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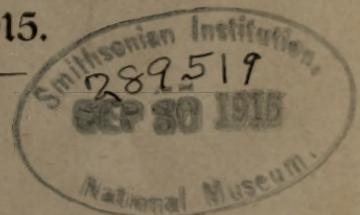
CHARLES T. DRUERY, V.M.H., F.L.S.

PUBLISHED BY

THE BRITISH PTERIDOLOGICAL SOCIETY

Secretary, C. T. Druery, 11, Shaa Road, Acton, London, W.)

KENDAL, WESTMORELAND.



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POLYPODIUM DRYOPTERIS PLUMOSUM.

THE
BRITISH FERN GAZETTE.

VOL. 3.

SEPTEMBER, 1915.

No. 25.

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EDITORIAL NOTES.

As our members will have been apprised by special notice, it has been considered by the Committee that it would be advisable to defer the proposed visit to South Wales until next year; the war, as in many other cases, reducing the chances of a successful meeting to a minimum. The health of the Hon. Secretary has also been such as to preclude the suggested previous journey to fix the locality and determine the arrangements. Under these circumstances the Committee framed the necessary resolutions for the transaction of the formal business of the Society, which are set forth in connection with the Report and Balance Sheet which are given elsewhere.

It will be seen therefrom that, despite the drawbacks which the present terrible war presents to the normal course of peaceful pursuits, our little Society still maintains its position, which is extremely gratifying to the Editor, though he feels compelled to make his customary appeal

for more assistance in the way of practical contributions to our cult by the members as well as the enlistment of further members with a view to the improvement of the "Gazette" by the aid of increased funds. The Editor would remind those members who have joined after Volume 1 was completed, that a small number of Volume 2 (Nos. 13 to 24, 313 pages) have been bound, together with a portrait of Dr. F. W. Stansfield as frontispiece, and that these volumes can be had *by members* for 3s. 9d., post free. As the issue is inevitably limited, and the books in the future are certain to be of value, this opportunity of acquiring a copy should not be lost.

X. The subscriptions for 1915-16 being due in advance, the Hon. Secretary would feel much obliged by a remittance of 5s. at an early date to 11, Shaa Road, Acton, London, W.

IMPORTANT.

In our June issue we referred to a previous publication issued many years ago on "Gazette" lines, which, however, was unfortunately but very short lived. We are now, however, happy to state that a copy of that publication being possessed by the Editor, Mr. W. B. Cranfield has very kindly and generously volunteered to provide therefrom a reproduction of Mr. G. B. Wollaston's very important paper on, and specification of, the differences between the three sub-species of the Male Fern (*Lastrea filix mas*), to the definition of which he devoted some twenty years of study. The detailed specification, dated October 29th, 1874, in the form of an illustrated chart, has been lithographically reproduced, and is of such great botanical interest as to render it a matter of congratulation that it has been, so to speak, resurrected and thus brought well within the cognizance of our present-day fern students. Mr. Wollaston's paper, referring thereto and elucidating it,

is also reproduced as it appeared in "The occasional paper of the British Pteridological Society," No. 1, 1875. We are sure that all our Members will feel, with the Editor, a deep sense of gratitude to Mr. Cranfield for his kindness.

THE EDITOR.

OUR FRONTISPICE.

POLYPODIUM DRYOPTERIS PLUMOSUM.

Mr. T. G. H. Eley kindly sends the photo reproduced as our frontispiece, together with the following note. We give here also a photo of the normal form to shew the great difference and increased beauty (p. 4).

Mr. Herbert Stansfield recently favoured me with a letter in which he referred to his astonishment and delight when he first saw the *Polypodium dryopteris plumosum* in my place at Furness Abbey, and how, after I had taken the plant to his Sale Nurseries, "he made it his first duty each morning to feast his eyes on the rare charms of that new and beautiful variety of *P. dryopteris*." I have, at his suggestion, had it photographed, and am sending you a copy with these notes, and I should be glad if you could find a place in the "Fern Gazette" for them. Mr. Stansfield, together with our much appreciated Editor, Mr. Cranfield, and myself (also possibly Dr. Stansfield and Mr. T. E. Henwood) have raised a number of sporelings from the original plant, and I hope, seeing that it is a good breeder, still further varieties will result. If our Editor has his usual luck he should come out with something startling. As stated by me in the "British Fern Gazette," Vol. 2, No. 22, December, 1914, I discovered this fern in the garden of the late Mr. T. Christopherson, at Row, Westmoreland. There were but two very small fronds, and the plant was growing in a *salmon*

tin, well under cover of more rampant ferns. Mr. Christoperson died shortly afterwards, but I was fortunate in getting his previous promise that as soon as it was possible



to divide the plant I should have a portion, and under these circumstances I was able to secure the plant from his sister,

When the British Pteridological Society held its annual meeting at Arnside in 1912, the principal outing was to Whitbarrow Scar, and I was able to indicate to the members of the Society—including Messrs. Druery, Cranfield, Henwood, Boyd, Edwards, Bell, Smithies and others—the dell in which *P. dryopteris plumosum* was found, and also in close proximity where the record was broken by Messrs. Christopherson and Sargeant finding *Polystichum lonchitis* at an altitude of under 400 feet. One of these plants was shewn by me at the Arnside meeting, and was declared to be a true *Lonchitis*."

THE AUGUST MEETING.

For the reasons given in the Editorial Notes, the meeting this year was held purely *pro forma* at the residence of the Hon. Secretary, 11, Shaa Road, Acton, W., at 12 noon on Monday, August 2nd, 1915. The balance sheet being produced as audited by Mr. J. J. Smithies, the following resolutions were passed (by means of proxies sent to the Hon. Secretary), to which we append the list of officers as re-elected, and also the balance sheet, shewing a balance to the credit of the Society of £76 2s. 10d., which may be regarded as extremely satisfactory under the adverse conditions of the war:—

RESOLUTIONS.

1. That the accounts and balance sheet as audited be approved.
2. That the Officers and Committee of the Society be re-elected for the ensuing year.
3. That the annual excursion (to South Wales) proposed for 1915 be held—subject to the war—in 1916.
4. That the Hon. Secretary be requested to continue the

Editorship of the "British Fern Gazette," and that an honorarium of ten guineas be voted to him for his services in that connection for the past year.

President : Mr. A. Cowan, Penicuik.

Vice-Presidents :

Dr. F. W. Stansfield, Reading.	Mr. J. J. Smithies, Kendal.
Mr. C. T. Druery, Acton, London.	Mr. W. H. Phillips, Belfast.
	Mr. W. B. Boyd, Melrose.

Hon. Secretary : Mr. Chas. T. Druery, V.M.H., F.L.S.

Treasurer : Mr. W. B. Cranfield, Enfield Chase.

Auditor : Mr. J. J. Smithies.

Committee :

Mr. T. Bolton, Warton.	Mr. T. G. H. Eley, Burgess Hill, Sussex.
„ J. J. Smithies, Kendal.	„ W. Bell, Furness Abbey.
„ R. Whiteside, Lancaster.	„ G. Whitwell, Kendal.
„ W. E. Farrer, Lancaster.	„ W. Wilson, Kendal.

Together with the President and Vice-Presidents as members *ex-officio*.

P. VULGARE VAR. CORNUBIENSE.

From the point of view of the biologist, any deviation from the normal structural specific form of a plant, which deviation is not due to accidental damage or defective cultivation and, therefore, affects its offspring by inheritance, is quite as interesting as those particularly marked types which claim our attention as being more beautiful and worthy of culture than the normal ones. In the one case, as in the other, something has happened to upset that regular succession of operations which characterises adherence to specific types and has for result the continuance of that type, generation after generation, without any appreciable variation. To such fern lovers as form our little Society, the wealth of varieties which we have cited as the more beautiful has, in course of time, become so great and the range of selection so extended that it has

BRITISH PTERIDOLOGICAL SOCIETY BALANCE SHEET, AUGUST 2, 1915.

	RECEIPTS.	£ s. d.	OUTLAYS.	£ s. d.
1914.				
Aug. 4.	To Balance at Bank ..	94 15 6	Aug. 4. By Cheque to G. Whitwell, as voted	10 0 0
1915.	" 116 Subscriptions, 1914-15, at 5/-	29 0 0	" " C. T. Druery,	10 10 0
Aug. 2.	" 6 Subscriptions, in arrears and omitted, at 5/-	1 10 0	" " Expenses of Vehicles, etc. ..	3 4 6
" "	" 11 Subscriptions, in advance, at 5/-	2 15 0	" " Miller, Son, & Co.:—	
" "	" Back Numbers of Gazette and Bound Volumes ..	2 1 3	Sept. 22. Sept. Gazette and Blocks ..	5 11 0
" "	H. B. May & Sons' Advt. ..	1 1 0	Dec. 19. " " ..	5 2 0
" "	Interest at Bank, less com. ..	1 7 7	1915.	
			Mar. 25. Mar. " " ..	4 18 8
			July 2. June " " ..	
			" " Portrait, and Binding Vol. 2, etc. ..	8 6 2
			" " Blocks and Photos for Gazette	1 12 6
			" " Carriage on books, etc., from City and elsewhere ..	5 5
			" " Stationery ..	13 6
			" " Clerical assistance ..	1 7 0
			" " Notices of Meeting ..	7 6
			" " Postages for year ..	4 9 3
			" " Balance at Bank, Kendal ..	72 8 2
			" " in hands of Hon. Sec. ..	3 14 8
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1915.	Aug. 2. To Balance at Bank ..	£72 8 2		
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CHAS. T. DRUERY, Honorary Secretary.

become necessary to ignore all, or nearly all, such varieties as present defects in make or inconstancy of type in the form of partial reversion, giving practically almost exclusive preference to those which persistently maintain that symmetry of form and make which constitutes their charm from the fancier's point of view. The constantly irregular forms indeed, in which no two fronds are alike, may biologically be even more interesting than the regular ones, suggesting as they do a continuous changing of mind, as it were, on the part of the formative cells which normally proceed on regular lines, repeating one and the same plan over and over again. To take one of our commonest examples of a fern of inconstant character but which is yet so good and so marked as to be indispensable to every collection :—

Polypodium vulgare var. *cornubiense* (*elegantissimum*) is one of the most marked examples of this eccentric type. Found as a wild plant in Cornwall, it was seen that it bore fronds of three distinct types, viz. the normal once divided or pinnate one, a somewhat slenderly divided bi-pinnate one, and a much more slenderly dissected or even tripinnate one, of which last selected specimens have been named "trichomanoides," owing to a marked resemblance to *Trichomanes radicans*, the beautiful native Filmy fern. For many decades this fern has been propagated, not only by division but also by spores, but this peculiarity of partial reversion has never failed to appear, and even asserts itself when a successful cross has been effected with exotic ferns of the same genus, or different varieties of native origin, e.g. *P. Schneiderianum*, *P. glaucum* + *P. vulg. corn.* and *P. vulg. corn.* + *bifido-cristatum*. Not content, however, with producing fronds of the three types named, it carries its eccentricity still further by change of plan even within the limits of one frond or part of a frond, one and the same example shewing normal, coarse and fine

sub-divisions side by side, or intermingled in the most wayward fashions conceivable. Curiously enough this eccentricity appears to be correlated with the type, since two other recorded wild finds in quite distant localities have presented the same peculiarities when brought under cultivation, so that, despite all efforts, there is no thoroughly constant form so far recorded.

The latest find of this type was made by our member, Mr. W. R. Roberts, as a quite tiny plant on a dry hedge-bank at Barnstaple. This was kindly sent to the writer, who grew it, and was for some time led to the belief that at last we had a constant form, as some twenty fronds arose all true to the intermediate type. A normal frond then presented itself and eventually precisely the same mixed character appeared. With regard to this variety, it bears three names—"cornubiense," indicating its Cornish origin and therefore appropriate; "elegantissimum," rather too superlative as it turns out, and "Whiteii." This last is derived from the name of one of its discoverers, three of which were apparently necessary for such an unique discovery. This name, however, was only temporarily applied or is rarely used nowadays. Besides the peculiarities already described, the fern is additionally interesting as a producer of dorsal bulbils on the more dissected fronds under favourable cultural conditions, but our own attempts to raise from these have so far failed. These bulbils appear in conjunction with the spore heaps, a rare but not unique phenomenon. The inclusion of such a variety among the *elite* is, therefore, seen to be fully justified despite its eccentricity.

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

MR. W. B. CRANFIELD'S COLLECTION.

Having been invited to Enfield by Mr. Cranfield and commissioned by him to take stock of his collection of British Fern varieties, with a view to their systematic classification and proper naming, we have enjoyed a peculiarly favourable opportunity of judging at once the merits and the extent of a collection which we imagine to be practically the most representative, the choicest, and the most up-to-date of those existent at the present time. The Kew collection, undoubtedly, far exceeds it in numbers, but, on the other hand, fails to include many of the latest acquisitions, both in the way of new wild finds and forms obtained by selective culture of the older types. The national collection is also handicapped by a considerable admixture of inferior varieties, which have established themselves as robust specimens among the innumerable seedling ferns which were planted, as it were on trial, when Mr. Carburne's and other collections were bequeathed or donated to the nation in the last century. The Kew authorities, however, have been so liberal in the allotment of space to our British Ferns that there is room for all, and their warmest admirers can only be grateful for the opportunity thus afforded to the public of forming a fair idea of their beauty and diversity. It is, however, with Enfield Chase rather than Kew Gardens that we are dealing, and here we have the additional factor that the owner is an ardent fern student, who devotes himself persistently and personally to the acquisition of the best types, their culture under the most favourable conditions, and, above all, to their propagation on selective lines of the most discriminating kind. Happily his estate is large enough to enable him to devote a very considerable space, or rather spaces, to his pets under varied conditions. Bold

growing trees provide the needful shade and shelter, and even permit of such ideal fern habitats as winding woodland walks and umbrageous dells, where all that is left to desire is the Devonian rainfall in lieu of that of Middlesex, where drought is too often a serious handicap.

Apart from the ferns themselves, much ingenuity is shewn in their specific arrangement. There are, for instance, a series of bays in a row under the shelter of lofty trees bordering the woodland in question. These bays consist of a short, broad path, surrounded horse-shoe fashion with wide, sloping beds, furnished here and there with stepping stones to facilitate access to the ferns installed in them. These bays are each about 21 feet wide by 27 feet deep, and over them, by means of wires, there are spread thin adjustable sheets of scrim, or thin canvas, while each bay is enclosed by a privet hedge. To each bay is allotted but one species, whose varieties are arranged according to size and type, so that here we may see some dozens of dwarf ones, and there a group of extra robust ones. All through, however, the different types or varietal sections are set out in separate groups, each specimen being given sufficient space to show its full character. The greater number of these bays is devoted to the Shield Ferns, or Polystichums, mainly *P. angulare*, of which alone in this collection there are several hundred distinct varieties. Another bay is devoted to Lady Ferns, *Athyrium filix fœmina*, in the same systematic way, and in another we see nothing but the Hartstongue, *Scolopendrium vulgare*, in a hundred and more distinct and different forms, from minute bunches of moss-like frondage to yard-long fronds, reminding one by their size of those in Cornish woods, but of very different forms, in the shape of broad frills and fringes, or heavy tassels on endlessly varied lines.

Leaving these bays and turning into the wood, we pass

by, on the way through, masses of Oak Fern and many specimens of Male and other ferns growing under more or less wild conditions, until we come to a circular path enclosing huge masses of *Osmunda regalis*, the Royal Fern, normal and crested, with a fringe or border of *Cystopteris fragilis*. Around this centre, on each side of a circular path, there are ranged scores of huge pots and pans, in which are grand specimen plants of several species, but mainly of the wonderful "superbum" section of plumose Lady Ferns, particularly *A. f. f. plumosum Druery*, the Queen of the tribe, and its regal sisters, the percristatums. The sloping beds surrounding this centre are filled with a great number of varied species, largely of the Lastrea or Buckler Fern family in variety, with beautifully rural effect.

Returning to the garden proper, we pass a long, sloping bed, the home of a hundred or more of magnificently frilled Hartstongues in rows, all, we are informed, raised from one of Mr. Moly's best finds, by means of bulbils formed on detached frond bases, a good proof that propagation on a liberal scale is not at all prevented by the absolute absence of spores on the frilled section of this species, at any rate on the thoroughbreds. Elsewhere we see other examples of this in the shape of large numbers of other "finds" treated in the same way. How this propagation is effected has already been described in the "Gazette," and we have seen as many as thirty young plants attached to a single frond base when treated properly, that is, to the persistent basal end of the frond which is attached to, and forms by accumulation, the caudex, or crown, of *Scolopendrium vulgare*.

Proceeding on our way we come to an enclosure within which, under a similar canvas shelter to that of the bays, is the major part of the Buckler Fern collection, in which we find practically all the varieties worthy of note of the

Lastrea family—*L. filix mas*, *L. pseudo mas*, *L. propinquia*, and *L. dilatata* and its sub-forms. Of *L. montana* there are but few, this species so far declining to thrive, though we are sure that, seeing the many varieties in existence, it will ere long be persuaded by Mr. Cranfield to be fairly represented. One or two of the finest, among them Dr. Stansfield's beautiful Welsh find of *L. montana plumosa*, are to be found in one of the greenhouses in conjunction with a few other gems which claim such protection.

We next come to an open field sparsely planted as an orchard, and here we find the few frames devoted to that class of culture. Two very long and wide ones are devoted, one to that unique and beautiful class of *Polystichum* known as the *Pulcherrimums* and *Gracillimums*, the other to *Polypodium vulgare*. This latter contains about forty varieties of that beautiful species, planted in very free leafy soil and actually rivalling in robust development the noted collections of this species of Dr. Stansfield and Mr. Henwood, which is saying a great deal. The former class was raised in the first place by Mr. Druery and Mr. Green, and subsequently by Mr. Cranfield himself, and is known as the "gracillum" and "plumosum" sections of that species, to which he has added a promising cristate form of *Pulcherrimum* itself. A special shelter close by accommodates practically the entire known section of *Scol. v. crispum*, or the frilled Harts-tongue, in its manifold forms, and here, as elsewhere, the robust healthy state of all the plants testifies to the grower's peculiar skill in meeting their requirements as to soil, shade and other conditions.

A fairly good collection of *Blechnum spicant* occupies a small frame, and in another close by we see a most charming collection of dwarf forms of several species, on which Mr. Cranfield has promised a special article. There is, furthermore, a close frame devoted to the new

"pellucidum" section of *Polystichum angulare*, a very beautiful one of somewhat doubtful origin. It is very finely dissected with semi-translucent sub-divisions, whence the name, and is so delicate as to require almost filmy-fern treatment, at any rate in the young stage, which none of them so far has surpassed. They are, however, of so extremely promising a character that Mr. Cranfield's special care is fairly certain to be handsomely rewarded in course of time by worthy additions to the *élite*. This section originated in Mr. H. Stansfield's collection, but a young plant also quite unaccountably made its appearance in Mr. Druery's as a stray sporeling. On our way to these several collections we find innumerable specimens, large and small, of good varieties dotted about or grouped wherever the conditions are favourable, but these are practically all duplicates or multiples of varieties more formally represented in the collections proper.

It is clear from what we have stated that space does not permit of more than a general reference to and indication of the scope of the collection, and a long article would require to be devoted to each bay or frame, and a much longer one to the "spinney walk," as we will christen the woodland one. We must, however, allude to one of the most interesting features of this collection, though it has already been touched upon in the "Gazette." This is the fact that a very large number of the ferns we see are practically "resurrections" of the once noted Moly collection which Mr. Cranfield fortunately purchased just before Mr. Moly's death. This collection was so old and had been for years so neglected that the great majority of the plants were moribund and practically dead. They were, however, transported in sacks and other receptacles to Enfield, and in the light of the writer's experience were surgically treated by drastic removal of all the dead matter, so as to give every particle of remaining central

life a chance by enabling it to meet with fresh soil and so develop bulbils and roots and start existence afresh. Happily, thanks to Mr. Cranfield's skill and assiduity, the vast majority of the old stumps responded to this treatment by forming buds and bulbils, with the result that at present there are hundreds of Mr. Moly's finds figuring as well-established typical plants of great beauty which otherwise had been lost to the world entirely. From some of these, too, offspring have been raised from the spores, and these in many cases not only promise to be, but actually are, the most beautiful forms we possess of the particular section to which they belong far surpassing their beautiful parents. Strolling through such a gathering of the choicest of the choice as we find under these fostering conditions one can but wish that we could be accompanied by the spirits of the old pioneers such as Moly, Col. Jones, Dr. Fox, Dr. Wills, Wollaston and others, and see their amazement and joy at beholding, not only their particular pets and acquaintances in good and appreciative hands, but also the new developments which have been derived from their discoveries such as the "superbum" *Athyria*, the *gracillimum* and *plumosum* "pulcherrimums" and some of Mr. Cranfield's own derivatives from the Moly finds.

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

FRAGRANCE OF POLYPODIUM CALCAREUM (Smith).

[P. ROBERTIANUM (HOFFMANN).]

Our Editor has pointed out to me that Hoffmann, in his original description of this species, as quoted by Newman in his "British Ferns," says "*odor debilis Geranii Robertiani*" (*i.e.* a weak odour of *Geranium Robertianum*), and it is presumably upon this characteristic that

Hoffmann's specific name is founded. We must, therefore, give to Hoffmann the credit of having first noticed and recorded the fact that this fern is scented. I cannot, however, commend his power of discriminating odours, for, after cultivating the two plants for a season and carefully comparing their scents, the impression made upon me is that the odour of the fern is entirely pleasant, while that of the Geranium is decidedly disagreeable. The difference is not merely a matter of degree (as Hoffmann's description would imply) but one of kind, for though the two may have something in common, there is in the scent of the fern a sweetness which is not to be found in that of the Geranium, while there is in the latter a rank heavy quality which is always unpleasant however much it may be attenuated. I should, in short, describe the Polypody as *suaveolens* and the Geranium as *graveolens*.

F. W. STANSFIELD, M.D.

Reading, July 27th, 1915.

A SURGICAL BIRTH AND ITS SEQUEL.

" — let that angel whom thou servest
 Tell thee MacDuff was, from his mother's womb,
 Untimely ripped." (Macbeth.)

I have previously recorded ("Gazette," December, 1914) the finding of a small offset upon our Editor's plant of the original *A.f.f. Clarissima* and its presentation to myself. It has occurred to me that a more detailed account of the operation of removal and the subsequent history of the plant may be of interest to readers of the "Gazette." The time of year (end of October) was the one least favourable to dividing operations in deciduous fronds, i.e. when growth had completely ceased and was not due to re-commence for a period of several months. Moreover, the offset was a small one from a large plant. It was dug out

with the help of a pair of nail scissors and was found to have been connected by a slender stolon with the parent plant, the offset having practically no roots of its own and its crown consisting of two rather loosely rolled fronds only. On reaching home three days later the little plant was potted in fibrous, springy soil, and placed in a cold house in the shade, the idea being to keep it at rest until the proper time for growth in the spring. Judge, then, of my surprise and dismay when, after a week or so, the two fronds which formed the crown began to unroll! As the plant had nothing else upon which to fall back it was necessary to preserve these fronds, so it was plunged in a pan of cocoa-nut refuse, covered with a bell glass and watered sparingly. The two fronds continued to develop very slowly until about Christmas, when they came to a stop although still not completely unfolded. During the next three months the plant was given as full light as possible, was carefully protected against frost, but was not subjected to any artificial heat. The bell-glass was removed every morning and replaced at night. Whenever there was any sign of sharp frost the whole concern was moved into the dwelling-house for the night and taken back in the morning. Things remained in *statu quo* until the end of March, when the two fronds became fully expanded. At the present time (June 30th) they are still living and green, though somewhat the worse for wear. Three or four larger new fronds have developed and the plant may be considered quite safe.

Its up-bringing recalls the way in which prematurely born babies are nursed into life in incubators in Paris.

F. W. STANSFIELD, M.D.

VARIATION: ITS STARTING-POINT.*

Since variation in the form of a plant can only be observed when there has been sufficient growth to evidence its existence, the question of its starting-point, that is, where the first abnormal mother-cell, from which the subsequent abnormal growth is derived, originates, appears to be, and probably is, an insoluble one. Despite this rather disheartening probability, it is, however, of great interest to record the various ways in which such sports have been known to declare themselves, and in this way provide at least some material upon which theories, if not certainties, may be based by extended investigation. In connection with Ferns, and particularly British ones, which have afforded such abundant material, both in the wild state and under culture, by selection from the offspring of such, the finder of these can throw no light upon our problem. All he can say is that among possibly many thousands of the normal type he has found one, or it may be several, of a distinctly different one, though of the same species undoubtedly as the others associated therewith. If there are more than one at or near the same spot, he will probably be justified in his conclusion that these are either the direct offspring of some normal plant in the vicinity, which had yielded such offspring through spores endowed with the capacity of variation, or that equally probably, all but one of them are the offspring of one plant from whose spores they have sprung, as what we may term secondary sports. Naturally, however, he cannot trace how that first one originated. It may have, as we have said, commenced as a spore on an otherwise normal plant, but, on the other hand, it may have started independently of the spore as an offset produced by a bulbil, but we have

* By permission of the *Gardeners' Chronicle*.

no record of a Fern sport being found that was so indubitably associated and structurally connected with a normal specimen as to admit of proof of this. Furthermore, if we assume that the sportive character originated in a spore, that spore, when it was detached and found a suitable nidus, produced a prothallus; this in its turn produced a large number of antherozoids or male fertilising germs, equivalent to pollen grains, and a cluster of archegonia, each of which had an incipient seed at its base, which, being fertilised by an antherozoid, produced subsequently the sport under consideration. Who, however, can determine whether or not the aberrant capacity may not have originated in an abnormal antherozoid or an abnormal archegonial seed? All we can know is that by a conjunction a Fern was engendered, which threw off the ancestral structural plan, and adopted another on possibly very different lines, while this new plan may be so pervasive in the new plant as to be inherited to the full by its offspring for an indefinite period on quite specific lines. It is therefore seen that the starting-point of a variety or sport may occur in several ways, viz. by a merely vegetative bud, by an affected spore on an otherwise normal plant, or by affected antherozoids or archegonial "seeds" on an otherwise normal prothallus; these last two being, it is true, only assumptions, but reasonable ones, when we know how it had been proved by extended experiments that Nature knows no limit to her inventive capacity, the prothallus and the Fern itself having exhausted every conceivable variation in the life-cycle, as proved by Professors Bower and Farmer, Dr. Lang, and Miss Digby. We may now cite a few instances which have come under our notice in connection with our theme. First, with regard to bulbil sports, we may mention the recognised case when a large plant of the Jones and Fox section, *P. angulare plumosum*

densum, was maliciously chopped up into over a dozen fragments in Mr. Barnes' collection by some miscreant. These fragments were collected by Mr. Whitwell, of Kendal, and under his fostering care each one formed a new axis of growth and a root system, so that subsequently a row of splendid specimens appeared in Mr. Whitwell's garden. Our attention being called to these, we noticed at once that one, though indubitably of that particular section, and equally indubitably derived from a division of the original specimen, was distinctly different from the rest, both in habit and cutting. This, of course, proved that the mother-cell by which the plant had originated as a bud on one of the fragments aforesaid had of itself adopted a special and new plan of growth—*i.e.* had sported.

It is, indeed, now well known that bulbil propagation, though fairly reliable as regards true reproduction of the type, is by no means absolutely so. That sportive spores may arise on an otherwise normal or nearly normal plant has been shown in two interesting instances in our personal experience.

(To be continued.)

The following paper was read by Mr. G. B. Wollaston at the monthly meeting in November (1875), held at his residence, Bishop's Well, Chiselhurst :—

LADIES AND GENTLEMEN,

You have kindly asked me to read a paper to you, at this our first meeting after the recess, and I do so with great pleasure, but at the same time with much diffidence in my powers, and I trust you will make allowance for all my shortcomings.

It is now many years since I first rode a hobby, viz.

that of the proposed division of *Lastrea filix mas* into three distinct species. I still ride over the same ground rough-shod, and shall continue to do so, until some such learned and benevolent Society as your own convinces me that I am wrong.

I now lay before you a diagram* of what I believe to be three distinct species of *Lastrea*, with the names I propose for the two new ones, *Lastrea propinqua* and *Lastrea pseudo mas*, showing many diagnostics peculiar to each in juxtaposition, so that you may the more readily judge of their difference of structure, shape, durability and localities in which they are found, etc., etc. I am fully aware that these diagnostics are not wholly scientific and botanical, but I trust you will think them of sufficient importance to enable me to unravel a knot which has at present defied all Pteridologists. Whether or not I shall be the happy man to do so I leave entirely in the hands of the Society to decide.

We will now, if you please, take each item of the diagram seriatim, and you will observe that in 1st Column the order of development (that is the first appearance of the new fronds) *Lastrea propinqua* is first, *Lastrea filix mas* second, and *Lastrea pseudo mas* third; and this, under similar conditions, has been the same almost without variation for nearly twenty years.

In the 2nd Column the vernation or unfolding of the fronds is very striking. In the first, *Lastrea propinqua*, it is circinate; and in the two last, *Lastrea filix mas* and *Lastrea pseudo mas*, pediiform, or like a shepherd's crook, sufficiently different for the eye to detect, but hardly to be described in language.

The 3rd Column you will find contains by far the best and most constant diagnostics of the three forms, and

* See appended Chart.

when taken young is unfailing; but in the more advanced growth, when the spores are nearly matured, ferns forming no exception in Nature's laws, protect their own offspring against the burning rays of the midday sun, and the baneful effects of too much wet in the perfecting and ripening of the spores by reflecting or folding back the margins of their pinnules, which would be destroyed were they to remain concave.

In the 4th Column we come to the form of the pinnula or pinnule; in *Lastrea propinqua* it is obtusely biserrate and biauriculate, occasionally developing the anterior auricle to such an extent as to become a small attached twin-pinnula. It is also succulent, soft and pulpy, very like a diminutive leaf of *Sedum Telephium*, with its margin slightly thickened. In *Lastrea filix mas* the pinnula is scarcely auricled, indeed one may say never, except when it runs into the variety of *deorsum-lobata* of Moore. In *Lastrea pseudo mas* the pinnula is not auricled at all, and generally has a squared oblique apex, which never obtains in the other two forms.

In the 5th Column.—Difference of colour is difficult to judge of at all times; but if you will refer to the diagram, you will find that attached to the different forms is again rather an eye difference than one which can be expressed by words.

6th Column.—The next diagnostic I consider a very good one, and which may be thoroughly relied upon, viz. the state of the old fronds when a winter has passed over them. Those of *Lastrea propinqua* are of a beautiful rufus brown, and perfectly fragile and perished. Those of *Lastrea filix mas* are of a dirty brown, with remains of the green, prostrate and fragile. And those of *Lastrea pseudo mas* are so tough that you cannot separate them from the plant; and they remain, unless beaten down by a heavy fall of snow, upright through the winter. They are

perfectly green, even far advanced into the next season, and under glass are green for three years. I have now in my possession pinnae of three years' growth, picked from the same plant at the same time.

7th Column.—The differences here are as much the same as in Column 3; but, as treating of the fronds themselves, and not of the parts, are of marked importance, and may be taken under ordinary circumstances as a good diagnostic.

8th Column.—The three forms are here taken when they have felt the effects of a severe frost, and you will observe that *Lastrea propinqua*, which is sub-Alpine (and if it were only a variety of *Lastrea filix mas*, would on that account be more hardy), is perfectly deciduous and perished. This surely is very strong confirmation in favour of its being a true species. *Lastrea filix mas* is prostrate in winter, but not deciduous, and *Lastrea pseudo mas* is evergreen or sub-evergreen, and preserves its erect position throughout, unless, as before stated, beaten down by snow.

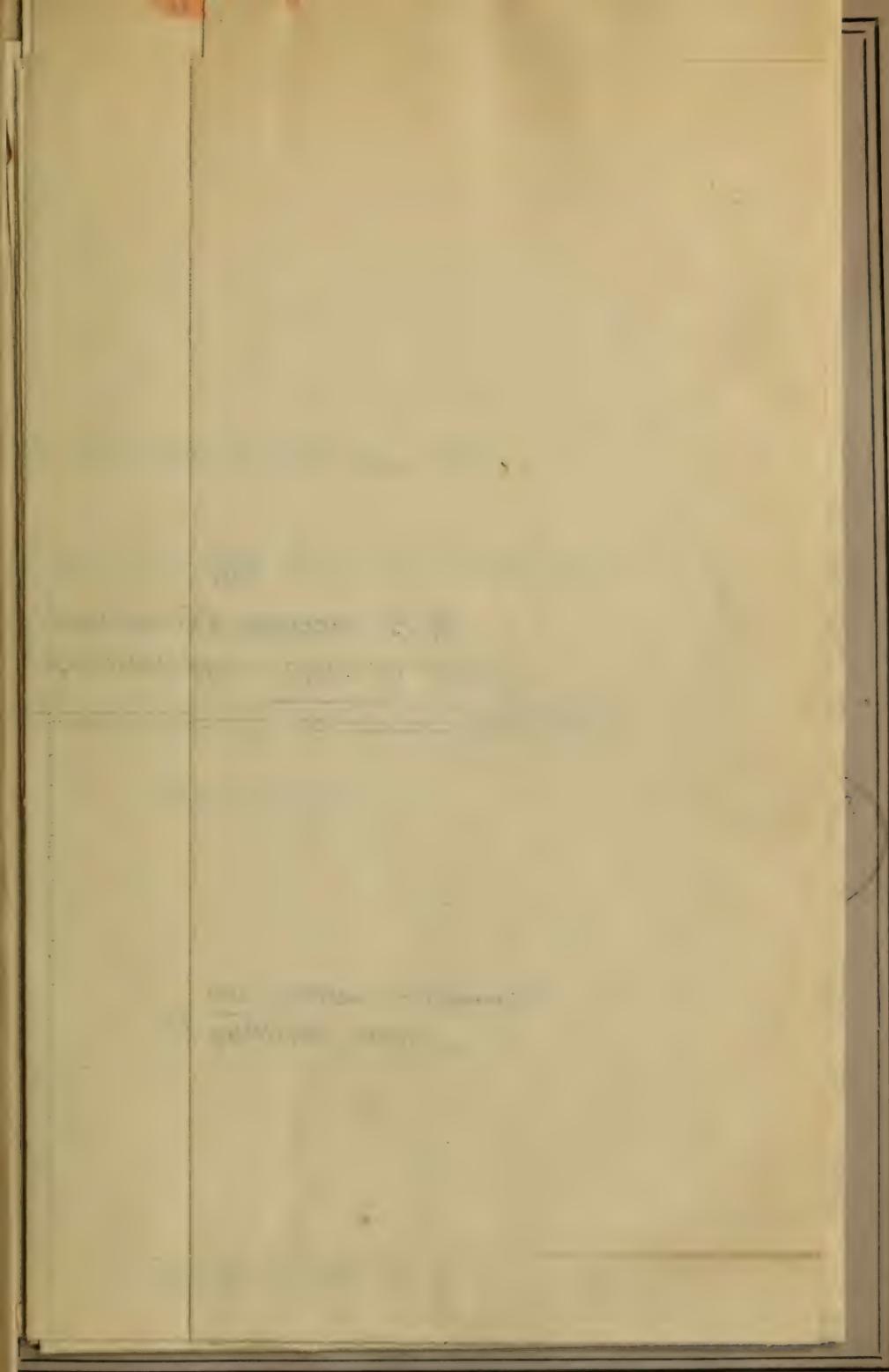
9th Column.—We have here a good characteristic for one out of the three forms. In *Lastrea propinqua* and *Lastrea pseudo mas* the indusia embrace the spore cases, and are persistent and entire, and in *Lastrea filix mas* the indusium (taken when quite young) in section, exactly resembles an inverted soup plate, and is eventually evanescent.

10th Column.—This, the most knotty point, viz. the possibility of distinguishing each by the markings of its spores, is a most difficult question to decide, there being such an infinite variety of causes, which militate against accuracy of manipulation, etc. I will enumerate a few. The difficulty of procuring the spores of each form of the same age and of the proper maturity, their extreme minuteness (viz. about the 1,400th of an inch in length), and their comparative thickness and opacity, which when

under a high power of the microscope requires a different focus for every minutia of distance. This obliges the operator to use a lower power in order to see the relative distribution of the verrucæ, or warts, with which most of the British fern spores are furnished, and which in this case I believe to be a certain diagnostic of each form. In *Lastrea propinqua* the spores are olive-green, not keeled, and covered with minute verrucæ equally distributed, so much so that it gives to each the appearance of being simply covered with minute punctures, which represent the interspaces of the verrucæ. In *Lastrea filix mas*, the spores, which are olive-brown, are keeled, and the verrucæ collected into serpentiform markings (or, to give a better illustration, like the spots on the ounce or leopard, arranged in the curved stripes of the tiger). They are also coarser than those on the spores of *Lastrea propinqua*. In *Lastrea pseudo mas* the spores are olive-brown and obsoletely keeled, and as one would expect to find, very similar to those of *Lastrea filix mas*, but the eye detects a difference, which consists in the aggregation of the verrucæ, being in what (for want of a better name) I have called Hebrew character, or zig-zag marking, as shown on the diagram.

11th Column.—The localities of each are soon disposed of, *Lastrea propinqua* being solely sub-Alpine, and where found, not a plant of *Lastrea filix mas* is to be seen, and yet there is abundance of *Lastrea pseudo mas*. *Lastrea filix mas* is universally distributed through the botanical provinces, and *Lastrea pseudo mas* very commonly so.

12th Column.—*Lastrea propinqua* (not determined). *Lastrea filix mas* is infected with a disease which disfigures it throughout its growth, but whether the disease is a fungus or the effects of an insect, is as yet not known. *Lastrea pseudo mas* is so very rarely affected that one may say never. This is again another strong proof of a specific difference.



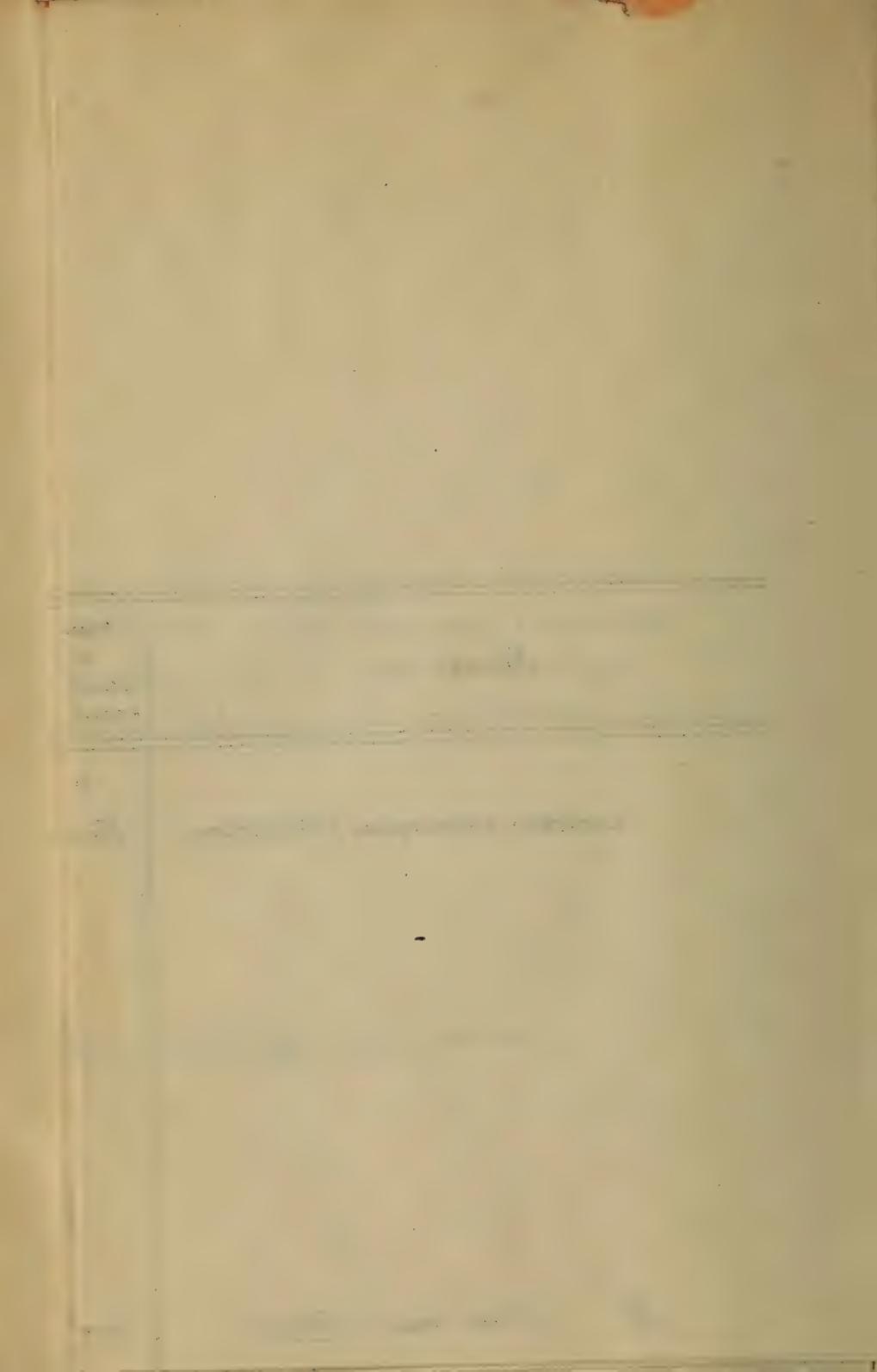
A Diagram

Giving twelve diagnostics or characteristics of the proposed division of *Lustrea Filic-mas* (Presl) into three Species, by George R. Wollaston.

Name	Order of development	Formation	Form of Frond during early development	Form of Fronds or Annulus	Colour	State of the Old Fronds in Spring	Frond	Persistence or durability	Inclusions to be observed in all cases when young	Spores	Where found	Reverses	
<i>Lustrea propinquia</i> (Wollaston)	1	2	3	4	5	6	7	8	9	10	11	12	
	Perib.	Gemmule	Gemmule or adpressed	Iregularly elongated lanceolate not succulent like a small leaf of <i>Sodium Telephium</i> (L.) blandly or slightly serrulate with the margin slightly thickened and depressed, lanceolate sometimes showing minute serrulae as a small pinnula	Stiff pale green	Distichous; rufous brown	Wide lanceolate bipinnate creased and depressed, soft	Petiole stellate; rufous brown; when decaying	Embracing the apex and persistent tiller	 	<i>Lustrea propinquia</i> (Wollaston) Spore  Olive green not keeled narrowly serrulate	Solely subalpine	Not determinable
<i>L. Filic-mas</i> (Presl)	Second	Podiform or Shuttle-cross like	Gemmule or depressed	Elongated oval papery rev slightly wrinkled, serrate & succulent, with the latter generally in the sharper teeth that bear the sori	Stiff pale green	Angulate prostrate dirty brown and green	Lanceolate bipinnate slightly undulate and depressed paper	Very partially deciduous prostrate in winter dirty brown and green when decaying	Sub-pinnule  not inverted very flat and concreting the apex case, eventually completely disengaged	 	<i>L. Filic-mas</i> (Presl) Spore Blue brown keeled very narrow or wide subapertiform	Universally distributed	Blighted with ?
<i>L. pseudomata</i> (Wollaston)	Third	Elongated podia form	Plane or flat	Hardened rigid nonsucculent or leathery almost entire slightly raised at the site of the apex of the rachis that bear the sori. Not wrinkled	Bright yellow green	Rough upright green	Lanceolate bipinnate plane or flat, sessileous	Europaea or sub-europaea occurring upright or nodding	Embracing the apex and persistent tiller	 	<i>L. pseudomata</i> (Wollaston) Spore Blue brown absolutely keeled succulent, narrow zigzag like <i>Holms</i> characters, spotted beneath, sub-crepitate	Commonly distributed	Never blighted with ? for name at present unknown

After long and careful study and investigation of the above forms in the growing state and under similar circumstances (all the plants being taken in their full development and of the normal form except when otherwise specified) I have arrived at the conclusion stated in the above diagram, and although I am willing to admit that in some conditions the three plants are so close that no one can discriminate between them, I still think they are all worthy of the rank of Species under the ordinary acceptance of that term. That they are first cousins or even brothers (under the Darwinian theory) I am equally convinced concerning that theory the only contradictory evidence to be given where all the characters of opposite species coincide or run one into the other. Let me recommend my fellow Pteridologists never to attempt an investigation of the above forms dried specimens only, as they will signify nothing.

Chichester Oct 29th 1874



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KENDAL, WESTMORELAND.



POLYPODIUM DRYOPTERIS PLUMOSUM.

(By kind permission of the "Gardeners' Chronicle.")

THE
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EDITORIAL NOTES.

Although naturally we have now entered upon the apparently dead season of the year, when little new material can be expected to turn up for record, we think that our present number will not be found to fall behind its predecessors in matters of interest, although, as usual, there is far too large a proportion of the C.T.D. matter, which properly, with so many members, should serve rather as padding than as the principal material. Several members have, however, come forward as valuable contributors, for which we are very grateful.

May we also beg the present members to strain a point and help us by inducing their fern loving friends to join the Society. A specimen copy will willingly be sent free to any likely subscriber on receipt of name and address.

The subscription is 5s. per annum (August to August), and entitles to four issues of the GAZETTE and any desired information *re* British ferns.

THE BRITISH FERN GAZETTE, VOL. 2, Nos. 13 TO 24.—The Editor would remind the members that only about thirty volumes containing portrait of Dr. F. W. Stansfield have been bound in cloth for the benefit of such members as have not preserved all the above numbers, or have too recently joined to possess them. As no reprint will be available, and the books are widely recognized as most valuable contributions to our Fern literature, the opportunity of acquiring copies, even extra ones, should not be lost sight of. The price to members is 3s. 9d. post free, and speedy application is advisable to secure.

X The subscriptions for 1915–16 being due in advance, the Hon. Secretary would feel much obliged by a remittance of 5s. at an early date to 11, Shaa Road, Acton, London, W.

OUR FRONTISPICE.

POLYPODIUM DRYOPTERIS PLUMOSUM.

The Editor of the *Gardeners' Chronicle* having very kindly lent us a block of a frond of this charming new Fern, which shows its beauty to far greater advantage than that given in our last issue (which see for particulars), we have profited by the opportunity to give our members the benefit of it, for which we are sure they will be grateful.

VARIATION: ITS STARTING-POINT.

(Continued.)

Many years ago a very handsome new form of *Gymnogramma Laucheana* was raised by Messrs. Dixon of Hackney. This was a very heavily crested grandiceps, and, visiting their foreman, he told us that

on a normal specimen he observed a single fan-shaped pinnule bearing spores, and that on sowing these, a large batch of plants all alike, and of the variety named, resulted. Here it is clear that the sportive principle had extended beyond the sori affected so as to affect the foliage which bore them, or that it pervaded so much of the local foliar area, and thus affected the sori. In the second case the writer found, at Staverton, in Devon, a strong specimen of the common Hartstongue (*Scolopendrium vulgare*), with a large number of fronds, all but one of which were perfectly normal. The exception was of the type known as *sagittatum projectum*, and this bearing a few spores was gathered, and the spores eventually sown. Some half a dozen plants resulted, all of which were alike, and all of a true *sagittatum projectum* form, plus terminal crests. Here, then, we see again a local affection of the foliage embracing an entire frond associated with a sportive tendency in the spores. Another question in this connection is, How far is the sportive tendency dependent upon seasonal influence? Experience has taught the writer that a varietal Fern capable of yielding exceptionally fine offspring at one time may at another fail more or less entirely to do so. Thus, the now well-known *Athyrium filix-fæmina*, known as the "superbum," yielded from the first crop of spores which the "superbum" parent produced, two unparalleled plumose sections, one crested and the other uncrested, all of the greatest merit. The parent plant still forms one of the chief ornaments of our collection, but repeated sowings since have only yielded mediocre forms or failed entirely, presumably owing to long continued culture under glass having weakened its vitality. Another *Athyrium*, *A. f. f. cristatum Kilrushense*, a find of our own, and recognised as the finest cristate wild find of the species, yielded from the first sowing a good crop of the new form, but several subsequent sowings have been hardly crested at all at one

time, but fairly true at others, for which the only explanation is, we think, seasonal influence of a little understood character. *A. f. f. Clarissima* on which apospory was first discovered, has never, we believe, reproduced the large local pear-shaped excrescences which led to the discovery. It has been maintained by some authorities that all sports are due to hybridisation or crossing, by which the normal specific type of growth is interfered with, with the result that a sort of compromise is effected involving the change observed. No thoroughgoing student of variation can, however, accept this theory. One fact alone suffices to contradict it, viz. that the new characters are rarely, if ever, specific ones, attributable to neighbouring plants. Cresting or tasselling, to wit, has never been recorded as found as a specific character, and yet so many abnormal Ferns present that peculiarity that the power of sporting in that peculiar direction appears common to all genera. In Great Britain, as in other countries, some genera are only represented by a single species, and yet these single species, *Athyrium filix-femina*, *Scolopendrium vulgare*, and *Blechnum spicant*, for instance, have been very generous in spontaneous wild sports. It is curious, indeed, that with such abundant evidence in disproof, such a theory can still be advocated by botanists of repute.

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

FERNS, HORNED AND THORNE.

One of the most curious types of variation in Ferns is that which embraces the varieties known under the several names of cornutum (horned), truncatum (cut short), excurrens (running out), peraferens (pocket bearing), spinosum (spiny), and possibly several others which we have not come across, but with which their owners or raisers have seen fit to dignify them. Naturally it is

impossible for the critical expert on high-class selective lines to consider any of these as other than "curios," devoid of the charm of symmetry and perfection which the élite must display to qualify them for their high position. As "curios," on the other hand, they must be conceded first rank. When we consider the mode of development peculiar to the fern tribe generally, that is, that the frond and all its subdivisions grow by the multiplication of cells at their extreme tips, which normally results in a tapering off to a more or less acute point, and that in that form of variation known as cresting these growing points are multiplied so that the result is a bunch of terminals instead of a normal single one, it seems, and indeed is, a very curious thing that now and again Nature pursues exactly the opposite course by suddenly checking the terminal growth entirely. This she does in such a way that the end of the frond, or it may be of all its subdivisions, terminates squarely and abruptly, the midrib projecting either as a horn or a thorn, and even being entirely suppressed. This peculiar form has been found to occur in a number of British species, viz. *Lastrea montana*, *Lastrea filix mas*, *Athyrium filix fœmina*, *Polystichum angulare*, *Scolopendrium vulgare*, and *Osmunda regalis*. In *L. montana* it occurs so frequently (*L. m. truncata*) that in the Lake district among the many fern-hunters there it is known as "the beginner's Fern," since, as in our own experience, there and elsewhere, where the species is plentiful, it is almost sure to turn up once or twice in the course of a day's hunting, sometimes as a thoroughbred, with all fronds so characterized, and more often as a "rogue" with only a few fronds truncate, and the rest quite normal, in which case the truncate character is almost sure to disappear under cultivation, as it may indeed, however thorough the "find" may appear to be. In *L. filix mas* truncate variation is rarer, but has been

formed on quite similar lines, that is, with fronds otherwise of the quite common type, but with the pinnae or side divisions squared off and the midrib projecting as a slender thorn. With the Lady Fern, the variety *A. f. f. excurrens* carries the type further, the pinnules or secondary divisions being squared and thorned, and through its spores some forms have been raised with a generally spiny appearance, but it must be admitted that carried so far, the plant approaches dangerously near to the section we have jokingly christened "hownotto doitums." *Polystichum angulare* has had too much respect for itself to err much in this direction, but has furnished an example or two which hardly merit naming. *Scolopendrium vulgare*, the Hartstongue, has, however, gone perhaps the farthest of all ferns in furnishing variants on truncate lines of diverse characters, as indeed might have been expected of a fern which has certainly eclipsed all other ferns in the world in the diversity of types which it has assumed. The best known variety of the truncate section is "peraferens" or "pocket bearing," in which the frond is very much shortened, the tip being abruptly ended and the midrib projecting as a horn. In addition to this, however, the leafy part of the frond has apparently endeavoured to continue growth, the result being the formation of a pouch or pocket from the centre of which the horn protrudes. This pocket, however, in one variety is in the front, in another at the back of the frond, and is also varied in shape in different varieties, though fairly constant in type in any one. These varieties breed fairly true from spores, and as they have been successfully crossed with branched and tasselled forms, largely by the late Mr. E. J. Lowe, an endless number of strange and often weird varieties has been obtained, in all of which the peculiar truncatum or abrupt and thorned mode of termination is evident. Outside the true "peraferens" type there are others in which

the frond is abruptly rounded off, the midrib being either abruptly suppressed near the end of the frond, as in *S. v. radiosorum*, which we ourselves have found wild more than once, and in which the sori or spore heaps radiate round the semi-circular frond terminal, like the figures on the upper half of a clock face, or the midrib projects from the back or front with or without the rudiments of a pouch. *S. v. peraferens* has been crossed with a fertile form of crispum, the frilled type, and given a crispum "peraferens," thus improving the peraferens, but hardly the crispum. *Osmunda regalis* we have mentioned, since very curiously the majority of the huge specimens in the R. H. S. gardens at Wisley have their subdivisions terminated more or less squarely, indicating "truncation" influence. Among exotics *Polypodium hexagonopterum truncatum*, a large growing close ally of our Beech Fern, was sent to us many years ago as found by Mr. W. Maxon, of the Smithsonian Institute. It reverted entirely to the normal in a year or two, but of recent years has reassumed the character partially. It is curious that the leaves of the Tulip tree, *Liriodendron tulipifera*, display the truncate character as a normal feature, being quite square ended, the midrib being abruptly suppressed.

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

FERNS FOR BEGINNERS.

One of our members in a friendly criticism of our "Gazette," which is always welcome to us as possibly providing material for an article, suggests that many members may be only beginners, and that a larger proportion of information for their particular benefit might well be given in place of the more advanced matter which is perhaps beyond their practical comprehension. It is, however, clear that this admits of some argument. In the

first place, we think that a careful perusal and a study of the very varied articles which appear in the "Gazette" will show that the very few simple fundamentals of Fern culture, and particularly the hardy Ferns, of which it is only necessary for us to treat, are sufficiently often clearly indicated as to serve perfectly well for the guidance suggested, while in the second place the primary object of the "Gazette" is to keep the hobbyist, *i.e.* the more or less advanced cultivator, up to date as regards the progress of the cult in the way of fresh discoveries and improvements. In point of fact, if he remembers that Ferns are most at home in broken leafy soil under shady and moist conditions, and like all other plants, if of extra delicate make, must be sheltered from blustering winds, in order to display their charms to perfection, the intelligent beginner holds the key to the entire position, and must, as with all other cultural hobbies, perfect his knowledge by actual experience. In the vast majority of cases, the varieties are as hardy and lend themselves to precisely the same treatment as the normal species. In short, to devote much space in the "Gazette" to cultural suggestions on beginner's lines would, we venture to think, tend to water down as it were the special matter which it is our aim to disseminate, and the best plan for the beginner is to acquire a reliable standard work on our British Ferns, their varieties and culture, such as the writer himself has endeavoured to produce. (*Vide* Advt. on Cover.)

C. T. D.

NEW FERNS.

FOUR FRESH VARIETIES.

In writing to congratulate our Editor on the completion of the second volume of the "British Fern Gazette"—an achievement for which the Society owes him more gratitude

than any of its members will ever be able to express—I ventured to submit four fronds which seemed to me distinct and of merit.

Not the least of Mr. Druery's many services to the cult of our Native Ferns, and its lovers, is the skill and impartiality with which he adjudicates upon our "finds" and our seedlings. Earlier in the year I had sent up three specimens; our Editor was courteous, as he always is, with reference to their points, but he was quite firm in refusing to acknowledge any of them as novelties. All the greater, therefore, was my gratification when he pronounced in favour of the whole four sent later (Not necessarily as "novelties."—ED.).

With his permission I now write a short note on each of these four novelties.

No. 1 Mr. Druery speaks of as "certainly a beautiful fern." He names it *Polystichum angulare falcato-pinnulum*, suggesting that "pendens" should be added if the tendency to curve down at the end, which the pinnae have been showing, should persist.

How this fern came to me I am unable to explain. It is probably three years old, but its special features did not develop clearly till this season.

No. 2 is "evidently," according to the Editor, "a form of *Athyrium filix fœmina Victoriae*," and he adds that if it has attained to its full size "it might well be named *A. f.f. Victoriae nanum*." He speaks of it as "very pretty."

The origin of the fern is interesting, and I think encouraging. Throughout 1910 a small box filled with leaf mould stood in one of my greenhouses. Towards the end of the year a number of seedling ferns appeared. There was a good deal of *Cystopteris fragilis*—I do not think I possessed a single plant of this species at that time—there were some good Polystichums of the *Divisilobum* type, but the gem of the collection was the

Athyrium. I suppose it is a seedling from a fine specimen of *A. f.f. Victoriae*, which was in the house at the time. The parent, however, always makes fronds which average 22 inches in length, while the child has never attained to more than 8—the average is 6. The little plant richly deserves the Editor's description "very pretty;" it never fails to attract the attention and admiration of visitors.

No. 3 is given the title *Polystichum angulare divisilobum plumosum acutum*, and is described as "very fine."

It is a child of a fine specimen of *P. ang. divisilobum laxum Fox*. The parent plant has yielded many bulbils, but all have been absolutely normal with this one exception. [This is a singular exception to the rule, particularly in this section.—ED.]

The bulbil which has developed into so striking a variety was separated from the old fern on July 3rd, 1907. At first it was so puny and delicate that I did not expect it to live; now, however, it has grown into a sturdy plant, which well deserves the Editor's praise. A special characteristic of the child is that, unlike the parent, it is tending towards the *Proliferum* type, and in this way it promises to be very prolific.

No. 4 has been my own favourite of the set. I do not think the Editor shares my preference, but because of it he has attached my name to the variety, which accordingly figures as *Polystichum angulare foliosum polydactylum Kingsmill Moore*. Mr. Druery points out that the fern has the usual defect of Polydactylums, in that some of the pinnae do not divide, but he consoles me for his criticism by adding "handsome nevertheless."

The plant is the result of a visit paid in 1911 to the Clifton Gardens. I have already had occasion to allude in the pages of the "Gazette" to that visit, and I am in hopes of further allusions. The curator, Mr. Harris, most

kindly gave me a fertile frond from an exceptionally fine *Polystichum*. In due course, which with me generally represents eleven or twelve months, the young ferns began to appear. They were full of promise from the first, and an agreeable amount of marked individuality gradually became apparent. There are at least three well marked types, and something like ten separate varieties. Of these "Kingsmill Moore" is the most advanced, and therefore the first to make its bow before the Editor. It is already large and of singularly rich appearance. The surface throughout undulates so markedly that the different lights caused by the hills and hollows give what almost amounts to a variegated effect. The "fingering," where it does occur, which is in all the pinnae of some fronds and in most of the pinnae of all, is profuse, and, to my eye, graceful and ornamental.

October, 1915.

H. KINGSMILL MOORE.

BRITISH FERNS OF THE FUTURE.

