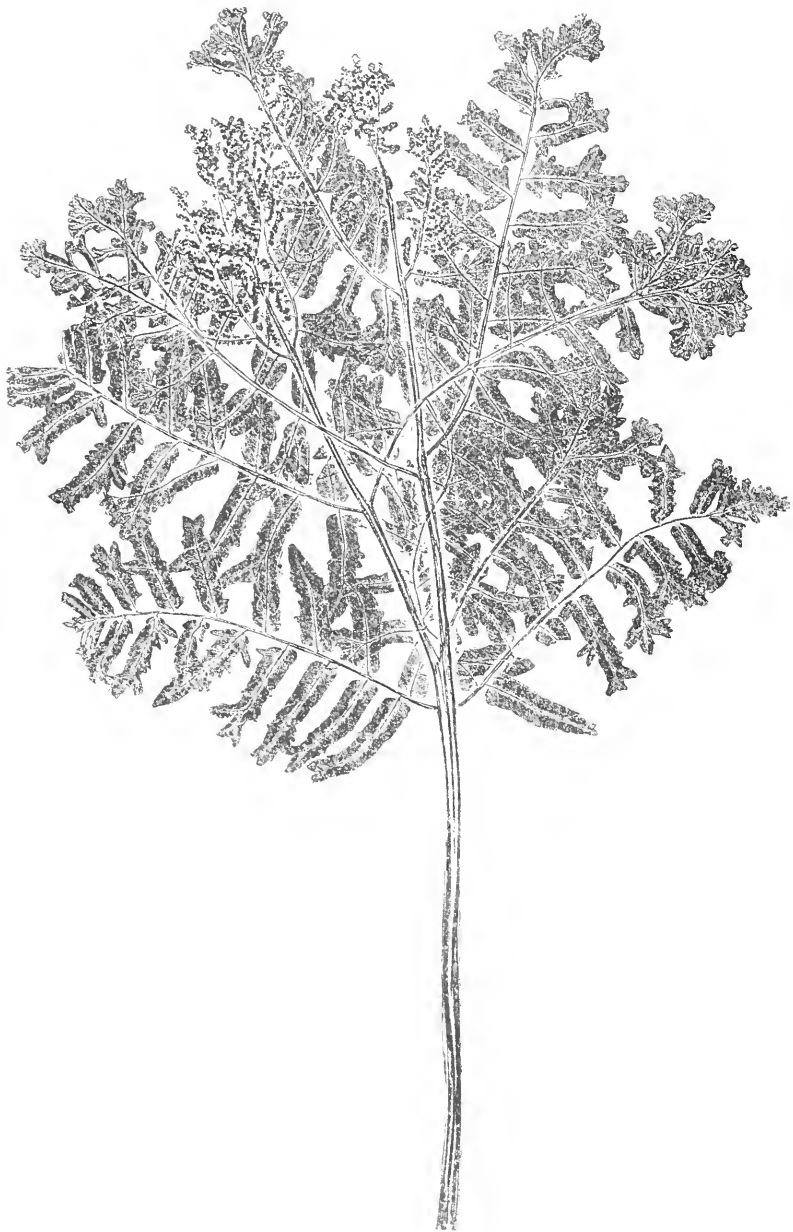
LASTREA MONTANA, var. *RAMO-CRISTATA*

XXXVIII

OSMUNDA REGALIS, *var.* RAMO-CRISTATA

(Raised) 1864.

By Captain Jones. A seedling derived from the crested form, from which it differs only in a tendency to divide in the rachis.



XXXVIII

OSMUNDA REGALIS, *var.* RAMO-CRISTATA

XXXIX

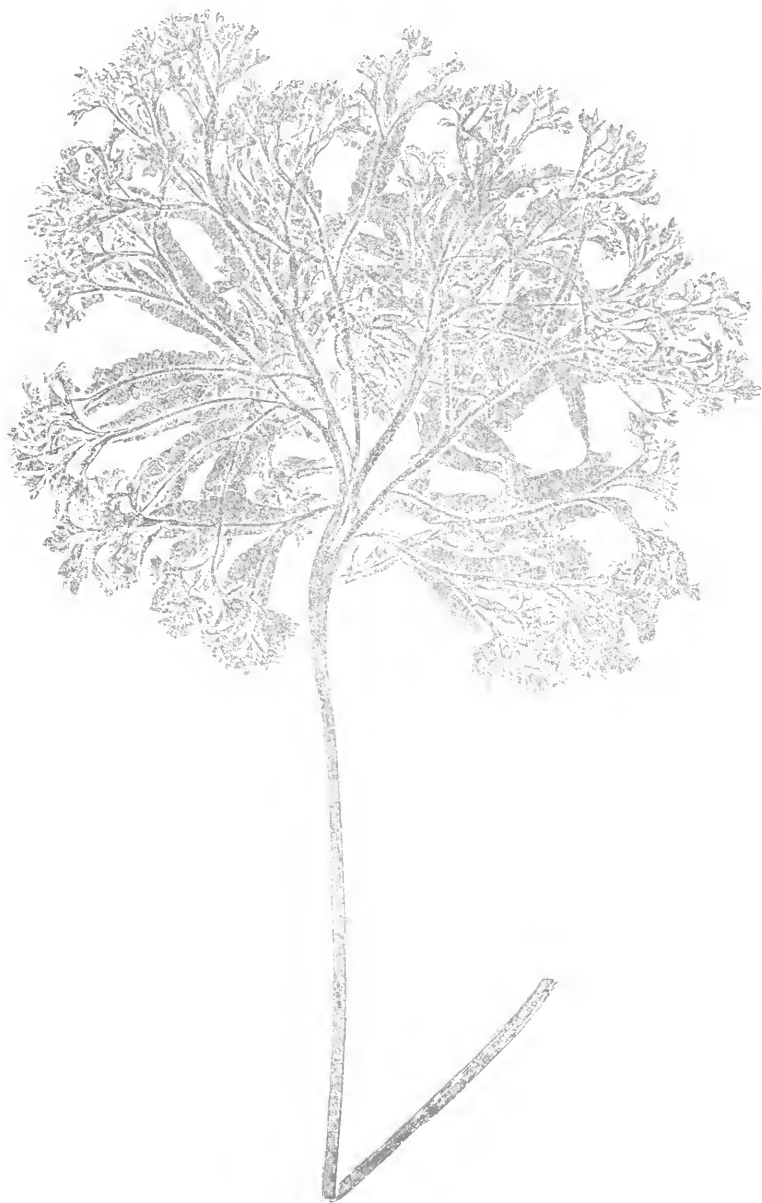
POLYPODIUM VULGARE, *var.* GRANDICEPS PARKER (*Woll.*)

Mr. Henry Parker, Weston-super-Mare. Somerset. 1854.

9 in.

Syn. MULTIFIDO-CRISTATUM (*Moore*)

Under glass by Mr. Wollaston. The most extreme of its class, —it might almost be considered a conglomerate form. It was found by a nephew of Mr. Elworthy.



XXXIX

POLYPODIUM VULGARE, *var.* GRANDICEPS PARKER

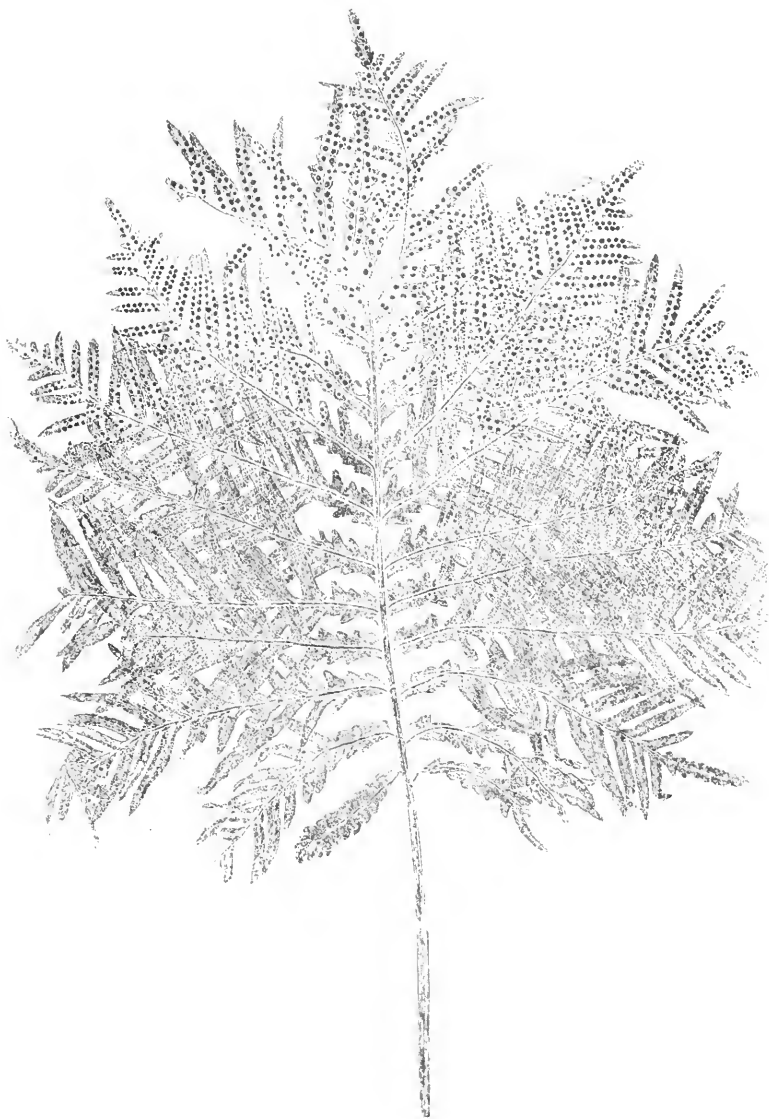
XL

SEMLACERUM GRANDE (*Jones*)

(Unknown.) Wicklow. 1862.

1 ft. 2 in.

By Mr. Barnard Hankey. The details of the discovery of this magnificent variety are unknown. All that can be traced of its history is as follows: "Years ago one of the Beresford family, a friend of ours, went to Ireland and was presented when in Wicklow with a fine clump of *semilacerum*: this was divided, and a portion came to me,—in due course I divided my portion, and observed at the time there was some difference in growth,—I therefore kept what was inclined to sport, quite distinct from the original bit, and whenever a normal frond appeared I stopped it—this bit never gives me more than a few fronds per annum. I must have had it more than fifteen years at least."—Note by Mr. Barnard Hankey.



XI.

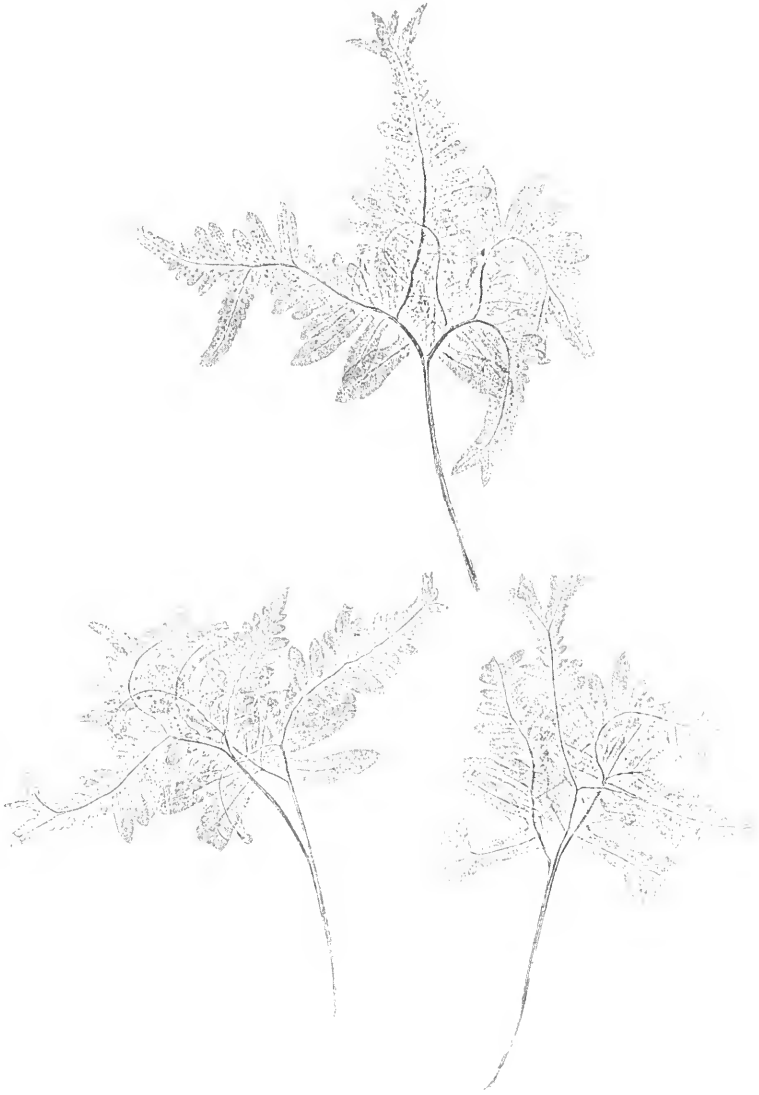
POLYPODIUM VULGARE, var. SEMILACERUM GRANDE

XLI

GLOMERATUM (*Moly*)

Mr. Job Mullins (gardener to Lady Oylander), Beaminster.

Dorset. 1873.



XLI

POLYPODIUM VULGARE, *var.* GLOMERATUM MULLINS

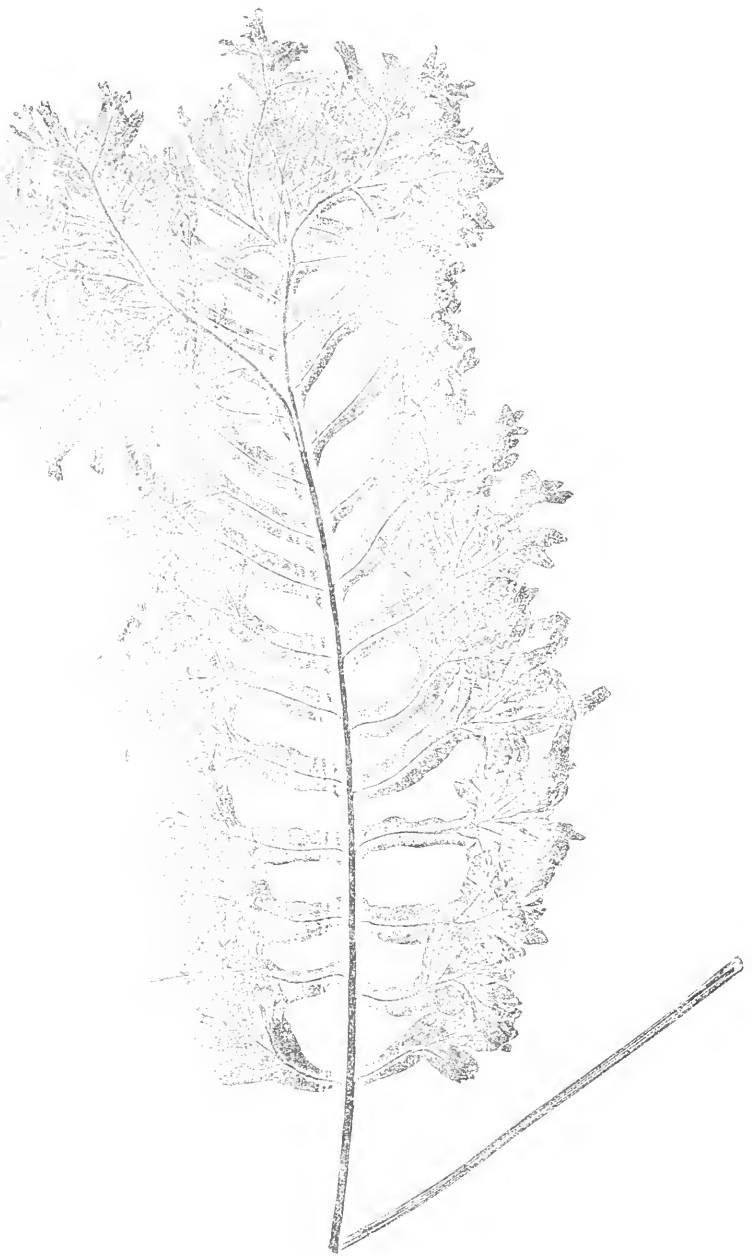
XLII

GRANDICEPS (*Barnes*)

Mrs. Fox, Liverpool. Lancashire. 1868.

11 in.

