

Exploring ambiguous morphology and unusual spore behaviour in *Dryopteris filix-mas*, *D. oreades* and their hybrid *D. × mantoniae*

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The tetraploid Common Male-Fern (*Dryopteris filix-mas* (L.) Schott) is frequent throughout most of the UK and Ireland. The diploid Mountain Male-Fern (*Dryopteris oreades* Fomin) is restricted mainly to mountainous areas in the north and west of Britain, with a few occurrences in Ireland. The triploid hybrid Male-Fern (*Dryopteris × mantoniae* Fraser-Jenk. & Corley) has very few records. Plants with ambiguous morphology and odd sporing behaviour that does not match that of the hybrid as currently described occur in areas with mixed populations.



Typical lowland *D. filix-mas*, Essex



Typical upland *D. oreades*, Wester Ross



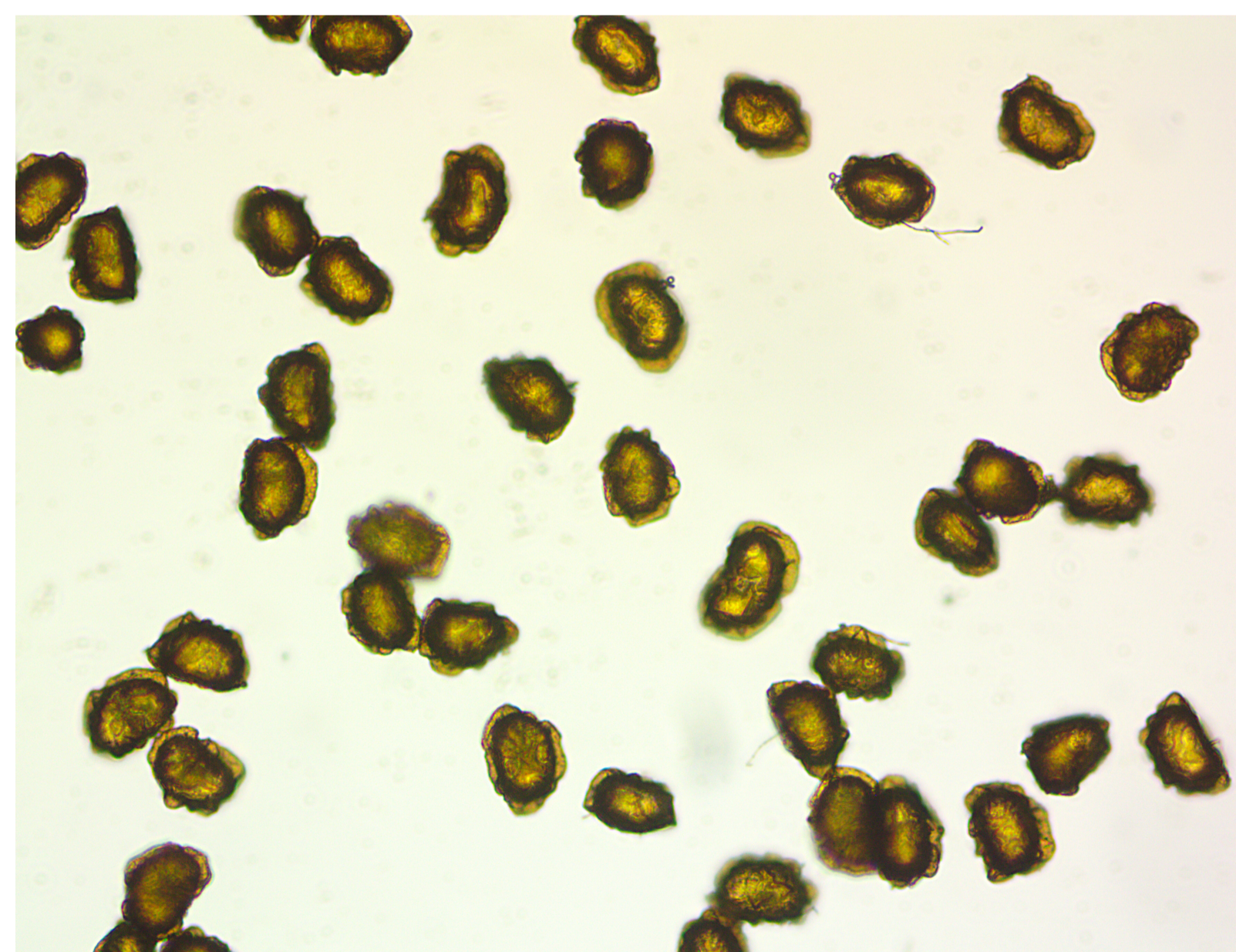
D. × mantoniae, near Priest's Crag, Cumbria



Plant with ambiguous morphology and mixed spore behaviour, Watermillock, Cumbria

The problem:

- the hybrid *Dryopteris × mantoniae* appears rare from the BSBI database records; in some cases it seems to have been misidentified or have erroneous database records, but at the same time is probably under-recorded;
- in areas where both parent species grow, plants with ambiguous or apparently intermediate morphology are common; but these are rarely a good match for published descriptions of the hybrid;
- even experienced botanists frequently experience confusion about these plants;
- spores of some of these plants show unusual characters – for example mixed proportions of good and abortive spores, and some cases good spores of two different sizes, along with abortive spores;
- *Dryopteris filix-mas* already exhibits wide morphological variation. This is probably partly due it being a segmental allopolyploid, i.e. a tetraploid derived by chromosome doubling from the hybrid of the diploids *D. oreades* and *D. caucasica*. This does not account for the additional variation found in areas where both *D. filix-mas* and *D. oreades* occur.