As it is now some years since we wrote an article under this heading, and then dealt mainly with the possibilities which existed of alliances between some of the more beautiful varieties of our native species with normal exotics of kindred ones, such as had been effected between our *Polypodium vulgare* and *P. glaucum* in Mr. Schneider's *P. Schneiderianum*, a short article will, we think, not be out of place in connection with what has since been effected. This subsequent development, however, has not been to any appreciable extent due to the suggestions then made with regard to hybrids, the trade having apparently quite ignored them. On the other hand, however, the selective cultivators, chiefly amateur, have been so successful in the improvement of the best varieties of that time through their spores, that the strictly British

cultivator has been fully justified in confining his selective endeavours to our native species alone. Naturally the "British Fern Gazette" has recorded and illustrated these triumphs as fully as possible, and it needs but a glance through its quarterly frontispieces to see what a number of really new and advanced varieties have been produced by selection, while every now and again it will be seen that more desirable acquisitions have been added by the assiduous hunter among the wild ferns of our country. These sometimes, as in the recent case of the plumose Oak Fern (*P. dryopteris plumosum*, see Frontispiece) show that Dame Nature is as fertile as ever in new devices, and capable of entirely eclipsing in beauty a normal type hitherto accepted as "perfect." From time to time in the few years covered by the "Gazette" we have given a *résumé* of such discoveries and additions, but it is hardly our intention at present to give another, our object being rather to impress upon our members the fact that nearly all our really valuable and definite improvements outside Nature's own contributions in the shape of wild "sports" are due to judicious sowing from recognized high class and perfect forms and the subsequent elimination of all inferior types which may present themselves in the offspring. Given such a form, and as a salient illustration of what we mean, we will take that unique fern, *P. aculeatum pulcherrimum* Beavis. It has of recent years been demonstrated that undreamt-of possibilities may be nascent in its constitution only awaiting the chance of declaring themselves and thereby adding not merely one, but several more beautiful varietal sections to a species hitherto by no means redundant in types. Not content apparently with the production of the peculiarly charming "gracillimum" and "plumosum" types of Mr. Druery and Mr. Green, it has now presented Mr. Edwards with the remarkable "foliosum" variety of a diametrically opposite

character to the rest. These three forms have been derived directly from the parental Beavis, but past experience would lead to the expectation that sooner or later some of these wonderful offsprings may themselves be fertile, and in that case would probably break into fresh forms of possibly greater beauty as contributions to the Ferns of the future of which we treat. We have only to look back to the origin of the "superbum" Athyria to see how a comparatively simple wild sport could in a generation or two yield not merely one, but several sections of such excellence as to stand unrivalled after nearly thirty years. We may now turn to the Harts-tongue, which at the beginning of this century might well have been considered as having run through the entire gamut of varietal possibilities, yet a glance through the "Gazette" will show types which were then undreamt-of. *S. v. plumosum* and *S. v. Drummondiae superbum grandiceps*, to wit, and now in Mr. Amos Perry's hands the first named (presumably) has donned splendid fimbriate edges and tassels greatly increasing its charm (*S. v. plumosum*, Perry's variety, A.M., R.H.S.), while in the "crispum" or frilled section Bolton's "nobile" well deserves its name. To revert to the latest wild acquisition, the plumose Oak Fern aforesaid, the writer's specimen has thrown up rameous and crested fronds, indicating a possibility which at the time of writing lies in an abundance of healthy prothalli from spores taken from the rameous fronds, so that it may well be hoped that the Ferns of the future will embrace not merely one but several types of variation in this hitherto coy species. The moral of this article is that our members should not content themselves with mere collections by search or purchase or exchange, but should, like some of them, Dr. Stansfield, Messrs. Cranfield, Eley, Walton, Edwards, Cowan, S. White, Rev. H. K. Moore, and the Editor among others, devote

themselves to spore sowing from the best types, always with the motto "Excelsior" and with the object of improvement and consequent addition to the British Ferns of the future.

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

N.B.—The Editor would here point out the inadvisability of giving distinctive names to any seedlings unless of obviously improved character, since a successful batch of youngsters may all inherit the parental character in varied degree so that the great majority can only be named as "So-and-so seedlings." Furthermore, it is unwise to name any until they are adult, well-established plants, since Polystichums in particular only then show their full character. Distinctly inferior ones should be thrown away, and only distinct improvements given indicative names as new.

BRITISH FERNS ABROAD.

Once a Britisher has acquired a keen interest in the ferns of his native country, he finds himself instinctively on the look-out for them wherever he goes. He is doubtless interested in all ferns, but he is more excited over one familiar fern than over many that he cannot identify.

I have just returned from a six months' stay in Serbia, during which time I had some opportunity of observing the ferns of that interesting country. A recent article in the "British Fern Gazette," on "British Ferns Abroad," suggested to me that a note on the Ferns of Serbia might be of interest. I should not dare to write on this subject were it not for the fact that practically everything I found was undoubtedly "British," and hence of interest to folk in this country.

But, in the first place, I must say that my fern hunts

were restricted to that part of Serbia which lies along the valley of the Western Morava, west of Nish. A short time only was spent in the Belgrade district. Serbia is a large country, reaching right up to the Danube in the north, and down into Macedonia to the Greek frontier in the south. Doubtless there are many unfamiliar species in the country, especially in the southern half, but of these I cannot speak. It should be noted, too, that typhus and other epidemics occupied so much of one's time as a Red Cross worker that one must not be unduly blamed if one missed some species that were present in the neighbourhood.

The ground explored was mostly mountainous in character, heavily wooded with beech. Numerous streams rushed down their little valleys to join the Morava River—a most excellent hunting ground.

Pteris aquilina grows everywhere. In fact, it is so universal that one scarcely takes any notice of it. One almost forgets that it is as much a fern as any of the others.

Next to the bracken, *Athyrium filix-femina* is undoubtedly the commonest fern. It grows in just the kind of situation we are accustomed to see it in this country. In places where the trees have been cut down, the fern becomes dwarfed and brown, as one would expect. Otherwise, among some thousands of plants, no variation of any sort was noticed.

The male fern occurs frequently, but is by no means as plentiful as the lady fern. No specimens of the "pseudo-mas" type were seen, most being typically "filix-mas" in character.

Lastrea dilatata is not entered in my diary, but unless I am much mistaken, I have found the plant. Some half-dozen specimens of *L. spinulosa* type were found in different districts, but it is not abundant.

The soft prickly Shield Fern could be found in almost

any locality. No specimens of the Hard Prickly Shield were found.

Two separate colonies of another fern were found in a wood on a hillside, which I scarcely hesitate to label *Lastrea montana*. Still, dogmatism is often associated with ignorance, and I must allow for mistakes.

Cystopteris fragilis grows abundantly about the woods and streams, and requires no special comment. I was specially pleased to find the beautiful Oak Fern growing in considerable numbers. When growing under favourable conditions—as in my little shady “Fern Valley,” as I used to call one of my favourite haunts—it attains the height of one foot or so.

I was surprised to find no specimens of our friend *Scolopendrium*. Indeed, two or three plants on a rockery in our Park were all I ever saw in Serbia, but I have little doubt that it occurs.

The genus *Asplenium* is well represented. *Adiantum nigrum* is the commonest of the Spleenworts, and occurs everywhere. *A. trichomanes* is rather less frequent, but there is plenty of it. On the barren rocky places I have found a good deal of *A. septentrionale*. In similar places one sees an occasional plant of what must be *A. germanicum*, though this species is only familiar to me as a text-book subject.

I had almost forgotten *Polypodium vulgare*, the common polypody, but by no means as common in Serbia as one might have expected. Some of the specimens attained a large size, but no variation of any interest was observed.

On an old ruined wall in the famous Kraljevo Monastery, I found two other British species that I had not previously encountered. These were two other Spleenworts—*A. ruta-muraria* and *A. ceterach*—both occurring as quite young specimens.

Two young plants, which might afterwards have

developed into something familiar, but which I could not identify at the time, were carefully packed in a tin box, together with some excellent roots of *Asplenium septentrionale* and *A. germanicum*. But, alas! the tin was lost, along with my macintosh, on the border between Bulgaria and Roumania. The waterproof was a small loss compared with the plants!

That old Monastery wall was a puzzle to me. The Monastery itself was some six hundred years old, and the particular wall referred to must have been in a crumbling condition for the last hundred years. The other walls were bone dry; this one was quite damp, though where the water came from I could not discover. It was wet above the limit of my reach. The peculiar thing is that though one would say it was an obvious place for ferns to have been growing for the last century, yet all the plants growing there were mere youngsters. None could have been more than three or four years old. There were no remains of old ferns. One has to suppose either that the plants are all pulled off at intervals, and that new ones keep cropping up—an unlikely theory—or that the dampness has only been recently acquired, and that previously the old wall was less suitable for fern growth.

Except for one or two possible plants on the old wall, which were too young to be identified, I found nothing that I could not state with reasonable assurance to be "British." But, as stated before, Serbia is a big country, and one's hunting was restricted. I cannot say that any particular species is not to be found. Given time and opportunity, one would doubtless have found others. But sufficient was seen to convince one that the great majority of the ferns of Northern Serbia are those which are also found in Britain.

S. P. ROWLANDS.

THE HARTSTONGUE FERN.

The award of a First Class Certificate to our member, Mr. W. B. Cranfield, by the R. H. S. Floral Committee, for a grand specimen of one of the frilled or "crispum" varieties of this species, inspires us to say a few words regarding the really curious fact that so little use is made of it by the British lovers of beautiful foliage plants generally. In the Midlands it is true that varieties of it are by no means uncommon for window decoration, since in any window not much exposed to hot sunshine, *i.e.* with other than a due south aspect, no plant is of easier culture, while its thoroughly evergreen character and perfect hardiness constitute it one of the best all-round-the-year plants that one could wish for. Around London, on the other hand, while literally thousands of Aspidistras occupy positions of honour as window plants, we cannot recall a single specimen of a frilled Hartstongue within the area of our peregrinations, and the sight of one would certainly inspire within us the desire to knock at the door and ask permission to inspect the rarity, ascertain its history, and endeavour to enlist the owner as a member of our B. P. Society. Some years back indeed, when Mr. Cranfield and the writer were in the village of Colyton, Devon, such a sight in a cottage window did induce us to act as above, and to our delight we learned that the three plants we saw were actually three independent finds in that locality of thorough-bred "crispums" by the lady owner. She did not profess to know anything particular about ferns, except that they were pretty wild plants, and these three had quite accidentally attracted her attention as being so much prettier than the associated common ones that she had brought them home, potted them up, and given them the places of honour in the front parlour window. She furthermore named another lady in the vicinity who had another specimen found independently in a similar

way, and who when subsequently visited showed us a very different find of the same varietal section filling a large pot as a fire-place ornament in a well-lighted drawing-room. Of all these, when we modestly revealed our exalted status in the British Fern cult, we were enabled, by offering an exchange, to obtain divisions, these now forming fine specimens in Mr. Cranfield's collection as the Colyton group. Curiously enough, all the first three being grown in small pots were themselves so small that one in particular we regarded as a dwarf for some time, but subsequently it took a sudden start and assumed even an extra robust habit of growth. That four such prizes should fall in such a fashion to these two ladies seemed somewhat unkind in view of the fact that for over thirty years one of the writer's ambitions has been to find a "crispum" for himself, and yet despite innumerable hunts in likely localities, not one has rewarded his search. To revert to our opening remark, the specimen shown by Mr. Cranfield has been named by Dr. F. W. Stansfield *Scol. v. crispum speciosum*, and is not only an extremely robust grower, the plant shown being fully a yard through and nearly as much high, but is very deeply frilled. It was found many years ago by the late Mr. Moly, and is one of the many beautiful things saved from extinction by Mr. Cranfield's acquisition of his collection just before the death of the finder. The frilled or "crispum" Harts-tongues constitute the equivalents of the "plumose" or extra feathery varieties of divided species, and are perfectly barren in the thoroughbreds, next to which stand the fertile crispums which bear spores in an irregular fashion, but always at the expense of the frill. Obviously, in an undivided strap-like frond like that of the Harts-tongue, the actual "feathery" character assumed by divided ones, as seen in Polystichums, Athyria, etc., is impossible. The normal venation or vein system of the species consists of a central midrib, from both sides of

which there are developed a continuous row of veins which travelling singly a short distance then fork into two, and as twins eventually reach the margin, thus producing a plain flat strap-like frond. Normally, at some distance from the midrib, many of the pairs of veins for a distance of perhaps an inch develop each of them a line of spore cases or sporangia, and to protect the pair of lines thus produced, these semi-transparent indusia or covers grow inwards, so that at the outset the two appear as one thin skin covering the space between the veins. Beneath this skin the spore heaps develop, and eventually push the indusia apart and aside, until finally they coalesce and appear as single long sausage-shaped masses arranged in rows along the back of frond on each side the midrib herring-bone fashion. This is the normal structure, but in the true or barren crispums the veins do not only fork once but over and over again, and as the spaces between them are maintained and filled with tissue as they progress toward the margin, when they eventually reach that margin it is clear that the length of the frond there must be much greater than in the centre next the midrib where the veins are undivided. Nature, therefore, meets this difference by a frilling or folding, thus forming the "crispum" character, and at the same time greatly enhancing the charm of the plant. Comprehending this, it is easy to understand that when spore heaps present themselves the vein pairs which bear them and *have to feed them* are more or less exhausted of vigour, and cannot therefore complete that part of the frill which they would otherwise form. Hence the margin of the fertile crispum is usually more or less irregular in the ratio of fertility. When such spores are sown we get young plants of apparently the true crispum type, but eventually as spore-bearing adults they follow the parental example and cease to be perfect in the eyes of the expert.

C. T. D.

(To be continued.)

THE ROMANCE OF LADY "CLARISSIMA."

Some time in the late summer of 1868, a Mr. Moule, one of our early Fern pioneers, rambling through some of the mossy dells, ferny woods, combes, or lanes of the glorious domain of North Devon, already renowned for the many marvels of ferny beauty which Dame Nature had vouchsafed to the fern hunters of that period, was suddenly entranced by the perception of an extraordinarily charming Lady Fern of such delicate and slender beauty that he determined at once to transport it, or we will rather say "her," to grace still further his bevy of beauties which it is to be assumed he had already accumulated in his home domain. It would seem, however, that ravishing as the beauty of this gentle dame undoubtedly was, her discoverer was either already so *blasé* with the beauteous attractions of his previous acquisitions of the Lady persuasion, or that he was singularly oblivious of the extra attention which his latest capture not only merited but vitally needed, since, though the day was dry and the sun blazing hot, and his prize already in a fainting condition when he reached his home, he left the poor thing reclining on a bench in the full sun, not even vouchsafing her a draught of refreshing water. As a consequence, her fainting fit was rapidly passing into a state of coma as a preliminary to absolute dissolution, when at this vital juncture romance stepped forward in the shape of a visitor, that well-known and gallant soldier, Col. A. M. Jones, who, as a recognised squire of dames of the ferny persuasion, rushed to the rescue, and at once appreciated not only the exceptional charms of the lady before him, but also the instant need of some restorative to prevent the threatened collapse due to the neglect to which the delicate creature had been so cruelly exposed. Being friends, no battle royal, but an entirely peaceful, though presumably reproachful,

colloquy ensued between the gallant Colonel and the captor of the lovely dame, ending happily in a transfer and the subsequent restoration to health of the beautiful prize by her gallant rescuer. Delighted with his acquisition, which proved to be unique and far beyond his expectations, Col. Jones named her in memory of his beloved wife *Athyrium filix fœmina Clarissima*, and for twenty-one years, until 1889, when, unhappily for the British Fern cult, he died suddenly, she was cherished by him as one of his most valued prizes. So far we have dealt with the discovery on quasi-romantic lines, but it is impracticable to keep up the "lady" metaphor throughout, as the subsequent doings of this wonderful fern will not lend themselves easily to the fiction. Naturally, upon the acquisition of an extra beautiful variety, the first effort of its owner is to propagate it, if possible, through its spores. In this respect Clarissima appeared at first to be peculiarly gracious, since every season the frond backs were profusely covered with apparent spore heaps. Spores, however, could not be individually detected, and repeated attempts at sowing proved entire failures, not even prothalli being produced. Lateral offsets were also, it would seem, rarely noted, and hence the only practical means of propagation were available at the rare periods when the central crown itself divided, and in time, usually after several years' growth, became safely separable. Clarissima, therefore, as a result perhaps of a determination not to cheapen herself, remained an extremely rare plant, represented only by three or four specimens up to the year 1883, that is fifteen years after its discovery. In that year a division in the hands of the late Mr. G. B. Wollaston produced a profusion of growths on the frond back, which were different, it is now believed, from any previously noticed, since none of a similar form have been since produced.

A piece of a frond was consequently sent to the writer for his opinion, on the supposition that the growths were bulbils such as had been observed on several other Athyria. From their peculiar structure, however, he conceived the idea that they were something quite new in the reproductive line, and without going here into details which have been repeatedly published, he eventually not only raised some hundreds of plants of the Clarissima type, but through the further material these afforded for deeper scientific research, so far enabled their true character to be studied as transformations of spore producing energy as to establish the existence of a hitherto undreamt-of form of reproduction in the Fern world. Clarissima consequently enlisted the labours of a considerable number of eminent plant biologists, who eventually demonstrated the occurrence of the phenomenon of "apospory" in this and a number of other species (*i.e.* the production of young plants without the intervention of the spore), the writer himself adding no less than four of our native species to the list of aposporous ones, and in some cases in several varieties of each. Lady Clarissima has thus had undoubtedly the honour of first exhibiting this phenomenon in a recognisable form to human eyes, and thus indirectly rewarding her chivalrous rescuer, Col. Jones, for her salvation fifteen years before by proof of great scientific value as well as beauty, while at the same time recompensing both him and the writer, plus Fern lovers generally, by a brood of some hundreds of characteristic youngsters. These, however, though inheriting the maternal charm of slender tenuity of make, lack that of thoroughly even growth, the fronds almost invariably assuming more or less of a twist, and thus detracting from the natural grace of the species. The original, however, forms perfectly straight and even fronds, and these moreover assume a much larger size

than the aposporous offspring, being about four feet high by over two in breadth.

Curiously enough, although more than thirty years have elapsed since the writer made the discovery in question, it was only a few years back that, thanks to Miss Jones, Col. Jones's daughter, he became the happy possessor of a division of the original find, which has inspired this paper, and thus enabled him personally to establish by comparison its superiority in size and form to the many plants existing in collections, all of which we believe originate from the batch first raised aposporously in 1883-4, and which Col. Jones distributed liberally amongst his friends. In conclusion, the writer cannot refrain from expressing his gratification that it is his good fortune to have been closely associated so long with the gentle dame of our pseudo romance, and to have been enabled by such association to materially enhance not only her reputation, but in some degree his own, and in so doing thus ending the romance on the most satisfactory lines of mutual benefit possible.

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

RECENT ACQUISITIONS.

SCOL. V. TRANSVERSO-CRISTATUM Rowlands.

From our member, Mr. Rowlands, we have received a frond of an extra fine form of this Hartstongue just found by him in Dorset, near Corfe Castle. It has bold sub-sagittate fronds, bearing heavy twin crests, which cross each other transversely, whence the name. The type is not new, but the "find" is so extra well developed as to justify the addition of the finder's name.

SCOL. V. PLUMOSUM PERRY'S FORM. A.M. Amos Perry.
SCOL. V. CRISPUM SPECIOSUM. F.C.C. W. B. Cranfield.

These two are both fine acquisitions, which are more particularly alluded to in our present issue under "The Hartstongue Fern."

VOL. 3.

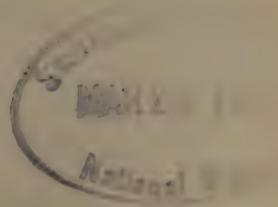
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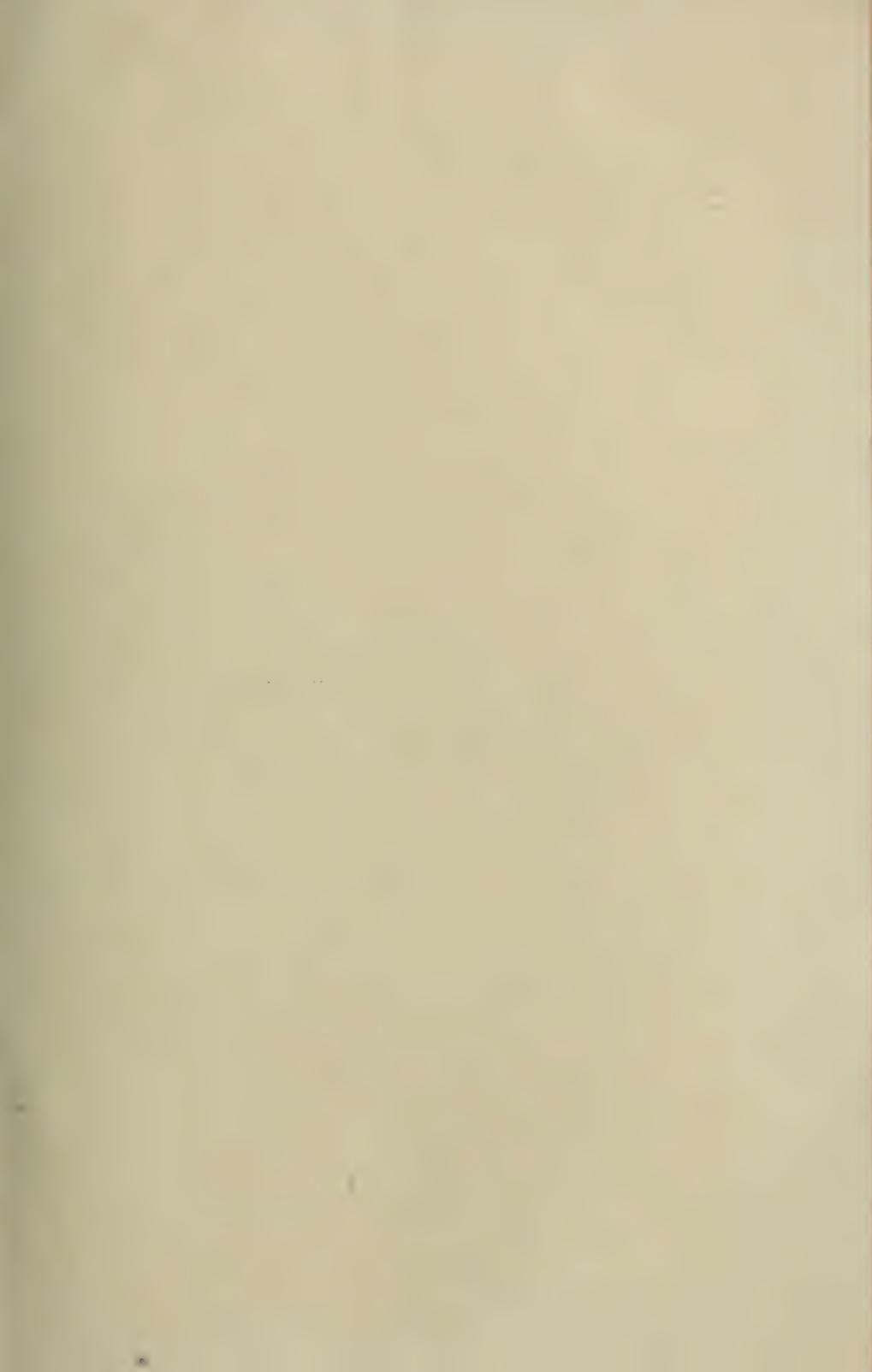
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L. *THELYPTERIS GRANDICEPS.*

THE BRITISH FERN GAZETTE.

VOL. 3.

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No. 27.

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EDITORIAL NOTES.

Although we, unhappily, are not yet within definite news of an end to the great struggle between the civilized nations and those which were formally classed as such, but by their actions have forfeited all claim to be so regarded, we are happy to say that our little Society, as a body, has not suffered to any appreciable degree by the abnormal conditions thereby brought about. Not only has there been no falling off of membership, but of late there have been several additions thereto, while the Editor has been greatly gratified by a number of appreciative letters from his many fern-loving friends. The dead, or rather dormant, season, now ended, has naturally afforded little or no opportunity for reports of fresh acquisitions, but Mr. Cranfield's contributions to this issue show clearly that much can be done during the period of rest to improve the conditions of growth, etc., in the coming active season. As an interesting branch of natural study, it cannot be contested that the cult of British Ferns is one which best repays the student both as regards the possibility of new

wild sports and that of increasing their charms by spore propagation at home, while at the same time all this can be done so inexpensively at holiday times and hours of leisure as to be well within the compass of practically all conditions of society, poor or rich. Even a small collection, if assiduously studied from the true fern lovers' and students' point of view, is soon seen to be of inexhaustible interest, while that interest naturally becomes greatly enhanced as the collection gradually increases, as the Editor can personally testify, by the acquisition, by hunting, growing and propagating of his own peculiar and perhaps unique varieties. In view of all this, the Editor once again exhorts the present members to do their utmost to gain recruits amongst their probably admiring visitors, and to assist him by sending him their notes and, if necessary, enquiries. To any likely recruit a specimen GAZETTE will be sent free of charge, and as the subscription is only 5s. per annum, entitling him to four GAZETTES, and any desired information, plus association with an important body of fellow enthusiasts, recruiting should be easy if the will be there.

THE BRITISH FERN GAZETTE, VOL. 2, Nos. 13 TO 24.—The Editor would again remind members that a small number of Vol. 2 have been bound into a very presentable volume of 313 pages and numerous illustrations. As no reprint will be available, and the books are widely recognized as most valuable contributions to our Fern literature, the opportunity of acquiring copies, even extra ones, should not be lost sight of. The price to members is 3s. 9d. post free, and speedy application is advisable to secure, as only a few are left.

X The subscriptions for 1915-16 being due in advance, the Hon. Secretary would feel much obliged by a remittance of 5s. by return post to 11, Shaa Road, Acton, London, W.

THE EDITOR.

OUR FRONTISPICE.

LASTREA THELYPTERIS GRANDICEPS.

(*The Marsh Buckler Fern.*)

It must be now some forty-five years since I made my first acquaintance with this Fern in the shape of some masses of soil and vegetable matter, about the size of one's fist, which I saw marked up on a Covent Garden flower stall as " Irish Moss, 2d. a clump." On examining one of these clumps, which afforded no evidence whatever of mossy growth, I could clearly see that some sort of Fern was concerned, as several coiled-up frond tips in a dormant state were visible, and I consequently invested twopence on the off-chance. Planted out in the garden, when the growing season came, it sent up several fronds by which I was able to identify it, but owing to the dry conditions of the situation as contrasted with its needs as all but an aquatic plant, it only existed as a starveling until a year or so later I had built my Fernery and could properly attend to its requirements. To do so, I dug a deepish hole in the soil, at the bottom of which I placed a deep earthenware glazed pan, about 15 inches diameter, with no hole for drainage, and this I nearly filled with largish pieces of broken brick. On this I placed a lot of fibrous material to prevent the soil from falling in, and finally planted what was left of my plant on the top of this, so that when levelled up the edge of the pan was several inches below the surface. I then poured water until I was sure the pan was quite full and left the rest to nature. The result was marvellous; that self-same season the roots evidently struck down into the pan, and led to such a vigorous growth that the creeping rootstocks emerged in all directions, and invaded not only the bed in the vicinity, but also the paths, until in time it became so monopolistic that it had to be exiled to the open.

Here, then, we have a clear indication of the best way to treat *L. thelypteris*.

This fern, however, in its normal form hardly repays all this trouble, nor in very damp situations does it need it. Among British Ferns it is the only one which thrives under absolutely bog conditions in mud. The Royal Fern is a thirsty one, but not to the same degree. *L. thelypteris* differs, as indicated above, from other native Lastreas, by having a widely creeping rootstock instead of a central crown. The fronds are long and slender, like an attenuated *L. montana*, but commencing with a long bare stalk, instead of being feathered all the way from the bottom. It is quite deciduous, disappearing entirely in the autumn. It is not a common fern by any means, frequenting only quite boggy situations. We have found it in great quantities in the Norfolk Broads, where it monopolises considerable areas. So far no variety whatever of this species is recorded as found in the British Isles, but a good many years ago a good polydactylous form was discovered by a lady (Mrs. Puffer) in the United States, and a division of this was very kindly sent to me in a dormant state, and being treated well, flourished accordingly. This had all terminals divided into somewhat irregular crests. For some years it bore nothing but barren fronds, but at last a small stunted one rose which was very fertile indeed. Seizing the opportunity I sowed from this and raised a crop, mostly like the parent, but, with my usual luck, one greatly improved one appeared, in which the cresting was on much bolder lines. Thus I named it *L. t. grandiceps*. Of this our frontispiece gives a good idea, and a well-grown plant is well worthy of a place in a collection. No second fertile frond has appeared on the parental form, nor one as yet on the improved offspring, but as a start has been made we may well hope for further developments.

C. T. D.

THE HARTSTONGUE FERN.

(Continued.)

The thoroughbred frilled forms, though barren, are, however, happily gifted with the faculty of producing buds from their detached frond bases, as we have frequently described, and as these yield true plants much more quickly than spores could do if produced, the *crispums* are by no means so handicapped as regards propagation as their perfect barrenness might suggest. So far we have dealt only with the frilled section of this truly marvellous species, the varieties of which, however, must far and away transcend in number and diversity those of any other fern in existence, despite the normal simplicity of structure. Of late years, too, though it might have been considered that it had exhausted all possibilities, a number of new varieties have arisen in the hands of selective cultivators which prove the contrary. Only at the last meeting of the R. H. S. Committee, already alluded to, Mr. Amos Perry obtained a well-merited award for another variety named *S. v. plumosum*, Perry's variety, wherein beautiful and finely comminuted heavy tassels were added to the very foliose form named "plumosum," previously raised by Mr. H. Stansfield, and illustrated in the "British Fern Gazette," September, 1912. In the issue for December, 1914, there is illustrated perhaps the most remarkable alliance of this tasselling, with not only the frilling of "crispum," but also the fimbriation or fringing, which as will be seen by that picture adds greatly to the ornamental character of the fern. All those that we have mentioned belong to the *élite* as far as beauty is concerned. Outside these there are scores of finely crested and otherwise varied ones, and a host which many would consider more curious than beautiful, and most of which are seedlings from erratic types and crosses between them,

whose merit as decorative plants is, as a rule, a minus quantity.

Despite its great difference in specific make and its extreme variability, the Hartstongue is so closely allied to the usually constant Asplenia or Spleenworts that a successful cross has been achieved between it and *Ceterach officinarum* by Mr. E. J. Lowe. Evidence of this we possess in the shape of micro-photographs of fronds, apparently of *Ceterach*, but simplified in form, being almost undivided, while the characteristic double lines of fructification of *Scolopendrium* are associated clearly with the single one of the Spleenwort family, both features forming a fairly reliable proof of the alliance. Furthermore, in *Asp. nidus avis*, the Bird's Nest Fern of the Antipodes, we have a true Spleenwort with simple undivided fronds precisely on the lines of the Hartstongue, but on a much larger scale, and of this curiously enough a ramo-cristate form has been found wild and introduced. In view of this close relationship, we feel sure that judicious sowings of, say, the good fertile crispums, or fine crested forms with *Asp. nidus avis*, might very probably result in a cross or crosses, yielding very beautiful varieties of that charming species.

Another characteristic of the Hartstongue as a relative of the Spleenworts is its capacity of associating itself with them as a wall or rock grower, since we find it, of course on a reduced scale, in abundance on stone walls in some parts of the country, though it is only in shady plantations with ample root room that it is seen at its best as a robust-growing fern with fronds between two and three feet long. As regards "sports," there is little doubt that the diminutive plants found on walls furnish a more likely hunting ground than the robuster full-sized specimens of the shady moorland or sheltered hedgerows which it so much affects, and this for several reasons. In the first place, the search is facilitated by the separation of the individual plants and

their easier examination, so that any departure in the way of expanded or divided tips or other sportive feature is easily observed, and, in the second place, as variation on marked lines is usually associated with diminution in size, incipient sports, which have a chance of preservation in the struggle for existence on the wall, are probably so heavily handicapped by their robuster neighbours in the wood, that they have little or no chance of survival until the keen eye of the Fern hunter detects a difference and rescues the would-be gem from destruction by the overgrowth of its neighbours. Some experienced fern hunters have also entertained an idea that variation may sometimes be due to some check or handicap in the conditions of environment, such as the restricted root growths resulting from development in chinks of rocks or walls instead of in free leafy soil, but so far there is little or no scientific evidence of this, it is a mere hypothesis.

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

THE CRANFIELD COLLECTION.

Some time ago I promised to string together a few notes to appease our Editor's craving for MSS., and possibly to afford a hint here and there by which some member may profit. I should like to acknowledge how greatly I am indebted to our Editor and many of our members both for gifts of plants and hints on cultivation and explanations of strange happenings. The visits to brother enthusiasts' collections afford such valuable means of comparison and acquisition of knowledge and material that one could wish they were of more frequent occurrence; in my case they are red-letter days to be reflected upon with pleasure and looked forward to with delight. It is

worthy of note that when looking through Mr. Amos Perry's stock about eighteen months ago I was struck by the vigorous appearance of a large number of plants which were planted out in very nearly pure peat moss litter. I determined to try it as a mulch, and the results have been so satisfactory that I have lifted all my ferns this autumn, incorporated a liberal dressing of the material with the soil, and top dressed with the same material. The peat moss is very retentive of moisture, and seems to afford just the coolness and humidity round the crowns and an atmosphere in which the ferns delight. In those favoured districts in which some of our members reside such precautions may not be necessary, but here on the borders of Middlesex and Herts drought during the growing season is one of the greatest difficulties with which we have to contend. There are others; the millenium is not yet. In a fairly extensive collection something of interest is usually cropping up. Amongst a batch of *Scol. crispum Nobile* one out of some 250 plants is a marginatum with hardly a trace of crispum character, an undoubted bud sport. Again, in a sowing of *Polyst. acul. Pulcherrimum (Bevis)*, which yielded various types of gracillimums, parental forms, reverions to practically normal angulare, and intermediate forms between the parental type and gracillimum, some of great beauty (of which more anon), there was a Polydactylous Pulcherrimum. When I first spotted it I had visions of a crested Pulcherrimum, but time brought disillusion to a certain extent, though I have still a faint hope. Members will recall the discovery of the Benbow collection by Mr. Green when making researches at the Natural History Museum and our Editor's interesting articles thereon. I collected some spores of which I made a number of sowings, using every precaution against strays. No signs of vegetation occurred for a long time, the spores all being forty or more years old, but at last a few

prothalli appeared, and the plants are now nearly full grown. Amongst them are two *P. ang. grandiceps*, a pretty *acutilobe*, some incised *Lastrea ps. mas*, a few rogue *Polystichums*, and some I am unable to identify. I propose to compare some of the fronds with the dried specimens if they seem sufficiently distinct next year.

It is impossible to assert that the plants I have raised are from spores of Benbow's plants. At the same time fern spores are known to retain their vitality for a very long period, and an inquest next year may help to elucidate matters. Amongst the many thousands of ferns raised from spores annually new breaks and improved forms are bound to occur, and one is tempted to conjecture upon which lines developments are likely to arise. An article by some expert on the ferns of the future (anticipated in December "Gazette"—ED.) would, I fancy, be interesting reading. There are now many beautiful forms existing as single specimens, of which many of us would be glad to hear and our Society to record. I would like to hear the experience of those who have tried or been successful in raising plants from variegated forms of *P. angulare*. For three years I have made sowings from a very beautiful and strikingly white variegated plant, given me by Mr. Harris, of the Clifton Botanical Gardens, but have not succeeded in raising anything. From Moly's *P. ang. pulch. variegatum* I have raised typical plants, including depauperation, but without any trace of the beautiful orange-coloured variegation of the parent. I am wondering whether this character may declare itself suddenly, like the breaking of a tulip. Padley's unequal variegation also yielded negative results. [This has been crossed with a cristate form with success.—ED.] The parentage of the Jones and Fox *plumose divisilobes* seems to be almost as far from elucidation as ever, but some while since I saw a series of plants of this section raised by a nursery-

man (the parentage of which he gave me) which appeared to be almost indistinguishable from some of Jones' and Fox's raising. Further experiments in this direction may yield a solution.

It seems a great pity that the history of such a wonderful advance should be wrapped in mystery.

In conclusion, I would express the hope that next year may witness our customary August reunion under happier circumstances than those which at present cast a dark shadow over our own country and a large part of Europe.

W. B. CRANFIELD.

December, 1915.

RESULTS OF FERN SELECTION.

It is extremely interesting to consider, taking the Ferns of the whole world into consideration, what an enormous difference exists between the small proportion of varieties or "sports" as compared with normals among the hundreds of exotic species as compared with the great number produced by our own few native species, about two score only. This difference, be it noted, exists, despite the fact that a large proportion of these exotic species, hardy and tender, have been in trade hands for a much longer period than our native ones. These latter indeed for a long time were all but entirely ignored, and only became the objects of selective cultivation when the last century was well advanced, and when considerable collections of exotics had been introduced. These, too, had been raised on a considerable scale from spores by the nurserymen who dealt with decorative foliage plants, including ferns, and who, of course, paid particular attention to any sports which cropped up in their propagative cultures.

As a result of this, at the time when the British Fern varieties began to attract attention (towards the end of the first half of the nineteenth century), there was certainly a considerable number of exotic varieties, some introduced from abroad as wild finds, but mostly acquired by selection, in the way indicated, from the offspring of these. At this time, however, when the British Fern pioneers became more and more inspired in their researches, by new discoveries in the ferny regions of Great Britain of forms which far and away transcended in beauty the normal specific ones with which they were associated, we must note, to judge by the early catalogues which a few nurserymen issued, that the really valuable forms were few as compared with eccentric ones, which nowadays are ignored except as souvenirs. Nature, if we may so personify the great Creative Power which underlies all natural phenomena, living or inanimate, in the invention and production of varietal forms of Ferns, as of other forms of life, produced many which may be regarded as thoroughbreds, that is, such as are symmetrically beautiful in make and characterized throughout on a consistent plan, but in addition to these, in a large number of cases, she produces imperfect and unsymmetrical or eccentric types in which the varietal influence is evidenced in a wayward and irregular fashion. As a consequence, on the principle of heredity, both these classes, the constant and the inconstant, produce corresponding offspring, and, as a rule, the perfect or symmetrical varieties come fairly true to type, while the progeny of eccentric forms vary greatly, reproducing their peculiarities even on exaggerated lines, no two plants being counterparts of each other. Some of these also are peculiarly apt to multiply so freely as to become veritable weeds. The better class of types, it is true, also vary, but as a rule this means only a greater or less development of the special character, the

symmetry and thoroughness being retained, so that this particular character may be, and often is, greatly enhanced in a generation or two, or even in one. It is due to this fact that at the present time we have a very large number of varieties, especially in the Polystichums, Scolopendriums, and Athyria, which are so improved by selection, that they far and away excel in beauty any of the wild "finds" or Nature's unaided productions. Among these latter, however, rank, almost without exception, the typical "sports" which form the basis of the numerous sections under which the British varieties have been classed. Something, too, has been done, but not much, in the way of combinations of varietal types by crossing, a branch which has yet to be properly cultivated, but the practicability of which has been demonstrated by several striking examples. In the early days to which we have referred, the number of wild "sports" available as a start was not very great, and among these were a large percentage of what we may term Nature's failures. These, of course, from the botanical biologists' point of view, are as interesting as are the best from that of the critical collector, since in either case we find, for no explicable reason, that the normal structural plan pursued presumably for ages, has been rejected and a new one adopted, on what can only be qualified as new specific lines, since the change is inheritable and permanent. These "failures," however, at the period we allude to, were regarded as "curios," and as equally interesting from the collectors' point of view as the "*élite*." They consequently found their way into trade hands, and being propagated yielded a copious crop of eccentrics. These were dignified with quasi-descriptive names and long descriptions, and quoted at high prices, based quite as much on defects, as we now consider them, as on their merits as decorative plants. To give a typical example from R. Sim's Catalogue, 1863.

A. f.f. diversifrons is described as follows:—"Spreading shortish broad fronds some in divisional appearance normal, i.e. like the species, others having occasional branching-pointed or oftener very irregular primary divisions (pinnae), or both irregularity of the secondary (pinnules), and forking of the primary divisions combined, the irregularity arising from the pinnules being here and there absent, or shortened, or rugged. A quaint-looking variety. . . . 10s. 6d."

On carefully studying this description, it is seen that the fern is simply a mass of imperfections, and of a type which nowadays would be thrown out ignominiously at once as an eminently undesirable seedling, instead of being encouraged to grow up and audaciously couple itself with a claim of 10s. 6d. There is no doubt whatever that a preponderance of such worthless types led to a reaction, and the subsequent neglect of British Ferns for many years. Meanwhile, however, the "cult" survived in the hands of the original pioneers and their successors, whose efforts resulted in many new discoveries, so many of which were of the right kind that mere "curios" were deservedly ignored. The catalogues of to-day consequently represent, with very few exceptions, only meritorious forms, and easier modes of propagation having also been discovered, the prices even of the best and rarest are extremely moderate.

Subsequently to the writing of the above, the *Gardeners' Magazine* has published the following, which we are permitted to reproduce. This refers to the same catalogue as is referred to above, viz. Sim's of Fooths Cray, 1863, and the high prices quoted, when considered in connection with the descriptions, contrast so greatly with the current ones for thoroughbreds as to form another source of congratulation to the fern lover of to-day, viz. greater ease of acquisition plus finer character.

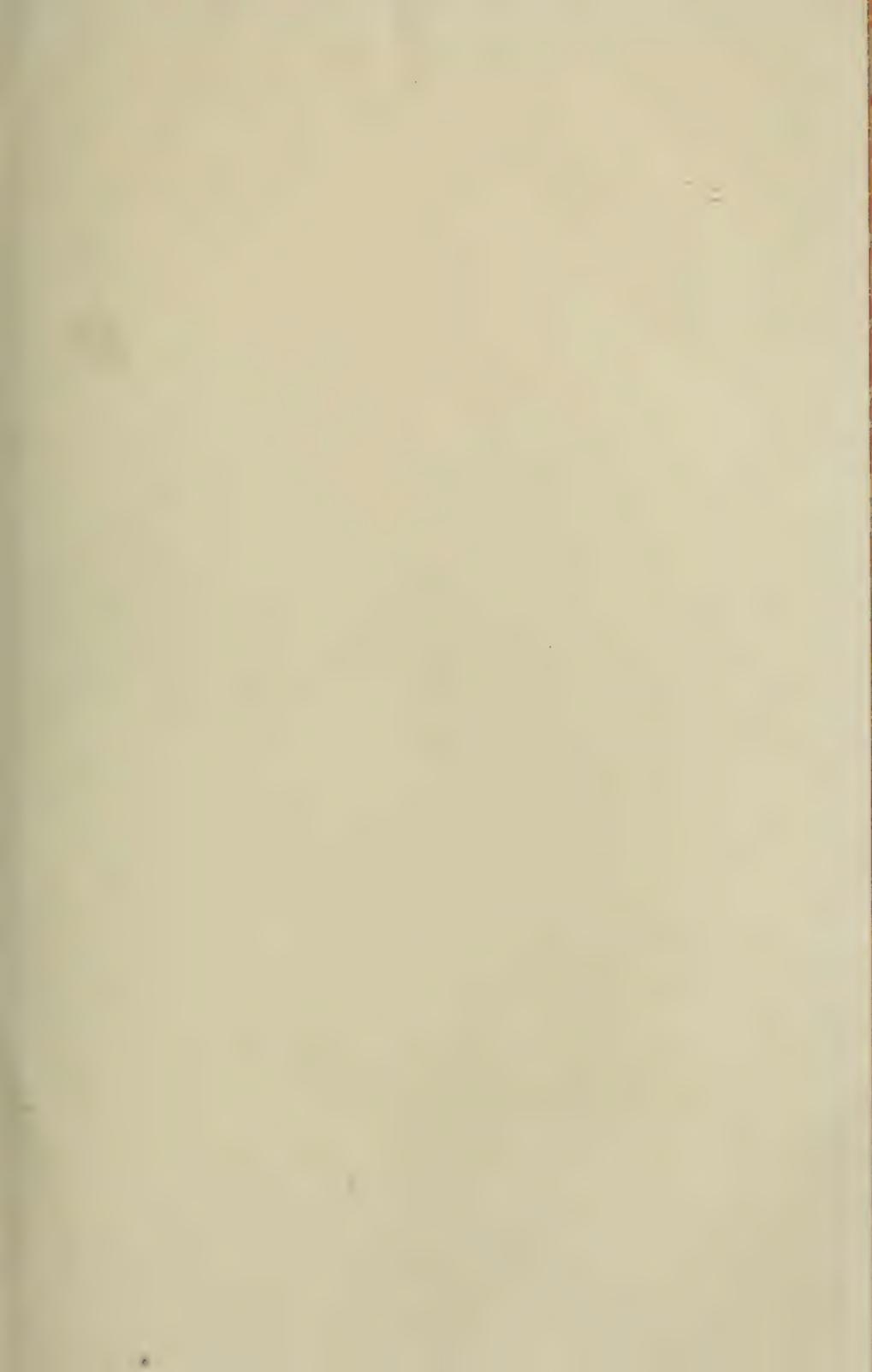
HARTSTONGUES.

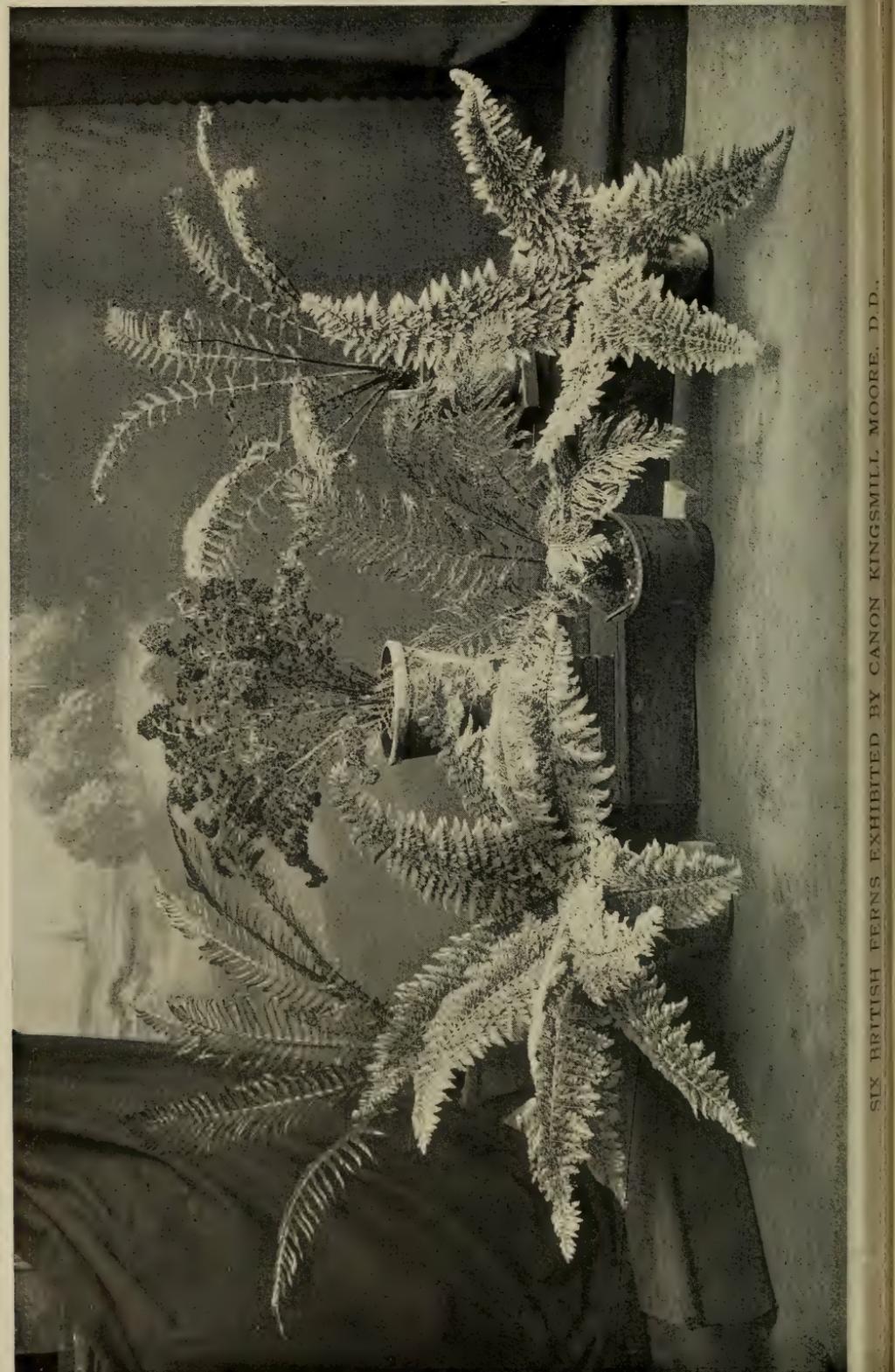
(Reprinted from the *Gardeners' Magazine* of fifty years ago,*
February 3, 1866.)

"The Common Hartstongue fern of the English hedge-rows is the most interesting of our native Filices. In its ordinary form it is distinct from all other British ferns, and it surpasses every known fern—no matter from what country—in sportiveness, so that to make a complete collection of its varieties would be a task of some magnitude. That readers who are not accustomed to Harts-tongues may form some idea of their importance to fern growers, I cite a few statistics from Mr. Sim's excellent 'Descriptive Catalogue of British Ferns.' I find in that work descriptions of eighty-eight varieties of the Harts-tongue, the descriptions filling no less than eight pages. The varieties are offered at prices varying from one shilling to twenty-one shillings each; and casting up the several sums at which the varieties are priced, the total cost of one good plant each of these eighty-eight varieties would be £42, or within a fraction of ten shillings each all round. Nor must it be for a moment supposed that these varieties exist in catalogues only, or that the prices are not as real as the prices in Consols. The fact is there are many fern collectors who gladly pay prices varying from half-a-guinea to two guineas for new sports of British ferns; and amateurs who are entering upon this agreeable and fascinating pastime usually make their first bold venture in the matter of outlay by ordering a complete set of Scolopendriums, so that there is really an active trade doing in such things; and if any of us were to run down to Fooths Cray, and see everything in Mr. Sim's nursery, there would be few things likely to astonish us more than the collection of Hartstongues."

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

* By permission of the *Gardeners' Magazine*.





A BEAUTIFUL FERN GROUP.

We are indebted to the kindness of the Rev. Canon Kingsmill Moore for the loan of a block illustrating his exhibit in Dublin last year of six British Ferns. As these speak for themselves, we need but to indicate their names. From left to right, back row, stand *P. acul. pulcherrimum* (Beavis), the parent of the gracillimum section, *A. f.f. formoso cristatum*, and *A. f.f. cristatum densum* (which seems to be hardly well named), and in front *P. ang. plumosum-loxum* (Jones and Fox), *P. acul. gracillimum Drueryii* (young plant), and *P. ang. plumosum Esplan.* These deservedly gained the first prize, all being not only of the élite, but capitally grown.

THE CAUSE OF VARIATION.

One of the most burning questions of the day in biological circles is that relating to the reason why plants which have presumably adhered for long periods to structural and other characters peculiar to their species, transmitting these practically truly for many generations, should apparently suddenly abandon these to a greater or less extent and adopt others of, it may be, a widely different character. This adoption it is found is, as a rule, of a permanent character, the new "characters" being transmitted to the offspring by seed or spore, so that to all intents and purposes a new species comes into existence. The botanist, however, recognizing the retention of some of the old specific characters, which may be termed fundamental ones, such as those connected with the mode of reproduction peculiar to the genus of the plants concerned, and also, as a rule, some of the merely specific ones in a modified form, refuses to accept these "sports" or "mutations," as they are termed, as true species, regarding them as mere "varieties." For a very long

period, up to indeed a comparatively recent date, the scientific botanists refused to regard these "sports" as other than Nature's mistakes, and it is only of recent years that the science of Teratology became established as a particular branch of study of these eccentricities, which was gradually found to be of absorbing interest and fraught with valuable lessons for the biologist generally. Out of the data accumulated in this direction there sprang naturally the desire to know the why and the wherefore of the changes observed. Many were easily traceable to interference with the normal course of development due to insect influence, such as galls, or other damage, but such divergencies always failed to be inherited by the offspring. Many, on the other hand, could not possibly be imputed to such origin, and as the great majority of the experiments were conducted under artificial conditions of high culture and in connection with plants already of complex pedigree, and consequently very variable in their offspring, due to varied parental potencies, the idea became more and more strengthened that variation was always due to some such departure from purely natural conditions, and never occurred except when some "change of environment" took place, and in such case evidenced a sympathetic response on the part of the plant in order to adapt itself thereto. Clearly, in the study of natural phenomena of this class, incomparably the best material for really practical research is presented by plants growing under entirely natural conditions, *i.e.* wild ones in their native habitats, and therefore free from the thousand and one disturbing influences inseparable from plants grown under artificial cultural conditions, and already, as we have stated, mostly of complex origin. Equally clearly, such study is not so easy, since it involves a vast amount of skilled and experienced research among the wild plants in order to discover the comparatively very rare "sports"

or "mutations" *in situ*, and thus be able to judge of the possibility or probability of their divergence from the normal being due either to "change of environment," or response to the different conditions thereby presented.

To the best of our belief, obvious as we consider this statement to be, not one of the many more or less eminent botanists who from time to time put forward their theories of variational causes, usually on the lines we have indicated of "change" and sympathetic response, has devoted himself earnestly to the study of the wild sports, or attempted to profit by that of the literature thereanent which has been accumulated for more than half a century by the coterie, which the writer at present represents, of ardent students of our native British Ferns. For some occult reason akin, as we think, to the proverb that "a prophet has no honour in his own country," the mere mention of "British Ferns and their Varieties" seems to scare rather than to attract the truly scientific student, but it is a curious fact that in all the domain of botanical research there is absolutely no family of plants which has been so thoroughly studied in the wild state and from the varietal point of view as the comparatively few species indigenous to the British Isles. Of no other family, too, has such careful record been kept by, it is true, amateurs, but amateurs, largely imbued by botanical knowledge, and who have been careful in the vast majority of cases to collect and preserve, not merely the dead fronds, but also the living plants themselves as indisputable evidence of the nature of the alterations observed. Surely such a fund of data as there is concerning these hundreds, for hundreds exist, of distinct and constant "sports," is worthy of thorough study by those who on deeper scientific lines are studying the causes of these differences, particularly when they are assured over and over again, that at any rate with regard to the

vast majority of such "sports" it is entirely impossible to attribute them either to (1) change of environment, (2) difference of environment, (3) any response to environmental influences, or with a few exceptions to hybridization. For some years past the writer has endeavoured by replies to papers insisting on the importance of these three conditions, to lead to a study of the literature we have alluded to, and even of the plants themselves, but all in vain; after a time the same insistence crops up again, literally repeated, and without the faintest reference to the evidence offered and which would inevitably confute the theory involved.

Although the reasons upon which the writer's belief is founded have been frequently stated by him, a brief reference to the ordinary conditions under which Fern sports are found may not be out of place. It may be asserted, as a general rule, that they are discovered so closely associated with the normal or common forms (1) that they have frequently to be disentangled from such, both as regards their fronds and their roots, so that the environment is consequently identical; (2) that they are often found on hillsides, in glens and in other situations which quite preclude the possibility of any local change of environment for a long period; (3) that "sports" occur to a predominant extent in species of which only one of the genus occurs here, such as *Athyrium*, *Scolopendrium*, *Blechnum*, which excludes the idea of hybrid origin dear to some theorists; and, finally, (4) the forms assumed afford no appreciable evidence of sympathetic response to environmental conditions. They will, of course, be stunted in dry and uncongenial exposed habitats, but when removed to sheltered conditions they are quite as likely to grow robustly as to retain a stunted or congested character such as a sympathetic response would involve.

That the writer is not prepared to offer a counter theory

in place of the one attacked, goes for nothing. To follow up a false theory is simply waste of time, and it is a service to science to demolish it, if reliable evidence to the contrary be adducible and producible, as is undoubtedly the case in this instance.

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

TRUE DWARF VARIETIES OF BRITISH FERNS.

A while ago in the "Gazette" appeared some notes respecting dwarf ferns, and as for some time past I have been getting together from various sources examples of thoroughbred dwarfs a few notes on the subject may prove interesting. These dwarf or midget forms are general in the animal and vegetable world, particularly when natural development may be affected by cultural conditions. It would be possible to cite numerous examples, but a few will suffice. In the domestic fowl there are Cochins in various classes and Bantam Cochins, Game in the various sections and Bantam Game, black and brown, red, pale and dark. The same occurs in pigeons, rabbits, dogs, horses, and other types. These forms are doubtless produced by selective breeding, and, as a general rule, I think the majority of dwarf ferns have been raised in sowings of congested or dwarf forms, which, in order to test thoroughly, are planted out in frames under conditions of soil, shelter and moisture calculated to encourage the utmost development of which the plants are capable. Under such conditions any tendency to "bolt" is quickly manifested, entailing speedy removal to the general collection or destruction. As might be expected, *Scolopendrium* furnish the most numerous examples in my midget family, of which the following are well-known forms: *Kelwayi*, *Densum*, *Spirale*, *S. cristatum*, *tripartitum*, *crispissimum*, *condensatum*, *Cousensii*, *ramosum*.

capitatum, angustatum and angustatum minor. The following have been collected from various sources, the nomenclature being descriptive :—Marginatum, cristatum nanum, crispum nanum, crispum cristatum compactum, crispum cristatum, sculpturatum nanum, ramo cristatum, muri-catum, curioso filiferum, ramo marginatum nanum, rugosum nanum, and several others on trial. None of these exceed six inches in height, the majority being between two and four inches; all are thoroughbred. In A. f.f. there are Congestum excurrens, c. minus glomeratum, c. grandiceps, Kalothrix cristatum (Druery), Velutinum, setigerum congestum, s. c. cristatum congestum minus, c. m. cristatum, congestum minus fimbriatum, c. m. f. cristatum, and a few seedlings under trial of P. angulare, grandidens nanum, congestum of Padley and Lyall, both simple and crested, congestum densum, congestum, perserratum, congestum, and what is, I believe, quite new in P. ang., a perfect spirale, five inches high, with quite circular truncate fronds, an inch in diameter, as stiff as a bottle brush. There are but few Lastreas and no Polypodies. One which was sent to me as a true dwarf very quickly changed its character, and became of almost normal dimensions. Doubtless many other dwarf forms exist, Blechnum sp. crispissimum being a notable example, and I hope to make additions from time to time, but judging from the number of trials I have made, true dwarfs, whether amongst large or small growing species, are not easy to raise or meet with.

W. B. CRANFIELD.

THE ORIGIN OF THE NAMES "OAK FERN" AND "BEECH FERN."

The exact significance of these names is involved in considerable obscurity. Sir J. E. Smith and Edward Newman both comment upon them as singularly inappro-

priate, and are at a loss to understand why they were bestowed. They cannot refer to any connection between the habitats of the ferns and those of the trees, for, though both ferns might possibly grow in company with the oak, neither of them would be in the least likely to thrive in company with the beech tree, since the latter generally grows on dry and preferably on chalky land, while the ferns love moisture and dislike lime. Carl Linné (Linnaeus) is the accepted author of the names *dryopteris* and *phegopteris*, which are simply "oak fern" and "beech fern" written in Greek. Whether Linné invented the names himself or simply translated old popular names is uncertain, but, in the absence of any evidence to the contrary, it is fair to assume that for some reason he bestowed them "out of his own head." His reasons can only be matter for speculation, but I venture to make one or two guesses which may be taken for what they are worth. To take the oak fern first: its surface has a velvety bloom, which is not unlike that upon the young leaves of the oak tree in spring. We know that Linné was peculiarly susceptible to the awakening of Nature in the spring, and it is not unlikely that he may have had in mind the young foliage of the trees when he named this fern. If this suggestion be accepted, the name of the beech fern is equally explicable, for its young fronds have a hairy surface, which is quite comparable to that of the young leaves of the beech tree.