Under glass by Mr. Hodgson. The history of this variety was for many years obscure,—but through the exertions of Mr. Barnes and Mr. Hartley, the uncertainty has at last been removed; the original plant is in the possession of Mrs. J. K. Hodgson, of Ulverstone.



XLII

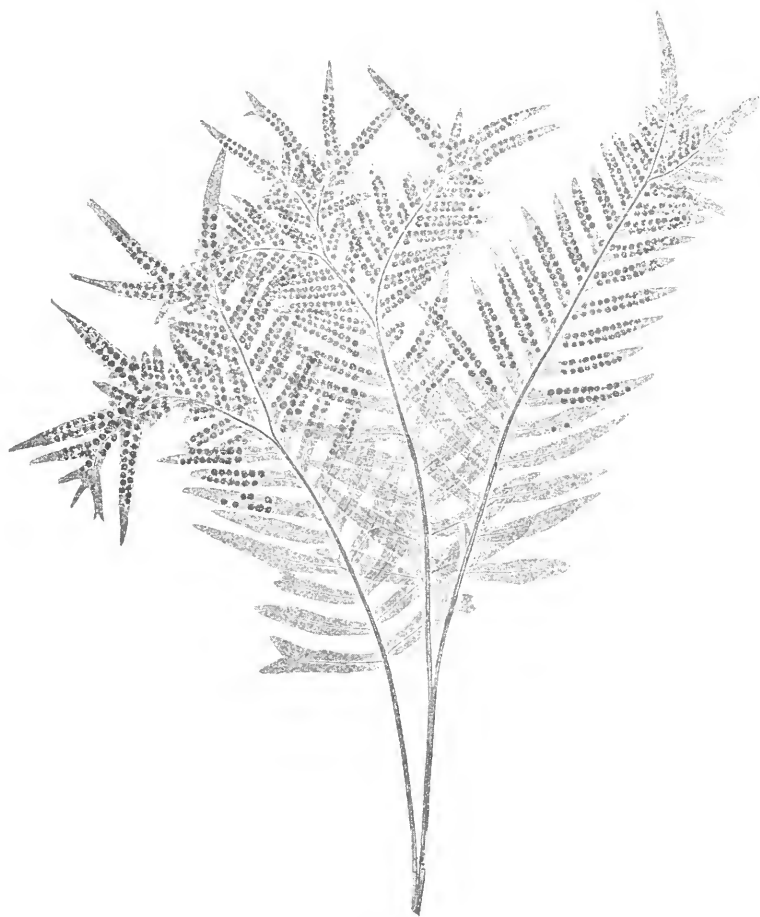
POLYPODIUM VULGARE, *var.* GRANDICEP'S FOX

XLIII

RAMOSUM

C. Hillman. Hants. 1860.

By Mr. Wollaston.



XLIII

POLYPODIUM VULGARE, *var.* RAMOSUM HILLMAN

XLIV

CONGESTUM PRESTON (*Woll.*)

Mr. R. P. Preston, Yelland, Carnforth. Lancashire. 1871.

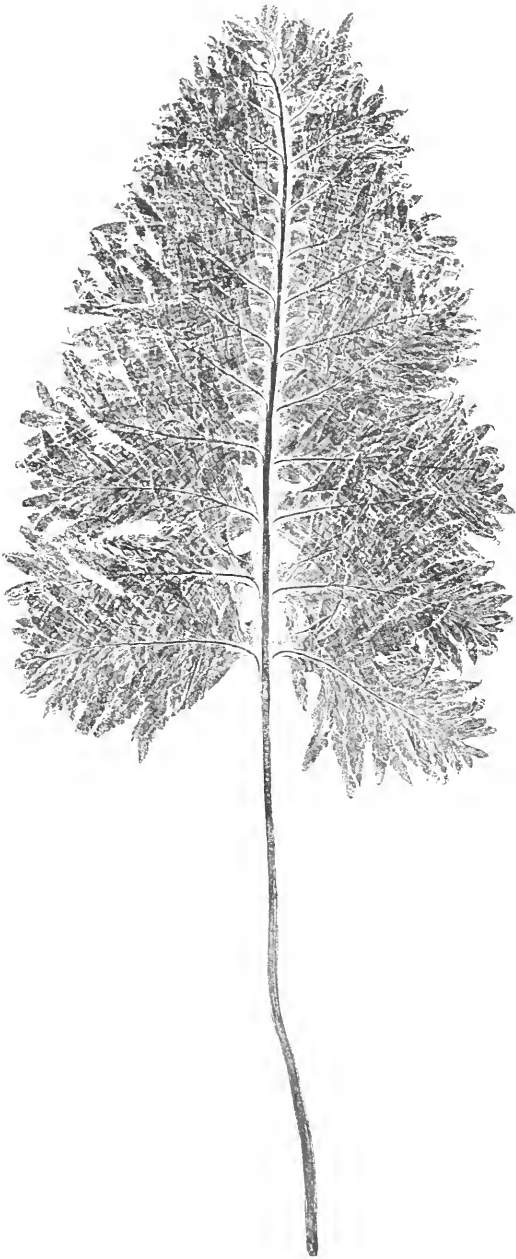
11 in.

Syn. PRESTONII (*Moore*)

Mr. Barnes records the discovery in the north of the following plumose forms of the species:—*Prestonii*, found in 1871 on the limestone range called Warton Crag, Lancashire, by Mr. Preston, of Yelland; *Barrowii*, found in 1874 near Witherslack, Westmoreland, by Thomas Barrow, a stonemason, of Lindale; *Hudwini*, found in 1875 near Silverdale, Lancashire, by Mr. Hadwin, of Liverpool. Mr. Lowe has a fine plumose form which is said to have been found near Macclesfield, by the gardener of the late Mr. Brocklehurst of that town. There is also Mr. Ivery's *Cambricum erectum*, a very robust deltoid form which is said to be fertile, and whose history appears to be lost. *Prestonii* is the nearest approach to a congested form.

Under glass by Mr. Barnes. "This plant was found by Mr. Preston not far from his own farm; it was very small, growing in the crevice of a rock,—and so fast that he could not get it out; he, however, managed to break off the piece of rock on which it was growing, and with true patience and perseverance got it safely home."—*Note by Mr Barnes.*

Perfectly barren,—in fact a close-growing plumose form.



XLIV

POLYPODIUM VULGARE, *var.* CONGESTUM (PRESTONII)

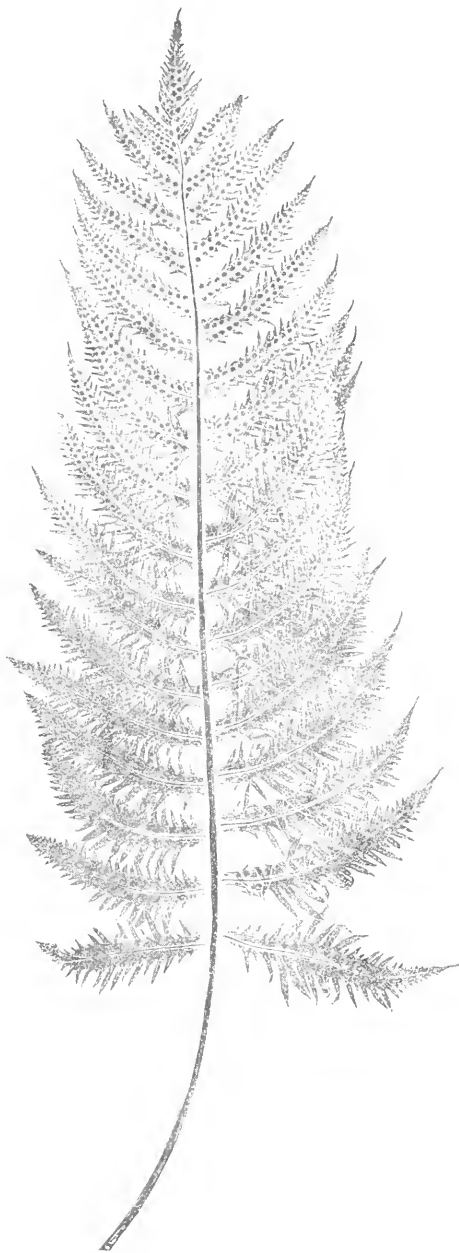
XLV

OMNILACERUM (*Moore*)

Mr. T. E. Bennett, Bolkham Lodge, Betchworth, Surrey
Hereford. 1848.

1 ft. 2 in.

By Mr. Clowes.



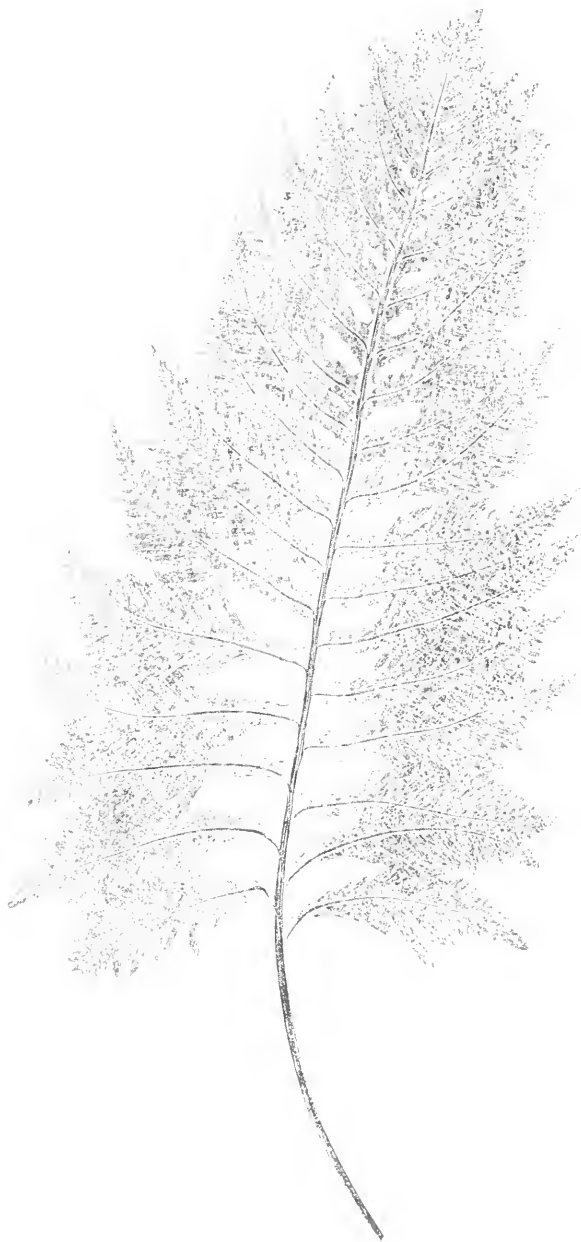
XLV

POLYPODIUM VULGARE, *var.* OMNILACERUM

XLVI

CAMBRICUM

Syn. PLUMOSUM



XLVI

POLYPODIUM VULGARE, *var.* CAMBRICUM

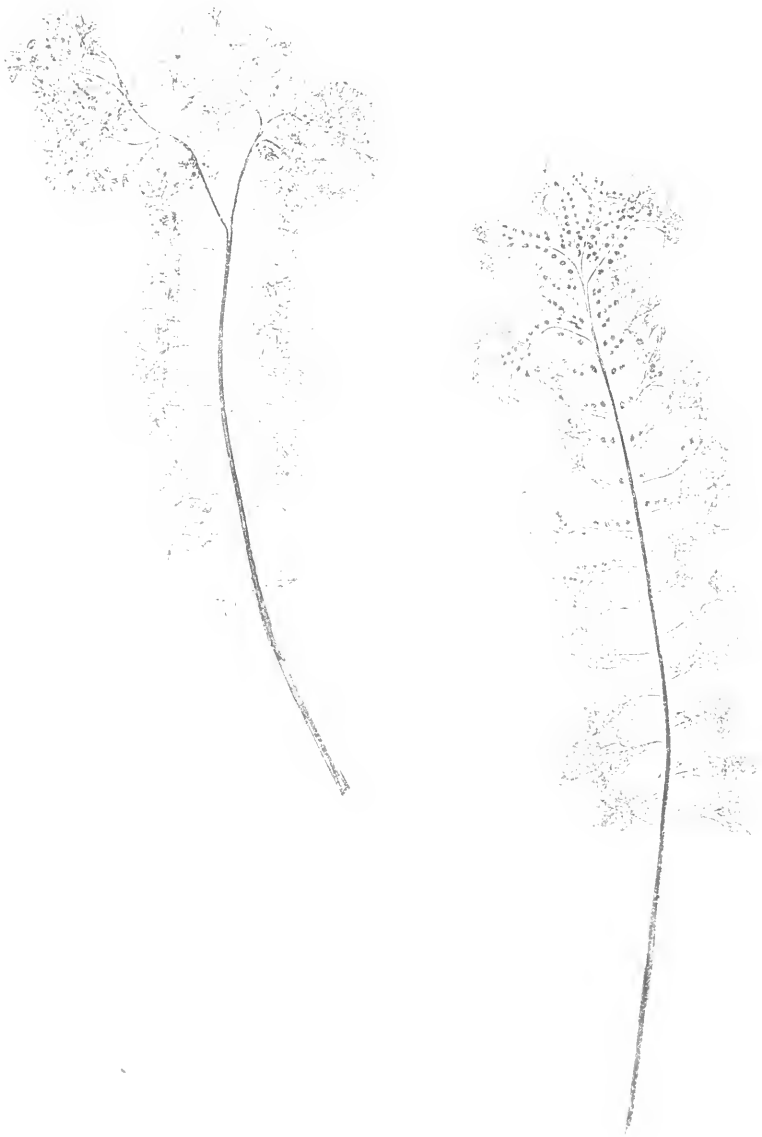
XLVII

CRISTATUM CLEWARTH (*Woll.*)

J. Clewarth, Fern Collector, Salford. Co. Clare. 1876.

11 in.

Syn. CRISTATUM, FORSTERI (*Forster*)



XLVII

POLYPODIUM VULGARE, var. CRISTATUM FORSTERI

XLVIII

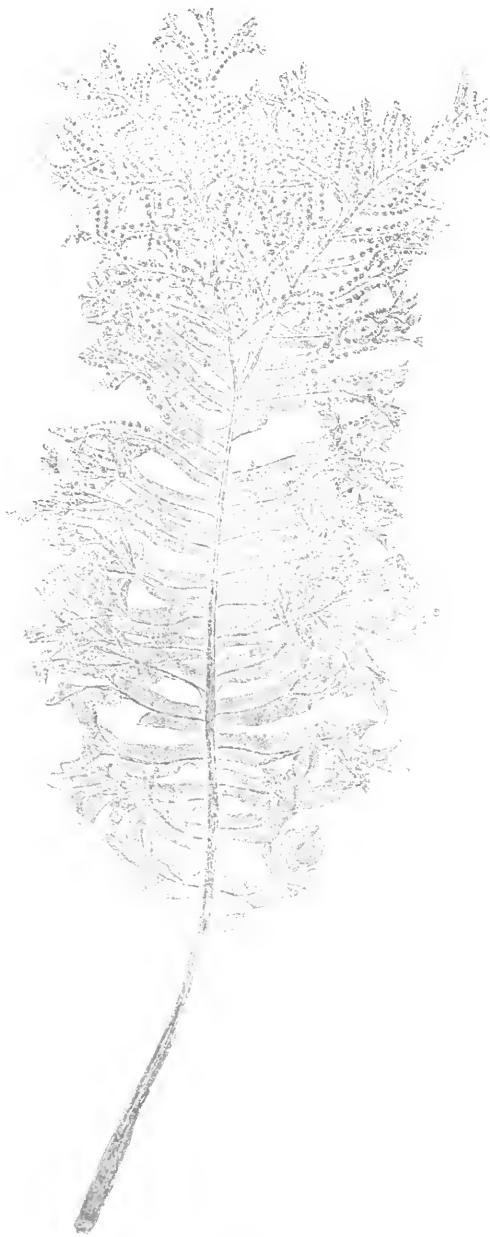
POLYPODIUM VULGARE, *var.* CRISTATUM (*Moore*)

Mr. H. S. Perry, Cork Lodge, Monkstown, Co. Cork.

Co. Cork. 1854.

1 ft.

By Mr. Wollaston. The original *cristatum*,—distributed by Mr. Sim, who writes with reference to it, “It was found by Hy. Parry, Esq., then of Cork Lodge, Monkstown, Co. Cork, on his brother’s property ;—it was brought here by that gentleman in 1856-7 ; I think he said that it had been under cultivation by him for some years previously.”



