ADVENTIVE PTERIDOPHYTES IN CHRISTCHURCH

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This note is concerned only with those species which occur spontaneously within the urban limits of the city. Not surprisingly almost all are found in the most obvious suitable habitat, Riccarton Bush, but only one, Phyllitis (Asplenium) scolopendrium (Hart's Tongue), is found only there. Whether or not this fern is included within or excluded from Asplenium is controversial, and perhaps only a matter of taxonomic taste; it may however be distinguished from Asplenium by the paired nature of its sori. Its undivided fronds will prevent it being confused with any native spleenwort. Brian Molloy's statement (1976, p.16) that this is the only known adventive record for N.Z. remains true. However, in its single site near the edge of the Bush it is well-established, nine crowns now being present.

The other two pteridophytes added to the Riccarton Bush list by Molloy (loc. cit.), Athyrium filix-femina (Lady Fern) and Selaginella kraussiana, which may also each still be restricted to one part of the bush, occur elsewhere in the city. S. kraussiana persists along the Okeover stream on the Ilam campus, where it occurs together with Cystopteris fragilis. However this example of C. fragilis (a peculiarly complicated species complex) is a notably different plant from the native montane plant given that name by Allan (1961), which I feel should more properly be called C. tasmanica Hook. f. The adventive plant is characteristic of forms prevalent in the Northern Hemisphere, having pinnae very much more divided than C. tasmanica, to the extent of rendering it impossible to confuse them, once both have been seen.

Our commonest adventive fern is Dryopteris filix-mas (Male Fern), which enjoys life in Christchurch gardens, and has become so abundant in Riccarton Bush that lately its presence has been actively discouraged. It has become apparent to me recently that D. filix-mas has taken more than its fair share of blame as a nuisance because another closely related species D. affinis (Lowe) Fraser Jenkins (= pseudomas = borreri = paleacea auct.) is also present. This fern, (which has suffered abominally from recent nomenclatural changes!), has not previously been confidently recognised in N.Z. but certainly occurs outside Riccarton Bush. I saw recently a flourishing colony in Cosy Glen, Dunedin, and nearer home at least one plant occurs along the Okeover Stream. It may well be much more widespread in Christchurch.

Dryopteris affinis and D. filix-mas present a nice exercise in recognition. D. affinis has several forms, but is always a tidier plant and its extreme forms markedly more handsome than filix-mas. It may be distinguished by its truncate pinnules, more scaly stipe and rachis, and by the margin of the indusium which is tightly inrolled, whereas it is nearly always flat in filix-mas. The whole plant is more yellow in appearance when young. By chance, an example of each grow side-by-side in our secretary's back garden! In this case, the form of affinis is a cultivar with forked pinnae, var. polydactyla, which also occurs in Riccarton Bush.

Alice Dumbleton's example is of spontaneous origin, she tells me, but polydactyla is deliberately grown in N.Z. An example has just

been planted with some care by the University gardeners in the copses associated with the Ilam Homestead.

However subtle the differences between Dryopteris affinis and D. filix-mas there is no doubt about their specific separation. They differ in chromosome number and in mode of reproduction; filix-mas reproduces sexually, whereas affinis is an apomict.

Apomicts are plants which by and large show all the usual morphological features of a normal sexual reproductive cycle, but nevertheless fertilization does not occur and in compensation there is no reduction in the chromosome number earlier in the life cycle (in spore formation). The most familiar example of an apomictic flowering plant is the common dandelion, which produces flowers and seeds abundantly enough, but these seeds are all produced asexually. In a parallel manner, the spores of D. affinis give rise to gametophytes (prothalli), but these have the same chromosome number as the parent plant and give rise to a new sporophyte spontaneously, without a sexual fusion.

Apomixis is not well-developed, or not well-known, in the native New Zealand fern flora. Apomixis is widespread in the genus Cheilanthes, and it is extremely probable that both C. distans and C. sieberi are apomicts. Asplenium flabellifolium is certainly an apomict (Lovis, 1973; Brownsey, 1977) and is notable for employing two forms of apomictic reproduction, being also a vegetative apomict, advancing and multiplying by its rooting frond apices.

It may not be entirely coincidental that all of these three species can tolerate unusually dry conditions for ferns, since the lack of free surface moisture for fertilization is of no consequence to them.

The Dryopteris filix-mas complex has become something of a classic example of micro-evolution. (Manton, 1950; Fraser Jenkins, 1976; Lovis, 1977, p. 337-343). D. filix-mas itself is of hybrid origin, being most probably an allotetraploid derivative combining two subalpine diploid species, D. oreades (= abbreviata) and D. caucasica, which meet in Asia Minor. D. affinis appears to exist on four levels of chromosome number, diploid, triploid, tetraploid and pentaploid! The two higher levels are however hybrids between D. filix-mas and the diploid and triploid forms of D. affinis. These may occur as isolated individuals wherever both parents are abundant. It may seem paradoxical that a plant which cannot reproduce itself sexually can nevertheless produce hybrids, but in fact the prothalli do produce functional spermatozoids and can therefore be the male parent in an interspecific hybrid.

