

Notes upon Apospory in a Form of *Scolopendrium vulgare*, var. *crispum*, and a new Aposporous *Athyrium*; also an additional phase of Aposporous Development in *Lastrea pseudo-mas*, var. *cristata*. By CHARLES T. DRUERY, F.L.S.

[Read 7th December, 1893.]

(PLATE XVII.)

THE case of apospory which I have the honour of bringing before the Society this evening is an entirely new one, in so far as it is exhibited by a fresh and apparently most unlikely species, viz. *Scolopendrium vulgare*, the normal smooth-edged strap-shaped fronds of which seem to offer no outlet for apical apospory, displaying, as they do, not the slightest tendency towards the formation of the slender lateral projections with which the phenomenon is usually associated in its apical form.

It was on a special visit to Mr. T. Bolton of Warton, near Carnforth, in August last to inspect a new aposporous *Athyrium*, to which I will later refer, that I came across the case now under notice in the shape of a variety of *Scolopendrium vulgare*, known as *Scolopendrium* var. *crispum Drummondæ*, found many years ago by Miss Drummond near Falmouth. This is a very singular compound variety in which the fronds are very long and narrow, finely frilled, and bearing, in addition, broad flat digitate crests often 9 inches across. Another peculiar feature is that the midrib is deeply undulated several times perpendicularly to the plane of the frond, and finally the margins of the frills are deeply cut into long fimbriate projections.

Mr. Bolton kindly sent me a plant, and on its receipt I at once perceived that in many cases the apices of these projections were bifid and translucent, presenting all the features of incipient prothalli. I consequently cut off a number of these with a small portion of attached frond, and inserted them in sterilized soil so that the terminal points or bifurcations were in contact therewith. In a few days evident signs of growth were visible, and in a week or two distinct prothalli of more or less cordate form and of normal size were developed, twin prothalli resulting in some cases, each limb of the bifurcations having developed independently. Root-hairs, however, were very tardy in appearing, due probably to the fact that growth was sustained by absorption through the adherent portions of frond; later on, however, they appeared somewhat abundantly, though hardly in

normal quantity. In some cases thick fleshy prothalli of irregular form were developed from quite blunt projections which, when laid down, showed no signs whatever of prothallial growth.

In October I sent several specimens of these prothalli to Prof. F. O. Bower at Glasgow; and upon one of these he found numerous archegonia, both old and new, but no antheridia. The fact of these being true prothalli was, however, thus fully established. Later, in November, I found both antheridia and archegonia in abundance on one of the largest prothalli in my culture, an abnormal feature of which was the production of these organs in quantity on both upper and under surfaces in conjunction with root-hairs, which, however, predominated on the lower surface, as might have been expected. It remains, of course, an open question whether plants will be produced; but, from general robustness of growth, I have little doubt on this point.

I exhibit the plant under notice, upon which the fimbriate projections will be clearly seen, though, unless laid down as described, they have failed to develop more than quite incipient prothalli even in a close warm frame. I also exhibit the cultures, two in number, showing developed prothalli, and accompany my notes with sketch of a portion of frond, natural size, and enlarged drawings of material after culture.

This constitutes the fourth British species in which apospory has been shown to occur, viz. *Athyrium Filix-fœmina* var. *clarissima*, *Polystichum angulare* var. *pulcherrimum* (several forms), *Lastrea pseudo-mas* var. *cristata*, and *Scolopendrum vulgare* var. *crispum Drummondæ*.

The second exhibit consists of cultures of a new aposporous find of *Athyrium Filix-fœmina* by Mr. T. Bolton, who showed some pinnæ at the meeting of the British Pteridological Society at Lancaster in August last. This had been found in the autumn of 1892 in that district; and on examining the portions of frond submitted, I was at once struck with its strong resemblance to that form of *Athyrium Filix-fœmina* upon which apospory was first discovered, and was found in North Devon. The peculiar slenderness and attenuation of all subdivisions and the general make of the two ferns were almost identical, though the second find is easily recognizable by most of the terminals being spiral. When the pinnæ were handed to me, they were accompanied by the remark that "the spores never seemed to ripen;"