Another possible, but less probable, explanation, I think, may be taken from the outline of the fronds when they are dried (*i.e.* pressed). If we look at a dried frond of the oak fern, its broad, soft, rounded form bears a certain resemblance to the outline in profile of *Quercus robur*. It is true that the stipes of the fern are much too slender to correspond to the sturdy trunk of the tree, but I think names have been bestowed on the strength of resemblances

not more fanciful than this. Again, the pointed triangular outline of *Thelypteris* would correspond roughly to the more conical figure of the beech tree by contrast with the broad squat figure of the oak.

Possibly, some member more learned than myself in the archaeology of names may be able to give a better explanation than either of the above. In that case, I shall be the more pleased, and shall be quite satisfied to have set the ball rolling.

F. W. STANSFIELD, Reading.

CHLOROPHYLL.

As Spring is near at hand, and as Ferns, like all other green plants, effect their growth by means of Chlorophyll, and have indeed, in the inconceivably remote period of the Coal age, played the main part, in conjunction with their close allies, in building up the incalculable treasures which have formed the chief basis of man's commercial and industrial progress, we venture, with the permission of the *Journal of Horticulture*, to reproduce a description of Chlorophyll and its supreme importance as a creative factor.

"At the approaching lovely season of the year, when foliage of infinite shades, and verdure in all its vernal freshness, clothe the landscape with an indescribable charm, it probably seldom occurs to the beholder that this universal greenness represents the first and most vital essential of his own existence, it being practically the one and only vehicle for the transformation of solar activity into potential life. All life is dependent, directly or indirectly, upon vegetation, and the old saying that 'all flesh is grass' is absolutely and literally true if we accept grass as the symbol of vegetation generally. The meat-eaters are always dependent upon vegetable-feeding animals, as a moment's consideration of our own case will clearly show, and hence we are easily led to the conclusion

that the entire realm of organic life is based on the capacity of plants to grow.

" We next find that all plants, except those which are practically parasitic ones, or fungi, which feed upon plant tissues dead or alive, and thus none the less exist at the expense of the green ones, can only form their foliage under the influence of sunlight, direct or diffused. Growth under the influence of electric or other artificial light forms no exception to this rule, for we have only to investigate their source to find the sunlight as its origin, since one and all kinds are obtained by the consumption of coal, oils, etc., which are merely the stored-up products through the vegetation of past ages, of the sunshine of their time. Directly or indirectly, therefore, we always come at last to the sun as the impelling vital force, and in connection therewith we equally invariably find that this force can only find vital expression through the vegetation which clothes the world with verdure; naturally, therefore, we find a certain synchronism to exist between cause and effect; that is, between vital vegetative activity and solar influence, especially as solar light and solar heat are so intimately associated, and the heat is also a factor in leaf development.

" The next thing to consider is how the sunshine is enabled to do its vital work within the leaves, and although it is impossible for us to define the actual 'how,' we absolutely know that the work is entirely done by the green colouring matter itself, the so-called chlorophyll, which is really the simple Greek for leaf colour. Within the partially transparent cells which form the fabric of all leaves this colouring matter exists as an infinite number of tiny green grains, which, under the influence of light, are enabled not only to multiply, but in some subtle way to break up or decompose the carbonic acid gas of the air, which is absorbed by the leaves through the pores,

and such salts as may be contributed from the soil through the roots; and also to recombine their elements in infinite ways to form woody and leafy tissues, and, in short, build up the plant on wider and wider lines.

"If we pause a moment to consider the infinite variety of flavours, odours, and chemical products which exist in the plant world, and remember that of all these, nutritious, noxious, or even deadly poisonous, are fashioned by these little green grains, and that every leaf in the fair prospect we may be enjoying is an actual and busy laboratory, engaged in this varied work, our conception of the wonders of Nature, and especially of the wonders of chlorophyll, cannot fail to be immensely widened. There is, indeed, absolutely nothing else in creation, nothing so pervasive and so essential to life, which can be compared to it; and the more we investigate, the greater becomes our wonder and sense of reverence at the creative power which underlies it.

"From the more microscopic forms of plant life to the giant Sequoias, it is the tiny green grains which, in conjunction with the formative cell, the twin wonders of creation, enable them to exist and reproduce themselves, and as we have already indicated, in those lowly forms of plant life, the fungi, which manage to exist without their actual presence within their substance, they can only do so by feeding, as carnivorous animals do, on organic matter previously shaped by chlorophyll, and consequently charged with nutritive elements. The green leaf, in short, forms the *one and only* link between the solar forces and life itself, and in viewing the wide expanse of verdure of hill and dale and fields and forests in their spring and summer garb, we are the actual witnesses of the wondrous process of transformation upon which our very existence, and that of life in every other form, is absolutely dependent."

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

VOL. 3.

Smithsonian Institution,
JUN 15 1916
National Museum.

No. 28.

... The ...

British Fern Gazette.

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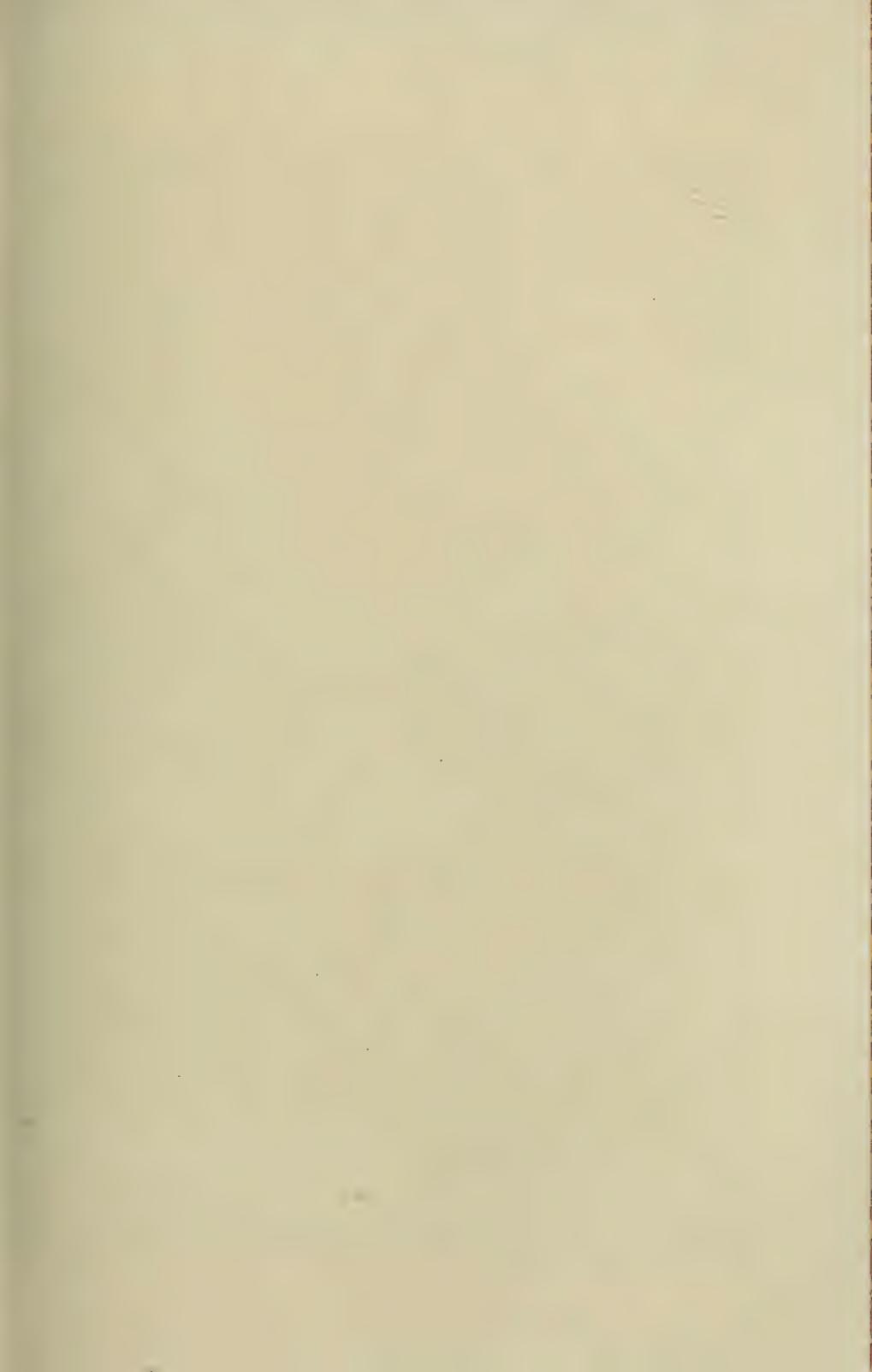
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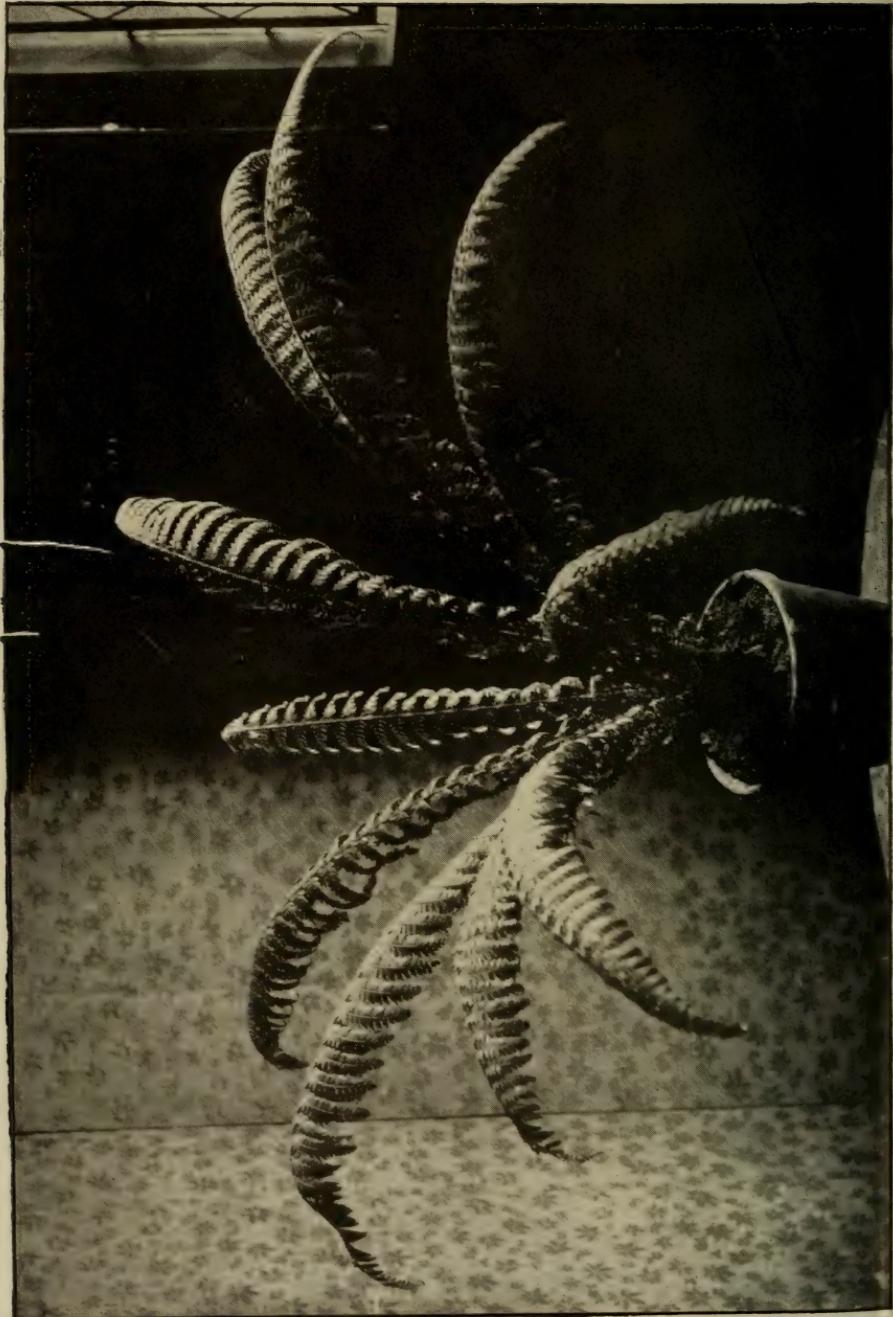
PUBLISHED BY

THE BRITISH PTERIDOLOGICAL SOCIETY

(*Hon. Secretary, C. T. Druery, 11, Shaa Road, Acton, London, W.*)

KENDAL, WESTMORELAND.







THE

BRITISH FERN GAZETTE.

VOL. 3.

JUNE, 1916.

No. 28.

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EDITORIAL NOTES.

Another year has rolled away since we had to refer to our August meeting as a practical impossibility owing to the war, and to our extreme regret we are again compelled, and for the same unhappy reason, to abandon any hope that between now and the August Bank Holiday the position will be sufficiently changed to admit of such meeting on the old lines. (See special note on page 75.) Meanwhile, the Editor has great pleasure in announcing that the members, despite the war, have manfully supported him, a very few withdrawing their support, and even these have been mostly replaced by fresh ones, so that numerically and financially we have suffered but little. We, however, regret to have to announce the somewhat sudden death of Mr. T. G. H. Eley, one of our most valued members, whose portrait we reproduce by the courtesy of the *Barrow News*, together with an obituary notice.

As usual, we cordially invite members to contribute to the pages of the GAZETTE, which is designed to be the centre to which all information, re British Ferns and their Varieties, should gravitate. This time, as too often, it is the Editor who has to do most of the writing, though every one with a collection worth the name, and with an intelligent power of observation worthy of the cult, *must* from time to time note things which are new to him or her, or requiring explanation, and it is precisely by such notes and records that knowledge is increased.

New members are wanted, and the Editor would regard as a favour the receipt of name and address of any known British Fern lover not on our list, and to whom we might send a specimen copy of the GAZETTE. The annual subscription to the Society is only 5s. from August to August, and entitles to four issues of the GAZETTE, plus association with a large number of fellow students of our beautiful British Ferns.

THE BRITISH FERN GAZETTE, VOL. 2, NOS. 13 TO 24.—The Editor would again remind members that a small number of Vol. 2 have been bound into a very presentable volume of 313 pages and numerous illustrations. As no reprint will be available, and the books are widely recognized as most valuable contributions to our Fern literature, the opportunity of acquiring copies, even extra ones, should not be lost sight of. The price to members is 3s. 9d. post free, and speedy application is advisable to secure, as only a few are left.

X The subscriptions for 1915-16 being due in advance, the Hon. Secretary would feel much obliged by a remittance of 5s. by return post to 11, Shaa Road, Acton, London, W.

THE EDITOR.

THE AUGUST MEETING.

In view of the practical impossibility, owing to the continued war, of holding a meeting this year in conjunction with an outing, the Hon. Secretary has consulted with Mr. A. Cowan as President, Mr. W. B. Cranfield, Treasurer, and Dr. F. W. Stansfield, with the view of transacting the necessary business with the minimum of trouble and expense. To this end they have approved the insertion of a notification in the present Gazette, that no formal meeting will be held, and that in default of any objection on the part of other members of the Committee, the usual resolution relating to the passing of the balance sheet after audit, acceptance of the Reports, election of all the officers *en masse* as before, and the allocation of ten guineas to the Editor of the Gazette for his services and contributions in that connection in 1915-16, will be recorded as passed at a *pro forma* meeting held at the Hon. Secretary's house on August 7th, 1916, precisely as was done last year. The report of that meeting will then be embodied in the September Gazette, and no other notice than this will be previously issued. For order's sake, the Members of the Committee, other than those named, are invited to confirm this arrangement on receipt of the June Gazette, silence, however, being assumed as acquiescence.

C. T. D.

OUR FRONTISPICE.

POLYSTICHUM ANGULARE REVOLVENS.

In this beautiful fern, wild examples of which have been repeatedly found, we have a striking example of an unusual type of variation, which is the more curious as the rolling up of the frond contravenes one of the ordinary laws of foliose growth. Normally, a leaf or a frond in the process of growth expands on lines which present the maximum area to the light upon the stimulating action of which so much, in plant life, depends. Here, however,

it is clear that the backward curving of the pinnae, or of the upper part of the frond, tends to expose their under surfaces, as well as to reduce the area of exposure generally. This form of variation is by no means common, but it is not confined to the *Polystichum*, since we have ourselves found very marked examples in *Blechnum spicant revolvens* at Barnstaple, *Athyrium filix fœmina revolvens* in Scotland, and *P. ang. revolvens*, as shown, in Devon, while in various parts of the country, including even Acton, we have noted a very handsome revolved form of the common bracken, *Pteris aquilina*. *Lastrea filix mas revolvens* was also found in the English Lake district, and we have seen varieties of Hartstongue with almost tubular fronds on the same principle.

C. T. D.

BRITISH FERNS AT ACTON.

Those who are only acquainted with the British Ferns as they existed and were known in the days of the late Mr. Thomas Moore, can have little conception of them as they exist at the present day. The number of species may be said to remain the same, but the varieties and their apparently illimitable variability of form have gone beyond the fondest dreams of the imagination. The other day between the daylight and the "mirk" we called upon Charles Thomas Druery, Esq., Stanwixbank, 11, Shaa Road, Acton, Middlesex, concerning whose Ferns we have heard a great deal, and some of which we remember seeing at the Fern Conference held at Chiswick some years ago. His unique collection is almost entirely confined to special forms of the British species, many of which are the loveliest forms of their kind in existence. They consist of wild finds, or have sprung from the wildlings under cultivation. On the present occasion we can only confine our remarks to a few of the groups, particularly those which are now in their best condition,

or are evergreen, though we cannot refrain from alluding to some of the Lady Ferns which are amongst the finest in existence.

The common Polypody is now at its best, whether in its native habitats or under cultivation, so that reference to it is very appropriate; but for the present we need refer only to specially fine forms. Starting with *Polypodium vulgare*, we may say that two of the primary developments of it are *P. v. longipinnatum* and *P. v. cristatum*. The former has pinnae about two or three times as long as those of the type, and was found by Mr. Druery at Killarney. The latter is simply crested. Between these and *P. v. cambricum* there is a wide gulf; but some five forms of it, we noted here, constitute a very natural group. Mr. Druery regards all of them as plumose forms of Polypody, inasmuch as all of them have undergone a great amount of vegetative development, that is, they are much divided, greatly amplified and absolutely barren, so that no sporelings can be raised from them. Before going further we may correct an erroneous impression that has got widely circulated, namely, that the Welsh Polypody, so called, is peculiar to Wales, the fact being that it has been also found in several places far distant, and the best types of it originated in the Lake District. The ample, leafy, twice divided fronds of *P. v. cambricum* are not yet mature, some being only half-grown, or less, as they only commence to grow in June when summer is upon us. *P. v. Prestoni* was found in the chink of a rock near Carnforth by Mr. Preston, and is a more plumose form of *P. v. cambricum*, being in fact the densest and most leafy or plumose of the whole section. *P. v. Barrowii* is the most robust of the section; and while it is less densely imbricate than *P. v. Prestoni*, it is in every way of bolder habit or form. *P. v. plumosum* Hadwin has much blunter segments than *P. v. cambricum*, less foliose and narrower fronds. *P. v. cambricum* *Oakleyae*

differs from the type in having distinctly narrower pinnæ and pinnules. While all these five forms might be taken for *P. v. cambricum* by a casual observer, they are really distinct in the eyes of the Fern lover who has patience to form a close acquaintance with them. This applies in a similar way to every other class of plants liable to vary in details of structure or form.

(*To be continued.*)

BLECHNUM SPICANT.

(THE HARD FERN.)

Considering the tough evergreen nature of this pretty fern, which justifies fully its common name, and its abundance in many parts of the country, it is very curious that it so rarely figures among the common ferns of the garden, for if given a shady moist station it is fully capable of taking care of itself, and forming a distinct feature among the other common species. In nature we find it abundant in humid shady woods, on sloping hedge banks, and often on exposed heaths among heather and other low-growing vegetation which gives it some protection, while in boggy situations it may be seen among the sphagnum. It has two particular aversions—viz. drought at the roots and lime in either the soil or the water supplied to it, hence a condition of success under culture is provision of rain or quite soft water, as hard water contains lime, and inevitably kills it in time. The writer years ago lost the bulk of a collection of forty varieties through this cause, but as evidence of survival for a long period under pot culture with rain water he has several surviving finds dating nearly twenty years back which are still in fine condition. The soil should be an equal admixture of leaf-mould or peat, and good friable loam lightened with some coarse silver sand. The Hard Fern or Blechnum is

A SOLITARY BRITISH MEMBER

of a large family or genus, and is distinguished from all other British ferns by producing two distinct kinds of fronds, one set being dark lucent green, once divided into blunt, closely set teeth or pinnæ, and pendant, so that they spread round in a sort of lax rosette; the other set, which bears the spores, is stiff and upright, longer and narrowed in all parts, so that the teeth are hardly leafy at all and stand much farther apart. On the back of these fertile pinnae are two rows of spore heaps, covered when unripe with a thin skin-like indusium springing from just within the narrow leafy margin on each side. This constitutes the difference between Blechnum and Lomaria, in which the edge of the leafy portion itself forms the cover. In Lomaria, too, the fertile fronds are always narrowed, as in our Blechnum, while in many foreign Blechnums and in one British variety this is not the case. *B. s. anomalum*, not rare in hilly districts, has all the fronds leafy and lax and the spore heaps ranged along the midribs of the pinnæ of most of them. In all the other varieties, and as we shall presently see there are many, the marked difference between the two classes of fronds persists and is often emphasized, broad, leafy, widely-tasselled barren fronds being set off by their stiff erect fertile ones with spiky, many-fingered crests, or it may be, with heavy bunch crests resembling green flowers.

SOME OF THE VARIETIES,

nearly all of which have been found wild, are very striking. The writer's first find in the fern line was *B. s. concinnum Druery*, found in 1881, on a stone dyke on the middle of Exmoor. In this the long, blunt teeth of the barren normal frond are transformed into deeply notched semi-circular short ones, like tiny scallop shells, so that the frond forms two even rows of these from end to end, and

is about one-third of an inch wide only. The fertile fronds are merely knobbed all the way up with hard little bosses containing the spore heaps. In the Lake district Mr. Barnes found an equally narrow form, *B. s. lineare*, but the rounded lobes are flat and smooth edged, and so slightly divided that the barren frond is strap-like, and the fertile ones far narrower still and not knobbed. Two forms midway between *concinnum* and the common are *B. s. contractum* and *B. s. strictum*, the former with round lobes a third of the way up the frond, and the latter more or less irregularly narrowed the entire length. *B. s. imbricatum* has the fronds shortened and side divisions so densely set on as to overlap, and *B. s. crispissimum* Hartley is a little dwarf an inch or two high only, said to have been raised from *strictum*, though widely different. The Blechnum is occasionally found with the edges saw-toothed, *B. s. serratum* Airey is a well-marked wild find of this type, and through its spores gave Mr. Airey a much improved plant, termed *B. s. plumosum* Airey, divided nearly thrice, and very handsome. It has also done well.

IN THE TASSELLING DIRECTION.

Fern hunting among the Blechnums goes rarely unrewarded as regards plants with some forked fronds, more rarely a plant is found with all fronds divided at their tips, and the writer's second find hard on the heels of *B. s. concinnum* was a fine specimen of this class, *B. s. polydactylum* Druery, with many-fingered tassels hanging down a hedge slope by the roadside near Wooda Bay, by Lynton. *B. s. ramos-cristatum*, Kinahan's, and Maunder's forms branch first and tassel afterwards in a very handsome way, and *B. s. Maunderi*, raised from the latter, is simply a dense ball of cresting. *B. s. multifurcatum* Barnes, sometimes called *trinervio-coronans*, has a stiff, radiating crest on a sort of stalk on the frond tip, and is very distinct and pretty. *B. s. Aitkinianum* is a curious branching variety, and the

several distinct finds known as *cristatum* are all pretty and worth growing. *B. s. trinervium* is a singular type not uncommon in hilly districts, especially in Ireland; in this the two bottom divisions of the frond are considerably lengthened, and in *B. s. t. Hodgsonæ* they are so large as to make the frond a trident. *B. s. Forsteri* is a remarkable leafy, crispy, dense variety, difficult to describe, but very distinct, and the writer has found three forms which approach it, one a dwarf, one very foliose, and one nearer the normal, but well forked pinnae here and there, and the pinnae set on so closely as to crowd each other and run together—confluent—at the frond tips. Mr. E. J. Lowe records eighty-five varieties of this charming fern, and as it

DOES WELL WITH POT CULTURE,

a frame or a shelf or two in a cool greenhouse may well be devoted to a collection. It is perfectly evergreen, retaining its barren fronds quite fresh well into the second season, and until the new ones are perfected; the fertile ones perish much earlier, and can be cut off as soon as shabby without detriment. The chief thing to bear in mind is, we repeat, the necessity of rain water or water free from lime, and the next thing, that the plant must not go dry; these points attended to, and proper planting to start with, the Blechnum will survive its owner.

CHAS. T. DRUERY, F.L.S.

FERN STRUCTURE.

Although the structure of every plant is at once a marvel and a mystery, and careful consideration of the work, which is apparently spontaneously carried out from the germination of the seed to the subsequent fruition which completes the life cycle, must fill every thinking mind with wonder; ferns, if studied in a like fashion, present certain fundamental differences, which constitute

special marvels peculiar to themselves. In the first place, the antiquity of the fern tribe is enormously greater than that of flowering plants. We may go back to the earliest coal ages, a period antedating the deposit of thousands upon thousands of feet of subsequent formations of all descriptions, and in those coal seams and the shale on which they were developed as primæval forests of ferns and their allies, we shall find fronds as large or larger than those of to-day, and, what is more striking still, we shall find them as finely cut and as completely planned as our ferns of the present day, and with their reproductive spores arranged on similar lines. This means that even then they had been evolved into full fern perfection, and were not, as we might reasonably expect, ruder and rougher types in process of shaping.

Reading the history of the evolution of organic life in the light of present science, and of the varying phases of existence on the earth's surface during the cooling and solidifying process, we are led to the conclusion that vegetation made its first appearance in an aquatic form, peopling, presumably, warm ocean waters, first as roving organisms, and then in the shape of seaweed or algæ. These, as the earth's crust assumed greater and greater stability, would gradually invade the coasts, and with that adaptability which is imparted by inherent variation, would eventually find a footing inland as low forms of land plants, lichens, and their like, merging into mosses in one direction and fungi in another. All these types of vegetable life are, it will be noted, reproduced in one and the same manner, viz. not by seeds the product of fertilized flowers, for they bear no flowers proper, but by spores, minute bodies thrown off in enormous profusion, and so light as to be easily carried hither and thither by air or water. The result of this profusion and easy transference, coupled with the inherent power of variation aforesaid, which

means adaptability, was that sooner or later all the varying conditions of the earth's surface, drier or wetter, warmer or cooler, sunnier or shadier, eventually found occupants to fit them. Presumably for a long period dense cloudy skies, frequent torrential rain, and fierce and stormy winds prevailed, under which these lowly growths alone could flourish and maintain their footing. But presently the skies cleared, and under the vitalising sunbeams, an elevating impulse lifted the creeping moss into the huge tree-like lepidodendron; the Calamites, now our equisetum, aped the fir tree, and last, but not least, in some occult fashion the fern frond was evolved as the fruit-bearer of some lowlier type of Marchantiform vegetation, and was differentiated into many genera and species prior to its final evolution, in conjunction with its allies, through some of their members, into trees, shrubs, and flowering plants which now adorn our globe.

In the maidenhair tree (*Salisburia adiantifolia*) we have a still existing link 'twixt fern and forest tree, and in many of our conifers we may still detect the structural features of the lycopods of long ago. It is a peculiar fact that this adherence to ancient types is coupled still with an independence of that insect aid to reproduction which has metamorphosed our flowers, the pollen of most if not all conifers being windborne, thus excluding one potent factor of change. It is a curious fact, too, that despite the enormous lapse of time since their first evolution, and since the coal age in which we find them so grandly developed, the method of reproduction has been so rigidly adhered to that to this day we find the first phase of fern life engendered by the spore, to be to all intents and purposes, lichen-like; a small green scale attached to the soil by root-hairs, and sometimes proliferous, so that a single spore may not only cover a relatively considerable area of soil with a marchantoid growth, but this may exist

for years without producing anything resembling a fern proper. Nay, more, it has even been found capable of existing indefinitely in this shape and producing spores without the intervention of fronds, quite possibly giving thus a glimpse of fern origin pure and simple, viz. a travelling, spore-bearing, lichen-like growth which, instead of throwing up fruiting columns like many of the tribe, evolved a chlorophyllic leafy frond instead, the better to carry its spores and scatter them the farther, evolution of the fittest doing the rest in time.

In these green scales, which are usually the size of a herring scale, but sometimes much larger, nearly an inch across, there is no vascular or veinlike structure, the spore produces first a short row of cells, which then multiply by fission until a heart-shape is assumed; at the indentation there is a thickened cushion, several cells thick, in which a group of incipient seeds is imbedded, each one being surmounted on the under surface of the scale by a teat-like, hollow projection, termed an archegonium. These form practically the female flowers. The under side of the scale bears also a great number of whitish root-hairs, which serve to attach it to the soil and nourish it, and among these, scattered indiscriminately on the surface of the scale, there are many small round-headed projections, termed antheridia. These constitute the male flower, and when ripe they burst, and the equivalent of pollen grains is scattered forth in the shape of a crowd of very minute ciliated organisms, *i.e.* tiny bodies, provided with movable hairs, which enable them to swim actively about in the dew-like moisture usually present beneath the scale or prothallus. When liberated they swim towards the archegonia, one or more of whose seed-cells become fertilized, and shortly after this seed sends a root downwards and a frond upwards, and a fern proper is thus launched into existence.

It is really only at this stage that the structure of a fern begins to resemble that of a flowering plant in so far that it now assumes the two fundamental forms of subterrestrial root and superterrestrial foliage. As regards the roots they may be at once dismissed with the remark that their formations and functions are practically alike in both classes, but as regards the foliage, both structurally and functionally there is a wide difference between the frond of a fern and the leaf of a flowering plant, however similar they may, in some cases, appear to be. The frond of a fern normally is a contrivance to carry the spores, and in this capacity plays an individual part in the reproductive system of the plant; the leaf of a flowering plant can only do this when it has been so far metamorphosed as to become a flower, and even then the spore phase of existence never appears, and the scale stage is lost in the intricacy of the floral arrangements of interacting stamens and stigma, the latter being fertilized by the pollen grains borne by the former, precisely as under the tiny fern scale or prothallus, the antherozoids fertilize the embryo seed at the base of the archegonium. The function of the travelling spore is fulfilled in the travelling seed so far as the spreading of the species is concerned. A fern frond in addition to this spore-bearing capacity has the faculty of growth by assimilation of the carbonic acid in the air through the action of its chlorophyll stimulated by light, and in this resembles plant foliage generally as well as in the resultant stimulation of root-growth and the consequent extension and strengthening of the entire plant.

C. T. D.

(To be continued.)

FERNS AND WEEVILS.

As it is in the winter time that the insidious ravages of the weevil grub at the roots, as distinct from the summer attacks of the weevil beetle on the foliage, are most to be

dreaded, it is well to know how they may be dealt with with least risk to the plants concerned. If a sharp lookout be kept the owner of a collection of hardy ferns in pots will be fortunate if he does not here and there find evidence of the grub existence among the roots, in the shape of loose fronds or wilted ones which come freely away from the root stock when pulled. Seedlings in pans, too, may become abnormally pale in tint and unhealthy looking, and, when subjected to the same test, they may be found to be simply lying loose on the surface, denuded of every root fibre. Such signs are infallible evidence that the grubs are busy, and the cultivator in mid-winter is confronted with the unpleasant fact that if the pots and pans be turned out and replanted they are bound to suffer seriously by removal at such an unfavourable season. On the other hand, if left alone, the grubs will never be satisfied until the plant or plants are destroyed, and hence it seems to be a choice of evils. We have, however, found that total immersion in water for several days, while doing no harm to the ferns, either drowns the grubs or drives them to the surface, and, in fact, in loose compost, they are almost invariably found on the surface of the soil in about forty-eight hours, when, of course, they can be disposed of. By actual experiments we have found these grubs able to withstand immersion for fully four days, so that, for safety's sake, it is well, when they do not appear on the top, to let the pots or pans stand in water, with the soil entirely covered, for a day or two longer, say a week in all. Hartstongues seem to be the favourite prey of these marauders, but in point of fact no fern is safe from their attacks, for we once found a large well-established plant of *Adiantum pedatum* which failed to rise in the spring, and on investigating the cause no less than sixty fat white grubs formed a layer where the rhizomes of the previous season had existed, while only one or two living

points existed where these rhizomes had slightly run up the pot edges. Any fern which is obviously checked for no apparent reason may well be plunged, and it is quite probable that a few of these marauders may be busy in the heart of the caudex, though invisible, unless very drastic shaking out be effected. Frequently in such cases mere turning out of the ball from the pot may reveal the white (sometimes grey in their young state) grubs snugly ensconced next the pots, which invariably means a further brood within the body of the soil. In places badly infested by the weevil, this winter search and the application of the suggested remedy is all the more advisable, as the grubs appear to have few enemies, and hence nearly every one permitted to survive will make its appearance in the spring as a beetle, which is a source of great damage by eating the rising or perfected fronds, and as a progenitor of a numerous brood of grubs, and thus a perpetuator of the nuisance on a larger scale. In hardy ferneries under glass the existence of this pest, when once introduced, almost compels pot culture as against the installation of the ferns in the soil itself in rockeries, since in the latter case they become ineradicable owing to the impossibility of locating the grubs when their root ravages are too partial to detect by failure of the plant.

MYSTERIOUS FERNS.

Although our utter ignorance of the cause of variations renders every "sport" a mystery, there are a few ferns in cultivation whose origin is so strange as to place them in a separate category, and entitle them specially to be classed as above. In the ordinary way, whether under natural conditions or under culture where considerable numbers of specific forms are found or raised, we occasionally find more or less isolated specimens which have

apparently spontaneously departed from the parental or specific type, and sometimes to a very extraordinary extent. These usually are capable of transmitting the new features of their progeny, and may also propagate by offsets, so that when discovered as adults, and perhaps old specimens, they may be associated with their offspring, but these latter generally are very few in number. In sowings of such varieties, it is also a common thing to find still further departures from the specific form, but usually on similar lines; the species, however, remains unchanged.

In the cases I purpose citing the sports have originated in a fashion which gives little or no clue to their origin, as will be seen. Some three or four years ago Mr. George Whitwell, of Kendal, made a sowing of *Blechnum spicant* varieties, and raised a number of plants of that species, but among them he found, not one only, but several plants of an extremely dwarf, congested, and rameous form of *Lastrea propinquua*, all alike and unassociated with others of that species, and these plants are utterly unlike any known variety of *L. propinquua*. They are only three or four inches high, dark green, extremely dense and hard in texture, and the small fronds branch at one or more points. Mr. Whitwell, whose authority and experience are unimpeachable, has various forms of *L. propinquua* in his collection, and the possibility of stray spores from them cannot be overlooked; nevertheless, there is not a form among them to which either he or the writer could impute the parentage, and, as has been said, several plants precisely alike originated simultaneously.

Another case associated with *Blechnum spicant* may be cited, viz. Hartley's *B. s. crispissimum*, a dwarf, dense form two or three inches high only, which came en masse from a sowing of *B. s. strictum*, a long and somewhat narrow form to which the whole batch presents no similarity at all, and, again, is diverse from any known type. I raised a

batch of this myself, and found even the prothalli to be thick and fleshy masses instead of the usually thin laminæ. A third still more mysterious case is that of *P. aquilina grandiceps depauperata*, which appeared spontaneously and simultaneously in five different and isolated places in Messrs. Birkenhead's nursery at Sale, near Manchester. This had lax, pendulous fronds, repeatedly branching into slender, depauperate, tasselled ramifications. All the plants were alike, and yet they occurred in widely separated houses at one and the same time as chance seedlings. They resembled no other known variety at all, and the only theory that can be formed is that somewhere, at the place where peat or leaf-mould had been taken and supplied to the nursery, a wild sport of the type existed or exists, whose spores had thus been imported into suitable quarters for development. This was eventually lost to cultivation.

In the former case we have a feasible theory, but what can we say for *Adiantum Luddemanianum*, that extraordinary ramosc and crested form of maidenhair so long known in cultivation? This originated in a French nursery, and was found growing in the soil under the staging of a greenhouse by Mr. E. Schneider, who chanced to pay a visit. Some plants of *A. capillus veneris* had been grown in the nursery, but the plant in question was the only fern visible. It was a robust clump, and speedily changed hands, as may be imagined, the owner of the nursery simply regarding it as an interloper. The presence, under the circumstances, of such an extraordinary and unique "sport" which the solitary plant evidenced was a mystery indeed. Another instance, presenting new features in the specific direction, occurred some years ago in Messrs. J. Veitch and Sons' nursery at Chelsea, in the case of *Todea grandipinnula*, assumed to be a form of *Todea superba*, or possibly a hybrid between *T. Fraseri* and *T. hymenophylloides*, as plants of these were

adjacent to the culture which yielded the plants—a fairly large batch, all alike. Its hybrid character is, perhaps, but not surely, indicated by the infertility of its spores, as the *todeas* are difficult to raise. On the other hand, some time afterwards, *Todea Moorei* (Baker) was introduced as a new species from Australia, and this cannot be discriminated from *Todea grandipinnula*.

The appearance of specific exotic forms in collections prior to their intentional introduction, such as occurred with *Lomaria Patersoni* at Kew years before it had been found in its native habitat and sent thither, can, of course, be accounted for by wind-borne spores being introduced in the soil attached to other importations, but that is a very different matter to most of the cases cited above, where no similar type is known to exist, and where the chances would seem to be infinitely against the appearance of not one only but numerous examples within the very limited area of an ordinary culture. The case of the *todeas* involves the actual evolution of a different species at one jump, for had the varied type not appeared under culture as described, the subsequently-imported plants would never have been associated with *T. superba* at all, a fact which opens up the whole question as to wherein lies the difference between a true species and an absolutely, constant distant variety which produces true progeny in continuous succession, as so many varieties do.

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

DWARF BRITISH FERNS.

The fact that among the many forms of variation which our British ferns have assumed, there is a very fair number of tiny *éditions de luxe*, as it were, must be of interest to those whose space is particularly limited, and hence I make no apology for describing a few of the best. This peculiar

vagary in the direction of smallness is, so far at any rate as actual finds and introductions are concerned, confined to British species ; the writer is certainly not cognizant of any dwarf exotic forms of otherwise large-growing species.

With British ferns, to take a typical case, we have the Hard Male Fern (*Lastrea pseudo-mas*) growing about four feet high, and its most striking large variety, the King of the Male Ferns, is as large or larger, as against which we may cite *L. p. m. ramulosissima*, dense crested, and usually only five or six inches high ; *L. p. m. crispa gracile*, densely congested, and with curly-tipped pinnæ, of the same size ; *L. p. m. crispa cristata*, a crested dwarf, no larger ; *L. p. m. Langi*, a narrow, dense-fronded and crested pygmy, like a starfish, all of which are quite at home in thumb pots, and yet have all the concentrated prettiness of the best of their larger brothers. As they are robust little fellows in their way it is extremely curious that nature should cramp them into so small a compass while favouring other members of the same species so markedly as to size as she has done.

In the Lady Ferns we have, as great contrasts, the species normally growing very large, while in *Athyrium felix-fœmina congestum minus* and *A. f.f. c. cristatum* we have two dwarf gems of four or five inches stature, both of dense growth and the latter prettily tasselled. A form which we must provisionally name, *A. f.f. minus Boydi*, is much smaller still, forming quite a mossy clump of three-inch fronds. *A. f.f. stellatum*, found by Mrs. Wilson, reaches about six inches, with rounded spiky pinnæ, the opposite parts of which form stars, whence the name. Somewhat larger but still dwarf, about nine inches or so as a rule, are *A. f.f. stipatum Grantæ*, *A. f.f. congestum Whitwell*, and *A. f.f. congestum Phillips*, all with dense stiff fronds and very pretty. *A. f.f. crispum*, an old form, has a rambling root stock and branching crested fronds some

six or eight inches high. And last, but not least by any means, there is that extraordinary form, *A. f.f. uncoglo-meratum* of Stansfield, which forms with its fronds a spherical ball of infinite division like a ball of minutely cut *Selaginella apoda*, a fern absolutely without a parallel, some eight or nine inches high at the outside.

Among the Shield Ferns, again, the same extremes occur, but in fewer number, feet being reduced to inches. *Polystichum aculeatum congestum Lyelli*, a dense-growing dwarf, is a gem. *P. a. parvissimum* is wrongly named, since it is much larger, reaching nearly a foot, and *P. a. con-gestum* is dense, and short in stature. These are the only dwarfs we can quote in this species.

In the Hartstongues, perhaps the most eccentric of all ferns, we have *Scolopendrium vulgare spirale*, a bunch of thick little corkscrews, as it were, and from this and others Mr. Lowe raised a host of dwarfs, muricate, rugose and sculpturatae, i.e. roughed in various ways on the surface, and also forked and crested; but few, if any, of these are in the market. Then there is the little moss-like form known *S. v. densum Kelway*, three inches high, and as wide across as the mass is permitted to grow. This forms first a mossy boss, and then produces young plants all over the edges, piling itself up with its offspring. This, too, must not be watered overhead, and is best under a bell-glass. The much-branched and crested varieties, *S. v. Kelwayi* (parent of the last), *S. v. Coolingi*, *S. v. Baxter*, *S. v. Wardi*, and *S. v. Cousensi* all form balls of frondage. The last is the best, and all have bulbils on the frond edges, by which they may be propagated. In the Hard Fern, *Blech-num spicant*, many of the varieties are small enough under culture to suit limited space, but the only two really dwarf forms are *B. s. Maunderi*, a mass of cresting, and *B. s. crispi-ssimum Hartley*, a tiny congested edition of the normal, with two-inch to three-inch fronds.

The whole of the ferns named could be well accommodated in a fair-sized north window, or on a stand in cold conservatory. With the few exceptions noted, they are tough and strong in growth, and therefore are best in a well-lighted position with plenty of air. A frame under a north wall would also suit them, and even a sheltered rockery with a northern exposure; but, owing to their small size and minute prettiness, they are best accommodated where their charm is most seen, *i.e.* in a position near the eye. They are too good to consider as mere stopgaps for an out-of-the-way corner.

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

FERN HUNTING.

In view of the immense number of varietal forms which our British species have assumed, and the fact that a very large proportion, numbering among them many of the finest, have originated in a wild state and been found by persons who have devoted their leisure to close inspection of the Ferns they have come across, or in rarer cases, altogether accidentally, we may well devote a short chapter to the consideration of this singular capacity for variation and the circumstances under which such sports are found. Judging by the results of Fern hunting in the British Isles as contrasted with the relative paucity of foreign finds, it would *prima facie* appear that there must be a special something in the soil, climate, or general environment which leads to greater sportiveness, but as against this theory it must be borne in mind that in no other country has there sprung up a special taste for variety hunting, which, as here, has led to a considerable number of both sexes assiduously searching for new ones after having been inspired by distinct finds with that faith which is the best encouragement to perseverance. On the average many

thousands of normal Ferns must pass beneath the scrutiny of the hunter or huntress (for ladies have been particularly fortunate) before a distinct sport presents itself, and obviously the first step necessary for a beginner is to acquire a thorough acquaintance with the normal forms, so that any departure is instantly noted and followed up by closer inspection. It very frequently happens that in a dense clump of rank-growing normals the merest tip of a frond or fronds indicates the presence therein of a variety, and it may even occur that one species may assume a varietal form closely resembling a different species of another shape and thus baffle the eye. Thus we have found two forms of *Athyrium* (Lady Fern), one which we named *A. f.f. oreopteroides*, so closely did it imitate the mountain *Lastrea* (*L. oreopteris* or *montana*) which grew in conjunction, and the other we took at a first glance for *Lastrea dilatata*, the fronds being quite triangular (*A. f.f. deltoideum*), especially as *L. dilatata* was abundant in the same spot. The texture alone determined the second look, which discriminated them as marked varieties. Both these would infallibly have been overlooked had not experience educated the eye to relatively minute differences.

Another point with reference to the greater number of British finds is that in many countries it is not so easy to hunt as here; the poking and prying and intrusion into the out-of-the-way nooks and corners which are liable to harbour good things, are all, it may be, attended with danger by harbouring bad ones, and we ourselves have still a vivid recollection of a fine rattlesnake in Mexico which turned up just beneath a lovely patch of *Nothochlænas* and *Cheilanthes*. Even here (in Ireland) we once let ourselves drop down the face of a rock to inspect a mass of *Hymenophyllum*, only to find a wasp's nest as big as one's head within six inches of our nose. Fortunately, by

standing perfectly still, the disturbed swarm, after a chorus of buzzing, obviously took us for a fallen rock and permitted us to glide gradually away unmolested. The main point, however, is that the explorer abroad is usually a general botanist on the look-out only for new species, and a general glance satisfying him as to the species, he passes on and does not pursue the quest pure and simple. When, however, a man with an eye for varieties goes abroad, as did the late Mr. S. Brown, to the Azores, very fine varieties crop up, as, for example, *Woodwardia radicans cristata*, two grand crested varieties of *L. dilatata* and *Asp. Hemionitis multifidum* and *cristatum*, a form of which we ourselves also found recently when there, plus a finely crested *Pteris aquilina*. In the United States Ferns are so popular that a special *Fern Bulletin* is issued quarterly and a Fern chapter is instituted for the encouragement of research. Here, again, quite recently varieties have been found, and we are the happy possessor of *Phegopteris hexagonoptera truncata*, like a huge Beech Fern, with all tips squared and thorned, and *Dennstaedtia punctilobula cristata*, prettily tasselled, sent us by Mr. W. R. Maxon of the Smithsonian Institute, while fronds of a nicely crested *Athyrium* were sent us not long since by a lady there. These facts point to our mind to the conclusion that wherever Ferns are plentiful it only needs proper hunting to find varieties, and the keener and more persistent the hunter the more there will be found. Mr. J. Moly, for instance, resident in Dorset, discovered in the course of years no less than 600 distinct varieties, numbering among them many of our finest, mainly within the district, and Dr. Wills, his neighbour at Chard, found a very large number in addition. We cite these facts at length because they constitute an encouragement to anyone enjoying opportunities of search in ferny districts.

C. T. D.

(To be continued.)

OBITUARY.

MR. T. G. H. ELEY.

We regret exceedingly to have to announce the somewhat sudden death of our esteemed member, Mr. T. G. H. Eley, at Brighton on March 18th, after an operation. Age 60. For many years he had been Postmaster at Barrow-in-Furness, but retired in 1912, when he left Barrow and took up his residence at Burgess Hill, near Brighton,

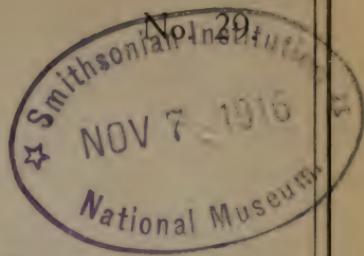


whither he removed his fine collection of British Ferns, as related some time since by him in the "Gazette." That collection was extremely choice, and embraced some 800 varieties, many installed in several conservatories, but the majority in the open. It will be remembered that to Mr. Eley we certainly owe the introduction of that charming wild variety of the Oak Fern, *P. dryopteris*

plumosum, the merits of which he recognized in the small collection of the finder, Mr. Christopherson, shortly before his (Christopherson's) death, and then arranged for its subsequent acquisition. All who knew Mr. Eley recognized in him not only an ardent lover of British Ferns, but also an extremely amiable, hospitable and kindly gentleman, with whose family the greatest sympathy is felt in their bereavement. We are indebted for the photo to the courtesy of the Manager of the *Barrow News*, Barrow-in-Furness.

VOL. 3.

... The ...



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PUBLISHED QUARTERLY.

September, 1916.

EDITED BY

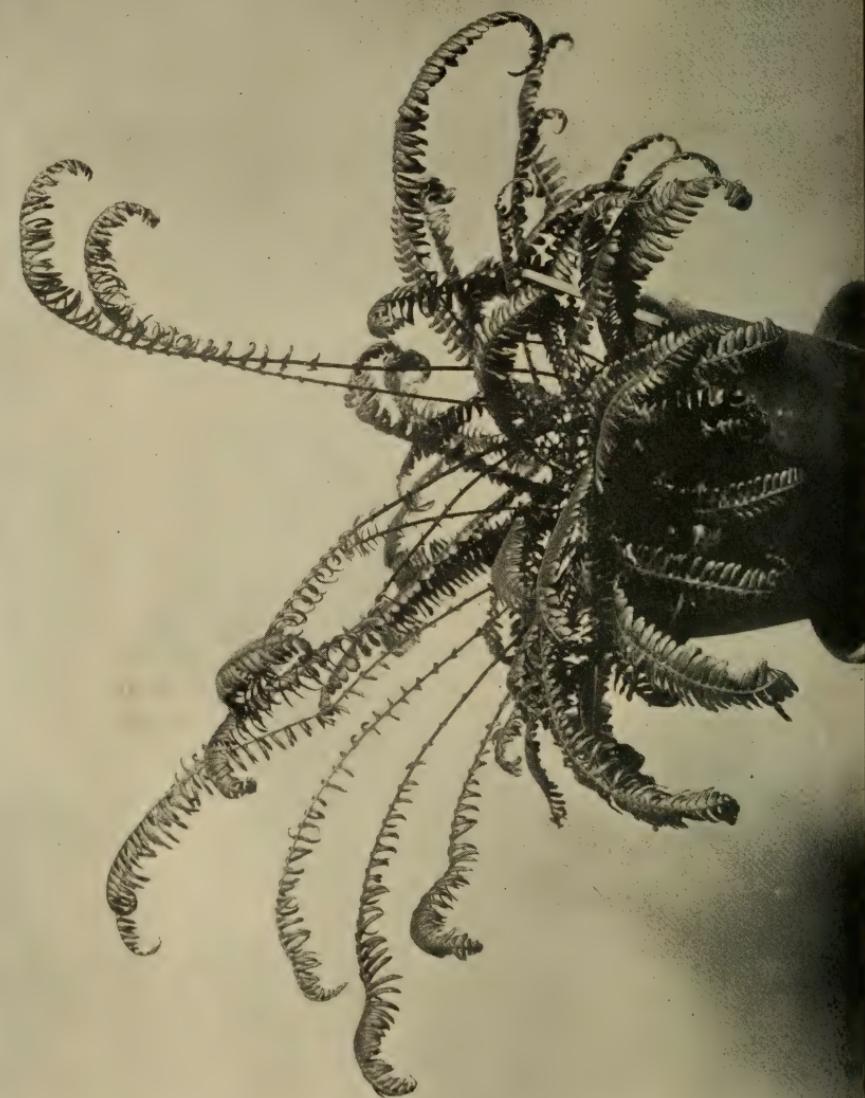
CHARLES T. DRUERY, V.M.H., F.L.S.

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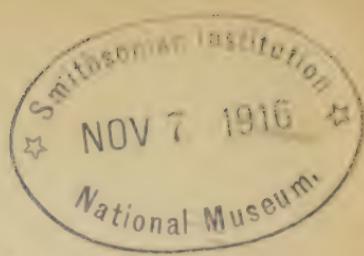
THE BRITISH PTERIDOLOGICAL SOCIETY

(Hon. Secretary, C. T. Druery, 11, Shaa Road, Acton, London, W.)

KENDAL, WESTMORELAND.



RIECHERTIA SPICANT VAR. REVOLVENS.



THE BRITISH FERN GAZETTE.

VOL. 3.

SEPTEMBER, 1916.

No. 29.

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EDITORIAL NOTES.

As announced in our June issue, in view of the continuance of the war, it was impracticable for our Annual Meeting to be held in conjunction with an outing as usual, and we now know that an additional obstacle has intervened in the shape of a postponement of the August Bank Holiday itself. We therefore give elsewhere the particulars of what has been done to fulfil the necessary business of such meetings, and to advise the members of the present position of the Society. Outside this we have nothing special to report, and can only express the heartfelt hope that, prior to another anniversary of our meeting, the war will be terminated and a Peace established on such a basis as will secure its permanence and satisfy both ourselves and our gallant Allies by involving that retribution which the German nation so richly merits by its submission to and support of, its vainglorious, presumptuous and altogether unscrupulous rulers.

As usual, we cordially invite members to contribute to

the pages of the *GAZETTE*, which is designed to be the centre to which all information, *re* British Ferns and their Varieties, should gravitate. This time, as too often, it is the Editor who has to do most of the writing, though every one with a collection worth the name, and with an intelligent power of observation worthy of the cult, *must* from time to time note things which are new to him or her, or requiring explanation, and it is precisely by such notes and records that knowledge is increased.

New members are wanted, and the Editor would regard as a favour the receipt of name and address of any known British Fern lover not on our list, and to whom we might send a specimen copy of the *GAZETTE*. The annual subscription to the Society is only 5s. from August to August, and entitles to four issues of the *GAZETTE*, plus association with a large number of fellow students of our beautiful British Ferns.

THE BRITISH FERN GAZETTE, VOL. 2, Nos. 13 TO 24.—The Editor would again remind members that a small number of Vol. 2 have been bound into a very presentable volume of 313 pages and numerous illustrations. As no reprint will be available, and the books are widely recognized as most valuable contributions to our Fern literature, the opportunity of acquiring copies, even extra ones, should not be lost sight of. The price to members is 3s. 9d. post free, and speedy application is advisable to secure, as only a few are left.

X The subscriptions for 1916-17 being due in advance, the Hon. Secretary would feel much obliged by a remittance of 5s. by return post to 11, Shaa Road, Acton, London, W.

THE EDITOR,

THE AUGUST MEETING.

For the reasons given in the Editorial Notes, the meeting this year was held purely *pro forma* at the residence of the Hon. Secretary, 11, Shaa Road, Acton, W., at 12 noon on Monday, August 7th, 1916. The balance sheet being produced, the following resolutions were passed, to which we append the list of officers as re-elected, and also the balance sheet, shewing a balance to the credit of the Society of £65 2s. 8d., which may be regarded as extremely satisfactory under the adverse conditions of the war:—

RESOLUTIONS.

1. That the accounts and balance sheet be approved.
 2. That the Officers and Committee of the Society be re-elected for the ensuing year.
 3. That the annual excursion (to South Wales) proposed for 1916 be held—subject to the war—in 1917.
 4. That the Hon. Secretary be requested to continue the Editorship of the "British Fern Gazette" and that an honorarium of ten guineas be voted to him for his services in that connection for the past year.

President : Mr. A. Cowan, Penicuik.

Vice-Presidents :

Dr. F. W. Stansfield, Reading. Mr. J. J. Smithies, Kendal.

Mr. C. T. Druery, Acton, London. Mr. W. H. Phillips, Belfast.

Mr. W. B. Boyd, Melrose.

Hon. Secretary: Mr. Chas. T. Druery, V.M.H., F.L.S.

Treasurer : Mr. W. B. Cranfield, Enfield Chase.

Auditor : Mr. J. J. Smithies.

Committee:

Mr. T. Bolton, Warton. Mr. W. E. Farrer, Lancaster.

" J. J. Smithies, Kendal. " W. Bell, Furness Abbey.

" R. Whiteside, Lancaster. " G. Whitwell, Kendal.

Mr. W. Wilson, Kendal.

sident and Vice-President

Together with the President and Vice-Presidents as members *ex-officio*.

BRITISH PTERIDOLOGICAL SOCIETY BALANCE SHEET, AUGUST 7, 1916.

RECEIPTS.		OUTLAYS.	
		£	s. d.
1915.			
Aug. 2.	To Balance at Bank	72	8 2
" " "	, in hands of Hon. Sec.	3	14 8
1916.			
Aug.	120 Subscriptions, current year at 5/-	30	0 0
" "	4 Subscriptions, arrears at 5/-	1	0 0
" "	7 Subscriptions, in advance, at 5/-	1	15 0
	<hr/>		
	131*		
" "	Bound Volumes and Back Numbers	2	4 9
" "	Advt.—H. B. May & Co.	1	0 0
" "	Interest at Bank	1	4 2
" "	Balance due to the Secretary	0	10 0
	<hr/>		
1916.			
Sept. 18.	By Miller, Son, & Co.;— Sept. Gazette and Blocks (2)	6	8 8
1916.			
Jan. 12.	Dec.	"	
Mar. 31.	Mar.	"	
June 14.	June	"	
1915.	Sept.	"	
1916.	Aug.,	Clerical assistance, 5/-, 6/-, 7/6, 2/-	1 0 6
	"	Envelopes, &c., and removal expenses ..	10 6
	"	Postages for year ..	3 16 11
July 20.	"	..	
1915.	Aug. 6.	Honorarium to Editor of Gazette as voted 1915 ..	10 10 0
1916.	Aug. 2.	Balance at Bank, Kendal ..	65 12 8
	Aug. 7.	Honorarium to Editor of Gazette as voted ..	10 10 0
	<hr/>		
	£113 17 9		
1916.			
Aug. 7.	To Balance at Bank	..	£65 12 8
	<hr/>		
	£113 17 9		
1916.			
Aug. 7.	By Balance due to Hon. Secretary	..	10 0

Owing to illness
* Agrees with number of receipts

Owing to illness Mr. Smithies was unable to effect the Audit.

CHAS. T. DRUERY, *Honorary Secretary.*

OUR FRONTISPICE.

BLECHNUM SPICANT VAR. REVOLVENS.

In our last issue we gave an example of this form of variation in *Polystichum angulare*, and now do so in *Blechnum spicant* as found by the Editor near Barnstaple a few years ago. A sowing from this has yielded quite true progeny in which the incurved character is as fully marked as in the parent.

BRITISH FERNS AT ACTON (*continued*).

