PTERIDOLOGIST

The Fern Magazine

2014 Edition [Volume 6, Part 1]

EDITED BY A.E. GREENING

ISSN 0266-1640

BRITISH PTERIDOLOGICAL SOCIETY

Editorial

It would appear that if you want to grow ferns from spores successfully, then you need to drink plenty of milk! Not only that, the milk should be bought in plastic 4 pint bottles and from the same retail outlet each time so that they are all the same size and shape. You don't believe me? Check out page 10 and see what Fiona Layton manages to do with hers.

There are some amazing articles in this issue. They range from ferns in far flung places to those nearer home. The Carribean islands of Antigua and Barbuda have had an incredible resurgance amongst the fern world, thanks to Kevel Lindsay. He has managed to find 109 species since the last major survey in 1993 which only listed 45. That's an increase of nearly 250%! His work continues and there is a book about to be published later this year. Please read his article starting on page 14. We had hoped to review his book in this issue but it has been slightly delayed and will hopefully be published very soon.

A little bit nearer home, the island of Madeira has prompted 2 articles from Neil Timm that tell of the local tradition of using ferns in Christmas decorations (Page 20) as well as those that survive underground. (Page 33)

We also have a very interesting article about a fern raised from detritus from an Antarctic glacier. Have a look at Page 58 and see what Ron Lewis-Smith has done.

Our very own Martin Rickard has visited Ecuador for the second time.This trip was with fellow fern enthusiasts and they managed to cover a lot of ground. (See page 24)

Furthest away in Australia, Mark Longley takes us through the Blue Mountains as well as reviewing his Ebook about Tree Ferns (Pages 55 and 76). He has also agreed to restart the Tree Fern Newsletter section of the Pteridologist so watch this space.

Nearer home, the amazing Bryan Yorke tells of his epic 2 year search for *Polystichum lonchitis* on Hutton Roof which hadn't been seen there since 1957. He eventually found not one, but two, plants of this species and also rediscovered *Asplenium viride* which hadn't been seen for at least 15 years and located a new record of *Asplenium adiantum-nigrum* for that area. Please turn to page 38 and marvel at his determination and diligence.

There are several major articles in this edition. On page 1 we see how complex hardiness in ferns can be. Adrian Dyer has been very busy and has produced, firstly, an article about Patrick Neill Fraser, a Victorian fern enthusiast (Page 48) and secondly a very detailed study of *Athyrium filix-femina* 'Victoriae' (Page 64). It would appear that it is a strong possibility that I have an origional clone in my garden, thanks to Robert Crawford.

My proof reading team has now been joined by Chris Evans which was very fortunate when my main proof reader had to go into hospital for an operation. Thank you Chris. Are there any more volunteers out there?

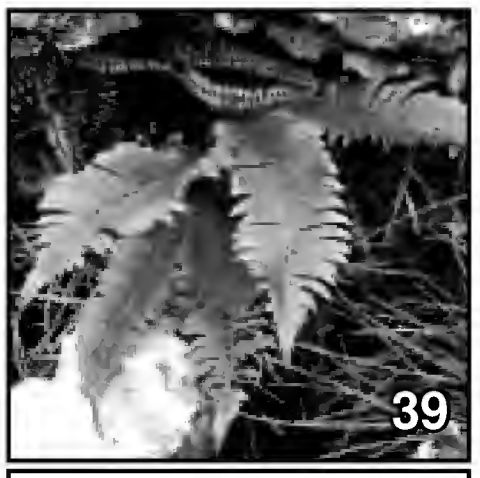
For the next edition of the *Pteridologist* the deadline for copy has been moved forward to 31st December. I have a long trip 'down-under' in March/April and would like to have the magazine nearly finished before I go.

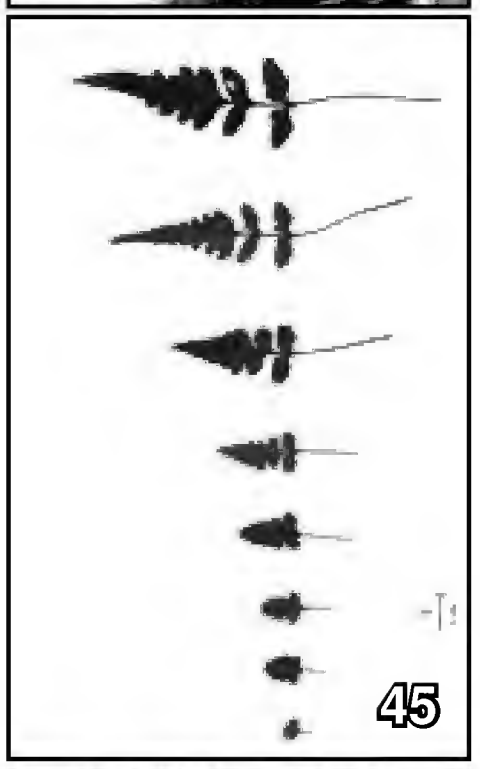
Alec Greening
e-mail: alec.greening@virgin.net

Notes for contributors

Ideally I would like contributions by e-mail or on disc or USB stick (which will be returned), with high resolution images.If this is not possible I will not rule out typed or hand-written copy. In general please follow the style of material in this issue.

Preview





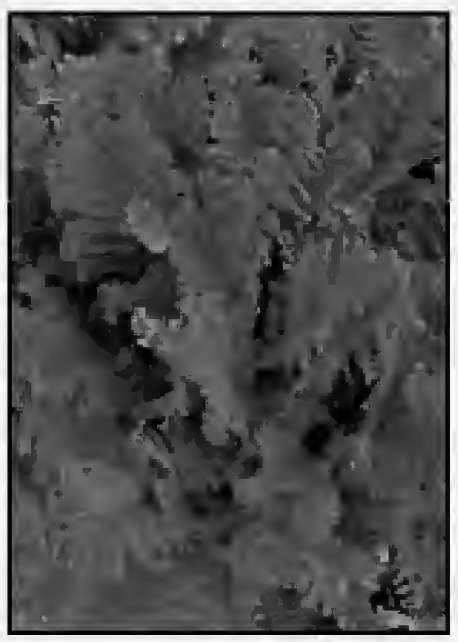
Printed by: MTP Media(2008) Ltd. Kendal. Cumbria

PTERIDOLOGIST 2014

Contents: Volume 6 Part 1, 2014

Sticheris simplex found in the Andes near Lago Llaviucu.

Photo: Martin Rickard.



(Left) Cover Picture: Front.

This magnificant British cultivar is a member of the *Athyrium filix-femina* "Percristatum Group" as denoted by the cresting on the pinnule tips.

Photo: Julian Reed.

(Right) Cover Picture: Back.

The back cover is based on this image of a *Polystyichum setiferum* 'Plumoso-divisilobum Group' recently found by BPS member Peter Clare in a lane in Kent.

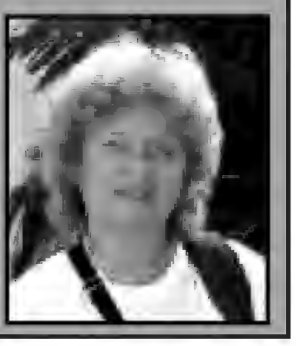
Photo: Julian Reed

Unless stated otherwise, photographs were supplied by the author of the articles in which they appear

HARDINESS AS A COMPONENT OF BOTH HORTICULTURAL SUCCESS AND WILD-PLANT RANGE-DETERMINATION IN PTERIDOPHYTA

Christopher N. Page
Geobiology and Environment
Camborne School of Mines,
University of Exeter, Cornwall, UK
e-mail:pteridо@hotmail.co.uk

Irina I. Gureyeva
Krylov Herbarium,
Tomsk State University, Siberia,
Russia
e-mail: gureyeva@yandex.ru



Hardiness in ferns is an important issue often regarded as of particular significance to horticulture. The hardiness of a species is also a critical component in the establishment of natural range distributions of species in the wild. This brief overview shows some of the links between these two aspects, and how in many ways those in one area can learn from the other. It also shows how complex a field such study can actually be, and how much yet we have to learn.

Fern hardiness - the issue

Hardiness, whether of horticultural plants or to its impact on wild ones, is a field which is always difficult to quantify in total, because it is a response to so many separate factors, most of which are largely 'unseen'. Some are also experienced not necessarily just at one moment, but over time.

The study of hardiness is, however, of immense importance in understanding the inter-related issues of the ecology of species conservation, wild plant ranges, and the use of ferns as terrestrial biomonitors of climate change. (eg. Page 1979-2006, Gureyeva 1990-2002, Page & McHaffie 1991, Murphy et al 2012). The facility to use ferns as biomonitors results from the combined high general ecological sensitivity of fern species to climatic subtleties, plus the innate great dispersal-capabilities shown by ferns as a whole, which enables them to appear rapidly, sometimes distantly, as environments change. Information gathered then feeds back into wider fields of fern ecology and fern conservation issues. The relative hardiness of different ferns is thus a topic important to both horticulture and science, on both a regional and a global basis.

Considering its significance, there is a remarkably scant fern literature basis for studies on fern hardiness. Instead much information resides in the accumulated experience and memories of those who have attempted to grow and maintain species, often from distant parts of the world, in cultivation across years and sometimes lifetimes. Such horticultural results often display varying and sometimes contrasting degrees of success, and at least allow certain comparisons to be cautiously drawn.

We have assembled here some relevant information, largely as a consequence of discussions developed with one of the authors (*CNP*) during a recent (October 2013) visit by a large contingent of BPS members to Cornwall. Our observations also including ones made by the other author (*IIG*) of wild fern-species survival in Siberia, under what must clearly be some of the most temperature-challenging climatic conditions for fern growth anywhere on this planet (Gureyeva 2001, 2002).

Multi-decadal hardiness monitor: *Dicksonia antarctica*. A planted 6-year old specimen, repositioned from self-set spores.
This species of tree-fern also now successfully self-sets by spores in appropriately sheltered habitats in West Cornwall. It is one of our best biomonitors for future climate change. Leaves naturally-fallen into the crown help to add extra winter-protection.

Local microsite monitor: *Woodwardia radicans* - this provenance from La Palma, Canary Islands, is thriving on banks adjacent to upwelling warm springwater. Photo taken 20th December 2013, when ground all around was covered with a white frost.

Life-cycle turnover monitor: *Polystichum polyblepharum* - a self-set specimen, now 4 years old, West Cornwall. One of the most successful self-setting introduced species.

Long-term averages and accumulated temperature influence

Fern hardiness is not always just the experience on the part of the plant at just one moment. Temperature influence on ferns can be both the existence of extremes and (especially often) the experience of sustained conditions over a long period of time. For example, survival by ferns of a temperature-low may well be possible for a species if average, or better-still, *accumulated* temperatures surround a particular cold-extreme, allowing recovery to be successfully-supported, compared with other sites in which these favourable conditions do not apply. For example, for the ferns of Britain and Ireland, one of the authors was able to construct such accumulated temperature maps with the support of both the British and Irish Meteorological Offices (Page 1997). Additionally, much wider and more generalised 'hardiness zones' for horticultural plants have also been mapped for Europe and North America. These are broad sets of areas into which specific and generic hardiness can be expected to occur, and embrace relatively average climatic characteristics across large continental areas (utilised, for example, in the European Garden Flora).

From such databases, it is clear that in sites in Atlantic Europe, at low altitude, such temperature tolerances are far from extreme, and winter accumulated temperatures are at their highest within extreme western and south-western fringes of the continent. Taking West Cornwall as an extreme oceanic example, while winter air temperatures themselves may occasionally drop to zero or beyond (especially at times when high pressure combined with drift of cold continental air from the east temporarily dominates atmospheric circulation patterns), these periods are seldom long-sustained, and the sea water itself, which averages about 14°C in summer, seldom drops below 11°C, and very rarely below 9°C throughout winter. The dynamics of

the movement of seawater in the form of the Gulf Stream ensures that coastal regions of western Europe are more or less continuously refreshed with warmth from the sea, and carried inland by south-westerly air movements, warm winter temperatures are more or less permanently sustained. Here, the great bulk and enormous thermal capacity of this adjacent seawater ensures that the mildest winter temperatures typically occur closest to the coast. There is a more or less constant atmospheric transfer of some of this warmth to terrestrial habitats nearby, allowing, for example, the tree fern *Dicksonia antarctica* (Fig.1) to be widely successfully cultivated in West Cornwall, even up to altitudes of c. 100 m. Nearer to these coasts, provided that they are relatively salt-tolerant, various fern species can utilise this sustained winter warmth, including, for example, *Adiantum capillus-veneris,* locally abundant is some sites along the Cornish coast; also *Asplenium marinum* is locally common despite not being frost-hardy, being easily killed outright by winter frost if cultivated even a few km inland. Other species, such as *Isoetes hysterix* and *Ophioglossum lusitanicum*, make most of their annual growth near to the sea, on the Lizard Peninsula and the Isles of Scilly respectively, each capitalising on the accumulated temperatures during the winter months of November to March (Murphy *et al* 2012).

Dryopteris sieboldii - 6-year-old planted specimens (in a group of 10), now spore producing, but not yet showing evidence of self-setting, regarded therefore as 'waiting in the wings'.

Athyrium distentifolium Tausch. ex Opiz in the sub-alpine coenosis on the Kuznetsk Altau ridge, Siberia.

Matteuccia struthiopteris (L). Tod. predominantes in the *Pinus sylvestris* forest in the Altai, Siberia.

Asplenium septentrionale (L.) Hoffm. on mossy rocks in the Altai, Siberia

Additional altitudinal, topographic, and local microclimatic influences

Winter temperature minima, as well as total durations of winter cold, clearly vary locally not only with location, but also with altitude. Temperatures fall with altitudinal increase (the 'lapse rate'), and climatic differences can also occur, for example, between windward and leeward aspects of topographic undulations. Horticulturalists will be especially familiar with the occurrence of 'frost hollows' in landscape settings, where heavy cold winter air can accumulate and persist longer than in surrounding areas, thus forming pockets where tender plants may easily fail.

By contrast, some fern species (in Siberia, for example, especially *Athyrium filix-femina* on mountains) prefer slight and concave slopes of various aspects and flat watersheds in the lower and middle parts of the mountain-forest zone. These provide sites of enhanced moisture regimes, and can also be snow-pockets in winter. There are also other important indirect effects in Siberia of climate associated with either presence or absence of forests, with the detailed topographic structure of mountains and their aspects, and with the micro-topography of the surfaces surrounding the niches in which ferns succeed, all modifying overall climate and having considerable further modifying effects on local fern survival. Siberia also demonstrates that rocks especially can provide niches of high local shelter, and can, on south-facing slopes, also warm appreciably, if exposed to winter sunshine (see below). However, under extremes of winter temperature, cold-desiccation factors can become also a strong component of fern survival potentials, and moderation of such winter-desiccation, as well as protection from the greatest severities of absolute winter temperatures, can be effects of covering with a well-sustained winter snow blanket.

Graphic examples of the influence of winter-warming resulting in species loss from alpine habitats have been vividly illustrated in Scotland. Here, Heather McHaffie has demonstrated, by sequences of site-matched repeat photographs, that *Athyrium distentifolium* sporophyte persistence is related to the amount of winter protection from frosts which the plants gain by being covered in a regular thick winter-snow blanket. Ironically, it is with climate-warming, and consequent loss of this protective snow-blanket, that plants become directly exposed to more severe cold penetration through winter conditions of which low-extremes these ferns are then unable to tolerate (McHaffie 2006, 2009).

Absolute minimum temperature dominance – the Siberian experience

In contrast to Atlantic Europe, climatic conditions deteriorate in terms of minimum winter temperatures experienced as we move inland, especially into more continental interior conditions of the Eurasian landmass, and reach an extreme of winter coldness across Siberia. Across these regions, winter accumulated temperatures are minimal, and fern hardiness is increasingly influenced by absolute minimum temperatures experienced. In Siberia, typical experience is that winter temperature minima frequently drop to below -20°C, and often -30°C (sometimes to -40°C) for prolonged periods of winter months (usually from the end of October to the end of March). Conditions fluctuate in different years. Vegetation can resume growth at the earliest at the beginning of May, but usually not until the end of May or the beginning of June, when the average daily temperature rises above zero. The annual growth-cycle for many species is thus compressed into growing-seasons of a few short summer months, from June to September, or shorter. Interestingly, the diversity of pteridophyte species does not decline, and some individual species, including many of *Equisetum*, and some each of the genera *Dryopteris*, *Polystichum*,

Athyrium and *Gymnocarpium* remain species-identical with western Europe, while different species of *Asplenium*, *Polypodium* and *Woodsia* appear even in continental interior conditions of Siberia.

Gymnocarpium continentale (Petr.) Pojark amongst stones in the Altai, Siberia

Surprisingly, Siberian ferns probably seldom experience such severe cold extremes as overall temperatures would suggest. Large forest ferns such as *Dryopteis filix-mas* (L.) Schott, *D. carthusiana* (Vill.) H.P. Fuchs, *D. expansa* (C. Presl) Fraser-Jenkins & Jermy, *Athyrium filix-femina* (L.) Roth, *Matteuccia struthiopteris* (L.) Tod. (all with deciduous fronds), predominate in the herbal cover mainly only in forest interior habitats; in these sites they are regularly covered by a thick blanket (more than 1–2 metre) of snow for the duration of the winter. Under these conditions, and insulated by the snow-blanket, temperatures are suggested to not drop below 0°C at soil level and around the nearby rhizome area, and within the soil itself they remain even higher. For example, in the mountain forests of *Abies sibirica* and *Populus tremula* (called chernevaya taiga) when the air temperature above can drop to betwen -20°C to -30°C, soil temperatures beneath the snow blanket have been measured to remain as high as +0.9°C to +6.7°C (Gureyeva, 1990, 1996, 2001). Further, species of smaller ferns such as *Asplenium altajense* (Kom.) Grubov, *A. sajanense* Gudoschn. et Krasnob., *A. trichomanes* L., *A. septentionale* (L.) Hoffm., *Camptosorus sibiricus* Rupr., *Cryptogramma stelleri* (S.G. Gmel.) Prantl, *Cystopteris fragilis* (L.) Bernh. and *C. altajensis* Gureyeva grow on rocks that are themselves usually situated within forests and are themselves similarly covered by a regular winter snow-blanket. Rhizomes of some rocky ferns, for example, *Lepisorus albertii* (Regel) Ching, *Polypodium sibiricum* Sipl. and *P. vulgare* L., are additionally protected by a mossy 'pillow'. A few species, however, occur on rocks which extend outside forests. These include especially several *Woodsia* species and *Aleuritopteris argentea* (S.G. Gmel.) Fée. These species retreat mostly to deeper clefts, often amongst large stones, between which there is an appreciable depth of snow accumulation in winter.

At higher altitude, ferns such as *Athyrium distentifolium* Tausch ex Opiz and *Polystichum lonchitis* (L.) Roth reach the subalpine zone, and, at more northerly latitudes, other rock-inhabiting ferns reach arctic zones in high latitudes. These include *Dryopteris fragrans* (L.) Schott, *Cystopteris dickieana* R. Sim *Woodsia glabella* R. Br. and *Asplenium viride* Huds. Here these species grow especially in niches that are well protected from cold winds, and hence winter wind-chill factors, and tend also to be protected from frosts by the rocky surroundings. Some fern species such as *Woodsia ilvensis* s.l. and *Aleuritopteris argentea* grow on rocks on more open slopes, sometimes with southern exposure. Here they do not suffer so much from cold, but from dryness and heat in summer, when temeratures can rise to as much as +35°C. These species are adapted to such conditons through poikilohydrick fronds, which can loose water in summer and curl-up, returning to an open frond condition again once wet weather returns.

Diurnal temperature fluctuations of exposed rock surfaces

Intimately involved with the ability of some ferns to survive and endure winter cold can be the thermal (heat-holding) capacity of the rocks around them. All rocks have a large specific thermal capacity – which influences the amount of heat they can contain and the time for which this can be held. This is acquired from daily sunshine. Dark rocks warm fastest, and usually hard and fine-grained rocks (such as andesites and basalts amongst volcanics, but also slates, sedimentary mudstones and darker sandstones) have the largest thermal capacities, and thus the abilities to remain warmest for longest.

Camptosorus sibiricus Rupr. in a deep cleft in the Western Sayan mountains, Siberia.

In especially rocky but exposed sites, when cold nights in winter are followed by clear days, sunshine on such rock surfaces by day has a direct effect on warming the surface microenvironment around rock-inhabiting ferns, depending on aspect, and this may be a strong influence on their micro-topographic distribution. Such influences potentially apply to various *Asplenium* species and especially, for example, to *A. septentrionale*, for which most northerly stations in Britain are typically also south-facing ones. Measurements in Scotland on dark-coloured basaltic rock surfaces of southerly aspect have shown temperatures to rise from below zero to more than +4-5°C within a few hours of winter daybreak on sunny mornings. Such potential effects of rock for ferns are often overlooked, but may well be particularly significant for ferns not only growing in exposed sites at low altitude, but potentially too for ones high on mountains. There is very much to learn here, but perhaps small-statured *evergreen ferns* are in a position to take most advantage of such short-lived but warm-day opportunities, as a component of their success in apparently exposed environments.

Local geothermally-enhanced temperature support

Although this is an often overlooked factor, and is not necessarily an extensive one, enhancement of temperature minima can result from genuine subterranean geothermal heating, creating local enclaves of especially constant warmth. Such geothermal heating is especially a factor associated with areas of igneous intrusive rock emplacements (eg. of granites), which mark sites of deep underground heat sources.

In appropriate districts, warmth of such deep-seated geothermal activity can be carried to the surface by ascending groundwater movement. Where such groundwater emerges in the form of local springs, such thermally-influenced spring-water has the significance of being normally relatively constant in activity, while its great plant-value is particularly in terms of growing-season thermal-lengthening and frost-avoidance during winter months. The warmth is transmitted locally through moisture-enhanced air, creating enclaves especially suitable for ferns. In one such spring in Cornwall, one of the authors has made regular water-temperature measurement, finding the spring-water to emerge at a constant temperature of +12.5°C, irrespective of external air temperature, even in winter. Thus where the spring emerges is a small ravine-like enclave of locally enhanced positive temperature minima, plus a high constancy of conditions. In this site (in the garden of one of the authors), *Woodwardia radicans* experimentally planted, introduced (via bulbils) from La Palma, Canary Islands, has now been successfully grown and established through 17 years of winters. The *Woodwardia* here is thus now a thriving colony, with fronds over 2m in length, successfully reproducing through frond-tip bulbil-rooting.

Contrasting climatic reactions in co-associated sites

Often overlooked is the apparent enigma that contrasting climatic preferences can occur even between species growing naturally alongside one another. This is particularly vividly exemplified by species enjoying oceanic influences. These demonstrate that *different elements* of the same climate can influence the distribution *of co-associating species* that elsewhere have contrasting geographic ranges. For example, in sites such as Western Ireland, it is possible to find southerly species, such as *Adiantum capillus-veneris* closely associated with plants that are elsewhere regarded as alpines, including saxifrages and *Equisetum variegatum*. It is only in extreme oceanic sites, that each can occur together. In such sites 'southern' species are able to be present because they are essentially *escaping from cold winters*, while the adjacent 'alpine' species are also able to be present because they are equally *escaping from hot summers*. Oceanic conditions provide just the right 'blend' of conditions for each to find differing climatic opportunities for adjacent success. Indeed, in such sites, study of *Equisetum* in particular (Page & Barker 1985) has raised a theory that it is especially under such oceanic conditions that inter-specific hybridisation opportunities in pteridophytes widen, because it is in such environments that species of contrasting and divergent climatic optima are most likely to meet.

A further apparent enigma of climate in relation to plants is that, on a global scale, the rate at which temperatures fall with increasing height significantly varies not just with increase in absolute altitude, but also additionally with the *actual mass of the land or of the mountain* involved. This is the seldom-appreciated 'mountain-mass' effect, which personal experience shows significantly influences at least pteridophyte and conifer ecological presence and ranges globally, and seems to demonstrate its greatest significance especially towards the tropics. This means that altitudinal vegetation zones tend to be telescoped downwards on smaller mountains, while the opposite trend is true on larger mountain masses. Thus 'alpine' habitats, often containing pteridophytes, occur lower on isolated mountains whose masses are smaller, such as on small island areas, and occur higher on mountains with larger masses, such as main mountain ranges. Notable pteridophyte examples of the former are on many small tropical islands, and of the latter are in the particularly high-montane 'alpine' habitats of areas near to the tropics, such as on New Guinea and in the Andes of South America. Indeed, the latter areas are especially extreme. In these, under conditions of strong heat-loss through clear-skies on a virtually nightly-basis throughout the year (hence their significance especially in tropical latitudes), some extreme conditions of pteridophte hardiness have evolved. This can result, significantly, in genera on different continents closely matching one another in adaptations and appearance, such as the fern genus *Papuapteris* at 'tropical-alpine' altitudes in New Guinea and the unrelated fern genus *Jamesonia* at similar 'tropical-alpine' altitudes in the Andes of South America (Page 1979a). Each of these have unusually white hair- and scale-covered narrow upright 'woolly' fronds, minimising the incidence of exceptionally high UV by day and extreme cold by night. Further, in at least the Andes, many species of *Lycopodium* are also extremely cold-hardy and grow extensively and diversely under such tropical alpine environments (Ben Øllgard, personal communication), and may be similarly protected by numerous white, bristle-like hairs.

Requirements and opportunity for 'hardening-off' of individual plants, and age-related factors

Perhaps often overlooked in the field, but probably much more observed by horticulturalists, is that processes of 'hardening-off' can also be immensely important in the survival of individuals against subsequent winter cold. 'Hardening-off' is a consequence of the sequences of events to which a plant has been previously-exposed, before the maximum of winter cold is experienced. This means that individual plants can have had adequate time, or otherwise, to effectively 'close-down' their growing processes gradually, allowing previously soft-growth to harden in structure, before exposure to winter chill. Such 'hardening-off' results in a plant achieving gradual cessation of fresh growth towards the end of the growing season as a result of such relatively gradual temperature diminishment.

Such 'hardening-off' can sometimes achieve winter-survival of unusual species in more eastern, more northern and more continental-interior climates. By contrast, in oceanic climates, much more winter-damage can sometimes be caused even by conditions of lesser cold to plants which have experienced only previously mild winter conditions, before a sudden cold-snap arrives - for under normally mild conditions, they are effectively still growing. Somewhat similarly, late spring frosts can severely damage plants if previous early-spring warm-spells have been long enough to already trigger new soft growth to begin.

Further factors of actual *size* of individuals, especially

A pokilohydric fern: *Aleuritopteris argentea* (S.G.Gmel.) Fee amongst dry rock in the Altai, Siberia

as achieved by age, can also be significant in cold-survival process, when larger individual plants may tolerate short-term cold penetration better than can smaller individuals. For example, in Cornwall, introduced tree ferns can provide particular cases of such mature-plant survival, when smaller sporophytes with less bulk and closer proximity to colder ground-layer air, are more rapidly damaged. As a consequence, large, old *Dicksonia antarctica*, originally introduced to Cornwall from the Blue Mountains of Australia, have survived every winter since they were planted (1820-1850), and thus provide important long-term fern biomonitors of particular constancy of local temperature conditions.

Innate fern provenance influences on hardiness

We often tend to think that any species must be the same wherever it may occur across its range. However, genetic diversity tends to ensure that the actualities of the situation are often far from this, and in ferns, with their advantages of allopolyploidy, genetic variation amongst individuals may be great. Further, it was rightly pointed-out, long ago by Manton (1950), that because fern spores are *haploid* with respect to their parent sporophytes (except for relatively infrequent apogamous species), a consequence of spore dispersal by ferns is that if self-fertilisation is an outcome of distant establishment, as is often likely, then the resulting sporophyte plant would become *homozygous* for every allele carried by the spore. This is a factor unique amongst vascular plants to pteridophytes (because, by contrast, angiosperm and gymnosperm proagules (seeds) are always *diploid* with respect to their parents, and hence progeny have the potential normally to be immediately *heterozygous*). The pteridophyte situation therefore tends to help to generate diversity and to present this to the new environment. New selection pressures, perhaps in distant locations, will then be appropriately operative, and doubtless, in the case of natural poleward migration, more hardy new individuals will become rapidly selected. Such chance factors, occurring virtually continuously everywhere, then contribute to defining limits of overall wild species ranges, which are actually most often likely to develop to form complex genetic mosaics, which at most polewards peripheral extremes probably contain more genes for hardiness.

Winter pinewood (*Pinus sylvestris*) near Tomsk (Western Siberia)

Hardiness and life-cycle turnover

We know the range-distribution of wild fern species by our field observations made mostly on the occurrence of their large and generally long-lived, observable and identifiable sporophyte generation. But we must not forget that hardiness is also a feature that clearly influences every part of the fern life-cycle, including that of the short-lived gametophyte generation, as a small free-living prothallus (Dyer 1979). This too has to be hardy, and only if it is appropriately so in the site in which it finds itself, will a sporophyte plant actually appear. Spores themselves, so long as ungerminated, have extraordinary cold-endurance potentials (Page 1979b), but subsequent to germination plants are much more sensitive to many extremes. The fern prothallus, living for usually 1-2 months in spring, can, however, often be a '*cold-avoider*', thriving only mainly in the warmer months. Exceptions, however, also occur. For example, we have found gametophytes of some species (e.g. *Woodwardia radicans*, mentioned above), to actually take two years to produce their first sporophytes, and thus such prothalli need to survive through at least *one* winter. This itself may have profound implications on limiting the natural northward spread by spores of this species, which may happen only in exceptional years (Rumsey et al 2005). A somewhat similar situation may range-influence the southern *Trichomanes radicans*. But for this species (as with at least some other filmy-ferns) the opposite is true, for *Trichomanes* can apparently persist indefinitely as a gametophyte, within and even beyond the range of its known sporophytes sites, not necessarily making a sporophyte frequently or at all in some of the more peripheral of these, except, again, perhaps in exceptional years.

Somewhat similarly, for horticultural ferns, we tend to recognise apparent hardiness by survival of a sporophyte plant. Interest by one of the authors in Cornwall in horticultural plants is in trialling those which demonstrate the capabilities to not only survive as sporophytes, but also to show evidence of production of further generations of observable mature plants. Thus a species under trial is only considered to be fully hardy when such natural generational-continuity is achieved. For example, this has happened, for certainty, successfully for introduced *Dicksonia antarctica*, *Polystichum polyblepharum, Cyrtomium caryotidium, Pteris cretica,* and *Cystopteris diaphana* (if indeed introduced). By comparison, other species which hold their own as sporophytes, but have not successfully achieved new-generational establishment, are regarded as present but still 'waiting in the wings'. This includes virtually all other species of tree-ferns, and many small temperate woodland species. But situations could change in future with climate-change, and here such ferns will prove immensely important as sensitive biotic measures

Conclusions – complexities of inter-linkage of multiple factors

All aspects of hardiness of fern species summarised here are clearly vital components of a knowledge base important equally to horticultural and scientific fields. What is also important is that virtually all of the above categories, do not necessarily operate independently, but are inter-linked, adding greatly to the complexity of the actuality of the situation in the wild for fern species survival. All of these factors interact with one another to determine whether any particular genotype survives at that site or does not, and whether or not it can then succeed in further reproducing.

Thermal boundaries are just *one* main element of a multiplicity of other factors not included here, which also include many *edaphic* and *hydrological* aspects, and for pteridophytes especially even *daylength* ones, upon the whole of which are also lain both internal and external *biotic* ones, as well as ones possibly influencing success or otherwise of particular stages of the complex fern *life-cycle* dynamics.

Climatic conditions, and the adaptations of ferns to survive these, are thus clearly far from simple, and in actuality are a complex of multiple inter-linking mosaic of factors, of which extremes, averages, and regularities of conditions all form integrally important components. Hardiness is thus not a simple measure. We have very much still to learn. Understanding the complexity of these factors has strong potential significance in relation to assessing details and the further complexities of fern ranges, as potentially sensitive measures of future climate change.

Nomenclature information of some referred species

Cystopteris almaatensis Kotuch., Botanicheskie materialy gerbariya Instituta Botaniki Akademii nauk Kazakhskoi SSR [Notulae Systematicae ex Herbario Instituti Botanici Academiae Scientarum Kazachstanicae], 4:27 (1966).

Type: Zailiisky Alatau, Chimbulak, on the open places near stones and in in rock crevices in the belt of the fir forest, 17 VIII 1964, Yu. Kotukhov (Holotype – AA, Almaty, Kazakhstan).

C. altaiensis Gureyeva, Sistematicheskie zametki po materialam gerbariya imeni P.N. Krylova Tomskogo gosudarstvennogo universiteta [Systematic notes on the materials of P.N. Krylov Herbarium of Tomsk State University], 87: 5–7 (1885).

Type: «Altaisky krai, Turochaksky district, lower reaches of the river Bolshiye Chili, in the niches of the shadow rocks, near Teletskoye lake, 13 VII 1981, I. Gureyeva, V. Goncharova. (Holotype – TK, Tomsk, Russia).

Gymnocarpium continentale (V. Petrov) Pojark. Soobsheniya Tadzhikskogo filiala AN SSSR [Reports of Tajik branch of Academy of Science of USSR], 22: 10 (1950). – *G. jessoense* (Koidz.) Koidz. subsp. *parvulum* Sarvela, Annales Botanici Fennici, 15: 103–104 (1978). – *Dryopteris pulchella* (Salisb.) Hayek var. *continentalis* V. Petrov, Flora Yakutii [Flora of Yakutiya], 1: 15 (1930). – *D. continentalis* V. Petrov (proposed name), Flora Yakutii [Flora of Yakutiya], 1: 15 (1930); Fomin, Flora SSSR [Flora of the USSR], 1: 43 (1934).

Lectotypus (I. Gureyeva, 2010, Botanicheskiy zhurnal, 95(6): 855): Yakutskaya oblast, south part of Olekminsky district, basin of the Tungir river, Dzyagdachi river near Nikolsky mine, rocks near mount Kropachevsky, 11 station, 3 VII 1910, No. 479, coll. No 753, V. Sukachev, G. Poplavskaya (Lectotype – LE, Saint-Petersburg, Russia).

Rhizomatopteris montana (Lam.) A. Khokhr., Flora Magadanskoi Oblasti [Flora of the Magadan oblast]: 347 (1985). – *Cystopteris montana* (Lam.) Bernh. ex Desv. Neues J. Bot., 1(2): 26 (1806). – *Polypodium montanum* Lam. Fl. Franc. 1: 23 (1778).