XLVIII

POLYPODIUM VULGARE, *var.* CRISTATUM

XLIX

SERRA (*Woll.*)

Jno. Wilson, Bowness. Lancashire. 1865.

11 in.

Under glass by Mr. Barnes. "The best biserrate variety."
Mr. Wollaston.



XLIX

POLYPODIUM VULGARE, *var.* SERRA

L

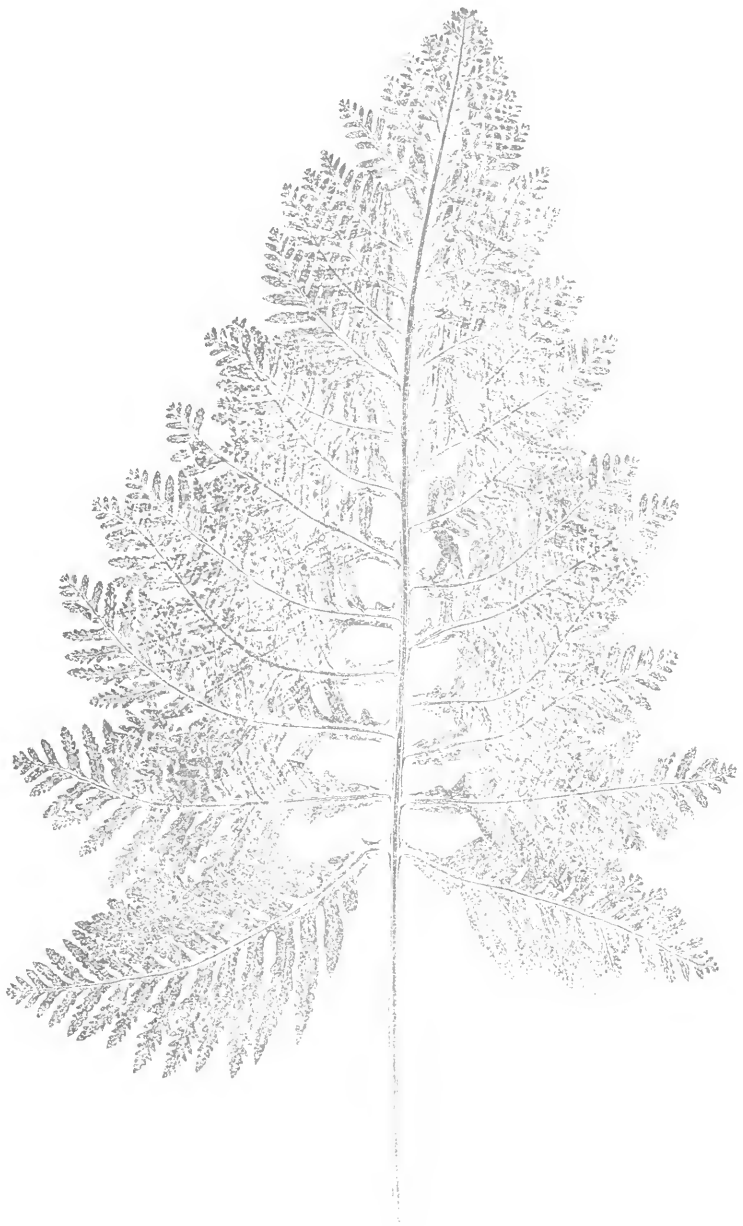
PULCHERRIMUM (*Moore*)

T. Addison. Westmoreland. 1861.

1 ft. 3 in.

By Mr. Wollaston. With reference to this variety Mr. Barnes writes, "I was with Addison when he found it, and I thought it then a good *semilacerum*; it, however, improved very much by cultivation, but when it went into Messrs. Stansfield's hands I had no idea of its great excellence; I sold it for the young man to Messrs. Stansfield for 15s., the whole find.

"I have now in my collection three distinct strains of this plant, — all very different; on one the fronds are very long and broad, the sori abundant and large; on another the fronds are longish and lax, sori few and small; on the third the fronds are thick, short, and almost deltoid, sori few and small."



L

POLYPODIUM VULGARE, *var.* PULCHERRIMUM

LI

POLYPODIUM VULGARE, *var.* DENTATUM (*Moore*)

Mr. J. M. Barnes. Westmoreland. 1865.

1 ft.

A deltoid form—rather suggestive of *Onoclea sensibilis*.



LI

POLYPODIUM VULGARE, var. DENTATUM

LII

POLYPODIUM VULGARE, *var.* SEMILACERUM (*Link*)

The late Mrs. Delves, Tunbridge Wells. Co. Wicklow. 1850.

1 ft. 1 in.

Syn. Hibernicum.

By Mr. Wollaston. The forms of *Polypodium vulgare semilacerum* may fairly be considered analogous to the *decompositum* forms of *Polystichum angulare*, and in either case the character can generally be developed, to a certain extent, from the normal form by luxuriant growth.

Some of the finest of the very numerous forms of *semilacerum* have been found by Mr. Barnes, Mr. Wollaston, and Mr. Barnard Hankey.

“The name *semilacerum* was originally given by Professor Link of Berlin, and was adopted by me for the British plant (*i.e.* the Irish) believing it to be the same.”—Note by Mr. Moore.



LII

POLYPODIUM VULGARE, *var.* SEMILACERUM

LIII

POLYSTICHUM ACULEATUM, *var.* PULCHERRIMUM (*Jones*)

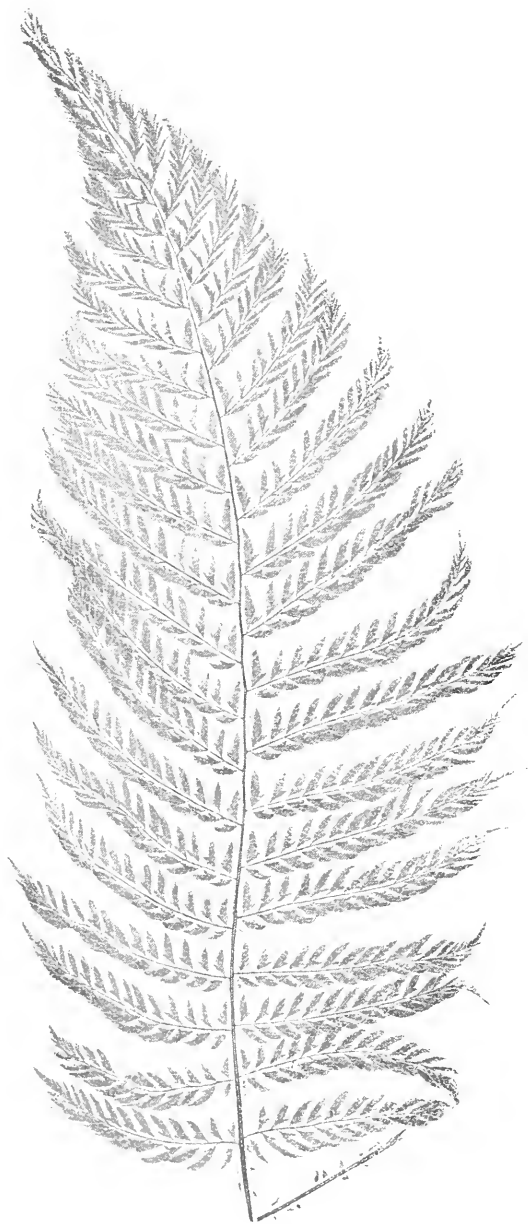
Jno. Bevis, Hawkchurch. Dorset. 1876.

2 ft.

Perhaps "the greatest discovery of modern times"; had this plant fallen to the lot of the most aspiring hunter that ever bore a vasculum, he could scarcely have helped feeling at the moment of discovery that he had not lived quite in vain;—but it was pulled out of the hedge in a ploughed field by a common labourer who knew nothing of Ferns. The whole find,—a goodly clump of six or seven crowns,—was handed over to Mr. Wills, and by him (with a rare liberality) very soon dispersed in about as many different directions.*

* Many and hot have been the discussions as to the species to which this variety belongs. Mr. Wills, who knows the exact circumstances of its discovery, and whose keenness of eye and instinctive knowledge in such matters are well known, stoutly maintains that it is *aculeatum*,—and it has yet to be proved that it is not either the plumose or *pulcherrimum* form of that species:—the slight tendency to crest at the extremity of the pinnæ is rather in favour of the latter supposition. It is a fact that not one of the plants has yet produced the sign of a spore. Mr. Wollaston, who confesses it is "a puzzler," admits that it has the *aculeatum* pinnule, and suggests that it may be a natural hybrid. Mr. Wills, writing with reference to it, says, "I am inclined to think it *aculeatum*, from its having a greater resemblance to it than to *angulare*,—rigidity, though the parts are slender,—sheen or gloss on upper surface of pinnules,—shape of frond,—the same angle at parting from rachis,—pinnæ also tending to diminish in length from middle of frond downwards."

Mr. Fox adds that it has also the peculiar shade of green of *angulare*.



LIII

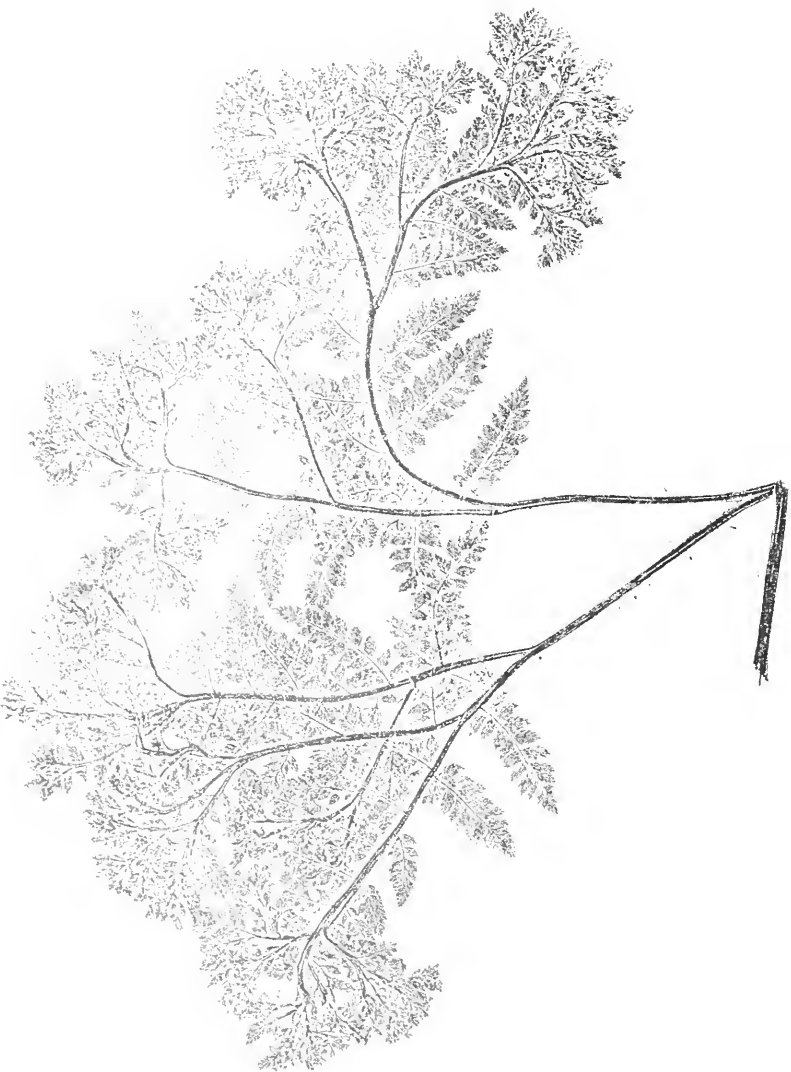
POLYSTICHUM ACULEATUM, *var.* PULCHERRIMUM

LIV

POLYSTICHUM ANGULARE, *var.* ACROCLADON (*Moore*)

Mr. J. E. Mapplebeck. S. Devon.

Syn. RAMO CRISTATUM (*Woll.*)



LIV

POLYSTICHUM ANGULARE, var. ACROCLADON

LV

BRACHIATO-CRISTATUM GREY (*Woll.*)

Mr. Robert Grey, Newlands, Alphington, near Exeter.
S. Devon. 1854.

1 ft. 6 in.

Syn. GREYI (*Moore*)

The first and still the most brachiate and crested form, and unequalled in its fine, robust character. When found it had five crowns, only one of which then showed brachiation, but under cultivation all the others subsequently developed it. It was found close to the sea, near Exmouth, growing on stiff soil, which is generally considered to be so unfavourable to the production of varieties in *P. angulare*.

The forms of *brachiato-cristatum* had for a long time seemed peculiar to the South and South-west of England until the present year, when a plant with the same unmistakable character was found in the North of Ireland by Mr. W. H. Philips, of Holywood, Co. Down.



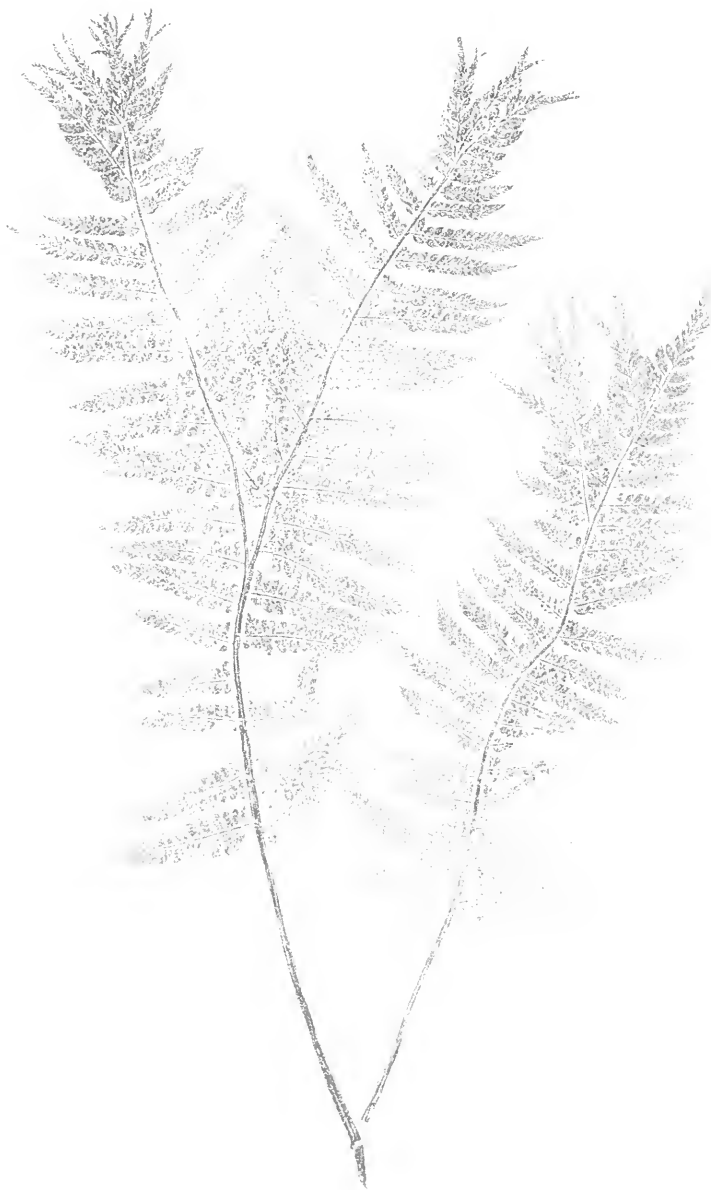
LV

POLYSTICHUM ANGULARE, var. BRACHIATO-CRISTATUM GREY

LVI

RAMO-FURCILLATUM (*Allchin*)

Dr. Allchin, Bridport. South Devon. 1871.



LVI

POLYSTICHUM ANGULARE, *var.* RAMO-FURCILLATUM

LVII

BRACHIATO-CRISTATUM (*Gray*)



LVII

POLYSTICHUM ANGULARE, *var.* BRACHIATO-CRISTATUM KEALL

LVIII

RAMO-CRISTATUM (*Padley*)

Rev. Charles Padley.