Yet another European Dryopteris, D. austriaca (= dilatata) has found its way into Riccarton Bush (Molloy, 1980). I was recently shown a frond by Brian Molloy who had encountered a single plant therein. It was already known from two sites along the Avon river in the city centre. This species is readily distinguished from the D. filix-mas complex, because the fronds possess an extra order of branching, being tripinnate, like Athyrium filix-femina.

The last species to be mentioned here is Equisetum arvense, (Field Horsetail). The horsetails are of course of great academic

interest as an extremely ancient distinctive and isolated group and their surprising absence from Australasia as native plants is a positive hindrance in the teaching of systematic botany here in N.Z. Fortunately for Christchurch gardeners, E. arvense is still extremely rare in the city, and indeed apparently currently extinct, though it is very firmly established in one or two relatively remote parts of N.Z. The most recent local record is by A.J. Healy, the doyen of students of the adventive N.Z. flora, who collected it in 1970 in Peverel Street (CHR 220881), but it does now seem to have been eradicated there, no mean achievement, for it is a most persistent weed.

It was fascinating to read in the first of A.D. Thompson's summaries of Cockayne's international correspondence (Thompson, 1979) of Cockayne's pleasure (loc. cit. 5, p. 390) in establishing four species of Equisetum in his New Brighton garden, but also, only eighteen months later (loc. cit. 16-10 1901, 10, p. 392), of his reluctant decision to destroy them, for "they would become a nuisance in my lifetime and I would be hanged ...."!

REFERENCES

Allan, H.H. 1961: Flora of New Zealand Vol. I.

Brownsey, P.J. 1977: A taxonomic revision of the New Zealand species of Asplenium. New Zealand Journal of Botany 15: 39-86.

Fraser-Jenkins, C.R. 1976: Dryopteris caucasica, and the cytology of its hybrids. Fern Gazette 11: 263-267.

Lovis, J.D. 1973: A biosystematic approach to phylogenetic problems and its application to the Aspleniaceae. Botanical Journal of The Linnean Society, 67: Supplement 1: The Phylogeny and Classification of the Ferns (edit. Jermy, A.C. & Crabbe, J.A.): 211-228.

Lovis, J.D. 1977: Evolutionary Patterns and Processes in Ferns. Advances in Botanical Research, 4, 229-415.

Manton, I. 1950: Problems of Cytology & Evolution in the Pteridophyta. Cambridge U.P.

Molloy, B.P.J. 1976: The Flora of Riccarton Bush. Canterbury Botanical Society Journal 9: 14-17.

Molloy, B.P.J. 1980: Report of the representative on the Riccarton Bush Board of Trustees. Roy. Soc. N.Z. Canterbury Branch Annual Report & Balance Sheet, 1979: 7-8.

Thompson, A.D. 1979: Annotated summaries of letters to colleagues by the New Zealand botanist Leonard Cockayne - 1, New Zealand Journal of Botany 17: 389-416.

LEWIS PASS NATURE WALK

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During the last ice age a great glacier from the west spilled over the saddle now called Lewis Pass. As the ice melted and the glacier retreated moraine of rocks and rubble trapped water and enclosed the lovely tarn from which this walk begins. The walk traverses the moraine deposits where tall grassland vegetation of red tussock, Chionochloa rubra, with small shrubs and herbaceous species contrasts sharply with the beech forest developed on the adjoining slopes. Here the lighter green of red beech trees stands out among the more sombre green of mountain and silver beech. Growing beside the waterfall are some trees of southern rata, Metrosideros umbellata. The vegetation on the moraine and nearby is somewhat modified as a result of burning.

Although a way through Cannibal Gorge was well-known to the Maori people in their east-west travels, several different parties of Europeans over a period of some years explored this area before a route from Nelson to the headwaters of the Grey River was confirmed. To the north are peaks of the Spenser Range, often shrouded in mist and cloud but sparkling and magnificent on a clear day. The highest peak visible is Gloriana, 2214 m, flanking the Faerie Queen, 2236 m, which lies just out of sight to the east. In the valley some 120 m below is the Cannibal Gorge of the Maruia River.

The boggy margins around the clear waters of the tarn have a number of interesting plants. They are best left untrampled and most can be admired from drier ground on or near the track. Sedges are prominent, with Carex sinclairii common. C. gaudichaudiana with fruiting spikes that have a distinctive green and black criss-cross pattern forms a low sward and C. coriacea with pendant fruits, is summer green. Amongst the mats of soft green sphagnum is Nertera balfouriana, a plant easily overlooked until the bright orange pear-shaped berries appear, and the bladderwort, Utricularia monanthos another plant not easily seen unless the deep violet flowers are showing. The star sedge, Carex echinata, grows through the sphagnum and two sundews, Drosera spathulata and D. arcturi grow here and in the firm green mats of comb sedge, Oreobolus pectinatus.

On higher ground white flowers of bog turpentine shrub, Dracophyllum palustre, perfume the air in summer, although some flowers are present at most seasons of the year. Two daisies, the yellow-flowered Senecio bellidioides and small, white-flowered Celmisia alpina are common, together with many small shrubs bearing attractive fruits. White coral lichen, Cladia retipora and golden clubmoss, Lycopodium fastigiatum, add to the variety of colour.