Acknowledgements (Irina Gureyeva)

I am grateful to Dr Christopher N. Page (United Kingdom) for the constructive discussions, consultations and help in correction of English in this paper.

This work was supported by Tomsk State University Competitiveness Improvement Program and Russian Foundation for Basic Research (grant No. 13-04-01705).

Acknowledgements (Both Authors)

The authors wish to thank Dr Heather McHaffie for discussion and helpful comments.

References:

Dyer, A.F. (Ed.). 1979. The Experimental Biology of Ferns. London: Academic Press.

Gureyeva, I.I. 1990. Sporophyte ontogeny and age composition of thre *Dryopteris filix-mas* coenopopulations in the northern low-mountains of the Kuznetsk Alatau. Botainichesky Zhurnal [Botanical Journal], 75(5): 643–652. [in Russian]

Gureyeva, I.I. 1996. Ecology-demographic analysis of the *Dryopteris expansa* (*Aspidiaceae*) coenopopulations in the primary association of the Kuznetsk Alatau. Botanichesky Zhurnal [Botanical Journal], 81(8): 54–64. [in Russian]

Gureyeva, I.I. 2001. Homosporous Ferns of South Siberia. Taxonomy, Origin, Biomorphology, Population iology. State University Publishers, Tomsk. [in Russian]

Gureyeva I.I. 2002. Rare fern species of Russia and reasons for their rarity. Proceedings of the International Symposium, "Fern Flora of Worldwide: Threats and Responses", University of Surrey, Guildford, United Kingdom, 23-26 July, 2001. Fern Gazette 16(6, 7, 8). P. 319–323.

McHaffie, H.S. 2006. Alpine lady ferns: are they suffering with climate change ? *Pteridologist* 4: 162-164.

McHaffie, H.S. 2009. A visible response to climate change. *BSBI News* 111: 7-8.

Manton, I. 1950. *Problems of Cytology and Evolution in the Pteridophyta*. Cambridge: Cambridge University Press.

Murphy, R.J., Page, C.N., Parslow, R.J. & Bennallick, I.J. 2012. *Ferns , Clubmosses, Quillworts and Horsetails of Cornwall and the Isles of Scilly.* Truro, Cornwall: Environmental Records Centre for Cornwall and the Isles of Scilly.

Page, C.N. 1979a. The diversity of ferns – an ecological perspective. Pp 9-56 in Dyer, A.F. (Ed.). *The Experimental Biology of Ferns*. London: Academic Press.

Page, C.N. 1979b. Experimental aspects of fern ecology. Pp 551-589 in Dyer, A.F. (Ed.). *The Experimental Biology of Ferns*. London: Academic Press.

Page, C.N. 1988. *Ferns. Their Habitats in the Landscape of Britain and Ireland*. London: Collins New Naturalist.

Page, C.N. 1997. *The Ferns of Britain and Ireland.* 2nd edn. Cambridge, UK: Cambridge University Press.

Page, C.N. 2001. Ferns and alied plants. Pp 50-77 in Hawkesworth, D.L. (Ed.). *The Changing Wildlife of Great Britain and Ireland*. London: Taylor & Francis..

Page, C.N. 2002. *Ecological strategies in fern evolution: a neopteridological overview*. Review of Palaeobotany and Palynology 119: 1-33.

Page, C.N. 2006. Fern range determination in the Atlantic Arc by an environment of complex and interacting factors. Pp 59-64 in Leach, S.J., Page, C.N., Peytoureau, Y. & Sandford, M.N. (Eds.). *Botanical Links in the Atlantic Arc*. Camborne, Cornwall: BSBI & English Nature.

Page, C.N. & Barker, M.A. 1985. Ecology and geography of hybridisation in British and Irish horsetails. *Proceedings of the Royal Society of Edinburgh* 86: 265-272.

Page C.N. & McHaffie, H.S. 1991. Pteridophytes as indicators of landscape change in the British Isles in the last hundred years. Pp 25-40 in Camus, J. (Ed.). *The History of British Pteridology*. London: BPS.

Rumsey, F.J., Barrett, J.A., Gibby, M., Russell, S.J. & Vogel, J.C. 2005. Reproductive strategires and population structure in the endangered pteridophte Trichomanes speciosum (Hymenophyllaceae: Pteridphyta). Fern Gazette 17: 205-215.

The Fern Gazette is Evolving

Adrian Dyer and Bridget Laue

Review Editors, The Fern Gazette

e-mail: adrian@dyer.freeserve.co.uk, bridgetlaue@blueyonder.co.uk

You may have noticed recently that there have been changes to the Fern Gazette which are intended to broaden its appeal and increase the number of contributions. Perhaps the most conspicuous development has been the introduction of regular short reviews. These are intended to present a clear and concise review of research developments across any of a wide variety of topics relating to ferns, horsetails, clubmosses or the other vascular cryptogams, together with a comprehensive list of the relevant references. The intended readership of these articles is any interested fern enthusiast who wants to increase their understanding of the selected topic, or any researchers new to the specialised field or requiring an update who want an easily accessible introduction to the most recent literature. To write an account in such a way that is comprehensible to every interested amateur and at the same time useful for professional specialists is a challenge, but it is hoped that everyone who reads a review will find most of it interesting and informative. In this way we hope to encourage a wider readership for the Gazette.

In fast-developing areas, these reviews will cover recent progress only, but for neglected topics a longer period is surveyed. Initial contributions have been by invitation, but we are happy to consider offered reviews that fulfil the same objectives. In inviting authors, we have had two main intentions: to include a wide range of both broad and more specialised subjects, and to invite international authorities from as many different parts of the world as possible. While the taxonomic and floristic themes familiar to Fern Gazette readers will continue to be covered, any research topic which has ferns or lycophytes as its central subject will be eligible for a review, whether it is concerned with conservation or classification, development or demographics, gametophytes or genetics, phenology or physiology. Some more historical topics, like the development of ideas, illustration methods and investigative techniques, or the exploitation of ferns as a resource, might also be suitable for a review. While we are flexible with regard to the length of the review, in our invitations we have been keen to stress that they can be short reviews with limited scope, to avoid potential authors being discouraged by the prospect of having to compile a traditional extended review of a broad topic. The intention is to publish each review within 6 months of receipt of the final draft, and we hope that prompt publication is attractive to potential contributors.

Authors are invited to include some of their own unpublished work if they wish, provided that the review also fulfils its main purpose. We ask the authors to provide a photograph of themselves and a brief autobiography for publication at the end of the review, because we think that this is not only of interest but will in time provide a useful record of some of the leading international authorities in pteridology.

Each article is initially handled by the Review Editors (i.e., us) in consultation with the author(s). During this process, it is sent out for peer review, which is important for ensuring that high standards are maintained. Finally, each review is considered by Mary Gibby, the Fern Gazette's Editor-in-Chief, who may again consult with the authors before sending it on to the Production Editor, Andrew Leonard, for preparation for printing. After publication, authors are provided with a PDF version of their review, which they can distribute freely (the 21st century equivalent of reprints). Authors who are not already BPS members (or the first such author of a multi-author paper) are offered free membership for one year, in appreciation of their efforts and in the hope that they may subsequently renew their membership and perhaps encourage others to join.

Of course, the Fern Gazette has sporadically published reviews before, but now we are making a concerted effort to make these a regular feature, with the intention being to include one or two reviews in each part of the Gazette. Starting from January 2013, four reviews have appeared so far, and others are in the pipeline. We have been delighted with the very high standard of these articles, and have also found the topics fascinating. In case you have not seen them, here are brief summaries to whet your appetite.

The first to appear was by Ana Ibars and Elena Estrelles, both based at the Botanical Garden of the University of Valencia. Their review is a survey highlighting the current conservation status of Pteridophytes and discussing management methods for conservation (Ibars & Estrelles 2012). One practical example they describe is the use of natural soil spore banks in the recovery of a lost population of *Marsileaquadrifolia* L. (Fig. 1).

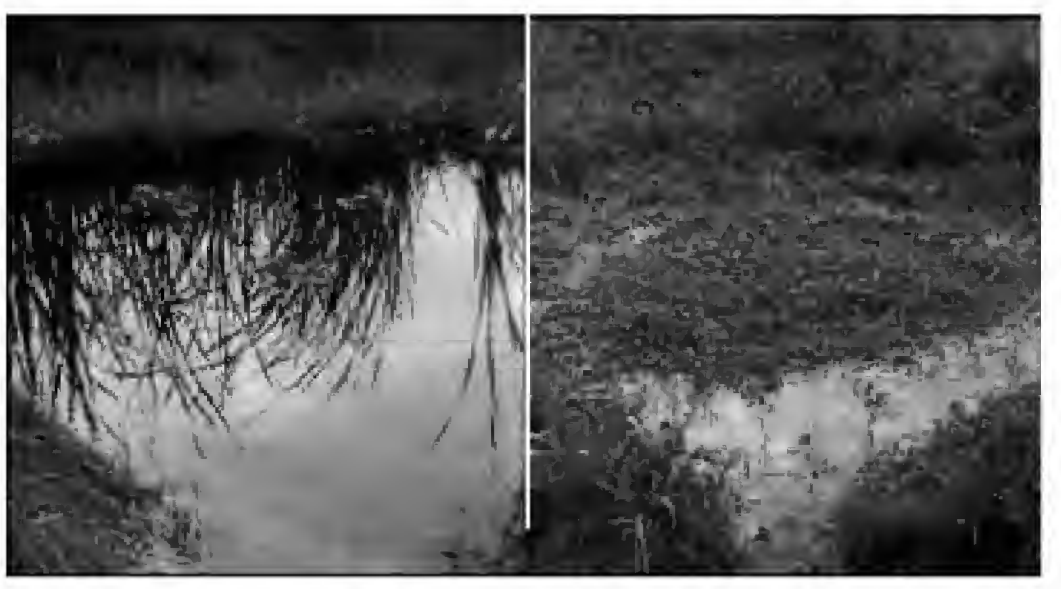


Fig. 1. An example of fern conservation work: recovery of *Marsilea quadrifolia* L. in the Natural Park of the Ebro Delta, Catalonia, Spain. Reintroduction of cultivated plants (left), and coverage of the plants five months later (right). (Taken from Ibars & Estrelles 2012).

The second review was written by Masamitsu Wada, from the University of Tokyo, Japan. His paper describes recent studies on the effect of light on the behaviour and development of fern gametophytes (Wada 2012). He emphasises that the simple structure of gametophytes makes them a useful system for studying phenomena

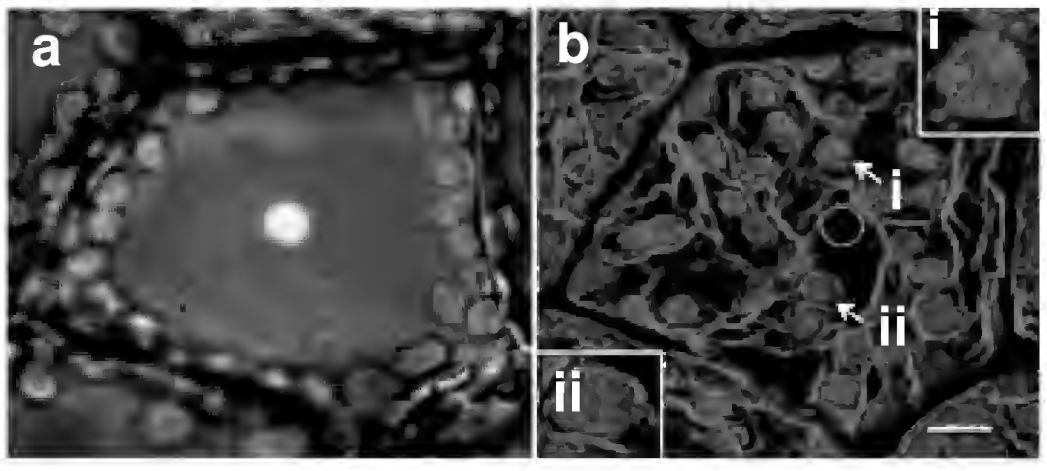


Fig. 2. Chloroplast migration in prothallial cells. (a) In the dark, the chloroplasts are located at the periphery, just inside the cell wall (appearing as light ovals). (b) After irradiation with a microbeam, the chloroplasts (showing red here) have migrated towards the irradiated area (the circle) in the centre of the cell, using the actin filaments (in green). (i) and (ii) are enlarged insets of the two chloroplasts indicated by the arrows. The scale bar (bottom right) is 0.01 mm. (Taken from Wada 2013).

common to ferns and seed plants, but which are difficult to investigate in the latter. For example, prothallial cells have been used to demonstrate the migration of chloroplasts in response to light (Fig. 2).

Another review, contributed by Ryoko Imaichi from Japan Women's University, in Tokyo, also focuses on gametophytes. She describes a new classification of the types of gametophyte development among homosporous ferns (Imaichi 2013). New methods of long-term observation have allowed the description of five basic types: Lygodium-type, Elaphoglossum-type, Anemia-type, Colysis-type and Vittaria-type. These are considered in relation to fern taxonomy and gametophyte ecology.

The most recent article is co-authored by Klaus Mehltreter of the Instituto de Ecologia in Xalapa, Mexico and Joanne Sharpe at Sharplex Services, Maine, USA. This examines leaf lifespan, making the point that this is a fundamental component of the evolutionary fitness of ferns (Mehltreter & Sharpe 2013). They include comparisons among temperate and tropical ferns, monomorphic and dimorphic species, and fertile and sterile fronds, to draw conclusions about the possible ecological significance of differences in leaf lifespan.

Six more reviews have been commissioned to appear over the next two years following invitations from the Review Editors, and another (unsolicited) has been submitted.We are continuing to approach more authors and we welcome any suggestions of suitable topics and/or potential authors. We encourage any potential author who has an idea for a review to approach the editors with a brief outline for consideration. In due course we would like to have illustrations in colour – those shown here were published in black and white in the Gazette; we think colour enhances the information content of the figures and would also make the Gazette more attractive to readers and contributors.

Finally, it is also worth noting that Mary Gibby has assembled a new Editorial Board for the Fern Gazette. This currently comprises an international panel of seven experts in a variety of specialisations, who will regularly serve as reviewers of submitted manuscripts, and who we hope will actively encourage colleagues to offer papers. The Gazette first appeared, as the British Fern Gazette, in 1909. Now well into its second century of publication, we hope that the developments reported here will help to prolong its lifespan, ensuring that it maintains its position as a respected source of pteridological knowledge, but also that it contains interesting reading matter for most BPS members.

References:

Ibars, A.M. & Estrelles, E. (2012) Recent developments in *ex situ* and *in situ* conservation of ferns. *The Fern Gazette* 19 (3), 67-86.

Imaichi, R. (2013) A new classification of the gametophyte development of homosporous ferns, focusing on meristem behaviour. *The Fern Gazette* 19 (5), 141-156.

Mehltreter, K. & Sharpe, J.M. (2013) Causes and consequences of the variability of leaf lifespan of ferns. *The Fern Gazette* 19 (6), 193-202.

Wada, M. (2013) Recent advances in the understanding of fern responses to light. *The Fern Gazette* 19 (4), 97-115.

Put it in your pipe and smoke it!

This unusual box decorated with ferns designs is an example of Mauchline ware. Bought at auction, by BPS member Robert Crawford last year, it measures about 15" by 10" by 8". The front opens to reveal a rack designed to hold pipes. Can you imagine the early members of the BPS being proud owners of such a fashionable item?

For further details of this type of decoration please see Jennifer Ide's articles in previous copies of the Pteridologist:-
2009 *Mauchline Fern Ware* pp 74-78 and 2012 *Mauchline Fern Ware Furniture* pp 382-385


Front


Back


Top

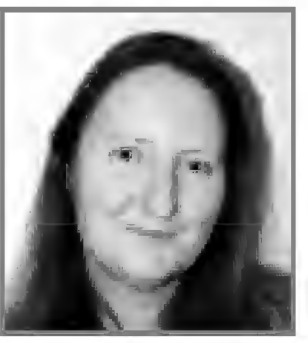

Right


Left

photos: Linda Greening

Raising Ferns From Spores Using Plastic Milk Bottles.

Fiona Lanyon



Fiona and her husband John own a private historic 5½ acre Cornish valley garden, home to many unusual plants including a wide variety of ferns.

Young Beginnings

My first attempt at raising ferns from spores was as a young teenager when I had a small patch of my own in my parent's garden. It was under an old greengage tree and as it was fairly shady I bought some ferns to plant and have been hooked on them ever since. I had a small fish tank in which I had originally kept stick insects but then put to a much better use- raising ferns! I sowed spores in flower pots and put them in the tank with a sheet of glass on top to keep in the moisture. I had limited success but enough to keep up my interest.

In later years I progressed to using catering sized ice-cream containers in which I cut a hole in the bottom of one corner for drainage. These worked extremely well as they kept moist for a long time allowing the prothalli and young fronds to develop without the need for additional watering.

Some experimentation

After a move to a much larger garden, I was keen to grow a lot more ferns. After using up my supply of ice-cream tubs, I started looking for an alternative. My first idea was to buy some cheap plastic food storage containers that I had found, but these had opaque lids and did not seem to let enough light in. I then decided to recycle pots I used in the home such as yogurt pots and cottage cheese pots. These however, proved to be of no use as they did not respond well to my usual method of sterilization, pouring on boiling water, as they just melted out of shape.

After much experimentation with different containers, I hit upon what I find is the perfect propagation container, the humble plastic milk bottle. We get through a lot of milk with a young family and I am pleased to have found a good use for my ready supply of plastic bottles.

My milk bottle propagators let in the perfect amount of light, can be sterilized with boiling water, do not take up too much room and being rectangular they fit together nicely whilst growing. The best thing about the containers is that when it comes time to wean the sporelings out of their humid little microclimate into the big wide world, the milk bottle propagators make this very easy without any risk of the sporelings shriveling up in horror (more about this later).

Collecting spores

We have a good collection of unusual ferns in our garden and after several losses with the last few cold winters, one of the things I am trying to do is to propagate all of the ferns we have already as well as introducing new ones. To obtain a good amount of spores, the fern spores should be collected when they are at the right stage ie. just before the sporangia open to release their spores. If they are immature they will not be ready to drop and if over mature, most of the spores will have already been shed.

Pick a small section of the frond on a dry day. Place in a piece of folded up white paper or envelope (fold up the bottom or spores will escape out of the corners) and leave for a few days. Once the spores have shed they can be separated from any debris by holding the paper horizontally, tipping slightly and gently tapping. The spores remain together towards the top while any debris slides downwards and off the bottom edge of the paper.

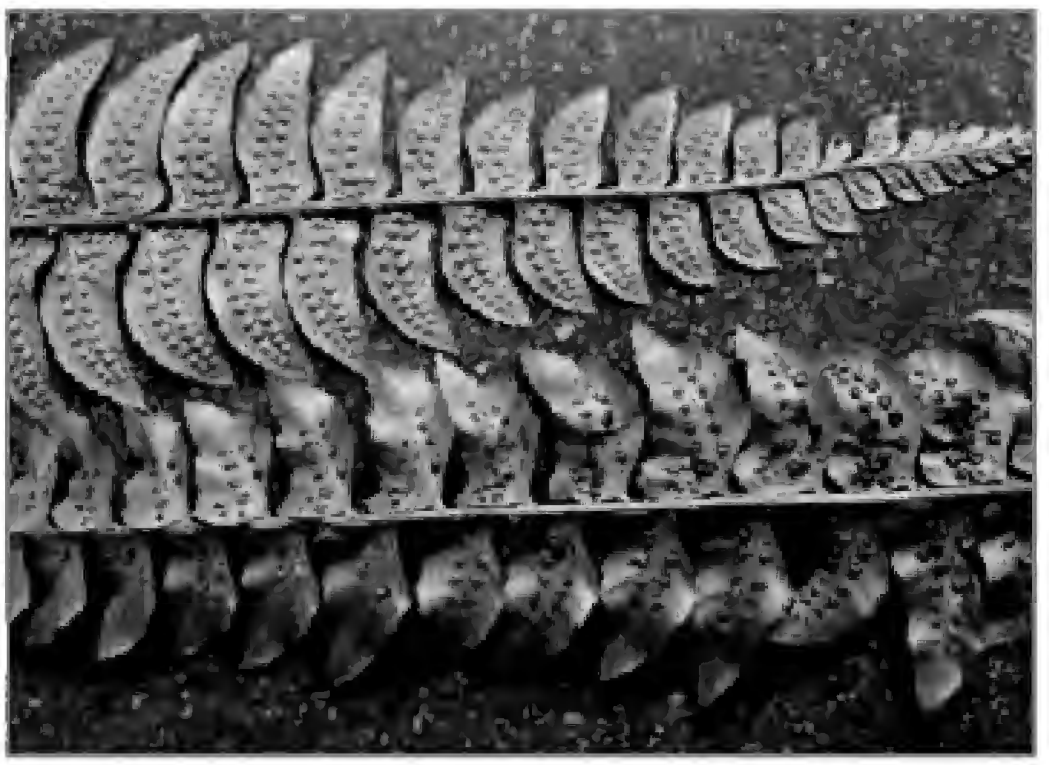


Fig. 1. *Polystichum nepalense*. Top frond with immature spores. Bottom frond, spores just right for collection.

Fig. 2.*Arachniodes* sp.- spores over mature

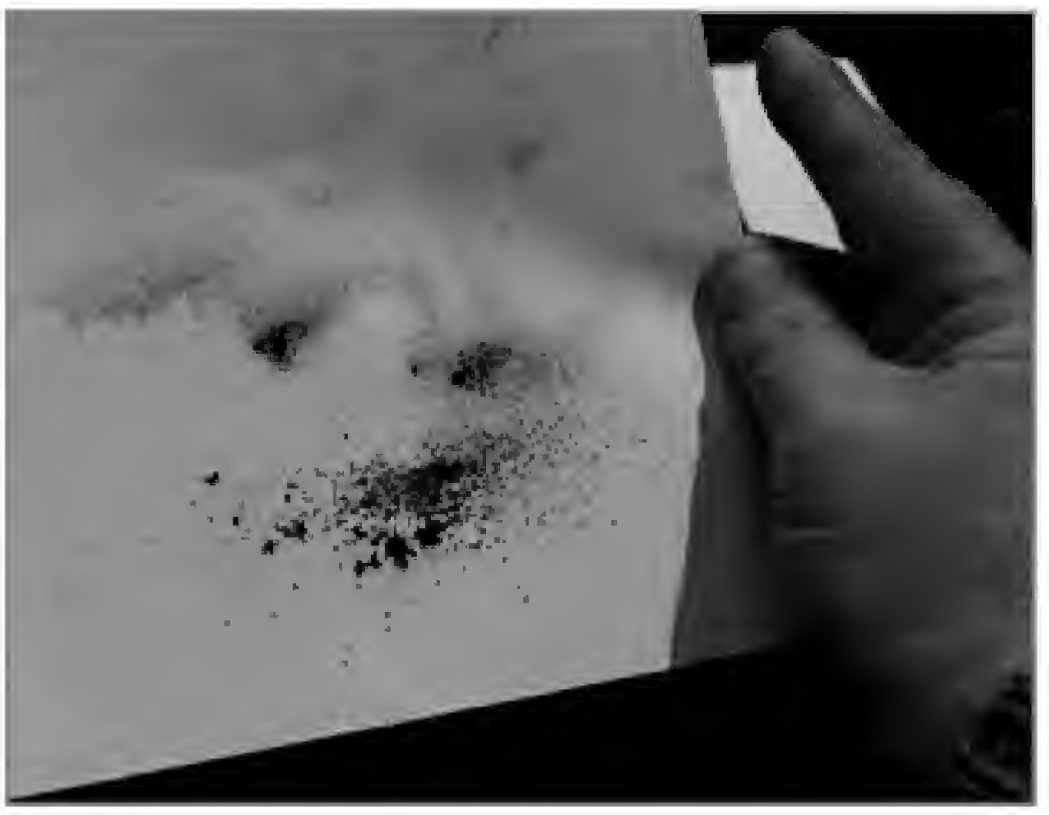


Fig. 3. Separating spores by gently tapping the paper. The debris can be seen sliding downwards.

Fig. 4. Making the propagators.
Cutting the base from the first bottle.

Fig. 5. Making the propagators.
Drainage holes cut and slits cut in the other bottle base.

Preparing the milk bottle propagators

First I cut the bottoms off two well washed 4pt milk bottles. Then I cut two small holes in two opposite bottom corners about 1cm in diameter, for drainage. Four slits are then cut in the sides of the other bottle base. This enables this piece to slide over the other to form a sealed unit which will keep out airborne contamination. This is very important when sowing spores. If the holes are too small the compost will stay too wet but if they are too big the compost will dry out before the prothalli develop. Ideally they will not need watering until the young sporelings have developed.

After preparing several propagators in the same way, I half fill them with a mixture of ⅔ multipurpose compost and ⅓ John Innes. The John Innes is necessary as the ferns will be in there for a long time. Then the lid and compost needs sterilizing by pouring over boiling water, making sure the compost is thoroughly soaked so the container will not need watering again before the young sporelings develop. The lid is then placed on top immediately to prevent any airborne contamination. The lid of the mini propagator keeps the surface of the compost free of contamination whilst the holes in the base allow sufficient drainage but cannot allow the surface of the compost to become contaminated as the compost provides a barrier across the holes. Great care must be taken as the containers are very hot and hold their heat for quite a while. The containers must then be left to cool down completely before sowing the spores.

Sowing and growing

Small quantities of spores can be sown directly from their envelope as this reduces the likelihood of contamination. If I have a large quantity of spores, I dip the tip of a clean knife into the spores and gently tap it over the compost to allow the spores to scatter evenly. It is important not to sow the spores too thickly as the prothalli will not have room to develop fully. It is also important not to cross contaminate with other fern spores by sowing each type in a different place or allowing plenty of time for any spores in the air to settle before sowing the next ones.

The lid is replaced immediately and the mini propagators are labeled using a permanent marker pen and placed on a bottom shelf in the glass house, towards the front, ensuring they get plenty of light but not direct sunlight or they will get too hot and dry out too quickly. A light north facing windowsill would also be good. Tropical species will need more warmth and light than temperate ones so will need positioning accordingly. I also move mine around according to the time of year ensuring the optimum conditions of warmth, light and moisture.

Fig. 6. Sowing with a knife.

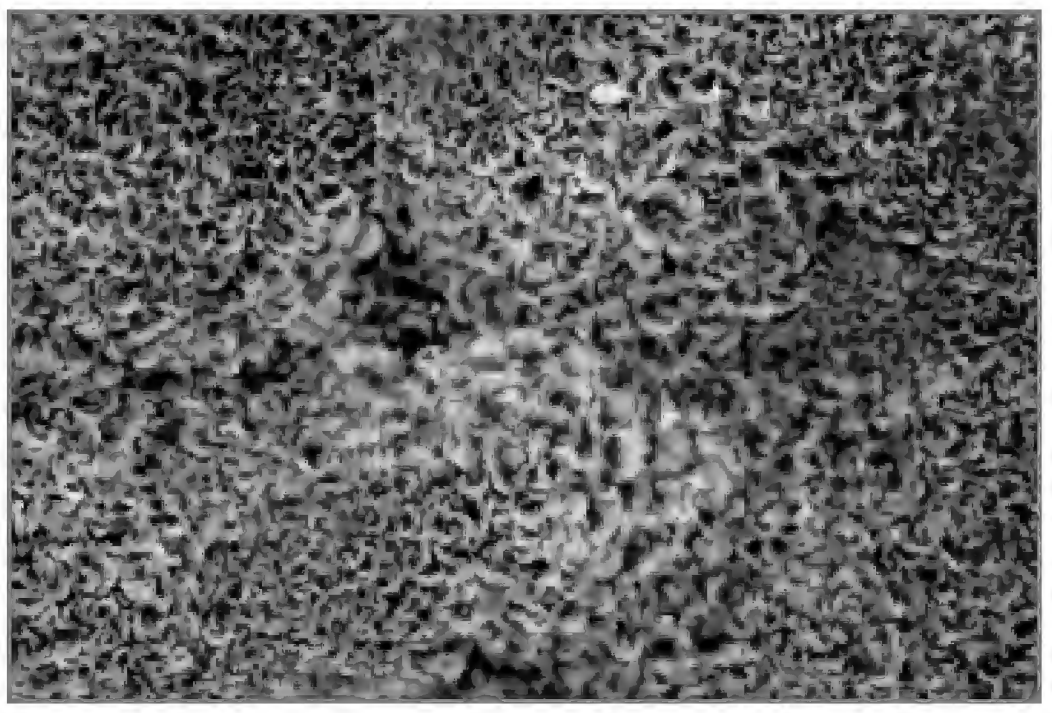


Fig. 7. Prothalli are too crowded.

Fig. 8. Prothalli with room for development.

Raising Ferns From Spores Using Plastic Milk Bottles.

After a few weeks to a few months, depending on when they are sown, where they are kept and the species, an algal like bloom will appear on the surface of the compost, after which the developing prothalli will be seen. After a further period of time the first fronds will appear.

Fig. 9. Mini milk bottle propagators under the glasshouse bench.

Once a good quantity of fronds are showing, then it is time to 'wean' them. If the lid is removed and the tender new fern fronds are exposed straight away to the elements, they will shrivel up and die. The best thing is to acclimatize them to the outside air over a period of a few days.

Fig. 10. First fronds appear.

This is another very useful aspect of these propagators as when it is time to acclimatize them to the outside air, I simply turn the lid on its side and slip it back over, allowing a gap to let a little air in. I leave it like this for a day or two then gradually slide the lid further off the base over the next few days, exposing the new sporelings gradually rather than suddenly to the outside environment as they have been cosseted inside the propagator for a while. Once fully acclimatized, the young sporelings can be fed with a half strength liquid feed.

Next I prick out tiny clumps(not individual plants unless they are growing very sparsely, as it disturbs the roots too much) into either small 7cm pots or if I have a large quantity, into a nursery frame situated in a shady spot in the garden. It is a good idea to cover the pricked out clumps for a few days until they settle in, to prevent them from drying out. My frame has a plastic cover which I put over for a few days. It also has a shade net cover for hot summer days. The ferns are then left to grow on until I am ready to pot them up individually or plant into a lazy bed before planting out in the garden once they have developed a good root system.

Acclimatizing young *Pteris wallichiana* sporelings

Fig. 11. *Pteris wallichiana* sporelings ready for acclimatizing.

Fig. 12.The lid removed , turned and slid sideways onto the base.

Fig. 13.The lid slid further back to help the acclimatization

Fig. 14.*Pteris wallichiana* sporelings fully acclimatized.

Raising Ferns From Spores Using Plastic Milk Bottles.

Conclusion

After trying various ways of sowing, the milk bottle mini propagators are by far my most preferred way of sowing spores and I shall certainly use this method in the future. The propagators can be cleaned and sterilized for use over and over again and I have had some very successful results with them. ❒

Fig. 15. Growing the clumps of sporelings on in the frame

Fig. 16. *Onychium japonicum* from BPS spore exchange 2012 , planted out and photographed September 2013

A role for instant porridge in pteridoculture.

Roger Horton

145 St Bede's Crescent, Cambridge CB1 3UA

e-mail rogerhorton@zoho.com

A curtailed camping expedition left me with the makings of several quick breakfasts in the form of instant porridge, namely Scott's 'So-Easy creamy porage oats'©, (other brands also available; and 'Yes' the people at Scott's really do spell it that way). These consist of the porridge mix contained in a white plastic pot with a thin card cladding, a foil seal and a clear lid. Once the porridge is consumed and the foil and card have been removed, what remains is an ideal planting pot. Although the intact product is described as 'not suitable for microwaving' the empty pots half filled with moist compost and with lids in place appear resistant to several minutes of microwave heating on medium power for sterilisation. The lids clip in place well enough to retain most moisture but not so tight as to be a complete seal, and are clear enough to allow superficial examination. The white plastic of the pot is well suited to labelling and the base surprisingly sturdy should there be a need to drill drainage holes.

The illustration shows an unknown young fern, found as a contaminant in a house plant pot, which has now out-grown its lid, plus pots containing *Asplenium adiantum-nigrum* gametophytes grown from spores, *Dryopteris erythrosora* transplanted sporelings, and the original product.
The spurtle* doubles as a handy dibber.

* A spurtle is a Scots kitchen tool, dating from at least the fifteenth century. It is used specifically for stirring porridge and soups. Ed

The Ferns of Antigua and Barbuda: A Case of Resurgence and Resilience

Kevel C. Lindsay
Island Resources Foundation
24 Rogers Avenue, Brooklyn, NY
e-mail: Kcl927@yahoo.com

My passion for wild ferns goes back to my early childhood on a farm on the island of Antigua. I spent many days in the wild open pastures and woodlands day-dreaming about such primitive places while I explored the *Nephrolepis* fern groves, hoping that the land before me would suddenly be transformed into a hot humid and wild jungle like those I often read about in books or saw on television.

In later years, as a forester with the Ministry of Agriculture (this was in the early 1990s), I discovered that the islands had relatively few fern species when compared to the wetter and more volcanic neighbouring islands such as St. Kitts; this disappointed me. It seemed that my dream of Antigua blossoming into a verdant primeval jungle with giant tree ferns was even more fanciful than I had imagined as a child.

Out of this disappointment grew a greater urgency to know about my islands' ferns because I was convinced that there were many more species than had been previously reported. In 2008, I began a study of the ferns of the islands of Antigua, Barbuda, and Redonda in attempt to determine the number of species, their distributions and habitats as well as their conservation status. During my research, I have learned that the fern species here are remarkably resilient, despite several centuries of deforestation and continued loss of habitats in some areas of all three islands, as well as the increasing impacts of global climate change. In fact, Antigua is seeing an increase in the number of ferns species, and this upsurge in numbers is likely due to an increase in moist forest cover in some parts of the hills of the volcanic south of the that island.

Before we look at the ferns, let me give you a brief overview of the tropical island setting.

The country of Antigua and Barbuda is a tripartite state, consisting of three islands, namely: Antigua (280 km^2), Barbuda (161 km^2) and Redonda (2.6 km^2). It is located 402 km southeast of the United States territory of Puerto Rico. The state is part of the Lesser Antillean grouping commonly referred to as the Leeward Islands. The capital of the country is St. John's, located on the shore of a deep harbour on the northwestern coast of Antigua. The island has a total population of over 81,000 (2011 Census), with an average population density of about 360 people/km^2. Barbuda has just one settlement, Codrington, and a population of about 1,400 people. Until November 1981, these islands were a part of the colonial West Indian territories of Great Britain.

