

Polystichum in Otago

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A recent study (Perrie et al., 2003) of the morphologically-variable common shield fern, *Polystichum richardii*, found it to comprise an allopolyploid complex, in which three species were recognised: two tetraploids *P. wawranum* and *P. oculatum*, and the allo-octoploid *P. neozelandicum*. *Polystichum richardii* is a later synonym of *P. neozelandicum*, and hence is not a correct name for any of these newly circumscribed species.

Unlike botanists in the lower North Island who have to contend with all three “*P. richardii*” species (Perrie, 2003), only one is currently known from the Otago region: *P. neozelandicum* subsp. *zerophyllum* (subsp. *neozelandicum* occurs north of Rotorua). I have seen *P. neozelandicum* subsp. *zerophyllum* at several places within the greater Otago region including the Flagstaff Creek area of Dunedin, Waipori Falls, the Wanaka end of Glendhu Bluff, and Kidds Bush at Lake Hawea.

Of the other “*P. richardii*” species, *P. wawranum* is seemingly confined to the North Island, while the apparent southern limit for *P. oculatum* is one old and somewhat dubious record from Timaru. Further north, *P. oculatum* is the predominant “*P. richardii*” on Banks Peninsula (*P. neozelandicum* subsp. *zerophyllum* is also there but is uncommon).

More thorough searching may reveal *P. oculatum* to be present in the Otago region (hence, I have included it in the key below), particularly in northern, coastal areas. The following table indicates how *P. oculatum* can be distinguished from *P. neozelandicum*.

<i>Polystichum neozelandicum</i>	<i>Polystichum oculatum</i>
Scales from the lower rachis less than 0.7 mm wide at their mid length; acicular-lanceolate in shape (Perrie et al., 2003, fig. 5).	Scales from the lower rachis greater than 0.7 mm wide at their mid length; almost pentagonal in shape (Perrie et al., 2003, fig. 5).
Lamina a lighter forest-green colour compared to dark blue-green colour of the costae (the mid-ribs of the pinnae).	Lamina and costae (pinnae mid-ribs) of similar colour, usually dark blue-green.
Spores big (46-58 μm \times 36-45 μm)	Spores small (36-48 μm \times 27-36 μm)

The other *Polystichum* species found in the Otago region are:

P. cystostegia: found in alpine conditions. It has large, pale-orange scales on its stipe (lower stem) and rachis (upper stem). The indusia (the little shield-like structures on the underside of the frond that protect the spore-producing apparatuses) are markedly convex; i.e., the outside margins of the indusia are closer to the frond than the main bodies of the indusia. The other species all have flat indusia (or none at all). The frond tends to be a lighter and paler shade of green than usually found in the remaining species.

P. vestitum: the most common *Polystichum* in Otago. The scales, which usually thickly clothe the stipe and rachis, are several millimetres wide and have a glossy dark-brown

centre completely surrounded by a pale brown margin. The indusia have only a small black spot at their centre. In bigger plants, the fronds become quite long (c.2 m) and narrow, and are distinctly parallel-sided.

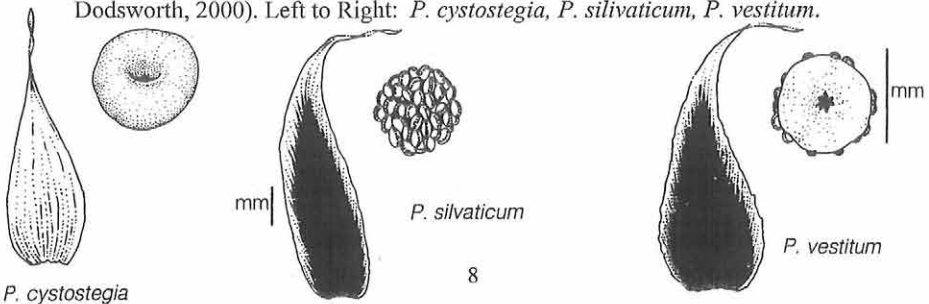
P. silvaticum: closely resembles *P. vestitum*. They can be hard to distinguish, but the best way is to look for indusia with a hand-lens or microscope; *P. silvaticum* never has any indusia, even when the spore producing structures are young. (Be wary as the other species can lose their indusia with age. Therefore, in trying to make a definite identification of *P. silvaticum*, old fronds should be avoided. Look for fronds with either young or mature spore producing structures; these will look greenish-white and black, respectively. Old spore producing structures look brown.) Also, compared with *P. vestitum*, the frond of *P. silvaticum* has a slightly more dissected look to it, and the scales are often thinner (they still have a dark brown centre surrounded by a pale margin) and do not have such a 'tidy' appearance on the stipe and rachis. *P. silvaticum* is usually found in dark, wet habitats (i.e., alongside forest streams).

