Dryopteris affinis and related taxa

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What makes *affinis* a problem?

• A complex of similar taxa, probably evolved from the same parents at differing times and places, the origin of which are still to be resolved

• Apomictic breeding system!
  – Production of clonal entities identical in the absence of mutations …but
  – Residual male sexuality allows creation of hybrids
  – Perhaps rare sexual events as female partner
  – and mutations happen!
Agamospory

Some pteridophytes complete their life-cycle without sex but still produce spores

- Produce spores without reduction in Chromosome number (\(=\) Diplospory)
- Gametophytes produce sporophytes without gametic fusion (\(=\) Apogamy)
- Process repetitive and obligate (obviously)
- usually arises as a consequence of hybridisation
Apomixis in Dryopteris

- Two types of sexual cell division seen – proportions differ from taxon to taxon
- Some cells divide normally, meiosis occurs but is irregular and gives rise to abortive spores
- Other cells fail to divide normally but give rise to 32 diplospores (not 64 haploid spores)
  - Diplospores are usually more spherical and larger than sexual ones
- Gametangia ♀ not functional but ♂ functional
  - so can hybridise with sexual species as male parent
the main British entities in the complex

2X
• D. affinis
  – D. kerryensis
• D. paleaceolobata

3X
• D. borreri
  – D. lacunosa/ "insolens"
  – "foliosum"
  – "robusta"
• D. cambrensis
• D. pseudodisjuncta

4X
• D. pseudocomplexa
this is still highly conjectural! See for instance Juslén et al., 2011 (Taxon 60:1284-1294).
Dryopteris oreades 2x
Dryopteris filix-mas 4x
Dryopteris affinis
D. affinis
D. affinis
affinis

- Spores (35-)40-45μm - +/- uniform, good
- Indusium thick, splitting but not shrivelling
- Veins impressed in upper surface
- Frond glossy, evergreen, tapering to base
- Lowest basiscopic pinnule semi-adnate
- Stipe thick, densely scaly, golden-brown
D. kerryensis
D. kerryensis
kerryensis

As affinis but

- Fronds smaller – to c. 70cm
- Pinnules (and to an extent pinnae) overlapping
- Frond rather flat
- Scales on stipe rather darker than typical for affinis
- Apparently restricted to high rainfall areas
D. paleaceolobata
D. paleaceolobata
D. paleaceolobata
D. paleaceolobata
paleaceolobata

Differs from *affinis*
- in lobed and crimped pinnules
- Lower basiscopic pinnule longer, stalked and with lobes overlapping stipe
- Tapers less to frond base
- Stipe scales darker and narrower
- Indusium thinner at margin - can shrivel a little

Differs from *cambrensis*
- Smaller spores
- Pinnae not upswept or U-shaped in section
- Broader frond
- Stipe scales more uniform in size/shape
- ?less calcifuge
Dryopteris cambrensis
D. cambrensis
cambrensis

- Spores typically c. 55μm, less uniform, darker brown and with more aborted
- Fronds narrow, tapering below, rather glossy
- Pinnae often twisted to give ladder-like frond, upswept and U-shaped in section
- Pinnule apices rounded, teeth oreades-like
- Lowest pair of pinnules of each pinna the longest with lobes overlapping rachis
- Lowest basiscopic pinnule of lowest pinnae stalked
- Stipe short, densely scaly with russet-brown often twisted scales, variable in size and shape
D. borreri
D. borreri
D. lacunosa
D. borreri “robusta”
**borreria**

- Spores (42-)46-49(-55)μm
- Indusium thin, not tucked under initially, lifting and shrinking to chanterelles
- Pinnules with acute teeth
- Pinnule apices usually squarely truncate or in more foliose forms side-lobes rectangular
- Pinnules irregular in length
- Fronds not glossy or very evergreen, relatively broad at the base
- Stipe long narrow, not densely scaly, scales pale
- Lowest basiscopic pinnule stalked
Dryopteris pseudodisjuncta
D. pseudodisjuncta
D. pseudodisjuncta
pseudodisjuncta

- Long narrow lowest basiscopic pinnule, stalked and with a rather cuneate base
- Pinnule apices narrow or wedge-shaped
- Pinnule teeth +/- absent
- Pinnae separated by wide V-shaped gap
- Stipe and rachis scales pale, with dark-brown bases.
- Abundant narrow wispy scales on costae
- Indusium with obvious depression in centre, margins markedly inflected and remaining downturned, shrivelling late in season
- Frond pale green, slightly glossy, not very evergreen
Dryopteris pseudocomplexa
pseudocomplexa

The most *filix-mas* like!

Differs from *cambrensis* in

- Pale, rather ovate scales
- Frond paler green, less glossy, less evergreen, broader with longer stipe
- Indusium thinner, not splitting, shrivelling more markedly

Differs from *borreri* in

- Larger spores (c. 56-68 μm)
- Pinnule apices narrowly rounded, never truncate
Dryopteris x complexa
\( \times complexa \)

- Shows hybrid vigour!
- Intermediate in many characters
- Glossier and scalier than \( D. \ filaix-mas \)
- Dark spot often somewhat indistinct
- High levels of spore abortion but some (to 20%) very large spherical spores produced
- Not forming populations
Dryopteris remota
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