When A. Alston and Harold Box wrote the *Pteridophyta of Antigua* in 1935—for decades the only compendium of the island's ferns—the landscape was dominated by large tracts of sugar cane fields. Even 26 years later, much of the island was intensively cultivated, as shown in the image in Fig.1 taken in 1961 (Antigua looking toward the northeast). Alston was a British botanist and naturalist of considerable talent, and was quite familiar with the flora and landscapes of many of the West Indian islands. Box was at the time, the Government Entomologist at the Antigua Sugar Factory.

Fig. 1. Aerial view of northeast Antigua showing mosaic of extensive cane fields. Photo taken by botanist Walter H. Hodge, circa 1960s. Source Island Resources Foundation Walter H. Hodge collection.

Along with his official role, he also spent a great deal of his time exploring the island, recording many of its natural features, including its plants.

During the periods of sugarcane cultivation, there remained small forest fragments, especially on some hills and in steep valleys, and ribbons of woodland along streams and property boundaries. Though these plant communities were only fragmentary, they perhaps served as seed-banks, harbouring spores, which may have allowed the repopulation of species in later years.

In Alston and Box's overview of the ferns of Antigua, they listed about 35 species (the authors also suggested the presence of the hybrid *Thelypteris* x *rolandii*, a naturally occurring cross between *T. tetragona* and *T. poiteana*), most of which were limited to the more humid woodlands of the southern volcanic region of the island, where the highest point is Mount Obama (Boggy Peak during his time) at 403 meters.

Fig.2. The island of Redonda from the air. Photo courtesy, Brian Cooper 2012.

Box also made observations on the ferns and other plants of the sister island of Redonda and published *A Note on the Vegetation of Redonda, B.W.I* in 1939, providing a useful timeline and overview of the rapidly changing natural environment of the small uninhabited island. Redonda was once extensively mined for guano from the late 1800s to around 1921. This changed the landscape very dramatically. Today, Redonda is unfortunately overrun by feral goats and introduced rats, which have wreaked havoc on the native plants and animals of the island. Fig. 2 shows an aerial view of this island.

No similar work was published for the ferns and other plants of Barbuda, though Box and other experts spent time there.

To establish the extensive agricultural fields of Antigua, the British began clearing the land of its native old growth forest soon after the first settlement was established in 1632. In less than 100 years, the island had been transformed into thousands of hectares of sugar cane fields, small-scale agricultural holdings and vegetable crop farms, especially in the central and northern regions, with more tree, fruit and crop farms (cultivating yams, taro, sweet potato, bananas, cassava, among other things) established in the volcanic hills of the south. Deforestation continued well into the 1800s, especially to obtain wood to fuel the factories that manufactured sugar. Fig. 3 shows a crew felling large Silk Cotton (Kapok) trees (*Ceiba pentandra*) at Wallings in the south of the island sometime in late 1800s. Note the numerous epiphytes covering the trunk.

Fig. 3. Fall of an old silk cotton, circa late 1800s by John Anjo. Source: Museum of Antigua and Barbuda.

The felling of the islands' forests likely resulted in the disappearance and even the extinction of many species of native plants and animals. Ferns, especially epiphytic species, declined, and by the end of the 18th Century, only a few species persisted, and only those that were hardy enough to survive in the desiccated, fragmented and degraded patches of remaining woodlands. Alston's and Box's 1935 summary review offers a rare window onto the environmental conditions to the island at that time, and it suggests that the flora consisted of species that were fairly widespread throughout the Caribbean, most being generalist that were able to survive in a range of enviroments, including dry seasonal to evergreen moist forests, and from sea level to the highest point. Even so, some species were quite rare, limited to the steep valleys of the volcanic south. The species that Alston and Box recorded are shown in table 1 below, and list 35 species.

Species	Status in 1935 Alston & Box	Status in 2013 (Lindsay)
Acrostichum aureum Linnaeus	Rare	Rare
Acrostichum danaeifolium Langsd. & Fisch.	Common	Uncommon
Adiantopsis radiata (L.) Fée	Rare	Rare
Adiantum tenerum Sw.	Common	Common
Adiantum tetraphyllum Humb. & Bonpl. ex Willd.	Rare	Uncommon
Adiantum villosum Linnaeus	Common	Common
Anemia adiantifolia (L.) Sw.	Uncommon	Common
Anemia hirta (L.) Sw.	Rare	Uncommon
Asplenium cristatum Lam.	Common	Common
Asplenium pumilum Sw.	Rare	Common
Asplenium serratum Linnaeus	Rare	Uncommon
Blechnum occidentale Linnaeus	Uncommon	Common
Campyloneurum phyllitidis (L.) C. Presl	Common	Common
Cheilanthes microphylla (Sw.) Sw.	Rare	Uncommon
Didymoglossum krausii (Hook. & Grev.) C. Presl	Common	Common
Doryopteris pedata (L.) Fée	Rare	Uncommon
Microgramma heterophylla (L.) Wherry	Common	Common
Microgramma lycopodioides (L.) Copeland	Common	Common
Nephrolepis biserrata (Sw.) Schott.	Uncommon	Common
Neurodium lanceolatum (L.) Fée	Rare	Common
Phlebodium aureum (L.) J. Smith	Common	Common
Pityrogramma calomelanos (L.) Link	Common	Common
Pleopeltis polypodioides (L.) E.G. Andrews & Windham	Common	Common
Psilotum nudum (L.) P. Beauv.	Rare	Rare
Pteridium caudatum (L.) Maxon	Rare	Extinct?
Pteris biaurita Linnaeus	Rare	Uncommon
Pteris vittata Linnaeus	Common	Common
Serpocaulon triseriale (Sw.) A.R. Sm.	Uncommon	Common
Tectaria heracleifolia (Willdenow) L. Underw.	Rare	Uncommon
Tectaria incisa Cav.	Common	Uncommon
Thelypteris dentata (Forssk.) E.P. St. John	Common	Common
Thelypteris patens (Sw.) Small ex R.P. St. John	Common	Rare
Thelypteris poiteana (Bory) Proctor	Rare	Rare
Thelypteris tetragona (Sw.) Small	Common	Common
Vittaria lineata (L.) Sm.	Rare	Uncommon

Table 1. Summary status of fern species listed by Alston and Box in 1935 and their status today.

Note that Alston's & Box's species names have been updated where necessary.

The situation for most of the ferns has improved considerably since 1935, in that many are found more widely, and/or population numbers have increased, while a handful have remained rare (this may be a natural dynamic).

It is not known how Alston and Box arrived at the status for each species, but given the landscape at the time, and the relative paucity of forests and woodlands, it is not hard to imagine how conclusions

were reached. The authors often suggested that a species was "very scarce" or "only found once" and so on, and may also say the species is "common" or "rare."

For my work, my experience often paralleled that of Alston and Box, and many of the species are only known from a handful of locations, one plant or one population, and so on. I used the IUCN species assessment approach to determine the conservation status of many species (though not all have been evaluated). For a full conservation assessment of the islands' ferns please refer to the Regional Red List of pteridophytes of Antigua, Barbuda and Redonda (2012). For the purpose of this article, simpler terms have been employed to denote the status of the species.

By1997, Island Resources Foundation (IRF), in a report on the country's *Biodiversity Profile for Antigua, Barbuda, and Redonda* (Lindsay and Horwith), increased the number of species for the islands, and listed 45 ferns (43 for Antigua and two for Barbuda).

Between 2007 and 2009 when the Environmental Awareness Group (EAG) published *The Wild Plants of Antigua and Barbuda*, the number of fern species increased from 45 to about 54.

By 2013, my field work determined that country has at least 109 species, far more than the 35 that Alston and Box recorded. Some of the increase is due to taxonomic revisions and splits, the recognition of many hybrids, and because of several introduced species, but most were new records such as the first documentation of the primitive *Ophioglossum reticulatum* for Antigua. Though a widespread species across the Caribbean and in other parts of the world, it is a rare species here. In fact, not long after that discovery, we found a single colony of another species *Ophioglossum harrisii*, a rare West Indian endemic (Fig. 4). Both species prefer grassy moist slopes with partial shade to full sun. They are also easily overlooked or mistaken for other plants given their simple leaves and terrestrial habits.

Fig. 4. *Ophioglossum harrisii* in the southern hills of Antigua.

Another great find—adding to our growing fern list—is *Adiantum fragile*. Adiantums, with their lacey fronds are a favourite of local gardeners, and in fact, are cultivated the world over. There are two varieties of this species on Antigua, these being A. *fragile* var. *fragile* and *A. fragile*

Fig. 5. *Adiantum fragile* var. *rigidulum,* Antigua.

Fig. 6. *Didymoglossum ovale* found growing on boulder, Antigua.

Fig. 7. *Asplenium uniseriale* on rocky escarpment at Christian Valley, Antigua.

Fig. 8. *Marsilea nashii*, a West Indian endemic aquatic fern in Barbuda.

var. *rigidulum* (Fig. 5). The latter is the smaller and more delicate of the two forms; it is also quite rare, known only from a handful of locations and a few plants.

Some species are very tiny and easily overlooked — they resemble mosses or hide amongst them (see Fig. 6). Alston and Box observed the diminutive filmy fern, *Didymoglossum krugii*, which is widespread in moist ravines and woodlands, often found growing on boulders, rocks and tree trunks. It is one of about nine species and varieties, found on Antigua since 2008. One of these is the country's smallest fern, *Didymoglossum ovale* (Fig. 6). So far, *D. ovale* is known only from one small colony found growing on a few rocks in a damp, dark, valley bottom in the southern hills.

Several species remain a taxonomic challenge, including *Pityrogramma*, and members of the *Asplenium cristatum*-complex. Many of the species closely resemble each other, and are very difficult to tell apart. This is compounded when two or more species grow in close proximity or in the same area. Fig. 7 shows what is believed to be *Asplenium uniseriale* found growing at Christian Valley in the southern hills. Its delicate and graceful fronds often have long attenuated tips.

In Barbuda, we have added another species of *Marsilea*, the clover-leaf aquatic ferns, which now means the island has two types: *Marsilea nashii* (Fig. 8) a West Indian endemic, and *Marsilea ancylopoda*, widespread throughout parts of the Neotropics. The island's list is now up to about 10, when previously, it was about two.

Redonda has at least six species, including the beautiful Island Goldback Fern (*Pityrogramma chrysophylla* var. *subflexuosa*), endemic to the Virgin Islands, Montserrat and Redonda (Fig. 9), with the bright yellow powder covering the underside of the leaves.

Fig. 9. *Pityrogramma chrysophylla* var. *subflexuosa* on Redonda. Photo courtesy Dr. Jenny Daltry, Fauna and Flora International, 2011

What accounts for the dramatic increase in numbers of ferns recorded? How did Alston, Box and others miss so many species? There are several reasons for this: many experts and observers only made occasional efforts to study the islands' species and could have overlooked several forms. Their field observations would have also missed many species because they are quite rare, limited in many instances to just one narrow valley or a handful of plants on a few boulders or trees.

During the 1930s to 1980s, many of the areas of Antigua consisted of open grasslands and scrubby patches of woods. With the abandonment of intensive export-driven agriculture since 1980, many were left fallow and have transitioned to taller and more stable forest habitats, which have provided the needed environments and conditions for ferns to prosper. In the early 1980s, areas such as Midway Ridge and the slopes of Mount Obama were a mosaic of extensive grass, shrublands and patches of forest, but by the early 2000s, many of these areas reverted to secondary woodland and the region is now largely wooded. Fig. 10 shows a view of the Christian Valley and the surrounding summits of Midway Ridge and of the highest point on Antigua, Mount Obama. The photo was taken from McNish Mountain.

Fig. 10. View of Midway Ridge, summit to left in background and Mount Obama summit in right background with communication tower.

Mature old trees also create suitable sites for epiphytic species to become established. The tall trees also provide shade and help to increase levels of humidity in upland and valley areas, conditions loved by many ferns. These sites were once denuded and exposed to destructive ultraviolet radiation, desiccating winds, the ravages of goats and other livestock, and erosion. Previously small, fragmented woodland patches are now a network of forests, woodlands, scrub, patches of grassland, rocky cliffs and herbaceous growth, offering a complex and diverse system of habitats that allow increasing biodiversity in the area.

Nevertheless, severe challenges remain, especially because some fern species are known from only one small colony or just one plant. This makes them vulnerable to disturbances, including droughts, floods, land-clearing, diseases, invasive species, and fires. Added to this is the increasing stress of the effects of climate change and sea level rise, which compound and amplify existing threats.

While some areas in the volcanic south of Antigua are seeing an increase in forest habitats, the central, northern and northeastern end of the island are experiencing a decline in forest cover and a loss of wetlands due to tourism and upscale housing developments.

On Barbuda, introduced feral livestock, which include goats, sheep, pigs, donkeys, horses, Fallow Deer (*Dama dama*) and wild boar, some of which may have been introduced as early as the 1500s, are causing a gradual but steady ecological decline in ecosystems. Barbuda also has seen a dramatic increase in sand mining and quarrying, which have destroyed large tracts of rare native woodlands.

Redonda is now largely deforested due to guano mining, to goats introduced prior the 1600s and introduced Black Rats (*Rattus rattus*).

Sadly, at least two species: *Pteridium caudatum* and *Microgramma piloselloides* may be locally extinct on Antigua. Field surveys have so far turned up no evidence that either species is still present on the island. Fig. 11 shows the author high on the slopes of Saddle Hill, from where Alston and Box reported *P. caudatum*.

Field studies continue, and new species are likely to turn up. But it is now necessary to develop effective ways to protect suitable habitats and ensure that these species maintain sustainable populations. Working with local authorities, I have been planning the development of a native plant nursery and garden to maintain populations of native species, and to eventually repatriate many of these to the wild. These plans are now in the beginning stages.

My field study of the ferns of Antigua, Barbuda and Redonda has been under the auspices of the Environmental Awareness Group (EAG) of Antigua and Barbuda, and generously funded by the Rufford Small Grants for Nature Conservation, UK, and the Mohamed bin Zayed Species Conservation Fund, Abu Dhabi. The study has resulted in the production of a Regional Red List of Ferns for Antigua and Barbuda, and a Conservation Perspective, both researched and authored by myself, and which can be freely downloaded from the EAG fern project website at: http://www.eagantigua.org/page525.html. Also being produced is a guide to the ferns, expected by early summer of 2014. ❒

Fig. 11. The author, Kevel Lindsay, searching for *Pteridium caudatum* high on the slopes of Saddle Hill on Antigua in October of 2013.

References:

Alston, A.H.G. & H.E. Box. 1935. *Pteridophyta of Antigua* Journal of Botany, Vol. 73 No., 366.

Beard, J.S. 1949. *The natural vegetation of the Windward and Leeward Islands*. Oxford Forestry Memoirs, 21. Oxford University Press.

Box, Harold E. 1939. *A note on the vegetation of Redonda, B.W.I.* Journal of Botany, British and Foreign, Vol. 77, No. 923.

Government of Antigua and Barbuda. 2012. *Census 2011: preliminary data results*. Ministry of Finance, the Economy and Public Administration Statistics Division.

Harris, D. R. 1965. *Plants, animals and man in the outer Leeward Islands, West Indies – an ecological study of Antigua, Barbuda, and Anguilla*. University of California Press.

Howard, R. A. & others. 1977. *Flora of the Lesser Antilles. Pteridophyta*. Arnold Arboretum, Harvard University.

Island Resources Foundation, 1991. *Antigua and Barbuda country environmental profile.* Caribbean Conservation Association.

Lindsay, Kevel. (In Prep.). *The ferns of Antigua, Barbuda and Redonda: an atlas and illustrated guide to the native and naturalised pteridophytes*. Environmental Awareness Group.

Lindsay, Kevel & Bruce Horwith. 1997. *A biodiversity profile of Antigua, Barbuda and Redonda*. Island Resources Foundation.

Lindsay, Kevel & Bruce Horwith. 1997. *A vegetation classification of Antigua, Barbuda and Redonda*. Island Resources Foundation.

Lindsay, Kevel. 2012. *Protecting native pteridophytes in Antigua, Barbuda and Redonda: a conservation perspective*. Environmental Awareness Group.

Lindsay, Kevel. 2012. *Regional Red List of pteridophytes of Antigua, Barbuda and Redonda*. Environmental Awareness Group.

Lindsay, K. & Horwith, B. 1997. *Plant species of Antigua, Barbuda & Redonda*. Island Resources Foundation.

Loveless, A. 1960. *The vegetation of Antigua, West Indies*. Journal of Ecology Vol. 48, No. 3.

Pratt, Christopher, Kevel Lindsay, Melanie Pearson & Carolyn Thomas. 2009. *The Wild Plants of Antigua and Barbuda: an Illustrated Field Guide to the Native and Naturalised Vascular Plants*. Environmental Awareness Group

Wheeler, L. Eichmond. 1916. *The botany of Antigua*. The Journal of Botany, British and Foreign, Vol. 54.

A FAN OF JAMAICAN FERNS

Michael Hayward
6 Far Moss Road, Blundellsands, Liverpool L23 8TQ
e-mail mhaywardL23@blueyonder.co.uk

In the last issue of the Pteridologist I described and illustrated the Jamaican lacebark fern doyleys made from around 1860-1920, predominately by the women's self-help society (Hayward 2013). Other fern decorated lacebark productions included fans, both simple paddles and more elaborate folding fans, and I am now taking the opportunity to describe one such in my collection. This large fan has a width of 57cm and height of 31cm when expanded (Fig 1). It is of brisé construction, i.e. of individual panels which slide one over another as the fan is opened and closed, with a linen thread passing through the apex of each panel to restrict their movement (Fig 2). The 16 sticks of the fan are made of bone with a simple geometric pattern produced by drilling and fretting (Fig 3) and it is likely that the sticks were imported to Jamaica from China. The lacebark brisé panels are constructed of the same materials as the doyleys, but with fern decoration on both faces. For details of the preparation of the lacebark and the construction of the items see my previous article.

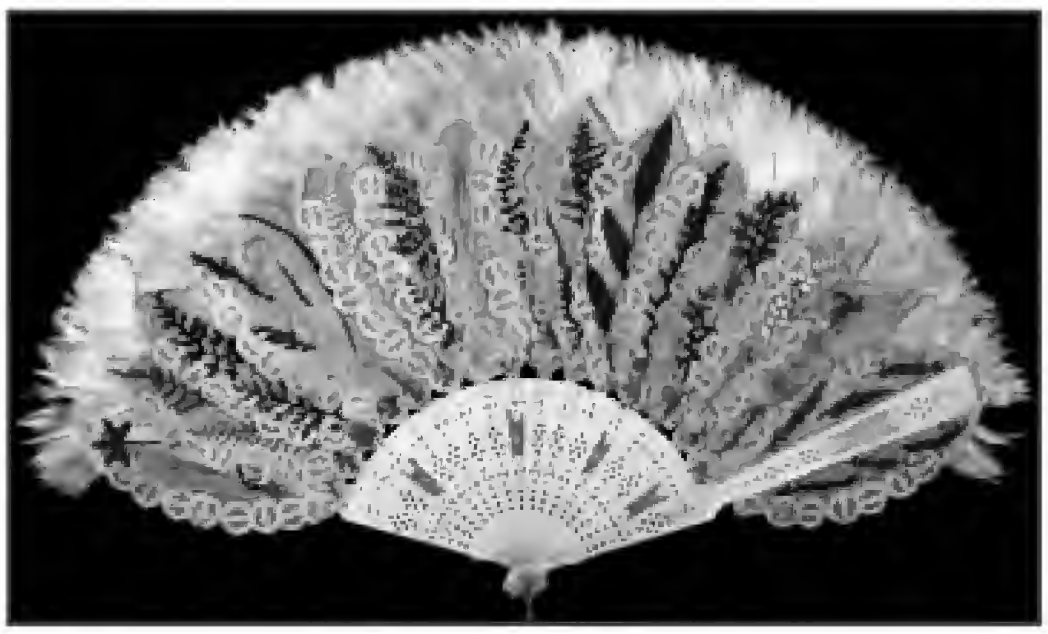


Fig 1. A large Jamaican lacebark fan with 16 panels. Both sides have similar fern decoration

The fan box is made of folded card held together by stitching. The ferns which once decorated the cover are long gone. The box contains both a hand written listing of the construction materials used for the fan and a printed list (Fig 4). The fan was sold to raise funds for the Kingston orphanage for girls at Half Way Tree. It is likely that such fans were made by the ladies of the local church, rather than by the girls of the self-help society.

The fan that Armstrong (1999) illustrates has tortoiseshell sticks and a repeating pattern of fern decoration on the central panels whereas this example has a different pattern on each panel. Lacebark fans are also recorded with wooden sticks. The *Lagetta* lacebark tree was introduced into Java by the dutch and fan specialists believe that similar lacebark fans were indeed produced in Java (Armstrong 1984). This view is largely based on the identification of similar fans in ninteenth and early twentieth century photographs from the region, but the examples that I have seen illustrated all mention 'mountain-cabbage palm' in their descriptions which clearly indicates their Jamaican origin. These fans are the most elaborate of the fern decorated lacebark artefacts produced in Jamaica and are a delight to hold and examine. They are decorated with a range of filmy and other small ferns. ❐

Fig 2. The apex of the fan panels showing showing the restraining thread

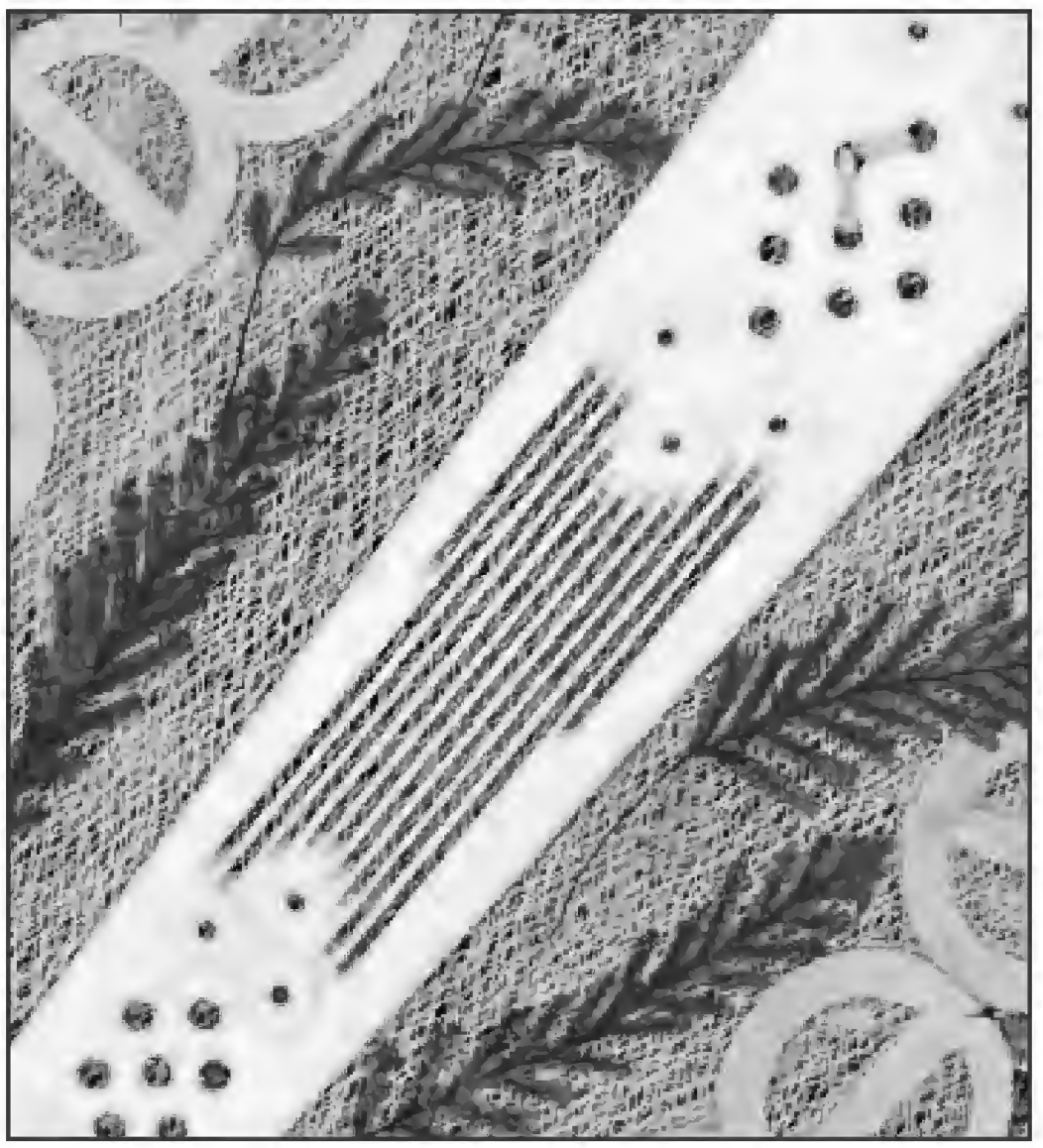


Fig 3. Detail of the bone guard stick decorated with fret work

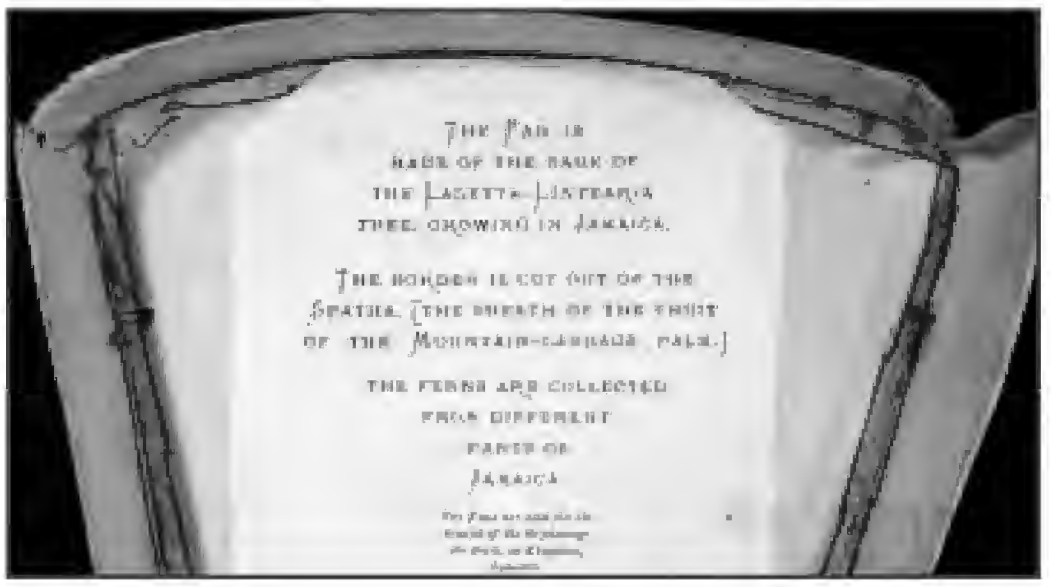


Fig 4. The printed label in the stitched card fan box

References:

Hayward, M. (2013). *Pteridologist* 5: pp 411-415

Armstrong, N. (1999). *The Book of Fans*, London: Colour Library International, p120

Armstrong, N. (1984). *Fans*, London: Souvenir Press, p76

Davallia as traditional decorations.

Neil Timm

The Fern Nursery, Grimsby Road, Binbrook. Linconshire LN8 6DH

e.mail: rtimm@fernnursery.co.uk

In mid December we made a visit to the island of Madeira, where the preparations for the Christmas festivities where well under way. One of the first things we noticed was the great popularity of nativity cribs on the island. Often large impressive structures depicting the stable in Bethlehem appear in just about every free space that can be found.

Fig. 1. A typical Nativity scene in Maderia.

We soon noticed that apart from the simple issue of size, these constructions differ from those you often see in Britain by frequently taking the form of a wider naturalistic landscape richly filled with Madeiran plants, including and especially ferns; with the nativity scene itself forming only a small central element. Moreover there is no attempt made to depict the Holy Land in any realistic way, instead the traditional stable with all its accompanying figures, is usually surrounded by a model countryside which is completely Madeiran in style and obviously inspired by the surrounding mountains. I think that it is probably completely impossible to say whether this is due to genuine naïvety, a deliberate attempt to entertain the tourists, or some complex mixture of both.

Fig.2. Another Nativity scene complete with model houses, bandstand and orchestra.

Of the ferns used for the displays *Davallia*, the Hares Foot Fern, is by far the most popular type. *Davallia canariensis* is indeed a very common Madeiran fern growing wild throughout the island, especially on the walls of the many terraces which make up most of the islands cultivated ground, but that alone did not seem to account for its exceptional popularity, since Madeira has a large number of both wild and cultivated ferns, any of which at first glance would do just as well for decoration. Indeed *Nephrolepis* the Boston or Ladder Fern is one of the most commonly cultivated pot and garden plants to be seen, why not use that instead?

Fig.3. *Davallia canariensis,* the Hares Foot Fern, for sale in Maderia complete with scaly rhizomes still attached to the fronds.

Davallia as traditional decorations.

It did not however take long to find the answer, because as soon as we set out to explore the streets of Funchal, the islands main city, we rapidly found numerous street vendors selling cut flowers and foliage, of which one of the most common items was small clumps of *Davallia*. What really made apparent the reasons for the ferns popularity however, was that it is sold in handy small clumps with its characteristic scaly rhizomes still attached to the fronds.

Fig. 4. Typical street vendor selling clumps of *Davallia canariensis*. Note the bag of extra fronds at her feet.

Obviously this way of harvesting the plants must mean that the fronds are easy to arrange in displays since they have a good firm base attached, and most likely supported by the roots the fronds will, as florists say, “stand well”, not wilting perhaps even through all the Christmas season. Moreover the ferns habit of growing among the loose stones on the edges of the terraces and in walls, must make them a very easy and obvious target for harvesting in this way.

I was not at the time sure whether or not the trade in *Davallia* foliage was year round, but research on the web shows that, like holly and mistletoe in Britain, it is a traditional seasonal one; which made it all the more interesting to find that wild ferns continue to be involved in what is almost certainly a vernacular minor industry marking the festive cycle, even well into the twenty first century. I can not say if the trade at this time presents any risk to the ferns themselves, or if it will be sustainable in the future should human population, land usage, and demand increase, though at the moment *Davallia* seems to be both common and widespread on Madeira. ❒

Fig. 5. Another street vendor not only selling *Davallia canariensis* but also other greenery and cut flowers.

Fig. 6. This street vendor seems to be a specialist *Davallia canariensis* seller.

In Madeira, tradition dictates that homes are decorated on the holiday of the 8th of December - the day of Our Lady of Conception. As well as the Christmas tree it is typical to assemble the Christmas crib or, as called in Madeira, "a Lapinha".

It is common to decorate the *Lapinha* with *searinhas* which are crops of corn, wheat or lentils in small vases. The seeds are usually soaked for 1 or 2 days and then are planted on the 8th of December so they are relatively grown on Christmas day. Some native plants to Madeira are also used such as the Climbing Butcher's Broom *Semele androgyna*, the Hare's Foot Fern *Davallia canariensis* and some other non natives such as the Lady Slipper Orchids, *Paphiopedilum sp.*

Read more at: http://www.madeirahelp.com/madeira_traditions#ixzz2rjCzpYeZ

Ed.

Ticks, Borrelia and Lyme disease.

Peter Blake

14 Mill Hill Road, Norwich, NR2 3DP

e-mail: nicklodge@btinternet.com

In August 2013, six members of the BPS South East and East Anglian groups travelled to Holland for a field-trip with Wim de Winter. On 24th August we went fern-hunting in the plantations of Voosterbos and Kuinderbos, guided by Piet Bremmer, a Dutch ecologist. Before entering the woods he told us that deer, ticks and Lyme disease were endemic in the area. He commented that he had ticks himself on at least three hundred occasions and had contracted Lyme disease (LD) three times, each episode being successfully treated with antibiotics.

Fig. 1. A tick waiting on a bracken crozier, ready to jump.
Photo: James Merryweather.

The group subsequently checked themselves for ticks and four of the six found them on their trunk and legs. In my case I found five, with two being behind my left knee and three around my midriff. At that time there was no evidence of a 'bite' mark, unlike mosquito or bedbug bites, which produce a red itchy lump. The ticks themselves were tiny, no more than two millimetres across and they moved quite quickly (Fig. 2). They were easy to remove with fine tweezers.

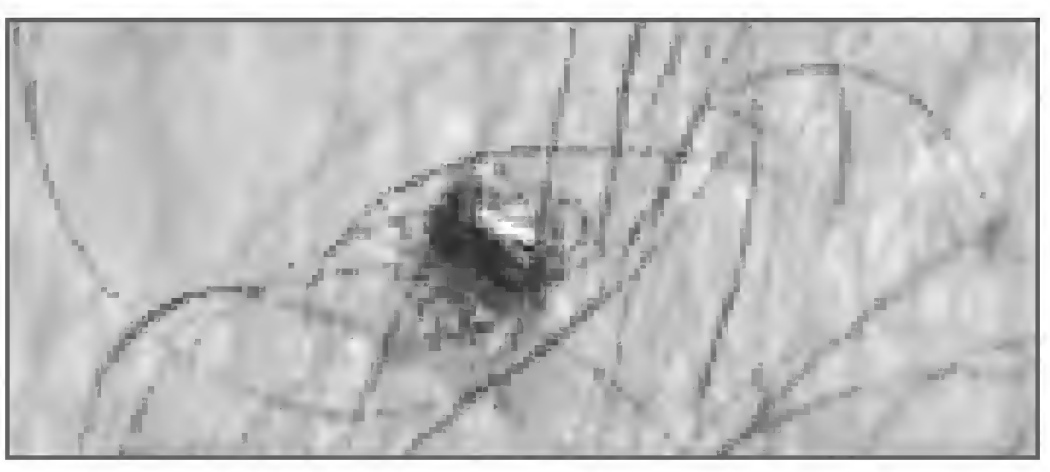


Fig. 2: A tick feeding

After returning to England I thought that it would be wise to look up Lyme disease on the internet and found the NHS site (Ref.1). I learnt that Lyme disease was caused by *Borrelia burgdorferi*, a bacterial spirochaete similar to that of syphilis (*Treponema pallidum*). Like this more infamous disease, infection with *Borrelia* could have both local and systemic effects, with an early skin rash[1] (Fig. 3), leading to a spreading ring or 'bulls-eye' (*erythema migrans* – Fig.4). This rash may be accompanied by flu-like symptoms. A common feature of persistent infection after the rash has faded is lassitude and weakness, but there may be involvement of major systems such as the brain, heart and, particularly, the muscles and joints, causing crippling

Fig. 3. Early skin rash at the bite site

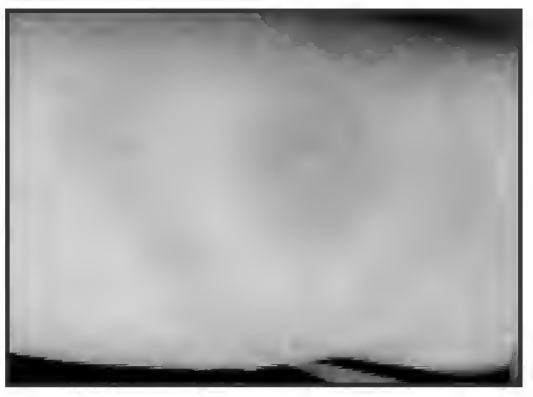


Fig. 4. Characteristic 'bulls-eye' rash

myalgia (muscle pain) and arthritis[2]. These symptoms of advanced disease can occur months or years after the initial infection.

