COMPARATIVE STUDY OF DIPLOID AND TETRAPLOID SPORES OF *DRYOPTERIS DILATATA* FROM BRITAIN AND EUROPE*

By FERN WARD CRANE

Summit, New Jersey

It has been noted that spore characters are diagnostic for separating various North American taxa of *Dryopteris* (Crane, 1953). Professor Irene Manton (*see* Manton, 1950), University of Leeds, and Dr. Stanley Walker, University of Liverpool, who have worked on the cytology of diploid and tetraploid specimens of British and European *D. dilatata* (Hoffm.) A. Gray, report it difficult to distinguish the fronds on the basis of gross morphological characters. In a recent conference, Professor Manton asked me to describe spores of such specimens in order to ascertain any correlation.

Mature spores of *Dryopteris* are protected by an alate membrane or perispore (Bower, 1928). In the "*spinulosa*" complex this perispore is spinose, the size and spacing of spinules varying with the taxon. Since there is no appreciable difference between these spores whether collected from living plants or herbarium specimens, I make comparative studies from the dried fronds. Another factor, a proper mounting medium, insures the stability of material to be examined. Permount, a synthetic resin solution, is most suitable for preparing permanent slides. This medium does not cause shrinking or swelling of the spores, but it preserves them naturally and permanently.

The accompanying figures of typical diploid and tetraploid spores of *D. dilatata* were originally plotted on graph paper according to measurement. Diploid specimens, collected in Scotland, Sweden, and Switzerland, and tetraploid plants gathered in England, Ireland, and Sweden, were made available.

There proved to be surprising dissimilarities between spores of diploid and tetraploid specimens of *D. dilatata*. While the sizes are not particularly indicative, an obvious difference in texture can be observed at first glance, even under low magnification. The spore of the diploid has a thin, tan-coloured, membranous perispore; in that of the tetraploid this structure is heavy, dark brown, and coriaceous.

A measurable difference in spinule size and spacing on the perispore of the two types is another constant criterion of discrimination. In a spore of the diploid the spinules are minute, blunt-tipped, 1 μ or less in height, and more or less widely spaced on the surface of the perispore. The spinules of a tetraploid specimen are large, heavy, coarse, thick-set, blunt-tipped, irregular, up to 2 μ, and crowded.

Thus it may be concluded from the above observations that spore characters are diagnostic for the diploid and tetraploid *D. dilatata* under consideration.

It is possible that a similar situation occurs in *D. spinulosa* of North America, and this problem is being studied in collaboration with Manton & Walker (1953).

* This study is financed in part by a grant-in-aid from the American Philosophical Society.

REFERENCES

BOWER, F. O., 1928, *The Ferns (Filicales)*, **3**, 125. Cambridge.

CRANE, FERN WARD, 1953, Spore Studies in Dryopteris, I, *Amer. Fern Jour.*, **43**, 159-169.

MANTON, IRENE, 1950, *Problems of Cytology and Evolution in the Pteridophyta*, p. 75. Cambridge.

MANTON, IRENE & WALKER, STANLEY, 1953, Cytology of the Dryopteris spinulosa complex in Eastern North America, *Nature*, **171**, 1116.

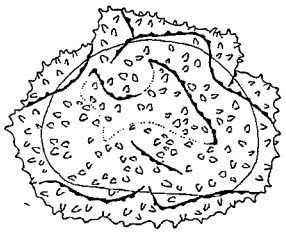

Fig. 1.

Diploid. Ben Lawers, Scotland. Crane #53141.

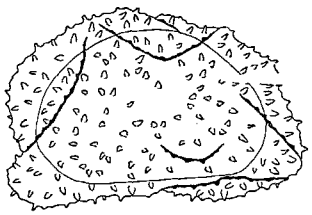

Fig. 2.

Diploid. Sweden. Crane #53139.

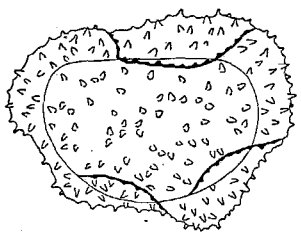

Fig. 3.

Diploid. Switzerland. Crane #53138.

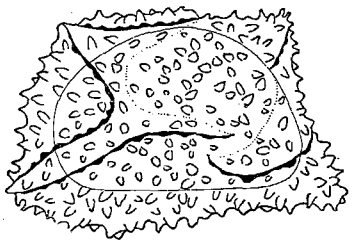

Fig. 4.

Tetraploid. England. Crane #53146.

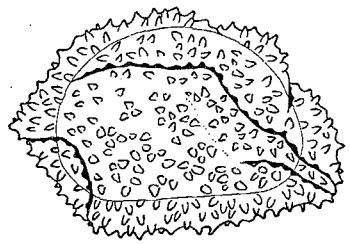

Fig. 5.

Tetraploid. Ireland. Crane #53142.

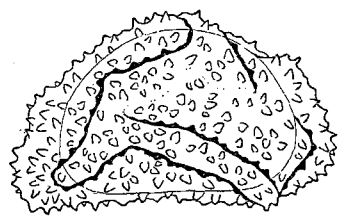

Fig. 6.

Tetraploid. Sweden. Crane #53143.

30μ