LVIII

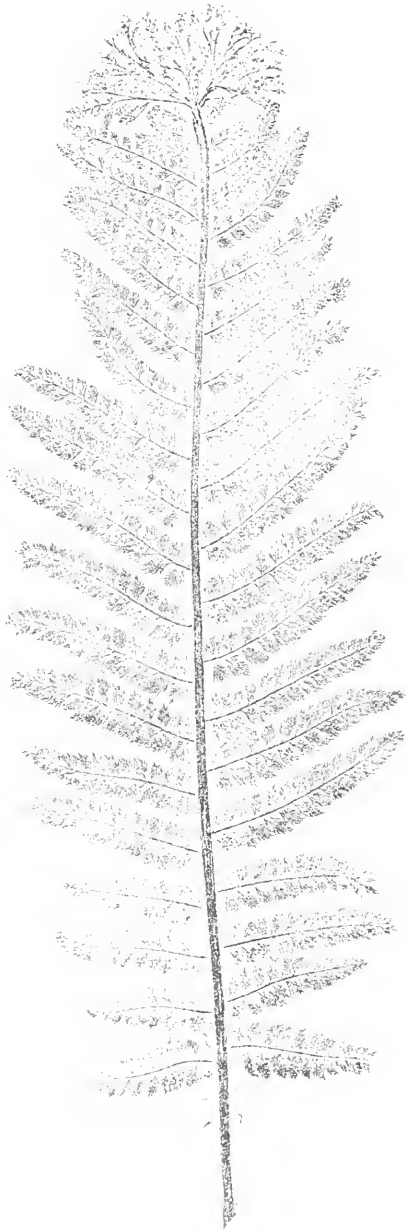
POLYSTICHUM ANGULARE, *var.* RAMO-CRISTATUM PADLEY

LIX

SETOSO-CRISTATUM (*Moore*)

Mr. J. Moly. South Devon. 1874.

1 ft. 7 in.



LIX

POLYSTICHUM ANGULARE, *var.* SETOSO-CRISTATUM

LX

GRANDICEPS (*Moore*)

William Talbot, late of Glasnevin Gardens. Co. Cork. 1861.

1 ft. 5 in.

Under glass by Mr. Wollaston. Found by a boy employed at the Glasnevin Gardens. Mr. W. H. Phillips records the discovery in Co. Antrim in 1877 of another plant, which is practically identical with this. Mr. Moly has two forms from South Devon, very closely allied to it. The plant found by the late J. J. Jones in Pembrokeshire, and distributed by Messrs. Stansfield under the name of *P. ang. Jonesii*, and which has at times been classed as *aculeatum*, is generally regarded as another form of *P. ang. grandiceps*. Mr. Wills' *grandiceps* is a fine compact plant, but does not partake of the narrowness of frond that marks the true forms of *grandiceps*. Mr. Moly's robust form, called *grandiceps Moly* by Mr. Wollaston, departs still more in this respect from the typical *grandiceps*.



LX

POLYSTICHUM ANGULARE, *var.* GRANDICEPS TALBOT

LXI

CRISTATUM MRS. THOMPSON (*Holl.*)

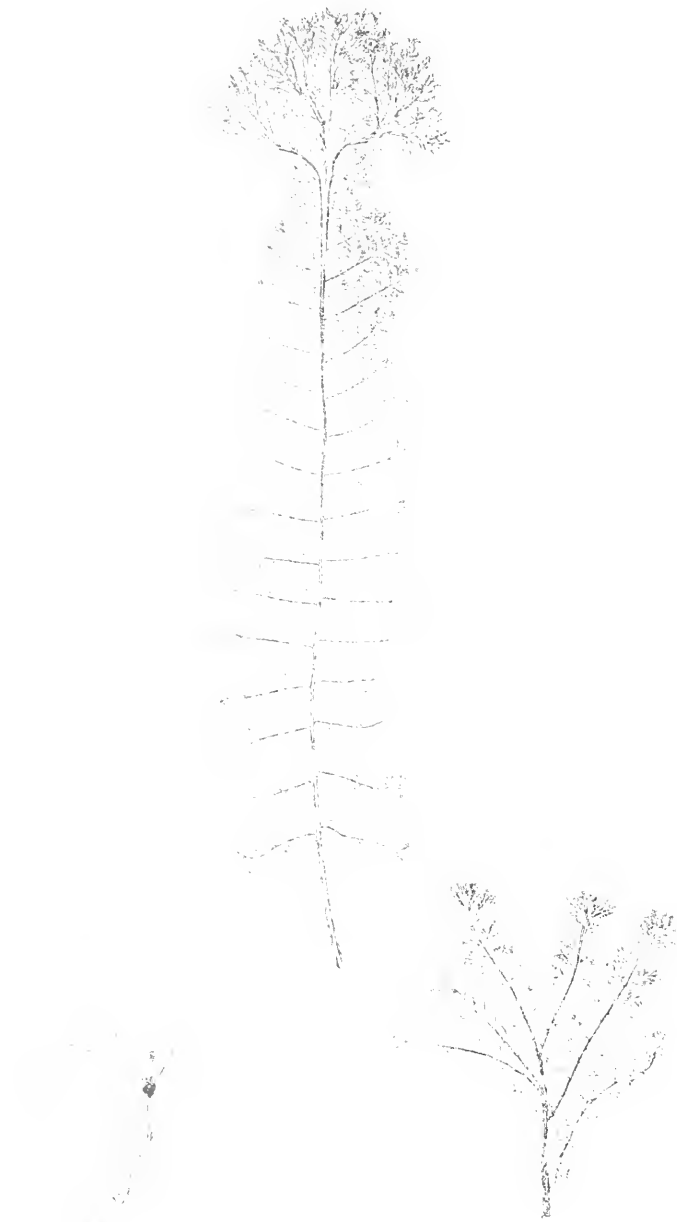
Mrs. Agar Thompson. N. Devon. 1860.

1 ft. 9 in.

Syn. THOMPSONIÆ (*Moore*).

One of the most deceptive of ferns, its transformations are truly startling. In its infant state it seems, and indeed is, in continual danger of being strangled by the very extravagance of its growth, for in point of cresting, branching, etc., it indulges in all the wildest excesses that a Fern is capable of (and a large proportion do die from suffocation), but it gets steadier after a bit, and the ramose character becomes less and less marked as the plant approaches maturity, but before it quite reaches this, it generally breaks out once more into a fit of extravagance, but in another direction, running to head, and assuming for a time the appearance of a grand capitate form, so much so as to deceive the unwary, and sometimes others too; in this stage it narrows itself at the base as if intending to establish itself permanently as a *grandiceps*—but it does not really mean it—for after a bit it takes more sober views, and either from this or from having exhausted itself by early excesses it settles down at last into the humdrum life of a very ordinary *cristatum*, and not even that always, for Mr. Wollaston maintains that his plants of *Thomsoniæ* generally run out altogether, but his experience in this way is exceptional, for it is still in the blood, and from spores of these almost normal plants will spring a fresh brood, that will run through the same wild career of extravagance, and settle down quietly at last like their parents before them. If anyone is anxious to undergo a series of surprises and disappointments, let him grow *Thomsoniæ* from spores.

Perhaps in its half-grown state it is seen to the greatest advantage—it is then one of the most striking of British Ferns—combining with the dark green foliose character and thickness of cresting that are peculiarly its own the branching habit of *acrocladon*; in fact, so close a resemblance does it bear, in this stage, to the latter variety, that the late Mr. Ivery, in spite of all his experience, was completely led away, and with perfect good faith sent out seedlings of it at a stiffish figure as *acrocladon*, which he had subsequently to redeem.



LXI

POLYSTICHUM ANGULARE, var. THOMPSONIÆ

LXII

POLYSTICHUM ACULEATUM, *var.* ACROCLADON (*Loève*)

Mrs. Agar Thompson. S. Devon. 1858.

1 ft. 5 in.

By Mr. Wollaston. The only densely-crested form of *aculeatum*—and perhaps it is chiefly from this cause that some have doubted whether it belongs to this species. Mr. Padley, who has had more opportunity of observing this plant than anyone else, and has brought to bear on these matters as large an experience and as sound a practical judgment as anyone, has no doubt whatever that it is *aculeatum*.



LXII

POLYSTICHUM ACULEATUM, *var.* ACROCLADON

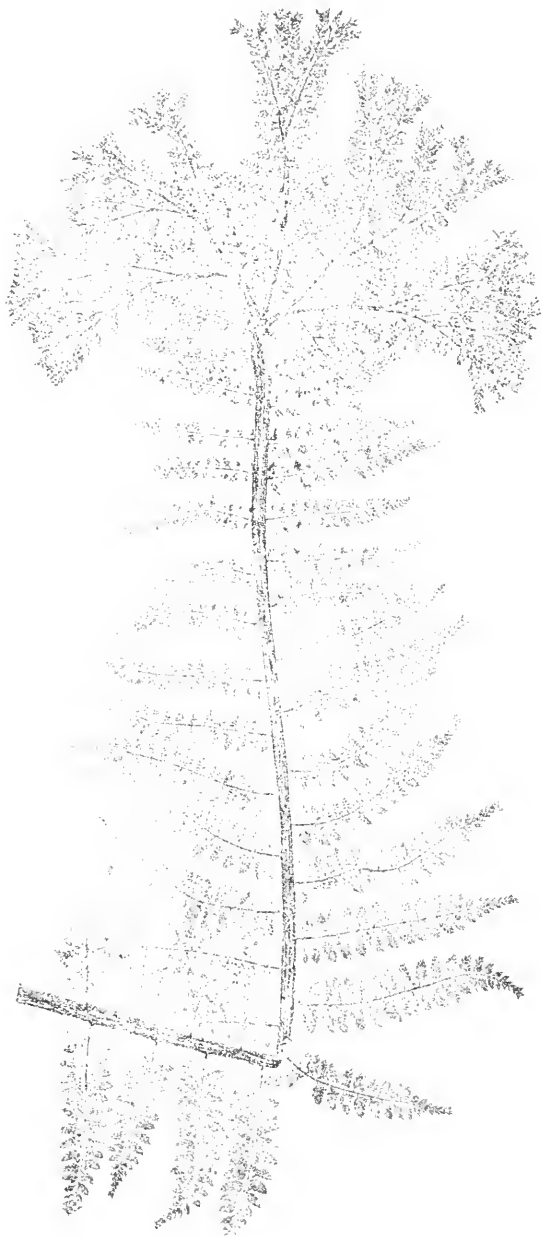
LXIII

POLYSTICHUM ANGULARE, *var.* CRISTATUM WOLLASTON

NO. 10 (*Woll.*)

Mr. G. B. Wollaston. Somerset. 1870.

1 ft. 9 in.



LXIII

POLYSTICHUM ANGULARE, *var.* CRISTATUM WOLLASTON No. 10

LXIV

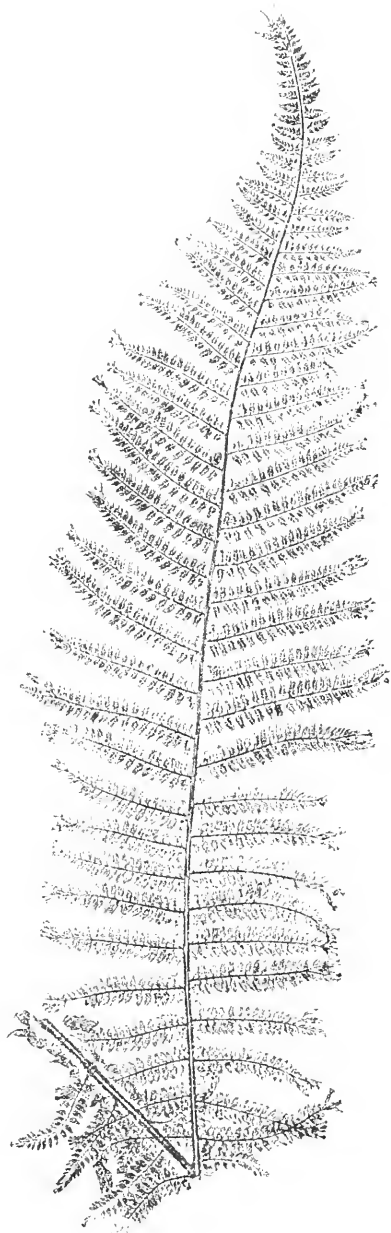
CRISTATO-GRACILE MOLY (*Holl.*)

Mr. J. Moly. S. Devon. 1868.

1 ft. 8 in.

Syn. PERCRISTATUM MOLY.

So thoroughly crested in all their parts are the true forms of *ristato-gracile*, that the name *percristatum* might with propriety be given to them. The original form was found in 1862 in S. Devon by Mr. Grey. Shortly afterwards Mr. Jackson found his in N. Devon. It is believed that Mr. Wollaston, Mr. Wills, and Mr. Charles Cowper are the only other discoverers of the true form of this variety. Mr. Elworthy's and Mr. Padley's crested forms, called by this name, lack the percristate character which is now considered as the only claim to this name. Mr. Moly's form is now generally admitted to be the finest and most characteristic of the class—next probably in excellence come two of Mr. Wills's, the pale-complexioned one found in Dorset, in 1872, and the Sidbury one found in 1874, and Mr. Grey's well-known dark green form. Mr. Moly has two forms.



LXIV

POLYSTICHUM ANGULARE, *var.* CRISTATO-GRACILE MOLY

LXV

DIVISILOBEUM CRISTATUM (*Woll.*)

Messrs. Ivery. (Raised.) 1870.

1 ft. 10 in.

By Mr. Wollaston. The parentage of this splendid variety is unknown. All that can be ascertained is that among a large batch of seedlings raised by Messrs. Ivery, from seed of some form of divisilobe supplied by Mr. Wollaston, a very fair sprinkling of crested forms appeared;—Mr. Barnard Hankey also raised a most extraordinary batch of crested divisilobes from some non-crested variety,—and in several instances Major Jones has had crested seedlings of divisilobes from some unknown source and Mr. Wollaston and Mr. Moly have each had one; it would appear that some particular strain of simple divisilobe, not yet identified, has the curious faculty of freely throwing crested seedlings.



LXV

POLYSTICHUM ANGULARE, *var.* DIVISILOBUM CRISTATUM IVERY

LXVI

PULCHERRIMUM (*Woll.*)

Mrs. Agar Thompson. S. Devon. 1863.

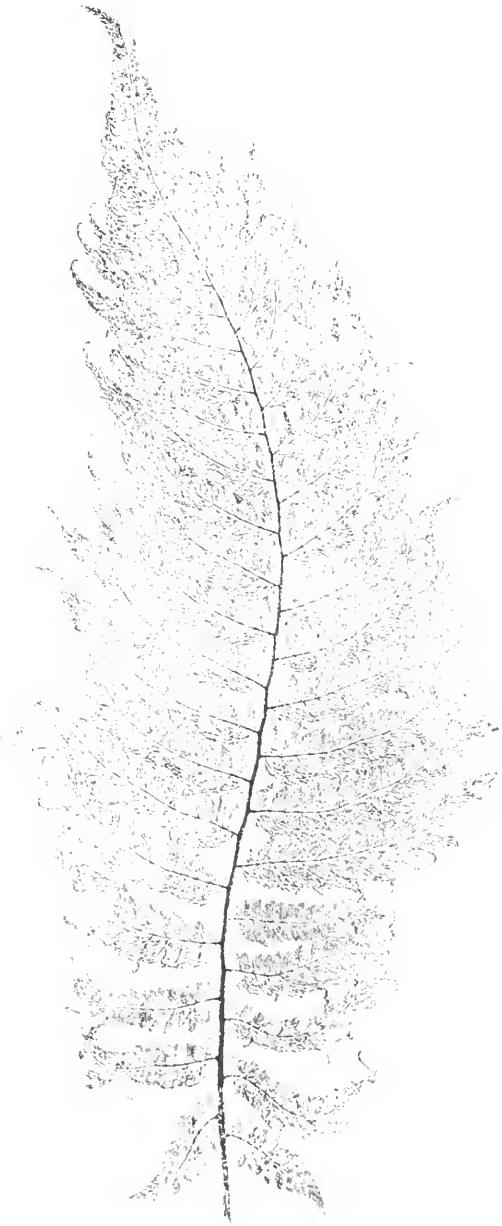
2 ft. 3 in.

Clearly the fairies have been at work here! This variety is considered to be a step beyond *plumosum*. It was first found in N. Devon by Mr. Padley and by the late Mr. C. Jackson; afterwards in S. Devon by Mrs. Agar Thompson and by Mr. J. Smith (then gardener to Mr. Padley), and in many instances by Mr. Moly and Mr. Wills in the border-land of Devon, Somerset, and Dorset.

Mr. Moly distinguishes between the permanently symmetrical varieties (of which he has been the much-envied discoverer of three, and Mr. Wills and Mr. Smith of one each) and the non-permanent or intermittent forms of which he has found six and Mr. Wills two (Mr. Padley and Mr. Thompson's plants were also intermittent). Mr. Moly has also found two of a class called by Mr. Wollaston *caudiculato-cristatum*, in which the minute extremities show signs of cresting.