Around 12th September I noticed a large purplish mark behind my left knee (Fig.5). For a day or two I thought it was a bruise, although I had no memory of trauma and the mark was completely painless. On 14th September, three weeks after our forage in the Dutch forest, it dawned on me that this peculiar, florid rash was similar to what I had seen on the internet and could represent *Borrelia* infection. I saw a medical colleague who had some knowledge of the disease, having had a friend who had developed serious central nervous system (brain) involvement before a diagnosis was made. He started me on antibiotics that day. I saw my GP two days later, who told me that he had never seen a case, but that the rash fitted the description and appearance on the NHS site. Fortuitously, he had a South African GP trainee with him that day who said that Lyme disease was common in South Africa and that she had treated it many times with a four-week course of antibiotics. The British National Formulary recommended a 10-14 day course. However, we decided to err on the side of caution and take the South African's advice and I took doxycyline for 28 days. The rash faded over several days, has not recurred and I have had no symptoms at any time[3].

Fig. 5. The author's rash behind the left knee

Ticks wait for passing prey by resting on the very tips of blades, especially of fern fronds including bracken (Figs. 1 & 6). They wait, with front legs outstretched, to latch-on to passing mammalian fur (or clothing). Once 'aboard' a target mammal, they crawl to seek the warmest places to bite, which are usually those parts of the body with thin skin and a good blood supply. Typical sites are behind the knee, in the groin or in the armpit.

Borrelia burgdorferi can infect several animals including deer and rodents but, apparently, also pheasants and blackbirds[4]. Ticks become infected having ingested blood

from affected creatures and can transfer this infection to humans. Larger ticks have most probably already bitten one or more animals, such as deer or rodents. So, larger ticks are more likely to carry the disease than smaller ones. The disease is then transferred to a fresh victim through a subsequent bite. Transfer occurs if the tick regurgitates blood from its gut into the human. Regurgitation occurs particularly if the tick is irritated by chemicals or heat applied to it in an effort to remove it. Quick removal with tweezers[5] or a 'tick card' carries the least risk of regurgitation and infection. A tick card has a narrow slot in it to slide under the tick and lift it off. In England and Wales the incidence of infection is thought to be at least 2000-3000 cases per year. However this may well be an underestimate as the disease is still poorly-recognised and not well reported. Blood tests for *Borrelia* infection are not 100% accurate and can only detect the disease after it has been present for several weeks. Diagnosis is therefore very dependent on the history of tick bites and the characteristic rash.

Fig. 6. Adult and nymph waiting on a bracken stem.
Photo: James Merryweather.

Early disease can be treated successfully with oral antibiotics but advanced disease may require intravenous treatment. Lyme disease can be very serious in its advanced stages and can cause heart failure and paralysis. However myalgia, arthritis and lassitude are the commonest symptoms. Indeed, there is at least one member of the BPS who developed severe arthritis after tick bites. This was in the days before the disease was recognised, his symptoms never entirely regressed even after treatment. Although the infection can be treated with antibiotics in the later stages, there can be no guarantee that the damage caused will be completely repaired or that the symptoms will be completely alleviated. There are support groups for those affected by chronic Lyme disease and groups campaigning for better diagnosis and treatment of the disease[6] (Refs. 2, 3, 4). ❒

Fig. 7. An adult tick searching for somewhere to bite.
Photo: James Merryweather.

References:

NHS Choices: http://www.nhs.uk/Conditions/Lyme-disease

Borreliosis and Associated Diseases Awareness UK: http://www.bada-uk.org/

Worldwide Lyme Protest UK: http://worldwide-lyme-protest.org.uk/

Lyme Disease Action: http://www.lymediseaseaction.org.uk/

P.S. (Written anonymously by a member of the BPS who has suffered tick bites on at least three continents!)

Because of the 'fern-connection', pteridologists should be aware of Lyme disease, especially if in any woodland environment in which populations of deer are also present. Early treatment at the time of the initial rash is important and, therefore, anyone venturing into heathland or forest where ticks abound should view the NHS site, be familiar with the appearance of this rash and seek early advice if they are suspicious of having contracted *Borrelia*. It is equally important that anyone who has been bitten by ticks in the past and who subsequently develops unexplained lassitude, arthritis or other unaccountable symptoms brings this to their physician's notice.

Endnotes provided by Wendy Parsons, co-founder of the Lyme Disease Action Group.

1.Surveys have shown that around 50% of people who contract LD do not see a rash. If you do have a rash then take a photograph of it and show your GP, ensuring that it is recorded in your medical notes.

2.The list of possible symptoms is very long because LD is systemic and can affect the whole body. These symptoms can all have causes other than LD and misdiagnosis can occur.

3.The antibiotics normally quoted in guidelines are the drugs that have been used in clinical trials. Doctors and researchers are looking for better treatment because these trials have shown very variable outcomes (38% – 100% successful outcome) and because investigations have shown that the bacteria can survive conventional courses of antibiotic treatment.

4.Hundreds of species of animals, including mammals, birds and reptiles, can carry LD. Live *Borrelia burgdorferi* spirochetes have been found in mosquitoes and biting flies, as well as the fleas that are carried by disease hosts. There are an increasing number of studies to show transmission via these routes.

5.When removing embedded ticks, always be careful not to squeeze the tick body. A distressed tick can release infected saliva or even disgorge its stomach contents into the bite wound, thus assisting the spread of any infection that is present. For this reason, only use finely pointed tweezers to remove ticks. It is much better to carry a tick removal tool, or tick card.

6.If you have been bitten and would like some help, contact support@lymediseaseaction.org.uk Your GP can also ask for advice via medics@lymediseaseaction.org.uk

Fern exploration in the high Andes

Martin Rickard

Pear Tree Cottage, Sutton,
Tenbury Wells, Worcs., England WR15 8RN.
e-mail: h.m.rickard@btinternet.co.uk

My first visit to Ecuador in 2011 was a general tour organised by Naturetrek focusing on native orchids. Inevitably time for ferning was limited. This time the tour was with pteridologists with the primary purpose of looking at ferns, and more ferns! Our group consisted of three somewhat decrepit Brits., Pat Acock, Paul Ripley and me, and one much younger German, Klaus Mehltreter. This 14-day tour was not organised in any real sense, apart from the first two nights and the last night, all in Quito. We had booked no hotels.

Fig. 1. Klaus Mehltreter and Patrick Acock in the Pontificia Universidad Catolica del Ecuador Herbarium.

The first day was spent in Quito visiting the Pontificia Universidad Catolica del Ecuador Herbarium (Fig.1). Pat and Klaus had previously made contact with Hugo Navarrete, Director of the Herbarium, a student of Ecuadorian ferns (he got his Ph.D. with Dr. Benjamin Ollgaard in Denmark). He kindly met us and gave us access to the University`s rather impressive collections. Additionally Hugo gave us ideas where we might find a visit rewarding, and sites for some more localised species. We learnt that the far north, near the Columbian border was very different from the Quito area. While further south towards Peru, near the city of Cuenca, the flora changed again. We decided to try and target all three areas even though it meant a lot of driving.

Suitably informed for our first day in the field we headed north to Ibarra with plans to visit the El Angel Nature Reserve the next day. Klaus had found a suitable hotel in Ibarra on his laptop. Once booked in we had a few hours before dark so we decided to follow up one of Hugo`s sites south of Ibarra. En route we made a roadside stop by a cliff in pretty dry country at 2500m. Even here we found about 20 fern species alongside the road. *Pellaea ternifolia* and *Asplenium aethiopicum* were old friends. The most interesting find was two species of *Niphidium*. The common *N. crassifolium*, and the new to us, narrow-fronded *N.longifolium*. The roads hereabouts were not good and our maps rather inadequate but we eventually found our way to Hugo`s site above Turucucho...well almost! The road was closed just short of our target area. Nevertheless we explored where we could. Sadly we did not find the main target species, *Jamesonia cinnamomea*, which is even more beautiful than your average *Jamesonia*, but plenty of other treasures were in the vicinity. We were at about 3500m. Among others we found a beautiful tripinnate polypodium, *P.monosorum*, climbing through bushes, a *Blechnum* from the *B.cordatum* group with very attractive deep red new fronds but lacking aerophores, and a large polystichum which might be *P.distans.* Following a track the other side of the valley we came into paramo where *Blechnum loxense* was abundant(Fig. 2). I`d seen this in 2011 at Papallacta where it was abundant very locally. Here it was simply abundant! It is a beautiful erect fern covered with scales which reflect a silvery light. As if that isn`t enough it also has a trunk up to 2 feet tall. Perfect for a temperate garden? If it`s hardy! One or two plants of the slightly taller growing *B.auratum* were scattered among the *B.loxense, a*nother potentially superb fern for temperate gardens. At this site we had our first sighting of *Lophosoria quadripinnata* – already a favourite in UK gardens.

Fig.2. *Blechnum loxense* recovering from fire.

The next morning it was north to El Angel (apparently pronounced hangel!). A small town with its central square filled with one of the most amazing topiary displays I`ve ever seen. Not done with box but some small-leaved conifer. It looked fabulous. The nature reserve of the same name lies north of the town and runs just about as far as the Columbian border. The long entry road proved fascinating taking up much of our day. *Blechnum loxense* and *B.auratum* were common, with one possible hybrid between the two. The blechnum-like *Plagiogyria semicordata* was rare. It is distinguished from *Blechnum* by its lack of scales and only three vascular bundles in the petiole (Blechnum has 4 to 7). The ever present mountain polystichum, *P.orbiculatum*, was frequent as were numerous species of *Elaphoglossum*, all of which remained unnamed at species level until Robbin Moran at the New York Botanic Garden later sent me an excellent article: "Taxonomic revision of *Elaphoglossum* section *Muscosa"* by his former student, Dr. Alejandra Vasco. I was then able to work out one particularly scaly specimen as *E.engelii*. We saw one or two plants of a *Jamesonia sp.* and the jamesonia-like *Grammitis moniliformis*. I was fascinated by large colonies of what I initially thought was *Lycopodium clavatum*, except it only had one stobilus per stem. Checking with the flora revealed our plant was *L.clavatum* subsp. *contiguum* (the same as to *L.lagopus* from Scotland?). Other ferns of interest I noted were *Eriosorus rufescens* and *Lophosoria quadripinnata*.

Fern exploration in the high Andes

Much as it grieves me to say it, however, the star of this habitat was not a fern! It was a composite! A flower! Oh dear! The plant in question is *Espelitia pycnophylla*. It covered hundreds of acres, disappearing into the distance as far as the eye could see, and that was a long way!(Fig. 3) It produces a trunk up to 10 feet tall which is crowned by a thick rosette of silver leaves. At the centre of this rosette are masses of large yellow 'daisy' flowers. Truly stunning!

Fig.3. Summit plateau wilderness at the El Angel reserve with *Espelitia pycnophylla* abundant.

At the top of the track, at 3800 metres, we found a short trail running through the *Espelitia*. There were initially very few ferns, except by drainage ditches with some beautiful stands of *Jamesonia alstonii* (Fig. 4).

Fig.4. *Jamesonia alstonii* at El Angel.

The trail wound down to a lake where with great excitement Klaus found a handsome species of quillwort, *Isoetes sp.*(Fig 5/6). It grew in company with the red-stemmed *Huperzia crassa* and various bog plants including a charming gentian. Nearby a rather splendid *Pinguicula sp.* was in bud amongst a mat of *Eriosorus sp*. The altitude here was a problem for the first time, and somewhat limited our exertions! A lot of heavy breathing and frequent rests were needed.

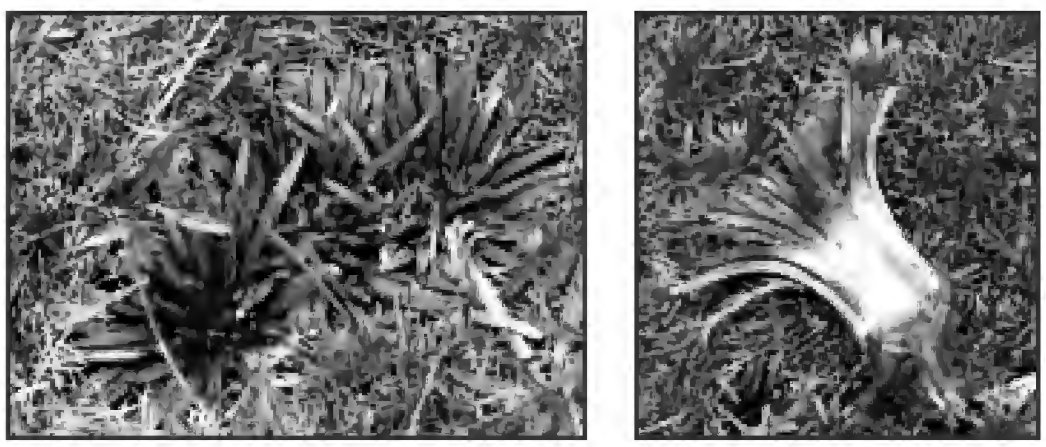


Fig.5 and 6. *Isoetes sp.*at El Angel.

Descending, back on the main track/road, we stopped a short distance from the top to examine a small section of cliff. Rock was rare up here, hence the relatively few ferns noted, but this cliff at about 3600 metres was a great surprise. Water dripped down a narrow crevice. Within were two new species of *Elaphoglossum*, one with the upper surface of the lamina lightly covered with dark brown bristle-like scales, this was *E.lindenii*, the other still unassigned! The greatest star here for me was a *Hymenophyllum*. Fronds were about 1 metre long but only 3-4 cm wide. I identified this as *Hymenophyllum elegantulum* later in the trip after finding it again at an even higher altitude. Surprisingly, a few metres further along the cliff there was another species of *Hymenophyllum, H.undulatum* var. *undulatum*, growing fully exposed to the elements, including the sun!

Fig.7. *Elaphoglossum matthewsii.*Papallacta Pass

The reserve at El Angel was our real reason for heading up north so with that objective achieved we headed south the next day on the long drive to the hills east of Quito. Specifically the Papallacta Pass (Papallacta means 'potato land in Quechua). At the top, about 4000 metres altitude, the species of *Elaphoglossum* were extremely varied but too numerous. Klaus commented that their identification would need serious research, endemicity is high and even if we had an account of *Elaphoglossum* for Ecuador there would be no guarantee that species we were seeing would be included. Many could still be waiting to be described. Nevertheless one of the most common species growing erect on the grassy banks was *Elaphoglossum matthewsii* (Fig.7). *Jamesonia alstonii* was here with another *Jamesonia sp.* and *Polystichum orbiculatum* (Fig.8), which

Fig.8. *Polystichum orbiculatum.*Papallacta *Pass*

always seemed to be common at these high altitudes. There were some great flowering plants too, I especially liked the various gentians. In a marsh at the top of the pass, Klaus found another *Isoetes*, without a microscope we could not tell if it was the same species he had found at El Angel. It is tempting to think it is the *I.andinum* that I looked for here briefly in 2011. An exciting end to a day, mainly given over to travelling, was capped in the evening by luxuriously soaking in the thermal springs at our hotel, the Thermas Papallacta.

The next day, Friday the 13th, was anything but unlucky! We had a great day in the hills about 2km up the lane behind the hotel. I`d been up this track in 2011 as far as the chain barrier. This time we went higher and had much more time. The ferns did not disappoint! A narrow side track led down to a waterfall. The added humidity made this valley a fern paradise. Again we were sadly unable to identify many species, especially the elaphoglossums. The elaphoglossums are difficult to key out but they are far from uninteresting. Many species seem distinct but despite much time being spent I think it`s fair to say we did not get very far with their naming at the time! Several grammitids were seen, one with reddish brown scales/hairs was particularly attractive. Robbin Moran has kindly identified this as *Alansmia stella* (formerly *Terpsichore lanigera* var. *stella*). Nearby *Grammitis serrulata* was also growing epiphtically in the festoons of moss. The hymenophyllum we`d seen in that small cave at El Angel (*H.elegantulum*) was growing strongly here forming curtains of wondrous foliage (Fig. 9). A polypodium which looked like *Polypodium(Serpocaulon) loriceum*, with conspicuous venation and blue green fronds grew out of the moss coating the trees. Again Robbin Moran has kindly identified this as probably *Serpocaulon cf. eleutherophlebium,* quite a mouthful! One patch had fronds approaching a crenate form much as we might see in European *Polypodium australe*. At the foot of the waterfall, in the spray zone, Klaus found another colony of *Isoetes*, species unknown again, but superficially similar to his earlier finds. He is the *Isoetes* king!

After quite a while we managed to pull ourselves away from this site and moved back to the main track and walked further up the mountain. The first kilometre or so was through fernless grassland surrounding beautiful lakes with the variously wooded or grassy slopes high above us. Eventually the path passed through a small wooded area (at about 3900 metres). Just above

Fig.9. Tree covered with epiphytes including *Hymenophyllum elegantulum.above* Papallacta village

Fig.10. High altitude dark woodland. Any bears here? Above Papallacta village.

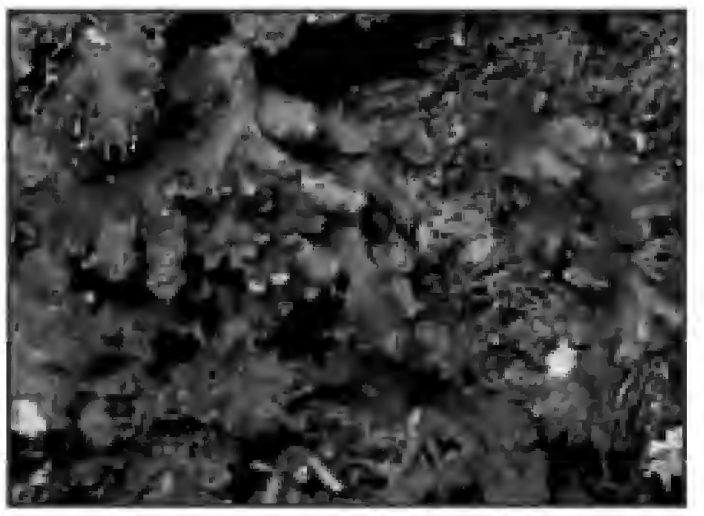


Fig.11. *Trichomanes (Didymoglossum) reptans* .Baeza.

Fig.12. *Trichomanes (Vandenboschia) collariatum*.Baeza.

Fig.13. *Trichomanes capillaceum*.Baeza.

the track the woodland was extremely dense and dark (Fig. 10). Recesses in the wall of vegetation were shrouded in sheets of filmy ferns and clubmosses. Most notable were *Hymenophyllum amabile* and *Huperzia tenuis*. Paul soon disappeared as he crawled into the undergrowth! The recesses here were so dark and quite large that my thoughts turned to Spectacled bears. I didn`t see one, however, Klaus, who had moved ahead did! It disappeared before he could photograph it. I believe him, though! I am very jealous! We finished the day botanising the trackside on our way back down to the hotel Lots more ferns of course, *Grammitis heteromorpha, Pteris muricata* and some wonderful robust erect huperzias were among the highlights. Huperzias may no longer be fern allies but they are a fabulous group very strongly represented in the Ecuadorian flora.

The following morning we moved down the valley from Papallacta towards Baeza, stopping on the way at a site at about 2700 metres that I visited in 2011. The highlight here for me was *Blechnum sprucei* with its long creeping bulbiferous fronds and a large plant of *Dicksonia sellowiana*. I`d missed that last time! A small colony of *Asplenium serra* was growing on a bank. *Lophosoria quadripinnata* was abundant here, cascading down the roadside banks – looking rather more attractive than it does in my garden! Moving on to Baeza, Klaus soon found a charming 'hotel' for a two night stop. In the garden were dozens of tree ferns planted by the owner. There were only two species but one was very distinct with the pinnae produced in pairs arching like a form of coat hanger. I think it is best described as *Cyathea cf bicrenata*. Beside our accommodation we took a walk down into tropical forest in pouring rain – making the track treacherous. On side banks was a handsome *Tectaria sp.*, possibly *T.heracleifolia*. We were particularly lucky when Klaus spotted *Lonchitis hirsuta*, an uncommon fern in Ecuador . A good clump of an unknown Adiantum was a first for that genus on the trip for me. *Cyathea aff. bicrenata* and a possibly *Sphaeropteroid* tree fern were also occasional along the path. In the bottom of the gorge with a beautiful waterfall, filmy ferns were frequent on cliffs and on trees, particularly tree ferns. Many types of fern abounded here, many too critical to identify, especially in pouring rain. Sadly tree ferns, elaphoglossums and many filmies fall into this category. Species we were able to identify, with help from Robbin Moran, were *Trichomanes (Didymoglossum) reptans*(Fig. 11) only about 2 or 3 centimetres tall growing

amongst mosses on a rock and nearby *Trichomanes (Vandenboschia) collariatum* (Fig.12)with elegant fronds similar to our own *T.speciosum* except the fronds were longer and more compact. This was intermixed with *Trichomanes capillaceum* (Fig.13), a beautiful filmy fern with hair-like frond segments. On a fallen tree I noted a mystery *Asplenium* rather like *A. laetum* with sori densely packed at the tips of each pinna, but it cannot be this species as it is never epiphytic. It remains a mystery! Nearby there was an attractive species of *Pteris*, *P. Haenkeana* , a tripartite species with ultimate divisions, rather narrow, like *P.cretica*. Among the elaphoglossums were a couple we could identify with some help again from Robbin. Both were small creeping species on trees and mossy rocks, *Elaphoglossum peltatum* forma *flabellatum* with simple, undivided fan shaped fronds about 2 cm long and the beautifully divided *E. peltatum* forma *peltatum,* which Klaus had shown us in Costa Rica a few years ago, similar except the fan-shaped frond is divided into linear segments. At the end of the path by another waterfall Klaus pointed out a crozier of what was possibly a *Dennstaedtia* species. This was incredibly tall and elegant, growing erect for 2 metres in height before the first pinnae appeared.

About 60 kilometres north east of Baeza at San Rafael, the main river, the Rio Quijos, plunges over a huge waterfall. An obvious site to explore! So the next day we were off. En route I spotted an example of that most dreaded 'fern' genus, *Equisetum*. Pat`s main target species for the whole trip were *Equisetum giganteum* and *E.myriochaetum* so reluctantly I drew them to his attention! The plants were huge, probably *E.giganteum*, and even I had to admit they had something about them, shooting vertically to about 4 metres high. Further down the valley in the middle of nowhere a huge power plant was being built by the Chinese, here too we found the *Equisetum*.(Fig. 14).

The footpath to the waterfall is 1.5 kilometres from the car park. In truth much of it is through secondary forest. Nevertheless, Paul soon got stuck in with the gleichenioid species. There were huge fronds of *Diplopterygium bancroftii* (the only *Diplopterygium* species in the American tropics) partially hiding a *Sticherus* species. A slender stemmed, pinnate pinnatifid tree fern quickly became frequent, appropriately named *Cyathea bipinnatifida*. *Elaphoglossum peltatum* forma *peltatum* was occasional on tree bark. The new red fronds of *Blechnum*

Fig.14. Patrick posing beside *Equisetum ? giganteum* with stems up to 12 feet tall.Road to San Rafael.

Fig.15. *Blechnum cordatum* agg. with the disgustingly slimy crozier. At Rafael.

Fig.16. San Rafael waterfall.

Fig.17. *Pityrogramma trifoliata* (formerly *Trismeria trifoliata*). Between San Rafael and Baeza.

binervatum subsp. *fragile* brightened up the gloom of the deep shade. Other species randomly scattered alongside the path included *Pteris muricata* and *Hymenophyllum trichomanoides* with exerted indusia looking like a species of *Trichomanes*, hence the specific name. This one fooled me and I have Robbin to thank for correcting me, again! A single plant of *Lonchitis hirsuta* surprised me – I did not expect to see an uncommon plant twice on this tour! Nearby was one of the highlights of the whole excursion; a bipinnate fern with fronds 7 to 9 metres long but only about 25 cm wide. Initially I thought it was a species of *Dennstaedtia* but there are none with fronds this long. Robbin later pointed out it was a *Hypolepis*, probably *H.parallelogramma*. As we descended the forest became more humid and ferns with aerophores were not uncommon. The disgustingly slimy form of *Blechnum cordatum* (Fig. 15)became quite frequent as did *Thelypteris cf. amphioxypteris*, an attractive species with reducing pinnae at the base of the frond a little like our European *Oreopteris limbosperma*. Eventually the reason for the path being created came into view – the waterfall of San Rafael. Magnificent!(Fig.16). On the way back to Baeza for the night we stopped briefly at another magnificent waterfall a short walk up a side valley, few ferns here but by the side of the river was *Pityrogramma trifoliata* (formerly *Trismeria trifoliata*)(Fig.17).

The next two days were mainly taken up with driving. At a short stop south of Baeza we saw *Hymenophyllum ruizianum* amidst quite a few different lycophytes.

Our route travelled to the edge of Amazonia at Tena, where we crossed the River Napo, and Puyo before heading back west into the mountain chain again. We stopped the night in Banos. The following day was a longer drive south to Cuenca where Hugo had told us to expect a different flora.

The city of Cuenca was quite a revelation. It was steeped in history and the architecture was a wonderful remnant of its Spanish past. Our hotel was no exception. Skilfully discovered by Klaus it had an internal covered courtyard and was furnished with antiques throughout. A marvellous place.

The Cajas National Park which lies just west of Cuenca boasts a high level of endemicity , flowering plants and ferns. The latter did not disappoint! Our first stop was fairly near Cuenca in woodland around Lago Llaviucu at about 3200 metres. One of the ferns I most wanted to see on the trip is restricted to this general area. Hugo

said we should find it easily, he was right it was everywhere! The fern in question is *Lophosoria quadripinnata* subsp. *contracta*. It differs from normal *L.quadripinnata* by being much more compact, as the name suggests. It tends to grow in grassy places and sits with upright fronds, a bit brush-like! It is probably not as beautiful as the normal form but certainly an exciting variant. When asked, Hugo thought it might be a distinct species. Although closely related to the tree-ferns *Lophosoria* does not produce a trunk. Initially I only saw one plant of the Lophosoria but there was much else. It was good to see quite a lot of *Dryopteris wallichiana*, (Fig. 18) an indication quite a lot of plants from here might be hardy, although this form lacks the black spot at the base of the pinna. Is it the same as plants in cultivation??? Along the trail down to the lago the banks were festooned with drapes of *Lycopodium* species while the less steep area beneath was heavily populated with *Huperzia spp*. Several elaphoglossums were intermixed with the huperzias. Robbin has placed one of these with a scaly blade and an obtuse tip in the subsection *Muscosa*. Another Elaphoglossum here with less scaly and narrower leaves is probably *E.gayaunum*. Other species of *Elaphoglossum*, unfortunately, went unidentified. *Polypodium (Pleopeltis) buchtienii* was common running through the undergrowth. To me, a polypodium addict, this is a real beauty with pinnae irregularly lacerated, a little like *Polypodium australe*'Omnilacerum'. Other nice things included a polystichum, possibly *Polystichum boboense*, and *Asplenium monanthes*, and we still had not reached the lago!

On reaching the shoreline we followed a footpath through the trees, probably designed for birders. Never mind it gave us easy access! I ignored rather beautiful epiphytic orchids overhead to concentrate on a very boring lady fern. It was *Athyrium dombeyi* with a somewhat more deltate lamina than *A.filix-femina*, otherwise similar. Hymenophyllums on the trees sadly remained unidentified. A magnificent *Huperzia*, probably *H.linifolia* var. *tenuifolia*, hung down in a solid, club-shaped festoon of hundreds of stems, perhaps 1.5 metres long and 20 cm through at its widest part. On the ground was more *Dryopteris wallichiana* plus a Pecluma species, possibly *P.venturii*, and a couple of polystichums. One, an attractive palish green glossy polystichum, a little like *P.luctuosum* in shape, this might be *P.platyphyllum*, the other rather similar

Fig.18. ?*Dryopteris wallichiana* pinna, showing no black spot. Near Lago Llaviucu, Cajas National Park.

Fig.19. *Botrychium virginianum*.Near Lago Llaviucu.

Fig.20. *Sticheris simplex*. Near Lago Llaviucu.

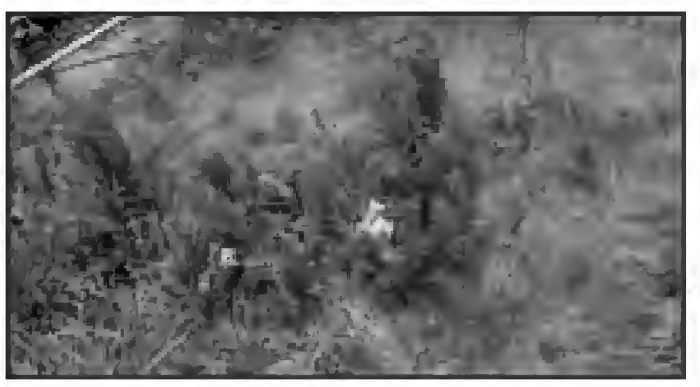


Fig.21. *Lophosoria quadripinnata* subsp. *contracta*, short colony up to 60 cm tall. Near Lago Llaviucu.

Fig.22. *Lophosoria quadripinnata* subsp. *contracta*, tall colony up to 2 m tall. Near Lago Llaviucu.

to the one we saw the first day which I have tentatively placed under *P. distans*. Another Northern Hemisphere fern, common in the United States, *Botrychium virginianum*, was scattered about through this wooded area (Fig. 19).

About 200 yards along this path through woodland we emerged into a cleared area. What a treat this was! We spent ages here. Discussing what species might be and which might be hybrids! The real eyecatcher was a pale green pinnate fern growing erect with indeterminate fronds about 30 to 50 cm high. This carpeted quite a large area. I think it is fair to say we all thought this was an exciting *Jamesonia sp*., certainly I did. However, I did photograph the underside of the frond and I was worried that the soral arrangement was not right. Eventually, to my amazement Robbin partially confirmed my suspicions by telling me this was in fact *Sticherus simplex*!(Fig. 20) I never knew any members of the Schizaceae could mimic a jamesonia so convincingly! Amongst the *Sticherus* were various lycopods including *Lycopodium(Diphasiastrum) thyoides*, and again, several elaphoglossums including one from subsection *Muscosa*. More exciting was a real *Jamesonia*, *Jamesonia cheilanthoides*, formerly this was an *Eriosorus*, but now all *Eriosorus* have now been sunk into *Jamesonia*. At this site the *Sticherus* was not in fact the highlight for me. The real star species was *Lophosoria quadripinnata* subsp. *contracta*. It was everywhere from little plants only 20 cm high to 2 metre high giants. The pinnae are crowded and the fronds almost perfectly erect. Rather like a dryopteris – but it is a great improvement on that! (Fig.21)The pinnae are tiled, that is they are turned close to horizontal and do not normally touch each other. If they were held in the plane of the frond they would touch. To add to its fascination the underside of the frond is silver as in the normal form of the species.

It was difficult to drag myself away from this area but time was running out and Ecuador is a country which never disappoints a pteridologist. Around the corner , near a stream, the trees were festooned with more unnamed elaphoglossums, and a very nice eriosorus, possibly *E.acrescens (*now *Jamesonia),* was weaving through the undergrowth. There was a pinnatifid polypod, rather like *Pleopeltis buchtienii*, but simply pinnatifid, <u>not</u> with lacerated pinnae. Another very scaly tripinnate *Eriosorus(Jamesonia)* unfortunately remained unnamed.

Fern exploration in the high Andes

Leaving the Lago Llaviucu valley we turned west and headed up the pass to Tres Cruces at 4170 metres (Fig. 23). En route, to my delight, hedgebanks were full *of Lophosoria quadripinnata* subsp. *contracta*. We didn`t stop though making straight for the col. Here we walked a short distance exploring amongst stones but there were few ferns. Mind you at that altitude we were soon out of breath and could not have walked very far!

Fig.23. Tres Cruces, summit of road west from Cuenca in Parque Nacional Cajas, 4160 m.

Species we did see at this exposed high altitude site included; *Polystichum orbiculatum* and possibly another alpine *Polystichum* species, *Grammitis (Melpomene) moniliformis*, *Campyloneuron*, possibly *C. angustifolium,* except it is unusual to see it on rocks so it may be a species of *Niphidium, Elaphoglossum matthewsii*, *Cystopteris fragilis* – looking quite unlike any European material and *Polypodium (Pleopeltis) buchtienii*,. The most remarkable find for me at this height was, however, *Lophosoria quadripinnata* subsp. *contracta*, surely it must be hardy in the UK if it can stand this climate at 4170 metres (Fig. 24). Is this the highest recorded altitude for a tree fern/ tree fern relative in the world?? (Robbin has since commented that it might be, although *Blechnum auratum* and a trunk forming *Plagiogyria* possibly grow higher in Bolivia. I would love to see the latter!)

Fig.24. *Lophosoria quadripinnata* subsp. *contracta*, at 4170 m.Tres Cruces.

