Dryopteris affinis and related taxa

Fred Rumsey

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*

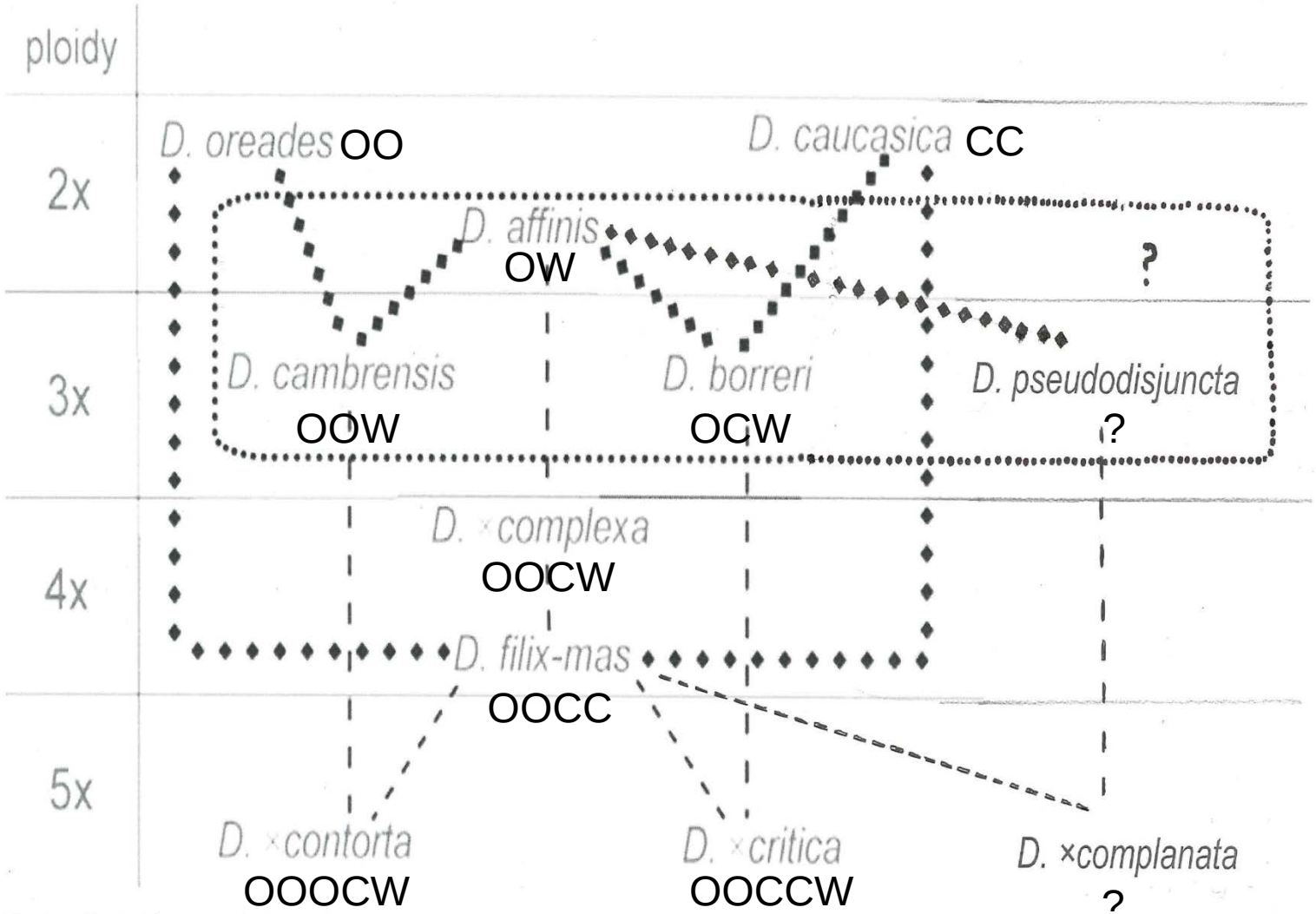


Fig. 1. – Evolutionary and hybrid relationships among taxa of the *Dryopteris affinis* and *D. filix-mas* groups in Central Europe. – – – recent hybrids; ♦ ♦ ♦ putative historical hybrids; ••• *D. affinis* group, other non hybrid species of the *D. filix-mas* group (compiled according to Widén et al. 1996, Fraser-Jenkins 2007).

this is still highly conjectural! See for instance Juslén *et al*., 2011 (Taxon 60:1284-1294).