The sub-permanent forms are apt to revert very curiously. Occasionally the whole plant, sometimes a frond or two, or only a portion of a frond is normal. The marked character of this variety is the excessive and peculiar development of the posterior pinnules. It is believed to be barren, at least in such portions as show the true character.

Mr. Wills's permanently symmetrical form differs from all others in its fine robust foliose character and in being prolific. With relation to these forms Mr. Moly graphically writes: "I found the first in 1862, and on the same day I found another of which (as the first was a far better specimen) I contented myself with taking only a frond, but on cogitation at home I saw so much beauty in it that a week or two afterwards I railed again to the town, and on reaching the spot my nerves received such a shock on perceiving that the Vandals had removed all the soil from the hedge where I had left it! Every year since I have made a pilgrimage to the neighbourhood in the hope of securing a specimen (for the original plant I had sent to Mr. Wollaston and it had died); my efforts were, however, unrewarded until the summer of 1876, when I found the one I now possess."



LXVI

POLYSTICHUM ANGULARE PULCHERRIMUM THOMPSON

LXVII

DIVISILOBUM PROLIFERUM BAGG (*Woll.*)

Jno. Bagg, gardener to the late Mrs. Henley, Leigh House,
Wickham, Somerset. Somerset. 1869.

2 ft.

Syn. HENLEYÆ (*Moore*).

Under favourable circumstances the beautiful development and lax habit of this variety can hardly be surpassed,—it is highly prolific.



LXVII

POLYSTICHUM ANGULARE, *var.* DIVISILOBUM PROLIFERUM BAGG

LXVIII

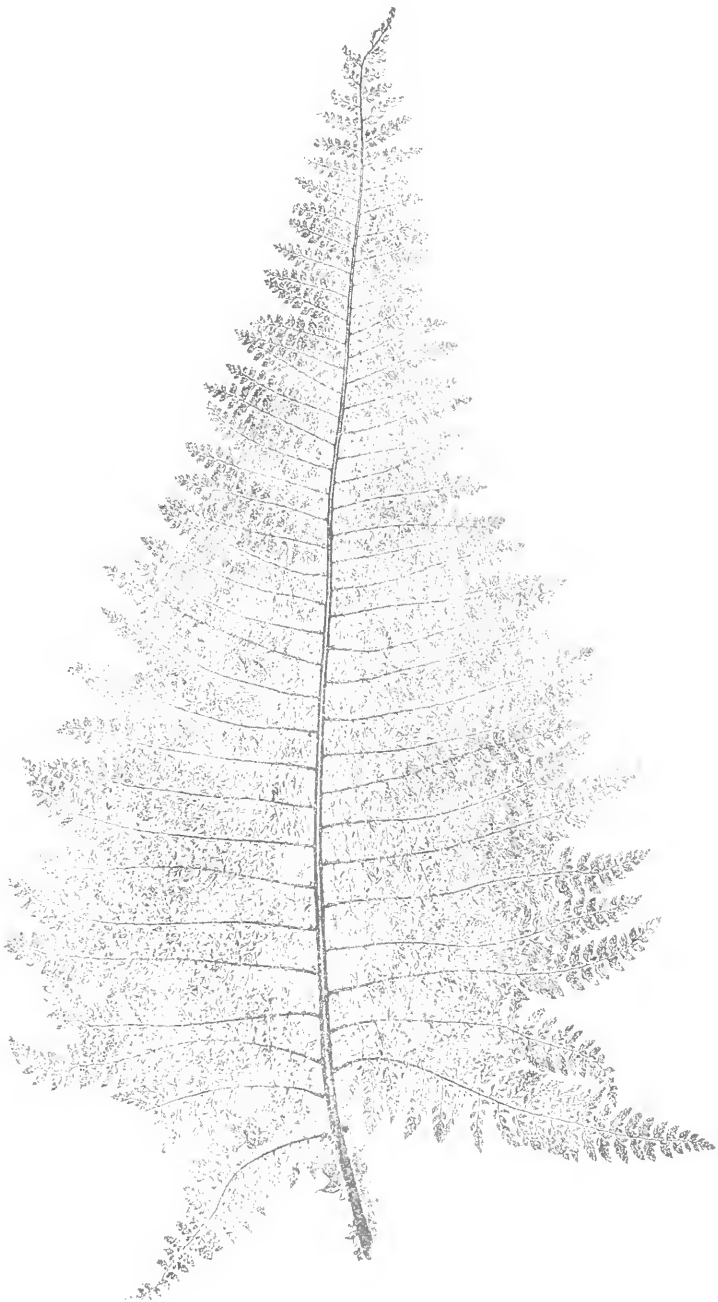
DIVISILOBUM PROLIFERUM PLIMSOLL (*Woll.*)

James Plimsoll, gardener to Mrs. Hole, Bovey Tracey, S. Devon.
S. Devon. 1861.

1 ft. 8 in.

Syn. PROLIFERUM HOLEANÆ (*Moore*).

By Miss F. Kitson. One of the best close-growing proliferous divisilobes.



LXVIII

POLYSTICHUM ANGULARE, *var.* DIVISILOBUM PROLIFERUM PLIMSOLL

LXIX

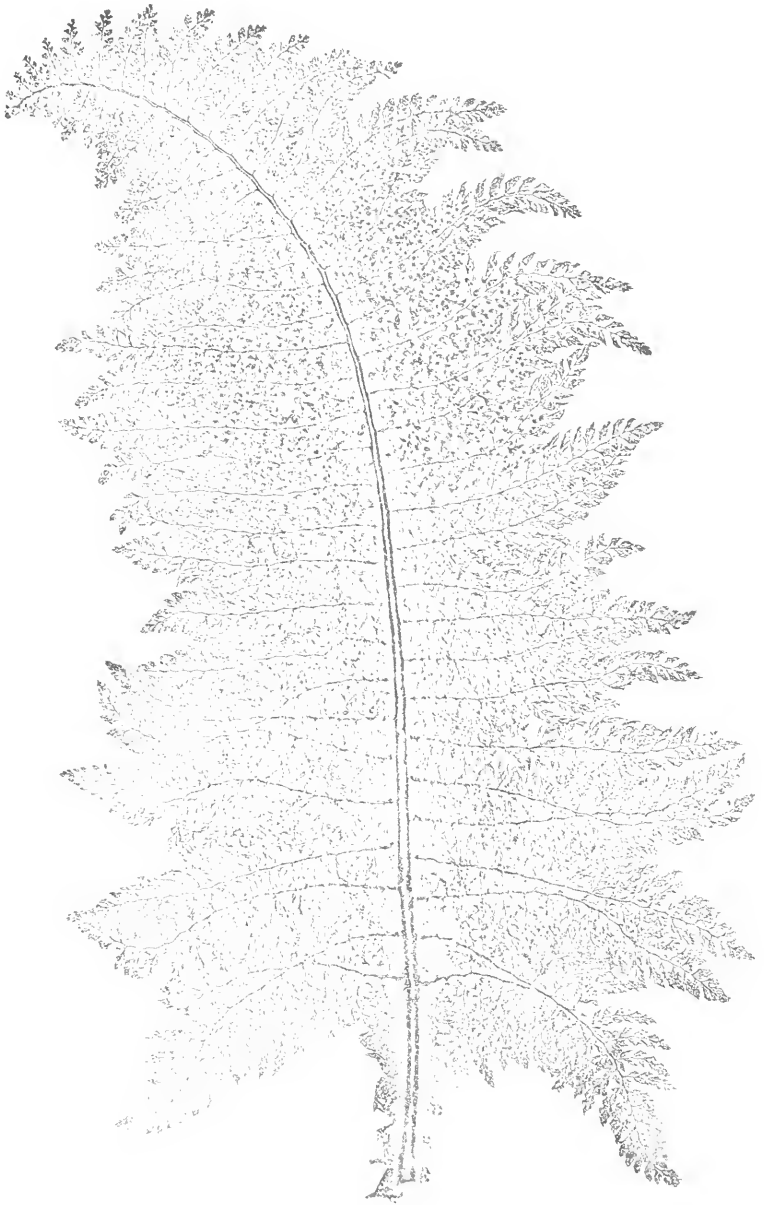
DIVISILOBUM SEYMOUR (*Woll.*)

The late Miss Seymour, Okehampton. South Devon. 1870.

1 ft. 6 in.

Syn. SEYMOURIÆ (*Moore*).

By Miss F. Kitson. Almost a congested form of divisilobe.



LXIX

POLYSTICHUM ANGULARE, *var.* DIVISILOBUM SEYMOUR

LXX

CONGESTUM (*Woll.*)

Rev. C. Padley. South Devon. 1865.

1 ft.

Syn. CONFERTUM (*Padley*).

Among the most beautiful of the varieties of *angulare*, but, from the closeness which gives it its chief beauty, difficult to represent in a nature print; the varieties of *congestum* are all dark green.

Mr. Padley, who has been especially fortunate with this variety, writes, "I found two at Littleham, N. Devon, one in S. Devon, and half a dozen others scattered through Devonshire, all alike," and lays some stress on the fact that without exception all the plants found by himself and that found by Miss Thompson were growing in damp places.

Mr. Jackson, Mr. Wollaston, Mr. Wills, Mr. Moly, and Miss Thompson are the only other recorded discoverers of this variety; from a plant, however, in the late Dr. Lyell's collection (the history of which is obscure) a remarkable multifid form has been raised by Mr. Sang, of Kirkcaldy, which is in the possession of Mr. E. J. Lowe, now of Shirenewton Hall, Monmouthshire.



LXX

POLYSTICHUM ANGULARE, *var.* CONGESTUM

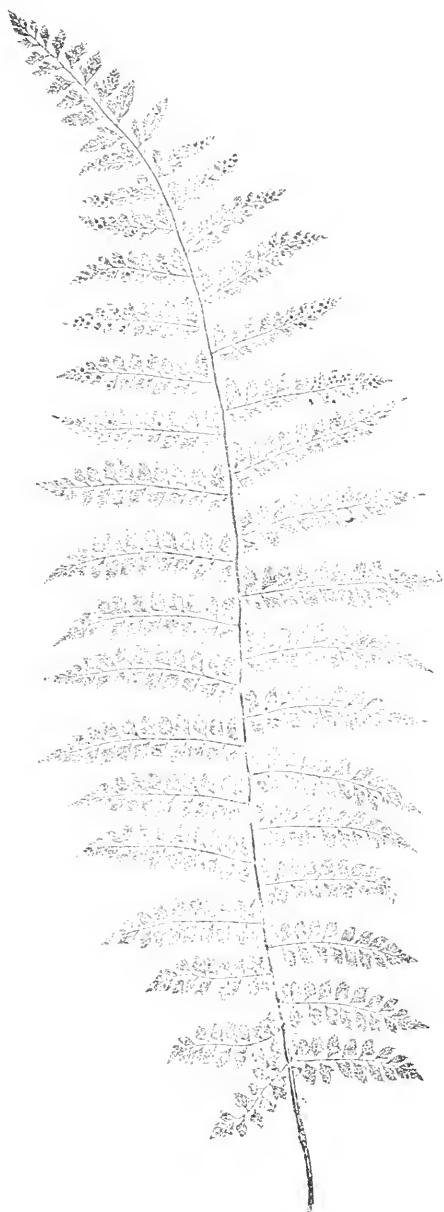
LXXI

SETOSO-CUNEATUM PHILLIPS (*Jones*)

Mr. W. H. Phillips. Co. Antrim. 1877.

1 ft. 4 in.

Another of Mr. Phillips's clever things,—the lustre and delicacy of this variety must be seen to be understood,—printer's ink is fatal to the fineness of its setose character;—Mr. Moly has a beautiful plant of this class, from South Devon, *setoso-gracile Moly*; Mr. Wollaston's *pallens*, found in Devonshire in 1872, is also of the same class, they have all a pale colour almost approaching variegation.



LXXI

POLYSTICHUM ANGULARE, *var.* SETOSO-CUNEATUM

LXXII

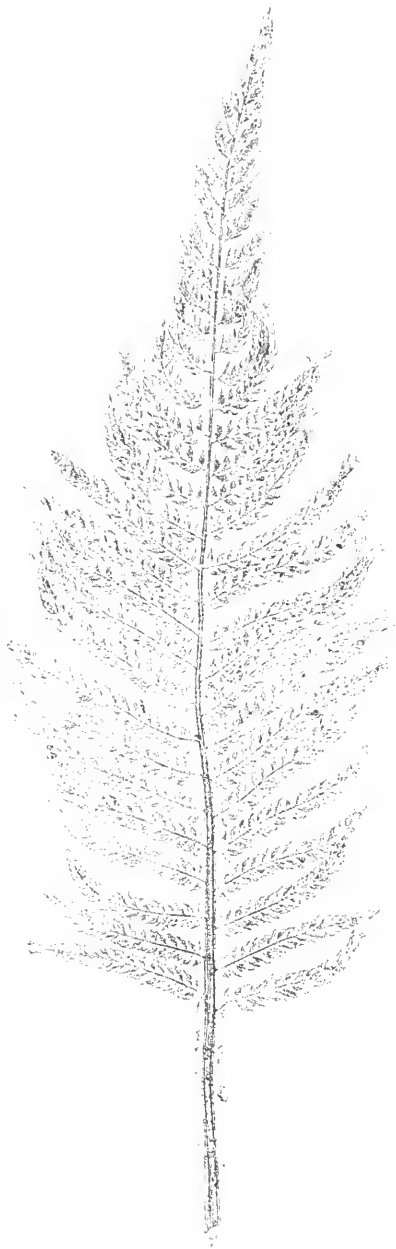
CRISTATO-GRACILE COWPER (*Holl.*)

Mr. Richard Cowper, South Kensington. Dorset. 1874.

1 ft. 4 in.

Syn. PERCRISTATUM COWPER.

Did not survive its discovery more than two years;—the more to be regretted as it gave promise of being the most elegant form of this class.



LXXII

POLYSTICHUM ANGULARE, var. CRISTATO-GRACILE COWPER

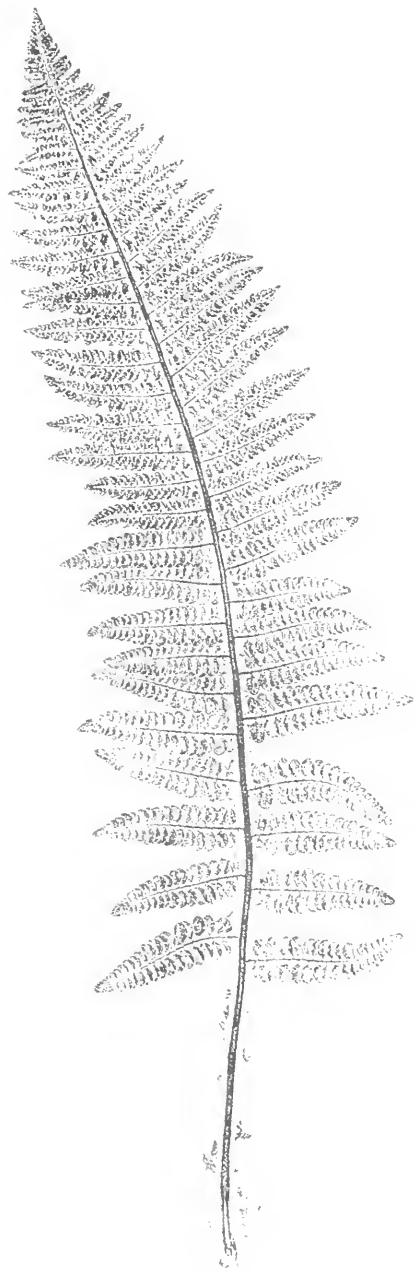
LXXIII

OBTUSISSIMUM (*Woll.*)

Mr. G. B. Wollaston. South Devon. 1861.

1 ft. 6 in.

Needs no description,—one of the first dozen of British Ferns,—dark green in colour ;—a remarkable peculiarity about this fern is that the spores, which are very abundant, produce only normal forms. The finest specimen by far of the imbricate class.