This altitude was very tough on the lungs so we soon moved back down the pass to a park information centre and tea rooms. We took advantage of the tea rooms! After tea we split into two pairs. Paul and I walked back up the road aiming to get to a high altitude rocky wood. Unfortunately there were rather a lot of distractions en route and we had very little time in the target area. The highlight was a beautiful little *Asplenium*. At first it looked a bit like a *Jamesonia*, but closer examination showed it to be *Asplenium triphyllum*(Fig.25). Interesting how plants in exposed sites at high altitude in the tropics often evolve to have an erect habit. In this case we were at about 3950 metres. Growing in the same general area on the roadside bank were *Polystichum orbiculatum, Asplenium monanthes* or something similar, *Polypodium sp,. Jamesonia alstonii, J.cheilanthoides, Sticherus simplex*,*Lophosoria quadripinnata* subsp. *contracta, Grammitis moniliformis* and *Blechnum loxense*.

Fig.25. *Asplenium triphyllum*. Near Tres Cruces.

Dusk was beckoning so we headed down the hill but had one more stop to admire the *Lophosoria quaripinnata* subsp, *contracta* on the roadside. How curious that we saw not one plant of normal lophosoria all day.

The next day Thursday the 19th September we headed into the hills east of Cuenca on the road to the settlement of General Leonidas (I almost said the road to nowhere!!). Driving up a mostly unmade road, often on steep slopes, we were concerned about the amount of water in the rivers. It was raining intermittently, sometimes quite heavily so the potential for the road getting worse was a slight concern. Never mind, we climbed on and upwards. At infrequent roadside stops we saw masses and masses of *Lophosoria quadripinnata* subsp. *contracta,* but again no plants of the normal form. As Hugo had told us this plant was so common up this valley I will not mention it any more. An unknown species of *Amauropelta* (Fig.26) or other thelypteroid

Fig.26. *Amauropelta sp.* Below Collay.

genus was quite common. Considering I generally have little time for thelypteris-types I find this plant rather attractive. Superficially it looks rather like a choice alpine polystichum.

At the top of the pass at around 3500 metres *Sticherus simplex* was occasional and various *Jamesonia* species were common. Apart from *J.alstonii* we could not name them. *Blechnum loxense* was common and higher up *B.auratum* (Fig.27)was occasional. Puyas were everywhere in this valley, dominant almost like the Espelitias earlier in the trip(Fig.28). Eventually, despite the rain, I managed to get a photograph of a flower! A few plants of *Dicksonia sellowiana* (Fig.29,30)to me indistinguishable from *D.antarctica*, and *Plagiogyria semicordata* (Fig.31) were scattered over the hillside. On tree fern trunks there were a range of unknown Elaphoglossums and grammitids, although *Cochlidium serrulata* looked familiar. This identification is, however, suspect because the altitude here is much higher than its usual sites. A beautiful *Blechnum sp*. with new fronds bright red was common. It might be *Blechnum chilense* but I do not think so as it only occurred as single plants. I could see no evidence of a creeping rhizome. *Lycopodium (Diphasiastrum) thyoides* was hanging over some banks. On our way down I spotted the dreaded *Equisetum* again – this time the other side of the valley and completely inaccessible. It was presumably *E.giganteum* again. Pat was quite happy!

The rest of the trip was largely driving and admiring snow capped volcanoes. We did manage a foray onto the side slopes of Chimborazo but made no exciting finds. It is in a cold, dry area. The most interesting observation was cows in makeshift jackets to keep them warm! *Cystopteris fragilis* and *Pellaea ternifolia* grew on our hotel walls. The next day we made a similar foray into the Cotopaxi area near Quito. This too is in a dry zone, but we did find a few ferns by a lake, and Pat found *Azolla filiculoides* on it, and looking bigger than it does in the UK. The most interesting ferny fern looked like *Asplenium viride*. It was green stemmed and pinnate, although there was a slight sign that if better grown it might become pinnate pinnatifid. Robbin has since placed it under *Asplenium stoloniferum* which we have seen on BPS trips to Reunion and South Africa. It`s a very small world! On the same bank at about 3900 metres altitude we found a *Campyloneuron*, again probably *C.angustifolium*.

Fig.27. A very wet Klaus by *Blechnum auratum*. Collay reserve.

Fig.28. Typical high altitude scrub with abundant *Puja sp*. by the Collay reserve.c.3500m.

Fig.29. *Dicksonia sellowiana* recovering after disturbance by road repairs. Collay Reserve.

Fig.30. *Dicksonia sellowiana* crown, showing hairs on crosiers. Collay reserve.

Fig.31. *Plagiogyria semicordata*.Collay reserve

The next day we flew home. What a great trip!

We may have been hopping backwards and forwards over the Equator but quite a few ferns we saw do already grow in the UK climate; *Cystopteris fragilis, Azolla filiculoides, Lycopodium clavatum, Dryopteris wallichiana, Lophosoria quadripinnata, Botrychium virginianum, Asplenium monanthes,* not to mention *Osmunda sp*. which I saw in 2011. This list speaks volumes about other species which might be hardy here given the right garden niche. E.g. *Lophosoria quadripinnata* subsp. *contracta, Pleopeltis monosorum, P. buchtienii, Athyrium dombeyi, Pellaea ternifolia, Blechnum loxense, B. auratum*, various *Campyloneuron* and *Niphidium* species etc., etc., etc. ❐

Acknowledgements:

I am very grateful to my travelling companions for their company and pteridological input, especially Klaus who already knew many of the species from his vast experience in central America. In addition we are even more grateful to Klaus for all the administration he took on without really being asked. He sorted the car hire and most of the hotels. I think we would have struggled in wildest Ecuador with no real Spanish between us, we would certainly have paid more for the hotels without his bargaining skills!

After the event I sent some pictures of ferns that I did not know or was unsure of to Robbin Moran. He is the main specialist pteridologist for South America at the New York Botanic Garden since the semi-retirement of John Mickel. I am very grateful for the way he dealt with my enquiries. He was amazingly patient, and usually within 12 hours I had his replies which were marvellously clear. I am also very grateful for reprints on *Elaphoglossum* which he sent me. I found both very interesting and useful. These were:

Vasco, Alejandra, 2011. Taxonomic revision of *Elaphoglossum* section *Muscosa* . *Blumea* 56, 165-202.

Vasco, A., Mickel, J., and Moran, R.C., 2013. Revision of Neotropical *Elaphoglossum* sect.*Squamipedia (Dryopteridaceae*) . Ann. Missouri Bot. Gdn.99, 2 1-43.

Robbin has named and corrected a lot of my identifications but I have not asked him to check the majority. Any mistakes are totally my responsibility.

Underneath the arches – an urban fern odyssey

Fred Rumsey

Angela Marmont Centre for UK Biodiversity,

Natural History Museum, Cromwell Road, London.SW7 5BD

e-mail: F.Rumsey@nhm.ac.uk

It is the lot of the professional botanist that when the sun shines you will most likely be in an interminable meeting, hankering for the open air and a live plant or two. It was thus that I found myself back in March 2013 outside the Ramblers offices in Vauxhall and with a yearning to ramble. In the distance my usual train terminus beckoned and I figured I had just enough time to make it before it got too dark. The railway lines that carry me in and out of work into Waterloo snake parallel to the Thames, at this point crossing numerous minor roads, the low arched over-bridges and a degree of urban decay providing an excellent series of locations for wall ferns – dank, shady and sheltered. I knew that Nick Bertrand and John Edgington had previously walked some of these unloved streets, turning up amongst other things a huge clump of *Pteris cretica* high above the Lambeth Road and so I had hopes of seeing enough to make the trudge worthwhile.

Almost immediately, the first bridge I came to, (1/A27) New Springs Garden Walk, revealed a nice small plant of *Cyrtomium fortunei sensu lato* on its northern arch (TQ30437 78324), but far better was yet to come! Under Tinworth Street bridge (1/A25) where a strip-light let out a baleful glow above a seeping, slimy wall, there was evidence of the formation and passing of many a fern but still tenaciously clinging to life (and just about to the wall) was, amazingly, a small rather mouldy plant of *Asplenium marinum* (Fig.1) alongside an interesting looking *Asplenium trichomanes* and a very dead *Dryopteris.* This was the first Greater London and Surrey (Vc.17) record for this scarce native of coastal rocks. A return visit in August found it still alive but if anything looking even more disconsolate. London walls had provided new finds of the other nationally scarce Spleenworts, *A. septentrionale* and *A. obovatum* subsp. *lanceolatum,* in the last few years so the discovery of this felt a little like completing a set!

Fig.1 *Asplenium marinum* under Tinworth Street bridge, Lambeth (TQ30469 78430)

Salamanca Street was to prove comparatively disappointing, although the presence of the most frequent of the tunnel ferns, *Asplenium scolopendrium,* and lots of *Asplenium trichomanes* subsp. *quadrivalens* (still not very common on London's city walls, Edgington, 2007) was encouraging. Moving steadily eastwards Black Prince Road (bridge 1/ A20) had a rather stunted *Dryopteris filix-mas* on its sunnier aspect, lots of the frilly *A. trichomanes* already seen *(*which I kept hoping might be subsp. *inexpectans*!) and two more plants of *Cyrtomium fortunei*, one large, one small (Fig. 2).

Fig. 2 *Cyrtomium fortunei* - Black Prince Road bridge (TQ30663 78664)

Whitgift Street bridge produced nothing of note, but while finding a way through the recreation ground off Lambeth High Street, *Asplenium adiantum-nigrum* was found on an old wall top behind the coffee roasting plant (TQ3068 7886). The next road under the railway, Old Paradise Street (1/ A17), started to live up to its name, with 16 separate healthy clumps of *Adiantum capillus-veneris* on the north-facing walls (TQ30785 78874). I had previously seen two plants of this (still present) in the shade of the bridge at Upper Marsh, virtually below Waterloo station (TQ30951 79551) on a past ramble. My return visit in August to check on earlier finds also revealed huge populations of this delicate fern under the arches, on the north side of the railway line, used as parking bays in a secure area off Carlisle Lane (TQ3092 7926 to 3093 7933). (Fig. 3)

Fig.3. *Adiantum capillus-veneris* - Carlisle Lane, Lambeth.

I knew that Juxon Street bridge (A1/15) had had a small population of *Pteris cretica* that I'd previously found many years before. It was thriving (Fig. 4), young plants mingling with those of more abundant *Asplenium scolopendrium* in a wet seepage. Going north under the bridge it became apparent that the *Pteris* population extended onto the more exposed north-facing walls of the railway arches from TQ

Underneath the arches – an urban fern odyssey

3083 7897 to 3082 7895 – many very young plants and some bigger rather brown-ended clumps with little but *Buddleia* for competition (Fig. 5).

Like the single plant present under the strip-light at the next bridge, Sail Street (1/A14) (TQ30864 79020), these *Pteris* almost certainly have arisen from spores originating from the very big old plant still on the Lambeth Road bridge (1/A13), first found by Nick Bertrand (Fig. 6). He very resourcefully took a long ladder to it to gather a voucher-respect! This clump has led a chequered existence, battling

Fig. 4 *Pteris cretica* with *Asplenium scolopendrium* Joxon Street Bridge, Lambeth (TQ30848 78944)

Fig. 5 *Pteris cretica* plants scattered on W.N.W facing brickwork (TQ3082 7895)

for supremacy with a bracken plant in drier years and after cold winters it looks particularly tragic but when it is damper and milder it flourishes and the fertile fronds are 40cm or more long. Several smaller plants occur further under this bridge and also round the corner behind the pub on the S.E facing walls at TQ30915 79100.

However, the greatest surprise still awaited me. Tucked behind a rather leaky downpipe was a then rather battered *Dryopteris*-sized plant, which I immediately recognised from my Macronesian travels, was *Christella dentata*. The distinctly hairy fronds, the veination and sporangia (Fig. 7) were unmistakeable. I felt rather guilty taking material for a herbarium voucher but this was, after all, the very first

Fig. 6 *Pteris cretica* – Lambeth Road (TQ30909 79090).

time this plant had been seen as an escapee in the British Isles, or indeed anywhere north of Galicia. I was particularly relieved then, when on my return visit in August the plant was so clearly flourishing. (Fig.8). It will be interesting to see if this plant survives and whether the species then turns up elsewhere in sheltered, damp nitrophilous spots in greater London, or elsewhere.

All in all it had proved a rather exciting and highly productive ramble. It amused me that in all the years I'd been trundling on the tracks above I had been oblivious to the pteridological treasures which littered my commute, just metres from my train, but invisible from it. It just goes to show that it is well worth spending a little while exploring even the most unpromising areas and also the power of ferns

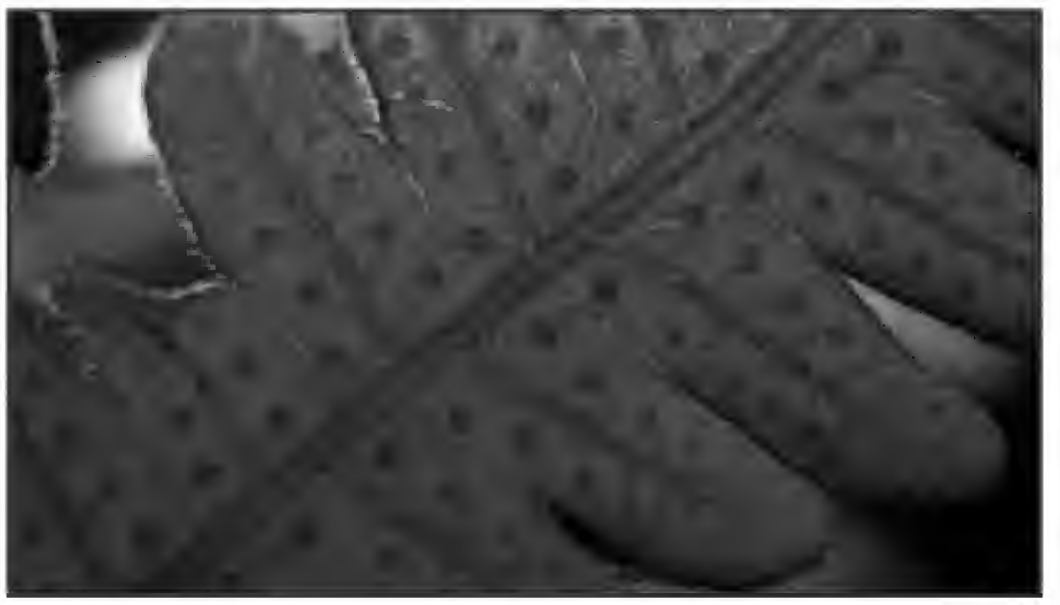


Fig.7 *Christella dentata* – veination and developing sporangia (Aug.2013)

Fig. 8. *Christella dentata* – Lambeth (Aug.2013)

to sow themselves in unlikely but conducive spots, even when these are many miles from the nearest spore source. To regard these plants as introductions, as for instance was done in the BSBI atlas (Preston, *et al.*, 2002), doesn't really capture the dynamic, admittedly often ephemeral, but un-assisted nature of these occurrences which give the city-bound pteridologist some succour.

References:

Edgington JA. 2007. Dynamics of long-distance dispersal: the spread of *Asplenium adiantum-nigrum* and *Asplenium trichomanes* (Aspleniaceae; Pteridophyta) on London walls. Fern Gazette 18: 31–38.

Preston, CD., Pearman, DA. & Dines, T. 2002. New Atlas of the British and Irish Flora, Oxford University Press, Oxford.

Cave ferns of Madeira

Neil Timm

The Fern Nursery, Grimsby Road, Binbrook. Linconshire LN8 6DH

e.mail: rtimm@fernnursery.co.uk

The village of Sao Vicente on the island of Madeira boasts a spectacular cave system, it is formed from ancient lava tubes made when the volcanic island first erupted, and the flowing lava cooled leaving behind it the holes in the rock from which it once poured. Recently in the last half century or so the caves have been opened to the public and artificial lighting has been installed, along with a spectacular, if somewhat quirky, visitors centre.

Fig. 1. An *Adiantum* species hanging from the cave roof.

While visiting the island recently we had to endure a very wet stormy day, and so we gave up on the ferning and went to see the caves instead, mainly because it seemed a good way to get out of the weather. However they proved to be more interesting than expected, not only because of the creative, (often, questionable) way the geology was presented, but also because the caves have been colonised by numerous ferns, which grow there thanks to the artificial lighting installed for the benefit of the visitors. The caves are slightly damp and drip with water here and there, so that there is moisture enough for plants to survive; though there are no stalagmites or stalagtites since the volcanic rock does not contain any suitable water soluble minerals. There are also some pools of standing water, though these seem to have been made with the aid of concrete dams, (like I said 'questionable'). The ferns however all grow within half a metre of the lights at most, and seem to belong to just two genera *Adiantum* and *Cystopteris*, of which the Adiantums were by far the most common. They grew on most of the surfaces, though most of the plants were small and had the look of immature sporelings. Perhaps they were living on the limits of low light tolerance, and were unlikely to grow strongly.

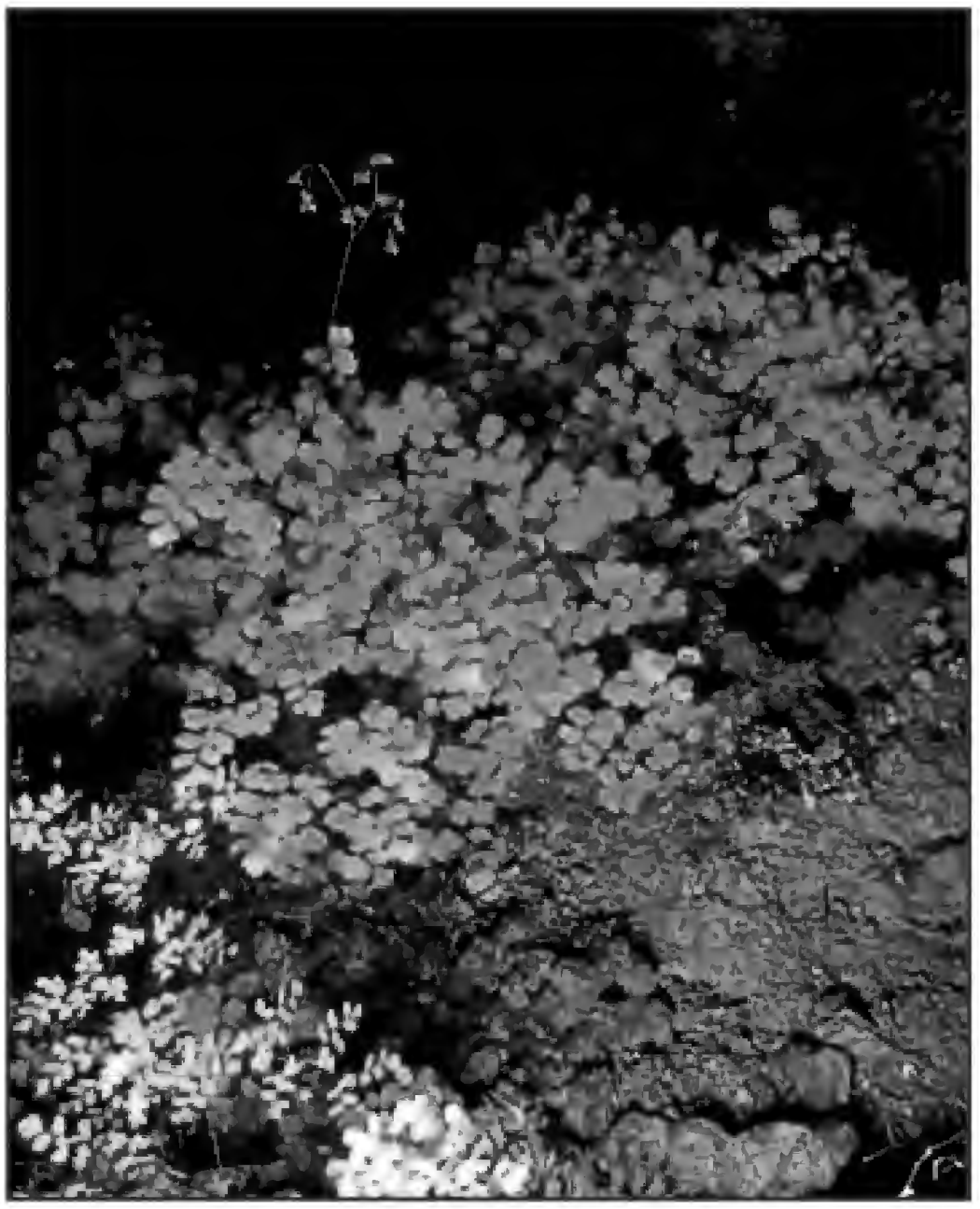


Fig. 2. Another *Adiantum* species growing on the cave wall.

It was however of course quite astonishing that spores could have found a way into a virtually draught free environment, down narrow tunnels, to reach a point tens of metres from the surface and could then grow just by the artificial light of electric bulbs. That they have done this in just the few decades since the light were installed says a lot about the potential of ferns as pioneer plants. I took several photographs but regret to say that I failed to note what type of bulb was being used to light the cave. Outside the caves around the visitor's centre there is an excellent garden where ferns, especially tree ferns, predominate, and the operators are clearly aware and proud of the troglodyte ferns as a novelty, since the guide pointed them out for the interest of the whole group during the tour.

(For more details of these caves, please see:-
http://www.madeira-web.com/pagesuk/caves-sv.php Ed.)

Starting in Ferns

Patrick Acock

13 Star Lane, St Mary Cray, Kent BR5 3LJ

e-mail: pat.acock@virgin.net

Going to your first indoor meeting of the Fern Society can be very intimidating for most people. It is not quite so bad if you go with someone. When you arrive you are in a room of strangers with what you think is the only common ground an interest in ferns but everyone else you think is an expert and you are not.

Most people in the room will rush here and there chatting to various clusters of people and a few will speak to you and ask who you are and where you are from and then have to rush off.

Someone (Jennifer Ide) once said, "Fern people are probably the friendliest people in the whole world." I can concur with this statement. I now know many fern people from all over the world. One or two by correspondence only but the great many by going to meetings or from field experiences.

And yet it was not always so. Would you believe this, it took the best part of 15 years to arrive and my hope is that in writing this it does not take you so long. I had been introduced to the society by Frank Brightman who was an education officer at the Natural History Museum. On my arrival at a day meeting in London, Frank would be the only person I knew and his real love was lichens. I would stand around waiting for the meeting to start and was usually interested and stimulated by the content of the talks. At lunch time I would once again hang around with the odd person passing the time of day. At the end of the day I would beat a hasty retreat to the suburbs avoiding the conversations which sounded even more intimidating and elitist.

One Christmas paying my subscription for the umpteenth time I thought I should make a step forward or I would never

Fig.1. Every, allowed, spare space filled with ferns at home. Obsessive?

Fig.2 Fern hunting in Ecuador Sept. 2013 with friends Martin Rickard, Klaus Mehltreter and Paul Ripley. It can be freezing on the Equator if you are high enough up.

Fig. 3. Remy Prelli, author of the book, Pat Acock and Paul Ripley examining *Dryopteris cambrensis* in Somerset, August 2013.

make any progress. I spoke to my brother and as the venue for the weekend was near a steam railway dear to both our hearts, I talked him in to coming. Clive Jermy my future mentor was leading the meeting and I had met him as a young man at the 1972 symposium dashing about the place trying to meet all the new people in the world of ferns. It was at this meeting after dinner when the power failed and we stepped out into the darkness that Paul Ripley came stumbling out of the darkness down the path and the rest as they say is history. Later we found out that we both had a similar history in the society up to this point.

That Christmas Clive invited Paul and myself around for tea with our spouses and spoke of us starting up a S.E. regional group. Of course Paul and I did not realise that after the first year we would be leading it. It is in becoming involved that we will feel we belong.

The regional groups and national meetings will help to establish these relationships and help us to learn about ferns. I always felt at school and university listening to and asking questions of my teachers was a much quicker way to learn than reading about things in a book. This was because I rarely found time for homework or assignments. In fact while I was training to be a teacher, I took time five days out to go to the fern symposium of 1972 despite being a total novice. At these meetings do not hesitate to ask questions on identification and any aspect of ferns you want to know. On one field meeting I went to I took my 7 year old son, John. It was based at Treborth, University of N. Wales. Our leader Nigel Brown, head of the Botany School there, was a teacher *par excellent* and John and I were

in the labs with him until past 10:30pm on the Bank holiday Monday. Such generosity from such a busy person. Nigel was the one who showed me the difference between *Equisetum arvense* and *E. palustre* and then went on to show me other Equisetums. Now you know who to blame for my lifelong love of the plants since then!

Good books are a great way into identification. The very best as far as I am concerned is Remy and Annie Prelli's *Les Fougères et plantes allies*. The layout and the photographs are stunningly beautiful and if you have the fern in front of you to compare with the photograph you cannot go wrong. Others include *Ferns of Britain and Ireland* C.N.Page with very good descriptions, *The Illustrated Field Guide to Ferns and Allied Plants of the British Isles* Clive Jermy and Josephine Camus with excellent line drawings to help identification, *Welsh Ferns* G. Hutchinson and B.A.Thomas and *The Fern Guide* James Merryweather and Michael Hill. Some of the best guides are over 100 years old and include *A Popular History of British Ferns* Thomas Moore and *A History of British Ferns* Edward Newman, which has some excellent line drawings as well a detail as to where to find ferns.

It is interesting that when 8 people were asked to bring the fern book to a meeting on books and to say why they were influenced by it 3 out of the 8 brought *The Observer Book of Ferns*. It is a great shame that we do not now have such a book so freely available and in every W. H. Smiths so that someone who has an inclination they might become interested would see it and eventually pick it up and their race to learn begin.

Growing ferns, especially from spores or bulbils is another way to develop your interest. Many of the great

Fig. 4. My son Richard showing me around the Peel Forest, New Zealand February 2013.

Fig. 5.Jose-Luis Perezcalo, a newish member ferning with us in Corsica May 2013.

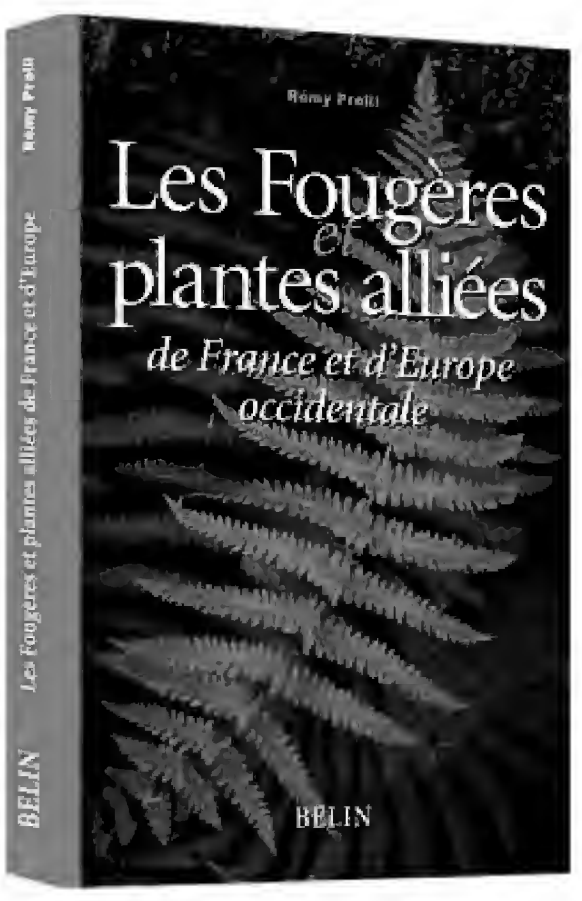


Fig. 6. Remy Prelli's highly recommended Fern Book.

fern people in the world have ferns in their gardens. You learn a considerable amount from watching the young ferns develop. You also learn how genera of ferns look as immature plants as well as learn the key identification characters and know what to look for in the wild.

One word of warning. Try not to become an obsessive. One wag on hearing a member had a new girlfriend quipped, "She will soon realise there are three in this relationship him, her and the ferns." I thought when I retired I would have time to do all the things I like doing and started off well but soon found that my interests of a former lifetime of steam railways, Pre-Raphaelite poetry and painting, music, football, science fiction, classic novels and history, were being squeezed. All this can add pressure to relationships and can help us to become fern bores. Some of us have become obsessive collectors of fern books which soon fill up our houses, others book holidays only where the ferns are good; this is usually where the weather can be damp. Our friends tend to be of the fraternity and all these can add to tension with our partners and will mean a lot of tolerance needed on both sides.

Remember, try to go to your first meeting as soon as possible to obtain the best out of your society. And make yourself known. Paul and I were at the Group for European Pteridologists in Corsica and were joined by a new young Spanish member, Jose Luis Perezcalo. It was his first fern meeting but he had a broad knowledge of natural history and he was never afraid to ask questions. It was a delight to see one so young developing his interest so quickly and with no inhibitions. I hope you will be more like him and not like me.

A gemmiferous form of *Asplenium lobatum* Pappe & Rawson found in South Africa.

Tim Pyner

182 Southchurch Boulevard, Southend-on-Sea, Essex. SS2 4UX
e-mail: t.pyner@byinternet.com

In February 2012 I had the good fortune to be able to visit South Africa with the BPS. It was a fantastic meeting with many ferns seen in the wild. The trip was based mainly in the Drakensberg range and a variety of habitats were explored. Details of the field meeting are reported in the BPS Bulletin Vol. 7 No. 5 (Ide et al. 2012).

One of the most species rich genera in South Africa is *Asplenium*, the spleenworts. 35 species are accepted in the most recent fern flora (Crouch et al. 2011). In addition some species are further divided into subspecies and varieties. Over the two week trip the BPS group managed to find and identify 19 species and 5 sub-taxa of spleenworts. Surprisingly, apart from members of the *A. aethiopicum* complex, most were easily identified.

Fig. 1. *Asplenium lobatum*. Typical form with single crown.

Photo: Andrew Leonard.

One species that was frequent in the evergreen *Podocarpus* forests was the attractive *A. lobatum*. Several dark green bipinnate fronds emerge from the erect rhizome forming a loose crown. The fronds are usually 30-40cm in length with a 5-10cm dark brown stipe turning greenish in the rachis. The pinnules are rather broad and obtusely lobed with elongated sori. Plants occurred singly or in small colonies on shady banks or the forest floor. Past classifications have included this as a variety of the simply pinnate *A. erectum* but it is now considered a good species (Schelpe & Anthony(1986),(Crouch et al. (2011)). Although plants we saw were fairly uniform, the species becomes more variable northwards into Zimbabwe, Malawi and Mozambique. Here the fronds can be much more divided, tripinnate to quadri-pinnatifid with narrowly linear ultimate lobes. They can also be strongly gemmiferous. The gemmae or proliferations form leafy plantlets at the junction of the stipe and rachis. These finely divided, often gemmiferous forms have been separated as variety *pseudoabyssinicum* Schelpe & N.C. Anthony. This variety is quite distinctive and Burrows (1990) even considers it deserving of specific or subspecific rank. Recently, Klopper et al.(2008) reported the occurrence of var. *pseudoabyssinicum* at 2 localities in South Africa, in the provinces of Limpopo and Mpumalanga, south of Zimbabwe. These plants are 3-4 pinnatifid but no gemmiferous forms have been discovered. However the plants illustrated in Crouch et al. (2011) appear to be less divided than those illustrated in Burrows(1990) or those I have examined in the Natural History Museum Herbarium (BM).

Fig. 2. Gemmiferous colony of *Asplenium lobatum*.

On 29th February 2012 the BPS party visited the Royal Natal National Park, KwaZulu-Natal. A keen sub-group set out for the Gudu Falls, a spectacular waterfall several kilometres along an ever steepening trail. As we neared our goal I was briefly distracted by some ferns on a large rock and lost site of the remaining group. As I moved on I reached a fork in the trail and realising that I had no way of knowing which direction to take decided to stay put until the group returned. I took the opportunity to study some of the ferns in more detail and one colony in particular caught my eye. It was obviously a bipinnate *Asplenium* but not one I recognised. Furthermore it was producing copious gemmae at the junction of the stipe and lamina and these were clearly rooting and forming a spreading colony. It did not seem to match any species in Crouch et al.(2011). On rejoining the group I found out that Alison Evans had also noticed the strange fern and asked our leader, Allan Nel, what it was but he was also uncertain to its identity. I had collected a frond for further study and later that evening we concluded that it was most likely a form of *A. lobatum* but without further evidence we could not be sure.

A gemmiferous form of *Asplenium lobatum*

I returned home with a lasting impression of South Africa, the huge variety of ferns, amazing scenery and fascinating cultures. Above all, the knowledge and hospitality of our leaders Jolanda and Allan Nel was outstanding and I promised to myself that I would return. This ambition was realised far more quickly than I expected and I was able to re-visit South Africa in January 2013 accompanied by Martin Rickard and Andrew Leonard. Jolanda and Allan were again fantastic hosts and guides and we were able to explore several new areas as well as returning to some of the sites visited the previous year. I was still intrigued by the strange *Asplenium*. Further research had indicated that we had been correct in equating it with *A. lobatum* however there was still an unanswered question. To which variety did it belong?

Fig. 3. *Asplenium lobatum.* Fronds of gemmiferous form.

Photo: Andrew Leonard

Needless to say I was keen to re-visit the Gudu Falls and carry out further investigations. This I was able to do on 28th January 2013.

The site was a few metres from the rocky stream exiting the plunge pool of the waterfall, under a light canopy of Yellowwood (*Podocarpus latifolius*). The main colony was on a rocky bank, c. 1 metre in extent. 2-3 sub-colonies occurred nearby that had clearly established from the proliferations. One other small colony was seen about 10 metres distant. This may have established from spores although gemmae could have been spread by wind or animals. The fronds were all bipinnate and matched those of var. *lobatum*. Most fronds were strongly gemmiferous and the colony was clearly spreading vegetatively. The size of the colony indicated that it was not very old and may have spread from other undiscovered plants nearby. Alternatively the gemmiferous habit could be a genetic character that can arise sporadically in both varieties but is expressed more frequently in var. *pseudoabyssinicum*.

From these observations I conclude that gemmae can be found in both varieties of *A. lobatum* and that the evidence supporting the recognition of var. *pseudoabyssinicum* as a separate taxon is weakened. It is not recognised at any rank by Roux(2001,2009). This appears to be the first record of gemmiferous *A. lobatum* for South Africa.

Of further interest, during my examination of herbarium specimens at BM I checked the folder of *A. abyssinicum* Fee, a superficially similar species found in tropical Africa. Several collections from Zimbabwe were clearly *A. lobatum* var. *pseudoabyssinicum* and therefore other records of *A. abyssinicum* from countries south of Tanzania may need to be checked or confirmed.