Quite different from the above are the original *P. v. cristatum*, an improved form of it, unnamed, and *P. v. grandiceps* Mrs. Fox. The last is a remarkable form, inasmuch as it continues to grow dichotomously from the apex of the pinnæ and pinnules until all are much divided. *P. v. grandiceps* Forster is more foliose than the previous one, and the midribs of the pinnæ are red when seen by transmitted light. *P. v. glomeratum* Mullins is very variable, scarcely two of the fronds being alike. *P. v. bifido-multifidum* has bifid pinnæ, and a multifid apex. Very handsome is *P. v. pulcherrimum*, having long and much divided fronds which go a long way in the direction of *P. v. cambricum*, but have not the same papery texture, and are freely fertile. All parts of the frond of *P. v. semilacerum undulatum* are much undulated or crisped. Undoubtedly the finest of all the forms of the common Polypody is that named *P. v. elegantissimum*, which was found by three collectors travelling together, each of whom gave it a different name, so that in course of time it leaked into other collections under all the three names. The other two are *P. v. Whitei* and *P. v. cornubiense*. There is another triad in connection with this splendid

Cornish find, namely, three forms of frond on the same plant, (1) the normal form or type; (2) an intermediate and much divided, very beautiful form; and (3) the absolutely best or *ne plus ultra* form of frond, while all three forms may appear as parts of one and the same frond. This last is finely divided to begin with; then it develops a long tongue at the tips of the principal segments. On the under surface the normal sporangia are usually very few, the rest being replaced by small green papillae amongst which nestle a few bulbils which develop presently into little plants. To see this fine form makes one cease to wonder at the enthusiasm of the pteridologist, and the affectionate care he bestows upon his pets. Nor was this all. One of the fraternity conceived the idea of effecting a cross between *P. v. elegantissimum* and *P. v. bifido-mutifidum*, and the cross having been obtained shows both parents, in exactly four forms of frond upon one and the same plant. The *Gardening World* gave an illustration of some fronds of this plant in connection with the Conference on Hybridisation held some years ago. The apical pinna of each frond of *P. v. microstachya* grows out into a long tail. *P. v. ramosum* Hillman has two or four laminae on the same foot-stalk and is singular enough in its way. Altogether Mr. Druery grows about three dozen forms of *P. vulgare*.

The only exotic we noted in the living state was *Asplenium Hemionitis cristatum*, which Mr. Druery picked up when in the Azores during the first half hour of a ramble. There seems no end to the possible variations of *Scolopendrium vulgare*, the Hartstongue. *S. v. crispum fimbriatum* Stansfieldi is a fimbriated, heavily crested and aposporous form of great beauty, and it continues to grow at the margins and apex, forming very deep and sharp fringes. Mr. Druery has discovered apospory in five

distinct species of Fern, this being one of them. Another very much lacerated, fimbriated and crisp form is *S. v. crispum Drummondæ*, originally found by Miss Drummond. *S. v. Kelway's densum* is the most outrageous thing in this line we noted. The plant keeps on developing fronds or segments about 1 in. long and $\frac{1}{8}$ th in. wide, forming a tuft like a small *Selaginella*, a moss or a *Jungermannia*, and totally unlike a Hartstongue. One has no conception of what this could mean or represent in the life history of the species. Quite a large and old piece can be grown under an inverted tumbler. *S. v. Cousensii* produces many round-headed fronds upon a single stalk, and the whole stands about 6 in. high. The fronds of *S. v. crispum Wills* measure 5 in. and more across, and in our opinion it constitutes one of the most handsomely crimped and crested forms in the species. It ought to be grown in quantity for decorative purposes in private gardens. Another very singular form is *S. v. cristatum viviparum O'Kelly*, which is heavily crested at the apex, and irregularly proliferous on the upper surface, the small protuberances or bulbils gradually becoming plants. *S. v. supralineatum* is notable for the presence of a raised line on either side of the mid-rib, its significance being undetermined.

Turning now for a glance at the multifarious forms of the Hard Fern (*Blechnum Spicant*) we felt greatly interested in the beautiful form named *B. S. concinnum Druery*, in all probability never detected by human eye till Mr. Druery spotted it on Exmoor in 1881. He was at once charmed by its distinctness and graceful form; and if he was an admirer of Ferns previous to that time, he henceforth became a most ardent and resolute enthusiast. It was in fact the turning point of his career, when he changed from an ordinary or casual observer, and developed into a specialist of the most pronounced character; and since then has been so successful not only in finding new and remarkable

forms, but in raising even finer ones under a state of cultivation. Within a week of his first find he picked up *B. S. polydactyla* near Lynton, Devon, and was now smitten with the fever for collecting, a most enticing and alluring pursuit which he has since cultivated at intervals in various parts of Britain and Ireland. The very narrow and neat fronds of *B. S. concinnum* Druery are made up of semi-circular, very short and beautifully serrate pinnæ. *B. S. lineare* Barnes differs in having entire or almost entire strap-like fronds. Quite a handsome form is *B. S. plumosum* Airey, which, in its best and highest development, is bipinnate, and 2 feet long, yet narrow and graceful. The basal third only of the fronds of *B. S. contractum* is narrow and contracted. The broad pinnæ of *B. S. imbricatum* overlap one another like the tiles of a roof. Another type is *B. S. ramo-crystatum*, with branching and crested fronds. *B. S. ramo-crystatum* Sinclair has the pinnæ of the fertile fronds mostly confined to the apex. Of the Lady Ferns, Lastreas and Polystichums, we must say something later on as the limits of space are against us on this occasion; while the varieties, which include some of the finest forms in existence, are too rare, beautiful and interesting to be overlooked.—*Gardening World.*

LASTREA DILATATA AND ITS ALLIES.

This fern, which is part of the *Polypodium cristatum* of Linnæus, the *Polypodium dilatatum* of Hoffmann, the *P. multiflorum* of Roth, and the *Dryopteris aristata* of the most modern school of botanists, is one of the commonest ferns of our non-calcareous districts, and may be thought to be thoroughly well known. Nevertheless, it is by no means easy to define its exact limits as a species, and there is still

much variety of opinion on the subject among botanists. The German botanist Roth, who is said by Newman to have given the first intelligible description of it, speaks of "the very great and really almost insuperable difficulties in the determination of this fern." On the one hand it sometimes closely simulates *L. spinulosa*, while on the other it sometimes approaches, or is approached by *L. æmula* (otherwise *recurva*, *concavum*, *fœniseccii*). It also passes by imperceptible gradations into *L. collina* and perhaps *L. alpina*, which are regarded by Wollaston as distinct species, but by others as varieties only. Other "botanical" varieties which have been described are *Smithii*, *dumetorum*, *angusta*, and *maculata*, and as far as I can make out the last four names merely indicate "states" of *L. dilatata*, with the possible exception of *maculata* (Deakin). As I have never seen a plant corresponding to Deakin's description I am unable to pronounce definitely upon this. *Lastrea collina* (Wollaston), *Lophodium collinum* (Newman) is the *L. dilatata collina* of most botanical writers. Newman suspects that it is the *Polypodium tanacetifolium* of Hoffmann. It does not appear, however, to be separated by any very definite botanical characters from *dilatata*, and even Newman, who is, I think, the first of British authors to describe it as a species, is far from precise in his description. He indeed admits this and confesses that he is "influenced mainly by some peculiarity which arrests the eye," but which he has "not been able to describe." After carefully comparing his descriptions of *collina* and *multiflora* (*dilatata*) I seize upon the following points, all of which are differences of degree rather than of actual character, viz.:—*collina* is more lanceolate in outline and shorter in the footstalk than *dilatata* and less acutely toothed. He says that the stipes, or footstalk, in *collina* is "notably shorter than the [rest of the] frond," while in *dilatata* it is "nearly as long as the frond." In our Berkshire woods we have a form which

agrees with Newman's somewhat unsatisfactory description and which I take to be his *collina*. The peculiarity which arrests the eye, but which he finds it impossible to describe I should put down as a less leathery texture and a somewhat finer subdivision of the ultimate parts, *i.e.* a slight approach to the plumose character. The form is, however, not sharply marked off from *dilatata* by any of these rather indefinite characters, but merges into it by imperceptible gradations. I do not regard it therefore as a species, nor even as a good variety, although no doubt plants can be picked out which are distinct enough to the eye.

L. alpina (Wollaston) is a much more distinct variety of *dilatata*, of which it is a mountain form, but is separated only by its smaller stature, thinner texture, and most of all by its perfectly deciduous character, all of which differences are maintained when it is removed to the lowlands and even when it is cultivated under glass in the South. I am not sure whether there are intermediate gradations between *alpina* and *dilatata*, as the former does not grow in my neighbourhood. The testimony of our Scotch members would be valuable on this point.

L. spinulosa may be distinguished from *dilatata* by the more lanceolate outline of the fronds, the creeping rhizome, and the whole-coloured scales. The species can be distinguished by the decumbent (instead of erect) caudex in a very early stage; as soon as a distinct crown is formed it assumes the horizontal position—often before the fronds are an inch in length. *Dilatata*, on the other hand, when growing naturally, has the caudex erect and forms a perfect shuttlecock. Of course, the crown may be tumbled over by stress of circumstances and may thus be found temporarily prostrate, but even then, as soon as it has taken root in the new position, the point turns upwards and it begins to reassume the erect attitude. The scales of the *stipes* (footstalk) form another distinguishing

character, for while those of *spinulosa* are broadly ovate and of a uniform light brown colour, those of *dilatata* are lanceolate-ovate, more acutely pointed, and have each a dark chocolate coloured stripe passing from base to apex. There is also, in well developed scales, a narrow margin of extremely thin tissue which appears paler than the general colour, so that the scale contains really three shades of brown in distinct bands. The central dark stripe is very characteristic of *dilatata* and its geographical forms or subspecies *collina* and *alpina*, and in my experience can always be relied upon to distinguish them from both *spinulosa* and *œmula*. Newman, however, describes another species, *L. glandulosa*, which resembles *dilatata* generally, but has scales like those of *spinulosa*. I have myself never seen a plant conforming to Newman's descripton. I have had fronds sent to me as *L. glandulosa* (Newman), but they appeared to be merely glandular forms or states of *dilatata*, and always had the dark-striped scales characteristic of that species. *Maculata* (Deakin) is another form described as having concolorous scales, the name *maculata* being taken apparently from patches of darker colour on the fronds and not referring to the scales at all. These patches of darker or brownish green are, however, very common on *dilatata* when frosted or weather-beaten, and are not reproduced on fresh fronds grown under glass or in a thoroughly sheltered position. Another character upon which great stress has been laid in botanical text books is the *indusium* or involucr, which is said to be fringed with stalked glands in *dilatata*, and with stalkless glands in *œmula*, while it is smooth and entire in *spinulosa*. Newman gives very exact drawings of the *indusia* of the three species, looking at which one would imagine they would be easily distinguished by the *indusium* alone. Of course it is only during a certain stage of development that this appearance can be discovered, viz. when the

frond is mature, but before the spores begin to fall. When I first examined these species for the characteristic indusia, I found Newman's picture, in the case of *dilatata*, very closely simulated by the radiating heads of sporangia projecting from beneath the covering indusium giving an almost exact reproduction of Newman's drawing. I was inclined to suspect that Newman had discovered a mare's nest, and that the heads of the sporangia projecting more or less in the different species represented the so-called glands, stalked or otherwise, according to the amount of their emergence. Upon dissecting off the indusium with a fine triangular needle, and examining it alone under a low power of the microscope, I found the projections were really there as outgrowths of the cellular substance of the indusium itself. They were, however, much less diagrammatic than in Newman's figures, and I should not advise even the botanist, and much less the beginner in fern study, to rely upon these appearances as distinguishing characters of the species. They are, however, striking examples of Newman's power of minute and careful observation.

A much more obvious character, by which the species can be distinguished, even in the absence of fronds, is the appearance of the crown of the living plant, especially in the autumn or winter. In *dilatata* the crown resembles a symmetrical nest, with dark brown eggs evenly disposed and pointing upwards or radiating outwards; while in *spinulosa* it is unsymmetrical, with light brown eggs pointing sideways and all in one direction; in *æmula* it is again a symmetrical nest, but with well formed eggs only around the circumference of the nest, those towards the centre being more or less fused together and undistinguishable as separate units. The "eggs," which of course are the incipient fronds of the next season, are covered with scales, which are pale brown or whitish in *æmula*, darker

in *spinulosa*, and darker still in *dilatata*. In the two latter species the scales lie closely packed, and the eggs are consequently smooth and sometimes even glossy, while in *aemula* the scales stand more or less on end and give the eggs a rough or woolly appearance. Still another character by which *aemula* can generally be distinguished is the scent which, however, is only perceptible while the fronds are undergoing the drying process. While perfectly fresh the fronds, like the stems of the Sweet Vernal Grass (which gives its well-known scent to half-made hay), are perfectly odourless, but during drying the cumarin scent is obvious and unmistakable. When the fronds become quite dry, or very shortly afterwards, they are again quite scentless, so that this character is of little or no use in the case of herbarium specimens. Although I have known *aemula* under cultivation for nearly fifty years, I had a very imperfect idea of its real beauty until I saw it a few years ago growing in wild luxuriance in Co. Donegal. When really at home, as there, it is a lovely fern of a vivid grass green colour, by which it can be distinguished at a considerable distance before its form can be made out. The crisplate surface gives it also at a distance a peculiarly velvety look, which is very characteristic.

A very puzzling ally of *dilatata*, though not a very close one, is *L. remota* of Moore. It is not a real natural species, because it is nowhere found wild in quantity, and does not, so far as is known, reproduce itself from spores. It is generally regarded as a hybrid between *L. filix-mas* and *L. spinulosa*. It has the outline of the former, with the more divided pinnules and spinulose teeth of the latter. It has also the erect caudex of *filix-mas* and *pseudo-mas*, and will in time develop a trunk like the latter. The scales are intermediate in character between those of the supposed parents, and are quite devoid of the dark

stripe of *dilatata*; the outline of the frond is also quite different from that of the latter species. There is still scope for cultural investigation as to the real relationship of this fern.

Another puzzling fern is Mr. W. B. Boyd's hybrid, or quasi-hybrid, *Lastrea*, found a few years ago near Loch Lomond. It has a general resemblance to *remota*, but the fronds are broadest at the base, like *dilatata* (although much narrower than that species), and it has the long stipes of *dilatata*. The scales have a dark brown patch in the centre, but this does not extend the whole length of the structure, but breaks off more or less abruptly about half-way up the scale. This dark patch, to my mind, is certain evidence of its relationship to *dilatata* rather than to *spinulosa*. It appears to bear abundance of spores, but I have not heard that anyone has succeeded in growing these into plants. I intend to try myself this year. I at first, with others, regarded this fern as a hybrid, but after cultivating it for a couple of years, I feel less positive in the matter. It may turn out to be a form of *dilatata*. If so, it is a very distinct one. A crop of seedlings, if raised, will probably throw light upon the subject.

Another mysterious fern is one found by myself in Devonshire while hunting with Mr. T. Henwood in 1913. When found it had but one frond, which in outline and cutting had more resemblance to *L. dilatata* than to any other species. The scales, however, were those of *filix-mas*. In 1914 it was a handsome and symmetrical plant, having an appearance intermediate between *dilatata* and *filix-mas*. It produced a few spores, which were sown as soon as ripe. In 1915, owing probably to some check to growth, it took on a roguish or ragged character and appeared most like a bad rogue of *filix-mas*, the only *dilatata* character remaining being the spinulose teeth around the margins of the pinnules. This year (1916),

although the first fronds were ragged, the plant is regaining its symmetrical character, and the later fronds are handsome and well formed. It looks like a very foliose subdeltoid form of *filix-mas*, and this is what it will probably turn out to be, although even yet its actual relationship cannot be regarded as quite settled. The seedlings, sown in 1914, are now coming on freely. They have a general resemblance to the parent, and are so much alike that I regard the batch as a pure culture. In the young state all have a strong resemblance to *dilatata*, so much so as to be easily mistaken for ordinary seedlings of that species, but as they develop the *filix-mas* character gradually comes out. A few of them have retained the *dilatatoid* appearance longer than the rest, and these I am watching with special interest. I have not yet seen one which has the bicoloured scales of *L. dilatata*, but this character is not easily made out in the young state. I have given plants to those of my friends whom I could persuade to accept them, and hope for reports from other cultivators. A curious incident happened in 1915, viz. Mr. Boyd's plant produced *one frond* with unspotted scales, and this was practically identical in character with some of the fronds on my fern.

Although, I fear, I have encroached unduly upon our editor's space (not at all, quite the contrary.—ED.), I have not touched upon those interesting plants, *L. cristata* and *L. uliginosa*. These, however, are only collaterally and indirectly allied to *dilatata* (through *spinulosa*), and are in no danger of being mixed up with it.

F. W. STANSFIELD,

Reading, July, 1916.

FERN STRUCTURE (*continued*).

The fern frond grows, however, in a different way to leaves proper, all its parts are developed by growth of the tips and circinately, that is coiled or rolled up upon themselves. In the bud of a tree, shrub, or flower we find as a rule a spiky growth consisting of a bunch of embryo leaves whose points are plainly visible, but in the bud or embryo fern frond we see a rounded, smooth, or scaly mass, consisting of the base of the frond stalk, which curves over and covers a spiral coil of embryo subdivisions. When the frond rises, this stalk lengthens, carrying with it the still coiled portion for some distance, and presently we shall see this loosen and the side divisions will each present the original appearance of a stalk rolled up and covering a coil. This repeated lengthening of stalks or midribs, and uncoiling goes on until it may be a very large and much divided frond develops. Careful observation of this process shows it to be a very wonderful one, the lengthening of the stalks and expansion of the parts being so admirably adjusted to catch the maximum of light.

If we study the internal structure of a large frond as it proceeds from the incipient rounded bud to the full-fledged stage, and consider that all this has been evolved in course of time from the simple cellular form of the prothallus, we cannot fail to be struck with admiration. First, within the originally soft and succulent stem, a complex and beautiful arrangement of woody fibre, pith, and cortex is built up to stand the evergrowing strain brought to bear upon it by the growth of the secondary parts, and the increasing leverage these exercise as they spread far and wide in the process; subtly arranged vessels are interspersed with these strengthening girders to convey the sap from root to frond, and *vice versa*, each minor stalk is doing the same work in nicest possible relation to the needs, so that every

pinna, pinnule, or pinnulet spreads out eventually at its precise and proper angle and in its precise and proper plane. Meanwhile, if it be a tree fern, each frond is sending down the trunk its own special contribution of wiry brown roots, acting at once as feeders for itself, and strengtheners of that trunk for its additional burden. Finally all this is done, the terminal growth ceases, and here and there at thousands of points in the marvellous network of veins which form the final architectural filling in, as it were, there is a busy fashioning of millions on millions of spores, the ultimate end and purpose of the whole structural scheme. But the structural work is by no means done. Each spore, though individually invisible to the naked eye, is beautifully constructed. In its heart is a tiny cell replete with all its potencies of the race, and sheathed with several protective coats. The spores, unlike the loose ones of the fungus tribe, are usually stored in tiny caskets of an oval shape, attached in groups to the parent frond by tiny jointed stalks. These caskets are cunningly fashioned with a jointed spring passing nearly round them perpendicularly, and ending at a weak point among the cells which compose them. When the spores are ripe this weak point splits, gapes a little, and then suddenly the backspring comes into action with explosive effect, the top half of the capsule flies violently backwards, and in the convulsion the spores are ejected far and wide.

As a rule the fern frond differs from its apparent parallel in a tree branch in having no axillary buds, *i.e.* buds seated at the junction of the leaves with the stems, but in some species instances, usually abnormal, occur, such as in our proliferous Polystichums or Shield Ferns, while in some of the Gleichenias it is a specific feature. In other cases, however, buds are freely formed, not in the axils but on the frond surface, springing from veins well within the margin. *Asplenium bulbiferum* and several closely allied

species do this, and *Woodwardia orientalis* and others. Other species, such as *W. radicans*, several adiantums, and the Walking Fern (*Camptosorus rhizophyllus*) bear buds at or near their terminal points, so that the decumbent fronds touching the soil root into it and so spread afar like our common bramble. Ferns, indeed, while steadfastly maintaining these fundamental differences, have adopted most of the contrivances of flowering plants for spreading themselves abroad, despite their persistent restriction as regards the one mode of spore distribution described and common to all genera, although flowers have adopted a thousand and one different methods of getting their seeds distributed. Thus, while many, indeed most, ferns propagate themselves by side shoots or off-sets, some of them like *Nephrolepis* and *Struthiopteris* improve upon this by sending out runners under or over the ground, which here and there develop buds and plants far away it may be from the parents, obviously a great advantage.

A number of species, also, like our Polypodies and Bracken (*Pteris aquilina*) achieve the same ends by travelling rhizomes, *i.e.* more or less fleshy root stocks which send up single fronds in succession as they progress, and do not, like the species previously cited, form isolated shuttlecock crowns when they develop plants. These travelling rhizomes are often very fleshy, and constitute reserves of nourishment which enables the fern to survive and rise again after periods of drought or heat, which might otherwise prove fatal. Some travel close to or upon the service, and in this way find congenial habitats on tree trunks and similar situations where soil proper is non-existent. Others, like our Bracken, burrow very deeply, and it is interesting to note how a seedling Bracken at its third or fourth frond forms a green bud at the side which, abjuring the light, plunges perpendicularly into the soil to emerge perhaps, like a diver, a foot away

in the form of a substantial frond. Despite this burrowing tendency, however, these rhizomes and stolons are not roots proper, these always exist independently as rambling fibres of indefinite extension, and generally bearing, in the open fissures of the soil, a dense covering of root-hairs, the presence of which is always a sign of health. Tree ferns, as we have seen, have their trunks annually strengthened by the roots sent down from the bases of the new season's fronds. The trunk is formed primarily of the fleshy or woody bases of the fronds. A young tree fern commences with a shuttlecock crown growing on the soil, each year the crop or circlet of new fronds springs up inside the old one at a somewhat higher level, the old fronds rot all but an inch or two at the base, which is woody and permanent; from each new frond base springs a set of roots which find their way between the old stumps into the soil. In time it is obvious the crown is lifted entirely free from the soil, and it is also obvious that the trunk is strengthened and thickened annually, although in an utterly different fashion to that of trees proper, unless, indeed, we may assume a parallel in the fact that its annual crop of leaves thickens its bark by a generally distributed ring of wood as an equivalent to an entwined ring of root fibres in the fern. Anyway, this is the structural process, and therein we may discover one of the main conditions of the tree fern existence, viz. a climate which is so constantly humid that the roots in descending the trunk are never killed by drought. Such conditions obtain in all tree fern districts, and to such an extent that we usually find them associated with such humidity-loving ferns as the delicate tribe of Filmies, which clothe their trunks and form very frequently in their minuteness and delicacy of structure the very antithesis of their grand associates.

In the filmy ferns we arrive so very near to the mosses,

the scale-like prothallus even giving place to a thready one, that in all probability we may regard them as the primordial forms of ferns, grading upwards through the lovely Todeas to the harder-fronded species which at the further end of the exposure scale defy both drought and heat in the most unfernlike fashion, a type of which we have at home in our familiar Ceterach.

Although I have alluded in a general way to the complex internal structure of the fern frond, which serves both to strengthen it and supply it with sap from the root system, space altogether precludes entering into the wonderful individual details of such structure which sections display under the microscope, and which, as well as the system of venation and general plan of growth, varies greatly in the different genera and species, and even in the varieties, although each species has certain characteristic arrangements which enable the expert to determine it, very often by sections only. A familiar example is the Common Bracken, a stem section of which invariably displays the rude resemblance to an eagle, which gives it its botanical name of *Pteris aquilina*.

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

FERN HUNTING (*continued*).

It is well worthy of note that in the large majority of instances the "finds" are either solitary plants or clumps originating presumably from an originally single sport, though now and again, as might be expected, seedlings have established themselves near by, so that further search is rewarded by further specimens. Very rarely colonies, as it were, are found as in our own case of *Asp. ad. nigrum caudatum*, where many yards of a stone dyke contained no other form but hundreds of this.

THE EQUIPMENT OF THE FERN HUNTER

is of the simplest; some carry a tin vasculum, which is so far good that it protects the fronds from injury; it, however, has the disadvantage when one is clambering over the rough and precipitous ground so dear to Ferns of swinging round and getting in the way, and personally we abjure anything but a strong trowel, a stout hooked stick, a cloth bag like a fish basket, which can be rolled up, a pocketful of old newspapers, and some string. A "find" discovered, we dig it up carefully by the roots, separate it from any associated common ones, wrap some moss or old fronds round the roots, envelop it in a sheet of paper, slip it into the bag, and sling this behind us by a string over our shoulders. At the first opportunity we dip the roots in water, and when we reach our temporary haven at the end of the day we instal it in a box with a good supply of fresh wet moss, and place this in a cool shady place. The Fern is then good for a fortnight or more, until finally installed at home. Puzzles, of course, crop up in such expeditions; "finds" sometimes occur in awkward places, are seen at the top of a high wall far out of reach, or in hedges where the tree roots almost require dynamite to liberate the Fern, or, as in one of our experiences, it may be so huge as to need two men and a horse and cart for dislodgment and conveyance, or, finally, as in the case of that beautiful Fern *P. v. Prestoni*, it may be seated so deep in a rock chink that the finder had to roll the rock itself across country and actually grow the Fern out of its hermitage at home. We, however, only know of one case which baffled the enthusiast, a charming Lady Fern, growing in a deep drain, in the mouth of which, at the base of a massive stone dyke, the merest tips of the fronds had reached the light with the roots under the dyke and on the inaccessible other side of it. We nearly suffered such a catastrophe ourselves once, finding a beautifully crested

L. dilatata in a close preserve bristling with threats of prosecution of Fern robbers. Here, however, the Fern itself saved the situation by bearing ripe spores, and thus, though left practically intact, eventually decked our fernery with true progeny.

However, we have now said enough, we think, to show that Fern hunting is not without its adventures as well as its rewards, and with the final remark that the occurrence of varieties is too wayward and capricious to permit as yet any definite information to be given as regards the likeliest places, we will simply conclude by recommending our readers to try their hand the first opportunity, and expressing the hope that success may inoculate them with that lasting and incurable disease known as the "Fern fever."

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

A DELIGHTFUL HOUR.

A brilliant sunshiny morning at the latter end of May, with a fresh cool wind after a heavy dew, and the air laden with the odour of the lilacs just at their best and a strong whiff every now and again of the delicate scent of the hawthorns, constitute in itself a perfect enjoyment and an irresistible temptation to a stroll round the garden to see how the Ferns are progressing. Charming, however, as are the conditions, it is as yet too early in the season for the Ferns in the open to evoke the enthusiasm inspired by the more previous ones installed in yonder temple in the shape of a spacious greenhouse, and hence after a little gloating over the promise afforded by the rapidly uncoiling fronds outside, we reverently open the door of the temple aforesaid and enter therein for a revel in revelations so to speak. Naturally the first thing that we do is to take stock of those Ferns in which we are

personally interested, either as finder of the wild originals or as raiser of improvements thereof; and here, though our collection is numerically small, we feel that we have certainly been peculiarly highly favoured by fortune during our Fern loving career, so large is the number and so beautiful are the plants that we can claim as our very own for the reasons given. Two of the most prominent specimens with many four feet fronds, though as yet with the outward pendulous tips peculiar to the developing *Polystichum*, are from divisions of *P. aculeatum pulcherrimum Beavis*, a Fern which, even as Dame Nature shapes it in its wild form, ranks with the most stately Ferns we Britons possess, but which, of course, we cannot claim as a personal find as it fell to the lot of a farm labourer, who, though not an expert, was sufficiently struck by its exceptional beauty and difference from its normal companions, that he at once took it to Dr. Wills, close by in Dorset, and thus secured it for future generations. For forty years, however, though liberal in offsets, and thus widely distributed in time by Dr. Wills and his friends, it was assumed to be barren of spores, but in recent years a few were discovered. The result of this discovery was astounding, and looking round the "temple" aforesaid, we may perceive a row of its much more beautiful offspring in the shape of grand plants of the now well-known gracillimum strain, Green's plumosum, and a handsome variant named provisionally "diversifrons," as in some years it bears fronds of somewhat different cutting. Each of these plants has its peculiarities of makes, but the gracillimums are very similar, the ultimate divisions being very slender, long and delicate, giving an entirely different aspect to the plant from that of the parental one. The parental form has the peculiarity that at the apex of the frond the side divisions turn inwards and lap over the midrib so as to form a long

slender terminal, and in one of the gracillimums this character is inherited in such a way that the secondary side divisions or pinnules are all crescent shaped and turned inwards so as to overlap the midrib with very charming effect. The ultimate long, slender divisions in some cases dilate at their tips so as to form small pseudo crests, but much of this depends upon close and liberal culture. Of these plants, there are seven or eight fine specimens. In a place of honour and in association with them there is, however, one of the closely allied family *P. angulare*, which it was our good fortune to raise, and which we fear stands alone as being the nearest representative survivor of the unique Fern *P. ang. divisilobum pl. Baldwinii*, by far the best of the Jones and Fox group, but which has now been lost to sight for a number of years. Fortunately, the year before the death of Mr. E. J. Lowe, the owner of that unique gem, the writer called upon him and saw the plant.

C. T. D.

(*To be continued.*)

THE LATE MR. T. H. ELEY'S COLLECTION.

It should interest our readers to know that Miss Eley is desirous of disposing of the above collection, which is a very good one. The Editor visited it about two years ago, and found it to consist of some eight hundred good varieties, including a large number of the very best forms. An unusually favourable opportunity is therefore presented for the acquisition of fine plants from a reliable source. Letters addressed to the Editor will be forwarded to Miss Eley with pleasure,

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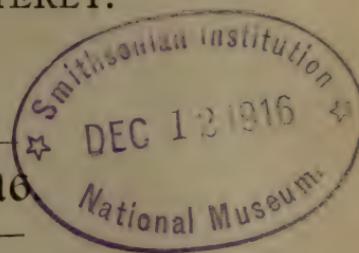
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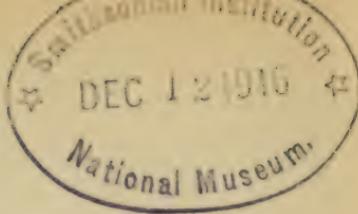
THE BRITISH PTERIDOLOGICAL SOCIETY

(Hon. Secretary, C. T. Druery, 11, Shaa Road, Acton, London, W.)

KENDAL, WESTMORELAND.



POLYSTICHUM ACULEATUM PULCHERRIMUM, DRUERYII.



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EDITORIAL NOTES.

It has been a source of much gratification to the Editor to receive numerous spontaneous letters of appreciation of the contents of the *GAZETTE*, and particularly of Dr. Stansfield's recent data concerning the puzzling species and sub-species known as the *L. dilatata* section. In this issue we have been favoured with a further contribution, by the same high authority, on the even more interesting forms of Ferns which make their appearance under culture or even under wild conditions under more or less inexplicable circumstances.

Our member, Mr. Rowlands, inspired by Dr. Stansfield's last contribution, also helps us materially on very practical lines, by dealing with some amateur difficulties. Furthermore, several new members have joined through the

recommendation of existing ones, so that altogether the Editor congratulates himself this time upon a very satisfactory response to his appeals for practical support in all these directions. Trusting that such support may be continued, and that the coming year may witness the advent of a lasting Peace on healthy and durable lines, the Editor cordially conveys to all friends the customary greetings of the season.

New members are wanted, and the Editor would regard as a favour the receipt of name and address of any known British Fern lover not on our list, and to whom we might send a specimen copy of the GAZETTE. The annual subscription to the Society is only 5s. from August to August, and entitles to four issues of the GAZETTE, plus association with a large number of fellow students of our beautiful British Ferns.

THE BRITISH FERN GAZETTE, VOL. 2, Nos. 13 TO 24.—The Editor would again remind members that a small number of Vol. 2 have been bound into a very presentable volume of 313 pages and numerous illustrations. As no reprint will be available, and the books are widely recognized as most valuable contributions to our Fern literature, the opportunity of acquiring copies, even extra ones, should not be lost sight of. The price to members is 3s. 9d. post free, and speedy application is advisable to secure, as only a few are left.

X The subscriptions for 1916-17 being due in advance, the Hon. Secretary would feel much obliged by a remittance of 5s. by return post to 11, Shaa Road, Acton, London, W.

THE EDITOR.

OUR FRONTISPICE.

POLYSTICHUM ACULEATUM PULCHERRIMUM, DRUERYII.

This fern, which is one of the original batch of seedlings raised by Mr. Druery, along with the *gracillimums*, from *P. acul. pulcherrimum*, Bevis, was originally named *pulcherrimum dimorphum* on account of its being supposed to produce two distinct types of fronds. A small offset, given to me by the raiser two or three years ago, has now grown into a large specimen and has been perfectly constant and uniform in character all through. I venture, therefore, to suggest that the name *dimorphum* should be dropped and *pulcherrimum* only retained. It is one of the very finest ferns in cultivation, having all the vigour, symmetry, and bold habit of its parent with all the parental beauties in an enhanced degree. It is, in fact, a perfect *pulcherrimum in aculeatum*. It is robust enough to do well in the open air, and seems to stand a certain amount of exposure to wind (that great enemy of fern beauty) without serious injury. Every fern grower who sees it will want to plant it as soon as he can obtain it.

F. W. STANSFIELD.

A DELIGHTFUL HOUR (*continued*).

It was believed to be barren, but our experience leading to a close examination with a strong lens, a few sporangia were detected, and Mr. Lowe kindly permitting, these were removed and sown, the result was thirteen plants all of the Jones and Fox type, and one of them resembling *Baldwinii* very strongly. This being of good constitution has become the grand specimen we are gloating over, and which this season for the first time is yielding a few spores, which of course have been sown with all possible care.

It is, we may here remark, by profiting by such opportunities that many of our finest Ferns have been acquired. This remark applies with peculiar appropriateness to the "superbum" section of *Athyrium filix fœmina*, which has resulted from a fortunate sowing from an immediate descendant of the *Axminster plumosum*, and which now, widely disseminated by divisions and seedlings, constitute the *crème de la crème* of the plumose and tasselled hardy Ferns of every collection worthy the name. Of these, of course, specimens of the best forms occupy considerable space. *A. f.f. superbum plumosum Drueryii*, half of which went to Queen Victoria as soon as it was full sized and divisible, and *A. f.f. superbum percristatum*, whose very pinnulets are tasselled, which accompanied it, are both well represented, together with "dissectum," "plumosissimum," uncrested, and Kalon, cristatum, grandiceps, rotundifrons, and others on similar lines but only termed "superbums," all crested in varying degrees. Turning now to the meritorious "wild" finds which have fallen to our lot, first and foremost ranks *A. f.f. cristatum Kilrushense*, an Irish find and admittedly the finest wild cristatum yet discovered, the long, slender terminal tassels ramifying so repeatedly as finally to defy counting of the segments. A full-sized single crown specimen of this has retained its solitary character for many years to the great enhancement of its beauty, though in early days, a number of offsets were produced and removed. By the side of this is a large specimen of *A. f.f. revolvens*, a Scotch find, with its fronds rolled up into lax tubes and its pinnæ with spiral twists ringlet fashion. In addition to these there is a considerable number of our own finds of distinct varieties, each of which brings back pleasant memories of the circumstances attending their discovery, but of which space precludes the detail. We think, however, that we have said enough

to justify our title of "a delightful hour," no less so for its being largely rewarded by the egotistical feeling that most of the acquisitions are indeed "our very own" in every sense, and that by their propagation and wide dissemination the whole Fern world is permanently the richer for our successes.

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

FERN MYSTERIES.

Everyone who has cultivated and propagated ferns for many years has probably come across some curious and inexplicable results, and, at the Editor's request, I propose to record a few mysterious happenings in my own experience.

(1) *Lastrea remota* (A. Braun) is generally supposed to be a hybrid between *L. filix-mas* and *L. spinulosa*, or *L. dilatata*. It is copiously soriferous, but no one, so far, has recorded a successful raising of seedlings from spores sown. About 1870, however, a few self-sown seedlings appeared on the surface of the pot in which a plant of *remota* was growing in the Todmorden nursery. These were at first regarded as *remota* seedlings, but, on development, it was found that they were not quite like the supposed parent, although having more resemblance to it than to anything else. They were named provisionally *L. remota hybrida* (the parent at that time not being recognized as a hybrid), and have remained in cultivation under that name ever since, although, now that the parent is believed to be itself a hybrid, the term is, at best, redundant. The idea at the time was that these seedlings were hybrids between *L. remota* and some other species. It is, of course, possible that the prothalli of

remota (if a hybrid), although barren by self-fertilization, might be fertile if impregnated by the antherozoids of one of the original parent species, and this would be in accordance with what is known as to the behaviour of hybrids generally. In that case, however, one would expect the offspring to resemble the specific parent more than does the hybrid parent, and thus to throw light upon the ancestry of the original hybrid. It cannot be said that this is the case with these seedlings; they are no nearer to *filix-mas* or any other species than is *remota* itself, and the ancestry of that fern remains as obscure as ever. My own impression is that these seedlings were the offspring, pure and simple, of *L. remota*, and that that fern (hybrid or not) is occasionally fertile, like so many other ferns long supposed to be barren. I have never myself sown spores of *remota*, but the late Mr. Lowe states that he made a score of trials without success. Nevertheless, it is possible that the twenty-first or the thirty-seventh attempt might be successful.

(2) Another piece of ancient history: About 1876 the late Mr. T. Mitchell, of Todmorden, found, in that district, a beautiful plumose *Blechnum*. He refused to part with any of this, and, to the best of my belief, it never produced any spores, but eventually died "without issue," as the lawyers say. Several years afterwards Mr. W. Forster, of Salford, sowed some old spores of quite another variety of *Blechnum* (I forget what), and raised a considerable crop of plants of exactly the same character as the Todmorden *plumosum*. This fern is now in general cultivation, and is, of course, known as Forster's *plumosum*. It is quite distinct from the bipinnate and bipinnatifid forms of the Airey strain, and could not, conceivably, have come from that source. Its real origin remains a mystery.

(3) A more recent case: In the autumn of 1910 my brother, Mr. H. Stansfield, sent me, as a small plant, a

promising seedling of *P. angulare*, of aposporous character. This was figured in the Gazette of March, 1911, as "an aposporous *Polystichum*," and again, more fully developed, in September, 1914, as *P. angulare pulcherrimum*, H. Stansfield, No. 1. A frond of the young plant was laid down in 1910, and produced a good crop of prothalli from the aposporous tips: there were, of course, no sori or pseudosori. The frond was well washed in running tap water to get rid of any possibly adhering spores, and the glass dish was closely covered to exclude stray floating spores. In 1912 some half-dozen small and feeble fronds appeared, but most of them seemed too weak to make plants, and only two survived. These two plants have been cared for *secundum artem*, but developed very slowly and weakly. It was not until the present year (1916) that their character could be made out, and then, to my great surprise, they turned out to be *percristatum*, although not quite like any recognized form of that variety. It will, of course, be said that they were from stray spores, and I agree that it is impossible quite to exclude that hypothesis. Against it, however, are the following considerations:—

- (a) I have only one *percristatum* in my collection, viz. Moly's, and the youngsters are quite different from that beautiful form. Moreover, no other seedling of that or any other *percristate* form has ever appeared, either as a stray or otherwise, in my fernery.
- (b) Had these plants been stray seedlings one would have expected them to grow with the normal vigour of seedlings. Instead of this they behaved just like *Polystichums* raised by apospory generally do, *i.e.* they grew very slowly and feebly, and were with great difficulty kept alive. Stray sporelings in a pot of aposporous prothalli can generally be

recognized by their greater vigour, even before any fronds are produced. Again, Polystichums are much less liable than other ferns to appear as strays. Strays are most frequently Athyriums or Lastreas.

- (c) There were *two* of these plants, both of the same character, and it is almost incredible that the gauntlet of coincidences could have been run twice over in this case.

The experiment can, of course, be repeated, but pulcherrimums are kittle cattle, and it may be years before I have another opportunity to lay down prothalli from this plant. Also the present experiment has occupied six years, and another five or six years may find the plant or the experimenter "gone west."

(4) I have often admired the grace and beauty of *Lastrea spinulosa* in our Berks. and Hants. woods, and have wished to discover a good variety of the species. About 1906 I found in Hampshire a plant of *L. spinulosa* having a few furcate tips, and decided to sow it in the hope of raising a multifid form from it. A sowing was made, and in due time a good crop of seedlings appeared, but in the meantime the original plant had quite reverted to the normal type, and been cast into outer darkness. The seedlings were allowed to develop for a time, but, as none of them showed a trace of any abnormal character, they were given to a nurseryman to be got rid of as "common ferns," leaving no *spinulosa* in my collection at all. In 1911 I made a sowing of a few spores (very rarely produced) of Moly's variegated *P. angulare pulcherrimum*. From that sowing plants have continued to be produced at intervals from 1912 until the present year, the offspring being mainly a slender form of *angulare* without any *pulcherrimum* character or variegation whatever. In 1913, however, there appeared in this pot a very slender frond,

different from the rest, and resembling a forked hair of a yellowish colour. The little plant developed very slowly, retaining the yellow colour, but seemed too slender and meagre for a pulcherrimum.

As soon as the fronds were an inch long they were seen to have a curious flexuose character, the rachis, and the green midribs and veins stood out prominently against the yellow background. It was not until this stage was reached that I noticed the one-sided character of the crown and the spinulose, up-turned teeth, and it dawned upon me that this was not a *Polystichum* at all, but *Lastrea spinulosa*, presumably the result of a stray spore from my sowing of several years previously, though where the spore could have lodged in the interval was a mystery. A still greater mystery was that it should have taken on a more or less variegated character, and should have chosen, for a nest, the pot in which spores of a variegated fern had been sown. The late Mr. Wollaston had an idea that variegation was an infectious disease, communicable by proximity to other plants, and even to other species, but that the spores of a variegated fern should communicate the character to another species without themselves producing variegated offspring is rather too tough a proposition! Personally, I have never believed in the infection theory, although I think that peculiarities of soil may bring about a temporary change of colour. In any case, the plant is still here and still retains a kind of variegation, though not a very distinct one. A week or two ago I noticed a few sori upon one or two of the fronds, and upon examining them with a strong lens I found them all devoid of any trace of indusium, thus making the plant a *Polypodium* according to a certain school of botanists. That reminds me of another head for my discourse.

(5) In 1913 I found near Totnes a small plant of a brachiate form of *P. angulare*. This "went blind" during

the succeeding winter, and for a time seemed to be dead or in a trance. However, late in 1914, a small bud was produced in the centre of the apparently dead crown, and this has now developed into a bunch of crowns with fronds nine inches or so in length and breadth. On this plant also this autumn I found a few sori, well developed but *all naked*. Here is another Polypody masquerading, this time, as a Polystichum. It occurred to me to see whether this character of naked sori was shared by other *brachiatums*, as these form a well-defined group with several characters in common. I only happened to have in my possession one other brachiate *angulare*, viz. *brachiatocristatum*, Keall, and upon examining the sori of this they were found to be all naked.

Perhaps members who may have other brachiate Polystichums will kindly look into this matter and report upon it. I am not aware that a Polystichum having naked sori has been previously reported; Wollaston's *P. ang. plumosum* has sori with imperfect and irregular indusia, but the indusia are certainly there. The moral is that those characters upon which botanists have founded specific and even generic distinctions are subject to variation like the rest.

F. W. STANSFIELD.

Reading, October, 1916.

HARDY FERNS IN WINTER.

Our native hardy ferns belonging to two categories, viz. those which are deciduous and die right down to the ground in the late autumn, and those which are evergreen and retain their fronds until the succeeding season; it is evident that, under glass at any rate, the latter may be arranged to preserve to a considerable

extent the attractiveness of a collection through the dead season of the year.

With regard to the former, the fact that the fronds fade and shrivel in the autumn is not infrequently regarded as a sign of actual death through some mysterious cause, the persistent greenness of the other species helping this conclusion. It is, however, a purely natural feature, and we see precisely the same phenomena in our deciduous and evergreen trees. Even to those, however, who recognise this fact, there is a great danger that the seemingly empty pots, so far as visible life is concerned, may be neglected during the long winter months as regards the all-essential point of watering.

If we study such ferns in their native habitats we shall find that during the winter they exist under the moistest possible conditions, being more or less buried in the wet débris of their own fronds and dead leaves from other sources and with the soil thoroughly saturated. Hence we may learn that even in their dormant condition, the roots should never get dry, and thus that occasional watering is essential. If the room occupied by the pots be needed for other purposes, they can, owing to the thorough hardiness of the ferns, be buried in soil outside or packed in cold frames until the early spring when new growth commences. These remarks apply to the Lady Ferns, *Lastrea filix-mas*, *L. montana*, *L. propinqua*, and *L. thelypteris*, the Royal Fern, the Bladder Ferns, the Oak and Beech and Limestone Polypodies, and the Bracken, the fronds of all of which disappear by November.

The evergreen species are far more numerous, and consist of the Shield Ferns, all the Spleenworts, the Harts-tongue, Blechnum, *Lastrea æmula*, the common Polypody and the filmy ferns, to which may be added, under glass, the hard Male Fern (*L. pseudo-mas*), and with a little coaxing by way of support, the Broad Buckler Fern, which, with its

sub-species *L. spinulosa* and *cristata* forms a sort of intermediate link, since though the fronds drop down as a rule, they retain their verdancy until the spring. The varieties of all these species retain their specific habits in this respect. Hence we see that, provided the plants have been healthy and free from vermin, there remains a large group of evergreen ones for the decoration of the fernery during the otherwise dead season. As under nature all these species occupy moist habitats in the winter, occasional watering, as we have said, is essential; but it is not advisable to keep the frondage wet under glass by overhead water.

In the open, under the stress of frost, wind and heavy rains and snow all the ferns, whether evergreen or otherwise, are apt to get beaten down and rendered unsightly, but it is not wise for mere neatness' sake to remove the fronds, even the dead ones, as they constitute the natural protection of the crowns from the weather, and it is better to give them generally a liberal mulching of dead leaves such as they usually get in their native habitats. This protection should be left until the end of March, when the risk of drying winds and sharp frosts is reduced, and even then it is well to leave the mulching close around the crowns, and for this special reason, each budding frond commences operation by emitting a fascicle of roots on its own account from its base, and until these have well penetrated the soil under such protection, they may be injured by its removal and seriously check the growth for the season.

The principle, indeed, to be borne in mind throughout is that the roots are alive and it may be actively active, though the visible growth is at a standstill, and the maintenance of this vitality by avoidance of drought is a *sine qua non* of successful culture.

C. T. DRUERY.

FERN BUDS.

One of the main differences between ferns and flowering plants lies in the fact that the latter are capable of producing axillary buds where the leaves are attached to the stalks, and that these buds are capable of developing into branches, producing other buds, and in this way forming bushes, or even our largest trees. Ferns, on the other hand, are usually incapable of this method of growth and extension, their fronds springing direct from the rootstock or caudex, and eventually building themselves up by the growth of their tips and those of their minor dimensions, these being formed as unrolling coils, and then growth being complete when once this process of unrolling and subsequent maturation is accomplished. We therefore find no fern built, tree fashion, by successive branches and twigs, produced by successive bud-growths, and even the tree ferns, so-called, are merely robust forms of the shuttlecock type, elevated into the air by perpendicular extension of the rootstock.

BUDS AS OUTGROWTHS.

Nature, however, in ferns, as in every other branch of the great biological tree, draws no hard and fast line in this respect, so far, at any rate, as the production of buds is concerned, though she certainly limits the development of these into substantial branches and subsidiary ones, on the lines of trees proper. Hence we find that many ferns are capable of producing buds, and buds of different kinds, as secondary aids to the spores in perpetuating the species. The familiar example of *Asplenium bulbiferum*, a common market fern, shows us how buds may be produced as outgrowths on the upper surface of the frond divisions, and under congenial culture, these develop on the frond into young plants, with several fronds, upon which another generation of buds or bulbils may be produced. Several

closely allied species of *Asplenium* do the same thing, and in *Woodwardia orientalis* we find similar outgrowths, which, however, are easily detached after producing two or three fronds, and then drop, parachute fashion, to the ground, where they have a chance of rooting, and establishing themselves. The *Asplenium* buds, however, are not so detachable, and only find their opportunity for rooting when the frond eventually droops and reaches the soil.

Here, then, we have already two variants. In *Cystopteris bulbifera* we have a third. Here no little plants appear, nor even what would be taken for buds, berry-like growths being produced in the axils of the frond divisions, which eventually become oval, lobed green bodies as large as good-sized peas. These fall off on reaching the soil, push out fronds and roots, as small tubers would do, and occasionally do so even while suspended. Here, then, we have a bud associated with a mass of nutriment to assist the young fern in its subsequent independent development, a distinct, and, we believe, an unique type in ferns.

APICAL BUDS.

In several species of ferns the tips of the fronds are lengthened considerably, and terminate with a bud, which develops fronds and roots, and eventually weighs down the tip of the frond until it and the young fern reach the soil. *Adiantum ciliatum* and *lunulatum*, *Woodwardia radicans*, *Camptosorus rhizophyllus*, and several other species do this, the fronds thus assuming the functions of a stolon. In *Lastrea vivipara* we find buds associated with the spore heaps, *i.e.* on the backs of the fronds. This is normally a rare phenomenon, but it appears in several abnormal forms of our native Lady Fern, some of the finest plumose varieties displaying this faculty. *Doryopteris palmata* is a type of fern which produces buds at the junction of the stalk with the leafy part of the frond.

AXILLARY AND LATENT BUDS.

Finally, in the *Gleichenia* we have examples of axillary buds, which approach the nearest to those of trees by aiding in the spread of the frondage by their development. So far, we have dealt with buds of various kinds produced on the fronds, in conjunction with their leafy portions, but many ferns have a capacity of producing buds elsewhere, some latent, that is, only developing when the caudex is damaged, and some patent, that is, developing without such need for reproduction, induced by catastrophes. Some are also specific features, while others are only found in abnormal forms. To take the latent class first, we may begin with such ferns as *Nephrolepis* and *Struthiopteris*. The former produces buds at the side of the caudex, or rootstalk, which lengthen out into overground stolons, which produce plants at their extremity, the latter does the same thing, but the stolons burrow into the ground, so that seemingly independent specimens spring up at a distance. In the *Nephrodiums* or *Lastreas* we find a different type of bud common to many other species. This bud springs from the base of the frond, and sustained at first by the parent plant, subsequently roots at its side, and in this way, in conjunction with others, transforms the plant into a bush or bunch of caudices, each with its independent set of roots and fronds.

These, obviously, are at a disadvantage, as compared with the stoloniferous or travelling buds of *Nephrolepis* and *Struthiopteris*, since they have at once to contend with the parent plant and their brothers in the self-same soil for root-room. In the *Polystichum*s we find a reduced tendency to this kind of bud formation, but many varieties of this species produce buds on the frond stems near the base, and some are even profusely proliferous all the way up the fronds, buds being formed in the axils of the pinnæ and even of the pinnules.

BASAL BUDS.

This faculty of producing basal buds on the stalks is nearly always a varietal, and not a normal one, and is often accompanied by a reduction in size or abortion of the lowest pinnæ with which they are closely associated. Latent buds dependent upon their development for some serious damage to the growing centre constitute a peculiar provision of Nature against destructive influences. Normally, there is no sign of them at all, and even dissection of the fern tissues will reveal no rudiments of their presence; they appear to be engendered entirely by aggregation of cell power, subsequent to destruction of the normal outlet for energy at the growing point of the caudex.

Thus we may take the caudices of the *Hartstongue*, *Polystichum*, or some of the *Lastreas*, when they have apparently died, and if any part be found alive, these parts, carefully cleansed, and all dead matter removed, are almost sure to produce buds on the exposed surfaces if kept close and damp, and exposed to the light. It is highly probable that many species possess this faculty, but so far, we believe, it has only been tested in connection with a few of our native British species. This is the more to be regretted as we are confident that many rare species, which otherwise are difficult of propagation, could be multiplied in this way far more quickly than from spores, and with greater certainty of obtaining true progeny.

PROPAGATION FROM BUDS.

The process is very simple as adopted by us. Taking a spare specimen, we cut away the fronds about half-an-inch above the caudex, remove all the roots, and thoroughly wash the residue; we then, with a sharp knife, cut the caudex through perpendicularly into several pieces, according to its size, dropping them loosely into a tumbler or similar glass receptacle, into which one or two inches of

coarse silver sand, thoroughly wetted, but not flooded, has been placed. We then cover with a glass slip, and put in a light place out of the sun. In the growing season bulbils may appear in a few weeks, and with exotics a little heat would probably hasten the process. The young plants should be left alone until two or three fronds are formed, when each will be found with root fibres extending towards or over the sand. A sharp knife may then be used to sever the old caudex again to isolate the plants for potting.

The late Mr. G. B. Wollaston records an instance where he scooped out the growing centre of a rare *Polystichum*, placed the caudex in heat, and eventually obtained no less than eighty plants as a result. An old *Hartstongue* caudex may be made to yield hundreds by pulling it entirely to pieces, every frond base, though several years old, then yielding six or seven plants indiscriminately from cut surfaces or the epidermis. Such buds are evidently produced on the same principle as those on cut begonia leaves, though in the case of ferns they are by no means confined to the edges of the wound. Ferns with creeping rhizomes of the *Polypody* type seem less apt to produce buds, either on the fronds or elsewhere, their rambling nature obviating the necessity which exists in crown-forming ferns, which run greater risk of being destroyed, having only one central axis of growth.

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

SOME DIFFICULTIES OF AN AMATEUR.

There are obviously several ways in which difficulties in fern matters may arise. In the first place they may be due to lack of the keenness and industry required for investigating the various troubles. More commonly, they are more or less unavoidable, being due to lack of experience, to lack of skilled advice, or to absence of opportunity

for studying the subject from a practical point of view. The more technical difficulties may be due to want of training in botanical subjects, or may arise because suitable literature is not available. For such as these latter, no amount of mere thinking can be of much use. One must fall back on others more fortunate in their wide reading and experience.

Two of my difficulties may not be difficulties to others—indeed they may not trouble them at all. The first was brought back to my mind by certain remarks of Dr. Stansfield's in a recent article on "Lastrea dilatata and its Allies." In one place he mentions two ferns which are "regarded by Wollaston as distinct species, by others as varieties only." In another place, he remarks of a certain fern, "I do not therefore regard it as a species, nor even as a good form."

This latter suggests that Dr. Stansfield has in his mind a clear idea as to what constitutes a "distinct species." The question that occurred to me was—what are the characters which lead the botanist to decide whether a particular plant is a distinct species, or variety, or form, of a particular genus?

In asking this question, I may say that I realise to a considerable extent the difficulties that would arise if anyone attempted to answer it. I realise that any written description would be ineffectual in the absence of wide experience and botanical instinct. I fear I am rushing in where wise men tread gently. A large number of the points one has already learnt for oneself, and one might be inclined to argue that if expert botanists cannot agree on the subject, it is not worth the while of a mere amateur to worry about it. But this, surely, is an unprogressive attitude, and problems would never be solved if a sufficient number of people did not worry about them.

The trouble is, perhaps, that the greater one's experi-

ence is, and the more the power of observation is cultivated, the more complex does the question become. The more keenly one studies the accepted species in any one genus, the more one realises that the division into species is a man-made convention. Increased study shows that plants are so affected by altitude, soil, situation, and a host of other factors, that apparently innumerable intermediate forms connect two closely allied species. Perhaps, too, hybrids occur, which still further puzzle the student.

Every fern student can at once distinguish the main species or varieties by "some peculiarity which arrests the eye, but which he has been unable to describe." But everyone will also agree with Dr. Stansfield that this is unsatisfactory. Some forms or varieties are unstable, varying from season to season. Others seem much more permanent, and vary very considerably from the type, and yet these are often put aside by the botanist as unimportant. Is the presence of intermediate forms between two distinct types considered as proof that one is only a variety of the other? Take an example of a fern genus in which intermediate forms are common. *Lastrea dilatata* is generally taken to be a variety of *L. spinulosa*. So is *L. aemula*. In the ordinary way these appear, to one with no more experience than I have, as being distinct enough to be classed as species. Dr. Stansfield gives a host of distinguishing characters for each, which one thought would have entitled it to specific rank. Each has its own character with regard to rootstock, arrangement of undeveloped fronds, stipes, scales, character of frond, and habitat. Surely the botanical world can supply examples of accepted species separated by no more important or permanent characters than the above?

In this connection, it was interesting to look up what the two or three text books immediately available had to say. The well-known "Hooker and Bentham" is notably

an opponent of "hair splitting," and seems to try and reduce the number of species as much as possible. In the buckler fern section, it clumps *spinulosum*, *dilatatum remotum* and *aemulum* under one species, remarking that "the four have been considered as species, but have no tangible characters to separate them."

On the other hand, Babbington's manual (a rather old edition, which also differs somewhat from the above in nomenclature), accepts each as a distinct species. Lowe, in his book on ferns in "The Young Collector's Series," apparently makes no mention of a form or species called *remotum*, except as a variety of *dilatatum*. He sub-divides a common species *spinulosum* into three sections, consisting of *aemulum*, *alpinum* and *dilatatum*, presumably not admitting to a form *spinulosum* which is distinct from the above three.

"Hooker and Bentham," again, gives no sub-species or varieties to the male fern, being content with the remark that it is one of the commonest and most variable of British ferns. Lowe adopts the sub-division familiar to most of us, i.e. *filix mas*, *pseudo mas (paleaceum)* and *propinquua*. Babbington is more confusing and gives as varieties of *Lastrea filix mas*, forms named by different authorities as *Borreri*, *affinis* and *abbreviata*.

With regard to the lady fern, "Hooker and Bentham" prefers not to notice any named varieties or sub-species, while Babbington gives brain-confusing descriptions of three, leaving Lowe to adopt a complicated sub-division to include all the known variations.

Most authorities certainly tend to refuse specific rank to *Lastrea aemula* and *dilatata*, but Lowe seems to be the only one who gives a good reason for his opinion. He tells us that he transplanted a number of plants of *L. aemula*, taken from a hill-top, into his garden, some into pots, others into open ground. In a few years, most of those grown in open ground had changed their character and became indistin-

guishable from *dilatata*, though the pot-grown plants retained their original characters. This, presumably, may be taken as good evidence that they are not permanently distinct enough to be separated as species. It would be interesting to hear if any further experiments along similar lines have been made.*

Many more examples could easily be found to emphasize the confusion that exists even among the shining lights of botany, but perhaps it would serve no useful purpose. Enough has been said to indicate what one's difficulty is. Perhaps, too, enough has been said to show that one realises many of the difficulties. I have asked a question, but I realise also that I need not expect a complete answer. The enquiry may even appear to some as foolish, but I like to tell myself that merely asking the question is an indication of intelligent interest and of an enquiring mind! The frequency of the Editor's articles is evidence that our members are interested in the scientific side of the subject. I feel sure that an article or two on this vexed question, from his own able pen, or from that of Dr. Stansfield, would be of general interest.

S. P. ROWLANDS.

(*To be continued.*)

NEW FERNS.

POLYSTICHUM ANGULARE CORYMBIFERUM, HAWKINS.

I have previously recorded (*Gazette*, Vol. I., p. 248), the finding, in County Cork, of a first-class *P. angulare cristatum* by our member, the Rev. E. H. Hawkins, of Stroud. I have now the pleasure of announcing the discovery in 1914, by the same hunter and in the same county, of another beautiful crested angulare. The plant was small when found, and, though it was very promising,

* See p. 179, Vol. I., for an interesting article by the Rev. Canon H. W. Lett on this subject, which we regard as conclusive.—ED.

it was thought inadvisable to describe it until it had attained to its full character. It has now grown into a fine plant, and, though it will probably never attain to the stature of *cristatum*, Hawkins (which is practically as large as the species), it surpasses it in size of cresting, and at least equals it in neatness of make and perfection of detail. The crests, both terminal and lateral, are round and mossy, and the fronds of perfect symmetry. The habit is somewhat that of a *grandiceps*, but, as the frond is widest in the middle instead of across the crest, it does not quite come into that section. The pinnules have the peculiar thorny character of the best forms of *grandiceps*, and altogether it is one of the very best crested *angulares* ever found. The name, *corymbiferum*, fits it exactly, and it is probably the first of this type which has been found wild in this species. I congratulate the finder upon a most happy discovery and an important addition to our wealth of beautiful British ferns.

