

Abnormal Ferns, Hybrids, and their Parents¹.

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AND

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With Plate III.
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WE do not intend by anything said in this paper to ignore the exertion of others in the same field; we only wish to place on record our personal experience, and what we have accomplished by the labour of a number of years.

More than thirty years ago experiments were commenced, and twenty-one years ago a paper was read by one of us (Mr. Lowe) 'on hybrid ferns' at the Dundee Meeting of the British Association. The subject was at that time in its infancy, and none of the botanists then present, with the exception of the late Professor Balfour, thoroughly believed in these crosses. The next year, 1868, the Rev. M. J. Berkeley sent a paper on the supposed crossing of two American species to the Royal Horticultural Society, and the late Sir William Hooker remarked 'that it was the most probable instance he had yet met with of a real hybrid amongst ferns.' This was a hybrid between *Camptosorus rhizophyllus* and *Asplenium ebeneum*.

The late Mr. Clapham, who had given the subject careful investigation for some years, only became convinced by seeing

¹ Read in Section D, British Association, on September 10th, 1888.

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in 1879 the series of examples Mr. Lowe was taking to the British Association at Sheffield,—crosses of varieties of *Athyrium*, in which were spores of *Victoriae* and *Proteoides*.

Afterwards, about fifteen years ago, endeavours were made by one of us (Mr. Lowe) to cross *Polystichum aculeatum* with *Polystichum angulare*, and when the seedlings had become mature (seven years afterwards), it was apparent, at all events to the experimenter, that this cross had been accomplished, but in only five examples out of 1000 seedlings. The object was to obtain a narrow cruciate variety of *Polystichum aculeatum*, a copy in *Polystichum aculeatum* of the narrow cruciate variety *Wakeleyanum* of *Polystichum angulare*, for as yet this was a desideratum. *Polystichum angulare*, variety *Wakeleyanum* (Fig. 1), was sown together with a dense-fronded variety of *Polystichum aculeatum*, known as *densum* (Figs. 2). In 1884 a specimen of this hybrid and a short paper were sent to the Linnean Society, but this was not sufficient to remove the doubts of botanists; a year later, however, a letter from Sir Joseph Hooker stated that the crossing of ferns was then an acknowledged fact. This hybrid (Fig. 3), and its parents, together with some of the offspring of the hybrid, were last year exhibited at the Bath Floral Fete, amongst the specimens of botanical interest, and it was awarded a first-class certificate.

Both of us have had great experience in the crossing of ferns, one of us (Colonel Jones) starting a little later than the other, and our results coincide. Instances of crossing have now accumulated to such an extent as to preclude the possibility of any further doubt on the subject. To produce the results, however, great care is necessary that the germinations of the spores are very general and also simultaneous. The clear proof of the reality of the crossing of varieties lies in the fact of the production of plants, either bearing a character intermediate between those of the plants sown, or combining their characters.

A remarkable fact in connection with the crosses is the frequent transference of the character of one variety to another, this even applies to variegation. It will be seen in the example of the cruciate hybrid of *Polystichum aculeatum*,

that it is a marked copy of the cruciate form of *P. angulare*, one of the parents selected with the object of obtaining a cruciate *P. aculeatum*. Instead of the usual gradual process, the form was obtained at once. This applies equally in the case of the polydactylous forms of *P. angulare* (see Figs. 4, 5, and 6), and in the variegated forms of *Scolopendrium vulgare*.

As example, we have selected experiments made with varieties of *Athyrium* and *Scolopendrium* from Mr. Lowe's series, and some made with varieties of *Polystichum* from Colonel Jones's series. We might have given several hundred examples, but a few of each is ample illustration.

Example 1. ATHYRIUM.

The following varieties were sown together: *Victoriae*, *multifidum*, *Jonesii*, *Craigii*, *uncum*, *Harrisae*, *cruciatum*; *Proteoides*, *tortile*, *reflexum*, *laciniatum*, and *grammicon*.

The result has been several hundred intermediate forms, some very interesting.

Example 2. SCOLOPENDRIUM.

In this experiment the varieties were *crispum* (rarely fertile); *Victoriae*, *muricatum*, *marginatum*, *undulatum*, *digitatum*, *ramo-cristatum*, *laceratum*, and a variegated *crispum*.

The result has been various intermediate forms, a number of which are variegated; for instance, the variegation in the *crispum* has passed into a crested form, the colour as well as the shape being altered.

Example 3. POLYSTICHUM.

The attempt was made to transfer the polydactylous character of certain forms of *P. angulare* to other forms of the same species, which preserved the normal outline and distinct individuality, but were not polydactylous.

The forms used were Mr. Padley's polydactylous form from the Vale of Avoca, and Colonel Jones's Hampshire form. The polydactylous character has now been successfully transferred to the forms known as *decompositum*, *acutilobum*, *divisilobum*,

frondosum, *alatum*, *lineare*, *congestum*, *inaequale-variegatum*, and others. The polydactylous character of *P. angulare* has also been transferred to *P. aculeatum*.