Fig. 4. Frond showing plantlet at apex of stipe.

Photo: Andrew Leonard

Acknowledgements

I am very grateful for the kind help and hospitality of Jolanda and Allan Nel prior to and during my trips to South Africa. Without them the visits would have been improbable and far less enjoyable. Also my thanks to Alison Paul at the Natural History Museum who has been of great help during my visits to the herbarium.

References:

Burrows, J.E. (1990) *Southern African Ferns and Fern Allies*, Frandsen Publishers, Sandton.

Crouch, N.R., Klopper, R.R., Burrows, J.E., & Burrows, S.M. (2011) *Ferns of Southern Africa*, Struik Nature, Cape Town.

Klopper, R.R., Nel, J., Klopper, A.W., & Smith, G.F. (2008) *Asplenium lobatum var. pseudo-abyssinicum*, A new record for South Africa, *Bothalia* 38(2) 144-146.

Roux, J.P. (2001) *Conspectus of Southern African Pteridophyta*, Report No. 13, SABONET, Pretoria.

Roux, J.P. (2009) *Synopsis of the Lycopodiophyta and Pteridophyta of Africa, Madagascar and neighbouring islands,* Strelitzia 23, SANBI, Pretoria.

Schelpe, E.A.C.L.E. & Anthony, N.C. (1986) *Pteridophyta* in Leistner, O.A. *Flora of South Africa*, Dept. of Agriculture and Water Supply, Pretoria.

Finding the Holly Fern (*Polystichum lonchitis*) on Hutton Roof, Cumbria.

Bryan J. Yorke
9 Glebe Close, Burton-in-Kendal, Cumbria LA6 1PL.
e-mail: bryan.yorke@sky.com

A developing interest in the natural world

If someone had asked me five years ago what was a Holly fern, or even *Polystichum lonchitis*, I would, without doubt, have been left standing there with gaping mouth and pondering as to what they were on about!

Again, if five years ago someone had asked me where Hutton Roof was, I just would not have had a clue. It could have been in the far south of England or to the far north of Scotland, I really had never heard of the place.

Although born in Beckenham, Kent, I spent 62 years of my life in a East Lancashire mill town called Haslingden which lies at the head of the Rossendale valley.

From a very young age, I was generally interested in nature, especially in ornithology. This has become a lifelong interest, which has developed over the years and continues to give me so much pleasure, with the added bonus these days of a far greater understanding of life, together with a more sympathetic view to the natural world as a whole.

It was around the 1980's when my interest became more serious. By then I was making more detailed notes and keeping diaries in relation to experiences with avifauna, fauna and flora, and I also had started to include poetry and prose and the odd sketch here and there. Apart from ornithology, other fauna and flora did play some part, but it was more or less kept to the background and was based purely on a keeping notes and records of what was about and where; nothing too detailed or scientific. I can't remember ever making notes on ferns although I did occasionally make records of fungi and lichens and local flowers.

Leaving Lancashire and settling in the South Lakes

It was in 2009 that everything was to change, when our daughter mentioned to us that she and her husband were seriously considering moving to the South Lakes. Would we be interested in moving with them and sharing their large rented accommodation? She showed us the property they had in mind, which was in Burton-in- Kendal. For us it did not take much consideration, as we were quickly approaching retirement and thought this would be a lovely place to live. We had always had a deep passion for the Lakes and its most special landscape, together with its associated limestone features (Fig.2) and some of the country's rarest flora right on the doorstep. So, soon afterwards we put our house up for sale and moved to Burton-in-Kendal. Four years on, and I can say it's the best move we could have possibly made at that time. And for sure nowadays I can tell you exactly where Hutton Roof lies. It can't be bad when you just live at the base of it!

Nature Study from a "new" area

Getting out on most days investigating Hutton Roof and meeting up with other local nature lovers, I quickly learned about all the beautiful flora in the area, with its magnificent orchids and other rare flowers. I was fortunate to learn about some of the rarities of the area which included: Birds Foot Sedge (*Carex ornithopoda*) (Fig.1) ,*Polypodium australe*, Limestone Polypody fern (*Gymnocarpium robertianum*), the Rigid Buckler Fern (*Dryopteris submontana*) and the aspleniums. I clearly remember my ears pricked up on hearing tales about the long lost "Holly Fern" (*Polystichum lonchitis*) in the local vicinity. I think this wetted my appetite to bring the search of the Holly Fern to the top of my agenda.

Fig. 1. *Carex ornithopoda* (Birds Foot Sedge). One of the rarities of Hutton Roof.

Fig. 2. Limestone pavements on Hutton Roof showing grikes[1].

Finding the Holly Fern (*Polystichum lonchitis*) on Hutton Roof, Cumbria.

Fig. 3. The trig point[2] on the summit of Hutton Roof.

History of the Holly fern on Hutton Roof.

Mr J. A. Wood recorded this rare species on Hutton Roof in 1957. A frond sample was collected at that time and placed in the Lancaster University herbarium where it has remained ever since. Although there have been various searches to try and locate this rare plant, especially within the last 20 years, no further evidence was found of its existence and subsequently many thought that the plant had become extinct on Hutton Roof.

The only reference I had of the original record was a comment "deep grike[1] near to the trig point[2]"(Fig.3). (Since writing the above, my subsequent television appearance on BBC regional news, prompted Mr. Tony Wood to get in touch with Cumbria Wildlife Trust on November 13th 2013 and his details were then passed on to me. Since then we have been in touch with one another and he kindly sent me his original sketch from 1957.)

Searching and finding the Holly Fern in 2013

During the three years from 2011 to 2013 it has been the most important of my "target species" to try and locate the rare Holly fern *(Polystichum lonchitis)* on Hutton Roof. I have spent numerous hours searching various areas close to the trig. point[3]. Why the trig. point[3]? Well that was the only lead I had to go on which could help in finding the actual location. I was originally told on good authority that it had been recorded in the past "somewhere near the trig. point". So it was a question of working blind around that area.

Although I had spent a lot of time during 2011 and 2012, looking specifically for this species, the outcome had always proved negative, yet beneficial in other ways as I was able to locate other interesting species in the area which I had previously been unaware of.

Thankfully during August of 2013, I was given further details of the original record and on this new information I noticed that the actual comment read *"deep grikes[1] just N of trig point[2]".*

It was reading the "N" for north that made all the difference. With this new information I could specifically concentrate my search in that direction, rather than having to work blind and take pot luck.

So on Friday 23rd August 2013 the search was on with even more vigour. That first day was spent searching out all areas near to the trig. point[2] on a northerly line. This meant trying to access and survey the nearby limestone pavement which was massively overgrown with vegetation, resulting in limited access, although I still managed to get a reasonable account of the area. My main target species eluded me, although I did find several locations for the Black Spleenwort (*Asplenium adiantum-nigrum*), which had never been recorded in this area.

The second day of the renewed search was the Bank Holiday, Monday, 26th August 2013, when I extended the northerly radius by another 50 yards or so (~50m) bringing me to an area to the north/north west of, and some 10-20ft (3-6m) lower than, the pavement I had searched previously.. This new area was mixed, with rank moorland grass and bracken, then fragmented pavement (near a man-made cairn) and some solid pavement beyond.

The area near the cairn was scoured and I was making notes of new finds of Angular Solomon's Seal (*Polygonatum odoratum*) and the Common Rock Rose (*Helianthemum nummularium*). After a lengthy search, without success, it was now time to give up the search for yet another day.

Finding the Holly fern.

However at that very point when I had decided to call it a day, something very strange happened and it was as if I was being forced to stop in my tracks to take a final look around. It felt as though I had no control in the matter, I just had it to do it. So stop I did, and directly in front of me (within 6ft (2m)), I started to stare at a *Polystichum* specimen, not sure at first, thinking perhaps it was just another *aculeatum*, and pondering in my mind for a short while, then realizing, that what was in front of me was that very special fern, the Holly fern (*Polystichum lonchitis*). An instant excitement came over me, which I would find so difficult to explain in words, but it certainly was overwhelming to say the least. Amongst this nervous excitement, I managed to take photos, in fact, many photos from all positions and depth of fields including macro shots (Fig.4). I got my notebook out and made notes of a gps reading, a sketch plan, etc etc etc.

After perhaps some twenty minutes aborbing all this "good feeling" I thought it was time to go home. On my way I phoned, then later called in to see, Alec Greening of the BPS, to show him the photos. He was as excited as me with my find, whilst at the same time confirming that without doubt the plant was the long lost Holly fern.

Fig 4. The first sight of the Holly fern (*Polystichum lonchitis*) after 56 years.

"I searched out that "revered of ferns" year in year out,

A record in 1957, with frond preserved in herbarium,

Since then it's remained a mystery and thought to be extinct!

Until now in 2013 when "Holly" was "ferned" again"

Finding the Holly Fern (*Polystichum lonchitis*) on Hutton Roof, Cumbria.

The Plant *in situ* and the habitat

This rare fern lies at approximately 884 ft (270m) above sea level, which makes it a very low altitude record for this particular species, which is rarely seen below 1,600ft. (488m) Dr. Geoffrey Halliday (the County Recorder), to whom I have already showed the plant, thinks that it is the lowest recorded altitude for this species in the British Isles and that it could well be the lowest ever recorded in Europe.

The plant is situated in a crevice of a fragmented piece of limestone pavement (Fig.5)

As you can see, the fern is growing out of a small crevice in the limestone with the fronds pointing north and growing erect to horizontal.

Within about 3ft (1m) there is a 4ft (1.3m) deep grike[1], which can be seen to the right hand side of the photograph above. There is no evidence of *P. lonchitis* in this grike[1] or, for that matter, any others close by. I mention this purely because the original record from 1957 mentions "deep grikes[1] just N of trig point[2]".

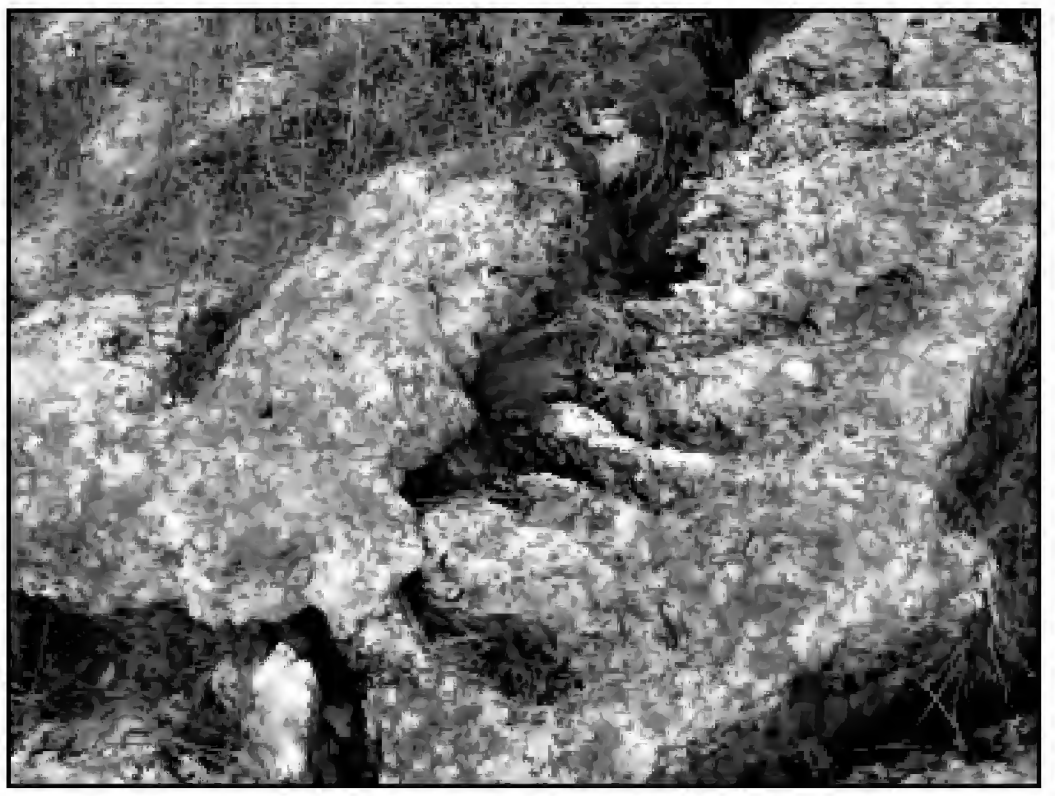


Fig.5 The location of the first Holly fern found at an altitude of 884ft.

Looking at the fronds, there are 7 fronds in total, 5 grouped together and then another two fronds about 6"(15cm) apart from the others. Each frond measures approximately 13" to 15" (33cm to 38cm) from tip to root.

On the day of finding (August 26th 2013) most of the fronds had sori on the upper half of the frond, as shown in Fig.6.

Fig.6. Sori showing clearly on the underside of the frond.

In the immediate vicinity of the Holly fern, the following plant species were recorded: Maidenhair Spleenwort *(Asplenium trichomanes)* intermingled with the Holly fern, bramble *(Rubus fruticosus)*. Hawthorn *(Crataegus monogyna),* Guelder Rose *(Viburnum opulus),* hazel *(Corylus avellana).* and Hard Shield fern *(Polystichum aculeatum)* all occur within a 5ft (1.5m) radius.

Fig. 7. Black spleenwort (*Asplenium adiantum-nigrum*) found near the site of the Holly fern. This has never been recorded in this area before.

The local area does support numerous specimens of Hard Shield fern (*Polystichum aculeatum*) very close to the Holly fern (within a 50ft (15m) radius). Other local ferns found in a 200 yard (180m) radius include; *Polypodium vulgare*, *Dryopteris submontana* (locally common), *Gymnocarpium robertianum* (several locations), *Asplenium trichomanes* (locally common), *A. adiantum-nigrum* (up to ten locations)(Fig.7), *A. viride* (one location only)(Fig.8) and lots of *A. scolopendrium*. Other flora in the vicinity include both Angular Solomon's Seal and Lily Of The Valley (*Convallaria majalis*), as well as Common Rock Rose and both Broad Leaved Helliborine (*Epipactis Helliborine*) and Dark Red Helliborine (*Epipactis Atrorubens*).

A further specimen of the Holly fern

On Tuesday 17th September 2013, I found another specimen of this rare fern, which I have now named Holly fern 2, and this one seemed to me to be a even nicer looking specimen than the original, This new plant was growing intermingled with a Hard Shield fern (*Polystichum aculeatum*); in fact the outer fronds on both sides were of the Hard Shield fern, whilst the Holly fern fronds were central to the clump. This is probably why I had missed it during my searches

Fig 8. Green spleenwort (*Asplenium viride*) found near the site of the Holly fern. This fern has not been recorded in this area for at least 15 years.

for the Holly fern, although I had walked passed it several times (Fig.9). This plant is approximately 40 yards (37m) to the east of Holly fern 1 and was lying almost level to the fragmented limestone floor making it even more exposed to the elements than the previous record.

This plant had eight fronds which were slightly smaller in size to the previous find, and they were of a deeper green colour.

This plant was also different in that it faces to the west (not north like the other one). It is also shielded from the east by a hazel bush, although a visit during late December when the hazel leaves had blown, made the plant look very exposed.

Within 3 to 4ft (~ 1m) of Holly fern 2 is another deep grike[1] of approximately 6ft in depth. (It is more than likely that the old 1957 record comes from here – more details in next section).

Fig.9. The author and the second Holly fern found on Hutton Roof.
(Photo: Andrew Walter - Cumbria Wildlife Trust)

"It's made my day,

No! It's made my week,

In fact it's made my year!

Holly fern here, and holly fern there.

I can't give up now, the search is on,

To find that holly fern everywhere".

Original 1957 record in relation to current 2013 records

It has now become clear that neither of the two recent specimens are growing in the exact location referred to in the original 1957 record (Mr. J.A. Wood), since the original record states that they were in fact down a deep grike[1].

Also, Mr. Tony Wood (the original finder), confirms that his original record is definitely not of any of the current

Fig. 10. Details of the second Holly fern.
(Note that *Polystichum aculeatum* is growing very close to this fern - a chance of a hybrid? AEG)

plants. In fact he can remember that his was about 18" (45cm) down and coming out from the side of the grike[1] and that it was in a very protected position.

After considering Mr. Woods' original sketch (Fig.11) and after showing him several photos of the current day alignments in relation to his sketch, it very much looks as though the original (1957) plant could have been in the deep grike[1] which lies within four foot of Holly fern 2.

For now we are happy to conclude that this could well have been the original area were the 1957 record was made. ❒

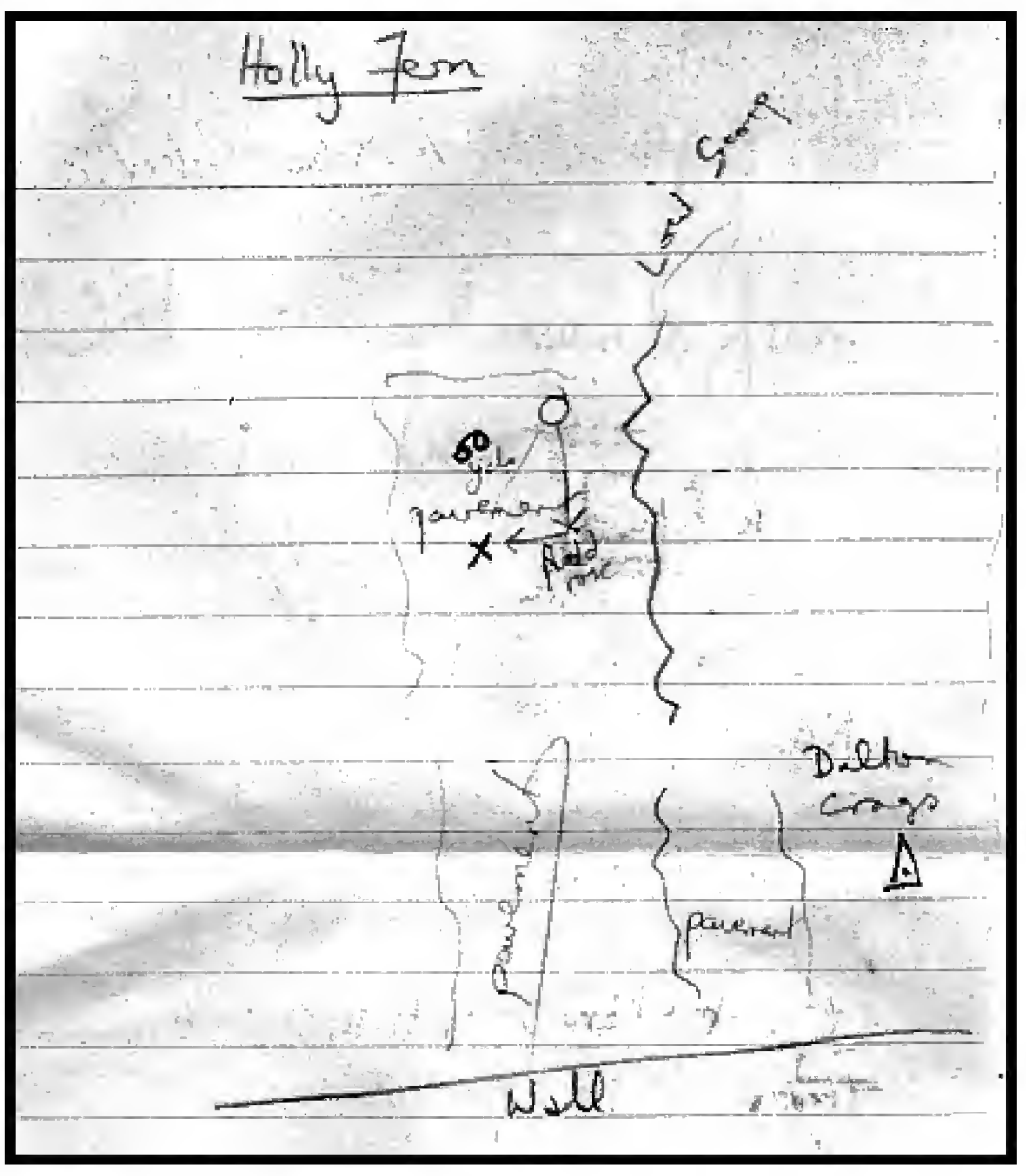


Fig. 11. The original sketch of the 1957 record.

Footnote:
1. Grike (Gryke) : A deep fissure in limestone pavements

2. Trig Point: Triangulation Point

Artificial Hybrids of *Asplenium*

Rolf Thiemann

Im Tuessenberg 10, Altena, D-58762 Germany

e-mail: rolf.thiemann@arcor.de

In the last issue of the Pteridologist I wrote about some artificially made *Polystichum* hybrids. Now I will present some self made hybrids in the genus *Asplenium*. Whereas some of the *Polystichum* hybrids had been known from nature (*P.* x *potteri*, *P.* x *lesliei*) or had also been described (*P.* x *arendsii*) the described hybrids presented here were unknown until now, as far as I know.

All hybrids presented here are between "normal" Aspleniums and *Asplenium* species of the group *Phyllitis/Camptosorus*. The success in producing the following described hybrids are one reason more to unite the genera *Phyllitis* and *Camptosorus* under *Asplenium*.

Asplenium scolopendrium x *A. cuneifolium*

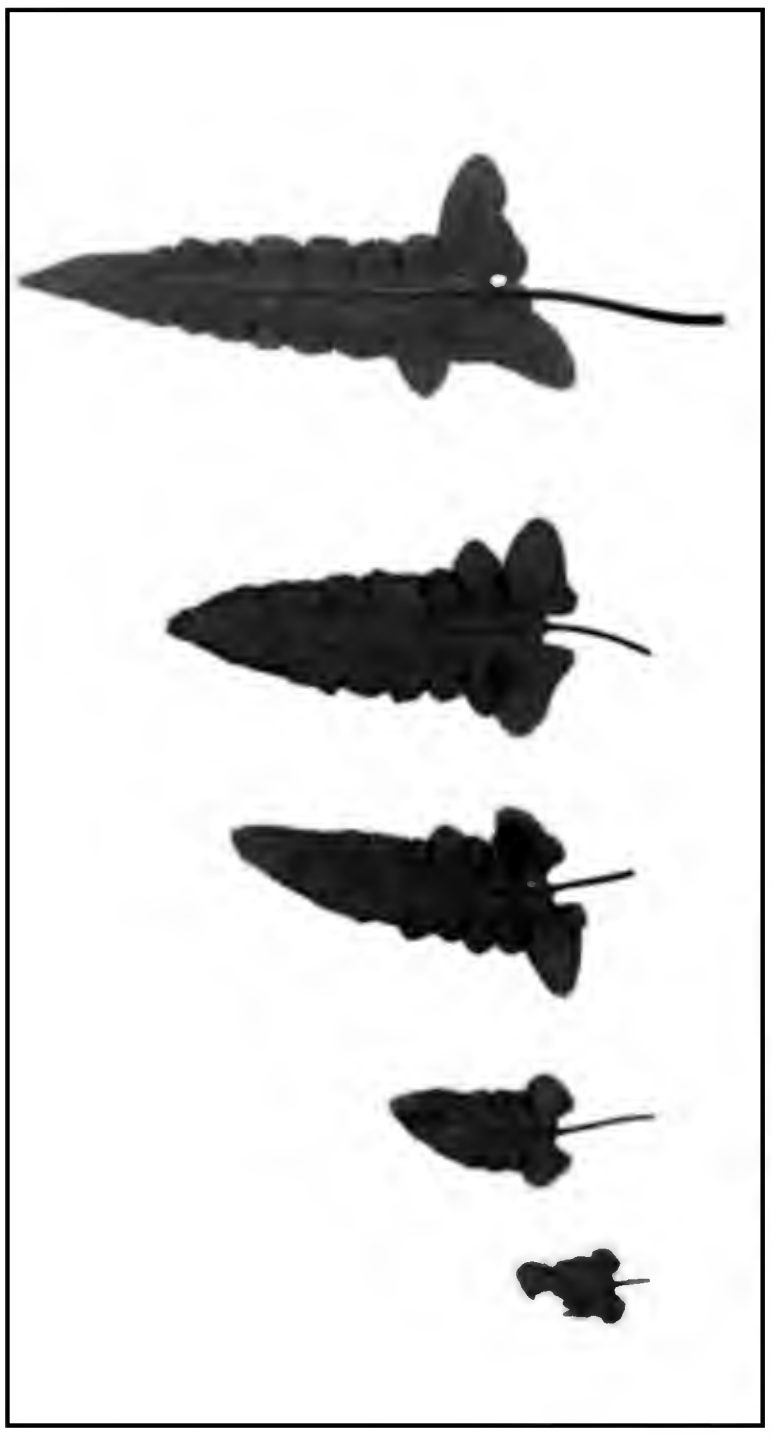


Fig. 1. Development of *A. scolopendrium* x *cuneifolium*

This was my first successful *Asplenium* crossing (2001), for which I used the European diploid subspecies of *A. scolopendrium*. The fronds of the hybrid are a paler green than those of *A. scolopendrium* and are also much smaller in size. Most fronds are not larger than 6´´and are more like *A. scolopendrium*. The fronds show two types of shape. Some are arrow-shaped but the majority are only slightly lobed (see figure 2). The fronds are toothed. This is inherited from *A. cuneifolium* and is quite distinct. The hybrid is sterile. This is normal for a hybrid but what is remarkable is the high degree of sterility; the sporangia fall away before they are fully grown (see figure 6).

The plant is slow growing and needs a fair amount of attention. Lime in the substrate is necessary.

Fig. 2. *A. scolopendrium* x *cuneifolium*. Two types of adult fronds.

Fig. 3. *A. scolopendrium* x *cuneifolium* in the garden

Fig. 4. *A. scolopendrium x cuneifolium*. Young frond in spring

Fig. 6. *A. scolopendrium x cuneifolium*. The dried up sporangia

Fig. 5. *A. scolopendrium x cuneifolium*. The toothed margins

Artificial Hybrids of *Asplenium*

Asplenium obovatum* ssp. *obovatum* x *A. rhizophyllum

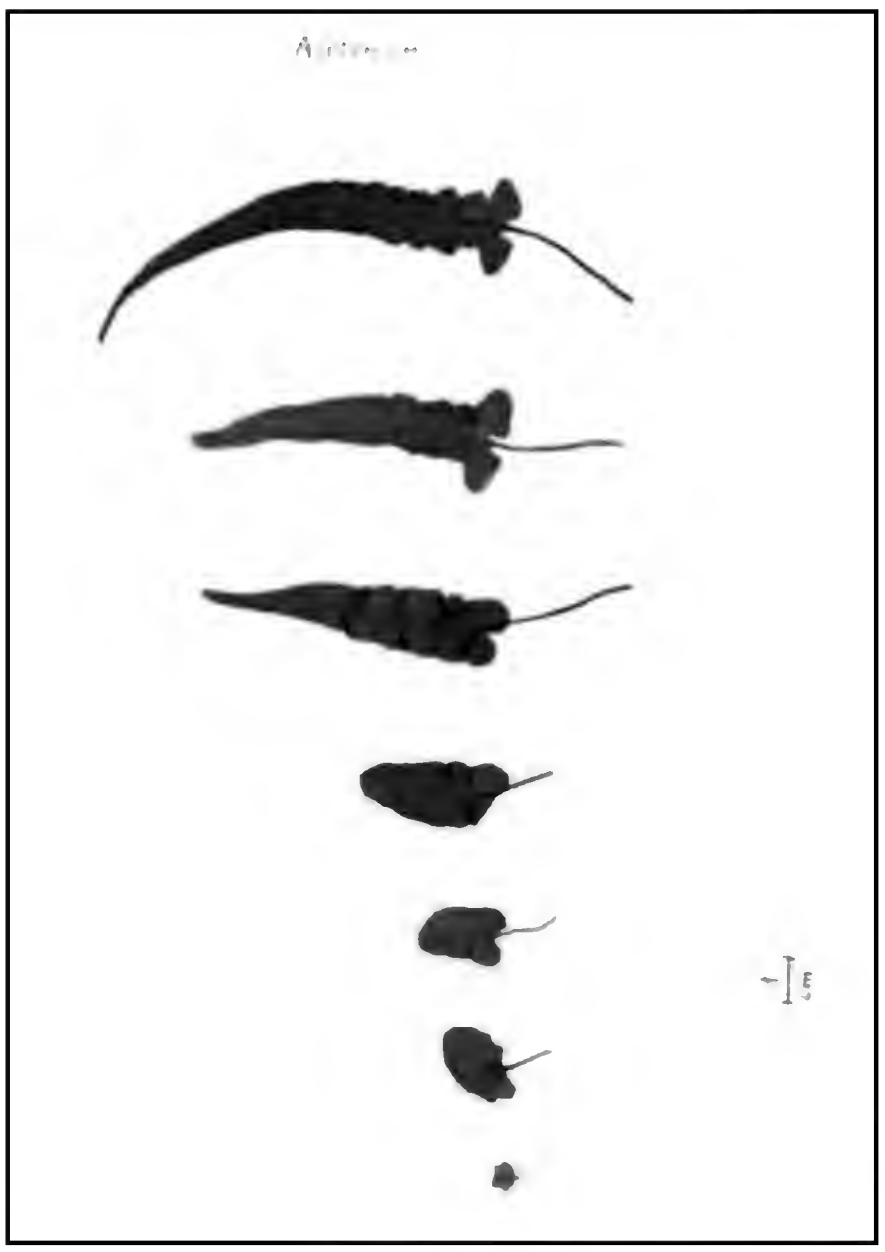


Fig. 7. Development of *A. obovatum* ssp. *obovatum* x *rhizophyllum*

Fig. 8. *A. obovatum* ssp. *obovatum* x *rhizophyllum*. Two types of adult fronds

The trial to propagate this hybrid was started in 2005. Plants of this hybrid resemble the hybrid above but the fronds have a very long curved narrow tip which give the plants the appearance of a green spider. The hybrid is strong growing and the apple green fronds can reach 12". The fronds are more or less lobed and some also are arrow shaped (see figure 8). To my pleasure most fronds of the hybrid produce bulbils and so the further propagation is easy but slow. I am suspicious now that only young and medium-sized plants produce bulbils.So as a precaution all bulbils that appear I propagated because this hybrid is fully sterile.

Cultivation in contrast to many Aspleniums is easy in acid soil. In the garden, however there is the same problem as with *A. rhizophyllum* – for snails and slugs it is festival time!

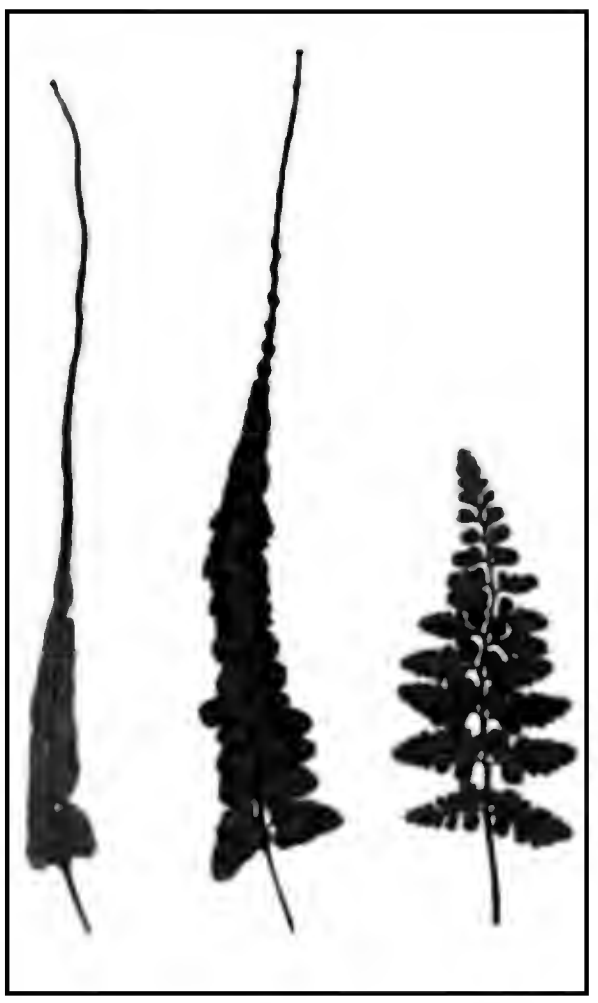


Fig. 11. *A. obovatum* ssp. *obovatum* x *rhizophyllum* between the parents

Fig. 9. *A. obovatum* ssp. *obovatum* x *rhizophyllum*. Bulbils

Fig. 10. *A. obobatum* ssp. *obovatum* x *rhizophyllum*. Arrow-shaped fronds with very large basic lobes

Artificial Hybrids of *Asplenium*

Asplenium billotii (obovatum* ssp.*lanceolatum)* x *A. rhizophyllum

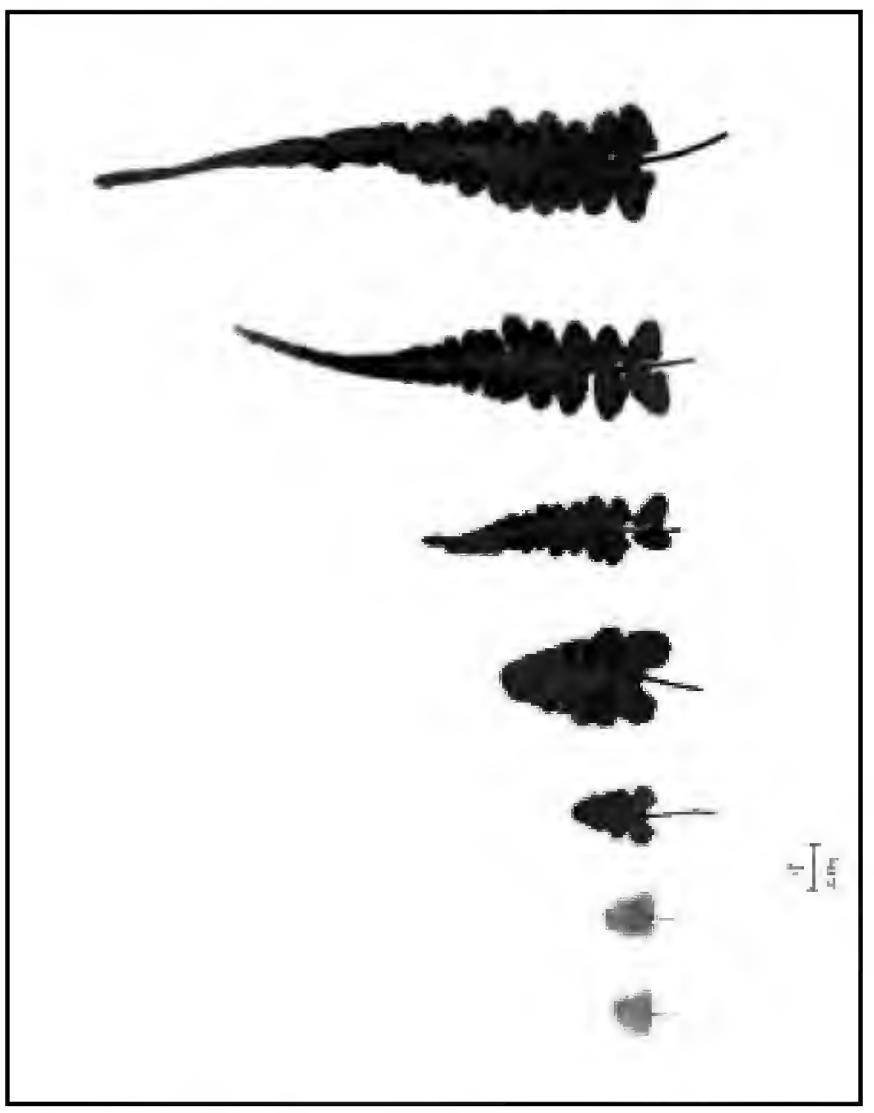


Fig. 12. Development of *A. billotii* x *rhizophyllum.*

This hybrid results from a trial started in 2007. The fronds of this hybrid are much more divided than those of the formerly described plant, the fronds being broader. In most fronds the ends taper to a long tip and the fronds can reach 10”. The plants appear a little like a *Polypodium*. Surprisingly the hybrid is fully fertile like a good species and it was easy to propagate a second generation. This is fortunate because the hybrid produces no bulbils.

