Chromosomes of the Male Fern from the Western United States

ELIZABETH ANN REISENDER*,[1]

Dryopteris filix-mas (L.) Schott, the Male Fern, has been shown to represent a species-complex of more or less similar plants. All are fairly large ferns with broad, pale-scaly, tapering blades, deeply pinnatifid pinnae, and large and indusiate sori. In North America the Male Fern occurs mainly in woodlands, often on shaded rocky slopes. It is relatively rare and sporadic. In the east it ranges from Newfoundland through Quebec and eastern Canada southward to northwestern Vermont and northern Michigan. Western populations of this fern (or a fern closely related to it) are separated from the eastern populations by a very large gap in the Great Plains. Reports from the Cascade Mountains of Washington, the Blue Mountains of Oregon, Zion National Park in Utah, western South Dakota, westernmost Oklahoma, and Jeff Davis County, Texas, as well as far western occurrences from British Columbia to the San Bernardino Mountains of California indicate that the western taxon is widely distributed. The considerable break in range between the eastern and western plants has led to the idea that the western *D. filix-mas* may actually be different taxonomically from the eastern. Edgar T. Wherry (1961, p. 114), for example, states that another taxon "commonly treated under the same name but believed to be distinct, is widespread in the w. mts."

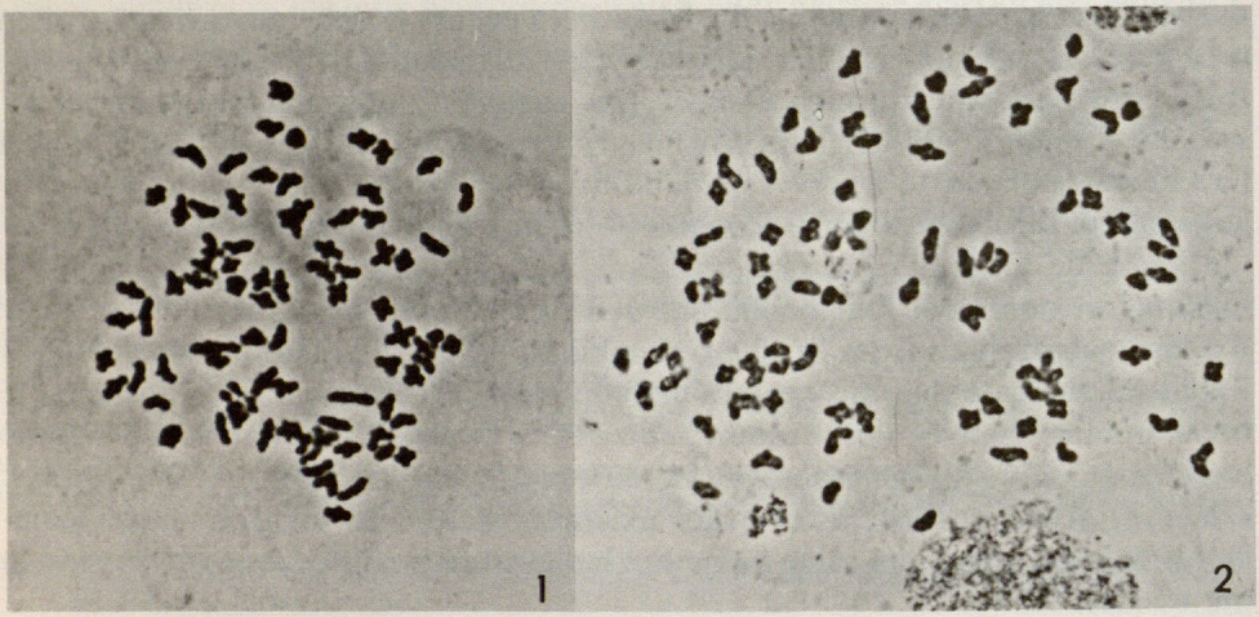
The cytotaxonomic problems of the genus *Dryopteris* were first studied extensively in Britain by I. Manton (1950, pp. 44–62). The genus presents an imposing evolutionary problem because of its tendency to hybridize and to produce numerous variations in morphology, ecology, and distribution. Manton determined a basic chromosome number of $x=41$ for the genus. Although *D. filix-mas* was originally reported to be tetraploid ($n=82$, $2n=164$), cytological observations of artificially made hybrids between the very similar *D. abbreviata* (a diploid) and *D. filix-mas* indicated that the diploid was probably one of the ancestors of the tetraploid. The other ancestral diploid was unknown at the time. Fraser-Jenkins and Corley (1972) recently proposed that the other ancestor is the plant known as *D. caucasica*; the morphology and the characteristics of the hybrids of *D. caucasica* support this proposal. Although at present the two diploid taxa do not overlap in range in Europe, it is conceivable that they once did during an earlier geological period, and it was at that time that the tetraploid originated by hybridization.

Previous chromosome observations of *D. filix-mas* in North America have been from the northeastern United States and eastern Canada. The first report was by Wagner and Hagenah (1962); subsequent studies in the eastern United States and Canada have supported $n=82$ as the diploid chromosome number. The present paper gives the first report for any western member of the *D. filix-mas*

*Department of Botany, University of Michigan, Ann Arbor, MI 48104.

[1]I am indebted to Dr. Florence S. Wagner for help in certain parts of this study. This work was completed under NSF Grant GB-30918X, "The Evolutionary Characters of the Ferns."

complex. The plant was taken on 22 August 1969 from a rocky shaded slope along Perry Creek in Chelan County, Washington (*Wagner 69256,* MICH). Subsequently it was grown at the University of Michigan, where the chromosomes were obtained. Meiotic configurations show $n=82$ pairs; no distinctions were found between these and figures obtained from plants in eastern North America. *Figures 1* and *2* show squashes of spore mother cells to illustrate the perfect pairing of the chromosomes.



FIGS. 1–2. Meiotic chromosomes of western *Dryopteris filix-mas* stained and squashed with aceto-carmine, showing 82 pairs of chromosomes (*Wagner 69256*, MICH).

Because the results of my study agree with those previously made on eastern populations, there is support for the idea that eastern and western *D. filix-mas* are actually conspecific, in spite of suggestions that they might represent separate taxa. Not only the cytology, but also the morphology tends to support this view.

The recent discovery by Fraser-Jenkins and Corley that *D. caucasica* is a probable ancestral diploid answers some of our questions as to the origin of *D. filix-mas*. It is probable that *D. filix-mas* originated as an interspecific hybrid in Europe and spread to North America. With the information presented here, it seems conceivable that an original introduction spread across North America, and that, unlike the situation in Europe, the New World Male Fern complex comprises a single, uniform, tetraploid species.

LITERATURE CITED

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