F. W. STANSFIELD.

October 18th, 1916.

FRONDS AND LEAVES.

To the popular mind the fronds of ferns and the leaves of decorative foliage plants generally are regarded as of the same character, but there are fundamental differences between them. In the first place, foliage plants, other than ferns, all bear flowers in some shape or other, although, as in the palms, they rarely appear on what may be termed domestic specimens, and in such plants as the ubiquitous *aspidistra* they are likely to be overlooked, owing to their Appearance round the edge of the pots instead of in the usual place.

SPORE HEAPS ON FRONDS.

With ferns, on the other hand, flowers are never visible, at any rate, to the naked eye, and all we can detect in this

direction is a number of brown or yellow spots, lines, or patches, on the backs or edges of the fronds, such as we shall find in no flowering plant whatever. These spots, lines, etc., represent the spores, or more properly speaking, heaps of little pods containing the spores, which in ferns take the place of seed. On careful examination of a collection of ferns, we shall find that, as a rule, fronds of a similar form will have these spore heaps arranged in a similar way. Thus in the many varieties of *Pteris*, which form the bulk of market ferns, they invariably form their continuous lines along the under edges of the divisions, the edges being thinned, and turn back to form a sort of protective cover, though this is hardly seen when the spores are ripe.

In the Maidenhairs, though the spore heaps are also on the edge, and protected in a similar, but more effective, way, the lines are broken up into very short ones, forming a series of oblong dots. In *Asplenium bulbiferum*, a familiar fern, whose fronds are dotted all over with youngsters, we see an entirely different arrangement, the spore heaps here being in numerous lines arranged in rows along the veins, which form, as it were, the ribs of the sub-divisions, and if we examine the Bird's-nest Fern (*Asplenium nidus-avis*) we shall see that altogether different as it appears from *A. bulbiferum*, it has still the same thin lines arranged in precisely the same way. Here then we obtain a clue to the way the botanists determine the genus of the innumerable ferns existing. Every genus has its one special way of bearing its spores, and however widely the species or varieties may differ in make and appearance, this one character almost invariably suffices to clear up any doubt.

In some cases, however, somewhat finer distinctions have had to be drawn. Thus, if we examine the common Male Fern (*Lastrea filix-mas*) of our hedges, and compare it with the almost equally common Shield Fern (*Polystichum angulare*) we find the spore heaps in both markedly alike,

being mere dots covered with a tiny shield, despite their very obvious difference in cutting and appearance generally. The shield of the Male Fern, however, is kidney shaped, and attached to the centre of the dot, at the indentation, while that of the Shield Fern is quite circular, and attached by a central stalk. Another genus, that of Polypodium, has also its spores in similar dot-like heaps, but the distinguishing character here is that there is no cover at all, as we may see by examining the common Polypody (*P. vulgare*) of the hedges, or its very different relatives, the Beech Fern (*P. phegopteris*), Oak Fern (*P. dryopteris*), and Limestone Polypody (*P. calcareum*), all members of a very extensive tribe. We see, therefore, from these few examples out of a large number which might be cited, that fern fronds carry, by means of their spore heaps, the evidence of their family relations, while the foliage of flowering plants performs no such office, since their genera are determined entirely by the construction of the flower, by the study of which alone the botanist can determine the genus in the case of newly-discovered plants.

DEVELOPMENT OF FRONDS AND LEAVES.

Another difference between the fern frond and foliage proper is that every frond springs direct from the root stock; unless it be upon a bulbil plant, which, however, does not alter the principle, since the first phase of even such plant is the formation of a fresh rootstock on a small scale. If, therefore, we compare a fern with a fern-like flowering plant, say a *Grevillea* or a *Thalictrum adiantifolia*, we shall note that the fern-like leaves of the latter spring from an ascending stem, while in even a Tree Fern, every frond springs straight from the central growing point, and, on examination, will be found to be sending its own individual set of roots down the trunk, which last is merely a perpendicular form of the creeping rootstock which in

non-arborescent ferns slowly creep beneath, or at the level of the soil. No annual ring of wood is formed in a Tree Fern stem, but it is strengthened in most species by an annual contribution of the root fibres descending to the soil from the new fronds.

Outside these two main differences between fronds and leaves there is a third, consisting in their mode of development. With a few unimportant exceptions, all fern fronds arise from the crown in the form of a compactly curled ball, which, as the stalk lengthens, unrolls, and, as it does so, shows that the sub-divisions, if there be any, are also rolled up in the same way, so that the eventual formation of a flat frond is brought about by a continued process of uncurling, expansion, and flattening. Take any of the fern-like flowering plants aforesaid, and we find no such thing as this; the young leaves when they appear are merely folded lengthwise in the bud, or at the growing tip of the plant, and eventually develop by simple expansion. We have here, consequently, one infallible sign by which a fern can be discriminated from merely fern-like flowering plants, and a frond from a leaf. Apart from these peculiarities fronds also appear to be endowed with a far greater capacity of sub-division and variation than leaves proper. Even the finest forms of decorative asparagus (*A. plumosus*, etc.) now so familiar as decorative plants, and popularly, though erroneously, termed Asparagus Ferns, delicate as is their foliage, do not go nearly so far as some of our best British Shield Ferns and Lady Ferns, in what is known as decomposite cutting, *i.e.* repeated sub-division, in which the frond is divided to the fifth degree, quinquepinnate, to which no known leaf even remotely approaches.

VARIATION OF LEAVES.

Finally, while both leaves and fronds vary considerably in form, and are subject to considerable vagaries in the sporting way, as we may see in crotons, and even in

collections of trees. There are, for instance, scores of oaks at Kew of one and the same species, whose leaves vary from small and slender cut ones to huge and bluntly lobed ones, and all shades in between. The fronds eclipse the leaves in versatility, and especially in their power of sporting into those tasselled tips, examples of which have been found in a large number of species. No leaf proper does this; the faculty seems to be correlated with that peculiar mode of growth which characterises all fronds, *i.e.* tip growth. The frond and all its parts develop by continued growth of all the tips, while the leaf, as we have seen, develops differently, and it would appear that with the tasselled varieties, the developing tips multiply their terminal cells at a certain stage, and, these continuing their growth, the result is the eventual formation of a tasselled instead of a normal point. Leaves and fronds both display very different forms of venation, *i.e.* of the ribs and veins which stiffen them, and form their channels of sap supply.

VEINING OF LEAVES.

In flowering plants the two great families of exogens and endogens, monocotyledons and dicotyledons, or to put it popularly, those which tend to form annual rings of wood and have two primary leaves produced from the seed, and those which form no such rings, and have only one primary leaf, are also roughly differentiated by the vein system being netted in the first case, and on a straight line system in the second. Thus we cannot tear an oak leaf straight from top to bottom, as we can a lily or a grass leaf. In ferns we have two systems, netted and non-netted, but no longitudinal system, and it is a peculiar fact that the tasselling appears to be a matter of some difficulty with netted ferns as compared with non-netted, since examples are not so common, and when found are not so thoroughbred, as we may see in the crested *Wood-*

wardia radicans, as compared with many others. Hence it would appear that netted veins form an obstacle in this direction by complicating the tip growth aforesaid, and this may also underlie the complete absence of any such tendency in leaves proper generally, while the longitudinal venation of the monocotyledons is, as we have stated above, also unknown in fern fronds, and is obviously a bar to any great variation in foliage in that division of the vegetable kingdom, since, except in the direction of size, it is conspicuous by its absence. In both fern fronds and leaves of dicotyledons we find great variation in the way of frillings, fringes, and deeply cut edges, which on examination we invariably find to be induced by a lengthening or multiplication of the veins, and a consequent carrying of the leaf tissues beyond the usual limits. See, for example, the frilled and fringed Hartstongues, Primulas, Cyclamen, etc. In the palms, lilies, grasses, and the entire tribe of their kind, there is not, and apparently cannot be, anything of this sort; the veins all run straight from end to end of the component leafage, and all they can do is to grow longer.

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

BRITISH FERNS.

Although the species of British Ferns, which are popularly known and grown in thousands of gardens, may be numbered on the fingers, and indeed, in the vast majority of cases, consist but of four or five kinds, viz. the Common Male Fern, the Lady Fern, the Broad Buckler Fern, the Shield Fern and the Hartstongue, there are really no less than forty-four species, representing fifteen genera, indigenous to the British Isles. A certain number of these, it is true, hardly lend themselves to general garden use as decorative plants, presumably owing to their small size and the difficulty of imitating

those natural conditions under which they thrive in their native habitats. Thus the Sea Spleenwort (*Asplenium marinum*), which lines the caves and dots the cliffs with its bright green foliage on many of our rocky coasts, especially in the west, will not stand inland outdoor culture. Deprived of salt-laden air it languishes, and despite its tough leathery foliage, a very few degrees of frost suffice to kill it. It is, in point of fact, better adapted to subtropical conditions, and when grown in a warm greenhouse assumes a size and luxuriance of growth such as it never attains here under natural conditions, the fronds reaching a height of two feet and the plant forming a stout bush as much through. The delicate Maidenhair Fern (*Adiantum capillus Veneris*) is also a coastal fern, but of more limited extension ; this, too, is tender, and is confined to our warm western counties. A few of the other Spleenworts (*Asplenia*), *A. fontanum*, *A. septentrionale*, *A. germanicum*, and *A. viride*, may, under very favourable conditions of climate, be induced to survive in rocky chinks and crevices, but cannot be recommended as popular plants. The Adder's Tongue (*Ophioglossum vulgatum*) and the Moonwort (*Botrychium lunaria*) belong to the same category requiring special conditions, while in no way appealing to taste as regards their beauty. Outside these exceptions, however, there are many of the remaining species which are popularly ignored, but which are well worthy of a place in those rockeries which are devoted to the hardy Ferns already cited. The Buckler Fern or Lastrea group, for instance, popularly represented by the Male Fern (*Lastrea filix-mas*), and the Broad Buckler Fern (*L. dilatata*) embraces two other species of quite equal or greater merit, viz. the Lemon-scented Fern (*L. montana* or *oreopteris*), and the Hay-scented Fern (*L. æmula*). The former is an erect growing Fern, with pale green fronds arranged shuttlecock fashion around a central caudex. These fronds are covered with glands, and when gently

drawn through the hands an agreeable lemon-like odour is perceived, whence its name. In habit and make it somewhat resembles the Male Fern, but is distinguished by the side divisions continuing right down to the base, where they taper into rounded lobes, while the Male Fern has a naked stalk of several inches, the side divisions then commencing are fairly long ones. *L. œmula* is a little on the lines of the Broad Buckler Fern, but smaller, and with its fronds beautifully crisped and crinkled rendering it far prettier. *L. thelypteris*, the Marsh Fern, resembles an attenuated *L. montana*, but has a creeping root, and only thrives in bogs. It is not to be recommended for garden culture.

The family of the Shield Ferns consists of three members, viz. the Holly Fern (*Polystichum lonchitis*), the Soft Shield Fern (*P. angulare*), and the Hard Shield Fern (*P. aculeatum*). The first is a true mountain Fern, rarely found below 2,000 feet. Its hard lucent green fronds are once divided, the midrib bearing two rows of acutely pointed divisions, somewhat like Holly leaves, whence its name. Given a northern aspect, with its crown well sheltered by an over-hanging rock or brier, it will grow in the garden, but is rather apt to perish, unless the air be very pure. *P. angulare*, the Soft Shield Fern, grows much larger and has long lax fronds twice divided, the segments resembling those of the Holly Fern in shape, but being much softer in texture, whence the name. The Hard Shield Fern (*P. aculeatum*) is stiffer in growth and tougher in make, but otherwise not very dissimilar. To these species, as to some of the others, we recur later.

The Polypody family, represented by the Common Polypody (*Polypodium vulgare*), the Oak Fern (*P. dryopteris*), the Beech Fern (*P. phegopteris*), and the Limestone Polypody (*P. calcareum*), are all available for rockeries in sheltered situations. The first-named is a very common fern in many parts of the country, topping old walls and fringing

the hedgerows and stone dykes with its pendulous once divided fronds. All four species have rambling, creeping root-stocks, but those of *P. vulgare* are thick and fleshy, those of the others are very slender and stringy, in a sort of mat whence the fronds spring, forming a dense clump. *P. vulgare* is quite evergreen, while the others die down in the autumn. As a result of this habit of growth, a loose, open, leafy soil is essential.

The Bladder Fern (*Cystopteris*) we will merely allude to, they are not be recommended for general culture, not being particularly beautiful, while the fronds have a habit of becoming brown very early in the season. Recurring to the Spleenworts, of which we have mentioned a few of the ineligibles, the Maidenhair Spleenwort (*A. trichomanes*) is a pretty little rosette-forming fern which does well in chinks of rocks, and the Black Maidenhair Spleenwort (*A. adiantum nigrum*) of very different habit, with upright twice divided fronds, is also a rock lover and forms a pretty relief among the robuster growers. The other Spleenworts (*Ceterach officinarum*) may do well in the chinks of a wall with sunny aspect. The Royal Fern (*Osmunda regalis*) is extremely handsome when well grown, but it is a moisture-loving species requiring plenty of water, and is most at home when its roots are in boggy soil. To plant it high up on rockworks is therefore to court failure. The Hard Fern (*Blechnum spicant*) merits far more attention than it gets. It is a very pretty Fern, with dark green-shining once divided fronds of two kinds, leafy barren ones, which form a spreading rosette, and thinner erect fertile ones, consisting of little more than midribs bearing the spores. It is quite evergreen and thrives in good leafy soil, provided it does not suffer from drought. The Parsley Fern (*Allosorus crispus*) is a pretty small growing species, usually supposed to be difficult of culture, but really of the easiest if properly planted. Its normal habitat is on the sloping debris of mountain sides,

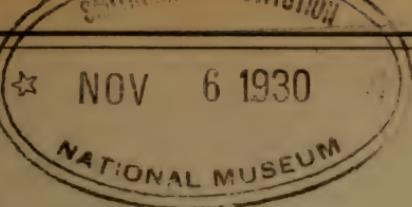
where it is constantly liable to be buried by slips and slides of the loose material. The way to plant it, therefore, is to dig a hole with a northern aspect, half fill it with loose rubbly fern mould, lay the plant on that with the crown towards the north, and then bury it entirely with a shovelful of gravel; this done, drop a large burr on the south side, leaving room on the north for the new fronds to push through the gravel, as they will do. This done, leave it alone and it will thrive for years. The Lady Fern and the Hartstongue practically remain to complete the list of available species, and both of these are too familiar objects to require description or cultural suggestion.

So far we have dealt entirely with our British Ferns from the normal point of view, *i.e.*, as concerns those types which grow wild in countless myriads in many parts of the country, and find their way into our gardens, partly by collection of the wild forms on the occasion of visits to ferny districts, but far more largely owing to vandalistic raids upon the wild plants for commercial purposes by the tramp, the needy villager, and last, but by no means least, by the wholesale raider with his horse and cart and lack of any idea of *meum* and *tuum*, who visits a picturesque ferny lane and leaves desolation behind him. Given suitable positions and a little care these common forms are very pretty, but as we have seen it is only a few of these that are utilized, so that a popular British Fernery is ordinarily, as we have said, a monotonous grouping of a few species only. What then will be thought when we assert that a fully representative collection of British Ferns would embrace many hundreds of distinct forms, very many of which far and away eclipse the common ones in delicacy and beauty? Yet that this is so, is evidenced by the magnificent collection in Kew Gardens, where some thousands of British Ferns and some hundreds of distinct varieties exemplify that remarkable faculty which our Native Ferns possess of spontaneously sporting

into types very different from the common ones. No man knows how or why it happens, but here and there among the normal species, there is occasionally found a "sport," that is, a Fern of the same species as its neighbours and undoubted parents, but shaped and fashioned in quite different lines. Such a plant moreover, when removed and cultivated, not only retains its new form unaltered, but when propagated by its spores, its progeny will be fairly true to the new type, or better still, may vary still more on like lines, so that greatly improved types are eventually obtained. Thus a fern with once divided fronds may sport into one with twice divided fronds of much more feathery nature, and this may go on until in a few generations, or even it may be in one, we arrive at fronds so dense and so moss-like in appearance, that only an expert could determine its species. Obviously with Ferns capable of spontaneous improvement to this extent, it is absurd to devote all available space to what the connoisseur regards as the weed forms, the mere raw material out of which Dame Nature generously fashions the improved and highly decorative varieties we have in view. Nearly every one of the British species has yielded "sports" of this description. According to the most recent descriptive catalogue, the Hartstongue boasts no less than 450 varieties, the Shield Ferns 384, the Lady Fern 313, the Buckler Ferns (6 species) 259, and the Common Polypody 75. A large number of these consists of beautifully tasselled forms, others are delicately dissected and feathery, others are prettily dwarfed and congested, and others are varied on quaint and eccentric lines. There are, therefore, forms adapted to meet all tastes, all are hardy save these species already mentioned, and in short, given sheltered conditions from hot sun and destructive wind, there is no family of truly British plants which remotely approaches that of the Ferns in varietal interest and amenability to culture.

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

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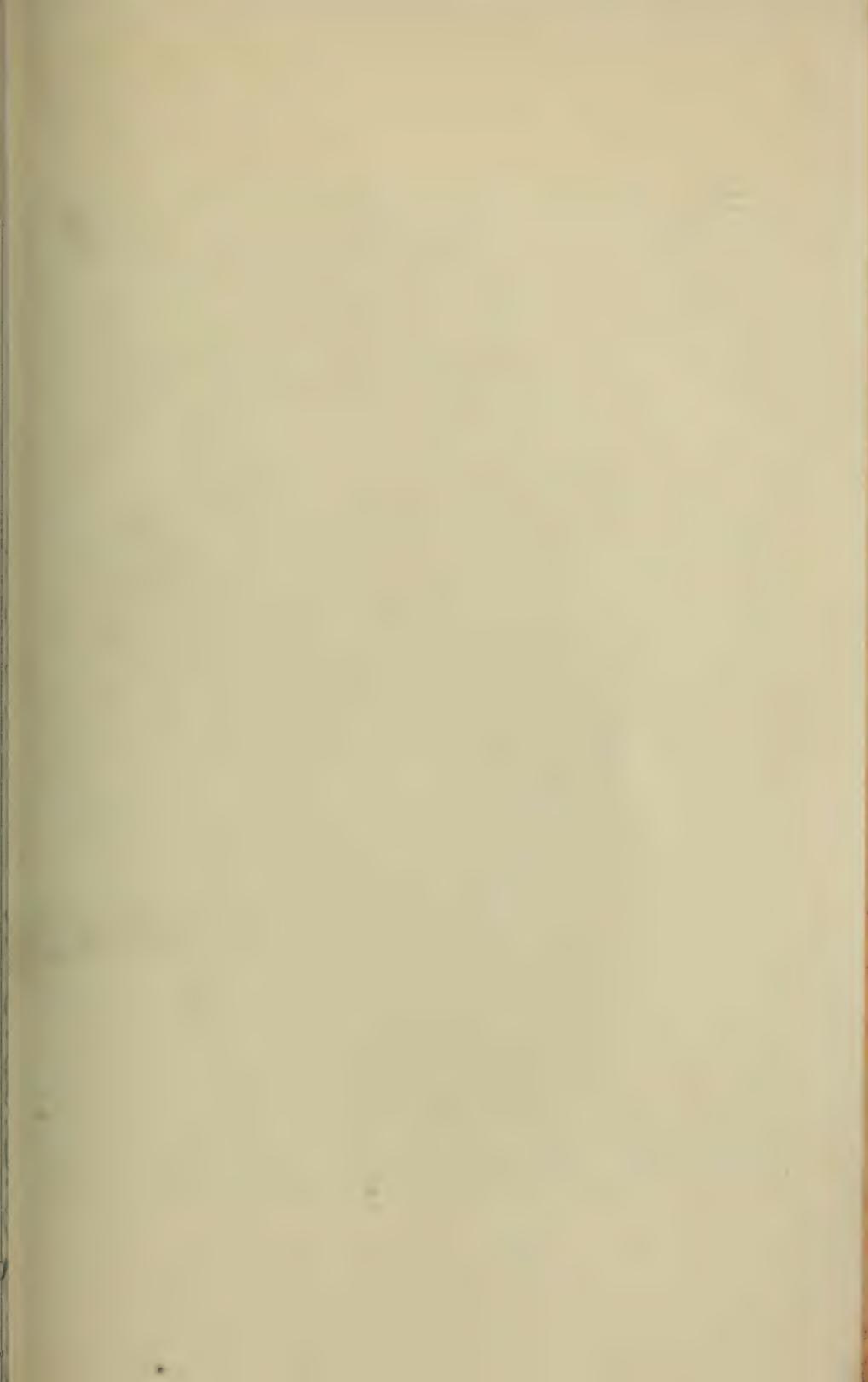
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POLYSTICHUM ACULEATUM GRACILLIMUM CRANFIELD.

THE BRITISH FERN GAZETTE.

VOL. 3.

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NO. 31.

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EDITORIAL NOTES.

Since our last issue nothing of special importance in the way of novelties has transpired to report in our particular connection, owing naturally to the fact that it only deals with the dormant season. We, however, as will be seen, have been particularly favoured by a contribution from Mr. Rowland in continuation of his article on the botanical side, and still more by Dr. Stansfield's most interesting and instructive paper in reply thereto. Such additions to our knowledge are peculiarly welcome to the Editor of the *GAZETTE* by reason of the present unsatisfactory state of his health, which renders it very difficult for him to do the needful when outside contributions are scanty, as is too often the case. *Verb. sat. sap.*

THE EDITOR.

New members are wanted, and the Editor would regard as a favour the receipt of name and address of any known British Fern lover not on our list, and to whom we might

send a specimen copy of the GAZETTE. The annual subscription to the Society is only 5s. from August to August, and entitles to four issues of the GAZETTE, plus association with a large number of fellow students of our beautiful British Ferns.

THE BRITISH FERN GAZETTE, VOL. 2, Nos. 13 TO 24.—The Editor would again remind members that a small number of Vol. 2 have been bound into a very presentable volume of 313 pages and numerous illustrations. As no reprint will be available, and the books are widely recognized as most valuable contributions to our Fern literature, the opportunity of acquiring copies, even extra ones, should not be lost sight of. The price to members is 3s. 9d. post free, and speedy application is advisable to secure, as only a few are left.

X The subscriptions for 1916-17 being due in advance, the Hon. Secretary would feel much obliged by a remittance of 5s. by return post to 11, Shaa Road, Acton, London, W.

OUR FRONTISPICE.

POLYSTICHUM ACULEATUM GRACILLIMUM CRANFIELD.

It is a special charm of the offspring of *P. aculeatum pulcherrimum* Beavis that even among those plants recognised as *gracillimum*s scarcely any two are exactly alike. In my own small collection I have quite half a dozen *gracillimum*s raised by Mr. Druery, besides one raised by Mr. Cranfield, and several seedlings of my own. All these have their special and individual charms, and one would be reluctant to dispense with any one among them. The subject of the illustration in this number of the "Gazette" has,

however (1916), come out as peculiarly distinct, and seems to deserve a separate name (that of the raiser), although it is still a gracillimum, and may, under some circumstances, be difficult to distinguish from others. It is marked by a somewhat more foliose character than the rest, and the ultimate segments, especially near the tips of the pinnae, are especially luxuriant; so much so, that by their weight they give the frond an elegant, drooping, and ostrich feather-like appearance, which is well shown in the illustration.

The plant was raised by Mr. Cranfield some years ago and given as a small seedling to Mr. Henwood, who very kindly gave me an early offset, from which in 1916 the illustration was taken. Of course, as soon as the distinct character of the plant was recognised, a piece (the first division, in fact) was sent back to the raiser, who has every reason to be proud of his bantling.

F. W. STANSFIELD.

Reading, January, 1917.

POLYSTICHUM ACULEATUM GRACILLIMUM CRANFIELD.

This peculiarly beautiful variety represents a further example of the diversity of forms which can be evolved from spores of one and the same variety when once a species has broken away from its normal type. For further remarkable exemplifications of this capacity we need only refer to our previous illustrations and articles in our "Gazettes," Vol. 1, Nos. 1 to 12, pp. 4, 24, 50, 119, 133, 226, 227, 271, 288; Vol. 2, Nos. 13 to 24, pp. 159, 200, 257, 285; and Vol. 3, No. 30, p. 123. The simple fact that so many references have been made constitutes a fair proof of exceptional merit, while the photo (285) displays a wide divergence of form in opposite directions, which is entirely unique in our experience.

THE EDITOR.

SOME DIFFICULTIES OF AN AMATEUR.

(Continued.)

Another subject that was forcibly brought back to one's mind while reading Dr. Stansfield's article, is the utter chaos existing in the nomenclature of Ferns. He commences his article by stating that *Lastrea dilatata* is "part of the *Polystichum cristatum* of Linnæus, the *Polypodium dilatatum* of Hoffmann, the *Polypodium multiflorum* of Roth, and the *Dryopteris aristata* of the most modern school of botanists."

When on earth are we going to get any uniformity in naming our plants? One knows, of course, that many of the older names have been permanently deleted, but even in the enlightened year of 1916 botanical authorities still continue to call the same plant by different names. Precedence—is it or is it not to be considered? Or is there any real difficulty now in deciding which was the original name given to any particular plant? Kew, I believe, still calls the Male Fern *Nephrodium filix mas*, but the Americans prefer *Dryopteris filix mas*, while I suppose most members of the British Pteridological Society still choose to call it *Lastrea filix mas*. Is one to suppose that it is a matter of no great importance, or does each think the name he uses is the correct one? Was the Vienna Congress a representative and an authoritative one? If so, why is it not accepted everywhere? A difference in nomenclature, such as is found in the examples *Blechnum spicant* and *Lomaria spicant*, is difficult enough to explain away—it is, I believe, one of Mr. Druery's pet troubles—but there seems to be less excuse for calling the same plant a *Lastrea*, a *Nephrodium*, an *Aspidium* and a *Dryopteris*, when no doubt is entertained as to which genus the plant really does belong.

My small library of Fern books was again referred to, with considerable interest. The generic names, *Pteris*,

Adiantum, *Cystopteris*, *Woodsia*, *Trichomanes*, *Hymenophyllum*, *Osmunda*, *Botrychium* and *Ophioglossum*, were accepted by all the writers, and so need not be referred to again.

Among the remaining genera, however, there was considerable variation. Take, first, the Male Fern group. The Kew Handbook (Second Edition) puts these ferns in the genus *Nephrodium*. For this same genus the "London Catalogue of British Plants" prefers the name *Lastrea*, which is also the name used by Babbington, and in Mr. Druery's book. Hooker uses *Nephrodium*, while Mr. G. Claridge Druce, in his recent revision of Hayward's "Pocket Book," uses *Dryopteris*. Mr. Druce, by the way, is one of the best known and most progressive of our modern botanists. In the preface to the above-mentioned "Hayward," he states that the names he employs are in accordance with the "Vienna Actes" of nomenclature, which, I believe, follows the law of priority very closely.

Take, next, the Prickly Shield Fern group. Kew and Hooker here employ the generic name *Aspidium*, while the London Catalogue, Druce, Druery and Babbington employ the name *Polystichum*. Lowe calls the Prickly Shield Fern *Aspidium aculeatum* and *angulare*, but proceeds to describe the cultivated varieties under the sub-section *Polystichum*. The Lady Fern is called an *Asplenium* by two (Kew and Hooker), and an *Athyrium* by the rest. The little annual Jersey Fern is included by all except one under *Gymnogramme*. Here, Hooker is the exception. He states that "the generic name *Grammites*, Swartz, has the right of priority over that of *Gymnogramma*, Dest.—an opinion not apparently accepted by the Vienna Congress, or Mr. Druce would have used it.

The Hartstongue has been generally known as a *Scolopendrium*, but I find that long ago Babbington considered

the name *Phyllitis* more correct, and in this he is followed by the London Catalogue and by Druce.

The Parsley Fern is another for which two different generic names are used. Hooker and Druery retain *Allosorus*, while all the rest employ the name *Cryptogramme*.

In the remaining ferns the trouble seems to arise not so much from accepting or ignoring the rule of precedence in nomenclature as from the different ideas as to the classification of them. Whatever generic name is used for the Lady Fern, there seems also to be some trouble in deciding whether it is to be considered a Spleenwort or not. This difficulty seems to be increased in the case of the fern known as the Alpine Polypody. Kew, Hooker and Babbington put it under the genus *Polypodium*, while the others do not approve of this, putting it under *Athyrium*.

All the above-mentioned authorities are agreed as to the genus of our Common Polypody, but the tendency now seems to be towards splitting off the Oak and Beech Ferns and putting them into a separate genus—*Phegopteris*. At any rate, the London Catalogue and Druce do so, and the American botanists do likewise.

As a final example, it might be mentioned that the little Scaly Spleenwort is retained under *Asplenium* by Lowe, by Druery and by Kew, while Druce, the London Catalogue, Hooker and Babbington place it under *Ceterach*.

All the above-mentioned books were compiled by men who can be justly called authorities. They nearly all give synonymous terms in brackets, but have deliberately chosen one of two or more names as that which is correct. But why all this variation?

War time, perhaps, is not the happiest time to remind one of this sort of worry, but surely botanical knowledge has now sufficiently advanced for such questions to be

settled! I am sure all keen students of the Fern World would thank the Editor or someone else of high authority in these matters for a ray of light on this dark subject.

S. P. ROWLANDS.

SPECIES AND VARIETY.

DR. F. W. STANSFIELD.

In the "Gazette" of December, 1916, continued in this issue, Mr. Rowlands raises the very interesting and pertinent question, "What is a Species?" In a great measure he answers his own question by realising that "the division into species is a man-made convention." In this I am persuaded that he is right, for no really satisfactory definition of a species has yet been generally accepted, even if it had been propounded, which is very questionable. The fact that among both zoologists and botanists we have always had "lumpers and splitters" is a practical confession that the word is undefinable. It is agreed that a species means "a sort or kind," but exactly how much difference is required to constitute a species is purely a matter of opinion and individual fancy. The result is that every man who aspires to be "an authority" has his own pet species and genera, varieties and forms. Practically no two writers (unless one is a copyist of the other) are agreed as to the exact number of species among even such a small section of plants as the British ferns.

Nevertheless, the fact that there is a large measure of agreement with regard to the great majority proves that there is something in the idea of a species. It is not a mere figment of imagination. Mr. Rowlands has quoted a large number of differences of opinion as to British species among botanical writers, so it is unnecessary to labour this point. There is, however, general agreement that *e.g.* the

Aspleniums : *marinum*, *trichomanes*, *viride*, *ruta-muraria*, *septentrionale*, *adiantum-nigrum* and *lanceolatum* are distinct species. Also that the *Lastreas* : *filix-mas*, *dilatata*, *montana* and *vigida* are equally distinct. The question of species or variety comes in only when *Aspleniums Germanicum* and *acutum* and *Lastreas spinulosa cristata*, *uliginosa*, *œmula*, *pseudo-mas* and *propinquua* come to be considered. It comes in again among the Polystichums, because there is difference of opinion as to whether *P. aculeatum* and *angulare* constitute one species or two. *P. lonehitis* is generally considered distinct, but there are grounds for doubting whether even this can always be separated from *aculeatum*. Mr. Rowlands does me the honour of assuming that I have a clear idea as to what I mean by a species as distinct from a variety. Thus directly challenged, I will endeavour to formulate what I, myself, mean by a species. I do this with much diffidence, and without contesting the right of any other person to hold a different opinion. A species then I should consider as an aggregation of individuals, wild in Nature, having a large number of characters in common and resembling each other more than they resemble other individuals. It must be capable of holding its own in the struggle for existence, and must be marked off from other species by characters which can be precisely defined in words. What, then, is a variety? We must discriminate between "botanical" varieties and varieties in our special fern sense, which latter are generally referred to, if referred to at all, by botanists as "monstrosities."

Broadly speaking, a variety consists of a number of individuals resembling some particular species in most points, but differing in minor particulars, which, however, are capable of being precisely defined. It must "come true" from seeds or spores in general, although it may sometimes revert to the parent species. It is this latter point which chiefly distinguishes a variety from a species.

It will be generally found in the case of a botanical variety that the origin is known, or that it crops up sporadically. If a variety has existed wild from time immemorial and always comes true from seed, it is generally regarded as a species, even though it may differ in very small degree from some other species.

(*To be continued*).

FERN PROPAGATION BY SPORES.

Since the Fern spore differs materially in several ways from a seed and requires different treatment in order to produce the Fern with which we are familiar, failure to propagate by its means is the rule rather than the exception with the amateur fern cultivator, an explanation of these differences which generally underly such failures may be of special service and lead to their avoidance. A seed differs from a spore by being not merely a reproductive body containing a vital germ which has been fertilized by the conjunction of two parental potencies, but this germ is associated with a supply of nutriment capable of supporting the infant plant and giving it a fair start in life. The spore, on the other hand, has no such store, and consists solely of a protective husk or shell containing a reproductive cell devoid as yet of a fertilized germ. As a consequence of this simplicity it can be, and is much smaller than any seed, and is always so small as to be microscopic, or only just visible to the naked eye, while the seed, as we know, may vary from the very minute up to huge bodies as large as a man's head, the Seychelles Cocoanut, for instance. The seed, as we are aware, only requires to be placed in soil or subjected to a similar environment of humidity and temperature, and the vitalized germ can avail itself of the contained nutrition to burst its

protecting cover, extend an incipient root, and become straightway an independent plant of the parental type. The spore, on the other hand, seeing that as an unfertilized cell it is as yet an imperfect organism, incapable of reproduction, must, when shed, find an environment of particularly favourable character where it can remain undisturbed long enough for it to burst its protective shell, and by multiplication of the single cell it contains, construct a scale-like organism, no larger than a herring-scale, on the under side of which there are generated male and female organs, the homologues of flowers, through which the essential operation of seed formation and fertilization can be effected, and the parental frond-bearing Fern reproduced. Now, when we consider that the spore is microscopic, and the whole of the reproductive operations are effected within the area of a herring-scale, and that it is on the under side of this scale that this is done, it is easy to understand that it is only about three-quarters of a century ago that the true nature of the operation was discovered and its practical identity with that of flowering plants made clear. Leaving, however, these technical points aside, which we have only mentioned to emphasize the necessity of observing the rules hereafter laid down to ensure successful culture by such delicately organized means, we will now give in detail the method which we ourselves have found most effective to that end. At the outset it will be seen that the first essentials are—

1. A constantly humid soil.
2. Freedom from disturbance by worms or other insects.
3. Immunity from fungi or other competitive growths, engendered by the persistent humidity.

To start with, we usually use small shallow red earthenware pans, about $1\frac{1}{2}$ inches deep and five in diameter. These we drain well by placing broken pieces of pots over the holes in the bottom. We then fill them up with a

mixture of loamy soil and leaf mould and coarse silver sand, forming an open porous compost, which we top with a sprinkling of loam. This we press down flat, so that a level soil is left with about half an inch free space between the surface and the eventual glass cover. To secure the contents from subsequent disturbance by worms or invasion by intrusive fungi, etc., we now place a piece of paper on the soil, and upon this we pour boiling water until this runs out scalding hot at the bottom of the pan, the contents of which is thus entirely cleared of worms, germs, etc., leaving a clear field for the Fern spores when these are introduced. We next cover the pan with a piece of glass and allow it to cool. When quite cold we take the pan into the dwelling-house, *i.e.* away from an atmosphere probably charged with undesired spores, and removing the glass and paper scatter the spores EXTREMELY THINLY and evenly over the soil, replace the glass, and the operation is complete. N.B.—The spores must lie quite on the surface and not buried. The pan should then be placed in a saucer, in which a little water should be maintained, the bottom edge of the pan just touching the water. The soil is thus placed at a slight angle to the light, while the risk of worms intruding from below is obviated. Nothing now is needed but to place the arrangement where it can remain and be easily seen, and receive plenty of light, but no direct sunshine. If the sowing be effected in the late spring, or in a warm house, say, in a Wardian case, or under a bell-glass in a living room, in about three weeks the first evidence of success will be visible as a faint green flush on the surface of the soil, showing that the spores have germinated and begun to form the prothalli or herring-scale-like growth above described, and as time goes on each of these tiny growths will expand, and if the precaution of *very thin sowing* has not been observed, will begin to overlap each other. If by so doing they become

densely crowded, small patches can be pricked out an inch apart, and inserted into other pans similarly prepared and sterilized by boiling water as above. If not crowded, the next stage, in a week or two later, will be the appearance of little fronds, and after this growth continues fairly rapidly until removal is obviously necessary, and complete success may be recorded. Unless the cultivator has been very careful to avoid the admixture of the spores with those of other perhaps undesirable species when sowing was effected as above described, it is fairly certain that a considerable number of these will assert themselves in the offspring, and by this time they will be fairly recognizable, and should be extracted and treated according to their merit, *i.e.* either treated as weeds and ruthlessly destroyed, or, it may be, as acquisitions worthy of exceptional treatment, and treated as such with special care. In sowings of fine forms of varietal Ferns, it is at this stage that the youngsters afford the most interesting study, as exceptional value is often quite evident to the expert in the young fronds when but a few inches high. Under ordinary conditions ripe Fern spores may be found in June or July, and then is the best time to gather and sow them. As a frond may yield millions of spores, each little patch of capsules containing scores of pods containing spores, our plan is to sever a pinnule or smaller portion of a frond and place it on a piece of white paper, when in an hour or two a quite sufficient number for a sowing will be shed, while a too generous admixture of undesirables will be avoided. To scrape or shake a whole frond over the pan, as is usually done, is to start a crop of many thousands of all sorts at the expense of the *élite*, and probably frustrate all previous precautions taken to obtain a pure culture.

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

FERNERY WEEDS.

Naturally, when for our choicest Ferns we provide glass accommodation in a conservatory, which we keep as cool and moist as possible for the sake of the pets it contains, other forms of vegetation make their appearance, and if not suppressed are as prone as the weeds out of doors to assert a would-be monopoly, and do their best to oust the proper occupants. Equally naturally, the conditions being different, we find these weeds to be mostly different species to the outside ones, and sometimes to be so pretty as to render their drastic suppression somewhat of a trial to the admirer of vegetative beauty. First and foremost, of course, since the occupants proper shed their myriads of spores every year under very favourable conditions for their germination, many of these succeed in reaching the frond stage, and some few varietal forms of moderate merit seem to be endowed with special vitality, and if not weeded out will heavily handicap their more select associates. These, then, constitute one section of what we must, with proper regard to the welfare of the *élite*, treat as weeds and eradicate on similar lines. In this connection, however, the fern lover should always keep his eye open for prizes, for stray seedlings may appear of the choicest forms, though it is remarkable what an extensive crop of very inferior ones turn up whose parentage under such circumstances is a puzzle. If, however, we have a single specimen of what is known as the "Craigii" section of Lady Fern, we may rely upon its vagrant offspring springing up everywhere and displaying all its imperfections and eccentricities on a liberal scale, though very rarely will there be one amongst them which is worth bringing on. The Lastreas, Male Fern and Broad Buckler Fern, too, come very freely, and in their true varietal forms, as a rule. The inferior or "rogue" types, however, form appropriate presents to

those visitors who, by bitter experience, you know to be such as will subsequently explain that the gardener forgot to plant them, or the maid forgets to water them, or some similar excuse for that neglect, which would make the giver "wild" had he entrusted them with something "rich and rare." Of a lower type of vegetation than Ferns are the various species of *Marchantia* or Liver-worts, which do their best to cover the surface of the soil with a dense mass of overlapping verdure. These are very beautiful botanically considered, and their various forms of fertilization are interesting, some like tiny turnstiles, some with fluted domes or stalks, some with shallow cups filled apparently with tiny green eggs, and so on. These, however, can form so thick a mat over, for instance, the soil in the pots and pans of Polypodies as to practically imprison the rising fronds, and consequently have to be cleared away from time to time. Another, and this is really a pest, is the common *Oxalis acetosella* or Wood-sorrel, which sends its slender tough stolons in all directions, and if left alone will so tie up even the crown-forming ferns as to hinder development seriously. Its seedlings come up all over the place as the plant, Balsam fashion, has explosive seed vessels, and shoots their contents when ripe far and wide. Another weed is *Sibthorpen europea*, a delicate creeping plant, which can hardly be debited with much damage, and indeed festoons the pots and pans so prettily with its light coloured small leafed foliage that we usually leave it alone. Of this there are three varieties, green, golden, and a variegated white and green, which, however, is too delicate to hold its own, and has only repaid repeated introduction by persistent disappearance. Another of like harmless kind is a *Selaginella*, which sows itself and spreads and forms a pretty adjunct without any tendency to over self-assertion. Occasionally, of course, the common outside weeds are

introduced with the soil, but these are not assertive under shady Fern conditions, and are easily removed. Mosses of various species sometimes appear, but not in our experience to any pernicious extent, but where impure water is used, or rather over used, *Confervæ* will clothe the sodden soil with such a dense mat of slender fibres as to seriously handicap the plant concerned, and this should be picked off persistently to enable the soil to be aerated, and water judiciously withheld to check it further.

Although scarcely to be classed as a Fernery Weed, though really a weed among my Ferns, I may chronicle here a curious sport, showing that even the weeds have their vagaries. The wild violets in the open is in my garden somewhat assertive, and recently while stooping down to examine a clump of dwarf congested *Athyria*, my attention was attracted to some curiously deeply frilled and fringed foliage which I took at first for an extra pretty Hartstongue. To my surprise, however, it turned out to be a violet and not a fern at all, of which most of the leaves were of this ornate character. I managed to get out a specimen to pot up, and hope to obtain a constant plant. Some thirty years ago, curiously enough, when Fern hunting in Devon, I found a precisely similar form, which I sent at once to the late Mr. G. B. Wollaston, whose garden was a museum of such curios of vegetation, in addition to his renowned Fern collection. Subsequently, however, I learnt that he has lost it. I hope I shall be more successful.

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

FERN FRINGES.

The frond of a Fern is undoubtedly one of the most wonderful developments in the vegetable world. There is little doubt that if we could trace it back to its origin, we

should find it to be an insignificant excrescence on some humble growth akin to the Liverworts, which still in lonely guise are apt to cover the pots and pans in which these developed relatives are growing. In some of these Liverworts, indeed, we find small and extremely pretty projections in the shape of turnstiles and ridged tabular growths which bear spores as do the Fern fronds, though in very different fashions. In others we see beautiful translucent cups seated on the surfaces and filled with little green bodies which are, however, not spores, but practically detached buds to which no Fern is known to bear a parallel. Anyway, it is certain that from such humble beginning fronds originated in association with a basal bud which produced fronds again, while in time, æons of time, inconceivable to the mind of man, these became differentiated in all directions, size and cutting, until we have arrived at the many thousands of distinct types which now people the world from the minute grass-like *Asplenium septentrionale*, or even smaller forms, up to the majestic Tree Ferns of Antipodean Fern Glens and Forests. The curious part of Fern history is that, judging by the fossil remains, even as far back as the earliest Coal age, Ferns were as highly developed, and appear to have existed in even greater profusion than now, since that was indeed the Fern age, Ferns and their allies constituting the main vegetation, hence for their evolution from the humble beginning suggested, we have to antedate all our required æons prior to the Coal formations hitherto discovered. The idea makes the brain reel, and yet must be accepted. Certain phases, however, of Fern development or evolution appear to have been left to quite recent times, since if we may judge by the records gathered by geologists the marked varietal forms, of which such an abundance have turned up under natural conditions in the last century, either did not exist in those old days, or else, which we must admit as

possible, their rarity has precluded their appearance among the fossil remains alluded to. Another fact, and one somewhat more to the point, is that it is under man's selective care that some of the most extraordinary forms have originated, and amongst these must be classed the fringed forms we have in view. The most remarkable of these belong to the species of *Scolopendrium* or Hartstongue, and from their history we gather that under natural conditions their extreme capacity for fringing would hardly be likely to appear, since it is only brought out by close Wardian case culture. On the other hand, one of the two wild finds from which our examples sprang was *S. v. crispum Drummondiæ*, found many years ago by Miss Drummond near Falmouth, and this, even under ordinary culture, sends up fronds of two sorts, one long, narrow, and smooth-edged, but frilled and tasselled and repeatedly curved, switchback fashion in the plane of the frond, while the other fronds are similar in general character, but with the edges fringed throughout with long slender projections, which are translucent at the tip, and when cut off and layered extend into prothalli, which yield typical plants in the normal way. Here, therefore, we have a fringed form which originated naturally as such; in the second case, however, the natural wild find was of most unlikely type, *S. v. undulato rigidum*, a form which as its descriptive name implies is only slightly frilly and of stiff habits. The edges are quite smooth. Messrs. Stansfield, however, on sowing its spores found that it persistently yielded a percentage of quite different progeny, viz. with thin papery fronds deeply frilled and beautifully fringed throughout. These, though assuming thus a true plumose character, retained partial fertility, and hence in time a fimbriate section was established, known as *S. v. Stansfieldii*, which furthermore assumed more or less heavy crests, which differentiated the plants still more from their

stiff fronded progenitor. The fringing of this section differs from that of *Drummondiae* in being shorter, and although it is believed that Mr. H. Bolton, of Carnforth, raised a batch of youngsters by layering the edges (*i.e.* aposporously), both Dr. Stansfield and the writer have so far failed to evoke a prothalloid growth from the tips, while with *Drummondiae* it is most easily done. Despite the great beauty of the *Stansfieldii* section, as developed by the Stansfields and by Mr. Cropper, it is in the *Drummondiae* progeny that we have the finest types, and in the plant in the writer's possession, obtained, he believes, as a seedling from Mr. T. Bolton, of Carnforth, the tendency to produce two kinds of fronds is completely eliminated, every frond is extremely deeply fringed, and under Wardian case culture every tip is surmounted by a translucent prothallus. The fronds are curved in their plane, deeply frilled and tipped by a spreading fringed crest, the "ensemble" being one of the most lovely ferns conceivable, and appropriately named *S. v. Drummondiae superbum*. Under ordinary greenhouse culture, robust plants become beautifully fringed, but lack the final touch of adherent prothalli, and much of the delicacy induced by case culture, which seems to agree with it perfectly. In Mr. Bolton's hands we have seen other plants of this section bearing extremely heavy crests, and apparently presenting even greater possibilities than our plants, but in this connection a very curious thing has happened. With his permission we cut off a frond base from his best plant, with a view to obtaining a specimen through the buds such bases produce under proper culture. In due time two buds appeared, one on each side. The original plant whence the base was taken has no trace of the plain edged fronds thereon, as we have described by the original find, but of these two basal plants one has all the fronds perfectly smooth edged, the other is all fimbriation and

crests, a proof that the original tendency is still in the blood, and also that bulbils are not absolutely reliable for the propagation of varieties. Furthermore, Mr. Bolton gave us portions of the fringed crests of some plants, which when layered produced abundance of prothalli and young plants, all but one of which appear to be fringed, and that is quite plain edged, the old blood presumably reasserting itself here also. Plants, indeed, so produced vary considerably; in another culture, from *Drummondia* itself, we have a true marginate form, but with certain *Drummondia* features which preclude the idea of a stray. The biological question underlying these fringed forms, especially the aposporous ones, is whether it is not a reversion to a far back ancestral lichen type, a possibility which recommends itself to the cultivator's mind when he has but to cut off a piece of the edge and peg it down, in order to see it grow out in all directions and cover the pot or pan with proliferous prothalli in profusion, imitating a *Marshantia* precisely. In other families we have also fringed forms. *Polypodium vulgare Cornubiense* often fringes its most finely cut fronds with long ligulate projections. Birkenhead's *P. ang. plumosissimum* crowds its delicate mossy fronds with an outgrowth of similar character, moss on moss, and in Bolton's *A. f. f. Clarissima* we see the slender tips of pinnæ and pinnules run out into prothalli tipped tongues, while finally in *L. p. m. apospora*, a beautifully-crested son of the King of the Male Ferns, but cursed, alas! with a consumptive constitution, every point is only waiting to touch the soil, in order to root as a prothallus, and breed a crop of asexual youngsters like itself.

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

FERN SPORTS.

Although the phenomenon of "mutation" or "sporting" is undoubtedly general through all organic life, animal as well as vegetable, naturally it is in the latter that it mainly appeals to the horticulturist, and particularly to the selective cultivator. It is often assumed, but in our opinion erroneously, that cultivation is the inducing factor in the changes observed, but continued research in the direction of the wild forms of ferns, especially British ones, has shown that an immense number of such mutations occur in perfectly wild plants growing under quite natural conditions, where the cultural factor is altogether absent.

We quite admit that long continued protection from adverse conditions, coupled with liberal treatment, will in course of time lead to stronger and stronger growth; but this is quite a different thing from those marked structural differences seen in "mutations" proper, and which are almost invariably transmissible by inheritance through the seed or the spore. These differences are fixed, and will be retained under natural conditions of growth, but those which are induced by high feeding, etc., will assuredly return to the normal type when these stimulative influences are withdrawn.

As a rule with ferns, if we can trace the past history of a marked abnormal form, we find that either it or its near progenitor was found as a wild specimen among the common forms of our woods, glens and hedge banks, and although it is unfortunately usually very difficult to trace the pedigree of exotic "sports," there is little doubt that the original departure occurred under similar conditions. However, it must be borne in mind that many exotics are raised, and have been raised for decades, by the thousand or even the million under circumstances which are all in favour of any departure or "sport" being observed.

From the sowing of the spore to the potting up of the saleable plant, they are passing under the inspection of expert discoverers, so to speak, and are not likely to escape notice.

The wild "sport," on the other hand, may originate in the midst of myriads of its normal fellows on a wild hillside far from the haunts of men, or in the deep recesses of a wood where the chance of its discovery is just as remote as under the opposite conditions described it is likely. Since this experience has shown that despite this handicap many hundreds of wild sports have been found, it is clear that given a like percentage or per millage of variation among the myriads of cultivated youngsters, it is no wonder that a large amount of variation is discovered among them, and it is by no means necessary to impute this at all to cultural stimulus.

Furthermore, a vast number of plants raised under cultivation are from already abnormal parents, and this, it is well known, tends to further variation. Among British ferns, as we have indicated, the great majority of sports under culture can be traced back to a wild source, but among exotics one of the most striking examples to the contrary is that of the innumerable forms of *Nephrolepis exaltata*, and other species, which have appeared of late years, as derived from species which originally appeared incapable of any marked variation.

In *N. exaltata* we have, indeed, one of the most un promisingly simple forms conceivable, a mere once divided frond of plain sword-like outline, and yet when this once began to become decompound, *i.e.* more than once divided, it proceeded to vary, so to speak, by leaps and bounds, producing by its thready stolons, and not as usual through its spores, a succession of variants in the way not only of finer and finer dissection, culminating so far in *N. e. Willmottæ* and *Marshalli compacta*, but also of different

detail, so that scores of distinct varieties have been acquired.

Here we have no wild progenital "mutation" to start with, but even here, it may be argued, that in a fern raised as this was from the outset by the myriad for the market, there was always a good chance that the starting "sport" should present itself under culture, without that culture being necessarily the inducing factor. In short, the moral of these notes is, we contend, that we are still as far as ever from knowing the reason why? of these subtle but invaluable changes.

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

BRITISH FERNS: SPRING TREATMENT.

Since the early spring is undoubtedly the best period of the year for the treatment of hardy Ferns as regards planting, shifting, division, and propagation generally, a few lines in that connection may be *apropos*. The forty odd species indigenous to Great Britain fall into two categories, viz. the deciduous ones, the fronds of which die down in the autumn, and the evergreen whose fronds persist through the winter, and only perish in the second season when new ones arise to take their place. To the first category belong the Lady Ferns (*Athyrium filix fœmina*), most of the Buckler Ferns (*Lastreas* or *Nephrodiums*), the Bladder Ferns (*Cystopteris*), and the Royal Fern (*Osmunda regalis*), three species of *Polypodium* (the Oak, Beech and Limestone), and the Bracken (*Pteris aquilina*). The evergreens embrace the Shield Ferns (*Polystichum*, three species), the Hartstongue (*Scolopendrium*), all the Asplenia (*Spleenworts*), the Hard Fern (*Blechnum spicant*), and the Common Polypody (*P. vulgare*). The remainder of the native species are so little adapted for general

cultivation that we may ignore them. At the time of writing (February) all the deciduous species are only represented by either underground stolons, and therefore quite invisible, or by projecting stumps or crowns in which are contained the incipient fronds of the coming season, while the evergreens bear the fronds of the previous season in a more or less shabby and damaged condition if they have been grown outside, and had therefore to stand the brunts of wintry storms and frosts, while under cover they may still be quite presentable and remain so until replaced by new ones. In either case root action will already have been commenced, as may be ascertained by turning out pot plants, and in the case of crown-forming species, it will be seen that new roots are springing from the bases of the future fronds, each one of which produces its own independent bunch. The new fronds, however, in either case, evergreen or deciduous, are still dormant, and hence no better time can be chosen than the present for separating crown from crown for propagating purposes, since not only is there no risk of damage to the future crop of fronds, but after the long rest the vigour of the plant is at its maximum to aid in re-establishment when the divisions are planted as separate individuals or the original plants replaced in the soil. The crown-forming ferns develop their fronds in more or less definite circlets, shuttlecock fashion, and are easily recognized as consisting of several individuals where these, in the form of lateral growths, have been allowed to develop. Each one can be separated from the mass by means of a blunt trowel inserted between them, and when thus forced apart each will come away with its own independent set of roots, all ready to establish it as an independent individual when potted or planted in the open. A great point is to avoid damaging the incipient roots aforesaid, and also to take care that the young crown is planted at once, and not

allowed to dry out in the least by exposure to dry air. In dry weather, too, care must be taken to keep them watered until obvious growth commences, showing that root action has recommenced. With the evergreens all dead matter should be removed, but absolutely green foliage should be retained, as it undoubtedly still plays a part in stimulating growth. Ferns with underground stolons may be propagated by divisions, each piece separated consisting of a section of the stolon or creeping rootstock with its bunch of roots and a frond or two of evergreen, or growing tips showing incipient fronds if otherwise. In the case of the Polystichums, a number of varieties, among them some of the finest, bear bulbils or young plants on the old fronds, and these can be used for propagative purposes by layering the bulbil-bearing sections in good soil, pegging them down and keeping close until rooted. By attending to these instructions the number of plants can be materially increased, and, what is more, experience has demonstrated that Ferns develop far more strongly when confined to single crowns, and display their beauty to greater advantage than when allowed to form bunches of many crowns, so that a double advantage is gained by these operations. It should be understood that in giving this advice we have in view not the common or normal forms of British Ferns, which the costermonger hawks at a penny or twopence per root, but the great number of far more beautiful varieties which may now be obtained from such firms as Mays, Stansfields, Perry and others at very moderate prices indeed.

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

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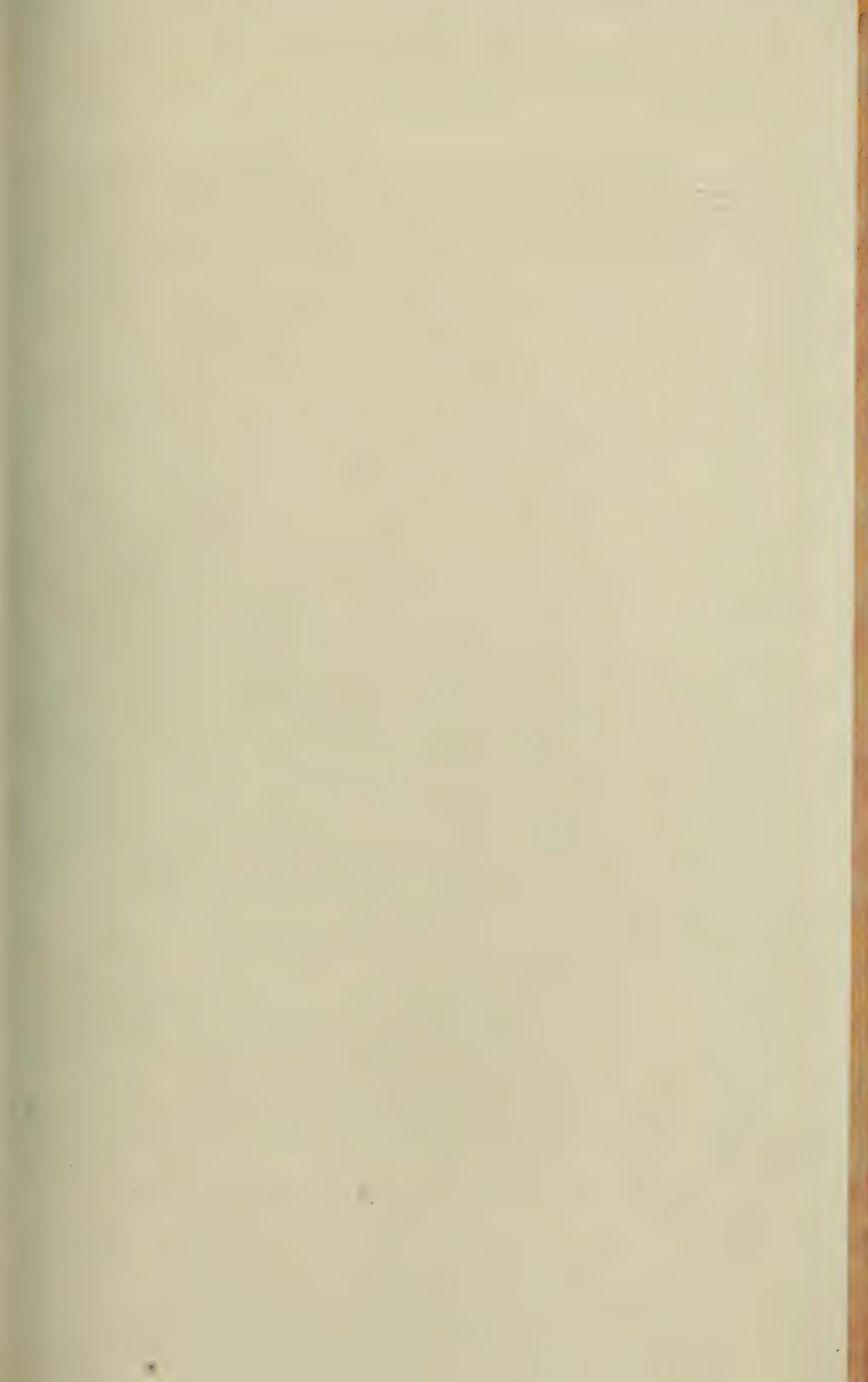
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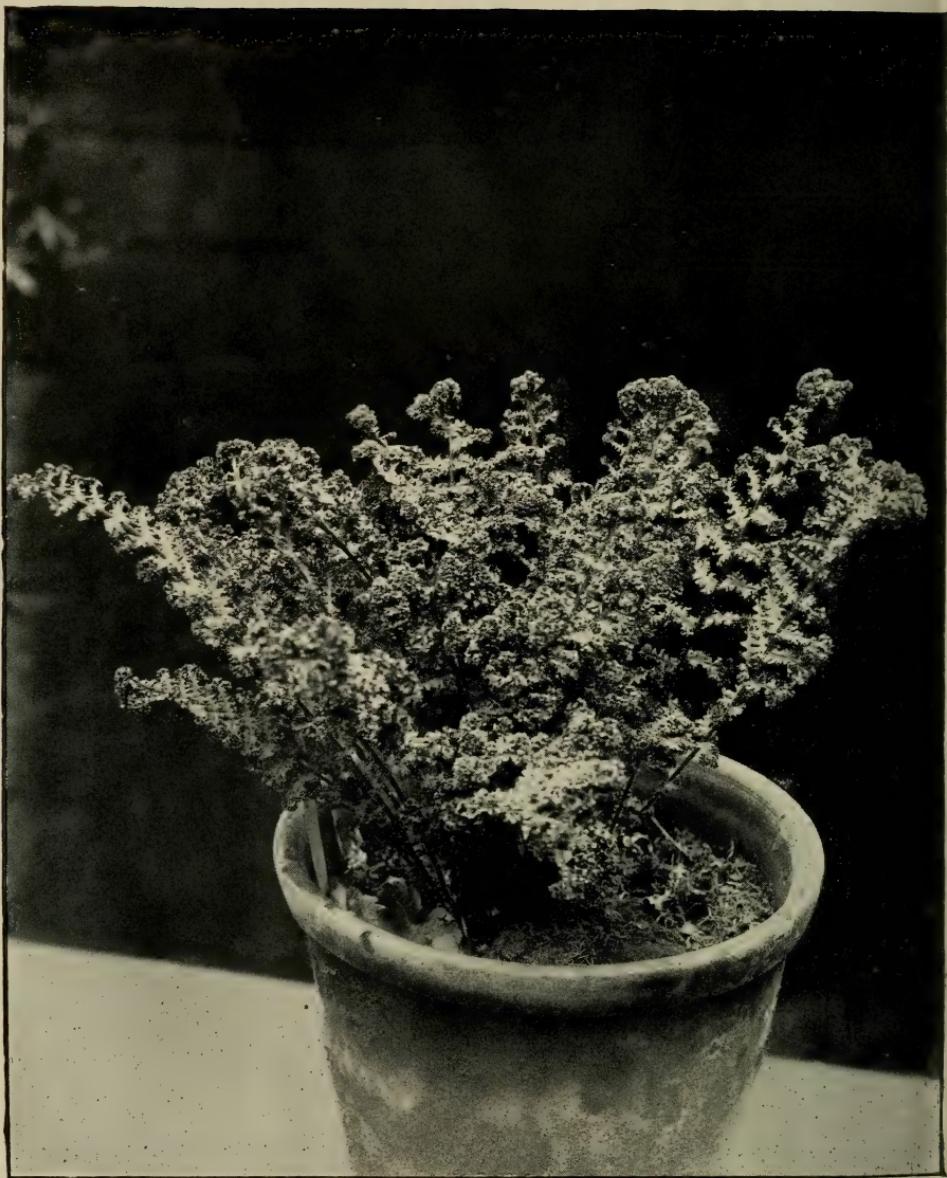
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LASTREAS MONTANA FORMOSA-CRISTATA F.L.S.