The F_2 plants I planted in the garden one year ago developed slowly but look healthy. Protection against snails and slugs is necessary. As with the parent *A. billotii* the plants don´t like lime.

Fig. 15. *A. billotii* x *rhizophyllum.* Very large frond of the F1-plant.

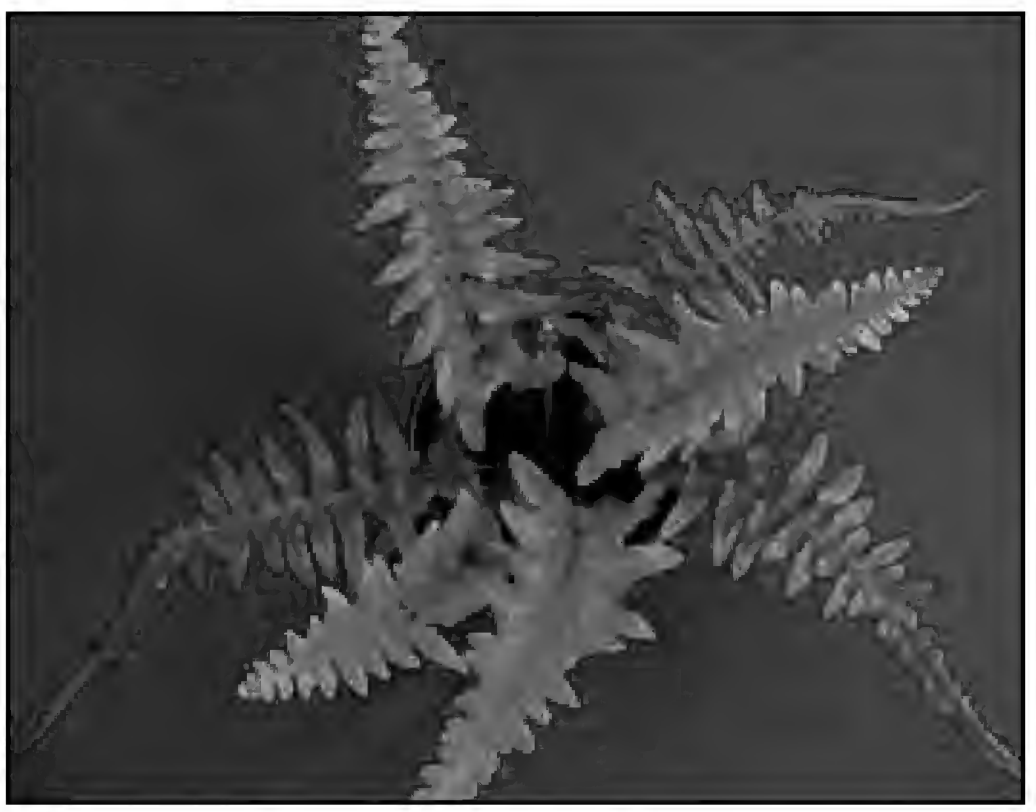


Fig. 13. Medium large plant of *A. billotii* x *rhizophyllum.*

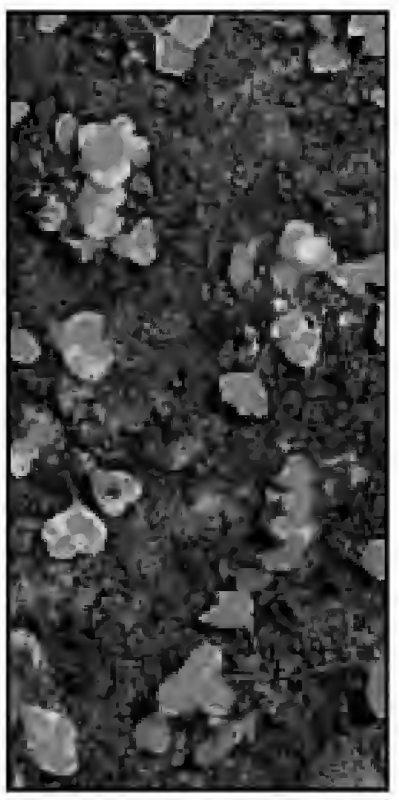


Fig. 17. F2-plants of A. *billotii* x *rhizophyllum*.

Fig. 16. *A. billotii* x *rhizophyllum* between the parents

Fig. 14. Very large plant of *A. billotii* x *rhizophyllum.*

Fig. 18. *A. billotii* x *rhizophyllum*. F2-plants.

Artificial Hybrids of *Asplenium*

Asplenium onopteris x A. ruprechtii (A. ruprechtii = Camptosorus sibiricus)

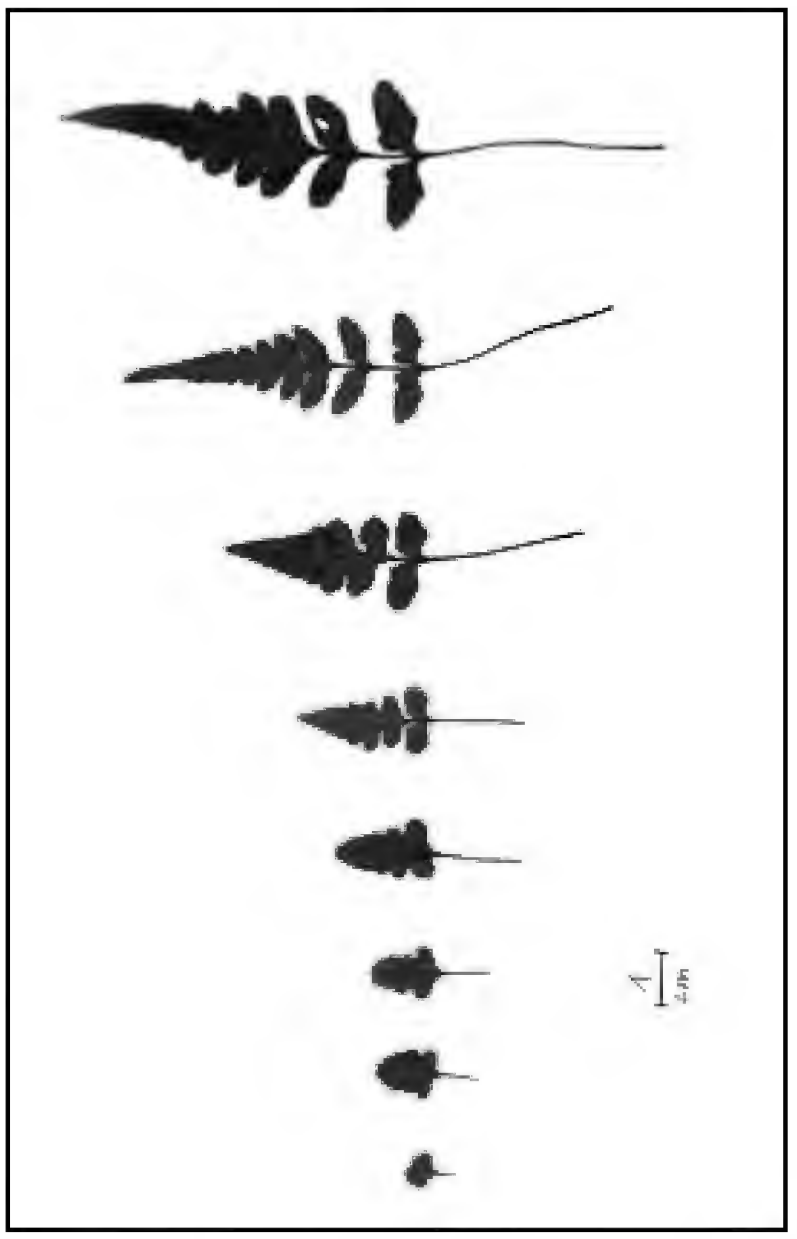


Fig. 19. *A. onopteris* x *ruprechtii.* Development

This hybrid was propagated successful in 2008. Surprisingly the hybridizing trial resulted in nine hybrid plants. All of these hybrids have inherited the small size of *A. ruprechtii* and reach only 7" in length (fronds of my *A. ruprechtii* are only 2" long). From *A. onopteris* is inherited the dark green colour. The fronds are pinnate-bipinnatified and very regular. Although sterile the hybrid seems to produce a few good spores (probably diplospores). Sowing the spore material very densely I grew a few prothallii but until now only two sporophytes have developed. I hope that the second generation of this hybrid will be a little more fertile because none of the hybrid plants produce bulbils.

Fig. 20. Young plants of *A. onopteris* and the hybrid.

Fig. 21. *A. onopteris* x *ruprechtii.*
The crossing trial gave 9 F1-plants!

Fig. 24. *A. onopteris* x *ruprechtii.*
Adult plant.

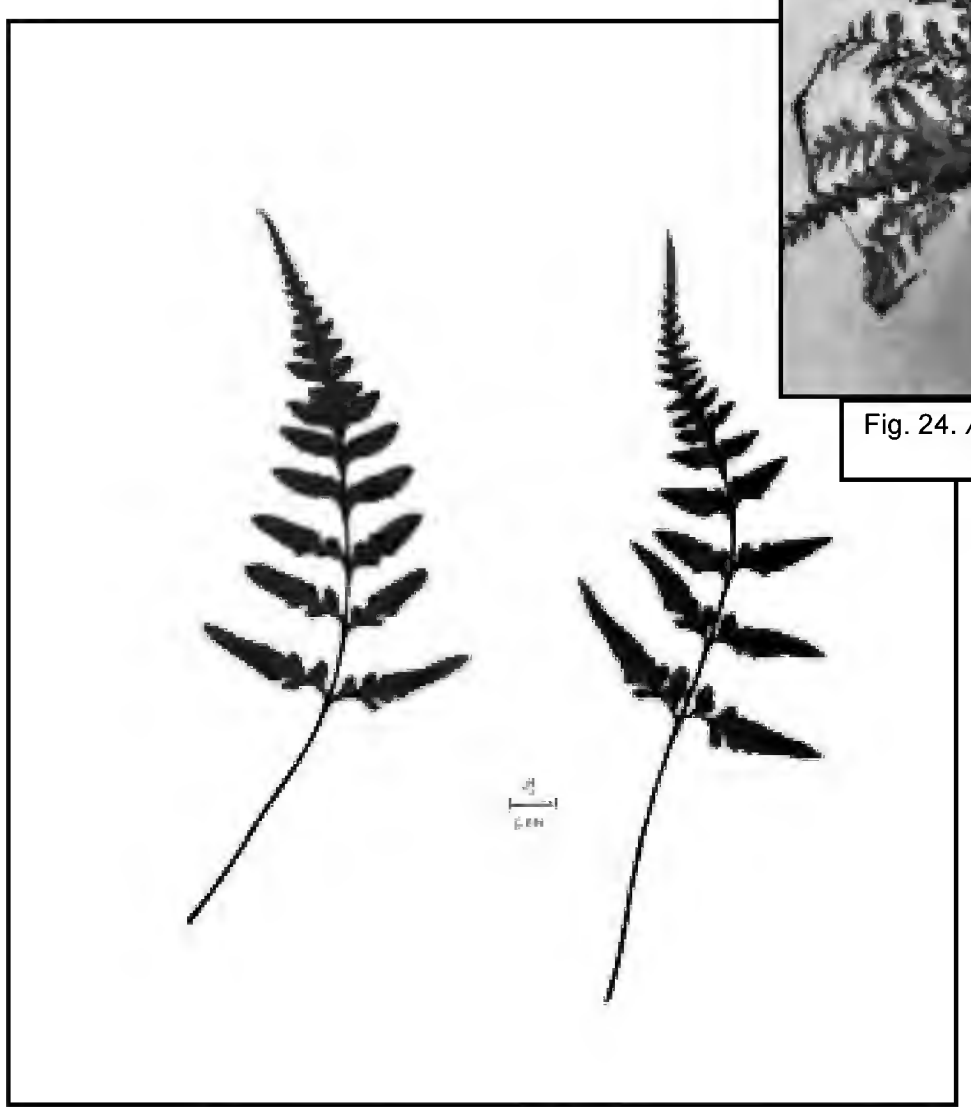


Fig. 22. *A. onopteris* x *ruprechtii.* Fronds from adult plant

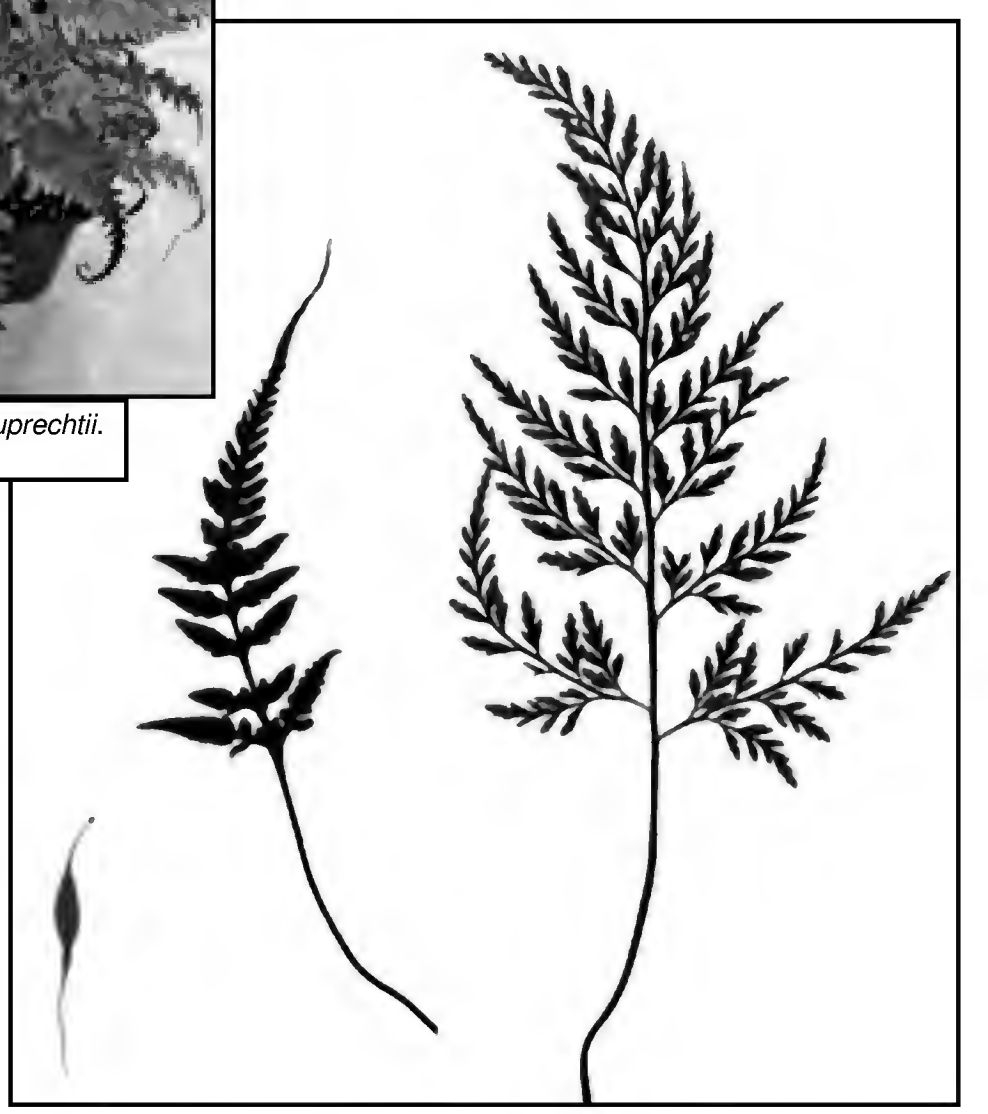


Fig. 23. *A. onopteris* x *ruprechtii* between the parents

Acknowledgements:

I am very much obliged to Prof. Ronnie Viane, University of Ghent, Belgium, for his flow cytometrical examination of the hybrid *A. billotii* x *rhizophyllum* and Pat Acock for preparing the text prior to publication.

References:

J.D. Lovis (1968). "Fern hybridists and fern hybridizing. Part II Fern hybridizing at the University of Leeds", Fern Gazette 10(1) BPS

The Dead of Winter?
Keeping Tree Ferns Alive in the U.K.

Pt 3. Mike Fletcher continues his trials

Mike Fletcher

1 Silcott St, Brightlingsea, Colchester, Essex CO7 0DP

e-mail: mikefletcher@waitrose.com

Seen from a tree fern's point of view, the winter of 2012 – 2013 wasn't really that bad, was it? You may not have seen it that way, but those of you that actually are tree ferns please stand up. Just as I thought! Down here, on England's south coast, tree ferns (and folks) certainly got off lightly and my sophisticated trunk heating set-up was definitely a step too far. Having said that, I know from bitter experience that a step too far is infinitely preferable to a step too short.

So all my tree ferns romped happily through the winter, without losing a single (unprotected) frond. This actually proved a tad embarrassing come the spring, for when the new crosiers emerged they rather inanely developed sideways, beneath the old fronds. I'm sure that this was because the sun was still relatively low at that time of year, and both the old fronds and the neighbour's overhanging walnut tree reduced the overhead light. I imagine that the fronds were desperately craning towards the sideways-moving light, which taunted them as it disappeared behind obstructions and then teased them by peeking from a different orifice between the houses and other obstructions. The end result was alarming, with crosiers spiralling in seemingly random chaos and with the pinnae unfurling in the vertical plane. Whoops! I was reminded of Medusa's writhing snake head-dress (Fig. 2), and I've little doubt that those crosiers would have mimicked those snakes if subjected to time-lapse photography. As a friend remarked with more wit than I could ever muster,

"With fronds like those, who needs anemones?"

Alarmed, lest they harden and preserve their Quasimodo posturing, I removed the old leaves. To my surprise and immense relief, in less than 24 hours every crosier had straightened gratefully.

I decided to simplify my electrical set-up, because I now have a shed in which I over-winter a few tender plants. These are cosseted by a domestic heater powered from a frost thermostat, and I argued that I really didn't need extra thermostats for the tree ferns living just beyond the shed's planking. This central control led to a significant reduction in the number of connections, and I furthered this by dispensing with the indicator lights. Not only should I expect increased long-term reliability, short-term it slashed the time I normally spend wrestling with the spaghetti, hunting for mislaid items and enduring the misery of frozen fingers.

Extending this laziness, I've also modified the way I protect each fern. No more winding the 12-volt Dennerle heating cables in spiral fashion, which is harder than it looks as it invariably involves kneeling, some untangling, and an undignified intimacy with the trunk which is quite difficult to explain away to the neighbours with any degree of conviction. This year I simply fed the cable up from ground level, over a few stalks and down again to ground level. Repeated twice more before wrapping, it's not only quicker and easier but it provides much less entertainment for those lurking eagerly behind twitching curtains.

Since all the tree ferns have done well, I'll not elaborate upon individual case histories except to concentrate on the outcome of the work involving vivisection – oh, all right then, division!

I'll dismiss the *Dicksonia squarrosas* briefly in a single paragraph, since all were divided into single crowns during the spring and all are doing well. I am getting much closer to my target of possessing the largest private collection of the smallest tree ferns in the country…

Fig. 1. *Dicksonia antarctica*, December 2010

The focus of this report is upon the *Dicksonia antarctica* that has featured, covered in snow, as the title shot in each of my 3 articles. (Fig.1) Let me briefly remind you that it was crippled during the winter of 2010/11 because, although I'd protected the top quarter of its trunk, I didn't then think it necessary to protect the rest of it. Wrong!!! During the spring of 2011, the emerging crosiers slowly withered and died. Dug up and discarded, it lay apparently lifeless until autumn. Then, prompted by a question from your editor as to precisely where the meristem (the growing heart of a tree fern) was located, I grabbed my camera, took a power saw to it and dissected it longitudinally. I was amazed to discover that the meristem wasn't quite dead; there were tiny deformed crosiers, unable to develop because most of the trunk was quite dead and therefore incapable of supplying nourishment (see photos in the Pteridologist, 2012). I wonder how many other "dead" tree ferns have been buried alive, so to speak?

I reacted to this discovery by discarding the dry and lifeless lower two thirds, lashing the 2 halves of the remainder crudely together with cable ties, and planting Frankenstein in a pot of that ambrosia for all ferns, seed and potting compost. By next spring he had rooted well and

The Dead of Winter? Keeping Tree Ferns Alive in the U.K.

Fig. 2.'Medusa' A survivor from the winter

I planted him out (Fig 5 in the Pteridologist, 2013). In that article I was trying to decide whether to leave Frankenstein alone or cut the ties to see if the graft had failed and it were now (sic) Frank and Francesca…

Curiosity killed both the cat and my procrastination and, knowing your own thirst for the truth, I succumbed to impatience and severed the ties in the spring.

Did you know that the greatest thing since sliced bread is a sliced tree fern? Frankenstein opened eagerly, as at the juicy bits of a well-thumbed naughty novel, revealing quite separate and fully-healed twins and about 100 disgruntled and homeless woodlice. Planted apart, with their naked rears facing the fence (no, not the woodlice - I speak of Frank and Francesca) they are progressing well as separate organisms. Of course, each had (and still has in autumn) a semicircular trunk and meristem, although immediately upon separation the soft fibres surrounding the latter sprang free providing both welcome protection and the illusion of circularity (see Fig 3). The fronds enhanced the illusion, for they obligingly radiated in all directions to seek light. Whereas there were 4 fronds last autumn, this autumn there are a total of 7. It's all a pale shadow of the fern heading this article, but even that was a pale shadow of the fern it once was in its native land. At least it's still alive, and has multiplied numerically despite shrinking so sadly.

The moral, I think, is not to give up on apparently lifeless tree ferns. I'm reminded that they reached our shores after being scalped, rendered legless, transported crudely and shipped half way round the world without water or care. Nevertheless, they happily root in our green and pleasant land given just a little encouragement, and they repay proper attention with their breathtaking beauty.

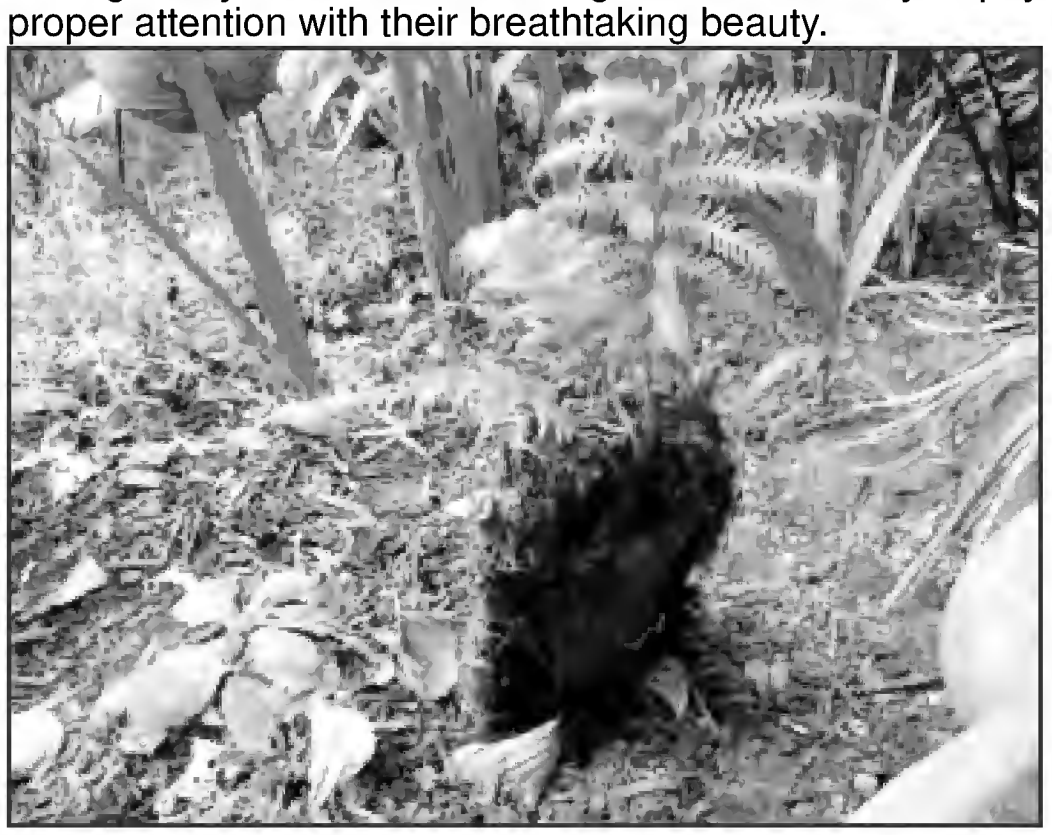


Fig.4 'Francesca' is surviving as well.

Finally, am I allowed a brief indulgence? To my eyes, a mature *Cupressus cashmeriana* tree is achingly beautiful and even more exotic than any tree fern. Yet I know of only one gardener in this country that grows them outside – me. You see, the R.H.S. books say that they won't take temperatures below 0^{C}. As a result, their exquisite blue cascades feature mainly in large public glasshouses, or in those books themselves to torment you. Nurserymen invariably shake their heads. The books are wrong. I bought my first one as a summer indulgence, like one buys summer bedding, and was amazed to see it romp away happily next spring, with no help from me. I can't say that you won't lose a young one, just that I never have. Just plant them and forget them, as I have done successfully for over 25 years in 2 small North Yorkshire gardens, both in north-facing situations. Search the web to find a U.K. supplier and please, please plant one as a specimen. Give it 3 years in the ground and then stand back and stare in wonder. ❒

Fig. 3. 'Frank' shows he has survived the brutal treatment of being sawn vertically in half.

Fig. 5. A mature *cupressus cashmeriana* (Kashmir cypress) showing it's beautiful foliage.

PATRICK NEILL FRASER – VICTORIAN FERN ENTHUSIAST

Adrian Dyer

499 Lanark Road West, Balerno, Edinburgh. EH14 7AL

e-mail: afdyer499@googlemail.com

Patrick Neill Fraser (1827-1905) was a committee member of the first British Pteridological Society c.1875, one of the first members of the second British Pteridological Society, a Committee member (1896-1898) and a Vice-President (1898-1905). A keen fern collector and grower, he was well-known in his time but his is not a familiar name today. The garden he created in Edinburgh was described as containing one of the finest collections of ferns in Britain. A few survivors of this collection have recently been discovered in the garden.

Introduction.

Patrick Neill Fraser was named after Dr. Patrick Neill, FLS, FRSE, Hon. LL.D., his father's business partner in Neill & Co., founded in 1749 by a second cousin of Dr Neill's father and eventually Edinburgh's largest printing firm. Although much has been published about Dr Neill, because of his influence on Fraser's achievements it is necessary to briefly review Dr Neill's life before considering that of Patrick Neill Fraser.

Dr Patrick Neill (25th October, 1776 – 3rd September, 1851).

Dr. Neill, an antiquarian, horticulturalist and keen naturalist, and an active field botanist throughout Scotland when young, was perhaps more of a scientist than a printer, although his botanical reputation no doubt helped to bring scientific printing work to the firm. He was a co-founder in 1809 of the Caledonian Horticultural Society (CHS), later the Royal Caledonian Horticultural Society (RCHS), and he served as its Secretary for 41 years. In 1819, Dr Neill published a paper on "Proofs that the beaver was a native of Scotland". In 1827, he was chairman of the committee that planned the development of Princes Street Gardens in Edinburgh. He wrote the "Fruit, Flower and Kitchen Garden" section of the Encyclopedia Britannica, which Neill & Co. printed while he was sole proprietor. In 1836 he became Vice-President of the Botanical Society of Edinburgh (BSE, now the Botanical Society of Scotland, BSS) and donated several thousand herbarium specimens to the BSE and, in 1841, to the Royal Botanic Garden. Their fate is not known, although there are Patrick Neill herbarium specimens at the National Botanic Gardens, Dublin, most of which are 'ex-RBGE'. There are also a few Neill algal specimens in the RBGE herbarium. Dr Neill is commemorated by the genus *Neillia*.

Patrick Neill inherited Canonmills Cottage from his father in 1812 and lived there for the rest if his life. It was situated in an area still known as Canonmills, just north of Edinburgh New Town and close to the CHS garden and the adjacent Royal Botanic Garden. Loudon considered the Canonmills Cottage garden to be "the best endowed suburban garden in the country". Dr Neill's gardener in 1832 was Alex Scott. Also in the 1830s he had a gardener, appropriately called William Brackenridge, who was interested in ferns. (After Brackenridge had moved to America, *Cyathea brackenridgei* was named after him and several ferns including *Blechnum vittatum* Brack. were named by him.) However, a long list of the plants grown in the garden of Canonmills Cottage included no ferns and there are no indications that Dr Neill was a fern enthusiast. On 3rd September, 1851, Dr Neill died in Canonmills Cottage and was buried in Warriston Cemetery. He left most of his estate to Patrick Neill Fraser, although Anne Neill, his cousin's daughter and for many years his housekeeper, inherited Canonmills Cottage and garden for her life time before it was owned by Fraser.

Fig. 1. The memorial to Patrick Neill Fraser's father, mother and six of his siblings in 'Dr Neill's Tomb', Calton New Burial Ground, Edinburgh.

Patrick Neill Fraser (5th August, 1827 – 27th February, 1905).

Patrick Neill Fraser was born at 59, Lauriston Place (since demolished), on the 5th August, 1827 (although his birth was entered in the 1828 Register for Births and Baptisms at St Cuthbert's Church, Edinburgh). He was named after Dr. Patrick Neill (see above) and in later years he usually wrote his name as 'P. Neill Fraser'. Maybe he used 'Neill' rather than 'Patrick' as his first name, but the result is that he has sometimes been referred to under the double surname 'Neill Fraser' and his widow was referred to as 'Mrs Neill Fraser'. In 1841, he was living at 1, Lauriston Lane (since demolished) with his father William Fraser, a printer, mother Agnes, two older brothers, Thomas and Alexander, 4 younger siblings, Barbara, Jane, William and Ann and 2 female servants. One older sister, Helen, had died and another sister, Agnes, had apparently left home. His father William Fraser died of heart disease aged 51 and was interred on the 13th July 1846 in Calton New Burial Ground, close by Holyrood Palace. The burial records state that he was interred in "Dr. Patrick Neill's tomb" next to his son Thomas, buried nine months earlier. A large memorial stone to William Fraser, his widow and six of his children (Fig. 1) can still be seen at the tomb that is marked on the cemetery plans as "Dr Neill's Tomb". It rests on a plinth

engraved with "The Burying Ground of William Fraser of Neill & Co Printers Edinburgh". (Maybe Neill reserved a tomb in New Calton Burial Ground but allowed his business partner to use it; Neill himself was buried later in Warriston Cemetery.) Patrick Neill Fraser, aged 18, and his surviving older brother Alexander, then joined Neill & Co. After Patrick Neill died (see above), Patrick Neill Fraser, now aged just 24, and Alexander became sole proprietors of Neill & Co.. In business, Patrick Neill Fraser is said to have combined caution and enterprise with a remarkable capacity for detail. He considered success or failure in business was a matter of book-keeping. The same qualities characterised his horticultural activities and fern collecting.

By the time of the Census on 6 April, 1861, Fraser's widowed mother Agnes, her sons, Alexander and William, and two servants, had moved into Canonmills Cottage, by then called "Canonmills Lodge". Anne Neill had moved out. Patrick Neill Fraser, described then as a Letter Press Printer employing 100 men, was lodging with two younger sisters, Barbara and Annie, in Oak Bank, one of a few large lodging houses on the main road (now the A9) through the middle of Bridge of Allan, Stirlingshire. The Canonmills Lodge garden was still being maintained; in the "Gardener's House" was George Robb, gardener. A comparison of the OS maps of 1849-53 and 1876 (Fig. 2) shows that much of the Canonmills Cottage/Lodge plot had not changed during the previous 25 years, except for a large addition built on the south-east side of the House. Perhaps this enlargement coincided with the name change during the 1850s.