Dryopteris oreades 2x




Dryopteris wallichiana 2X

Dryopteris caucasica 2x



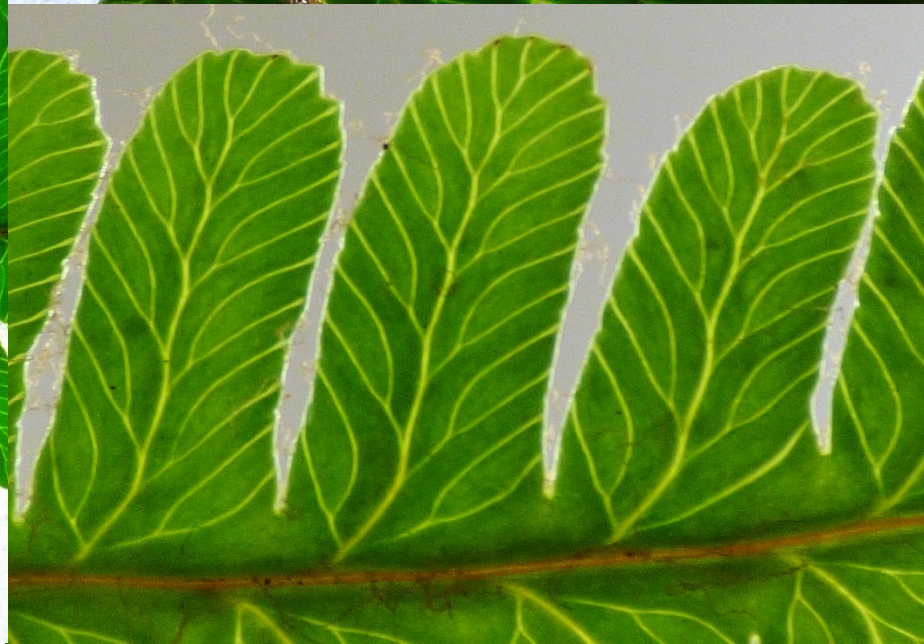


Dryopteris filix-mas 4x

Dryopteris affinis

D. 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

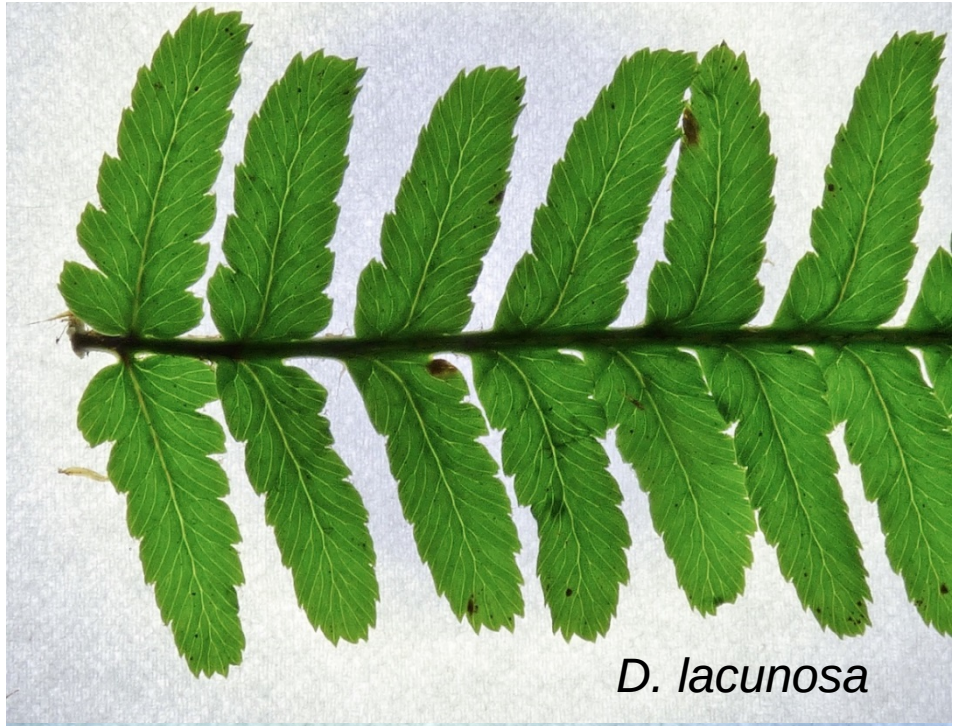
D. cambrensis

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”

borreri

- 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

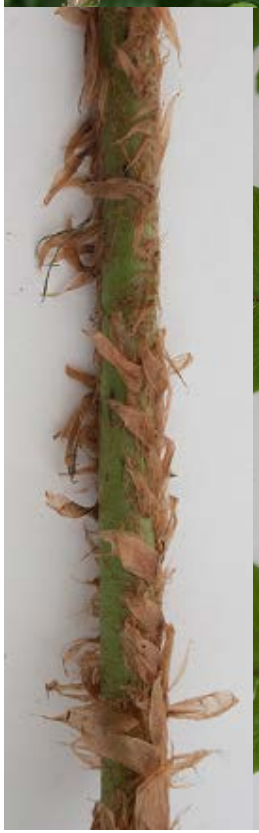
D. pseudodisjuncta


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

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.56-68µm)
- Pinnule apices narrowly rounded, never truncate

Dryopteris x *complexa*

×*complexa*

- Shows hybrid vigour!
- Intermediate in many characters
- Glossier and scalier than *D. filix-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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