LXXIII

POLYSTICHUM ANGULARE, *var.* OBTUSISSIMUM

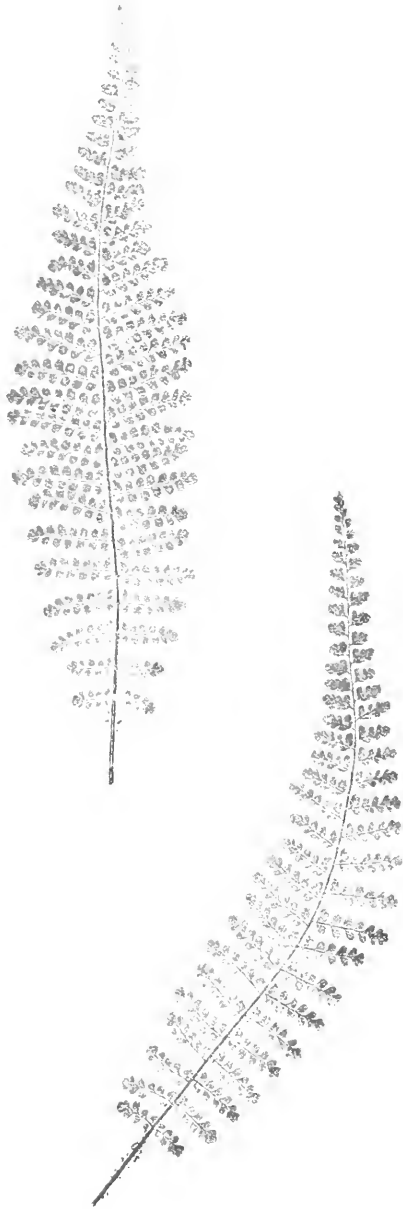
LXXIV

ROTUNDATUM PHILLIPS (*Jones*)

Mr. W. H. Phillips, Lemonfield, Holywood, Co. Down.
Co. Down. 1877.

1 ft. 3 in.

One of the happiest of recent discoveries.



LXXIV

POLYSTICHUM ANGULARE, *var.* ROTUNDATUM PHILLIPS

LXXV

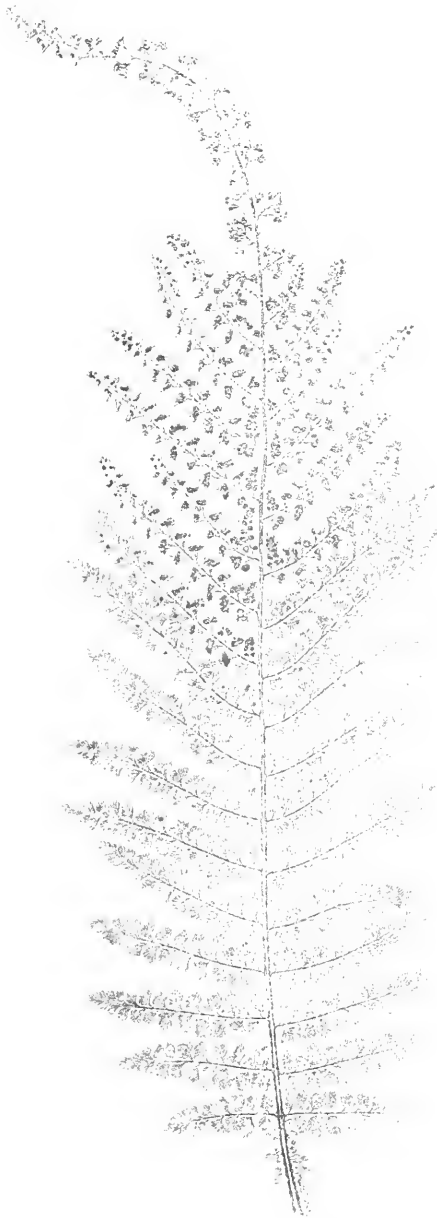
CRUCIATO-PINNULUM (*Holl.*)

Mr. J. Moly. Dorset. 1873.

1 ft. 9 in.

Syn. CRUCIATĀ-PINNULĀ (*Fox*).

An unique form to the present time.



LXXV

POLYSTICHUM ANGULARE, *var.* CRUCIATO-PINNULUM

LXXVI

PROLIFERUM WOLLASTON (*Woll.*)

Mr. G. B. Wollaston. S. Devon. 1852.

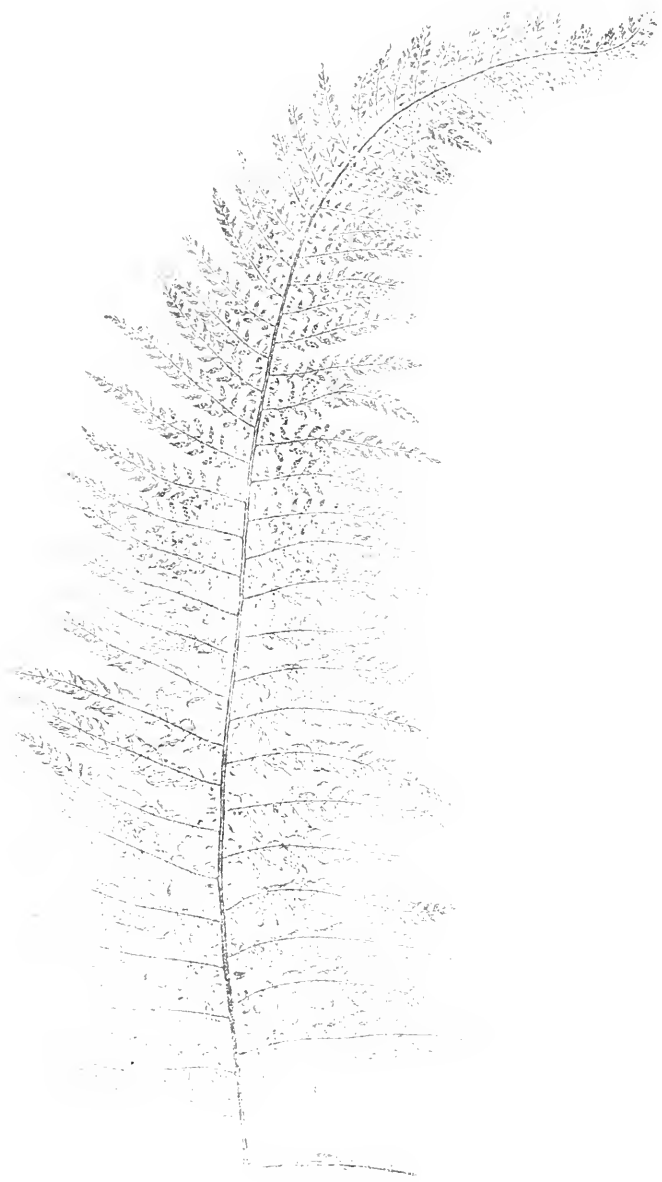
2 ft. 6 in.

Syn. ACUTILOBUM PROLIFERUM (*Woll.*)

From the original plant. "This is a true acutilobe, frond elongate, deltoid, tripinnate,—in its best character has only one or two pairs of bulbillæ seated in the axils of the lowest pair of pinnæ; pinnules acute."—*Note by Mr. Wollaston.*

No British Fern exceeds this in beauty, and probably none has figured so prominently in exhibitions; it is not to be wondered at therefore that it should have taken more than one person to find it. With reference to its discovery Mr. Wollaston relates that himself and the late Rev. Wm. Gardiner,—then Curate of Ottery St. Mary,—during a ramble in that neighbourhood, being brought suddenly by a bend in the lane face to face with it, were at the same instant (it was then a large plant and in true character) transfixed with astonishment, etc. Mr. Wollaston was, however, the first to recover his presence of mind, and the plant will ever deservedly bear the name of the first of British Fern-hunters.*

* The name *proliferum* was first given to a plant found in S. Devon more than thirty years ago by Choule, one of the Kew Gardeners. Mr. Wollaston states that an impression prevailed at one time that it was exotic—probably from its difference to other then known British Ferns. Dr. Allchin writes that in 1852 this plant was growing in the outdoor fernery at Kew, marked *P. a. discretum*, and afterwards *angustatum*, and it was from spores of this that he raised the very beautiful proliferous form that bears his name, which was much more proliferous than the original and perhaps more so than any that has since been found or raised. Choule's plant being the first to show its character was named by Mr. Moore *proliferum*. Subsequently other proliferous forms were found and named *proliferum*—*Wollastoni*, *Footii*, *Crawfordiæ*, *Holvancæ*, *Henleyæ*, *Moulei*, etc. As all these partook more or less the finely-cut character of the original *proliferum*, and no other proliferous form was then known, it was



LXXVI

POLYSTICHUM ANGULARE, *var.* PROLIFERUM WOLLASTON

It is true that in a general way the finely-cut varieties have a greater tendency than others to be proliferous, but it is now known that this habit is very general among varieties of *angulare*, and is sometimes seen even in the normal form. "I have generally found," writes Mr. Padley, "that the Ferns having a hard, woody rachis are the ones most proliferous, such as acutilobe, multilobe, *lineare*, etc." Forms of *brachiato-cristatum* are nearly all proliferous, and in some cases not only near the brachiation. Mr. Wills's *pulcherrimum* and some forms of *revolvens* are regularly proliferous, and a variety of *cristatum* found by the late Dr. Moore in Ireland has often bulbs extending half-way up the frond.

It is also now known that there are many varieties which in every important particular are identical in character with the proliferous forms,—and yet they are not proliferous at all, or very slightly so.

It would seem, therefore, that the proliferous habit is both too general and (even in the class of varieties where it is most common) too arbitrary in its appearance, to entitle it to give a name to any class of varieties.

Nor is the name at all descriptive of the very marked character of the class to which these, perhaps the most beautiful of all the forms of *angulare*, belong.

The variations, too, of character among these finely-cut varieties are now,—owing to the discoveries of Mr. Padley, Mr. Moly, Mr. Wollaston, Mr. Elworthy, Mr. R. Gray, Dr. Allchin, Mr. Wills, Mrs. Thompson, and Dadds, Hillman, and Moule,—known to be so great that they can no longer be mingled together without considerable confusion of ideas. Mr. Wollaston was the first to meet this difficulty by a subdivision of the class of finely-cut varieties into three classes; with respect to which he has himself supplied the following descriptive notes:—

"*Multilobum*, an excess of *decompositum*,—the whole plant being more or less tripinnate, but the division of the pinnules or pinnulets more or less abnormally rounded, and in this respect differing from the two that follow, which have these portions much more acute.

thought by some that the proliferous character was more or less the habit of that class, and that it was confined to it; subsequent discoveries, however, proved that in neither respect was this the case; the name therefore lost much of its appropriateness.

“*Acutilobum*, tripinnate,—all the divisions of the frond acute, the anterior and posterior pinnules nearly of the same length.

“*Divisilobum*, tripinnate,—the same as *acutilobum*, except that the anterior and posterior pinnules are of unequal lengths, the latter far longer and the divisions altogether more highly developed—a well-grown plant, is sub-quadripinnate, or even quadripinnate.”

By the almost general consent of *angulare* hunters and cultivators, Mr. Wollaston's arrangement has been adopted, and the name *proliferum* is no longer used, except as an adjunct to denote either such multilobes, acutilobes, etc., as have a marked tendency to the proliferous habit, or such as have been long called by that name.

Thus the original *proliferum*,—and Mr. Wollaston's are proliferous acutilobes—Miss Crawford's, Mrs. Hole's, and Mr. Henley's are proliferous divisilobes.

Mr. Padley, whose experience in this class of varieties is perhaps unrivalled, and who has studied the matter with at least as much interest and care as anyone, is in favour of Mr. Wollaston's arrangement,—as far as it goes; but he still retains the name *conspicuilobum* as descriptive of the varieties which do not quite come up to the multilobes or acutilobes, though evidently partaking of the same “gentle blood.”

With reference to these matters Mr. Padley writes: “With me there are two principal divisions of the varieties whose pinnules are much divided. The tripinnate or *decompositum* class; and the acutilobe class (comprehending *conspicuilobum*, *acutilobum*, and *divisilobum*)—the main feature in the former being that the pinnules are more frondose, and in the acutilobes more acute and narrower.”

“*Multilobum*, or as I prefer to call it *equilobum*, seems to lean towards the two divisions, one section to *decompositum*, the other to *acutilobum*.”

“My order (of the more finely-cut varieties) is conspicuilobe, multilobe, acutilobe, divisilobe; some people have thrown doubts on *conspicuilobum*, but I consider it a distinct variety.”

If to these four classes be added the two classes of *decompositum*—the ordinary, and the higher or more developed class called here *tripinnatum*—it will be found that with a very few exceptions (and those probably varieties which combine different characters)

the whole of the divided or multilobed varieties will drop into their places very naturally.

It may be said that this arrangement makes no provision for the plumose forms, which are certainly divided forms, but Mr. Padley's suggestion that *plumosum* is but the plumose form of *decompositum* well deserves consideration—and it will probably be found that between *plumosum* and the higher forms of *decompositum* there is room for all the forms generally known as sub-plumose and foliose, and such as *struthio*, *Parsonsii* (*Moore*), and others.

No doubt the plumose class have other characters, so distinct as to entitle them to a place of their own in any system of classification. No more is attempted here than to draw attention to Mr. Padley's views regarding their relationship to the decomposite forms, and to point out that if these views be sound (and there is much to recommend them) the whole of the divided forms may be very easily and naturally connected.

The expression "gentle blood" has been used here more than once as expressive of that look of quality which seems to distinguish the finely-divided forms of *angularis* from all others. For whoever has once seen a real acutilobe or divisilobe—well grown,—half or two-thirds unfolded, with its wealth of feathery foliage spreading from a centre,—so finely cut and yet so evenly crowded together, the dark green of the unfolded part contrasting charmingly with the clear white of the curled-up heads of the fronds that turn gracefully back, crozierlike,—with the tips of the pinnae still folded up, and standing out like rows of little frosted-silver balls along the outer edge of the frond,—and the rich, thick, fox-coloured scales that cover the stem, running right up the centre of the frond like a bit of sable fur,—and the fine, hair-like spines standing out from it everywhere, for the dew to rest on or the sun to shine upon;—whoever has once seen this mixture of form, detail, and colour can hardly help regarding it ever afterwards as distinct from other *Polystichums*. And it isn't cultivation only that does it, for often has the eye of the fortunate *angularis* hunter been struck by a similar contrast,—as, for instance, when Mr. Wollaston came face to face with No. LXXVI, or when Mr. Wills (with that magical hooked stick of his) uncovered his Sidbury divisilobe from the common leaves that hid it;—there they stood out, distinct among their fellows, just like bits of china among earthenware,—clearly enough Nature's gentlemen,—and we may be sure that it takes

at least three generations to make them such, for it can hardly be credited that such forms start from the normal type.

Mr. Edwin Fox has drawn attention to the strong cedar smell which is one of the peculiarities of the acutilobes and divisilobes *pur sang*.

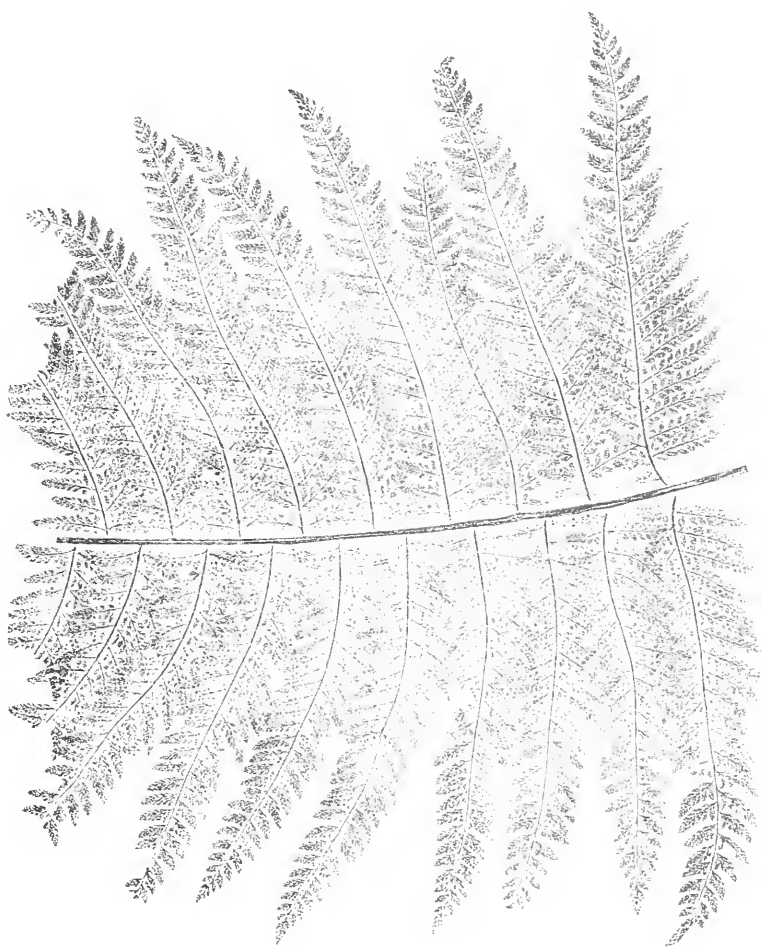
LXXVII

TRIPINNATUM GILLETT (*Moore*)

Mr. Gillet, Cirencester. Somerset. 1864.

