

Morphology, ploidy level, and genetic markers of taxa in the *Dryopteris affinis* (Lowe) Fraser-Jenk. complex in Britain and Ireland.

Alison Evans

The scaly male ferns of the *Dryopteris affinis* complex are a difficult group to identify. The taxa are under-recorded, partly because of the confusion over naming. Taxonomic treatment is currently inconsistent, with Sell and Murrell (2018) listing eight recognised taxa as separate species, and Stace 4th Edition (2019) listing only one species with four subspecies. There is a lack of published systematic morphometric and genetic evidence from the UK or Ireland for these taxonomic decisions. The **aims** of the current doctoral study are to determine the diagnostic morphometric traits, the ploidy levels, and if possible, the genetic markers of these taxa, in order to inform their taxonomic treatment.

Methods used in this study were developed during an MRes study of six diploid taxa (Evans, 2021). Sampling will be undertaken across the UK and Ireland, aiming for 30 - 50 individuals of each of the more common taxa. The plants will be assigned to taxa based on qualitative features. Each sampled frond will be scanned, and digital microscope images of critical features made. Morphometric analysis including stomatal size, and where possible, spore length, will be carried out on each sample. Ploidy level will be determined by flow cytometry, backed up by cytological examination of at least one plant from each taxon. A protocol for DNA analysis will be developed, then applied to each plant sampled.



In search of *Dryopteris pseudocomplexa*

Dryopteris pseudocomplexa (Fraser-Jenk.) P.D. Sell, originally named “morphotype Arranensis” (Pigott, 1997) and then thought to be a subspecies of *D. cambrensis* (Fraser-Jenkins, 2007) has been shown to be tetraploid, and has mostly fertile spores. There are known populations in Co. Waterford, and in Scotland, mostly on Arran and Skye. The type location is in the grounds of Dunvegan Castle, Skye, VC 104, Figs. 1 and 2. Recently Roger Golding has found it at Stromeferry, VC 105, and in Kirkbean Glen, VC 73. Tony Church recorded it on Islay, VC 102, in 2007, but this is not currently on the BSBI distribution map. This year (2022) I was awarded a BSBI Science and Research grant to support field work on Islay. On the same trip, samples of *D. affinis* taxa from Kintyre, Colonsay, and Kirkbean Glen were collected. Samples of *D. pseudocomplexa* from Arran and Stromeferry were collected on a previous trip in August 2022, and from Co. Waterford, Irish VC 6 in 2021.

Bennert et al (2022) report this taxon from the Vosges Mountains, and also the German Harz Mountains. Jessen et al (2022) have published a tetraploid fertile taxon, which is very similar in morphology, as *D. carpatica* from the Carpathian Mountains in Romania.

Dryopteris pseudocomplexa – descriptions

Fraser-Jenkins’ (2007) description of this taxon (as subsp. *pseudocomplexa*) most accurately fits the UK and Irish plants. In addition to the high proportion of good spores, Fraser-Jenkins points out that this taxon differs from *D. x complexa* in having a paler lamina, and ‘smaller, narrower, less-lobed pinnules’ (Figs. 2a,3,4a). This differs from Bennert et al (2022), who describe it as looking the same as *D. x complexa* (Fig. 3). Fraser-Jenkins describes the indusia as thin, ‘seldom splitting, soon lifting and shrivelling markedly’ (Fig. 4). In contrast, Sell and Murrell (2018) describe the indusia as ‘more or less thick, only slightly lifting and usually splitting on ripening and not or only slightly shrivelling’. The latter does not fit with our observations, neither do their assertions that the pinnules taper towards the base, and do not have visible impressed veins on the upper surface.

Specimens from the Islay expedition

Two plants were found with morphological features of *D. pseudocomplexa*, stomatal length measurements in the tetraploid range, and good spores, one on Islay and one in Kirkbean Glen. Flow cytometry results however showed that the Islay plant is triploid, so *D. borrieri*, but the Kirkbean Glen plant is tetraploid, so *D. pseudocomplexa*. Twenty-two specimens were collected in total, made up of:

<i>Dryopteris affinis</i>	7	<i>D. cambrensis</i>	5
<i>D. affinis</i> mt. ‘convexa’	1	<i>D. pseudocomplexa</i>	1
<i>D. borrieri</i>	7	<i>D. pseudodisjuncta</i>	1



Figure 2. *Dryopteris pseudocomplexa*, Dunvegan plant, 2a) mid-frond pinnae 2b) 1st – 3rd lowest basicopic pinnules 2c) sori with ripe spores. Photos: James Merryweather



Figure 3. *D. x complexa* mid-frond pinnae for comparison. Photo: A. Evans



Figure 4. a) Mid-frond pinnules b) indusia of *D. pseudocomplexa*, plant from Arran. Photos: A. Evans

References

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