There are now four clearly established cases in which the characters of distinct forms of *P. angulare* have been transferred to *P. aculeatum*. Hitherto the varieties of *P. aculeatum* have been very few, so that now a new field for exertion is open, the results of which it is difficult to overestimate, for the robust constitution of *P. aculeatum* enables it to thrive in climates in which *P. angulare* would soon perish.

The interest in the varieties of British Ferns ought to increase now the crossing of varieties has become an acknowledged fact, alike on account of the extreme beauty of many of the crosses already effected, and also because, however beautiful crosses already obtained are, it may be confidently asserted that they are nothing to what will be accomplished when exhaustive experiments, guided by tasteful and judicious selection, shall have been made. Though much will depend on selection, there will always be enough left to the element of chance to keep up the interest. We may liken the prospect of endless combinations to the combinations in bell-ringing, and we learn that the changes in the ringing of twelve bells amount to forty millions. We can scarcely conceive of the immense field of inquiry that is opened up in these investigations. The number of forms to be obtained is past all conception, and as the discovery of one truth is the stepping-stone to the discovery of even greater truths, so every new form that is raised, enables the raiser or those following in his footsteps to produce countless other combinations.

EXPLANATION OF FIGURES IN PLATE III.

Illustrating Mr. Lowe's and Col. Jones's Paper on Abnormal Ferns, Hybrids, and their parents.

Fig. 1. *Polystichum angulare*, var. *Wakeleyanum*. Parent.

Fig. 2. *Polystichum aculeatum*, var. *densum*. Parent.

Fig. 3. *Polystichum aculeatum*, var. *cruciatum*. Hybrid between preceding Figs. 1 and 2.

Fig. 4. *Polystichum angulare*, var. *polydactylum*. Parent.

Fig. 5. *Polystichum angulare*, var. *multilobum*. Parent.

Fig. 6. *Polystichum angulare multilobum*, var. *polydactylum*. Hybrid between preceding Figs. 4 and 5.

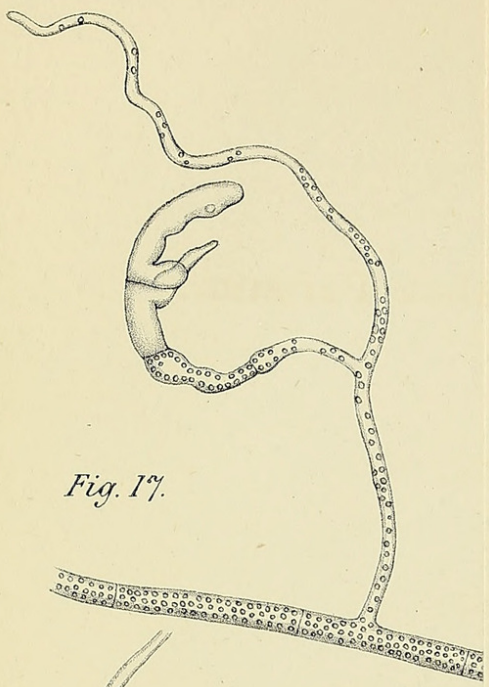


Fig. 17.

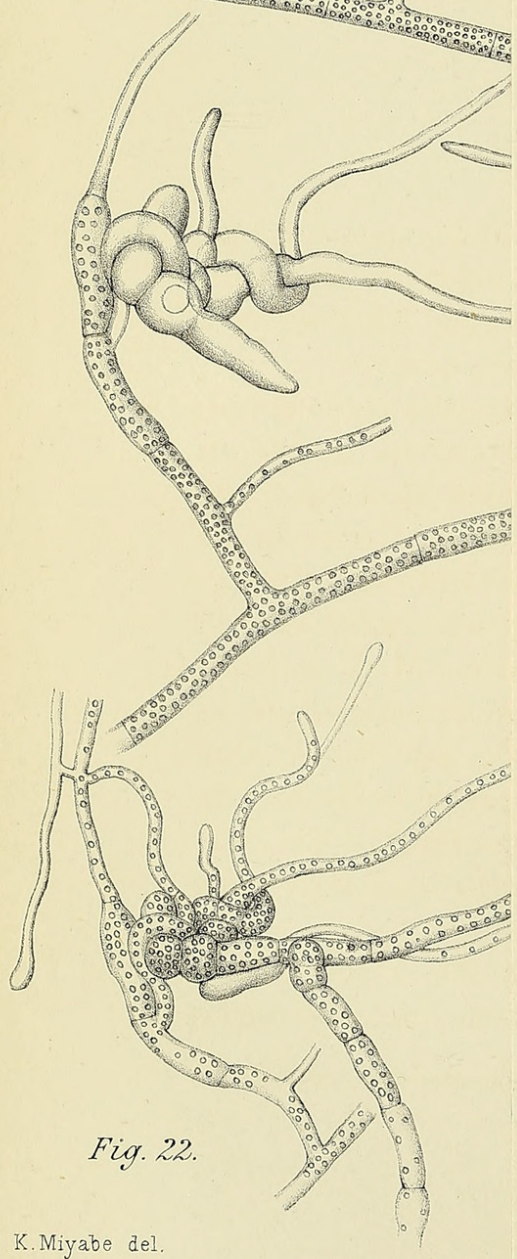


Fig. 22.

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