and upon turning them over, the reason was obvious, since I immediately recognized the peculiarly woolly appearance of the sori indicative of apospory, the masses of incipient prothalli being in this case so large as to give in some places a suprasoriferous appearance to the frond. As Mr. Bolton very kindly provided me with material, I laid down several pinnæ with the excrescences next the soil, and under close culture actual development immediately began, so that in a week or two each sorus had produced a crowd of full-sized prothalli. Reporting progress to Dr. F. W. Stansfield, who had also received material, he wrote that in his case apical apospory was also appearing, *i. e.* prothalli were being developed from the apices independently of the sori. Examining my material, I found several apparent cases of this, which, however, on closer investigation, I found to be produced from small aborted sori situated so near the terminal point that the resulting prothalli seemed to spring therefrom. I therefore asked Dr. Stansfield to re-examine his material, with the result that in the majority of cases he found the appearance had been deceptive, but in some the apices themselves were certainly dilating. A little later I found an unmistakable instance of an apical prothallus, as can be seen by the culture I exhibit. Otherwise this case is identical with that of *Athyrium Filix-femina*, var. *clarissima*, Jones, except that the growths are much more redundant. I have named the fern therefore *Athyrium Filix-femina*, var. *clarissima*, Bolton.

It will be observed that in this case, as in all previous ones, the abnormality occurs on wild finds, and has not been induced by culture; and considering the ease with which the prothalli are produced when the pinnæ are brought into contact with the soil, and the immense advantage which they must derive from being firmly attached to the frond from the beginning instead of, as in the detached spore, being at the mercy of a thousand and one disturbing factors, it is curious that the specimens found are solitary crowns instead of clumps. This advantage, however, in the struggle for existence is far more than counterbalanced by the absence of scattering spores, which limits the variety strictly to its birthplace.

Finally, I exhibit young plants raised from the aposporous prothalli of *Lastrea pseudo-mas*, var. *cristata*, which I brought to the notice of this Society in November 1892. These are interesting as exemplifying exactly intermediate stages between the oophore

and sporophore, the primary fronds in some cases consisting of erect prothalli borne on stalks, while in the case of the parent the primary frond had been eaten off when the plant came under notice, owing to a prothallus forming at the tip of the second frond and others subsequently on its edges and surface. This exhibit was therefore necessary to complete the case by supplying the missing step, which it does, I think, very satisfactorily.

#### EXPLANATION OF PLATE XVII.

*Scolopendrium vulgare*, var. *Drummondæ*.

- Fig. 1. Fimbriate projection from edge of frond (much enlarged). *p.* Prothallus developed by culture on moist soil. *rh.* Root-hairs. *c.* Thick fleshy cushion.  
 Fig. 2. Portion of frond, natural size, showing fimbriate projections terminating in *pp.* incipient prothalli.  
 Figs. 3, 4, 5, 6. Prothalli ( $\times 4$ ) developed after severance of fimbriate projections from frond and insertion in soil.

---

Contributions to the Natural History of the Flower.—Part II.  
 Fertilization Methods of Various Flowers; Cleistogamy in *Salvia Verbenaca*. By J. C. WILLIS, M.A., late Frank Smart Student in Botany of Gonville and Caius College, Cambridge. (Communicated by FRANCIS DARWIN, F.R.S., F.L.S.)

[Read 15th February, 1894.]

(PLATES XVIII. & XIX.)

THIS paper comprises the results of observations upon various native and exotic plants. The plants whose methods of fertilization were studied belong to the genera *Brodiaea*, *Stanhopea*, *Pimelea*, *Cotyledon*, *Nemophila*, *Hydrolea*, *Ziziphora*. A study of cleistogamy was made upon *Salvia*. The observations are mostly of similar character to those detailed in the first paper of this series.

Since the publication of my former paper\*, my attention has been called by Prof. Bessey to a paper by him† in which the movements of the stamens in *Claytonia virginica* are described: the description tallies with that of the author for *C. sibirica*, &c.

Robertson‡ has described the fertilization of *Ellisia Nyc-telea*, L., which seems on the whole to resemble that of the less

\* Journ. Linn. Soc., Bot. vol. xxx. pp. 51–63.

† "Sensitive Stamens in *Portulaca*," Amer. Naturalist, vii. 1873, p. 464.

‡ "Flowers and Insects, X.," Bot. Gazette, xviii. 1893, p. 49.