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EDITORIAL NOTES.

Owing largely to the inclemency of the weather, there has been little or no improvement in the Editor's health, and he is therefore once again compelled to claim indulgence for any shortcomings.

THE BRITISH FERN GAZETTE, VOL. 2, NOS. 13 TO 24.—The Editor would again remind members that a small number of Vol. 2 were bound into a very presentable volume of 313 pages and numerous illustrations. As no reprint will be available, and the books are widely recognized as most valuable contributions to our Fern literature, the opportunity of acquiring copies, even extra ones, should not be lost sight of. The price to members is 3s. 9d. post free, and speedy application is advisable to secure, as very few are left.

X The subscriptions for 1916-17 being due in advance, the Hon. Secretary would feel much obliged by a remittance of 5s. by return post to 11, Shaa Road, Acton, London, W.

OUR FRONTISPICE.

LASTREA MONTANA FORMOSA-CRISTATA F.L.S.

For the photo of this very beautiful form of the Lemon-scented Fern *Lastrea montana* we are indebted to Doctor F. W. Stansfield, as representing one of the best varieties raised by Mr. W. Barnes from a wild find of a species considered at the outset as rarely liable to vary at all, but which subsequently proved quite otherwise and most prolific in this direction.

SPECIES AND VARIETIES.

(Continued.)

On the other hand, a very distinct thing, found wild only once, is regarded as a variety. For instance, *Cystopteris (fragilis) Dickieana*, found only once wild, is regarded as a variety only, although it comes perfectly true from spores, and might conceivably hold its own as a wild plant. If a mountain side had been found covered with it, or a mile or two of shore largely inhabited by it, it would almost certainly have been called a species. Something of the kind actually happened in the case of *Pseudathyrium flexile*, which, when first found by Mr. Backhouse "in one place only in Glen Prosen," was called a variety of *P. alpestre*. On seeing specimens, and being informed that it was "most abundant in Glen Prosen," Newman immediately described it as a species. It has since been found in a number of localities by our president, Mr. Alex. Cowan, and others, but the plants vary from each other in the degree to which they depart from *P. alpestre*. In other words, there are connecting links with *alpestre*, although I am not sure that it merges imperceptibly into that species. Now this matter of

connecting links is the stumbling block which prevents the three forms of the old *Lastrea filix-mas* (species of Wollaston) from being universally accepted as species. The types are distinct enough, and the distinctions can be precisely defined; each one is also capable of holding its own in the struggle for existence, since wide districts can often be found in which each is the prevailing fern, if not the sole occupier, but, unfortunately, for precise botanical classification, there are numerous individuals which do not belong altogether to one type but present characters of two kinds, or intermediate characters. In this and similar cases I think we may fairly fall back upon the term sub-species. They are, in fact, species in process of evolution, not yet completely separated. It is quite conceivable that in no very long time the intermediate individuals may die out (they are even now much less numerous than the types), and we should then have three fully developed species. In the case of the *Polystichums aculeatum* and *angulare*, we have two sub-species in which the process of separation has gone a little further; that is to say, the intermediate individuals are much less numerous, and in many localities are scarcely to be found at all. In North Hampshire, however, they are frequent, and plants are often to be found which are difficult to assign to one "species" rather than to the other. To go back to *L. filix-mas* and its varieties or sub-species, Mr. Rowlands, quoting Babington, refers to *affinis* as a variety. This is the same thing as Moore's *L. f. mas incisa*, and is by Newman given the same rank as his *Borrerii* (*pseudo-mas* of Wollaston) and *abbreviata* (*propinquua* of Wollaston). It has also been described as a species (*Aspidium affine* and *Polystichum affine*) by German botanists. The figure of it in Moore's Nature-printed Ferns, however, appears to me to be much nearer to the typical *filix-mas* than either *pseudo-mas* or *propinquua*. I have certainly seen wild individuals much more distinct than Moore's

figure, and I have in my garden a plant found by the late Mr. Barnes (*L. f. mas incisa, Barnes*), which is quite as distinct as either *pseudo-mas* or *propinquua*, and which, if it were found wild in the same profusion, would be quite as much entitled to rank as a sub-species as either of them. It must be regarded, I think, as a variety, to be distinguished from a sub-species only by its, hitherto, smaller power of colonization.

What, then, about the "horticultural" varieties in which we, as fern-growers, are particularly interested? They are, in most cases, quite as distinct as the "botanical" varieties, and, indeed, often much more so; they are capable, in most cases, of reproducing themselves fairly truly from spores. What, then, is the bar to their ranking as varieties proper in the botanical sense? It is that they are found wild mostly as *isolated individuals*, and not in considerable colonies. *Polypodium v. semilacerum*, which is frequent in the West of Ireland and fairly so in some parts of England, is often recognised as a variety by those who would deny the title to the quite equally distinct, but not equally common, *P. v. cristatum*; and we know that *P. Cambricum* was described as a species by Linnæus, although it is devoid of one of the essential parts of a fern (*i.e.* fructification), and is therefore incapable of reproducing itself from spores. It must be admitted that there is some ground for the term of abuse "monstrosity," which has been so indiscriminately applied to horticultural varieties, inasmuch as in the early days of fern collecting many depauperations and deformities were gathered, propagated, and named. The British Pteridological Society has, however, since its foundation, set its face against the naming and perpetuation of mere ugliness. If the word "monstrosity" could be restricted to those forms which are less beautiful than the parent species, it would have a useful application, but I imagine that but

few of these now survive in cultivation, and with the multiplication of beautiful and symmetrical forms there is no excuse for the cultivation of abortions. Of course, it is a matter of taste as to what constitutes beauty, and what is beauty to one may be ugliness to another. I have heard, for instance, of cresting being condemned *in toto* as a deformity, and an eminent gardening authority "would as soon have a dog with a tail on the end of its nose" as a crested fern. Most of us, however, look upon cresting, so long as it is symmetrical, as a pleasing variation. I think it must be conceded that the essence of beauty in a fern is symmetry, and although some ferns which are not perfectly symmetrical may, for other reasons, be worth growing, the absence of this quality must always be looked upon as a defect.

Returning now to Mr. Rowlands and his very reasonable complaints as to the absence of uniformity in the names given to genera and species, even when it is regarded as a settled question what these are, I must admit that I personally take little interest in questions of mere priority, especially as the names first given, so far as these can be ascertained, are often absurdly inappropriate. When a name is in practically universal use, it seems a pity to alter it because some person, perhaps in the dark ages, called it by some other name long since forgotten. There would seem to be no finality in this matter, unless some researcher can discover the names given by Adam. If, however, the high scientific persons who try to settle these things will only agree among themselves, either as the result of a Vienna Congress or by some other method, I promise that I, for one, will conform to their decision. *Dryopteris aristata* will serve me just as well as *Lastrea dilatata*, *Phyllitis Scolopendrium*, as well as *Scolopendrium vulgare*, and "a rose by any other name would smell as sweet," but the trouble is that as soon as one becomes

accustomed to a new name, another alteration is made, and so on *ad infinitum*. Up to the present, in writing for the "Gazette," I have used the names under which I was brought up, simply because, in my judgment, they are those best understood by my readers.

F. W. STANSFIELD.

Reading, January, 1917.

A SERIOUS FERN PEST.

The following matter appeared partly in the "British Fern Gazette," Vol. 2, No. 13, but is of such importance that we have no hesitation in reproducing Sir F. Moore's addition, and suggesting the wisdom of submitting either the weevils or the grubs in suspicious cases to experts for their opinion before it is too late, as when once established it appears to be almost impossible to save the plant attacked.

EDITOR.

Our Native Ferns are, as a rule, so free from either disease or pests that we are apt to think there is no necessity for being on our guard against danger. But a recent experience of mine has been of a very startling nature, and I am sure the readers of the "Gazette" will thank me for a warning with reference to a danger, which if not common is certainly terrible.

For some time a large and exceptionally fine collection of Native Ferns with which I am acquainted was observed to lack its usual vigour; the crowns developed unevenly, making much less than their usual number of fronds, and the fronds produced in many cases were very unequal in size and finish. Under the impression that what was wanted was re-planting and new compost, the collection was lifted and very carefully re-planted. Unhappily the

results this year, instead of being improved, were so much worse that a thorough inspection was instituted, and I am sorry to say that a very alarming discovery has been made. The whole collection has been found to be infested with a white grub which forms the larva of a weevil. These pests appear to burrow downwards from the top; they hollow out the stems of the fronds and work right into the very heart of the crowns, so much so that their favourite resting place would seem to be the cells where the fronds for the succeeding year are in process of formation. The melancholy feature of this discovery is that unhappily there appears to be no cure if once the pest gets established. The collection to which I refer, so far as it is affected, is about to be destroyed, and all the infected soil is to be removed. The importance of giving publicity to the matter consists in the forearming which arises from forewarning. It is quite possible that if the approach of the marauder was recognised early its ravages might be stayed. What is suggested is a very careful examination wherever established Ferns show signs of failure or lack of vigour. So far as the habits of the weevil have been observed, it appears to attack chiefly the *Polystichums* and *Scolopendriums*; the *Athyriums* and *Lastreas* seem likely to escape, and no inroad has been made upon the *Polypodiums*. I have ascertained that the name of the insect is *Syagrius intrudens*.

H. KINGSMILL MOORE.

With reference to above we have, with the kind aid of Mr. F. J. Chittenden, of the Royal Horticultural Society's Gardens at Wisley, ascertained that the insect in question is a Weevil of Australian origin, which has found admission to this country doubtless with imported plants, and has proved terribly destructive to Ferns in the Glasnevin Gardens at Dublin. The insect is very fully described in

a paper by J. Mangan, B.A., etc., in the "Journal of Economic Biology," Vol. III. (1908), pp. 84-90, with several plates, but according to his notes its attacks had so far been exclusively confined to hot-house Ferns. This, however, judging by the material sent us by the Rev. H. Kingsmill Moore, would appear to be no longer the case, since such material consisted of stout caudices of *Polystichum angulare*, and his note refers to other species which would certainly not receive hot-house treatment.* About a dozen specimens of the living beetle were sent to us for inspection. Both these and the material were at once immersed in boiling water to prevent risk of escape. The Weevil is named *Syagrius intrudens*, and is very much smaller than the Vine Weevil, *Otiorrhynchus sulcatus*, with which we are only too familiar already, being about one-third the size, with a much rougher cuticle and a comparatively larger proboscis. The grubs are white and curved, similar to those of the Vine Weevil, but on the same smaller scale. The damage done by the grub is effected differently to that effected by the Vine Weevil, the eggs being laid, not in the soil, but in depressions gnawed into the frond stalks into which the grubs burrow when hatched, thus destroying the fronds to a much greater extent, the frond, however robust, being crippled or destroyed. The beetles, however, attack the frond laminæ in the same way as does the Vine Weevil, viz. by gnawing from the edges. When severely affected, this suppression of proper frond growth by the grub appears to weaken the central axis, and so lead eventually to the entire perishing of even large established plants. That the actual axis of growth is directly destroyed we are inclined to doubt, as on dissecting the material sent we could find

* The Rev. H. K. Moore confirms this having visited the collection, which was grown entirely in the open,

no burrowings in its vicinity, though the single grub we found was entangled in the scales of the frond bases (*Polystichum*). We could find no traces of attack upon the roots or undersides of the caudices, as with the grubs of the Vine Weevil. The fronds alone appear to be devoured. As with the Vine Weevil, it has been found that complete immersion in water of pots or pans, when these are employed, compels the beetles to leave the soil almost immediately and climb the frond stalks, where they are easily captured, thus supplying a means of reducing their numbers where such immersion is possible. Both beetle and grub appear to be immune from the action of any insecticide remedy which the plants can withstand, even hydrocyanic vapour failing to kill them, while immersion in water for a long time leaves the grubs unharmed. Under these circumstances it is almost, if not quite, impossible to get rid of the pest if once established in immovable plants, since practically the only way of eradicating it is to immerse the pots or pans whenever it is noticed that the fronds are attacked by the beetle, which is purely a night feeder. This, if persisted in throughout the season, is fairly effective. Should any of our readers come across a Weevil of this small type, we should like to see it, not necessarily alive, but preferably killed by hot water. Incidentally we may mention that although the affected caudices sent us were immersed in boiling water before dissection, some pieces being dropped on to damp sand in a stoppered bottle after that operation are already developing, despite the scalding, numerous bulbils on the freshly exposed surfaces in the shape of small white pimples, an indication that resuscitation and even propagation is possible, even when the plant is seemingly quite destroyed. (*Vide also "A Resuscitated Collection," Vol. I., p. 251.*)

THE EDITOR.

ROYAL BOTANICAL GARDENS,
GLASNEVIN, DUBLIN,

DEAR MR. DRUERY,

March 7th, 1917.

I fear there is nothing I can write for you as to infected sources, as I have no idea from whence the weevil came. Professor Carpenter concluded it was of Australian origin. I can only say that it has been a most destructive pest in every way. It first appeared in the houses, and cleared out two-thirds of my collection of ferns. I found that anything that killed the weevil killed the plants.

Cyaniding only killed any beetles that might be out and about; it did not reach the grubs in the root stocks, or the beetles under the soil. From the greenhouse it spread to my out-door collection, which was a particularly good one, enriched from Bristol, the late Dr. Lowe, of Shire Newton, Chepstow, and many other collections. I think it must have got to this from soil used as top dressing, the old potting soil which had been screened. The result is my whole collection of hardy ferns is gone. I burnt the last of it last year. Indoors I have it well in hand and am almost clear, and the collection is beginning to look well again. The only remedy I found was soaking the plants in water, one inch above the level of the pots, and picking off the beetles as they come to the surface. This I do four times yearly. From sixty to seventy at one time, I only got nine last time I steeped in all the different houses.

You will see from this that I cannot possibly state where the weevil came from. I do not know where it is now distributed, nor do I know if it exists outside these gardens, therefore I am unable to give any warning such as you suggest.

With kind regards,

I am, faithfully yours,

F. W. MOORE.

FILMY FERNS.

We now come to a class of ferns which, although native to our country, grow in such moist and shady positions as only deep and secluded glens or even rocky humid caves by waterfalls can furnish, hence ordinary out of door culture is quite out of the question, and practically nothing but bell-glasses or Wardian cases are available for their culture, since even the moist air of a fernery under glass is not sufficiently evenly and constantly humid for them. They are truly the children of shade and aerial humidity—a touch of hot sun shrivels them irrecoverably, and with these facts in mind we must treat them accordingly. Where they grow we find them revelling in rocky rubble, intermingled with vegetable débris and sand, their creeping root-stocks forming a sort of mat thickly covered with their translucent dark green fronds, the smaller species, the *hymenophyllums*, resembling luxuriant moss clumps; the larger species, *Trichomanes radicans* or the British Fern, anchoring itself upon the stones by roots penetrating deeply among them, and emanating from a thicker creeping root-stock of a black colour and hairy, in the fashion of our friend the common Polybody, the beautifully twice-cut erect transparent fronds rising singly in like fashion. Moisture-lovers as all are, they do not affect bogs, but always running water, which means a need for drainage. As we have now mastered all their vital needs let us see how we can provide for them artificially.

A WARDIAN CASE

we will take into consideration, though a redware pan closely fitted with a bell-glass answers as well, bar the more restricted space. An ordinary Wardian case has a zinc-lined receptacle for soil about four or five inches deep, and this should have an outlet provided with a tap, since, as we have seen, drainage is a necessity. To secure a free

outflow for surplus water we cover the bottom of this receptacle all over with concave pieces of broken flower pots, hollow side down, supplementing these with pieces of broken brick or pots, until quite two inches are taken up by this sub-arrangement. Over this spread a thin layer of moss, just covering it, and upon this we may now spread a good open compost of brown peat, good lumpy loam, and coarse silver sand in about equal proportions, filling up well to the brim. Upon this we may spread a number of pieces of any open porous stone, sandstone or limestone, or, failing these, pieces of broken red bricks. On these spread a little more compost, and then peg down on the surface the little mats of *hymenophyllum* and the long, creeping root-stocks of *trichomanes*, taking care to put the latter near the centre, so that its larger fronds may have free room to develop. Now take a double handful or two of finely rubbed down compost as described, and sift this well over until all roots are quite covered, and perhaps even the little mats of fronds themselves, and as a final operation take a watering-can full of rain-water, if possible, and give the whole such a drenching shower that this last addition is washed right into the rest of the soil, and so beds the plants firmly in the desired positions, all fronds being visible, and even the creeping root-stocks of the bristle fern, as they like the air and do not burrow. Now put on your glass, and place the case where it gets

AMPLE LIGHT BUT NO SUNSHINE;

close the doors and even the ventilating apertures, and leave it severely alone for a month or two, by which time ample evidence of growth will certainly be afforded if the above instructions are complied with, and the plants were healthy when put in. As the moisture exhaled from the soil and condensed on the glass trickles back again to the soil a close case needs water rarely, but now and again,

say once a fortnight, when growth is well started, a gentle dewing with perfectly clean water will be beneficial. At the outset, however, "leave it alone" is the motto.

Having mastered the *modus operandi* of the start, we will devote a line or two to the plants themselves.

HYMENOPHYLLUM TUNBRIDGENSE AND H. UNILATERALE.

Both these are small-growing filmies, with fronds an inch or two high as a rule, though they may attain double that size. The fronds, which are twice divided into blunt-ended, tongue-shaped lobes, are semi-transparent and very much alike in both species, but in *H. unilaterale*, as its name implies, the divisions all spring from the upper half of the pinna or side division of the frond. These ferns bear their spores in relatively large urn-shaped cups seated at the base of the pinna next the midrib. In *H. Tunbridgense* this cup is fairly level-brimmed, while in *H. unilaterale* it is cleft in the middle. Both have long, creeping root-stocks, quite thread-like, from which the fronds spring singly. Some branched forms have been found of *H. unilaterale*, but the variation has no appreciable effect on the appearance of the clumps, which owe their charm entirely to their mossy look and translucent, fresh, dark green colour.

TRICHOMANES RADICANS.

This fern now is very rare in a wild state, only existing in very secluded mountain glens on private estates, but formerly it was found in a number of places, and as a species it is widely distributed in many distant parts of the world, especially in warmer climes than ours. It is, however, quite hardy. Its culture is already indicated. A number of very distinct varieties have been found, the best of which are: *T. r. Andrewsi*, with narrow and more lance-shaped fronds than the type; *T. r. dilatatum*, a

splendid robust form; *T. r. dissectum*, very finely cut; *T. r. densus*, a congested form; and one rather small-growing variety, *T. r. proliferum*, was sent the writer from Dublin some years back, which bore little plants freely on the fronds like *Asplenium bulbiferum*, but although we raised several plants from these bulbils, no persuasion, either by ourselves or by our friends, has induced them to follow the parental lead.

IN CONCLUSION,

although it is not a Britisher, we cannot ignore the wonderful filmy fern, *Todea superba*, which is equally hardy, and forms a charming companion, where room is available, for its much larger growth. The same treatment fits it exactly, except as regards planting, which is done in the ordinary way, as it is of the shuttle-cock persuasion, growing in a circlet round a central crown. A brick pit sunk with a northern aspect and closely glazed would accommodate this and the others splendidly.

C. T. DRUERY.

FERN VARIATION IN GREAT BRITAIN.

Up to a comparatively recent date, the departures from the normal type of ferns which were found growing wild under perfectly natural conditions received little or no attention from professional botanists, but were simply dubbed "monstrosities" and left for amateurs to collect, cultivate, and observe. Eventually, however, the discovery that "sports" did not always merely involve a superficial change of form, but also that this change was in some cases correlated with hitherto unknown modifications and abridgments of the normal life cycle, led to a greater interest being taken, with the result that theories

as to the origin of alternation of generations were seriously affected. Before these investigations and discoveries, it was assumed that the life cycle was necessarily spore, prothallus, fertilized egg, and finally the sporophyte or fern proper. Apogamy, however, discovered by Professor Farlow, eliminated the sexual act, a vascular structure originating in the prothallus which resulted in an asexual bud, whence at once arose the sporophyte, the life cycle then being spore, prothallus, sporophyte. This, though first remarked in a normal *Pteris cretica*, was subsequently found by DeBarry to occur with seeming constancy in an abnormal tasselled form of *Lastrea* (*L. pseudo-mas cristata*) and several other species normal and abnormal. The next discovery was that of soral apospory by the writer, on a form of *Athyrium filix-fœmina*, which shortened the life cycle in another way altogether, by eliminating the spore, masses of prothalli being produced, as Professor F. O. Bower subsequently ascertained, from the stalks of aborted sporangia, on the ordinary soral sites.* Here the life cycle runs thus, sporophyte, sorus, prothallus, fertilized egg, sporophyte. No sooner was this phenomenon announced than Mr. G. B. Wollaston reported the still more remarkable case of apical apospory in the form of *Polystichum angulare* (*P. ang. pulcherrimum*), in which the abnormally long sickle-shaped pinnules had their terminal and segmental apices dilated into prothalli, which when layered ran the normal course, with the exception that resulting plants were invariably defective and depauperate. Here the sorus is eliminated, and the prothalli are produced altogether independently of the usual reproductive sites, by a modification of the tissue of the sporophyte. Several quite independent finds of the *pulcherrimum* type existed,

* DRUERY, C. T.: Jour. Linn. Soc. 21: 354. 1884: 22: 427-440.
1885. BOWER, F. O.: Trans. Linn. Soc. 2: 301-326. 1887.

and in every case apical apospory was found to be correlated with it, and furthermore soral apospory existed on the fertile fronds. The modifications of the life cycle, however, were not even yet exhausted, for curiously enough a sporeling of the apogamous variety of *Lastrea* above mentioned was found by the writer to bear a well developed prothallis at the tip of its first frond, and the second and third bore prothalli, even profusely, on their surfaces, a sort of prothallic rash as it were.* These produced a brood of plantlets, but one and all lost this aposporous character and assumed the merely crested type of the parent as their later fronds arose. Here as we have apogamy and apospory associated, the life cycle dwindle down to the sporophyte, prothallus, sporophyte, the shortest possible cut except the bulbils on the fronds of viviparous ferns, which have no intermediate stage at all. Subsequently, the writer found both soral and apical apospory on another variety of *Athyrium*, and apical on a fimbriate form of *Scolopendrium*.† Curiously enough, subsequent to the discovery of the aposporous *Lastrea*, a sporeling of the same parentage originated in Mr. Cropper's collection, which was and is profusely prothalliferous from all apices, the smallest piece of frond forming a mass of prothalli when layered, which creeps about *Marchantia*-like and yields a perennial crop of typical plants. Finally, in this connection, Professor Farlow found an aposporous (soral) type of *Pteris aquilina*. Subsequently, at Professor F. O. Bower's suggestion, Mr. W. H. Lang commenced a series of investigations in connection with the prothalli produced from spores of abnormal varieties, and thereby practically completed the series of abnormal modifications of the life cycle, by finding in more than one species prothalli

* DRUERY, C. T.: Jour. Linn. Soc. 29: 480-482. 1892.

† DRUERY, C. T.: Jour. Linn. Soc. 30: 281-284. 1892.

bearing developed sporangia and spores,[†] thus cutting out the sporophyte, and reducing the life cycle to spore, prothallus, spore, an absolute minimum. I must refer to Mr. Lang's papers for the most interesting details of these and other vagaries, and will merely add that on one and the same prothallus several different modes of reproduction were found, namely, asexual bulbils, some producing fronds and others merely roots, other prothalli budding out from the surface, and sporophytes sexually developed, all these on prothalli which themselves were thick cylindrical fleshy masses instead of the normal flat cordate thallus, while archegonia, antheridia, and sporangia were indiscriminately dotted about among the other varied growths.

The above facts are cited merely as a prelude and justification for the suggestion that in the study of American species the varieties should have due attention and not be labelled "monstrosities," and ignored as they were in Great Britain for a very long period. The writer has repeatedly urged and urges once more that it is quite as much, if not more, in the direction of nature's exceptions that we should seek the key to many of her secrets. Certainly in the study of the abnormal fern types alluded to, a number of new and unexpected facts have cropped up, which largely modify previous ideas regarding fern reproduction, not one of the links in the normal life cycle being absolutely essential. Spore, prothallus, egg, sporophyte, have all in turn been shown to be superfluous, the fern in one shape or another reproducing itself without them.

As regards the great number of varietal forms which have originated in Great Britain, there is little doubt that

[†] LANG, W. H.: Proc. Roy. Soc. 63: 56-61. Phil. Trans. Roy. Soc. Ser. B. 190: 187-238. 1898.

it is due far more to the continued existence of a coterie of persistent variety hunters than to any predisposing elements in the environment. The travelling botanist is rarely a variety hunter, but a species hunter, hence he does not in a habitat full of known species examine them plant by plant, or scan them with a peculiarly trained eye, as would the hunter for sports. If he have such an eye and a taste for varieties, we have the evidence that "finds" will crop up abroad as well as at home. Witness Mr. George Brown, who found *Woodwardia radicans cristata*, two finely crested forms of *Lastrea dilatata*, and two tasselled forms of *Asplenium hemionitis* in the Azores; while the writer, hunting in all for about two hours recently at Fayal (Azores), found a clump of *Asplenium hemionitis* beautifully tasselled throughout, and a fine pendulous polydactylous variety of *Pteris aquilina* which lined the high road for fifty yards. This being so I would advocate variety hunting in the United States as a pursuit likely to reward its votaries not merely with very beautiful types for their collections, but also with material well worthy scientific attention. Thanks to some short notes sent to the *Fern Bulletin*, I have received already fronds of a crested *Athyrium* found by a lady, and plants of *Denstaedtia punctilobula cristata* and *Phegopteris hexagonoptera truncata*, the latter found by Mr. W. R. Maxon on the Potomac, which have originated in the United States as wild sports, a proof that such sports exist. At the same time, however, I note that much stress is laid upon doubtful subvarieties, which a wider knowledge of marked ones would probably minimize considerably. In my own fern hunting expeditions I invariably come across subvarieties in which the cutting is more or less modified; but with the abundance of really marked types in mind, these are simply noted and left.

As exemplifying this abundance the figures from

Mr. Lowe's *British Ferns*, a descriptive list published in 1891, may be appropriately quoted.

						No. of vars.
Pteris aquilina	..	..	..	..	..	17
Adiantum capillus-Veneris	..	..	..	..	..	34
Asplenium adiantum nigrum	..	..	..	..	..	16
trichomanes	..	..	..	..	..	27
maximum	..	..	..	..	..	28
Athyrium filix-femina	..	..	..	..	..	313
Scolopendrium vulgare	..	..	..	..	..	450
Polystichum aculeatum	..	..	..	..	..	34
angulare	..	..	..	..	..	394
Lastrea filix-mas	..	..	..	..	..	54
pseudo-mas	..	..	..	..	..	42
propinqua	..	..	..	..	..	28
montana (oreopteris)	..	..	..	..	..	77
dilatata and others	..	..	..	..	..	57
Polypodium vulgare	..	..	..	..	..	74
Other varieties of sundry species	..	..	..	..	..	214
<hr/>						
Total	..	..	..	..	..	1,859

Upon analysis it is found that 1,119 of these were wild finds, without reckoning additional independent finds of forms too similar to differentiate. This list cannot be regarded as exhaustive, and we may safely reckon the distinct varieties at over 2,000, and the wild finds at 1,500. As a concrete example of what one man can do in a single district, Mr. J. Moly, of Langmoor in Dorset, is credited with no less than 600 distinct finds in that and adjoining counties. His near neighbour, Dr. Wills at Chard, found several hundred more. The numbers, however, represent the outcome of many years of persistent search, which, however, could not have been exhaustive, as it is recorded that Mr. Patey, visiting Mr. Moly, found one of the finest of all types (*P. ang. plumosum Patey*) in Mr. Moly's own hedge, while Dr. Wills was indebted to a farm labourer for that unique fern *P. ac. pulcherrimum*, also found in a

hedge close to his house, and thought to have "a funny look" about it by the finder. Finally, as an inducement to fern hunting, we have the incontrovertible fact that many of these wild sports are far more beautiful than the normal forms, and as such constitute decorative foliage plants of highest merit.

A word may be added in reference to the soral bulbils, as these occurrences should afford good material for the morphological study of the sporangium. Professor Bower's monograph on apospory and allied phenomena, already cited, gives some illustration of this, and the writer's previous paper ‡ also alluded thereto. Since then, however, such soral bulbils have been recorded as occurring on *Adiantum capillus-Veneris* vars. *daphnites* and *imbricatum*, and on *Polypodium vulgare elegantissimum*, while most of the *superbum* section of plumose Athyria have inherited the capacity from the original wild Axminster find. In all these cases the bulbils are seated on the soral sites, and are usually accompanied by sporangia grading from imperfect and aborted ones to perfect ones with full complement of perfect spores which germinate freely and yield fairly typical plants. In the case of the Polypodium, such bulbils occur only on the most highly developed fronds, and on pinnules of extremely fine cutting, the terminals of which run out into nearly inch long lingual extensions, pointing I think to aposporal tendencies. The sori are massive and consist of filamentous processes, some of which lengthen out into fronds, while others form perfect sporangia of normal golden yellow colour. Here, then, do not appear those massive cellular growths which are found on the Athyria, but in time one bulbil gets the predominance and a little plant of several small fronds is developed. Unfortunately, neither my leisure nor my

‡ Jour. Linn. Soc. 21: 254. 884.

training permit me to investigate properly transitional stages which must exist in cases like these, but I should be happy to provide material to any one who desires to follow up this line of research.

CHARLES T. DRUERY.

MYSTERIOUS FERNS.

Although our utter ignorance of the cause of variations renders every "sport" a mystery, there are few ferns in cultivation whose origin is so strange as to place them in a separate category, and entitle them specially to be classed as above. In the ordinary way, whether under natural conditions or under culture where considerable numbers of specific forms are found or raised, we occasionally find more or less isolated specimens which have apparently spontaneously departed from the parental or specific type, and sometimes to a very extraordinary extent. These usually are capable of transmitting the new features to their progeny, and may also propagate by offsets, so that when discovered as adults, and perhaps old specimens, they may be associated with their offspring, but these latter generally are very few in number. In sowings of such varieties, it is also a common thing to find still further departures from the specific form, but usually on similar lines; the species, however, remains unchanged.

In the cases I purpose citing, the sports have originated in a fashion which gives little or no clue to their origin, as will be seen. Some ten or twelve years ago Mr. George Whitwell, of Kendal, made a sowing of *Blechnum spicant* varieties, and raised a number of plants of that species, but among them he found, not only one, but several plants of an extremely dwarf, congested, and rameous form of *Lastrea propinqua*, all alike and unassociated with others of

that species, and these plants are utterly unlike any known variety of *L. propinqua*. They are only three or four inches high, dark green, extremely dense and hard in texture, and the small fronds branched at one or more points. Mr. Whitwell, whose authority and experience are unimpeachable, has various forms of *L. propinqua* in his collection, and the possibility of stray spores from them cannot be overlooked; nevertheless, there is not a form among them to which he or the writer could impute the parentage, and, as has been said, several plants precisely alike originated simultaneously.

Another case associated with *Blechnum spicant* may be cited, viz. Hartley's *B. s. crispissimum*, a dwarf, dense form two or three inches high only, which came *en masse* from a sowing of *B. s. strictum*, a long and somewhat narrow form to which the whole batch presents no similarity at all, and, again, is diverse from any known type. I raised a batch of this myself, and found even the prothalli to be thick and fleshy masses instead of the usually thin laminæ. A third still more mysterious case is that of *P. aquilina grandiceps depauperata*, which appeared spontaneously and simultaneously in five different and isolated places in Messrs. Birkenhead's nursery at Sale, near Manchester. This has lax, pendulous fronds, repeatedly branching into slender, depauperate, tasselled ramifications. All the plants were alike, and yet they occurred in widely separated houses at one and the same time as chance seedlings. They resemble no other known variety at all, and the only theory that can be formed is that somewhere, at the place where peat or leaf-mould had been taken and supplied to the nursery, a wild sport of the type existed or exists, whose spores had thus been imported into suitable quarters for development. This was eventually lost to cultivation.

In the former case we have a feasible theory, but what

can we say for *Adiantum Luddemanianum*, that extraordinary ramosc and crested form of maidenhair so long known in cultivation? This originated in a French nursery, and was found growing in the soil under the staging of a greenhouse by Mr. E. Schneider, who chanced to pay a visit. Some plants of *A. capillus veneris* had been grown in the nursery, but the plant in question was the only fern visible. It was a robust clump, and speedily changed hands, as may be imagined, the owner of the nursery simply regarding it as an interloper. The presence, under the circumstances, of such an extraordinary and unique "sport" which the solitary plant evidenced was a mystery indeed. Another instance, presenting new features in the specific direction, occurred some years ago in Messrs. J. Veitch and Sons' nursery at Chelsea, in the case of *Todea grandipinnula*, assumed to be a form of *Todea superba*, or possibly a hybrid between *T. Fraseri* and *T. hymenophylloides*, as plants of these were adjacent to the culture which yielded the plants—a fairly large batch, all alike. Its hybrid character is, perhaps, but not surely, indicated by the infertility of its spores, as the *todeas* are difficult to raise. On the other hand, some time afterwards, *Todea Moorei* (*Baker*) was introduced as a new species from Australia, and this cannot be discriminated from *Todea grandipinnula*.

The appearance of specific exotic forms in collections prior to their intentional introduction, such as occurred with *Lomaria Patersoni* at Kew years before it had been found in its native habitat and sent thither, can, of course, be accounted for by wind-borne spores being introduced in the soil attached to other importations, but that is a very different matter to most of the cases cited above, where no similar type is known to exist, and where the chances would seem to be infinitely against the appearance of not one only but numerous examples within the very

limited area of an ordinary culture. The case of the *todeas* involves the actual evolution of a different species at one jump, for had the varied type not appeared under culture as described, the subsequently-imported plants would never have been associated with *T. superba* at all, a fact which opens up the whole question as to wherein lies the difference between a true species and an absolutely, constant distinct variety which produces true progeny, in continuous succession, as so many varieties do.

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

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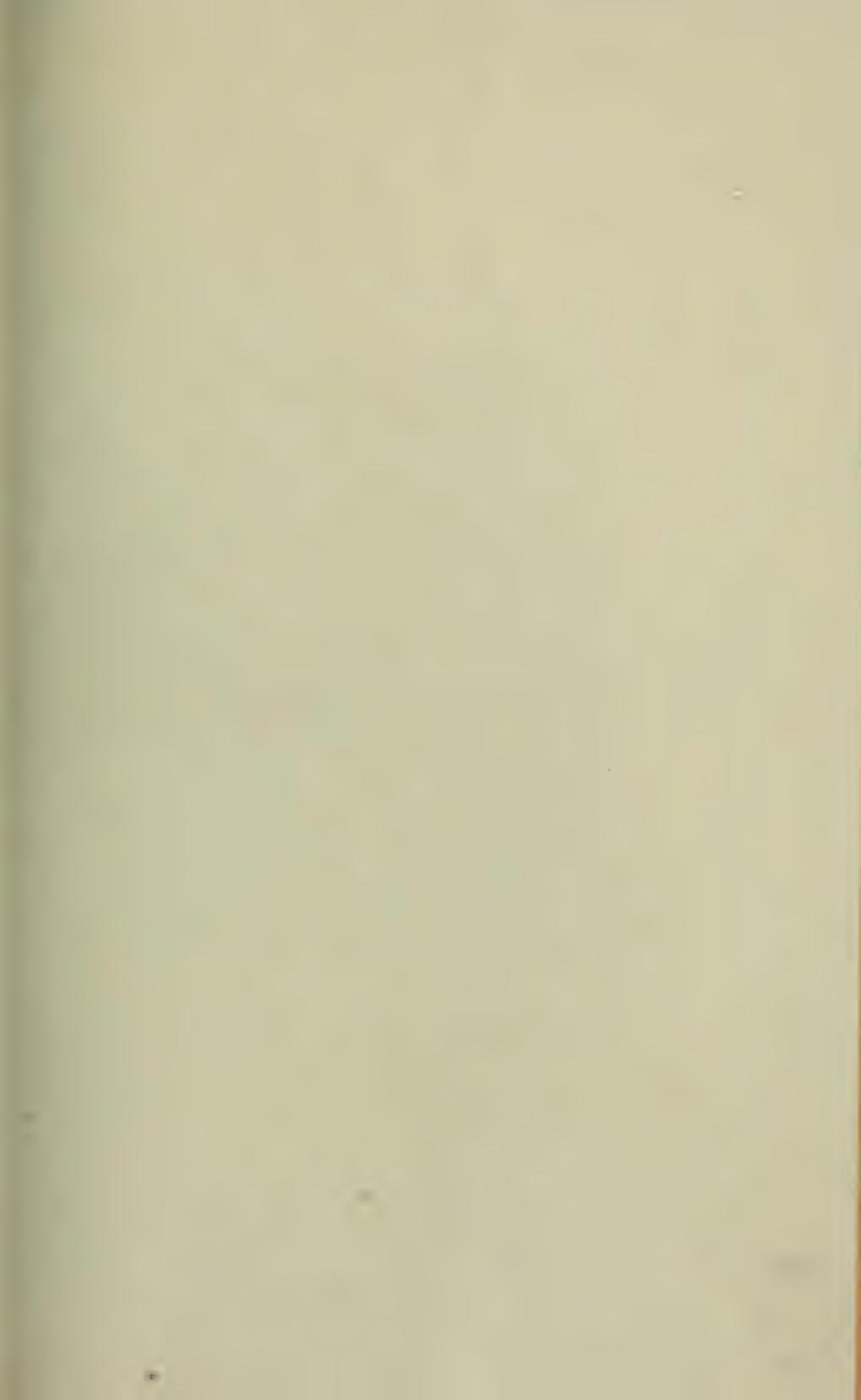
F. W. STANSFIELD, M.D.

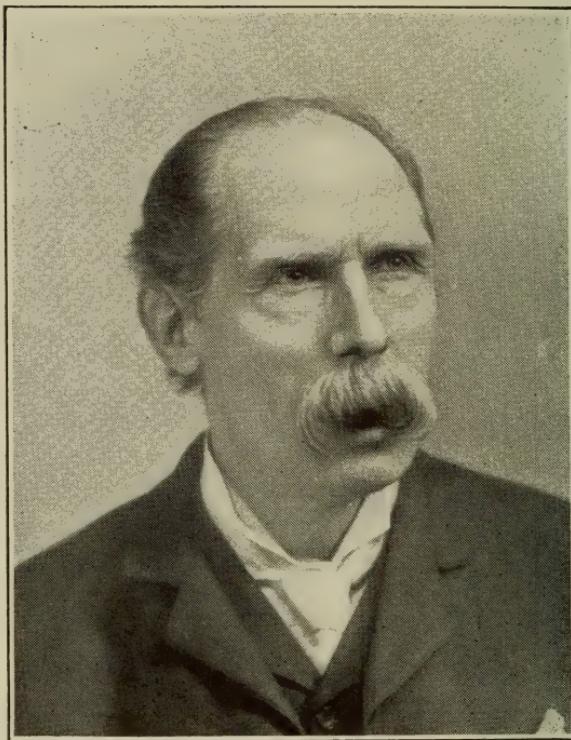
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THE BRITISH PTERIDOLOGICAL SOCIETY

(Hon. Secretary, W. B. Cranfield, East Lodge, Enfield Chase, Middlesex.

KENDAL, WESTMORELAND.





The late Mr. Charles T. Druery.

THE BRITISH FERN GAZETTE.

VOL. 3.

SEPTEMBER, 1917.

No. 33.

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The late Mr. C. T. Druery.

Our readers will learn with the deepest regret that Mr. Druery's long period of enfeebled health has ended in his death. He passed away peacefully and painlessly on August 8th, and was buried at Acton cemetery on August 11th. His funeral was attended, on behalf of the Society, by Mr. W. B. Cranfield, Mr. T. E. Henwood and Dr. Stansfield. So terminates a forceful and unique personality in the Fern world. His services to the British Fern cult have been gigantic, and his labours on behalf of the Society herculean. His loss leaves a gap which it will be impossible adequately to fill. The writer's acquaintance with him dates from 1882, *i.e.* from about a year after his first find, and therefore existed during practically the whole period of his association with British Ferns. Throughout that time he has manifested an unflagging and whole-souled

enthusiasm for the department of botany, which he had chosen as his speciality. He never tired of pushing the claims to notice of his favourite plants and, although there were many other departments of science and art in which he was interested and profoundly versed, he was always best known as "Druery, the Fern man." He wrote voluminously on many subjects both in prose and verse, but always most happily and spontaneously on this, his favourite subject. He was a brilliant conversationalist, with an unfailing fund of wit and humour. His jokes and puns were incessant and, from their very abundance, were occasionally atrocious but always ingenious and frequently brilliant. Many of his happy and witty sayings will long be remembered by his friends. His best claim to enduring fame rests upon his discovery of the curious phenomenon of apospory in Ferns. For this he had an exceptional opportunity in being placed in possession, by the late Col. A. M. Jones, of material from one of the ferns in which it is most easily manifested, viz. *Athyrium f.f. Clarissima*. Mr. G. B. Wollaston had indeed preceded him in the actual observation of apospory (in a different fern), but had failed to follow up and note the significance of the discovery. Mr. Druery's observations were made quite independently, and the result was immediately made the subject of scientific scrutiny and record, and consequently the discovery will always be deservedly associated with his name. Like almost every other Fern fancier, Mr. Druery was ambitious as a hunter of wild varieties. He devoted most of his holidays to this quest, and was successful in making many interesting finds. His opportunities, however, as a town dweller, were much fewer than those of a countryman and especially of a resident in a ferny district, and his successes as a hunter were consequently not to be compared with those of Padley, Moly, Wills, Barnes, Whitwell, etc. His best finds were probably his *Blechnum sp. concinnum* (which

first fired his enthusiasm for hunting), his *Lastrea montana cristata-gracilis* (which is very close to the much older *L. m. cristata* of Clark), and his Kilrush *Athyrium f.f. cristatum*, certainly one of the best crested Athyriums ever found wild. As a raiser and propagator of Ferns he was exceedingly successful. His power of minute observation and his scientific carefulness and precision of work made him succeed where others had failed. Besides *A. f.f. Clarissima*, he was the first to propagate, when it was on the verge of extinction, the crested form of *Lastrea ænula*. It is to his work also that we owe the survival of the race of *P. angulare Baldwinii*, the highest development of Col. Jones's wonderful strain of plumose divisilobes. When the only existing plant of this was in the possession of Mr. E. J. Lowe, Mr. Druery discovered spores upon it and—obtaining permission to take and sow them—carried them off in triumph and raised from them five plants more or less resembling the parent. Two or three of these still survive in the collections of Mr. Cranfield and Mr. Henwood, and are very close imitations of the parent. The original plant has been lost sight of, and has probably ceased to exist. It is entirely to the efforts of Mr. Druery that we owe the "superbum" strain of *A. f.f. plumosum*. The two finest developments of this strain are *plumosum*, Druery (non-crested) and his *plumosum percristatum*, which is the best known example of the union of the crested with the plumose character. Both of them are gems of the first water and constitute the highest expression at present known of the beauty of the plumose Lady Fern—putting *A. f.f. Clarissima* out of the question as something more than a plumose fern. His latest achievement was the raising of the *gracillimum* strain from *P. aculeatum pulcherrimum*, the credit of which, however, he must share with Mr. C. B. Green who grew the plant which supplied the spores and who also himself raised *gracillimums* and, along with them,

the still finer *pulcherrimum plumosum*, Green. Mr. Druery's success with the *gracillimums* was remarkable, inasmuch as he got such a large proportion of good things among his seedlings—30 per cent. of *gracillimums*, if we remember rightly, was his estimate. This man has made his mark upon life, and has left the world richer than he found it. We say farewell sadly. May we profit by his example.

F. W. S.

EDITORIAL NOTES.

The death of our Editor and Hon. Secretary, combined with the effects of the war, has brought about a crisis in the affairs of the British Pteridological Society. As it seems hopeless to expect that a general meeting, at all representative of the members, could be obtained under present conditions, Mr. Cranfield has kindly consented to act as Honorary Secretary *pro tem.*, and Dr. Stansfield has undertaken, at the late Editor's request, to act as temporary editor until either a general meeting can be held or until other action shall be directed by the President and Committee. Subscriptions for the current year (1917-18) are now due and should be sent to Mr. W. B. Cranfield, East Lodge, Enfield Chase, Middlesex. Contributions of material for the Gazette may be sent (for the present) to Dr. Stansfield, 120, Oxford Road, Reading.

The subscriptions for 1917-18 being due in advance,
X the Hon. Secretary (*pro tem.*) would feel much obliged
 by a remittance of 5s. by return post to East Lodge,
Enfield Chase, Middlesex.

BRITISH PTERIDOLOGICAL SOCIETY BALANCE SHEET, AUGUST 17, 1917.

RECEIPTS.		OUTLAYS.		
		£	s.	d.
1916.				
Aug. 7.	To Balance at Bank ..	65	12	8
"	89 Subscriptions (1916-17) at 5/- ..	22	5	0
"	" (in arrear) at 5/- ..	5	0	0
"	" (in advance) at 5/- ..	1	15	0
"	Bank Interest ..	1	6	0
"	Back Numbers of Gazette and Bound Volumes ..	1	2	6
1917.				
Jan. 2.	Dec. ..	"	"	..
		"	"	Frontispiece ..
	Mar. ..	"	"	..
	"	"	"	..
	June ..	"	"	..
	"	"	"	..
	Clerical Assistance ..	"	"	..
	" Envelopes ..	"	"	..
	" Carriage, etc., on Gazette ..	"	"	..
	" Postage for the year ..	"	"	..
	" Cash in late Secretary's hands ..	4	15	0
	" Balance in hand ..	3	8	4
		45	4	8
		<u>£</u>	92	6 2

Since the preparation of the Balance Sheet, all the Society's books and papers have been handed over, the Subscriptions collected by the late Secretary accounted for, and all Liabilities discharged. The number of Subscribers is 126; four new Members joined in the past year; five Members resigned; and two died, viz. Mr. C. T. Drury and Mr. Eley.

The cost of the Gazette is nearly double that obtaining under pre-war conditions. Arrangements are being made to alleviate this burden on the Society's funds. Members are urged to do their utmost to introduce new Members, and those Members who have not paid their Subscriptions are requested to do so as early as possible.

FERNERY WEEDS IN A NORTHERN GARDEN.

A weed is a plant which increases at a greater rate than is desirable, and by so doing endangers the well-being of the rest of the community.

The only Fern weed which is a Fern proper, in the open-air fernery, is *Pteris aquilina polydactyla*. In deep, sandy, well cultivated land, a single plant of this fern will in a very few years overrun an acre of ground unless vigorously combated. Its fronds, 3 to 4 feet high, remorselessly cover up all smaller growing subjects and quickly blot out the landscape so far as all other ferns are concerned.

Under glass the list of Fern weeds is a more formidable one, and my most dreaded weed is *Cystopteris bulbifera*, which, propagating itself by its dropped bulbils, and growing 2 feet or more, has taken possession in four seasons of 200 square yards in spite of persistent weedings involving the destruction of hundreds of thousands. One crop of bulbil produced plants following so quickly upon the heels of another, as to suggest the words of Macbeth :—

“ The times have been,
That when the brains were out the man would die,
And there an end, but now they rise again.”

Then comes *Struthiopteris Germanica*, which pushes its ropelike rhizomes in all directions, and proceeds with Teutonic thoroughness and “ peaceful penetration ” to take possession of the whole earth. This it would quickly accomplish were outdoor conditions equal to the ideal conditions prevailing in my bog fernery. Its North American relative is on the whole the greater sinner of the two, in consequence of its thinner and more numerous rhizomes. A single plant becomes a battalion in two seasons if undisturbed.

Lomaria Magellanica, a most majestic fern growing 5 feet, and making rhizomes and young plants innumerable, can with persistence and determination be kept within bounds,

but the other fern weeds above mentioned have come to stay, and cannot, in the short space of life left to an elderly cultivator, be exterminated.

Lastrea decurrens is a standing menace to the rest of the community, being propagated by buds produced on the roots. A small colony of ten plants have in a few years become as many thousands, without any assistance on my part.

Onoclea sensibilis and *Lastrea thelypteris* are sometimes troublesome, but not to the same extent as the above mentioned, which are the chief sinners.

It will be noticed that it is not the ferns produced from spores that are the most formidable weeds, but the scampering rhizomiferous and bulbiferous subjects.

Microlepia anthriscifolia, thoughtlessly introduced a few years ago, and growing 2 to 3 feet, now requires most drastic treatment in order to prevent its destroying everything less than 1 foot high.

My most troublesome non-fern weed is *Equisetum sylvaticum*, which, as a general nuisance, is *facile princeps*. It grows 2 feet, and can only be partially kept in check by deep and persistent forking, the effects of which only hold good for one season.

The main rhizomes are met with at a depth of 30 inches. The uninitiated would never suspect the existence of these main arteries, which are as thick as one's finger. The upper stratum of rhizomes, as thick as coarse packing string, can be removed for years without sapping the vitality of the whole plant, whose main roots may have an outlet above ground 20 yards away. The plant grows at an alarming rate, probably a foot per week. The hot steaming conditions under glass in the bog fernery are suggestive of the conditions prevailing in the carboniferous epoch, and one can easily understand the deposition of the coal measures after experiencing the phenomenally

luxuriant growth of our common *Equisetum* under practically tropical conditions. Liquid mud under foot and a temperature over 100° F., and no ventilation. *Cardamine hirsutum* is another weed which projects its seeds 3 feet in all directions. Under tropical conditions this plant occupies ten days from birth to maturity, and can reproduce itself a hundredfold every ten days.

Sagina procumbens is a bad weed in the open ground, and there are several others, but I think I have mentioned the most troublesome.

LASTREA MONTANA FORMOSA-CRISTATA.
(F.W.S.)

The history of this Fern, which formed the frontispiece of the June Gazette, was not correctly given in that number, doubtless owing to my failure to supply the particulars in time for publication. It originated as a seedling from spores of *L. montana plumosa-cristata* sent to me by Mr. Whitwell, who was himself the raiser of the very beautiful parent. The ancestry of the latter is not certainly known, but from its appearance I should say it was the result of a cross between *L. montana coronans* of Barnes and one of the plumose varieties, probably either Mr. Whitwell's own or Mr. Barnes's find. The grandchild, the subject of this paragraph, was the *only montana* which appeared from the sowing of *plumosa-cristata*. It differs from its immediate parent in being much more densely crested, and was named from its striking similarity to *Athyrium f.f. formosa-cristatum*. The plant has had a somewhat chequered career, inasmuch as, three years ago, I divided it into three, intending to send the first division to the giver of the spores. Unfortunately the two best pieces died almost immediately, and it was not until the autumn of 1916 that I was able again to divide the survivor. The better of these two pieces was sent to

Mr. Whitwell, but I learn from him that his plant met with an accident from a chance stone thrown by a boy and consequently perished. There is, therefore, only a single crown of this plant now surviving. I am glad to say it is doing well, although much smaller than when the photograph was taken, which was before the first division.

F. W. STANSFIELD.

SOME RECENT WILD FINDS.

Notwithstanding the difficult conditions as to travelling and the lack of leisure produced by the war, new finds continue to be made by members of the Society and others, sometimes in the most unexpected places. East Anglia has not hitherto been considered to be productive Fern country, but Mr. Charles Henwood, while staying at Cromer in the autumn of 1914, went for a walk with a lady friend and they admired the luxuriant growth of *Polypodium vulgare* which lined some of the lanes. The lady (Miss Scott) remarked that one of the plants was of a "different colour" from the rest. Mr. Henwood then saw that it differed not only in colour but in form as well, and was in fact one of the plumose or "*Cambricum*" section. It was extracted from the wall, in which it was growing, with some difficulty and was sent by post to Mr. Henwood, senior, who received it in a dried up and almost moribund condition. He revived it by dint of extreme care, and it is now (1917) a fine plant and turns out to be very near the old *Cambricum*, from which it differs in being slightly denser although not approaching to *Prestonii* in this respect. The following year Mr. C. Henwood re-visited the place and extracted another scrap from the old habitat. He was also successful in finding, in the neighbourhood, a very thoroughly crested variety of the same species. It is very near to the old *cristatum*, and is not yet quite sufficiently

developed to make sure whether it will be distinct from that variety. In 1916 the same hunter found a nice variety of *Blechnum spicant* on an old wall in the county of Bucks, quite near to the Middlesex border. It was very small and stunted when found, but was finely toothed in the way of Airey's *serratum* No. 1. It has now made some growth of a more foliose type, and seems likely to be near to Airey's *serratum* No. 2, which is one of the finest known varieties of the species. It will, however, not be named until it has attained maturity and, with it, its final character. The finding of these three Ferns, by a new hunter and in quite new Fern country, is a good omen for the future. The discovery of a "*Cambricum*" Polypody in East Anglia is a further example of the absurdity of naming a plant from the locality in which it is first discovered. Another case of this hasty nomenclature is to be found in *P. v. Cornubiense*, which has been found in Wales and, more recently, in Devonshire as well as in Cornwall.

F. W. S.

EVERGREEN HARDY FERNS.

Our British species of Ferns are pretty equally divided into two sections, the evergreen and the deciduous. The former retain their fronds through the winter and until the fresh growth replaces them the following season, and the latter die down to the ground in the autumn, whether protected or not. In many hands, where this latter peculiarity is not understood, the gradual discoloration and subsequent decay of the fronds, without any touch of frost or other apparent reason, is construed as actual death of the plant itself, especially as there is not, as in the more familiar case of deciduous trees and shrubs, anything left above ground to indicate persistent vitality, nothing remaining visible but a dead-looking, hard caudex.

or root-stock. Even with those who do interpret this decay rightly as merely superficial, the absence of any visible plant often leads to neglect; the pots are placed out of sight to make room for more presentable things, watering is consequently forgotten altogether, and as a result the sleep merges into the sleep of death as the central tissues dry and perish, and valuable plants are consequently lost. In natural conditions dormant Ferns are saturated throughout their resting period in such a climate as ours, and as our native species are, of course, quite hardy (with unimportant exceptions), the simplest plan is to turn deciduous pot plants out of doors, and plunge them, pots and all, into soil or cocoa fibre. They are thus secured from drought without need of any attention whatever, while it is a simple matter, in March or April, to lift them, wash the pots, and reinstate them when they show signs of reawakening.

The entire absence of old fronds is then an actual advantage, as nothing is left to detract from the beauty of the new frondage, which with such treatment rises with great rapidity under the genial influence of the spring. I should, however, give a word of warning to those who possess warmed conservatories against introducing Hardy Ferns into them earlier than March. Some varieties respond freely to such forcing conditions as this involves, but, like human beings, they must have their proper spell of rest in order to do their full day's work, and, if precociously roused, are apt to suffer in constitution, and show the effects later in the season. The evergreen British species are the spleenworts (*Asplenia*), the Shield Ferns (*Polystichum*), the Hartstongue (*Scolopendrium*), Hard Fern (*Blechnum*), the Hard Male Fern (*Lastrea pseudo-mas*), and the Common Polypody (*Polyodium vulgare*), including all their varieties; and as, fortunately, all these have been very liberally endowed by Nature with a capacity for

sporting into very beautiful abnormal forms, we have in them ample material for indoor decoration throughout the winter if we only take a few precautions for their protection and proper treatment.

Undoubtedly the first essential is clean culture during the growing season, since if white fly, aphis, thrips, or similar vermin are permitted to prey upon the fronds, the damage becomes accentuated in the autumn by fungoid growths, and consequent discoloration and unsightliness ensues when the dormant period arrives. A clean-fronded evergreen Fern will lose little or none of its attractiveness during the winter, while a dirty one will be but an eyesore. A few fumigations are the best remedy for most of these pests, but I have found it advisable to remove tender seedlings, especially of *Blechnum spicant*, before using this remedy. With some of the heavily-crested varieties, or heavy-fronded plumose forms of *polystichum*, I frequently find it well to tie black thread or silk some few inches up the stalk of each frond, *i.e.* where the pinnæ begin, in such a way that it forms a tight ring, extending from frond to frond, with a knotted turn round each one. This is quite invisible except on very close inspection, and checks entirely that tendency to drop which is induced by the abnormal weight and the relaxed sap vigour of the resting season. The Broad Buckler Fern (*L. dilatata*), so treated, may be added to the list of evergreens with advantage, while the two grand varieties of this species found in the Azores (*L. d. foliosa-cristata* and *L. d. polydactyla*) are perfectly evergreen without such aid.