I have never seen *P. silvaticum* in the South Island, but there are scattered collections of it. On behalf of WELT, I would greatly appreciate receiving South Island specimens of *P. silvaticum*.

Two exotic species of *Polystichum* might also be encountered: the Australian *P. proliferum* and a finely-dissected cultivar of the European *P. setiferum*. Both are prolific, producing little plantlets on their fronds (*P. proliferum* has only a few bulbils, borne near the rachis apex; *P. setiferum* has numerous bulbils, borne along the rachis at junctions with the primary pinnae), and this characteristic distinguishes them from the native species (Brownsey & Smith-Dodsworth, 2000).

A factor complicating identification amongst the native species is hybridisation. In particular, *P. neozelandicum* subsp. *zerophyllum* and *P. vestitum* often form hybrids where they grow together (these hybrids are sterile, with aborted spores). Recognition of such plants in the field can be difficult, and requires familiarity with both parents. Like most hybrids, they combine characteristics of both parental species. The frond architecture is intermediate. The indusia have the obvious blackened centres found in *P. neozelandicum* subsp. *zerophyllum* but usually lacking in *P. vestitum*. The rachis scales of *P. neozelandicum* × *P. vestitum* hybrids have pale brown margins like those of *P. vestitum*, but are thinner, and have cilia-like projections on their margins as is common in *P. neozelandicum* but unknown in mainland *P. vestitum*.

Rachis scales and indusia from native *Polystichum* species. (Brownsey & Smith-Dodsworth, 2000). Left to Right: *P. cystostegia*, *P. silvaticum*, *P. vestitum*.



Key to native *Polystichum* in the lower South Island.

1. Indusia absent *P. silvaticum*
Indusia present 2
2. Indusia markedly convex; stipe and rachis scales uniformly pale orange-brown;
plants of alpine conditions *P. cystostegia*
Indusia flat; stipe and rachis scales NOT uniformly pale orange-brown; lowland,
montane, or alpine plants 3
3. Rachis scales bicolourous with pale brown margin completely encompassing dark
brown centre 4
Rachis scales concolourous (uniformly dark brown, almost black, or pale brown), or
if bicolourous not with a pale brown margin completely encompassing a dark
brown centre 5
4. Indusia lacking an obvious dark centre; rachis scales without marginal projections;
spores normally formed *P. vestitum*
Indusia with an obvious dark centre; rachis scales usually with marginal projections;
spores abnormally formed
..... *P. vestitum* × *P. neozelandicum* subsp. *zerophyllum*¹
5. Scales from the stipe-rachis junction > 750 µm (and usually > 1000 µm) wide at
their mid-length, often almost pentagonal *P. oculatum*²
Scales from the stipe-rachis junction < 650 µm wide at their mid-length, generally
acicular-lanceolate (like an isosceles triangle)
..... *P. neozelandicum* subsp. *zerophyllum*

Notes¹: *P. vestitum* × *P. oculatum* would also key out here.

²: *P. oculatum* is not presently known from the Otago region.

I would be more than happy to assist/confirm identifications of *Polystichum*, and can be contacted by mail (Leon Perrie, Te Papa, P.O. Box 467, Wellington), phone (04 381 7261), or email: leonp@tepapa.govt.nz

References

- Brownsey, P.J., & Smith-Dodsworth, J.C. 2000: New Zealand ferns and allied plants. 2nd ed. Auckland, David Bateman Ltd.
- Perrie, L.R. 2003: *Polystichum* in the Lower North Island. *Manawatu Botanical Society Newsletter* 30: 3-4.
- Perrie, L.R., Brownsey, P.J., Lockhart, P.J., & Large, M.F. 2003: Evidence for an allopolyploid complex in New Zealand *Polystichum*. *New Zealand Journal of Botany* 41: 189-215.