Spore sample of normal *Dryopteris filix-mas*, Watermillock, Cumbria

Hypotheses:

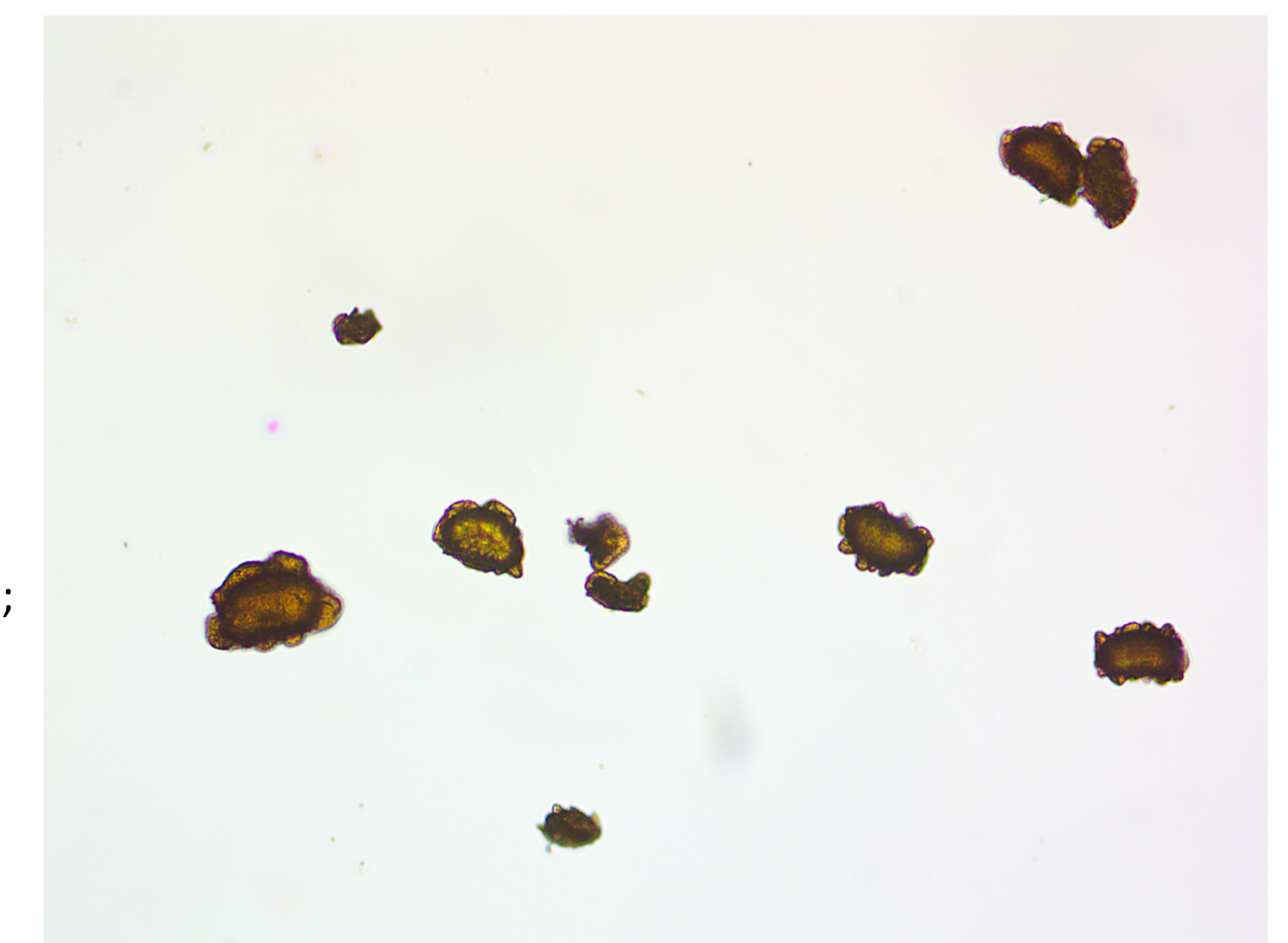
- back-crossing and perhaps introgression;
- different types of meiotic division leading to different spore types: this has been observed in *Polystichum × illyricum* (by Vida and Reichstein) and inferred in *Polystichum × bicknellii* (by Pintér), both equivalent triploid hybrids derived from diploid × tetraploid crosses;
- hybrids are more frequent and show a greater range of morphological variation than previously thought.

Methods:

- sampling of populations in areas where both parent species occur, along with known examples of the hybrid and examples of true *D. filix-mas* and true *D. oreades* for comparison;
- microscopic examination of spores;
- stomata measurements to estimate ploidy level;
- flow cytometry measurement of selected samples to confirm ploidy;
- squash preparations of meiotic chromosomes to examine pairing behaviour.

References

- PINTÉR, I. 1995. Progeny studies of the fern hybrid *Polystichum × bicknellii* (Dryopteridaceae: Pteridophyta). *Fern. Gaz.* 15(1): 25-40.
 VIDA, G. 1973. Polyploid evolution in ferns. (Doctoral dissertation in Hungarian language. Hungarian Academy of Sciences, Budapest. P.136 (quoted in PINTÉR, I. 1995).
 VIDA, G. & REICHSTEIN, T. 1975. Taxonomic problems in the fern genus *Polystichum* caused by hybridisation. In Walters, S.M., *European Floristic and Taxonomic Studies* pp.126-135.



Spore sample of triploid hybrid with abortive spores and mixed size good ones. Watermillock, Cumbria