I have so frequently given lists of the best forms of these species that I will not here recapitulate. I may, however, lay particular stress upon the value of our polypodium varieties for winter decoration under glass. Here there is no question of adventitious support, and many of the finest forms are characterised by the peculiar fact that, while

the type starts growth early in the season, they remain dormant until July, though retaining the previous season's fronds entirely. They also continue growing until so late in the season that experienced growers maintain they are not at their best until November, a fact which implies that they present a bright and fresh appearance the whole winter through, and extend the active interests of the Fern lover for several months. To succeed with this Fern and form attractive specimens, the varieties must be grown either in pans or hanging baskets, and in a good open compost of brown fibrous peat or leaf-mould, kept open with silver sand. The fleshy travelling rootstocks peculiar to this species must be bedded on the surface or only slightly mulched over, and the pans should be well drained and stand upon, not in, saucers which constantly contain water. So treated the fronds assume a size which is rarely seen under natural conditions, and the varietal character is enhanced in the same ratio. Hanging baskets should be liberally lined with moss to retain both soil and moisture, the soil should be somewhat heaped, and the rootstocks planted thereon as above. Kept well watered, these will travel, and eventually fronds will emerge at the sides as well as the top, and so form very handsome specimens. A few small seedlings of other Ferns may be introduced at the sides, and the common variegated selaginella may be dotted in as a set-off, but this, like the seedlings, must not be allowed to grow rampant. The common green selaginella especially is apt to handicap the tenants proper, and must be kept well within bounds. *Sibthorpia europaea* is, subject to the same restriction, a pretty companion, but *Oxalis acetosella*, the common wood sorrel, is an invader to be rooted out remorselessly as a pest.

Finally, I may remark that my observations apply to perfectly cold greenhouses or conservatories. In warmed ones, i.e., where the frost is just excluded, the ferns in

question will also be quite at home, and under such conditions the Sea Spleenwort (*Asplenium marinum*), especially its plumose form, will make grand specimens, and the true Maidenhair (*Adiantum capillus veneris*), and its varieties imbricatum, daphnites, and Cornubiense (a small Farleyense-like variety) will do well. These, however, perish if frozen, since, despite the fact that they are natives, they are only found on our warmest coasts, and within the influence of the western sea breezes. Winter sun need not be avoided, as the ferns will bear and be the better for all the light they can get, and, above all, let it not be forgotten that the watering-can is a vital factor in fern life, sleeping or awaking.

C. T. D.

BRITISH AND EXOTIC FERNS.

Although so far only one definite alliance is recorded between a British Fern and a tender exotic, in the shape of that very striking success in hybridisation, *Polypodium Schneideri* \times , this one success is amply sufficient to show that a wide field is open for the amplification of fine forms on similar lines. This plant is due to a cross effected between a variety of *Polypodium vulgare* and the normal form of *P. aureum*. The former is in itself one of the most remarkable varieties of a normally simple pinnate species, and was found wild many years ago in Cornwall, for which reason it is known as *P. v. cornubiense*, while on account of its very elegant cutting it is also more generally known as *P. v. elegantissimum*. It is characterised by being polymorphic, *i.e.* bearing fronds of several distinct types; a small proportion are quite normal, and the rest are of two much divided forms, one tripinnate and foliose, the other tripinnate, and even quadripinnate, the divisions being all very narrow. To add to its peculiarity, all three types may appear on one and the same frond.

Finally, the finest cut fronds, under congenial conditions of culture, finish their growth by forming long linear extensions to the ultimate segments, and a profusion of bulbils on the sites of the spore heaps. We have here consequently not merely one distinct varietal feature, but several in conjunction, and it is this fact, among others, which stamps the cross in question as an undoubted one, while the appearance of a single varietal character might be imputed to an independent variation or sport, despite the use of a parent which possessed it. In *P. Schneideri* ×, as we have seen, one parent, *P. aureum*, is of a normal specific type, somewhat resembling the normal *P. vulgare* in the fact that despite its far greater size, it is simply pinnate. The introduction of the blood of *P. v. elegantissimum* evidences itself in the cross by imparting to the huge size of *P. aureum* precisely the same finely-cut character of the intermediate fronds (the finest type had so far not appeared) conjoined with the same, in this case, dimorphic feature of an intermixture of very slightly modified normal fronds of *P. aureum*, plus the piecemeal appearance of the two characters in one and the same frond. In addition to this incontestable proof of the alliance, we have a constitutional factor introduced in the shape of a capacity to stand several degrees of frost, a plant in the writer's collection having survived several winters in a quite cold house, where it has been repeatedly slightly frozen. As further evidence of alliance between very distinct species, the spores are imperfect, and though seemingly freely produced, appear under the microscope as mere dust. The possibility therefore of *P. Schneideri* × being a mere sport on parallel lines to *P. elegantissimum*, instead of a cross, may, it will be seen, be dismissed as untenable, and we are fully justified therefore in accepting it as a fair starting-point for further experiments on similar lines. Mr. Schneider indeed was not content with this success, but

subsequently sowed *P. v. cristatum* with other exotic members of the same genus, and undoubtedly obtained crested forms of the latter among the results of his sowing ; cresting however *per se* occurs so frequently as a sport that these results, though we see no reason to doubt their hybrid origin, are not so conclusive, though nevertheless encouraging for further efforts.

The British species of Ferns curiously enough have not only afforded a far greater number of "sports," crested, plumose and otherwise varied, than the exotics, but there are many types of variation among them at once beautiful and curious which have not appeared at all among the latter, and which, if they could be introduced by judicious crossing, would certainly give rise to very attractive and valuable decorative plants, besides, and this is a material point, adding in all probability to their hardiness and consequent ease of cultivation. In Ferns fortunately the would-be hybridiser is not handicapped as in flowering plants by incompatibility between the size of the pollen grains and the length of stigma to be traversed to reach the embryo seed. Undoubtedly in most plants these factors are nicely co-adapted ; a very long-styled stigma, like that of a Lily, is associated with large pollen grains, and very short-styled flowers with smaller ones. Practically, however, all Ferns, from the smallest to the largest, perform their reproductive functions on the same microscopic scale, the prothallus or tiny primary leaf produced from the spore is much of a size throughout all the genera, and as the antherozoids are free-swimming organisms, a little difference in dimensions forms no obstacle to their reaching the archegonial bud.

Hence no obvious structural difficulty stands in the way of mating the tiniest Fern with the largest Tree-Fern ; all that is necessary is some degree of kinship. This fact clearly widens the field of operations considerably, and,

to take a concrete example, suggests the possibility of infusing the pretty cresting of our native *Asplenium Trichomanes* even into the grand *Asplenium nidus-avis*, or many others of the large family of the exotic Spleenworts, which by the way are peculiarly constant and non-sportive in themselves. In this particular connection too, and especially in allusion to *A. nidus-avis*, our native Hartstongue, *Scolopendrium vulgare*, which has perhaps afforded more distinct varieties than any other species, might well be used. That it is closely allied to the Spleenwort is seen in its linear fructification, and the fact that although these are always in faced pairs, while that of the Spleenwort is assumed to be single, there are exceptions to the rule in the latter family, faced pairs precisely of the *Scolopendrium* type occurring frequently in *A. hemionitis*, while they have been noted in varietal forms of *A. marinum*. In these genera, then, there are obviously many openings for alliance, which by the way there is strong evidence to prove has already been affected in the case of *S. vulgare* and *A. Ceterach*.

In the Polypodium family, likewise a large one, there are many fine forms which, allied with the many types of *P. vulgare*, would be very handsome, as evidenced by *P. Schneideri*. In the Polystichums, also, there are many exotics which are evidently very closely akin to our native species, *P. lonchitis*, *P. aculeatum*, and *P. angulare*; and as most of the very finest plumose forms of the latter bear spores, there is ample material to work upon. In that beautiful lucent-fronded evergreen *P. setosum* alone there is an invaluable subject for hybridisation. Our *Blechnum spicant* is another species which has varied considerably on pretty lines, and has numerous foreign relatives which have not done so, and yet might be induced to do under persuasion of marriage; while the *Lastreas* or *Nephrodiums*, though apt to be apogamic—

i.e. to produce young by mere asexual budding from the prothallus—have yielded in all native species plenty of good forms, although the exotics, with the exception of *N. molle*, have done but little in that way. *Osmunda regalis* has given both crested and fine-cut types probably capable of introduction into the several exotic species, since they are certainly closely allied. All these possibilities being assumed, the next question, and a vital one, is—How are they to be attacked? and this is a very simple matter.

The crossing of Ferns, unfortunately, cannot as yet be systematically done, as with flowers, owing to the microscopic nature of the reproductive process; but numerous successful attempts prove that if the spores of the two parental forms be sown together in one pan, there is the chance of the antherozoids or fertilising organisms of one prothallus being conveyed either by water or insect agency to another, and thus effecting a cross. Hence success would doubtless crown the efforts of the Fern spore sower who, when sowing his exotics, persistently scattered the spores of likely British partners, on the lines above indicated, among those of the exotic. Or, in view of the fact that spores vary considerably in the time occupied in producing the prothallus, and eventually the Fern proper, he might sow separately and subsequently associate by pricking out patches of each and replanting in very close juxtaposition. This we believe was the way *P. Schneideri* was obtained. On the other hand, there is considerable range of time between the maturing of Fern prothalli, even in the same sowing, so that success might well be obtained in the simpler way of sowing together. In any case, nothing is lost by the attempt, since with judicious selection of good forms a crop of the parental types is obtained, and is worth having, even if the wished-for conjunction fails.

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

IDEAL FERN HABITATS.

In the plant world, as in that of humanity, it is the exception rather than the rule for the individual to be naturally placed under such favourable conditions of environment that its potentialities can be developed to the utmost. As a rule, the all but inevitable struggle for existence necessitates some sort of compromise, which may mean such a degree of handicapping that the real merits and capabilities are hardly at all developed. Hence in the Fern world we frequently find that, although Ferns as a rule are constituted to flourish in shady, damp, and sheltered situations, and although by virtue of their robust and hardy nature they manage to exist in places where these essential needs are but very poorly provided, the result is that they present stunted, unattractive growth with but a trace of the natural charm which more favourable conditions would enable them to develop. Nature, with her usual knack of adapting her creations to the most varied conditions, has, in the course of æons of time, endowed many of the original shade and moisture-loving Ferns with the capacity to withstand both drought and sunshine, as we may see evidenced in such genera as the Cheilanthes, Nothochlænas, and even in our familiar Ceterach officinarum. In all these cases, however, we find the adaptation to detract from the foliose, pendulous grace of the major portion of the Fern tribe, the fronds of necessity become more or less hard and leathery, and thus, though undoubtedly pretty when at their best, cannot for a moment compare with the stately grace of the Tree and other Ferns which fill our antipodean valleys or even with the smaller but yet delightful frondage of our largest native Ferns, such as the Lady, Male, and Shield Ferns, which deck the sheltered combes of our humid western counties.

The aim of gardeners is to obviate, as far as possible,

the natural handicapping to which we have alluded, and to provide the plants taken in hand with as nearly as possible ideal conditions of growth, and supplied with all incentives to perfect development. To do this effectively we have, however, in the first place to study Nature to ascertain under which natural conditions the plants are at their best, and, having acquired this knowledge, to apply it as far as practicable to cultivation. Thus to see our native Ferns at their best we must visit one of our deep western valleys, where a rushing, tumbling stream brawls between high, rocky banks hemmed in by trees, the two latter sheltering admirably from boisterous breeze and broiling sun. The very air is humid from the proximity of the stream, and the leafy, rocky soil is never dry. Here are all the essential conditions of Fern life at their best, and we see the results all around us in waving masses of feathery frondage, while a closer inspection will show the ground beneath to be covered with flourishing colonies of Blechnums, Oak Fern, Beech Fern, *Polypodium vulgare*, and others of the smaller Ferns. Leaving the glen and reaching an adjacent road we may still find all these, but in a much smaller state, and in many cases stunted and torn by the wind, and thus void of all the charm of their more favoured neighbours. Presently, however, the road dips into a hollow and becomes a shady cutting, walled in on either side by rough, retaining stone dykes, while overhead the trees almost meet, and thus once again we have a Fern-paradise, but with a difference. Nature, as we have said, has varied her creations to such varied conditions. Here we have more air and light, and the loose stone dykes afford a combination of perfect drainage with constant dampness, that better suits the tastes of other species of Ferns, which, moreover, under the freer conditions of growth in the dell we have left, would be over-grown and enfeebled.

Hence in these walls we find colonies of the various Spleenworts, associated with Polypodies, common, Oak, and Beech Fern, and last, but not least, the beautiful, strap-fronded Hart's-tongue will be found, not merely in a comparatively small state in the chinks and crevices, but also in robust condition along the foot. Such dykes, indeed, form ideal hunting grounds for the Fern enthusiast, for besides the wall or rock Ferns proper there are sure to be innumerable seedlings of the dell species, which, being precluded by their position from becoming huge, full-grown specimens, make up for this by their numbers, and in this way increase the hunter's chances of a find. In such a lane or cutting we have frequently found no less than fifteen or sixteen different species, and it is clear, therefore, that a sunken artificial rockery shaded judiciously by trees may represent one of the ideal habitats we have in view. Some Ferns, however, are more exacting in their water requirements than even the dell Ferns aforesaid, unless, indeed, that dell develops here and there—as it well may do—into a local bog or marsh. In that case we may find a colony of the Royal Fern (*Osmunda regalis*) lifting its tall, fertile fronds from amidst an abundant circle of more drooping barren ones; a grand sight indeed under ideal conditions. On the banks of the Upper Dart we have seen this splendid Fern with huge fronds 10 feet high covering the stream-banks like a coppice. The secret of such growth is that although the crown of the Fern is well above the water-level, its deeply penetrating roots are really below it, and, given these conditions, the *Osmunda*, owing to the toughness of its fronds, will stand considerable sunlight without damage. Naturally, this fact renders it particularly adapted for water-side culture generally, in proof of which we need only refer to our illustration of a beautiful specimen, the condition of which attests how

perfectly its particular needs have been met and how entirely the ideal has been realised.

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

THE MOTOR-CAR IN FERN-HUNTING.

Although the coming of the motor-car into general use will probably be eventually a factor in the denudation of our ferny districts, both by the greater opportunities offered for vandalism and the direct destruction of fern habitats, by the improvement of roads, yet in the meantime the judicious use of this convenient method of travelling may be of great value to fern hunters in the exploration of districts hitherto difficult of access. It is obvious that the actual hunting must be done on foot, since no other method allows time for the careful examination of the ferns in a given area. The preliminary selection of promising hunting grounds can, however, be done with great advantage by means of a motor-car, horse-carriage or bicycle. When the hunting grounds have been selected they can be reached by any means which may be found most convenient. When the profitable ground is some miles away from one's base there is nothing like a motor-car for reaching it quickly and avoiding the waste of time involved in tramping over barren roads. In my own district there is no fern country less than eight or ten miles from home, and the nearest really profitable ground is some twenty miles away in a district badly served by railway. The twenty odd miles can be easily covered in an hour or (let it be whispered only) even in less time, and thus several hours of happy hunting can be got in the course of half-a-day's holiday, which is the most that can often be spared from the cares of life by a busy man. Some of the best hunting I have had was during a "long week" in Somerset (before the war), when a motor-car was available to carry us out to a suitable district in the

morning. The day was spent in exploring the lanes and woods on foot, and the car returned again in the evening to carry us back home. In this way the best parts of a district some fifty miles in diameter can be explored in a week or a fortnight according to the richness or otherwise of the neighbourhood. This method of fern hunting has been enjoyed by our members on several of our annual excursions, and has resulted in some good finds being made. When, for any reason, the motor-car is not available as is now generally the case during war-time, the humbler bicycle makes a very fair substitute, and has the additional advantage that good things can sometimes be "spotted" by the roadside while one is actually riding. I know of several finds which have been made by a member while travelling about his business on a bicycle. In the summer of 1916 I spent a week at the seaside in Dorsetshire with some members of my family, and, by means of a bicycle, was able to explore the neighbourhood, for many miles around, for ferns. Starting out in the morning, in any likely direction, one rode on until a suitable lane or wood was observed; the bicycle was then put behind a hedge or leaned against a gate (the people are mostly honest in Wessex), and comfortable and leisurely hunting was pursued on foot until the locality was exhausted, when again a short ride would enable one to reach another promising habitat, and so on until evening fell. In this way one reached one's quarters in the evening healthily tired but not over-fatigued, and with an excellent appetite for dinner. Should bad weather befall during the day, as will sometimes happen, one has only to mount the bicycle and "scoot" for home, shelter, and dry clothes. In the old days before the coming of the motor-car, when the Society's annual meeting yielded only one day of fern hunting, a horsed vehicle was

generally chartered for the party, and was put up at some country hostelry while the members botanized. Some very happy and profitable days were spent in this way, and some notable finds were made. I remember one occasion some twenty years ago when, while driving through Long Sleddale, Westmorland, almost the whole party noticed a wall covered with a form of *Asplenium trichomanes* which had a peculiar "combed" appearance. We all dismounted and collected plants. Mr. Smithies secured one which seemed better than the rest and, as his plant had two crowns, he kindly shared it with me. I still have my plant and it has turned out quite constant, and is a very pretty variety which I call *serrato-constrictum*, *Smithies*. The pinna are narrow and toothed and all turn upwards almost parallel with the rachis, giving the frond, especially in its upper half, a very slender and pointed character. The variety is abundantly fertile and comes true from spores. That was an occasion upon which the horse "had the pull" over the motor vehicle, inasmuch as the latter would probably have travelled too swiftly for a *trichomanes* to have been noticed from the car. Nevertheless, the car has points of superiority over the horsed vehicle, not the least of which is that it is independent of any hostelry, and can be left for hours, if necessary, in any out-of-the-way place in the charge of a boy or a wounded soldier, or even without any attention if care be taken to make it temporarily incapable of travelling, which can generally be arranged without much difficulty. Should the happy days ever come when the younger members will be home from the war, and the elder ones will have time and opportunity for travelling, I trust our annual meetings may be resumed in England, Wales, Scotland and Ireland. I hope also that a motor-car may be available at least for the elders of the party. May the time soon arrive. Amen.

F. W. S.

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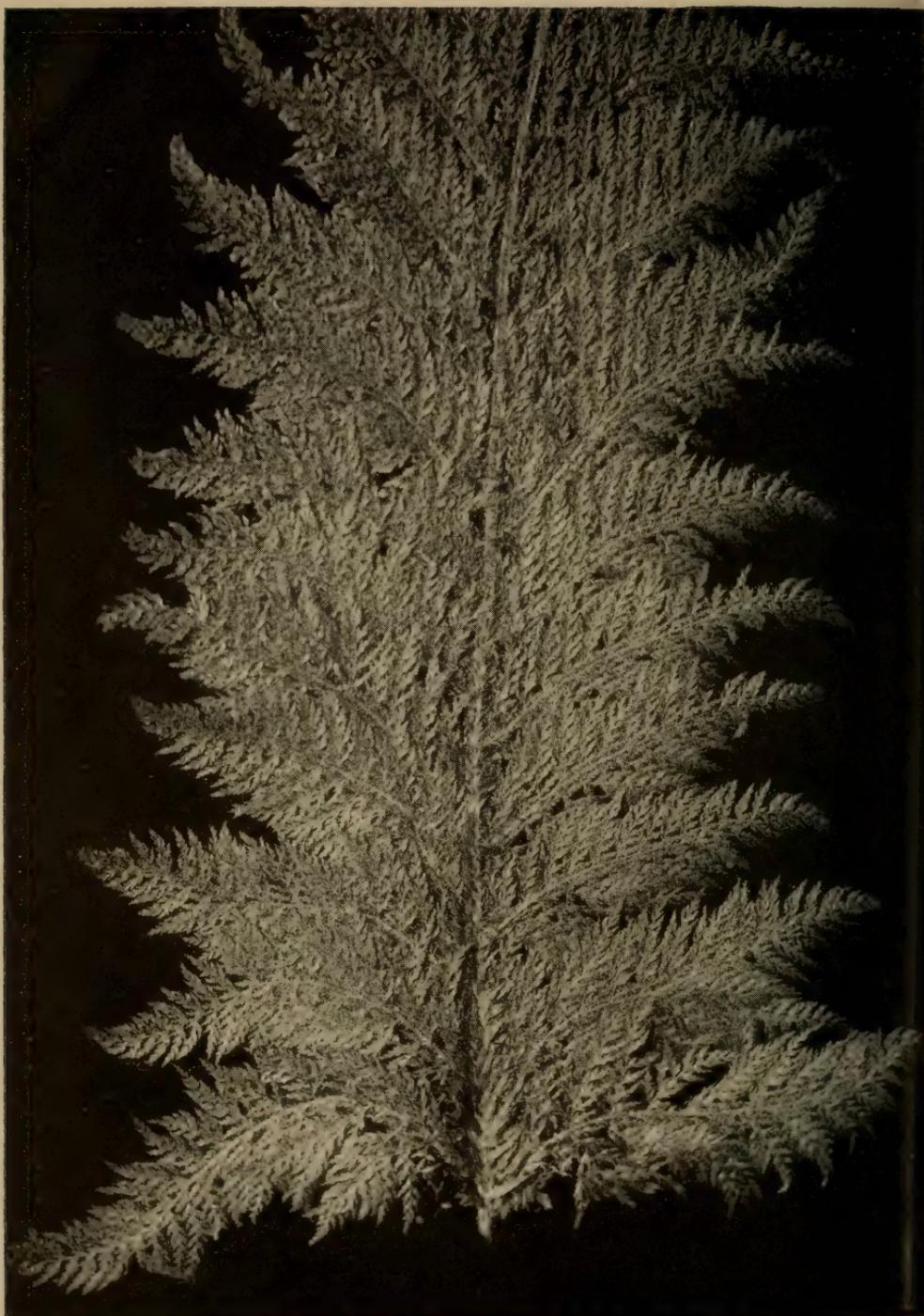
F. W. STANSFIELD, M.D.

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THE BRITISH PTERIDOLOGICAL SOCIETY

(*Hon. Sec. and Hon. Treasurer, W. B. Cranfield, East Lodge, Enfield Chase,
Middlesex.*)

KENDAL, WESTMORLAND.



P. ANGULARE DIVISILOBUM PLUMOSUM BALDWINII, JONES AND FOX

THE
BRITISH FERN GAZETTE.

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EDITORIAL NOTES.

In taking up the duties of conducting the GAZETTE the Editor begs to say that he has accepted the responsibility (for the time being) with the greatest diffidence and with considerable reluctance. The position is one which he has not sought, but would much prefer to avoid, and will be only too glad to relinquish upon the smallest hint. In addition to the severe handicap necessarily involved in the succession to an experienced literary man like the late Mr. Druery, the new Editor is weighted by the duties of a busy professional life which leave him little leisure for other work, even in peace time, and still less in the confusion and stress caused by the world war. He hopes, therefore, that the readers of the GAZETTE will grant him their kind indulgence as a beginner at the work of editorship and that the members will afford him all the assistance in their power by literary, photographic, and other contributions, without which the work cannot long be carried on. He expresses

his warm thanks to those members (only too few at present) who have already promised him their support, and trusts that the remainder will rise to the occasion and make the GAZETTE what it should be, *i.e.*, a real medium of communication for fern lovers all over the English-speaking world.

Contributions and material for the GAZETTE may be sent to Dr. Stansfield, 120, Oxford Road, Reading.

X The subscriptions for 1917-18 being due in advance, the Hon. Secretary (*pro tem.*) would be much obliged by a remittance of 5s. by return post to Mr. W. B. Cranfield, East Lodge, Enfield Chase, Middlesex.

OUR FRONTISPICE.

P. ANGULARE DIVISILOBUM PLUMOSUM BALDWINII,
JONES AND FOX.

The frond from which this photograph was taken is one sent to the Editor by the late Mr. E. J. Lowe, F.R.S., some 25 years ago, when the original (then the only existing) plant was in Mr. Lowe's possession. The exceedingly fine sub-division of the pinnules is well shown, but it is possible that the resulting slenderness of the ultimate segments has been slightly exaggerated by the drying process to which the frond has been subjected. It is doubtful whether any one of the seedling plants now in existence is *quite* equal to the original in refinement, although two or three of them undoubtedly approach it very nearly. Most of them are in the collection of Mr. Cranfield, but Mr. T. E. Henwood and the Rev. E. J. Hawkins each possess a plant and the writer has also a small one—a bulbil from Mr. Henwood's plant.

THE JONES-FOX (AND OTHER) ANGULARE PLUMOSE-DIVISILOBES.

These beautiful ferns made a great sensation among fern lovers when they were first exhibited to the world some thirty odd years ago. They are still among the very best and most telling of British ferns, the admired alike of the connoisseur and the raw beginner. This one fact is eloquent testimony to their transcendent merits as decorative plants. Their grace of form, exquisite finish, and perfect symmetry, all tend to make them appeal strongly even to the most untutored eye, while the more one knows of ferns and their capabilities the more one appreciates the tremendous advance which these ferns made upon anything previously known. The exact origin of this section has never been published and has been the subject of some discussion and of more speculation. It is known that they were raised by the collaboration of the late Col. A. M. Jones and the late Mr. Edwin F. Fox. What part each played and what was the material upon which they worked, however, is a matter which it was no one's particular business to record and it was only after both men were dead that the history began to be more exactly inquired into. Many people (myself among the number) had been told that they were raised from "*decompositum splendens*." But what is *decompositum splendens*? This name had been given, in Col. Jones's time, to at least three different varieties of *angulare* one of which (*decomp. splendens Moly*) is still in existence as a living plant in the collection of Mr. Cranfield, while of another (*d. s. Williams*) a dried frond, given to me by Col. Jones, is in my possession. There is no doubt that Mr. Moly was under the impression that his find was the parent of the plumose divisilobes and this belief, in extreme old age, he confided to Mr. Cranfield with great pride.

The probability is that he had heard vaguely of a *decompositum splendens* as the parent and afterwards jumped to the conclusion that it must be his own find of this name. Both Mr. Cranfield and the late Mr. Druery tried to test the matter by sowing again spores from Moly's find. Both raised a large number of seedlings but in neither case was anything produced which at all resembled a plumose divisilobe. The present writer has in his possession a letter from Col. Jones in which he refers to "MY *decompositum splendens*" as the parent. Now Col. Jones found a number of decomposite forms of *angulare* and it was at one time a standing joke that whenever he went fern-hunting with Moly or Wills or Padley he "always found a *decompositum*." Now it is not difficult to find a decompositum during a day's hunting in Somerset or Dorset or Devon, and probably most of these finds were afterwards discarded, but it is more than likely that he would keep the best and sow from it. There is evidence that he actually did so, for I find in my old note-book an extract copied at the time (September 20th, 1889) from a letter of Mr. Fox (in reply to a special inquiry) which states that "*decompositum grande* was found at Torquay, 1870-72; *decompositum splendens* was a seedling raised at Iona House, Clifton, by Col. Jones *from a wild find of his own.*" It is thus established that Col. Jones himself found wild the grand-parent of his plumose divisilobes and also himself raised from that plant the immediate parent. Mr. Fox's part in the work was that he actually raised the plumose divisilobes from spores given to him for the purpose by Col. Jones. The Colonel and the "doctor" (Mr. Fox was a medical man but did not call himself Dr.) shared the plants between them and wished equally to share the credit, or rather—like the perfect gentlemen they both were—each wished

the other to have the principal part of it. Both, early, gave me plants of *laxum* and *densum*, but it was not until later that Col. Jones sent me *robustum*, which has always been less bulbiferous than the other two. These three forms were in the original batch and were considered the gems of the lot. With them were raised a number of plumose and foliose forms, including *plumosum grande Jones*, a very fine thing, and *frondosum Jones*, of both of which I possess fronds. The only identifiable plant of *p. grande* is now in the possession of Mr. T. E. Henwood. *Frondosum* has recently given rise to developments of which more anon. *Baldwinii*, which turned out to be the best of the whole batch, was given as a small plant to Mr. J. Loraine Baldwin and it was only under his culture that it showed its superb development. It is said to have been a bulbil from *densum* and if so it was a bud sport. In view of its very distinct character and the extreme rarity of bud sports among *angulares* I am inclined to suspect that it was "a promising seedling" and was given away, as so many promising seedlings have been, by their raisers, with more generosity than discretion. The three original Jones-Fox plumose divisilobes then are *laxum*, *densum* and *robustum*. They are very similar in general character, their differences being sufficiently indicated by their names. *Baldwinii* originated later and is much finer in cutting than any of the others. It is certainly the most beautiful of the lot. Many other forms have been raised from the originals, and from their unnamed collateral relatives, by Mr. H. Stansfield and others. Of these may be mentioned *div. pl. foliosum*, *frondosum*, *imbricatum*, and *incisum*—all exceedingly fine things, and there are doubtless many others to which no special names have been given. " *Densum superbum*," of Perry, I have not yet seen. The type is still evolving

and comparatively recently gave rise to the “*pellucidum*” section, a distinct break, which includes some lovely gems. Another race of plumose divisilobes of quite independent origin is the Pearson strain raised by Mr. Pearson of Chilwell from a *multilobum* form of his own finding. The best of these in my judgment is more refined than *laxum*, *densum* or *robustum*, and runs *Baldwinii* rather close in the race for supremacy. A third batch of plumose divisilobes emanated from Scotland, viz., the various Esplan forms and *Grimmondiæ*. Mr. Esplan, so far as I can gather, never divulged the history of his plants, but it is certain that he put into circulation, under his name, two or three forms. Some of these have nothing very distinctive about them and are not distinguishable from many seedlings of the Jones-Fox strain. The best of them, however, which I call the *true* Esplan, is quite distinct from all others and is probably the densest in character of all. It is entitled to rank with *Baldwinii* and *Pearsonii* among the choicest gems of the section. Unfortunately many pseudo-Esplans or, at all events, inferior Esplans are in cultivation. The best form is much rarer although it has been fairly widely distributed. *Grimmondiæ*, whose origin I do not know, is a fine bold form, a little less dense than the Jones-Fox strain, but a good grower and well worthy of a place in any collection.

The cultivation of these lovely ferns presents no difficulties in the south-western counties, where a mild, moist climate and a pure air can be relied upon. They only require to be planted in good loam in the open air and to be sheltered from violent winds and they will take care of themselves. In districts where the climate is less favourable, however, the matter is not so simple. If grown under glass, and especially if grown in pots, the difficulties are greatly increased, but even then they are not insuperable. The

great complexity of the fronds renders them liable, on any check, to "finish badly"—that is to say, the tips of the fronds perish before they are fully expanded, thus greatly detracting from their symmetry and beauty. The more dense forms, if grown in a close atmosphere, are liable to a kind of rust or fungoid disease which is fatal to their beauty and health and may even destroy life if not speedily checked. These troubles can, however, be overcome by a skilful cultivator, and beautiful specimens can be grown in pots even in a moderately smoky town if care be taken to avoid checks to growth and to maintain good ventilation. The secrets of success are—

- (i.) A good soil to promote healthy root action.
- (ii.) The avoidance alike of a pot-bound state and of a sodden condition the result of over-potting.
- (iii.) An abundant supply of water with efficient drainage.
- (iv.) Good ventilation.
- (v.) Freedom from vermin.

If the glass fernery be where the morning sun can strike the plants or even the roof it is important that the ventilators be opened *before the sun rises*. The sun shining upon the uncurling fronds while they are wet with dew in a close atmosphere is fatal to the perfect development of the tips. It is best to leave the ventilators open all night in warm weather. If rust should appear upon the fronds the plants should be at once moved into the open air in a well-sheltered situation, which measure will speedily check its mischievous progress. The plants are worthy of all the care that can be devoted to them to ensure their perfect development, and unless this end can be secured the cultivator fails to obtain any just idea of their real beauty.

F. W. S.

NOTES ON ATHYRIUM F-F. KALOTHRIX.

It is now some 40 years since I first made the acquaintance of *A. F-f. kalothrix*. This beautiful fern in consequence of its lucent and general hair-like appearance and the great advance made on then existing varieties, is entitled to a first place among the many plumose varieties of *Athyrium F-f.* Its weak point is its tendency to revert; entire fronds, or more frequently individual pinnæ, of inferior plumose character, being produced in greater or lesser proportion throughout the whole plant. Another weak point is its unfitness for outdoor culture. In order to do it justice it must be grown in a moist, shady spot under glass, where the beautiful hair cannot be dishevelled by the wind.

In *kalothrix lineare*, raised about 25 years ago, we have a type which, so far as my observation goes, has not yet produced any reverted growths. This sub-variety is less robust than its parent, and is of a dwarfer and more hair-like habit, producing its elegant fronds in greater profusion. It appears to be quite barren, and propagation is necessarily slow, two offsets only having been made in 25 years.

On sowing *kalothrix* with *formoso-cristatum*, several polydactylous and well crested combinations resulted, one showing the dark green of its crested parent on the normal pinnæ, the rest of the plant being of that light sheeny pale green peculiar to *kalothrix* proper. The best crested seedlings appear to be rather ragged in outline and feeble in constitution, but are true and heavily crested *kalothrix* in every other particular.

Another break is of a deep rich green, intermediate in colour between its two parents. It has, however, a suggestion of *setigerum* in its general appearance. It seems moderately vigorous in constitution, but the *kalothrix*

character, although undoubtedly present, is less pronounced than is the case with the other types. It is curious to note that the more pronounced the *kalothrix* strain, the less vigorous the constitution and *vice versa*.

Another seedling appearing in the same batch is a sort of a *folioso-kalothrix*, but is better than the first seedlings of that name, being of more robust and compact habit, with fronds more lucent and sheeny even than true *kalothrix*, although perhaps less hair-like. Only very slight traces of reversion are as yet noticeable and no spores, but these latter will probably appear next season. The best position for the cultivation of *kalothrix* appears to be a cool position under glass, on the floor of the house and about two inches above the water-line. In such a position it retains its true character better than in a drier situation. The less hardship the plant is called upon to endure, the greater is the proportion of true fronds produced. A low temperature is no hardship, in fact, a low winter temperature is a distinct advantage to many hardy ferns, the rest being more thorough, and the start in spring more vigorous and concentrated. I never knew an *Athyrium* killed or injured by frost in winter. It is the late spring frosts that are so destructive.

Kalothrix is often driven in self-defence by slight dryness either of the soil or atmosphere to partially drop the production of best type fronds, and reluctantly to adopt the coarser garb. Just as though self respect were maintained at some considerable effort, and, being once lost, it becomes a case of " "*facilis descensus Averni*," a sort of "rake's progress," which is seldom checked.

Your readers will perhaps have noticed that spores from reverted *kalothrix* (plants reverted 30 years ago and apparently hopeless renegades) can be depended upon to produce

a small percentage of best type *kalothrix*. The production of spores on *kalothrix* can be stimulated by removing the plant from a moist to a drier atmosphere for a year. The explanation being that the plant (long accustomed to uniform atmospheric conditions) feels that there is a screw loose and, evidently realising that things are going from bad to worse, makes one supreme effort to perpetuate the race (even although the effort results in the loss of its own life) before life becomes unbearable.

A similar effort but on different lines takes place with *Trichomanes radicans*. If fronds are cut off and allowed to remain on the ground in a uniformly warm and moist atmosphere until they decompose, nothing takes place for some time. The detached fronds retain their vitality, remaining more or less green for a year or two; evidently they are "waiting for something to turn up." In this they are, like ourselves, usually disappointed, and find they must rely on their own efforts.

Just before they decompose and whilst the vital spark is still flickering, they rush out a crop of bulbils, which often covers the whole frond as is seen in *Woodwardis Orientalis*. The decomposing frond affords the necessary sustenance to establish the young plants and give them a start in life. All the species of *Trichomanes* appear to possess this capacity for bulbil formation, but experiments with *Todea superba* and *Hymenophyllums* have hitherto given a negative result.

H. STANSFIELD.

Sale, October, 1917.

The fronds sent are a very interesting series all having the *kalothrix* character in a varying degree combined with cresting to a still more varied extent, some showing merely

a forking of the tips of the pinnæ while others are polydactylous, multifid, crested or capitate. Perhaps the best is *A. F-f. kalothrix cristatum*, H. Stansfield, in which the two characters are pretty evenly balanced, and which seems to be also fairly vigorous in constitution, contrasting markedly in this respect with Mr. Druery's crested form of *kalothrix* which is very feeble and difficult to keep alive. Mr. Stansfield's experiment with *Trichomanes radicans* is very instructive and corresponds with our own experience in the induction of bulbil-bearing and apospory in *A. F-f. unco-gloemeratum* twenty years ago, as related to the Linnean Society and reproduced in another column of this issue of the GAZETTE. The lesson conveyed is that vegetable protoplasm if it can be kept alive, always tends to find a mode of growth. The same idea is manifested in the propagation of ferns from frond bases and of Begonias and Gesneriaceous plants from severed leaves.

EDITOR.

BRITISH FERNS.

Mr. Druery always maintained that there was a big future for British ferns. I am inclined to think he was right and that his prediction was founded on more reasonable grounds than his wonderful enthusiasm and energy.

This dreadful war has for the present interfered with the cultivation and spread of our favourite plants, though many of us can testify to the comfort our little friends have afforded us. They will come into their own by and by.

We have now on our side a splendid ally, the intelligent head gardener, and there are many such. Just now he is too busy, for in these days of restricted rations it is a case of all hands to the vegetables. The head gardener's sympathy and skill are with us, and in the days to come these

valuable assets will be crowned with success and new developments.

I am confirmed in this opinion from my friendship with head gardeners in this neighbourhood, and also from an experience of mine in the summer of this year. Cirencester possesses a very successful society of gardeners, amateur and professional. They discuss all manner of subjects. I spent a very pleasant evening with them, when I spoke to them on British ferns. The old days of prejudice are gone. Now they see clearly that ferns are to be grown not in the place of roses, carnations, etc., but in addition to them. Now they know that the unsightly damp corner can be made beautiful for ever by ferns.

One has still to point out the incongruity of beautiful and expensive rockeries stocked with fern rubbish obtained from the nearest wood—or advertised as lovely from Devon and Cornwall. These rockeries, built with so much care and skill, deserve the very best plants in the fern world.

The Committee was kind enough to listen to all I had to say—yes, to say—for in my selfishness I had nothing to show, my plants were then at their best and I did not have the heart to remove any fronds.

However, I enlisted some recruits, with the promise of many more—one friend then and there began by ordering “some of the best” to begin with.

It is to the head gardener I look for the great “push.” His eye is trained and his hand is full of skill—one or two such come to see me occasionally. Just for the present he is lacking in technical knowledge. He does not yet know the full history of plumosums, but when he sees them, they are to his eye—trained in the beauty of colour and form—beautiful indeed. Intuitively he fastens on the best, he turns away from freaks and monstrosities to admire,

which he does without stint, the Athyriums in their many varieties, the plumose Polystichums, and above all the gracillimums. And his is the touch of a magic hand, plants grow with him with a growth that makes one sad and envious. He spares no pains over the spores, a disappointing and yet fascinating work ; he overcomes failure and sows again in hope—if he has not been, he hopes to be blessed with success—and he is certain to succeed ; there is through him a big future for British ferns.

(Rev.) E. H. HAWKINS.

Stroud, Glos.

[Extracted from the LINNEAN SOCIETY'S JOURNAL—BOTANY,
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On the Production of Apospory by Environment in *Athyrium Filix-fœmina*, var. *unco-gloemeratum*, an apparently barren Fern. By F. W. STANSFIELD, M.B.
(Communicated by C. T. DRUERY, F.L.S.)

[Read 2nd February, 1899.]

The form of lady-fern which is the subject of the present paper is of such a remarkable character that it will be well to give its history ; and fortunately this can be done in very few words. Its pedigree commences with *A. Filix-fœmina*, var. *acrocladon*, an extremely ramosè, or, as fern-fanciers would say, a *ramosissimum* form, which was found wild in Yorkshire in 1860 by Mr. C. Monkman. Until about 1877 *acrocladon* was supposed to be a barren fern, and was propagated only by division. In 1877 my brother and I noticed spores upon a plant of it, and these were carefully collected and sown. From this sowing there resulted, in the following year, a fair crop of plants, of which about

one-third were true *acrocladon*. The remaining two-thirds were mostly weeds—*i.e.*, irregular forms, worthless from the decorative point of view. There were two plants, however, which were considered to be advances upon *acrocladon* in the matter of extreme development. One of them was *A. Felix-fæmina*, var. *unco-gloemeratum*, so named by the late Colonel A. M. Jones because, along with the gloomerate character of *acrocladon*, it possessed the peculiar subdivision of parts which is characteristic of the variety *uncum* of Barnes. Whether it was the result of a cross between *uncum* and *acrocladon* it is impossible to say, but it is not improbable that this was the case, inasmuch as the parent *acrocladon* was growing in a house with a large number of other ferns ; and under these circumstances (or, indeed, under almost any circumstances) it is impossible to exclude stray spores of other ferns which may settle upon the spore-bearer.

A. Felix-fæmina, var. *unco-gloemeratum* proved to be a very beautiful form, but exceedingly refractory in the hands of the propagator. During nearly twenty years only some three or four divisions were obtained, and two years ago there is reason to believe that only two or three plants were in existence. The plant had shown in my hands no tendency to produce spores or bulbils, nor did there seem the slightest reason to suppose that it was capable of apospory. All its vital energy seemed to be expended in branching and subdividing, so that a frond consisted of a solid mass of ramifications ending in myriads of minute green points.

Matters were at this pass when in October, 1896, as the plant in my garden was dying down for the winter, I noticed that, in the case of one or two immature fronds, although the greater part of the frond was turning brown, the extreme

tips were still green and formed little knots of living tissue each about the size of a pin's head. It occurred to me that if these could be kept alive until the spring they might develop into bulbils, and so form independent plants. Under the influence of this idea, on November 5th, 1896, I laid down in a pot a portion of a decaying frond with the green bud-like bodies attached, the latter being brought into contact with the soil, and the whole covered closely with a bell-glass.

I quote now from my journal the notes made at various stages of the culture :—

Dec. 1, 1896.—The bud-like bodies are evidently the undeveloped parts of the frond to which they belonged. They are beginning to unroll, and look green and healthy.

Feb. 5, 1897.—Development has been going on slowly all through the winter. The growths are branching and continuing to unroll. They look like bits of frond still only partially developed.

June 6, 1897.—The pieces are now luxuriant and healthy-looking masses of branches, each about $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in diameter ; they are still growing, but there are no roots nor root-hairs visible, nor any bulbils or new axes of growth. It has been, so far, a process of continued unrolling.

Nov. 5, 1897.—The basal parts of the pieces of frond are beginning to decay. The tips are still alive and green, and continue to expand, but this process has apparently nearly reached its limit. The tips are thin and pellucid, and have a semi-prothalloid appearance. There are no buds nor root-hairs to be seen.

March 1, 1898.—The cultures have been almost at a stand-still during the winter. Only the extreme tips of the growths are now alive, though the bunches of frond are still discernible in a half-decayed condition.

April 30, 1898.—Several of the pieces have died altogether. One or two of the tips of those still living are expanding laterally, and have a distinctly prothalloid appearance. Two or three other tips have run out from the rachides into long slender ribbon-like processes which branch dichotomously though at longer intervals than in *unco-gloemeratum*.

May 5, 1898.—One of the tips has assumed the character of a definite prothallus. It has increased considerably in size, being now about $\frac{1}{8}$ of an inch in diameter, and root-hairs are visible upon both its upper and lower surfaces. A tiny bud, I think, can be perceived at the bifurcation of one of the ribbon-like processes noted April 30.

June 1.—The largest prothallus has a bud upon its upper surface near the sinus, but not proceeding from it.

June 3.—A tiny frond is emerging at the sinus from the underside of the prothallus. The bud on the upper surface is more distinct and shows white silvery scales.

June 6.—The tiny frond is beginning to branch, being now bifurcate and still unrolling. The bud upon the ribbon-like process, noted May 5, has developed into a ramulose frond characteristic of *unco-gloemeratum*. The process from which it sprang is decaying without having produced any prothallus.

July 4.—The frond from the sinus of the prothallus is ramulose and characteristic; another is pushing up alongside it. The bud on the upper surface is throwing up two fronds. A curious fleshy translucent process is emerging from the side opposite to the sinus of prothallus No. 1. One or two other prothalli are developing root-hairs; one other prothallus (No. 2) is $\frac{1}{8}$ of an inch in diameter.

July 10.—A bud is visible on the upper surface of prothallus No. 2. Two other bulbils have appeared on the

growths from the old rachides ; none of these have produced prothalli. At Mr. Druery's suggestion I replanted the old pieces of fronds in order to bring the living tips into contact with the soil.

August 10.—Another bud has appeared, close to the first, on the upper surface of prothallus No. 2 ; the first bud is sending up a frond. Several other prothalli are developing from the old tips. The fleshy process on prothallus No. 1 is forking near its base ; the enlarged process begins to look like the stump of a frond, but is not circinate.

Sept. 1, 1898.—The fleshy process from prothallus No. 1 has assumed the form of an axis of growth, a bud or crown forming at the bifurcation, and the blunt processes assuming the character of fronds.

Oct. 1.—The pinnulets or leaflets upon the various fronds from the prothallus and buds are semi-translucent and lacerated at their edges. I am pinning down a few of them to see if they will develop into prothalli. The first bud which appeared (not from a prothallus) is now a dense tuft of ramulose fronds like the parent *unco-gloemeratum*. Prothallus No. 1 has three distinct axes of growth, from all of which ramulose fronds are arising. The prothallus is beginning to shrink.

Oct. 18.—Some of the pinnulets which I pinned down on Oct. 1 are obviously growing at their edges, and one or two which do not quite touch the soil are developing root-hairs. These are, however, short and scanty.

Nov. 6.—A frondlet is emerging from the sinus of a third prothallus. There does not seem to be any functional difference between the upper and lower surfaces. Close to the sinus the prothallus has twisted upon itself, the under surface coming uppermost and taking on the smooth shining character of the normal upper surface. Root-hairs are

emitted from what was the upper but is now the lower surface.

Dec. 8.—The root-hairs which were visible a month ago on one of the pinnulets from prothallus No. 1, which was not in contact with the soil, have perished. Those in contact with the soil are living and presumably rooted, but very little growth is now going on.

SUMMARY OF RESULTS OF EXPERIMENT.

(1) The fact that detached portions of frond from a deciduous fern can be kept alive for over eighteen months is a little remarkable. Had they been left on the parent plant they would undoubtedly have perished the first winter.

(2) Influence of environment on the development.

(3) The rapidity and energy with which the isolated protoplasm breaks out when once the tendency to branching has been exhausted and a free cellular tissue produced.

(4) The variety of ways in which this occurs, viz.:-

(1) Gemmation from the rachis without production of prothalli.

(5) The ease with which apospory is induced in the primary fronds as compared with the extreme difficulty in the case of the adult fronds is characteristic of all aposporous ferns, so far as I know. I have at various times succeeded in raising plants by apospory from eight different ferns—four forms of *Polystichum angulare*, one of *Lastrea paleacea*, and three of *Athyrium Filix-fœmina*; and in every case I have noticed that if the first fronds from the prothallus were pinned down (and, indeed, frequently without this special treatment), the edges rapidly developed into prothalli.

Assuming the truth of the recapitulation theory (*i.e.*, that ontogeny is an epitome of phylogeny), this would seem to suggest that apospory is an atavistic trait in ferns—a character which may have been general or even universal in the infancy of the race. This idea is also borne out to some extent by the fact that apospory is favoured by a uniformly humid atmosphere, a condition which probably prevailed in early geologic (say, Silurian and Devonian) times.

(6) The *prima facie* unlikeliness of *A. Filix-fœmina* var. *unco-gloemeratum* as a subject for apospory leads me to suspect that that phenomenon could be induced in many—possibly in most—ferns by taking sufficient trouble. This fern has apparently nothing in common with the other abnormal forms which have manifested apospory. All these, so far as I know, belong to the plumose or ultra-plumose sections of varieties. It is true that among them are two other crested ferns, viz., Cropper's *Lastrea paleacea* var. *cristata pulcherrima* and *Scolopendrium* var. *crispum Drummondiae*; but both these are specially modified forms, whose appearance at once suggests to the experienced eye that they are likely subjects for apospory. It is evident that there is a wide field for further experiments in the cultural inducement of apospory. Some of these further experiments I hope to make and to record results in due time.

NOTE.—On December 18, 1898, I took up one of the original prothalli which had not yet produced either frond or bud, shaved off the root-hairs, and examined it with the microscope for archegonia and antheridia. I found the "cushion" crowded with archegonia, in some of which the egg-cell could be distinctly seen. A few antheridia were found in the usual situation, but they were apparently not yet mature,

On December 29, 1898, I went round my garden and snipped off portions of fronds from some eight different ferns, the only principle of selection being to take fronds which were devoid of any trace of sori, and were not too mature to allow any hope of further growth. They were well washed by a stream of water to remove any adherent spores of other ferns, and were then pinned down in a pot and covered with a bell-glass.

Examining these on January 12, 1899, I found that in the case of one fern, *Polypodium vulgare* var. *grandiceps*, Parker, two translucent (presumably prothallic) growths were already proceeding from the termination of a veinlet near the edge on the upper surface of the frond. These growths, as well as the piece of frond from which they grew, I regret to say have been since destroyed by fungoid growth. I hope, however, to repeat the experiment.

WINTER GROWTH.

A point which is not always appreciated by the amateur flower and fern lover is the fact that, despite the apparently entire dormancy of many plants in the winter months, they are not absolutely at a standstill, and consequently still require some little attention in the way of watering and looking after generally. There is, indeed, much root activity going on beneath the soil long before any obvious evidence is given above it by actual leaf development, and Nature herself teaches us by the example of every field, wood, and other plant habitat that it is precisely during the winter that the soil is at its moistest, and thus best adapted to aid this root action. As a proof not only of the activity of the roots, but also of the foliar tissues to fulfil their functions, we may cite the fact that during periods of continued

and intense frost the fronds of evergreen ferns shrivel up, and lie prostrate as if they were dead, and on examination they will be found precisely in the flaccid condition induced by drought. When, however, the frost ceases, and the soil thaws, we shall find that these shrivelled fronds will gradually rise and plump out, and in a day or two not the slightest trace of damage will exist. Hence, it is clear the roots have resumed their usual function of supply, and the frond cells have responded by absorbing and transmitting the needful sap precisely as they would do in the active growing season. The fact that the fronds shrivel when the root supply is checked proves that transpiration is going on all the time, and this means a certain amount of activity throughout the system. In many cases, too, and especially with bulbs, we cannot at all estimate the amount of root-work going on in the so-called dead season by the amount of the foliar growth. An extensive root system may be formed below a bulb while as yet the leaves have developed so little as not to pierce the surface of the soil, but doubtless within the bulb itself important work is going on, preparing it for that comparatively rapid development of its contents so soon as the spring has fairly arrived. How otherwise can we account for the curious fact that some daffodil bulbs, Horsfieldi to wit, if dug up in August, will be found to be rooting freely, though they do not push their foliage above the soil until well into February, *i.e.*, practically six months later ? Another fact which we have observed, and which involves considerable risk of drought to plants under glass, is that hard frost has a materially drying effect upon the soil. Soil which previously was thoroughly moist, and even wet, will often, when the thaw sets in, be found in a more or less dry condition, belying the natural presumption that so long as it was frozen hard the moisture contained therein was

unaffected by evaporation. Many failures may be attributed to a want of appreciation of these facts, and a belief that, since nothing is obviously growing, nothing need be done, the end result being that "nothing" is the reward, the failures being imputed to mysterious causes which had nothing at all to do with them.

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

ROCKWORK ON SLOPES.

In many gardens undue steepness is partially avoided by a series of terraces forming alternate levels, and slopes of forty to forty-five degrees. These slopes are also frequently turfed, and constitute one of the gardener's most difficult tasks to keep in presentable order, for the simple reason that they are unnatural.

Slopes of such gradients only occur naturally in rocky regions, and are there usually formed by rocky debris weathered down from higher levels, and under such circumstances an abundance of alpine plants take the place of grass, and find a congenial harbourage in the rough and open soil. Here, then, we have a hint from Nature for a better utilisation of such terrace slopes than devoting them to a monotonous and formal covering of grass, for if we face them instead with a sort of rock wall, constructed in proper fashion, we can find no fitter home for an alpine collection if the aspect be southerly, or for a hardy fern collection if it faces north or north-east.

Assuming the slope to be at an angle of forty-five degrees, or more, the best plan is to build a sort of rock wall, and the first step would be, of course, to remove the turf entirely, or the grass will assuredly assert itself detrimentally later on. This being done, the soil should be well dug up two spits

deep, and, if it be stiff, it should be lightened by a liberal dressing of leaf-mould during the digging process. As this naturally raises the level somewhat, it is advisable to let it settle down before proceeding with the wall, so as to obviate subsequent undue settlement after planting. In constructing a wall of this kind, it is obvious that the planting should be effected simultaneously with the laying of each course, for once the wall is completed, the component pieces of rock or burr are, as a rule, too firmly fixed to be removed, and proper planting is, consequently, impossible.

We proceed then as follows : From end to end of the projected wall bottom we bed very firmly and deeply in the soil a row of fairly uniform pieces of stone, leaving spaces of a couple of inches between each. In placing these the bank soil is dug out with a trowel or spade to half the depth of the stones, the excavated soil being thrown up the bank. The stones being in place, the soil is well worked in and rammed down behind them, leaving space for specially prepared soil to be filled in all along as the planting proceeds. The bottom courses of the wall will necessarily be the moistest, and it is well, prior to planting, to sort out the alpine or other plants into groups most suitable for dry or moist positions, or requiring peat or lime in the soil, and so on, since in constructing the rockery on the lines I am indicating, their special tastes can all be provided for as we proceed. Thus, if a plant requires lime, we can mix some old lime rubble with the compost, and so on. The next thing is to lay the plants on the layer of compost, spread out their roots carefully, and arrange them so that their growing crowns will just be free of the second course of stones. The roots spread out as described, a little more compost is spread over them, and a fresh row of stones is bedded firmly in such a way that an inch or two of the first

course projects beyond them ; the bank soil is excavated for this course as before, and precisely the same procedure adopted until the wall is carried up to its full height. Should the stones be at all of slab form, care must be taken to bed them to slope at the reverse angle of the wall face, so that all rain falling upon them runs into the bank, and, consequently, to the plant roots, instead of dripping outwards.

To secure uniformity of slope, it is usually sufficient to see that the roughly-dug bank basis of the wall is all right in this respect, but if it be desired to check this, a few strings stretched up the bank at the proper angle as eye-guides are easily arranged.

In arranging the plants, the perpendicular chinks left between the stones must be firmly filled with soil when they receive their tenants, and it is well to pack these in with a few small pieces of stone. If old building stones are used, it is well to knock off all square corners, and if they are a mixed lot, to vary them as much as possible. When the work is done, a good, but gentle, syringing should be given to settle the soil and refresh the plants, and should the weather be sunny this should be repeated a few times, especially if any soft-foliaged plants, like campanulas, etc., have been introduced. If such a wall face north, it is, as I have said, best fitted for hardy ferns, but as many of these have substantial crowns, the lateral spaces between the stones must be widened to accommodate them ; this, however, is a common-sense matter, and I need not enter into useless details. All, indeed, that I need add, is that, given such a wall, a selection of good varieties should be installed, and the space not wasted on common ones, as is too often the case.

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

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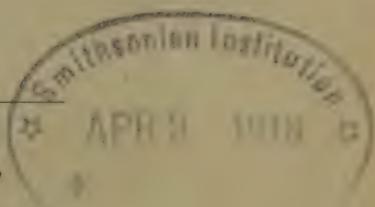
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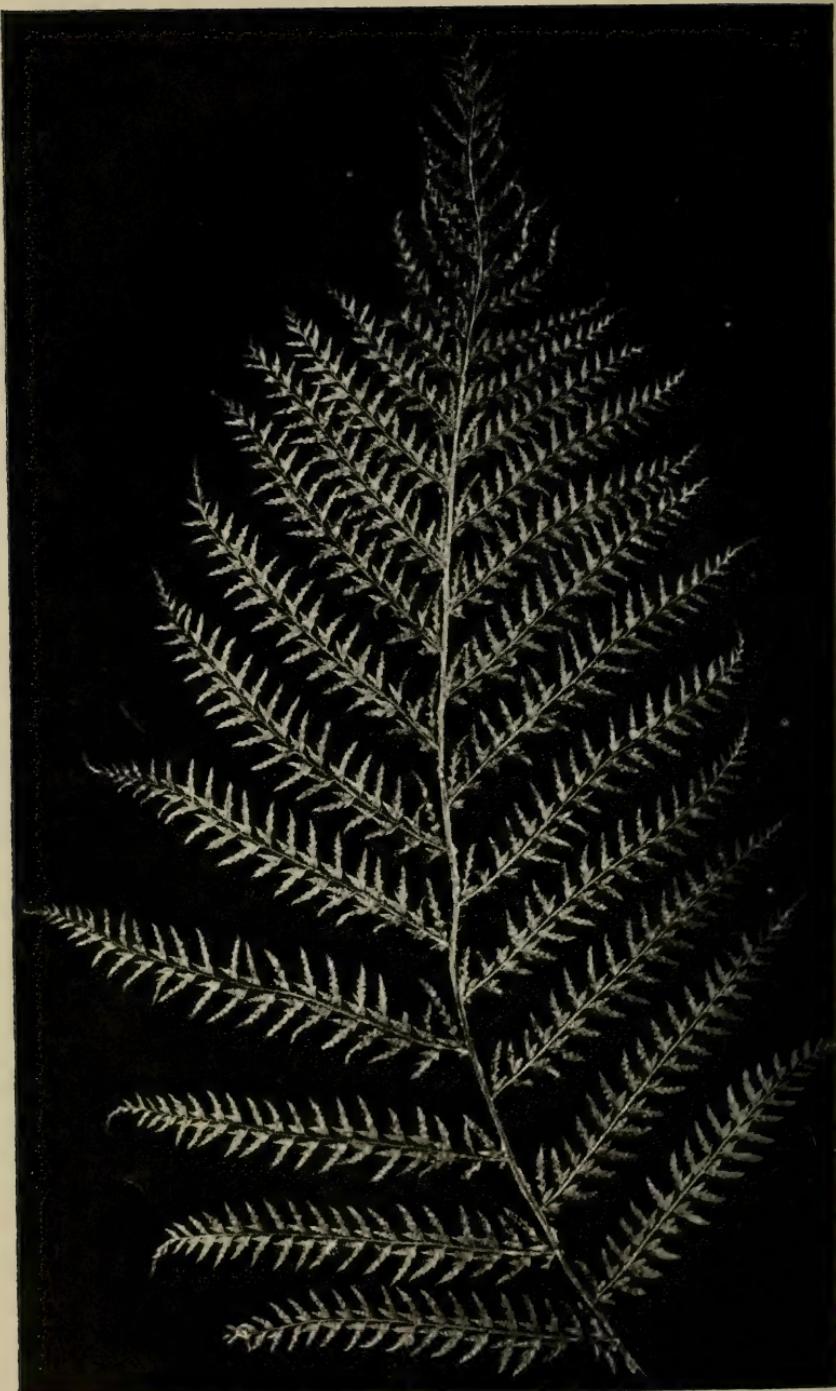
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POLYSTICHUM ANGULARE LINEARE "HIRONDELLE" (WILLS).

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EDITORIAL NOTES.