2 ft. 3 in.

It is doubtful whether such development, as Mr. Gillet's plant is capable of, can be found in any other variety, and yet when badly grown it is scarcely distinguishable from the normal form.



LXXVII

POLYSTICHUM ANGULARE, *var.* TRIPINNATUM GILLET

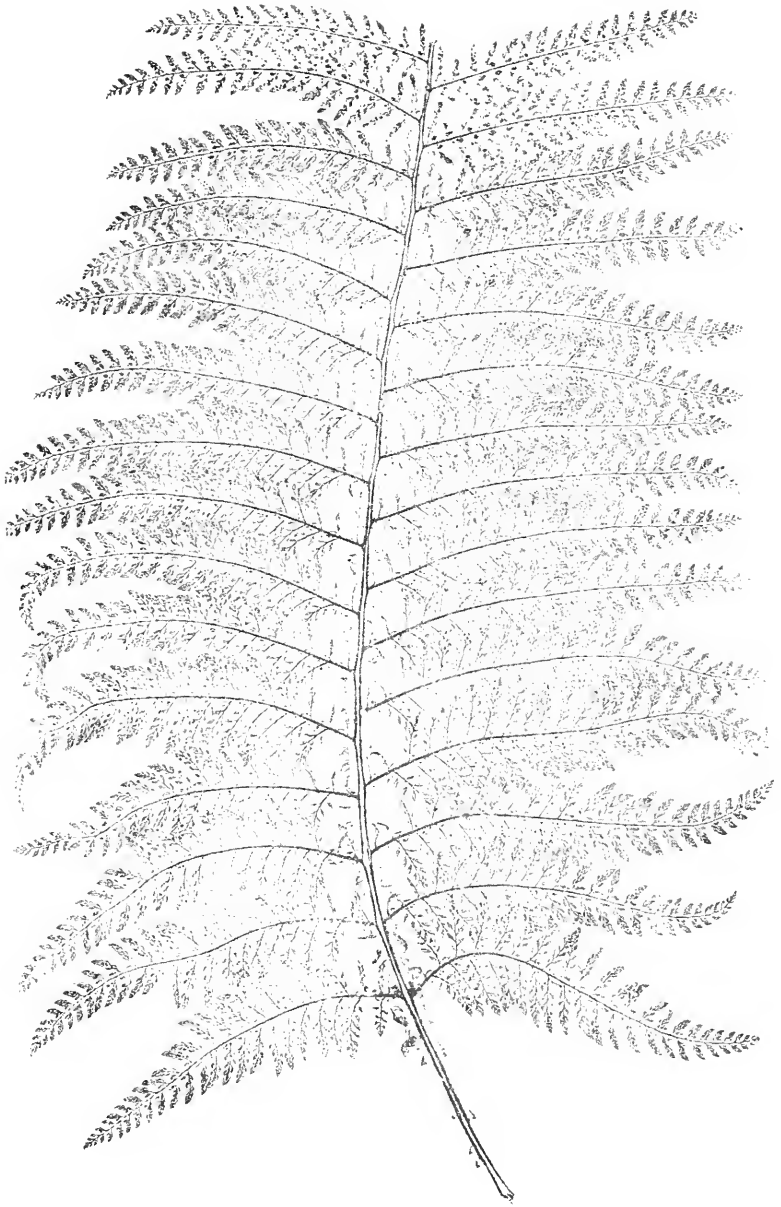
LXXVIII

DIVISILOBUM LAXUM (*Jones*)

Mr. J. Wills. S. Devon. 1874.

2 ft. 6 in.

Believed to be the finest and most beautiful of the lax divisilobes. With the exception of Mr. Padley, Mr. Wills has been perhaps the most fortunate discoverer in this beautiful class of varieties.



LXXVIII

POLYSTICHUM ANGULARE, *var.* DIVISILOBUM LAXUM WILLS

LXXIX

MULTILOBUM GRAY (*Holl.*)

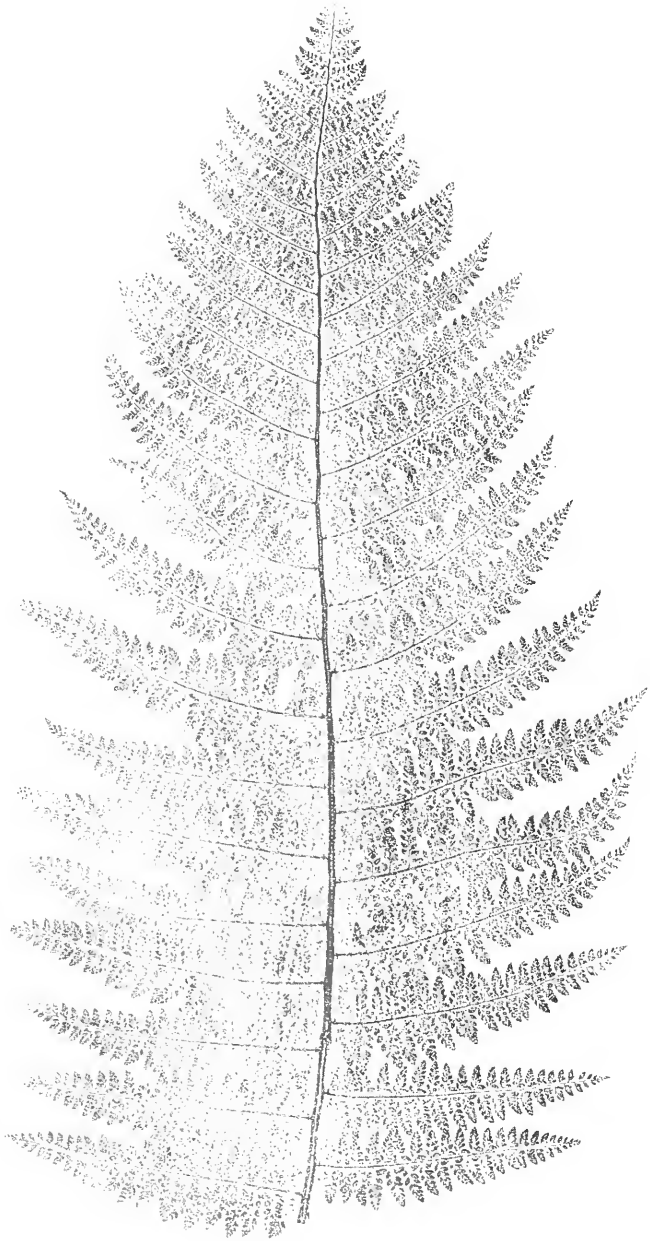
Mr. Robert Gray. S. Devon. 1865.

2 ft. 6 in.

May be taken as a typical specimen of a thoroughly good multilobe of the more robust kind, there are not many so thoroughly even in development.

The multilobes may be said to hold an intermediate place between the forms of *decompositum* on one side, and the acutilobes and divisilobes on the other;—resembling the former in the more or less rounded shape of the divisions of the pinnules, and partaking to a certain extent of the finer and neater look of the latter; in fact, they may be said to have a dash of that “gentle blood” which so distinguishes the latter varieties, and which *decompositum* has not.

Multilobes vary much, in some cases they are little more than very neatly cut *decompositums*, and when varying in the other direction and much developed, they are often only distinguishable from divisilobes by the greater roundness in the divisions of the pinnules and by the more equal development of the upper and lower pinnae, whereas in divisilobes one of the most marked peculiarities is the excessive development of the posterior pinnules.



LXXIX

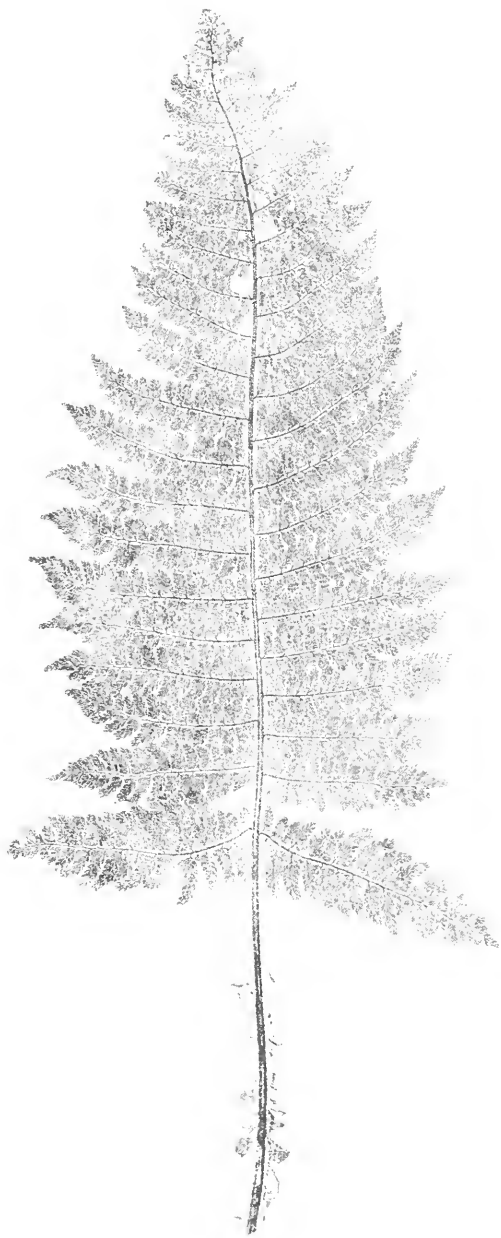
POLYSTICHUM ANGULARE, *var.* MULTILOBUM GRAY

LXXX

DELTOIDEO-FOLIOSUM (*Jones*)

Mr. J. Moly. Devon. 1875.

2 ft.



LXXX

POLYSTICHUM ANGULARE, *var.* DELTOIDEO-FOLIOSUM MOLY

LXXXI

REVOLVENS (*Moore*)

Mr. Jno. Wills. Somerset. 1872.

1 ft. 6 in.

Mr. Lucas, of Balham, was the first to notice this variety in Sussex and it was then named *arctatum*. It has since been frequently found by Mr. Wills, Mr. Moly, Mr. Padley, and Mr. Wollaston in S. Devon, and in the adjoining parts of Somerset and Dorset it was also found to a considerable extent and in good form in Hampshire by Major Jones. Among the most marked forms of this variety are a fine crispate form, found by Mr. Padley, a sub-plumose form, by Mr. Moly, and one with reflexed pinnules by Mr. Wills, who has also been the discoverer of some of the most characteristic of the simpler forms.

Mr. Wollaston attributes the *revolvens* habit (as also that of *reflexum* (when in excess), and even that of *flexuosum*) to "the natural tendency of all Ferns to protect their fructification from too great an exposure to sun and rain."

Mr. A. Leipner has supplied the following suggestions towards an explanation of the flexuose habit: "In a leaf the ultimate *number* of cells is already present whilst in a bud, and the development of the leaf consists of a differentiation of these different cells into the various forms and sizes as present in the parenchyme and fibro-vascular bundles.

"May not in Ferns the same hold good and the flexuose form be produced by an extreme elongation of the wood cells and in the rachis?"

Mr. Wollaston adds, "The flexuose habit both in Ferns and trees must arise from the unnatural expansion or contraction of one part or parcel in excess to the prejudice of the others—and that this abnormal growth is caused by the extreme elongation of the wood cells in the rachis."

Mr. J. Morris writes: "I am much more disposed myself to think cell division is the secret, but what is the cause of cell division abnormally copious and how is it inherited?"

Mr. E. F. Fox supports Mr. Morris's opinion.

Whatever doubts there may be on this point, there can be no doubt that it will for a long time hold its own among the first dozen of the most beautiful of British Ferns.

The Rev. H. Aubrey has suggested the idea that the flexuose character is a preparatory attempt on the part of these varieties to adopt the climbing habit.



LXXXI

POLYSTICHUM ANGULARE, *var.* REVOLVENS

LXXXII

WAKELYANUM (*Moore*)

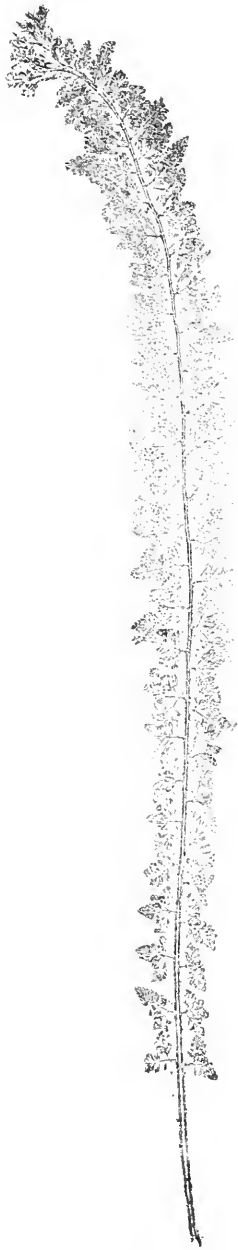
Thomas Russell (a navigator). S. Devon. 1860.

2 ft. 3 in.

Syn. CRUCIATO-MULTIFIDUM RUSSELL (*Holl.*)

By Capt. Jones, from a seedling of the original. The first multifid form of cruciation, and named after Miss Wakely, of Rose Mount, Axminster. It was found by "a navy," working on the line then being constructed between Yeovil and Exeter, and was given by him to Miss Wakely, from gratitude for the instruction that he and his comrades had derived from the schools in which Miss Wakely was interested.

The original plant was purchased by Messrs. Ivery, by whom this variety was distributed. About twelve years afterwards a very similar specimen was found by Mr. Wills, about five miles more to the east. Mr. Wills's plant—which was little more than a seedling when discovered—is probably the more robust form and is more multifid.



LXXXII

POLYSTICHUM ANGULARE, *var.* WAKELYANUM

LXXXIII

PTERIS AQUILINA, *var.* CRISTATA GLOVER (*Holl.*)

Mr. T. Glover, 15, Bold-street, Southport. Derbyshire. 1872.

3 ft.



LXXXIII

PTERIS AQUILINA, *var.* CRISTATA GLOVER

LXXXIV

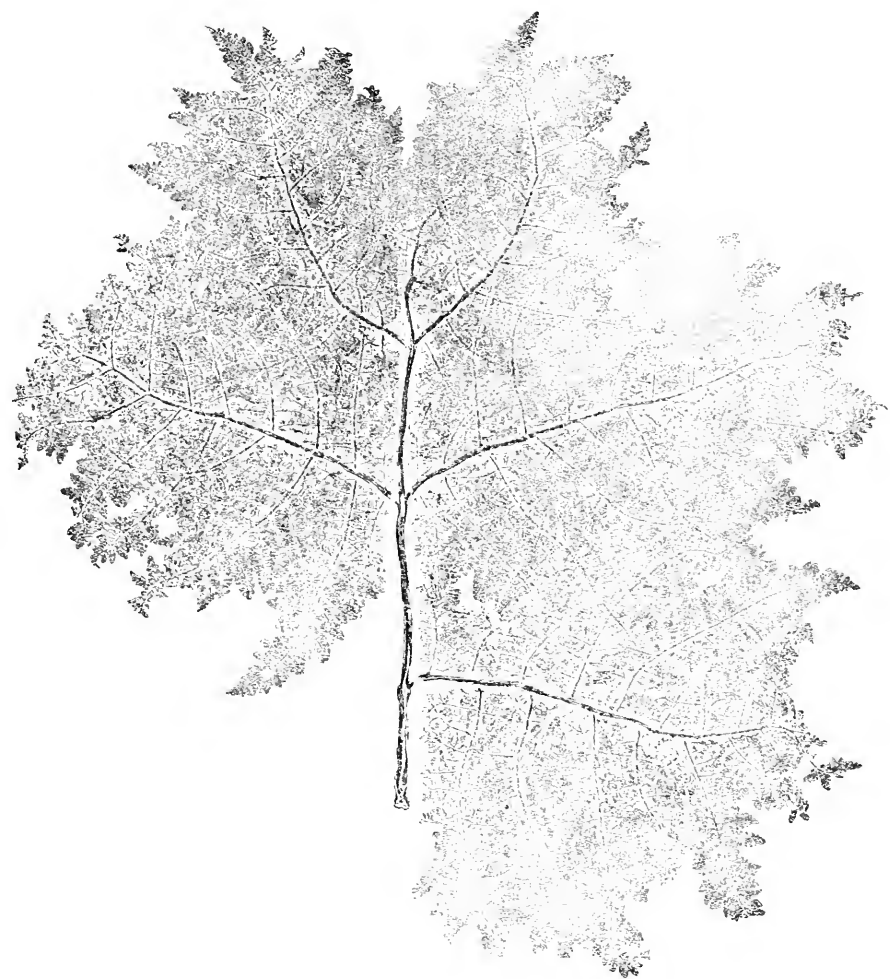
CONGESTA (*Will.*)

Mr. Hindson, Kirkby Lonsdale. Westmoreland. 1872.

