

On the Microsporangia of the Pteridosperms.

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(Abstract.)

The first point considered is the question of the identity of *Lyginodendron Oldhamium* and *Sphenopteris Höninghausi*, Brongt. Although this seems to be generally accepted, it has not, as far as the author knows, ever been demonstrated and from continental botanists a clear proof of their identity may be justly demanded. The form, nervation, mode of attachment of the sterile pinnules, the presence of spines on the pinnules and stems and the sclerenchymatous net-like bands in the outer cortex are shown to be similar in both, and further, that as a petrification, *Lyginodendron Oldhamium* on the one hand, and as an impression, *Sphen. (Crossothea) Höninghausi* on the other, each in their respective condition, are the only two plants occurring on the same horizon what each possess all these characters.

The structure of the *microsporangia* of *Sphen. (Crossothea) Höninghausi* is then described in detail, of which a preliminary account has already been given.* This is followed by a description of the *microsporangia* of *Crossothea Hughesiana*, n. sp., which possesses all the essential characters of the *microsporangia* of *C. Höninghausi*, differing only in its larger size and the limb of the fertile pinnules being cordate, not oval, as in *C. Höninghausi*.

The last part of the paper deals with the affinities of the *Cycadofilices*. Beginning with the Upper Devonian, where the first satisfactory evidence of the occurrence of “ferns” or “fern-like” plants is found, the fructification of *Archæopteris* is discussed and the conclusion arrived at that it agrees much more with *microsporangia* than with true fern *sporangia*. The “ferns” of the Culm are next considered, where the only evidence of “ferns” is found in the occurrence of a few sporangia with an annulus of more than one row of cells. The presence of the *Cycadofilices* on this horizon is very conspicuous; the *Botryopterideæ* also occur if one is justified in regarding *Zygopteris* as their petioles. The annulate sporangia from this horizon are regarded as being more probably related to the *Botryopterideæ* than to the true ferns.

The “ferns” or “fern-like” plants of the Upper Carboniferous are next reviewed. In the *Lanarkian series* or lowest division of the Upper Carboniferous, which includes the Halifax hard bed—it is pointed out, that though

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Cycadofilices, *Pteridosperms* and *Botryopteris* occur, there is no satisfactory evidence of the existence of a true fern on this horizon. In the succeeding *Westphalian series*, true ferns possibly exist in such genera as *Hymenophyllites*, *Oligocarpia*, *Senftenbergia*, and *Kidstonia*. Also the *Marattiaceæ* are present in *Asterotheca* and some allies. In the *Radstockian series* and *Upper Coal Measures* of the continent, all these groups are probably present, but the *Marattiaceæ* assume here a very important place.

The conclusion is, therefore, come to that the *Cycadofilices*, which long antedated the advent of true ferns, cannot have been derived from them but are themselves the oldest type of fern-like plant at present known. In regard to the true ferns it seems probable that they may have been derived from the *Botryopterideæ*.

Some Observations on Welwitschia mirabilis, Hooker, f.

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(Abstract.)

The material examined was obtained by the author from plants of *Welwitschia* growing near the German military station at Haikamchab, on the south bank of the Swakop River, 31 miles north-east of the British station at Walfish Bay. Owing to the native rising, it was impossible to carry out the intention of spending some weeks in the country, and keeping plants under constant observation. The results recorded are, therefore, based on the investigations of flowers collected during a hurried visit to the *Welwitschia* country.

The author deals with the habitat of the plants, and describes the climatal conditions under which they grow. Evidence is adduced in support of the view that *Welwitschia* is partially, if not entirely, insect-pollinated, and that the processes of fertilisation and maturation of the seed seem to be effected much more rapidly than in other *Gymnosperms*.

Male Flowers.—The author supports Strasburger's view that the male flowers are reduced forms of an originally hermaphrodite structure. The development of microsporangia and microspores is described. The characters of the pollen-grain, in which three nuclei were observed before the dehiscence