The war continues its weary and disastrous course “dragging at each remove a lengthening chain” of horror, and has already taken its toll of life and health in some one dear to every member of the Society. Probably every one of us has some near relative engaged in the Titanic struggle for decency and humanity. All the sons of our President and of our Hon. Secretary are in the war and each of these members has had at least one son severely wounded. The Rev. E. H. Hawkins is another member whose sons have all answered the call, one of them having already given his life for the cause, while another (Captain Gerald Hawkins) is home on leave with his FOURTH wound stripe. Of actual members of the Society engaged in the war we know of Captain J. R. Roberts, Captain S. P. Rowlands, R.A.M.C., and Captain T. Stansfield, R.A.M.C., all of whom are, or have been, contributors to the GAZETTE. There are probably others whose names have not been brought to our notice. The names of Captain Gerald Hawkins and Captain T. Stansfield (probably also *inter alia*) have been “mentioned in despatches.”

Lieut. Walter Stansfield, R.A.M.C., of Sale, who has recently gone to the front, is the only son of our contributor Mr. H. Stansfield. Doubtless we elders, who are compelled to stay behind, are all doing something, directly or indirectly, to support the cause of honour and good faith.

We are indebted to our member Mr. T. Brown, J.P., of Belfast, for a cutting from the *Belfast Newsletter* announcing the death, in her 95th year of Mrs. Frisell, of Belfast, formerly of Castle Kevin, Co. Wicklow. This lady was the first finder of *Athyrium f.f. Friselliæ* in 1857, which event she survived for 60 years, thus probably creating a record in longevity in the history of fern-hunting. We hope this record may be surpassed by some of our present members, several of whom are already octogenarians and still hale and hearty. Fern hunting has been called “an old man’s hobby,” but there is no reason why we should not, at all events, BEGIN young. Some of us did.

OUR FRONTISPICE.

POLYSTICHUM ANGULARE LINEARE “ HIRONDELLE ” (Wills).

This fern, found by Mr. Moly, was considered by him to be one of his greatest prizes. So much did he think of it that he would never part with a plant until he disposed of his whole collection to Mr. Cranfield shortly before his death. We are indebted therefore to Mr. Cranfield for the rescue of this beautiful thing, with many others, from extinction and oblivion. It is certainly by far the most refined form among the numerous finds of the *lineare* type. Like many other highly finished varieties, however, it will only give its best development when in good health and in full maturity. Young plants, especially seedlings, pass

through a stage of imperfection during which they may be almost normal, although generally showing something of the lineare character. The perfect state, however, is well worth waiting and working for. Unfortunately when it is attained the plant seems to lose the vigour which characterises it in the larval state (if we may use the expression) and is apt, upon small provocation, to fall into a condition of feeble health from which it recovers with difficulty and only after much coaxing. The name "hirondelle," given by Dr. Wills, is French for swallow, and the resemblance of a pair of opposite pinnules to a flying swallow is sufficiently striking. It is not so clear why the French language should have been selected instead of the usual classical tongues. Perhaps the French form was considered more euphonious than the corresponding Latin *Hirundo* or its adjectival form *hirundinum*. Chelidon (Greek) would probably be thought too obscure. Let us be thankful it was not *Schwalbe*. The illustration is taken from a portion of a frond accidentally broken from a seedling plant kindly sent to the Editor some years ago by Mr. Cranfield. It is evident that the variety is capable of coming true from spores.

F. W. S.

MY EXPERIENCE IN PROPAGATING FERNS FROM BULBILS.

As I am in no sense a botanist, but merely a grower of plants, it will be my object in this paper to avoid using technical terms, and to describe, in the simplest language I can command, how I have raised Ferns from bulbils.

In certain classes of Ferns, I refer particularly to *Polystichums*, and especially to the plumose varieties of *Polystichum angulare*, the grower notices from time to time a

certain thickening of the central rib or stem of the frond. This thickening is always towards the lower end of the frond, and is often confined to the part beneath the lowest pinnæ. At first it is little more than an unevenness of the stem, then it develops into a kind of wart-like growth, which gradually swells until rather like a very small tumour, paler in colour on the upper side. There are two radically different ways of treating these growths, or bulbils, for such they are,—

(1) The whole frond may be removed and pegged carefully down in a seed pan. When this method is followed success will largely depend upon fixing the frond firmly, and keeping the whole of it, except the part where the bulbils appear, carefully covered with very finely powdered compost. When the frond has been fixed in position in a carefully drained pan, glass should be placed on top, and careful watering should be given. The pan should then be put in a shady place, where it will be free from any possibility of disturbance. Whenever water is wanted it should be given, and fresh compost should be powdered over if for any cause it should become necessary.

By this means it is possible to raise young fernlets from the bulbils, which throw roots downwards into the compost, and gradually form little ferns. It is the only process available if a fertile frond breaks off from the parent plant, or if a frond with bulbils comes from a friend. I have, however, found the method tedious and uncertain, and I should never dream of attempting it when the second means which I am now about to describe was available.

(2) The surer and, in my opinion, simpler means of propagating from bulbils consists in pegging down the fertile (*i.e.*, bulbiferous) fronds. When I notice that bulbils have been formed or are in process of formation I lay underneath

the frond sufficient good leaf mould to form a medium which the little roots, when they develop, will be able to penetrate easily. Any light compost would I believe serve the purpose, but I think that leaf mould is the best.

The cushion of leaf mould so formed should be deep enough to allow the stem of the frond to become half embedded. When the cushion is ready I press the frond gently downwards and peg it firmly to the ground. At first I used wooden pegs, but these are not always easy to get, they are seldom quite easy to insert, and they very easily rot or break. For these reasons I now always use hairpins, sometimes one and sometimes two, as may be necessary to ensure the frond being pegged so that it cannot move. Wherever it is possible, which is nearly always the case, I insert the hairpins further from the base than the bulbil or bulbils, for there are sometimes more than one. The pressure of the pins, placed otherwise, might interfere with the free flow of nourishment, and rust, which comes before long, might be injurious.

Once the pin or pins are inserted the main part of the operation is complete. I generally end by cutting off the outer half of the frond ; this diminishes the risk of disturbance and allows a fuller supply of nutriment for the swelling bulbils. When the operation has been thus completed the plant may be left to itself, and little doubt need be entertained that the bulbils so secured will in time develop into little ferns. The only additional precaution which I have found necessary is to make sure from time to time that the pegs hold firm. If from any cause they fail to maintain their grip in the ground, the pegging must be done over again, using either larger pins or more pins. For success the essentials are that the fronds should be fixed firmly in compost properly adapted for the formation of roots.

After some months (I shall give details as to dates later) the grower will be gladdened by seeing tiny fronds beginning to uncoil and develop.

When the plant is sufficiently matured the time has come for the final process, viz.: the separation of the young fern, for such it now is, from its parent.

I commence by cutting the stem of the old frond, upon which the little fern is now growing, with a sharp knife. The closer this is done to the central stock or caudex the better. I next carefully draw the hairpin or hairpins; and finally with the blade of a knife or better with a strong wooden label I carefully lift the whole. The next step is the planting of the young fern, or ferns, if there are more bulbils than one, in pots. In doing this I leave sufficient of the old stem to enable me to anchor it by means of two small hairpins placed one on each side of the little fern, and firmly fixed in the compost. The details as to potting, draining and proper compost are such as rule in all fern potting, the only special point is to ensure here, as in previous stages, that the plant is immovable. If the plant is sufficiently matured and proper roots have been formed when the potting takes place the future success is assured.

It remains to give some hints as to the dates upon which the operations already described are possible and desirable.

The causes which lead to the formation of bulbils are, so far as I am aware, obscure. Some species (and varieties) yield bulbils at an early age, while others take a long time, and, of course, there are many that do not yield them at all.

I got my first plant of P.A. *plumosum laxum* Fox in 1897, its first bulbil was formed in 1903; I got my first plant of P.A. *plumosum* Esplan in 1903, and its first bulbil in 1910.

Once the plant begins bearing it is likely to continue at any rate for some years.

From the Esplan *plumosum* first mentioned I took 14 bulbils in 1911, 24 in 1912, 13 in 1913, 3 in 1914, 7 in 1915. This year the plant ceased bearing and it has been in a feeble condition ever since.

To avoid wearying readers I do not give similar particulars with reference to Fox's *plumosum*. It bore well for a number of years and then died.

My first grandchild of the Esplan *plumosum* came in 1915 from a bulbil which I had taken in 1912, and which was therefore three years old. Other bulbils have been much slower in coming into bearing; three years is the shortest time in my experience.

The time for formation of bulbils is commonly the winter months, from December to February. I do not think anything is gained by pegging a frond at a very early stage of the formation; the right time is when there is some prospect of the bulbils beginning to make rootlets. Similarly with reference to what I have called *taking* the bulbils, that is severing it from the parent stock, it is a mistake to hasten this process. If the bulbil is pegged in December or January it will begin to develop its little fronds about April or May, but the rootlets in my experience are very feeble at first. A bulbil taken with rootlets only just beginning may be coaxed into a flourishing state by care, but the process is slow. If on the other hand the bulbil is not taken until the rootlets are well formed, the subsequent process is made easier and more rapid.

A great many of my bulbils pegged the previous winter are taken in July; and sometimes, when the formation of the parent fern encourages it, i.e., when the developing fernlet is not likely to suffer any damage, I rather like leaving the bulbil untaken for nearly 12 months.

In concluding these notes on the growth of ferns from

bulbils I desire to emphasise that all I have set down is my own experience. If I have seemed at times to dogmatise, this has been owing solely to a wish to avoid using unnecessary words. I am quite sure there are many others in the Society who can usefully supplement what I have said, and whose experiences have been more successful than mine. I believe that if artificial heat or close treatment were employed, the processes I have described would be very greatly hastened. My account deals solely with an amateur's experiences of growing from bulbils in a simple way in the open air.

H. KINGSMILL MOORE.

Cedar Mount,

Dundrum, Co. Dublin.

FERNERY CONSTRUCTION AND FERN CULTURE.

Ferneries are of two kinds, outdoor and indoor, and although they have many points in common, it may be useful to describe both. The fernery requiring a minimum of attention is the outdoor fernery on dry sandy scil, and it is surprising what a number of species and varieties can be successfully grown on any land that will grow potatoes.

The fundamental principles to be observed are pretty much the same as regards the general treatment of the land, whether we are growing ferns, flowers, or vegetables—that is, the land must be first of all deeply trenched and thoroughly pulverised. Assuming that the subsoil is sand it will be advisable to work up and incorporate a few inches of this sandy bottom every time the land is planted, and cow manure should be used at the time of planting, at the rate of 25 tons per acre. A good dressing of this

manure will keep the soil moist and in good growing condition for several years, in which time the ferns will be thoroughly established and able to take care of themselves during the longest spells of drought, with the assistance of frequent hoeings. The land must be kept well cultivated and thoroughly aerated all through the dry weather, and a dust blanket of 3 or 4 inches must be always maintained. This dust blanket imprisons the moisture in the soil, leaving it available for the use of the plants. Without this dust blanket the moisture would be quickly lost by evaporation. The hoe should therefore be used once a week, whenever the land is dry enough to tread. If the ferns appear to be languishing because of the long delayed rain, give the land an extra hoeing. Plants don't know the difference between H. O. E. and H_2O , and the use of the former is more efficacious than artificial applications of the latter during spells of drought in the outdoor fernery.

A soil that cracks in dry weather, denoting the presence of clay, is unsuitable for ferns and requires the addition of much sand. A sandy, fluffy, peaty soil is the best for general purposes. Sandy soils seldom crack and are never dry 6 inches below the surface provided the hoe is in constant use. Every shower of rain in hot weather closes up the pores of the soil either wholly or partially, leaving a sort of impervious crust on the top when dry. It is the duty of the cultivator to break up this crust immediately it is formed, and to work it up into a dust blanket. If this is not promptly attended to, the ground rapidly loses its moisture by evaporation, and there is a look of silent suffering about the ferns which is very pathetic.

A few small and medium sized trees planted among the ferns will provide the necessary shade and shelter from winds.

An ideal spot for a moist fernery would be a sloping hillside at a moderate altitude above surrounding ground. I have such a spot on the North-West side of Cader Idris, and about half the distance from the summit, in my mind's eye. Here there is ample air drainage and there would be a total absence of late spring frosts which often prove so disastrous in low-lying districts. The ground is always wet, never even approaching dryness, and cool summer conditions prevail. The matter of water drainage is usually overdone and we are all apt to err on the side of too much drainage. A wet sloping bank or hillside would require no drainage, gravity would do all that is necessary in the way of removing surface water. Your readers will observe that in a permanently wet outdoor fernery no hoeing can be done, and it is in fact here unnecessary. The use of the hoe is to keep the land moist, and if this can be effected without labour, so much the better.

As regards the under-glass fernery : A fernery requiring constant artificial watering is rather a nuisance, and watered ferns are seldom permanently happy, therefore the fernery site should be so moist that all watering is unnecessary and the watering can ought to be banished from the fernery. I am assuming, of course, that your readers have discarded pot culture, and have adopted the more commonsense method of planting out. The main difficulty in establishing a wet non-drained fernery on a wet bottom is that of maintaining the soil in a light and open condition. The soil in which the ferns are to be planted should be introduced in a perfectly dry state at the time of planting, and should be spread out on the wet boggy land above described, to a depth of 9 to 12 inches, according to the size of the plants to be dealt with. As regards the growing medium ferns are not very fastidious

provided the soil rests on permanently wet mud or floating bog, and is, and can be maintained, in an open and porous condition. A mixture of garden soil with an equal bulk of peat moss litter, or cocoanut refuse, leaf mould, street sweepings, shoddy, decayed sphagnum, sand, anything, in fact, that will keep the soil open and porous will grow all but the most delicate ferns. Sand and soil alone would not be quite light enough for ferns under glass. The soil should be spongy and elastic as well as light, and a mixture of quarter soil, quarter sand and half moss litter or any of the substitutes aforesaid would make an ideal compost. I use leaf mould, street sweepings and decayed packing moss as a lightening medium, these being close at hand and readily procurable, but should prefer peat moss litter, shoddy and horse droppings as being more springy and elastic, if they could be procured locally and economically.

The object is to have the soil dry at the top but very wet at the bottom, and as light at the time of planting as newly fallen snow. The hoe should also here be used whenever the surface is dry enough, and the arrangement of the beds such as will enable the cultivator to do all necessary work such as weeding and replanting without treading the soil, as treading would tend to deprive the soil of its porosity. If we water the plants from above, we clog up the pores of the soil and destroy our dust blanket, therefore all water must reach the plants from below, and watering must be as far as possible self-acting. But your readers will say: "How about ferns in the open air? Nature usually supplies water from the clouds and not from the bowels of the harmless earth." Very true. The fact that nature usually dispenses her supplies of moisture from above has not escaped my notice, but we are now

treating of ferns under glass, where no rain can penetrate, and nature is not catering exclusively for the benefit of our ferns ; if also we can improve upon or assist nature in any way, so much the better. After planting, the lower roots will quickly penetrate the watery zone below, and there remain permanently immersed, whilst the upper or breathing roots will find their proper level in the drier strata above, and the plants will quickly adapt themselves to the prevailing conditions.

Such delicate subjects as *A.f.f. Kalothrix* and *A.f.f. Girdlestoneii* are at their best when planted only two or three inches above the waterline, and *P. ang. Pateyii* and *P. ang. acrocladon*, as well as many other kinds which are usually supposed to require much humouring, are equally aquatic in their requirements.

A very thin shading of limewash should be applied to the glass internally about April, and the same externally two months later. This outer application ought to have been gradually washed off by the rain, leaving the glass externally almost clean by September. The internal shading, if not too thickly applied, will have almost disappeared by the end of October.

Another great advantage in connection with the wet fernery is the total absence of *O. sulcatus*, that *bête noir* of the fern lover. My own bog fernery under glass has not been watered for twelve years and during the whole of that time I have not seen a trace of the common enemy, although the place is packed with ferns to which the vermin are very partial.

Whether the larvæ are drowned in winter, when the land is usually covered with more or less water for long periods, or whether the perfect insect is drowned in summer in the numerous water holes from which plants have been lifted,

or whether they fall a prey to the colonies of frogs infesting the place, I am at present unable to say. I notice the beetles drown in less than an hour, but the larvæ can stand four days' total immersion and still come up smiling and hungry.

A fernery constructed on the above lines is not such a tax on the time of the cultivator. The ferns take care of themselves and can partake of liquid refreshment at any time without having to ask for it, and beyond careful weeding require little attention. The owner can take his annual holiday or attend to his general business with an easy mind, "wrapped in measureless content" in the knowledge that his treasures are in the care of nature herself, the best of all nurses.

Sale.

H. STANSFIELD.

[Our correspondent's views on culture are apparently somewhat heterodox, but he has given abundant evidence that he can grow ferns as well as most people. The conditions which he describes—on the one hand a naturally dry soil with sandy subsoil, on the other a quagmire with water below—are neither of them ideal and are widely divergent from each other, yet the same ferns are persuaded to flourish in both. It is clear that the methods which will suit one position will not suit the other. Moral: Let each cultivator study the conditions of his situation and adapt his measures thereto. The secret will perhaps be found in the maintenance of a soil which is at once moist and well aërated.—EDITOR.]

FERNS IN FLANDERS.

The man who rides a hobby has always the pull over the dull pedestrian, and especially so when the lines of both are cast in places not of the pleasantest. Life with our

infantry in Flanders is characterised by monotony, varied by periods of excitement provided gratis by the Hun, and no condition could bring out more forcibly the value of an enthusiasm, be it for horses, fishing, botany or what not, as a preventive against boredom. To one in whom fern hunting is a hereditary disease, ferns of any sort, anywhere, cannot fail to provide entertainment, although it must be confessed that in Flanders the material is very limited and the results of many months of desultory hunting have been precisely nil, as regards varieties of decorative value.

Luckily the pleasure of the pursuit is not dependent solely on the discovery of the very occasional "good thing." "Where there are ferns there is always a chance" and at least there are always those forms of minor variation which are interesting botanically, though useless for the garden, to say nothing of the beauty of the normal ferns themselves.

Polystichums are fairly generally distributed over our Army area, though their numbers are few, and they are all of the extreme aculeatum type, not a single angulare or intermediate form being found, nor any varieties.

Lastreas are fairly abundant, *dilatata*, *spinulosa* and *filix-mas* especially so. *Pseudo-mas* is not so common, though it does occur. *Montana* was not found.

Polypodium vulgare is plentiful on that curious group of isolated sandy hills which rise abruptly from the plain on the Franco-Belgian borders. Much hunting was done on one of these, formerly a valuable observation post overlooking the old German lines, and still under occasional shell fire from the high-velocity naval gun, vulgarly known as "Percy." A few sub-varieties were found, e.g., *semi-lacerum*, *bifidum* and *acutum*, one of the last, with long tapering pinnæ, being almost worth "bagging."

Athyriums are plentiful on the same hill, and generally in suitable locations.

Of *Asplenia*, *Adiantum-nigrum* was found most abundantly near a base hospital on the Channel coast and the plants were of a character distinctly more acute than the British average. *Asplenium trichomanes* is not generally distributed but was found in profusion in one village occupied during a period of training, decorating every suitable wall with its delicate tracery, in company with *Asplenium ruta-muraria*, which is much more generally abundant. An attempt at cresting was the only variety noticed.

Near this same village were chalky hills which made a famous hunting ground for Orchids, of which, the season being June, many interesting species were found.

It seems a pity that no fern variety could be found, to serve as a War souvenir, more attractive than the stereotyped shell-case, Hun weapon, etc., but possibly the luck may yet turn.

T. STANSFIELD.

Empire Hospital,

London, W., December, 1917.

A TRIPENNATE FERN.

Blechnum sp. paradoxum (Jones) was found by Mr. G. Whitwell in Bannisdale, Westmorland, in 1877. It was an absolutely unique plant, no fern with this three-winged character having been recorded in any species so far as the writer knows. The frond was, at first sight, somewhat of the *strictum* character with toothed and abbreviated pinnæ, but along the middle of its upper surface was an upright ridge like the crest on the back of the male newt. The ridge was, however, divided into lobes, corresponding to

pinnæ, and the frond was consequently described as having "three rows of pinnæ," *viz.*, the two normal lateral rows and, in addition, the vertical pinnate ridge. The upright row had no lower surface but both sides had glossy epithelium similar to that of the upper face of the normal frond. Col. Jones had an opportunity of seeing the plant shortly after it was found and was much interested, having been, quite naturally, sceptical of the existence of such a fern until he saw it with his own eyes. He named it *paradoxum* and suggested that it should be handed over to Mr. Barnes to develop, as that gentleman was very successful as a grower of *Blechnums*. The suggestion was adopted, Mr. Whitwell receiving a choice *montana* in exchange with a promise of the first division of the *Blechnum*. The plant became established and developed over twenty fronds of some three inches in length. It was at this stage that I saw the plant (probably in 1878) in Mr. Barnes's garden, and marvelled at its remarkable and unique character. Unfortunately for everyone, Mr. Barnes was too anxious to redeem his promise to send back a plant to the finder—the plant was divided with a knife (alas ! the fatal knife), the result being that one of the pieces perished entirely while the other was all but killed. Mr. Barnes's half was, with some difficulty, coaxed back to life and remained with him until his death, when the plant came again into the finder's possession. It never, however, became robust and never shewed any fertile fronds, but eventually died without progeny more than thirty years after its discovery. I saw it *in extremis* some three or four years ago (I think) when there were, in one pot, three tiny pieces, each of which could have been covered by a shilling, but all still showing the three-winged character quite distinctly. The extinction of this fern was a greater disaster to the fern world

than the loss of many more beautiful things. Its decorative value was very small but as an example of variation it took first rank inasmuch as it was the only example of its kind. Centuries may elapse before another such fern is found, but what nature has done once she can do again, and it may be that some even of the present generation may re-discover this extraordinary type in this, or in some other, species. Unfortunately no frond, photograph, or drawing of this fern exists but, in order that its memory may not be lost, I have here set down its history in greater detail than it has yet been given.

F. W. S.

THE EFFECT OF FROST ON FERNS.

Much misconception exists in the popular mind as to the effect of severe frost on ferns. With the exception of *Asplenium marinum*, *Ad. capillus-Veneris*, and perhaps *Trichomanes radicans*, the whole of our native ferns (the strong growing and deep rooting species at any rate) derive considerable benefit from spells of severe frost during winter, provided the plants are not in pots. [An important qualification.—ED.]

A good old-fashioned winter with frost and snow extending towards the end of April, augurs well for a magnificent display of fern foliage later on.

The conditions to be dreaded are those periods of comparatively warm weather which are sometimes sandwiched between periods of severe frost.

If these mild warm days occur later than February, there is danger of the ferns being excited into premature growth, and they do not obtain that complete rest which is so necessary a prelude to the serious business of life.

Ferns require winter weather of a very decided kind, such as we experienced during the winter ending May, 1917. Then we had a mild autumn followed by protracted spells of frost, with an average night temperature of 25 degrees Fahrenheit. These conditions prevailed until towards the end of May. *Asplenium marinum* and *Ad. capillus-Veneris* in cold houses were mostly killed, but among ferns in the open ground, such as *Athyriums*, large *Polystichums*, *Lastreas* and *Osmundas*, the deaths were nil. Small late transplanted plants of shallow rooting varieties of *P. angulare* died to the extent of perhaps 5 per cent. in the open ground, but under glass all were uninjured.

If we could have the weather to order, that best suited to ferns would be : Autumn with occasional slight frosts such as we are now experiencing (1917), then a cold but frostless January, then a moderate fall of snow with cold frosty sub-arctic weather until mid May. Such conditions are conducive to thorough rest, with that refreshing dreamless slumber which is so essential to a vigorous and uniform start in spring.

After mild winters the ferns will often begin to move during the second week in April, and the first crop of fronds, which ought to be the best, is bound to suffer from the effects of the frosts which will inevitably occur a month later. If on the other hand the weather in March and April is very mixed, the crowns are liable to issue their contents in serial fashion instead of all the fronds marching together.

Ferns cannot be disturbed during March without hastening the start. This is a matter of no consequence provided we get a frostless May. Unfortunately, however, May has rather a bad character, and we rarely get a frostless May. For this reason autumn planting is most desirable, whilst

the ferns are having their beauty sleep. If we wake them too soon, they will slumber again, but if disturbed towards the end of March, like Macbeth, they will "sleep no more," but will start into growth two weeks earlier than would have been the case had they been undisturbed.

Some of the so-called hardy exotic ferns are less immune from the effects of severe frost than are our native ferns. In the cold fernery under glass the crowns of large 5 feet specimens of *Lomaria Magellanica*, which for 20 years have come safely through the winter, have this (16/17) winter been killed, but the underground rhizomes have survived and have produced quite a thicket of strong sturdy plants 2 feet high.

Dennstaedtia punctilobula and *Pteris scaberula* although in great measure killed, have just managed to pull through. *Asplenium monanthemum* perished.

Polystichum Ilicifolium and *Lastrea Standishii* although badly punished, are still alive. The N. American *Osmundas* are hardier than our own *O. regalis*, and are quite happy with a zero temperature during winter. The Brazilian *O. palustris*, although usually reckoned hardy, has succumbed to the frost although under glass and otherwise slightly protected. *Polystichum setosum* and *P. Braunii* are both early risers. They are uninjured by the most severe frosts in winter, but nothing can induce them to remain in bed until all danger of frost is at an end. The proverbial wisdom does not appear to accompany early rising in this case. It may be possible by a process of selection, to breed a race of sluggards who can be persuaded to remain in bed till "somewhat nearer to the stroke of noon" (June 21st). Until then we may expect to see these lovely ferns cut down by the frosts of May.

One of the ill effects of a succession of alternate frosts and thaws is the lifting of small and unestablished plants out of the ground, where they are liable to remain high and dry until killed by drought. If an inquest could be held on the mortal remains of these plants, it would probably be found that death was caused by drought and not by frost *per se*.

In rhubarb forcing the universal practice is to lift the roots out of the ground and leave them exposed "all thin and naked to the numb-cold night" or, more correctly, to the frost, for 3 weeks before transferring them to the warm steamy atmosphere of the forcing house. The more thorough the freezing, the quicker and stronger the growth after their removal to the forcing house.

The late Mr. Tyldsley who was one of our most successful fern growers here in the north, and whose cold glass fernery excited the envy and admiration of all, thought he could enhance the general interest by installing a heating apparatus, so as to exclude the frost during winter. The result was quite satisfactory so far as the winter was concerned. The evergreen and sub-evergreen ferns retained their freshness of foliage until long after Christmas, but the growth in spring left much to be desired. The crowns broke feebly and unevenly as though the long night of winter had been spent in riot and dissipation. There was also an air of general debility about the ferns which contrasted very unfavourably with their former robust health.

Frost in winter, although so detestable to elderly people, certainly has its good points, and is very serviceable as a soil pulverizer. A good hard frost after the land has been roughly dug is the very best possible preparation for the summer drought, as it leaves the soil in that light and powdery condition which is so essential to the well being

of ferns in the open air fernery, and which condition is almost impossible of attainment by any other means.

H. STANSFIELD.

Sale, December, 1917.

[*Asplenium lanceolatum microdon*, although under double glass protection, was killed outright in Reading by the frost of the winter of 1916-17, as the species had been by a previous severe winter. This species (*lanceolatum*) appears with us to be almost, but not quite, as tender as *A. marinum*. Many choice varieties of *Polystichum angulare*, grown in pots, suffered severely, while those planted out, whether in the open ground or in frames, were practically uninjured.—EDITOR.]

POLYDACTYLISM IN POLYSTICHUMS.

Every raiser of *Polystichums* (especially of *P. angulare*) from spores must have been struck by the increasing tendency of late years for polydactylous forms to appear among the seedlings. Unfortunately the polydactylism is invariably more or less irregular, being greater in some pinnæ than in others, while it is always missing from a few of them. This want of thoroughness is a defect in the polydactylous forms inasmuch as it causes the fronds to be more or less unsymmetrical. Occasionally a frond will appear which has all the pinnæ affected, but no one has yet succeeded in raising a form which was constant throughout, i.e., in which ALL the pinnæ of ALL the fronds showed this character. The first *polydactylum* recorded was found in Tipperary in 1857, named by the late Mr. Thomas Moore, and distributed by Mr. R. Sim, of Fooths Cray. It was a poor thing, being a small grower with a tendency to

irregularity in the development of the pinnæ as well as in the amount of fingering which they bore ; it is doubtful whether it is now in existence and its loss need not be regretted. In 1862 the Rev. C. Padley found his Vale of Avoca *polydactylum*, which was a fine grower with symmetrical fronds so far as the general cutline was concerned, but exceedingly unreliable as to the amount of fingering produced—some fronds being fairly well hung with fingered pinnæ, while others were normal or almost so. Col. Jones greatly admired this type and from Padley's find he raised his *polydactylum splendens*—a great advance upon the parent and certainly one of the best purely polydactylous forms produced up to the present. He was very ambitious of finding a good *polydactylum* himself, and in 1875, while fern hunting in South Hampshire, he was day-dreaming of this. To quote his own words : “ I was just thinking what I should like to find—it was to be a *polydactylum*, and the best *polydactylum* ever found—when suddenly there it was before my eyes.” This was the history of his famous Hants *polydactylum*, which he afterwards sowed so persistently and endeavoured to cross with almost every uncrested form of angulare, thus laying the foundation of the compound polydactylous angulares now in almost every collection—indeed the difficulty now is to avoid them. He even tried to introduce *polydactylum* blood into his beautiful plumose divisilobes. When he told me of this I remarked, “ What a mercy it was that you did not succeed.” Since his time, however, the plumose divisilobes have become infected with polydactylism and it must be admitted that the results are, in some cases and at some times, exceedingly beautiful. Among them are *P. ang. div. pl. polydactylum* H. Stansfield, *div. pl. dissectum* and, perhaps most striking of all, the form which I call

cupressoides, also raised by the same grower. In this form there seems to be a minute infusion of lineare blood which gives a peculiar sharpness of cutting to the ultimate segments. The fronds are rather narrow and erect and the suggestion of a Cypress is, in some conditions, very striking. None of these forms, however, can be relied upon to produce two fronds alike, owing to the exceeding variableness of the polydactylous character. This character has even invaded the *pulcherrimum* section, and, oddly enough, this was in the first *pulcherrimum* ever raised from spores—my own *pulcherrimum polydactylum*. In 1888 Col. Jones sent me a large collection of spores for sowing, among which was a mixed packet of *decompositum grande polydactylum* and *deorsopinnatum* (both of Jones). The ferns raised from this packet included one which I early recognised as a *pulcherrimum*. The polydactylous character was not noticeable for some time but appeared when the fronds were 9 or 10 inches long, somewhat to my disappointment even then, for I was very anxious to raise a *pulcherrimum* pure and simple. I still have this plant and it is a very interesting but somewhat tantalizing form. Every new year it seems to make good resolutions and starts the spring growth with a set of fronds of most refined and exquisite *pulcherrimum* character, generally with just a touch of polydactylism here and there, but fronds are sometimes produced of almost pure *pulcherrimum* type. These fronds are thin in texture and lacking in timber in the footstalks, so that they are apt to drop after a month or two of life. During the summer, however, the *polydactylum* blood seems to get the upper hand and the later fronds gradually become coarser in cutting, thicker in texture, and more polydactylous, until in the late autumn but little of the *pulcherrimum* character is to be seen. The *polydactylum*

blood appears to confer vigour and has probably been the main cause of the preservation of the variety, which would otherwise not have survived the vicissitudes to which it has been exposed. The feature of polydactylism has also crossed over from *P. angulare* to *P. aculeatum*, this being first effected by a deliberate and purposive sowing on the part of Mr. E. F. Fox. A later example is the manifestation in *P. aculeatum pulcherrimum* of an imperfectly polydactylous form, this being a seedling raised by Mr. Cranfield. This form at times seems to promise well but as a rule the fingered character is too irregular and fugitive to be considered anything other than a defect from the ornamental point of view. Nevertheless the plant is interesting biologically because it was not the result of an intentional cross at all and it may possibly be a manifestation of simple "sporting" on the part of the parent *pulcherrimum*. Other cases have given rise to the suspicion that there may be an inherent tendency in the *Polystichums*, and especially in the more complex forms to put on this character when propagated from spores. A sowing of my own, in which the polydactylous strain was carefully avoided, rather supports this view, but it must be confessed that this kind of sporting—if sporting it be—was absolutely unknown in these species until intentional crosses had been effected.

[*To be continued.*]

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PUBLISHED QUARTERLY.

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F. W. STANSFIELD, M.D.

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THE BRITISH PTERIDOLOGICAL SOCIETY

(*Hon. Sec. and Hon. Treasurer, W. B. Cranfield, East Lodge, Enfield Chase,
Middlesex).*

KENDAL, WESTMORLAND.



ALEXANDER COWAN, Esq.
President of The British Pteridological Society.



P. ANGULARE DIVISILOBUM FALCATUM, MOLY.

THE BRITISH FERN GAZETTE.

VOL. 3.

JUNE, 1918.

No. 36.

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EDITORIAL NOTES.

As the present issue will complete the third volume of the GAZETTE, we have pleasure in presenting, as a frontispiece, a portrait, from a photograph taken some years ago, of our President, Mr. Alexander Cowan, of Penicuik, who has worthily presided over the fortunes of the Society for the last ten years. We trust he may long continue to occupy that position. Our readers will learn with the deepest sorrow that Mr. Cowan has lost his eldest son, Captain Charles J. A. Cowan, of the Royal Scots, aged 25, who died on March 25th from wounds sustained while fighting for his country in France on March 23rd; Mr. Cowan's second son lost a leg in the war last year, while the third is now suffering from severe shell shock. Our deepest sympathies go to our President and his family as to all who are similarly bereaved.

We regret also to announce the death of our member, Captain Harry Sanderson (acting Major), of Galashiels, which has only just come to our knowledge although it occurred as long ago as April 23rd, 1917, when he was killed in

action near Arras. Mr. Sanderson enlisted in August, 1914, as a private in the Inverness-shire Horse Artillery, from which he obtained a commission in the R.F.A. He rapidly rose to the rank of Captain. He commanded his battery in the battle of the Somme, in which he was wounded, and in the end of 1916 he returned to France. Captain Sanderson took an active part in the public life of his native town of Galashiels, where he was a partner in the firm of P. & R. Sanderson, cloth manufacturers. He was a keen horticulturist and botanist and had a fine collection of rock plants. He was one of the most active members of the Scottish Alpine Botanical Club, having a keen eye for a fern as well as for a flowering Alpine plant. So far as we know Captain Sanderson is the first actual member of our Society who has died for his country in the war as he was also one of the first to offer himself. He leaves a widow and three children to whom we offer our profound sympathy.

It is with deep regret that we announce the death, on March 16th, of our honoured Vice-President, Mr. W. B. Boyd, in his 88th year. His death was mercifully sudden, as we understand he was in his garden on the previous day and the Editor received from him a letter, written in his usual neat and firm hand, dated March 15th and bearing the Melrose postmark of March 16th. In it he says : "I have been in the doctor's hands lately, but am now feeling a good deal better." Mr. Boyd was regarded with esteem and affection by all who came in contact with him on the Society's excursions, in which he frequently joined. He attended the very last meeting in Eskdale in August, 1914, and was then successful in finding a very promising and vigorous plumose form of *Lastrea montana*. He had many years previously found another plumose form of this species and a sub-plumose form of *L. dilatata alpina*. He was also

the discoverer of an imbricate variety of *Polystichum lonchitis* and a congested form of the rarely varying *Allo-sorus crispus*. Another interesting find of his was his Loch Lomond *Lastrea*, at first supposed to be a hybrid between *L. flix-mas* and *L. spinulosa* or *L. dilatata*. As, however, it comes readily from spores it is probable that it will turn out to be a botanical variety of *L. dilatata* with which it certainly has affinities. The seedlings still await development and investigation. The Revd. J. J. M. L. Aiken, who knew him well, has contributed the biographical sketch of our venerable friend which appears upon another page.

The completion of our third volume affords a convenient opportunity for the Society to re-consider whether the GAZETTE shall still be continued or shall be suspended for the duration of the war. In view of his many preoccupations the Editor would welcome the latter solution (which is also suggested by such considerations as the scarcity of paper and labour), but he will be glad to fall in with the wishes of the members as to what may be considered the best interests of the Society. Our membership has naturally decreased during the war, though perhaps to a less extent than might have been anticipated from the nature of the conflagration which is devastating the world. A list of members is published in the present issue. We trust our readers will continue loyally to endeavour to obtain new recruits to take the place of those members who are being lost to us. Contributions, both literary and pictorial, as well as fronds for comment, will be welcomed by the Editor, and should be sent to Dr. Stansfield, 120, Oxford Road, Reading.

Business communications and subscriptions (5s. annually) should be sent to the Hon. Secretary, Mr. W. B. Cranfield, East Lodge, Enfield Chase, Middlesex.

WILLIAM BRACK BOYD, OF FALDONSIDE.

By the death of Mr. W. B. Boyd, on Saturday, 16th March, the Pteridological Society lost a genial and devoted member who, if precluded from taking part in its annual meetings through advancing years, retained a keen and loyal interest in its objects of pursuit.

Mr. Boyd was born in 1831 at Cherrytrees, Yetholm, at the base of the Cheviots, being the youngest of three sons of Mr. Adam Brack Boyd, who succeeded to that property from his maternal uncle. He was educated at The Grange, Sunderland, a scholastic establishment presided over by Dr. James Cowan, in which a number of Border youths in those days received the rudiments of learning.

On entering on the active business of life, he tenanted the farm of Hetton Hall, Northumberland, but afterwards removed to Ormiston, Roxburghshire. Having married in 1862 Elizabeth Bell, only daughter of Mr. James Wilson, of Otterburn and Buchtrig, who as one of two co-heiresses succeeded to the estate of Faldonside upon the death of Mr. Nicol Milne, her uncle, he took up residence there, cultivating a portion of the inherited property. Three children were born to him, the elder son, Major A. Boyd Wilson, who succeeded to Otterburn, and held a commission in a cavalry regiment; the younger, Captain James W. Boyd, who was appointed estate agent to Lord Allendale, but at the outset of hostilities volunteered for service in France, where he was killed in action; and an only daughter, her father's constant companion for many years, who has survived him and succeeded to the property.

Living quietly the life of a country gentleman engaged in agricultural pursuits, Mr. Boyd devoted a large part of his leisure to the study and propagation of plants, and through his extensive knowledge and successful cultivation of them

established himself as an authority to whom florists and students of botany gladly had recourse for information and guidance. Instinctively a collector, he wandered far and wide at home and on the Continent in search of specimens, and with such success that his rock-garden at Falkonside attracted many a flower lover to view the wonderful assortment of Alpines and Ferns which his practical knowledge enabled him to grow to perfection. His eminence as a botanist was duly recognised by his appointment as President of the Edinburgh Botanical Society, of the Berwickshire Naturalists' Club on two separate occasions, and of the Scottish Alpine Club, of which he was till his death the soul and trusty guide. The Pteridological Society also did him honour in electing him to be a Vice-President.

A man of simple tastes and marked individuality, he proved a delightful companion, his enthusiasm being unflagging and contagious. A day in his company on hillside, seashore, or among his rock plants at home was one of insight, exhilaration and lasting profit. As one of like proclivities, who knew him well and often journeyed with him on his botanical rambles has testified, "Duplicates of such men are rarely forthcoming."

It is matter for regret that with him has passed away an accumulated store of valuable information, as he was disinclined to commit his thoughts to writing; but in his occasional contributions to scientific publications, and particularly in his Presidential Address to the members of the Berwickshire Naturalists' Club in 1905, he has afforded no little proof of his intimate acquaintance with the habits and stations of many of the less common plants of our own and of foreign countries. Happily his name is preserved to science, as by his discovery on the Grampian Range of a hybrid Willow and an inconspicuous Pearlwort,

he has added two species to our native *flora*, namely, *Salix Boydii* and *Sagina Boydii* (Buch., White).

His remains were interred in the family burying ground within the precincts of Melrose Abbey.

OUR FRONTISPIECE.

POLYSTICHUM ANGULARE DIVISILOBUM FALCATUM, MOLY.

The illustration is from a frond grown while the plant was still in Mr. Moly's possession, about 1886. The sub-varietal name of *laxum* was originally given by Mr. Wollaston to this form but Mr. Moly was always dissatisfied with that name and, when he sent the plant to me, he asked that it should be re-named. The sweeping sickle-shaped pinnæ and pinnules being by far the most prominent and noticeable character I called it *divisilobum falcatum*, by which title it has ever since been known. Unfortunately when the plant left Dorsetshire it failed to keep up the falcate character so far as the pinnæ were concerned, although retaining it fully in the pinnules. As grown by Mr. Moly it was one of the most striking of British ferns, surpassing even *P. aculeatum pulcherrimum* in the magnificent upward sweep of the pinnæ. Probably a return to the genial and bracing air of its native climate would result in its reversion to its original character. In any case it is one of the most beautiful divisilobes ever found. The original plant is now in the possession of Mr. Smithies. Many seedlings have been distributed. I suspect that Mr. Cranfield's *falcato-decompositum*, obtained from Mr. Moly, is a seedling from this.

F. W. S.

POLYDACTYLISM IN POLYSTICHUMS.

(Concluded from March GAZETTE.)

Another polydactylous form of a different type is Wollaston's North Somerset find. The previously mentioned forms when in their best character, although the pinnae are fingered, have the apices of the fronds undivided. It is true that, in the young state, the fronds frequently carry large ramulose heads, but this is merely the exuberance of youth and, as maturity is reached, the apices of the fronds usually become single and pointed. Wollaston's form, however, always carries a crested head in whatever stage of life, and is really as much a *cristatum* as a *polydactylum*. It is distinguished by the sharply pointed tips of the fingers and of the ultimate divisions of the apical crest and is also much more thorough in its polydactylism than any of the others. I suspect that this is one of the parents of Mr. Edwards's *P. ang. lineare cristatum*. Mr. Wills also found a polydactylous form which, however, is irregular and not worth growing. The same may be said of a find of my own made in 1914—probably the most recent find in this section.

F. W. S.

THE TENDER CONSCIENCE.

A TRAGIC INCIDENT IN A NORTHERN FERN NURSERY.

Quarters for filmy ferns were being arranged on scientific lines. A hot water pipe was led through a tank of cold water at the bottom of a close glazed inner frame about 40 ft. long, with a view to the production of a saturated atmosphere, so that the foliage would be perpetually "dewy with nature's teardrops," "a consummation devoutly to be wished" in filmy fern culture.

There being little or no apparent deposition of moisture, the scientific member of our staff observed that it was not the amount of moisture held in the atmosphere that determined its suitability for filmy culture, but the amount that the atmosphere could be induced or compelled to part with in the shape of condensed moisture.

"What we want" remarked our tame scientist, "is a current of cold air to come in contact with this warm moisture laden atmosphere. We should then get artificial rain on a small scale inside this case all the year round, provided the stoker did his duty. The stoker compels evaporation and the current of cold air would compel condensation."

But how are we to acquire a current of cold air in this torrid weather, and had we not better "draw out leviathan with a hook and loose the bands of Orion," "to leave no rubs nor botches in the work?" Queried our irreverent stoker who was on his dignity. "If we make an opening, our carefully imprisoned moisture will escape and be absorbed in the dry outer air."

"What we must have," continued our scientist, ignoring the stoker's ill-timed levity, "is a current of permanently cold air, and to insure its being uniformly cold, it ought to travel some distance underground. Why not utilise that old drain which formerly carried off the rainwater from the roof? It is close at hand, and the drain being untrapped, the flow of water down the drain will displace a corresponding volume of air, and thus compel a constant upward current of air from the main sewer if we break into this upright shaft. It will only mean removing a few bricks which are our own property and on our own premises."

"Alas! How oft the sight of means to do ill-deeds makes ill-deeds done."

Our timekeeper here begged to remind us that “ much fearful communing was leaden servitor to dull delay, that delay leads impotent and snail-paced beggary,” and that the infusion of a modicum of fiery expedition into the proceedings would not be considered inopportune at the present juncture.

“ Halt ! ” yelled our Conscientious Objector, “ Don’t you see that the resulting cold current would be the property of the Urban District Council, and that unscrupulously and surreptitiously to lay violent hands on this current, whose very helplessness ought to appeal to us truinet-tongued, and to divert its feeble energies towards the furtherance of our own nefarious schemes for self-aggrandisement, would be nothing less than larceny, naked and unashamed ? ”

If we were prepared to enter into negotiations with the U.D.C. in a legitimate and straightforward manner for the acquisition of the current, then he saw no reason why he should object, but deliberately to steal the current because we happened to want it, that was a horse of another colour. We might just as reasonably tap the gas and water supply. These operations would present no difficulty, and we should derive considerable financial benefits. It was opportunity that made the thief.

A reasonable distinction should always be preserved between *meum* and *tuum*, in spite of any pecuniary advantages which might accrue from a confusion of these matters. He had never entertained a very high opinion of the moral qualities of his co-workers, but he literally stood aghast at the enormity of such “ naked villainy ” as was now in contemplation, and his feelings on finding himself associated with such an unscrupulous gang of conscienceless desperadoes were wonderfully akin to those of the lady in the poem (Miss Kilmansegg) who dreamt she had married the devil.

He wished therefore to enter a most emphatic protest against, and to utterly dissociate himself from, any such predatory and disreputable proceeding.

“ Shall we sell the mighty space of our large honours, for so much trash as may be grasped upon ? ” Such conduct would be “ most heathenish and most gross,” and would put us on the same level with the Germans.

As a sop to Cerberus, and to overcome the absurd scruples of our C.O., a consultation of officers was immediately called, and it was resolved, and carried with only one dissentient :—

- (a) That the current having not as yet embarked upon its career of iniquity, it would be manifestly absurd to discuss the hypothetical claims of the U.D.C. to pre-natal property which had as yet no separate existence.
- (b) That it was not proposed to lead the current into captivity and exile against its own wishes and inclinations after the manner of the Germans with the civil population of Belgium, but to extend its sphere of influence, broaden its intellectual horizon, and to enlarge the scope of its voluntary operations.
- (c) That the current was vagrant, homeless, and without any visible means of subsistence, yet notwithstanding its humble origin, we were willing to accord to it that full and complete measure of liberty, freedom and justice which was its birthright, and that its freedom and liberty would be augmented rather than restricted or curtailed.
- (d) That the end would justify the means, seeing that the world could ill afford to jeopardise the existence of these priceless gems of the vegetable kingdom.

They were landmarks on the path of progress, beacons "lighting for us the way to dusty death."

- (e) That by harnessing the current we should succeed in replenishing our depleted exchequer, without the disquieting reflection that the plundered party would be left "poor indeed."
- (f) That our aspirations did not soar to those inaccessible heights of unctuous moral rectitude claimed by our C.O. and that to call to our assistance the blind forces of nature could not be considered (except by a crank) as an indication of natural depravity, but rather as a sagacious and praiseworthy application of the first law of nature.
- (g) That the U.D.C. having neither a body to be kicked nor a soul to be saved, might, with the strictest propriety, be safely and permanently consigned to perdition in the general interests of science.
- (h) That the distorted mental vision and intellectual obliquity of our unfortunate C.O. were melancholy facts in nature which we deeply deplored, and for which we must make due allowance, and that the prayers of this congregation be earnestly desired for his speedy and complete return to sanity.

"Then quietly to steal we stole," our C.O. having been completely pulverised and reduced to incoherence by the logic of our irrefragable arguments.

The bricks were removed and an opening made. The current responded with commendable alacrity, and frisked and gambolled to and fro, hugging itself in blissful and ecstatic appreciation of its newly acquired liberty, which was in such marked contrast to its former "cribbed, cabined and confined" condition. Nature's teardrops

were duly shed in copious showers, "larding the lean earth" in most approved fashion. The foliage was drenched with condensed moisture, and every omen seemed propitious. Our C.O. appeared mollified by (if not completely reconciled to) the arrangement, and even condescended to "damn it with faint praise."

In course of time it was reported that *H. pulcherrimum* which had latterly been advancing by leaps and bounds, had now a "lean and hungry look," and that the general appearance of the rest of the ferns impressed one with the conviction that "sin, death and hell had set their mark upon them." Could it be the sewer gas that was exercising such a baneful influence, or did the absence of the natural resting season in this artificially arranged structure account for the rapid and all-round deterioration of the plants?

A consultation was immediately called, and a thorough investigation made, when it transpired that both these hypotheses were incorrect. The place had been invaded by a colony of rats which had gnawed off many thousands of fronds in order to construct nests which would be high and dry above the water line. The tenants were evicted in summary fashion and wire netting fixed over the aperture to the airshaft.

There could be nothing better calculated to unchain all the latent ferocity in one's nature than to witness such a scene of devastation as then presented itself. Forests of fronds from all the choicest filmies on earth remorselessly butchered, not "to make a Roman holiday" but to construct shelter for the above-mentioned vermin.

"It's worse than the sack of Louvain," groaned our scientist.

"Had I but died an *hour* before this chanced, I'd lived a blessed *time*," sobbed our timekeeper.

" For Banquo's issue have I 'filed my mind,
 For them the gracious Duncan have I murdered,
 Put rancours in the vessel of my peace
 Only for them, and mine eternal jewel,
 Given o'er to th' common enemy of man."

wailed our C.O. with his customary Cassandra-like lugubriousness.

Our stoker excommunicated the rats with a vigour and impartiality worthy of a Grand Inquisitor. We heard muttered maledictions in which the rodents' sanguinary fluids and visual organs were mysteriously involved. His peroration, however, was lucid, fluent and forcible, but is unfortunately unfit for reproduction, being too redolent of the sulphurous atmosphere and lurid light of the stokehole, to which haven of refuge we gently assisted him.

H. STANSFIELD.

FERNERY CONSTRUCTION AND FERN CULTURE.

Mr. H. Stansfield's article on the above subject contains some strange and remarkable, not to say "Bolshevik" philosophy. Doubtless it will appeal to Fern cultivators in different degrees.

Apart, however, from his extreme views—for such they will appear to many—his style is bold and fascinating. Personally I am much obliged to him, for I think many of us may be adhering too closely to what he would call our "antiquated" methods. Still there are one or two things which seem to require some further explanation.

That Ferns will grow under extreme conditions naturally, I have often noted; but shade and moisture doubtless

produce the best results. Anyhow water is a *sine quâ non*, whether the application be from the top or bottom. As, however, I am rather more concerned just now with *under-glass* conditions and the abolition of the watering-pot! I shall confine my remarks to that phase of Fern Culture. I can, therefore, quite agree that “constant artificial watering is rather a nuisance,” but how to avoid this in an ordinary construction passes my comprehension.

All the same the desire exists, for the older one gets the less inclined one is to perform any work which savours of supererogation. On the other hand how is it possible to have a dry top-soil and a wet bottom-soil? The two conditions seem to be antagonistic. If the bottom is boggy will not the moisture therefrom rise to the surface by the process known as “capillary attraction?” If this be so then these two extreme conditions cannot remain permanent. Pulverisation of the surface soil, which is insisted on, will increase this action, and, of course, render humidity more uniform. The absorbent power of some soils is much greater than others, and thus, the more finely comminuted the soil is, the greater the degree of capillarity.

Again, *drainage* is always considered a most important item even in the culture of Ferns; a saturated soil being detrimental to the health of most cultivated plants.

That the “common sense”—or less troublesome—way of dealing with Ferns is to plant them out, goes without saying. This in itself is a labour-saving arrangement, besides giving additional vigour to the plants and otherwise operating to the advantage of the cultivator. But notwithstanding all this there is, I think, a special charm about pot-plants which ground-culture cannot claim. In my own little Fernery—which is all too small—I cannot find sufficient room for planting out, even with my limited

collection ; and so I have an open shelf, *i.e.*, inch-square pieces of wood tied crosswise, running round the house, to accommodate those troublesome things in pots ; the object being to admit as much light as possible to the Ferns below. These pot-plants, however, are thirsty subjects in the summer time, and require, if not “perpetual motion,” something akin to it, to keep them supplied with H₂O ! But “the labour we delight in physics pain.” Still, I am convinced that for sale (or Sale) purposes, it is much more economical to plant them out.

Concerning the usual methods of cultivation, that is, keeping the soil sweet by aeration, etc., top-dressing with suitable material, and so on, I am glad to be in accord with Mr. Stansfield’s recommendations.

As to the effects of frost, too, on our favourite subjects, I am also at one with him, for I always subject Athyriums especially to a cold spell before packing them away for the winter. Unfortunately the winter of 1916-17 did destroy several other choice things which I would not have lost for the proverbial “king’s ransom.”

That Mr. Stansfield succeeds with Ferns I have ample evidence, and so I have come to the conclusion that he who can do this in however “heterodox” a manner, is entitled to the respect and esteem of all Fern lovers.

C. B. GREEN.

Swanage, March, 1918.

SUPRASORIFICATION.

Not the least interesting fact in connection with fern development is the arrangement and general behaviour of the sori. In the major portion of fern genera, the sori are developed on the under sides of ordinary fronds. In others,

such as *Struthiopteris*, *Onoclea*, *Osmunda cinnamomea* and *Lomaria Magellanica*, they are borne on special non-foliaceous fronds, which in the case of *O. cinnamomea* and other early ripening kinds, die off and practically disappear soon after the spores are shed. In *Struthiopteris Orientalis* and other late ripening kinds on the other hand, the fertile fronds persist until long after the barren ones have disappeared.

Ferns are, however, not so much the slaves to precedent as might be imagined, and it is not unusual to find them leaving the beaten track and striking out a line of conduct more in harmony with the local conditions.

In a huge bed of *Struthiopteris* here, I have unique opportunities for noting any departure from the normal method of fructification, and have frequently noticed spores produced on fronds of normal (or barren) outline instead of being confined to one type of fertile frond as is usually the case. I have also noticed stray sporangia trespassing on otherwise barren fronds of *O. cinnamomea* instead of being confined to one central non-foliaceous fertile frond.

Perhaps the most singular recently acquired habit is that of suprasoriferation in *Scots*, and to a lesser extent in Polypods. For countless ages these plants have been content to produce their spores on the under surfaces of the fronds. With the introduction of the marginate and muricate varieties, however, it was soon seen that the sori showed a strange tendency to make their appearance on the edges of the fronds, and some even went so far as to produce the greater portion on the upper surface.

It is evident that nature has no insuperable objection to suprasoriferation, otherwise she would never adopt it. She managed to rub along pretty comfortably from the dawn

of life until the latter half of last century without leaving any traces of suprasoriferation, although it must have been a possibility all along, and does not appear to be much of a handicap in the struggle for existence. We now see occasional traces of suprasoriferation in almost every fertile variety of *Scolopendrium*. These traces could be accentuated and perpetuated indefinitely by a process of selection, if such a thing were desirable.

I know nothing more fascinating than to watch the gradual ripening of the spores in a bed of suprasoriferous *Scols*. The spores being in great measure on the upper surface, are nearly all visible from above, and the gradual changes in colour, from white to black, and lastly to brown, are a perpetual feast.

As to the reason for this gradual migration of the sori from the under to the upper surface, there is nothing definitely known, and we can only surmise.

The most reasonable hypothesis as to why spores should usually be produced on the undersides of the fronds is : that since the upper surface is always harder and more leathery than the under, it would require a lesser effort to develop the sori through the softer and more yielding under surface, than through the glazed, tougher and more leathery upper surface. On the under surface also the spores would be kept drier and in better condition for germination, and would also be more quickly and effectually evacuated and distributed. Any advantage, however slight, possessed by any plant would tend to be reproduced in succeeding generations, and would tell in the long run, in the struggle for existence.

In the narrow marginate forms, the tissues all the length of the frond are contracted into a sort of ridge or tidal wave, to produce the marginate character. In order to form this

ridge there will be a general thinning down of the adjacent tissues. Where this thin stratum occurs, the plant will probably encounter much less than the average amount of resistance, and may feel disposed to make use of this easier outlet for the development of sori. The fact that the sori in the marginate section are often confined to one long continuous narrow line stretching the whole length of the frond on each side of the midrib, instead of being arranged in the usual double set of transverse lines, lends a certain amount of plausibility to this hypothesis.

There appears to be much difference in the times of ripening and shedding of spores. In many instances we may be able to gather ripe spores almost anytime from June until December. There is, however, at least one notable exception in *Osmunda japonica* and its varieties. The time of ripening and consequent shedding of spores of this species comes like a thief in the night. As the critical time approaches I have tapped and examined the fertile fronds several times a day without being able to extract any ripe spores. At the next examination, in perhaps half-an-hour, I have found every shell practically empty and the spores all shed. The only safe plan is to place a large sheet of white paper under the plant to catch the spores, and examine it periodically.

The muricate section of *Scolopendrium* has, next to the marginate, given us the greatest number of examples of suprasoriferation. Examined through a microscope, the upper surface of a muricate Scol appears to be pitted with shell craters like a miniature representation of the battle field in France. Where these craters are deepest, the hollows will be softer and more tender than the upper surface in normal types. The sori will be pushed out along the lines of least resistance, and in the roughened Scols the least

resistance will be frequently encountered from above, because of the uneven deposition of the fern tissue.

Bulbils, it will be noticed, are sometimes produced on the upper surface as in *W. Orientalis* and sometimes on the under surface as in *C. bulbifera*, and on the rachis as in *Polystichum*. We may reasonably infer that it is entirely a matter of convenience as to where the sori are produced, and that a reasonable amount of latitude is allowed to ferns in general and that they are at liberty to make use of either the front or the back door according to circumstances.

Most of the marginate, muricate and fleshy Scols are bulbiferous under close moist culture, and these bulbils almost invariably occur on the upper surface, possibly because of the greater amount of light on the upper as compared with the under surface. There is also some subtle connection between sori and bulbils, as is seen from the number of instances in which immature sori can by abnormal atmospheric conditions be transformed into bulbils, *e.g.*, *A.f.f. plumosum elegans*, *p. Druery*, *p. divaricatum*, *Cyst. sem-pervirens* and several others. *Scolopendrium* bulbils in their earliest stages occur in small brownish white patches, and look uncommonly like immature sori, as are best seen on abortive fronds of *A.f.f. plumosum elegans*, when what would eventually be developed into hundreds of spores seem by some inexplicable process of fusion to develop into one bulbil. It is not improbable that when in this mobile half-and-half condition, they might if taken in hand just at the psychological moment, be persuaded to alter the programme and develop into sori instead of bulbils. Just as in the instances above cited the reverse operation is known to take place.

If then, *Scolopendriums* find it most convenient to emit

bulbils and occasionally sori from the upper surface, we may conclude that the restraining influence tending to the production of sori on the under surface is not very great, and that any slight additional inducement in a contrary direction would be sufficient to overcome the general habit.

H. STANSFIELD.

NEW FERNS.

From the Revd. Canon Moore comes *Athyrum f.f. Victoriae nanum*, one of his seedlings. As its name implies it is a dwarf form of *Victoriae*. It is very neat in make with particularly fine fringe-like crests, large in proportion to the length of the fronds. It differs from *Victoriae gracile* (raised many years ago by Mr. James McNab and afterwards, independently, by Mr. E. J. Lowe) in being dwarfer and having finer crests. It has some resemblance also to *cruciato-coronans*, *Carbonell*, but it is also dwarfer than that variety and the cruciation is more perfect and thorough.

From Mr. W. Askew comes *P. angulare productum cristatum*, a promising thing which looks like a cross between *P. ang. divisilobum productum*, *Fox*, and one of the *percristatum*s. The frond sent was, however, from a plant not yet mature; we should be pleased to see another frond when the plant has reached full development.

Mr. Walton, of Richmond, sent a large parcel of fronds to the Hon. Secretary, but, owing to Mr. Cranfield's illness and absence from home, the parcel went astray and was not recovered until the fronds were almost beyond recognition. We hope to have another opportunity of seeing some of them.

F. W. S.

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