2 ft. 6 in.

The following information was obtained by Mr. Barnes from Mr. Craig: "The plant was found in the neighbourhood of Kirkby Lonsdale,—Mr. Hindson, a wine and spirit merchant of that place, and Mr. Lodge, a barber, being in company; they took home both roots and fronds, but the roots never grew;—when they found the plants were dead they went for more, but could not find it again;—Craig had a portion of a frond at the time of its discovery, but it got laid aside for two or three years,—it was then sown and two plants were raised, one worthless, the other you have seen."

Mr. Craig's plant is quite a sight,—more like a bush than a fern.



LXXXIV

PTERIS AQUILINA, *var.* CONGESTA

LXXXV

FLEXUOSA (*Woll.*)

The late Jacob J. Jones, Burton, Westmoreland. Westmoreland.

1864. 2 ft.

Syn. GLOMERATA (*Barnes*).

Syn. INCURVA (*Moore*).

Mr. Barnes writes that he was told by the finder that he discovered it growing in great abundance, but he lost his bearings and never could hit upon the spot again.



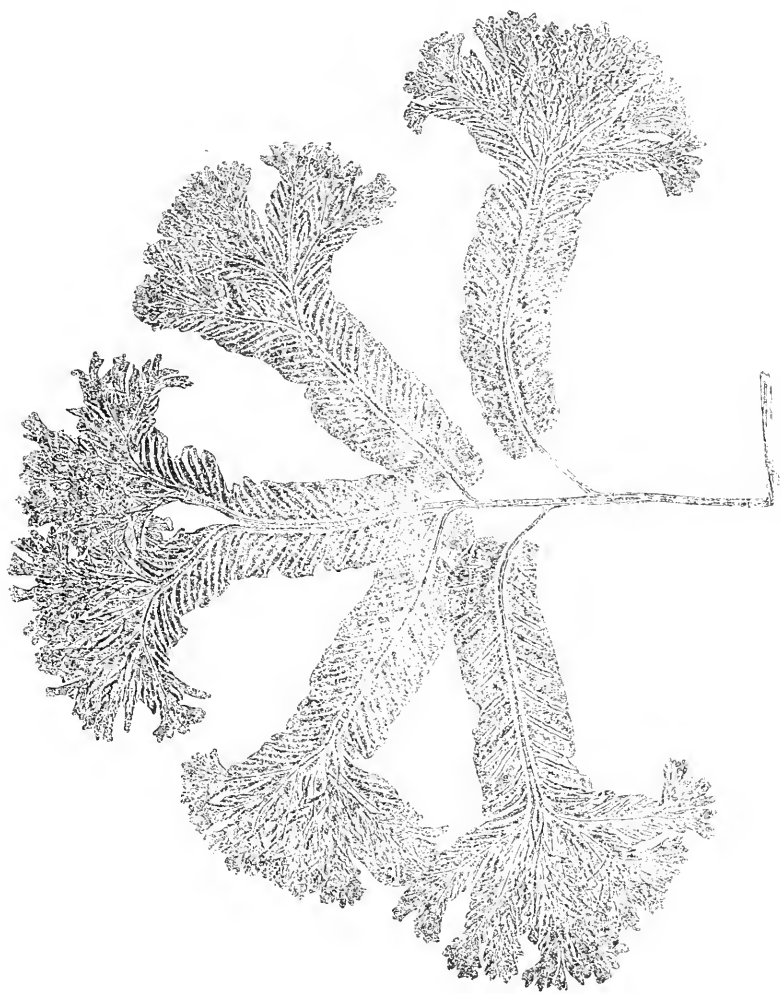
LXXXV

PTERIS AQUILINA, *var. FLEXUOSA (GLOMERATA)*

LXXXVI

SCOLOPENDRIUM VULGARE, *var.* RAMO-CRISTATUM (*Holl.*)

Mr. Moly. South Devon 1862.



LXXXVI

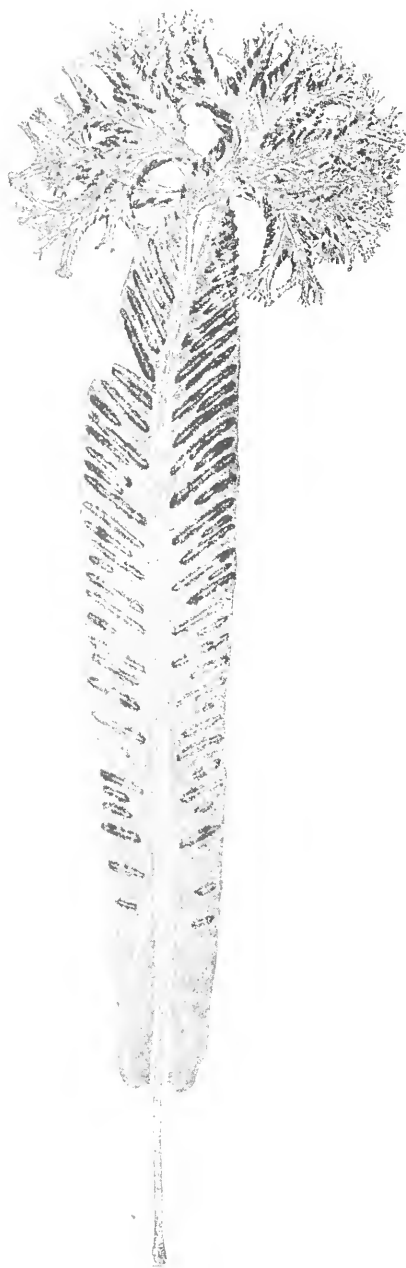
SCOLOPENDRIUM VULGARE, var. RAMO-CRISTATUM MOLY

LXXXVII

CRISTO-GALLI MOULE (*Holl.*)*Syn.* CRISTATUM

Robert Moule, Ilfracombe. N. Devon. 1864.

1 ft.



LXXXVII

SCOLOPENDRIUM VULGARE, *var.* CRISTO-GALLI

LXXXVIII

DRUMMONDIÆ (*Moore*)

Miss Marion Drummond, Oakfield, Penshurst, Kent.

Cornwall. 1861.

1 ft. 10 in.

Syn. CRISPUM MISS DRUMMOND (*Woll.*)

By Mr. Barnard Hankey. One of the wayward ones,—it often sends up long, narrow, normal fronds,—often, too, the fronds are fimbriated as well as frilled,—and it is generally more or less flexuose. Miss Drummond states that she found it about a mile from Falmouth and that it was then quite a small plant.



LXXXVIII

SCOLOPENDRIUM VULGARE, *var.* DRUMMONDIE

LXXXIX

LACERATUM (*Moore*)

The late Mr. J. Young, nurseryman, Taunton. Somerset. 1851.

10 in.

Syn. ENDIVIFOLIUM (*Holl.*)

Syn. BRACHIATO-CRISTATUM.

May perhaps be considered the counterpart in *Scolopendrium* of Mr. Grey's robust form of *P. ang. brachiato-cristatum*.

Mr. Clapham considers that a much-improved form has been raised by Glave, of Scarborough, whose cleverness in raising varieties of *Scolopendrium* is well known.



LXXXIX

SCOLOPENDRIUM VULGARE, *var.* LACERATUM

XC

SAGITTATO-PROJECTUM SCLATER (*Woll.*)

Capt. Sclater, Newick Park, Surrey. Co. Sligo. 1860.

1 ft. 4 in.

By Mr. Barnard Hankey. The earliest and perhaps finest form of its class.



XC

SCOLOPENDRIUM VULGARE, *var.* SAGITTATO-PROJECTUM SCLATER

XCI

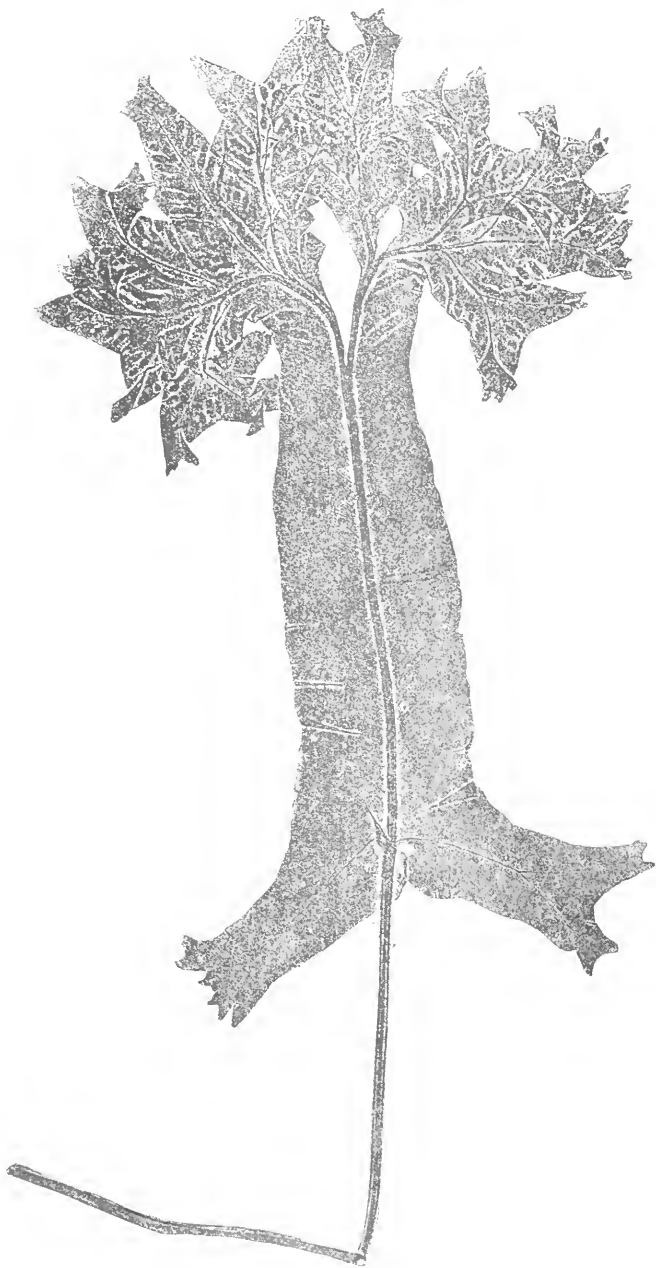
SAGITTATO-CRISTATUM HANKEY (*Woll.*)

Mr. G. B. Hankey. (Raised.) 1873.

1 ft. 2 in.

Syn. BRACHIATO-MULTIFIDUM.

Generally admitted to be the finest of the sagittate class without lateral projections.



XCI

SCOLOPENDRIUM VULGARE, *var.* SAGITTATO-CRISTATUM

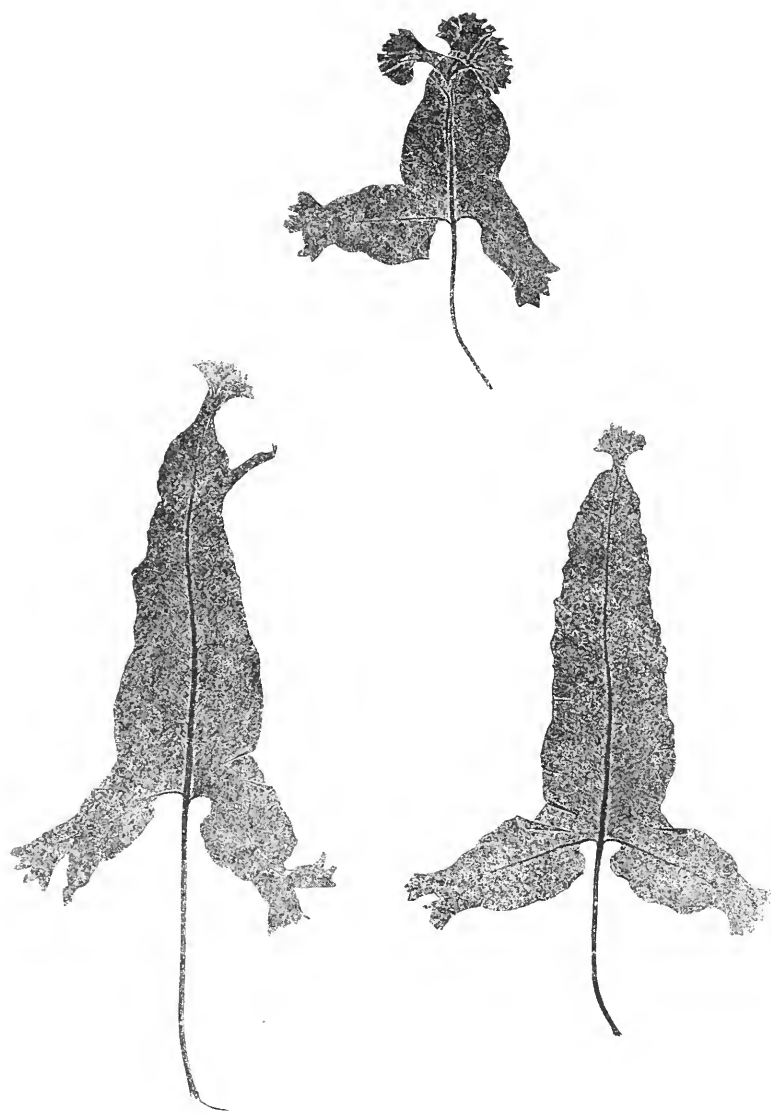
XCII

SAGITTATO-CRISTATUM DADDS (*Padley*)

John Dadds, Nurseryman, Ilfracombe. North Devon. 1860.

8 in.

Varies considerably, some of the smaller fronds being often very marked and symmetrical. *Hemionitoides*, stated by Messrs. Stansfield to have been raised by them some years since, is not distinguishable from this variety.



XCII

SCOLOPENDRIUM VULGARE, var. SAGITTATO CRISTATUM DADDS

XCIII

CRISPUM FERTILE (*Fox*)

R. Moule. Cornwall. 1868.

1 ft. 6 in.

Under glass by Dr. Charles Fox. "The plant had three crowns, two of them turned out good specimens of *crispum*, the third only was fertile."—*Note by the discoverer.*

SAGITTATO-CRISPUM (*Woll.*)

Mr. G. B. Wollaston. Hants. 1855.

1 ft. 6 in.

One of the grandest forms of *crispum*. Under favourable conditions it becomes at times distinctly brachiate, the lobes extending four or five inches. An unusually promising form of the sagittate class was found in 1876 in Ireland by Mr. Foster, of Manchester; and Mr. Tyerman has lately drawn attention to another remarkable form (multifid also) which has been found near Penzance by Mr. Curnow.



1

2

XIII

1. *SCOLOPENDRIUM VULGARE*, var. *CRISPUM FERTILE*
2. *SCOLOPENDRIUM VULGARE*, var. *SAGITTATO-CRISPUM*

XCIV

CRISTATUM MILLETT (*Holl.*)

— Millett, Fern Collector, Bideford. N. Devon. 1865.

1 ft. 2 in.

Syn. MILLETTII.



XCIV

SCOLOPENDRIUM VULGARE, var. CRISTATUM MILLETT

XCV

LIMBOSPERMUM CRISTATUM (*Holl.*)

Mr. Elworthy. Somerset. 1858.

1 ft.

“We received *limbospermum* from Mr. Elworthy at the same time as *crispum latum*, *crispum densum*, and *crispum irregulare* in 1859-60.”—*Note by Mr. Sim.*



XCV

SCOLOPENDRIUM VULGARE, var. LIMBOSPERMUM CRISTATUM

XCVI

MULTIFIDO-VARIANS (*Jones*)

Mrs. Grant, Hillersden House, near Cullompton. Devon. 1870.

1 ft 8 in.

A grand Fern,—a sort of elephant among *Scolopendriums*. The fronds vary a good deal, some are grandly multifid, others are supra-lineate or lobed at the base,—a few are dwarfed, but there are always sufficient of the larger-growing fronds to give a character to the plant,—one has to hunt for the defects.



XCVI

SCOLOPENDRIUM VULGARE, var. MULTIFIDO-VARIANS

7/-

42769