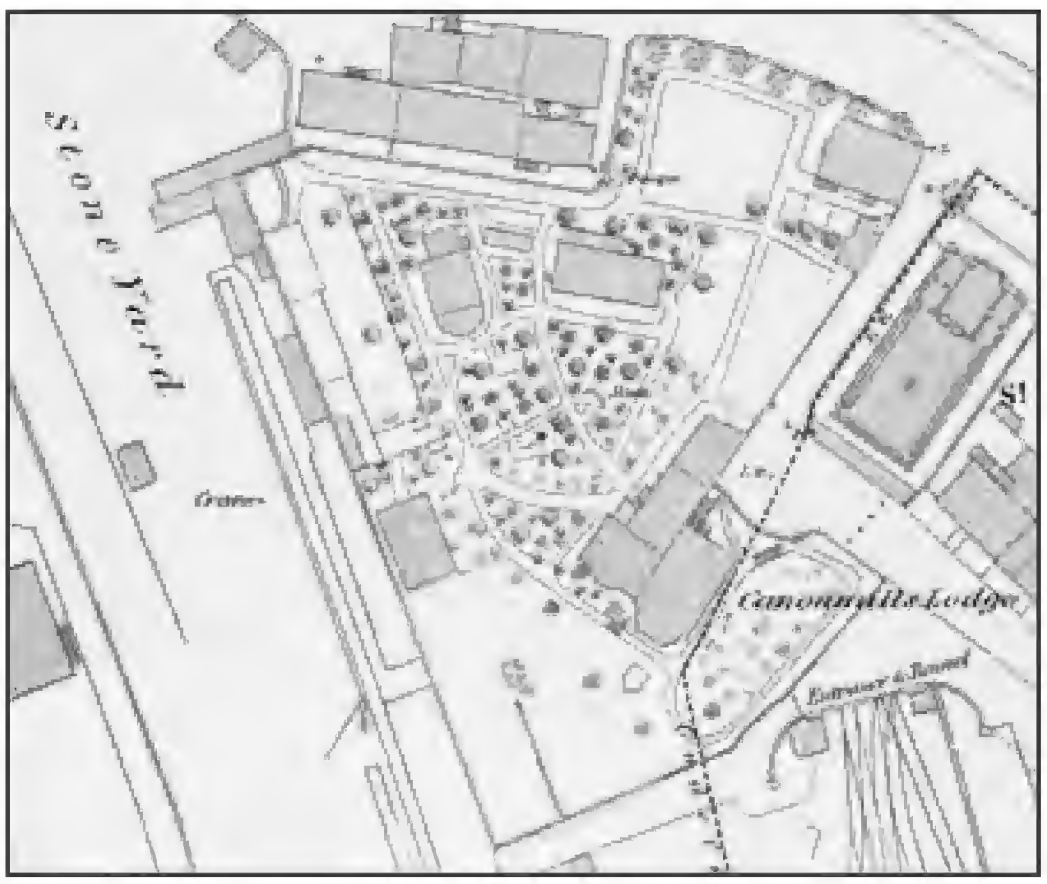


Fig. 2. A plan of the Canonmills Lodge garden in the 1876 OS Town Plan of Edinburgh. The lane leading to the house still exists as Rodney Place.

Although Anne Neill did not die until 2 June, 1869, Patrick Neill Fraser had moved to Canonmills Lodge by 1865, the year that he published his first list of "British Ferns and their Varieties". He was living at Canonmills Lodge on the 8th October, 1869 when he married Margaret Watson, daughter of Glasgow stockbroker James Watson, who later became Sir James and Lord Provost of Glasgow. They were married "according to the established Church of Scotland" when Patrick was 42 and Margaret was 23, with his brother William as a witness. In the 1871 Census, Patrick Neill Fraser was listed as a Master Letter Press Printer and Junior Partner, living at Canonmills Lodge, with his wife, baby daughter Rachel, sister-in-law Marianne Watson, and three servants. Living in the Gardener's Cottage was James Green. In the adjacent dwelling was "Isabella Roxburgh, garden worker" who might also have been employed in the garden of Canonmills Lodge. Fraser's mother had moved out with Agnes, William and Anne, to 37, Drummond Place, Edinburgh, where she remained until she died on 19th of October, 1887 aged 92. Canonmills Lodge and garden is shown little changed in the 1894 OS map but is now a car park between two blocks of apartments (Fig. 3).

Fig. 3. The site of Canonmills Lodge garden in 2014 – the car park for the Simpson Apartments, Rodney Street, EH7 4FR.

In 1876, Fraser, perhaps in need of larger accommodation for his expanding family, bought 'Rockville' in Murrayfield, about 2 miles from RBGE. In 1881, still described as a Master Letter Press Printer, he was living there with his wife, and five children, Rachael A Neill Fraser (aged 10), James Watson Neill Fraser (8), William Neill Fraser (5), Patrick Neill Fraser (2), and Margaret (10 months), as well as 4 servants. In Rockville Gatehouse was William Anderson, a young gardener from Banffshire, and his family. Fraser was for many years an elder and manager at the Church of Scotland West Coates Church, approximately half-way between Rockcliffe and Princes Street.

In 1891, Patrick Neill Fraser was still at Rockville with his wife and five children, together with a sister-in-law, Mary Ann Anderson, and three servants. His gardener, James Napier (31), lived next door in 'Rockville Lodge', with Napier's sister as housekeeper. Napier was still the Rockville gardener in 1894. According to the 1901 Census records, Patrick Neill Fraser was not at home on 5th April but his wife and two children were present, along with 3 servants. In Rockville Lodge, the appropriately-named gardener David Gardner lived with his wife and four sons; Daniel Gardner, the oldest son, was also a gardener, probably also working in the Rockville garden.

Patrick Neill Fraser died aged 77 on 27th February, 1905, after suffering from angina for a month. He was buried in Dean Cemetery, where his funeral took place on 2nd March 1905. His gravestone (location JJ157; Fig. 4) stands beside a small cross commemorating his youngest daughter Nina, who had died aged 5 in 1891. His widow stayed at Rockcliffe for several years, maintaining the garden and continuing to send plants to RBGE. For example, there is a record of Saxifrage plants being sent by "Mrs Neill Fraser" in 1905. On Census day in 1911, she was still at Rockville with her children Patrick Neill Fraser Jnr. and Margaret Neill Fraser Jnr. and 3 servants. In the "Gardener's House" was Archibald Knox, "Gardener (domestic)" with his family and a boarder Samuel Smith, also listed as "Gardener (domestic)". It seems likely that both Knox and Smith

worked in Rockville garden. Patrick Neill Fraser's widow Margaret died of cancer of the pancreas on 26th February 1927 at 22 Moray Place, Edinburgh, but her residence then was given as 30 Grange Road. She was buried in the same plot as her husband (Fig. 4), with her children Margaret (who died serving in a hospital in Serbia in March 1915) and Patrick (who died on the first day of the Battle of the Somme, 1st July 1916) and a servant Lizzie Lunan (died 1908). Her son James was buried there in 1946. Rockville had been sold during the 1920s.

Fig. 4. Patrick Neill Fraser's gravestone in Dean Cemetery, Edinburgh. Also commemorated are his wife Margaret, daughter Margaret, and sons Patrick and James.

Patrick Neill Fraser, botanist and horticulturalist.

There is no record of his early introduction to botany but in an obituary it is suggested that his early interest was stimulated by Dr Patrick Neill. In 1852, Fraser enrolled at the Royal Botanic Garden as a second year student in the Botany Class. In the same year he went on the class excursion to Ireland, and accounts of this excursion reveal that he was already especially attracted to ferns. He visited Ireland regularly, the last time, with Col. Jones, when in poor health 6 months before he died. During the 1860s, he was collecting fern varieties in the wild in Scotland. In April, 1864 he published his first list of "British Ferns and their Varieties", re-issued in March, 1865. This list "contains, as far as is known, the names of all the British Ferns and their varieties hitherto discovered….". It includes the first use of the name 'Victoriae', given by Moore, for the variety of *Athyrium filix-femina* also known as the Buchanan Fern. In October, 1866, he produced a 4 page list of "British ferns and varieties grown by P. Neill Fraser.". In April, 1868, he published the "List of British ferns and their varieties.", an enlarged edition of his 1864 list and, like the previous lists, printed by Neill & Co.. Included were 565 varieties of '*Scolopendrium vulgare*' and 482 varieties of *Athyrium filix-femina* alone and even 22 varieties of *Asplenium ruta-muraria*. Two further printed lists of "Exotic Ferns grown by P. Neill Fraser" at Canonmills Lodge were "Printed for Private Use". The first, dated 1 October 1871, listed more than 200 hardy and glasshouse non-native species; the second, dated 16 April 1875, included nearly 400 species plus some varieties. He clearly had a well-established interest in ferns while still at Canonmills Lodge. For much of his life he amassed ferns from all regions, in part collected by himself, and his fern herbarium became one of the best in the country. After his death, his collection of 5-6000 specimens was valued at £30 (equivalent to about £2,100 today according to the National Archive Currency Converter) by Professor Isaac Bayley Balfour, Regius Keeper of RBGE, on 18 March 1905 in a letter to the solicitors acting for Fraser's executors. He suggested that an advertisement should be put in the Journal of Botany to bring it to the attention of collectors, and that the Secretary of the "Pteridological Society" should be asked to notify members. In the end, the RBGE bought the collection for £30; the specimens are now distributed among the other specimens according to species. Taking *Athyrium filix-femina* as an example, there are many (c.50) wild and garden-grown Fraser specimens, though none is identified as being grown in his garden. Some are identified as varieties; most of these show unusual degrees of 'leafiness'. None of the Fraser specimens are crested or have other types of irregular branching.

In 1875 he was a Committee member of the first British Pteridological Society; this began as the West of England Pteridological Society in 1871 but ceased activity in 1876.

Fig. 5. Rockville house and garden in 2012. The slopes between the terraces were probably rockeries in Fraser's garden.

In 1876, Fraser bought "Rockville" in Murrayfield (Fig.5). Rockville was a substantial house, built in the 1840s, at the top of a south-facing slope in 4 acres of ground which included an old flooded quarry. In 1854, segments of a 7m long tree trunk of the fossil referred to as *Pitys withami* (Lyginopteridaceae) had been taken by a previous owner to the garden from Craigleith Quarry, source of stone for much of the Georgian New Town. The segments of the fossil tree were placed along the Rockville drive, though several were later distributed to neighbours. After he took over the property, Fraser transformed the walls of the Rockville quarry, creating walks through planted shrubs and extensive rockeries on which he planted a great number of alpines, with a particular fondness for 'Polyanthus'. Aquatics were planted round the lake margin.

The large sloping garden, the quarry, and the glasshouse(s) offered scope for Fraser to assemble his large collection of alpines and tropical and temperate ferns. In particular, he was known as an enthusiastic collector and cultivator of filmy ferns and for his "remarkable" collection of varieties of British fern species. Fraser and his gardeners won prizes at the RCHS shows for their ferns. In a report (Gardener's Magazine for July 22, 1882) of a Society of Arts competition for designs of plant labels, he was commended for his widely-used zinc strip labels written on with "bichloride of platinum". Another list of ferns grown in his garden (i.e. Rockville) was produced in 1884, according to the account of the Annual Meeting of the BPS for 1891, but this list has not been traced. The 1:2500 OS map of 1894 (Fig.

6) shows a small lodge near the entrance gate and a large glasshouse close to the north-west corner of the house. A nearby structure could be a potting shed or a range of frames. Trees line the perimeter of the garden and the lake margin. The southeast part of the garden appears to be open but no formal beds are indicated. In a published report ('H', 1894) of a visit in 1894, special note is made of several fern species; these are reported here using the names as given in the article. The visit was early in the year, so the report does not include the hardy ferns, but it gives a flavour of the collection that Fraser had accumulated under glass. The first plant that attracted attention in the tropical house was a specimen of *Polypodium glaucophyllum*, 5ft in diameter, growing in a tub. Also mentioned is *P. aureum* and a plant of *P. subauriculatum* with numerous fronds up to 10ft in length. The list continues to include *Davallia hirta* (a crested form), *D. dissecta, Adiantum speciosum, A. williamsii, A. aethiopicum,* several varieties of *A. cuneatum* including var. *grandiceps*, *Gymnogramma laucheana, G. tartarea, G. schizophylla gloriosa, G. cantonensis, Asplenium resectum, Gleichenia dicarpa*, and *Lygodium scandens* on a pyramidal trellis. Most of the filmy ferns were cultivated in "light cases" on stages. These included *Trichomanes maximum, T. auriculatum, T. javanicum* (as *T. pyxidiferum*), and *T. trichoideum*. In large pans, *T. radicans, T. radicans alabamense*, and *T. radicans andrewsii* were successfully grown. Noteworthy among the Hymenophyllums were *H. hirsutum, H. asplenioides, H. demissum*. Quoting the report:

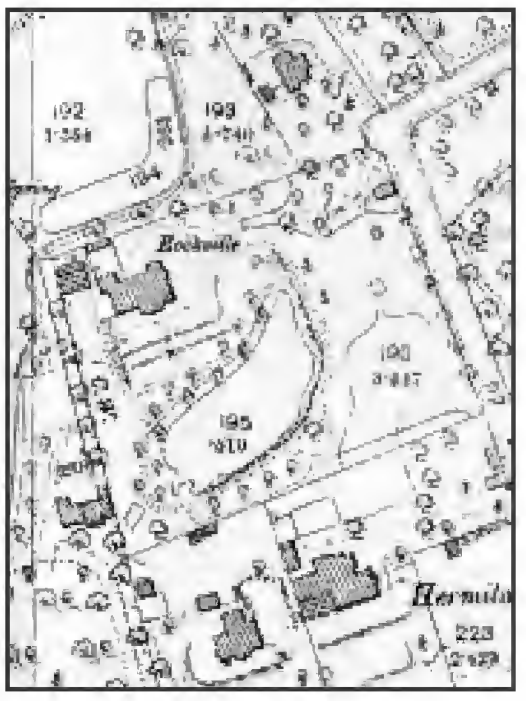


Fig. 6. A plan of the Rockcliffe garden from the 1894 OS map Edinburgh sheet 3.06.

> "In a small brick pit several square yards of the lovely *H. tundridgense* and *H. tunbridgense* var. *Wilsonii* formed a carpet. This variety was collected in the west of Scotland."

Todea hymenophylloides and *T. superba* had several stout fronds and "seedlings were springing up in all directions". The report finishes:

> "Some of the above had only the protection of a cold frame during the winter. Others too numerous to mention here, are well cultivated by Mr. J. Napier, the gardener."

The report refers to the need for a later visit to study the hardy species grown outside, but no report of such a visit was published during the next two years. In 1896, Fraser went on an expedition to Jamaica to study filmy ferns in their native habitats. Specimens he collected in Jamaica at altitudes up to 6,000ft and in Grenada were brought back and cultivated with considerable success in the Rockville glasshouses. Accounts published shortly after his death state that his collection of ferns was among the finest in Great Britain.

Fraser was an acquaintance of James McNab, Curator of RBGE and he donated live plants to the Garden. In addition to Saxifrages, Primulas, and bulbs of various genera including *Galanthus*, he donated glasshouse and hardy ferns. For example, on 16 February, 1897, the 'Glass Department' (the section that maintained the glasshouses) of the Garden received plants of *Trichomanes spheroides*, and on 24 June, 1902, plants or spores of *Gymnogramma chaerophylla, Notholaena marantae, N. lanuginosa, Cheilanthes pulchella, Adiantum reniforme, Asplenium palmatum,* and *Ceterach aureum*. On 8th April, 1902, the Herbaceous Department received plants of *Scolopendrium hybridum*. Fraser was in contact with other luminaries of the Victorian fern world in Britain. He is referred to only twice in the text accompanying the nature prints of ferns produced by Col. A M Jones in the late 1870s, but as noted in the book "Our Native Ferns" (E J Lowe, 1876), Fraser sent fronds, live plants or illustrations of several named fern varieties to Lowe. Amongst them were the varieties 'Spirale' and 'Fimbriatum' of *Scolopendrium vulgare* (*Asplenium scolopendrium*), and 16 varieties of *Athyrium filix-femina*: 'Multifidum-Fraseri', 'Alatum-Fraseri', 'Arranense', 'Defectum', 'Flexuosum', 'Fraseri', 'Furcillatum', 'Grantlae', 'Impastum', 'Laciniato-elegans', 'Laciniato-interruptum', 'Mesembryanthemoides', 'Pruinosum', 'Trifidum', 'Victoriae', and 'Sub-erosum'. Of these, no doubt grown at Rockville, four were found in the wild by Fraser: 'Alatum-Fraseri' in "Corrifern Glen, Peebleshire" (= Carrifran?) in July1860; 'Arranense' on Arran in September 1863; 'Defectum' at "Drummelzien" (=Drummelzier?), near Broughton, in July 1860; and 'Fraseri' in Larrington Glen, Lanarkshire in June, 1863. Those varieties named after Fraser were so-called by Lowe. Few of the names used by Lowe are still valid, even if the ferns themselves have survived. Years later, in 1892, Fraser sent *D. aemula* to Lowe. Just after Fraser died, Professor Balfour, reporting on the value of the living collection, wrote "At auction these would fetch nothing. There is no money in them for dealers. Some private collector should if possible be found to whom they might be offered." The only fern enthusiast in the Edinburgh area known to Balfour was Alexander Cowan (1864-1943) of Valleyfield House, Penicuik, who knew the collection. Balfour continues "If he will buy at any price you should accept his offer." Cowan later took all the ferns, except the Todeas, for an unknown sum. Cowan's grandfather had been a close neighbour of the Frasers, which perhaps explains how Cowan "knew the collection" but he would have also known Fraser through the BPS. Cowan exhibited varieties that he had found in the wild at Annual Meetings of the BPS in the early 1900s and was President from 1909 to 1920. Fraser and Cowan may also have had business connections. Along with Valleyfield house and garden, known for his father's Narcissus collection, Cowan had inherited the adjacent papermill, established by his great-great-grandfather and one of Scotland's largest. Perhaps Alex. Cowan & Sons sold paper to Neill & Co. Ltd. Little has been recorded of Alexander Cowan's pteridological activities and his time as BPS President, and the fate of his fern collection, including those acquired from Fraser, is not known. Cowan's daughter-in-law Margaret lived at Valleyfield in the late1940s but does not remember there being a fern collection or even a glasshouse at that time. The Cowan family left the house in the early 1950s.

Fraser's botanical and horticultural interests and especially his garden occupied most of his free time, and he was a quiet and retiring man who shrank from prominent public duties. He was one of the early members of the second British Pteridological Society (BPS), and within a few years of its founding, initially as the Northern Pteridological Society, in 1891, he was a Committee member (1896-1898) and a Vice-President (from 1898 until his death in 1905), but he rarely attended AGMs of the BPS, held in Bowness, and does not appear to have taken an active part in BPS meetings. He was Honorary Treasurer of the Botanical Society of Edinburgh from 1857 to 1891 and sometimes spoke at meetings but he refused the Presidency. Fraser wrote few papers but was a recognised British authority on

ferns and fern cultivation and was always ready to receive those who sought his knowledge and advice or who wished to see his herbarium or garden. Despite his retiring nature, people were drawn to him and he was "a general favourite". In February 1905, he sent a hybrid snowdrop to E A Bowles. Bowles wrote asking about its origin but received no reply because Fraser's death intervened. It may have arisen spontaneously among the Snowdrop collection in Fraser's garden. Bowles named the variety "Neill Fraser" after him. It is of average height but has a distinctively-shaped green mark on the inner segments and is still offered for sale.

Fraser's considerable library and voluminous detailed and well-ordered notebooks enabled him quickly to provide friends with information on any plant. In 1905, Professor Balfour valued all the books at £60-£70 (£4,200-£4,900 today). He recommended approaching a second-hand bookseller such as Mr Thin of South Bridge, Edinburgh. A few papers and some books with Fraser's signature and other annotations are now in RBGE library (Fig. 7).

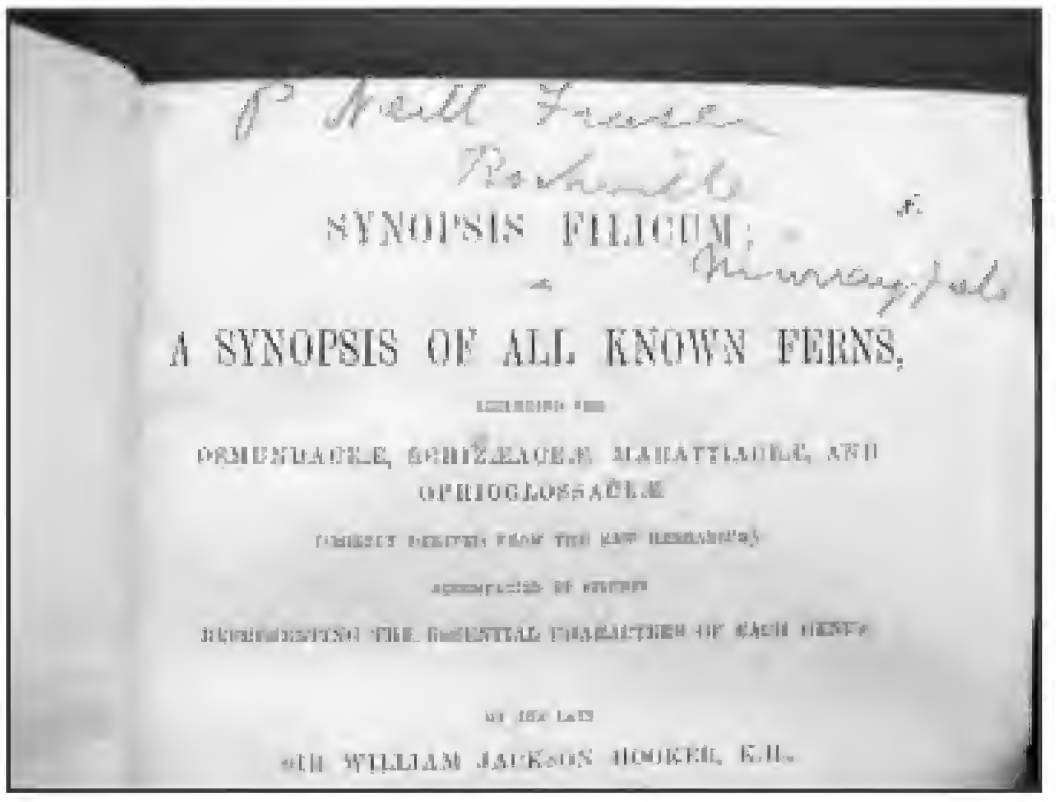

P Neill Fraser
Rockville
SYNOPSIS FILICUM;
Murrayfield
A SYNOPSIS OF ALL KNOWN FERNS,
OPHIOGLOSSACEÆ
SIR WILLIAM JACKSON HOOKER, K.H.

Fig. 7. Patrick Neill Fraser's signature and address on his copy of Hooker, W. J. and Baker J. G. (1874) Synopsis Filicum. 2nd edition. Throughout there are annotated letters P (black) and R (red) in the margins beside names of species and relating to pencil notes in the front of the book referring to "945 sheets" of "Parish" ferns and "Blanford" ferns.

For example a copy of Milde, J., Filices Europae et Atlantidis, Asiae Minoris et Siberiae. (1867) has pencil notes on a title page relating to ferns received from Tenerife in 1872, and correspondence with a Mr. Brown. There are several other Victorian fern books that have the same library accession date stamp for 27th June 1905, and are almost certainly also from Fraser's library, although his name is not on them. In his later years much of Fraser's reading was the works of explorers and he was a member of the Royal Scottish Geographical Society.

He was elected a Fellow of the Royal Society of Edinburgh, like his mentor Dr Patrick Neill, and of the Scottish Alpine Botanical Club. His service as Honorary Treasurer of the Royal Caledonian Horticultural Society from 1871 to 1898 was recognised with the presentation of a service of silver plate. He was also a Fellow of the Royal Horticultural Society. He was on the General Committee of the RHS for the Fern Conference and Exhibition of Ferns at the Chiswick Gardens of the Society in July 1890. He was on a RHS Committee to draw up a schedule of prizes for the RHS Exhibition of British Ferns, in August, 1892, again at RHS Gardens, Chiswick. He contributed to the cost of the Silver Floral Medals for Class I and Class K. He also exhibited *Polystichum angulare* (=*setiferum*) varieties at the 1892 Exhibition.

Although Fraser's significant contribution to fern collecting and growing was recognised during his life time, he then seems to fade from view. He has an entry in Desmond (1994), but does not feature in the Directory of National Biography (Patrick Neill appears in both). He gets only passing mention in Lowe's book "Fern Growing" of 1895 and does not feature in Druery's "British Ferns and their Varieties." of 1910. Unlike some other fern growers of that era his reputation has not lasted. It is perhaps time for his place in the history of fern growing in Britain to be reinstated.

Rockville garden today

Identification of "Rockville" was complicated by the fact that between the 1920s and the 1970s, the name of the house was changed to "Rockshiel". Once it was found, the current owner generously allowed me into the garden in September, 2012, to search for ferns with a colleague, Phil Lusby, from RBGE. It was clear that the house was largely unchanged externally since Patrick Neill Fraser's time. Much of the garden remained, although in the 1920's, perhaps about the time that Fraser's widow left, about one quarter of the area on the east side was sold off as a building plot and now contains another house and garden. The gardener's lodge is still beside the gate and the one remaining segment of the fossil tree trunk remains beside the driveway (Fig. 8). The present owner has lived there for about 35 years, during which time the derelict greenhouse and frames were removed.

Fig. 8. The present owner beside the fossil tree in Rockville garden, 2012. Growing on the stump is *Polypodium vulgare* (sensu lato).

The garden is now mostly mown grass surrounded by dense tangled shrubbery, while the other areas, such as the sides of the quarry, well drained and exposed to sun most of the day, are overgrown with brambles and small shrubs (Fig. 9). The margin of the pond also has dense unmanaged vegetation. Conditions over much of the garden would seem to be less than ideal for ferns but some were found. Six species were present, all of them

native to south-east Scotland: *Asplenium scolopendrium, Athyrium filix-femina, Dryopteris dilatata, D. filix-mas, Polypodium vulgare*, and *Polystichum setiferum*. The present owner has not intentionally or knowingly introduced (or removed) any ferns.

Fig. 9. The flooded quarry; the pond margin (foreground) and rock wall (behind) have become overgrown.

Asplenium scolopendrium is common on the more shady walls and paving between the house and the site of the greenhouse. Most plants were typical of the species and some of those growing in the abandoned brick 'old meat-store' are very well grown, some with a slightly wavy margin. However, two or three small individuals amongst them had conspicuous terminal cresting of the fertile fronds (Fig. 10a. and 10b.) which Martin Rickard has identified as falling within the 'Ramosum' group. While other possibilities cannot be entirely discounted, it seems probable that they are descended from specimens in Fraser's collection, having naturally reproduced by spores for one or more generations over the nearly 140 years since ferns were first cultivated there.

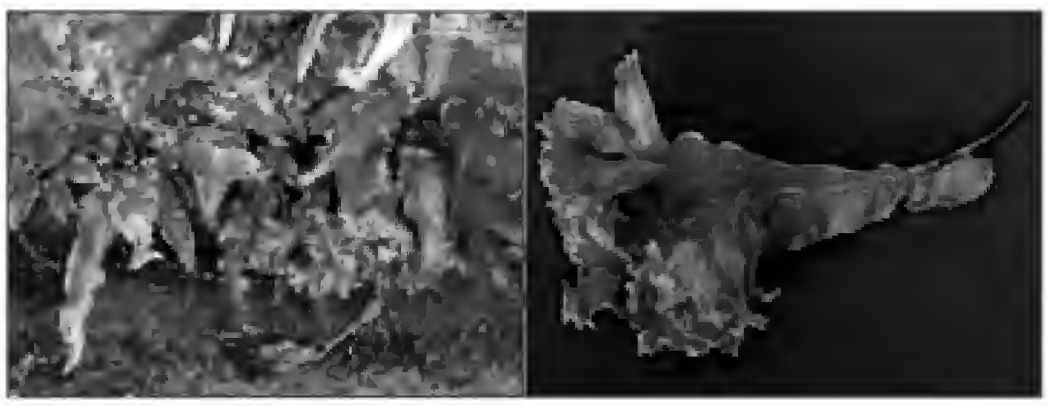


Fig. 10a. Normal and crested forms of *Asplenium scolopendrium* growing in a wall.

10b. A single frond of the crested form, resembling 'ramosum' group.

Athyrium filix-femina is the most abundant and widespread species in the garden and is scattered throughout the unmown areas. The morphology of most individuals was within the normal range of variation but several plants were regularly crested on the ends of the fronds and of each pinna (Fig. 11). They have been identified by Rickard as 'Cristatum' group. One individual growing near the remains of a jetty in the flooded quarry had pronounced terminal crests and was possibly a different variety, as was another plant with very narrow pinnules but no crests.

Two juvenile plants growing in cracks between paving slabs had narrow fronds, downwardly directed pinnae, and cresting of some fronds and pinnae (Fig. 12). Because we thought they might be different from the others, we removed one plant (with permission) and Phil Lusby gave it to Andy Ensoll at RBGE to grow on. One year later, it still looks rather different from any others in the garden, and is slightly depauperate with irregular, rather lax, cresting (Fig. 13). Rickard says it would be best described as Cristatum group although it is "close to Gemmatum Barnes". Perhaps its characteristics will have developed further in another year or two. Again, these varieties are probably descended from Fraser's collection.

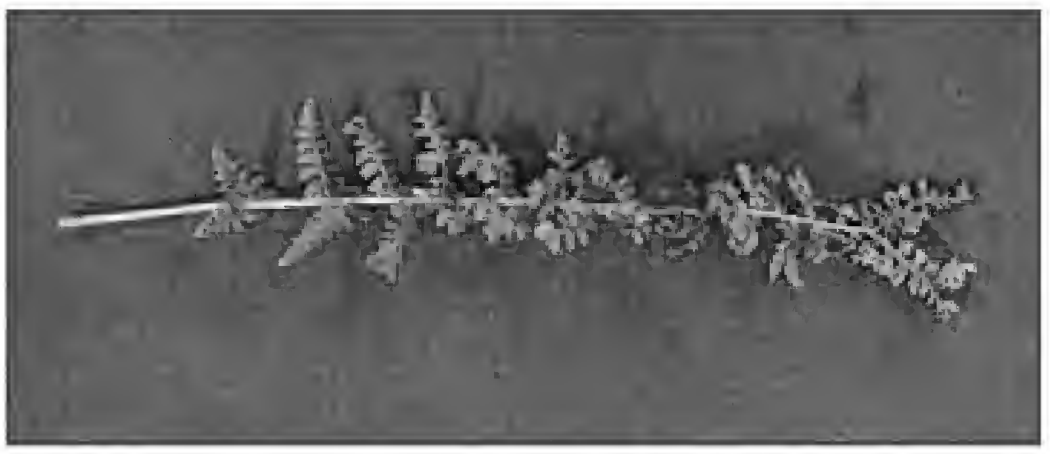


Fig. 12. A frond from one of two juvenile plants of *Athyrium filix-femina* with depauperate downwardly-directed fronds and irregular cresting.

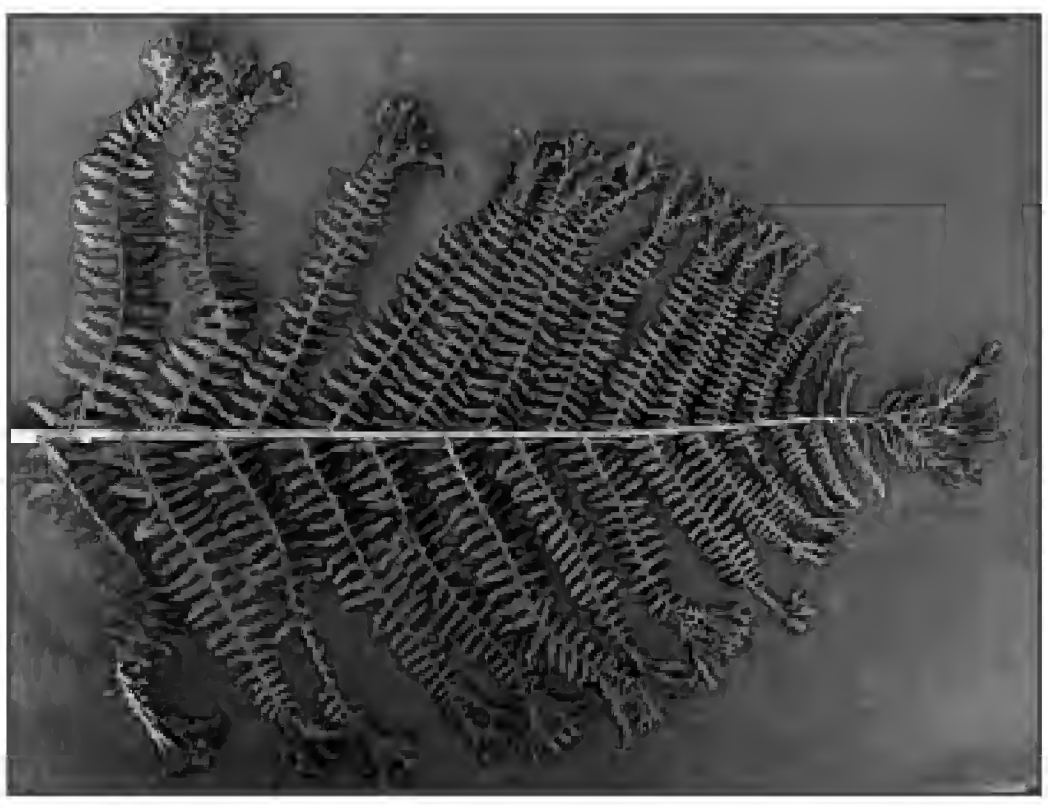


Fig. 11.Part of a frond of a cristate *Athyrium filix-femina*, typical of several found scattered in unmown areas throughout the garden.

Fig. 13. The same plant as in Fig. 7, one year later. It is still different from most of the crested plants in the garden but, despite the irregularity of the cresting, best described as Cristatum group.

Dryopteris filix-mas:

Among the few individuals present in the garden, all growing along a shady path through shrubs on the edge of the quarry, was one with unusually narrow pinnules. All of them could have colonised naturally from incoming wind-blown spores.

Dryopteris dilatata:

A few individuals grew with *D. filix-mas*; none had abnormal morphology. These also could have been naturally sown from incoming spores.

Polystichum setiferum.

Two plants typical of the species occurred on the same path as the *Dryopteris* spp. Unlike the other species found, *P. setiferum* is not common outside gardens around Edinburgh. The nearest known large natural populations are on the coast about 35 miles away, near its northern limit on the east side of Britain. A few plants, usually as single individuals, are known in the wild in and near Edinburgh, but usually, if not always, close to habitation and thus perhaps garden escapes. The plants at Rockville could be descended from plants grown by Fraser, who exhibited this species, or from spores blown in from other gardens.

Polypodium vulgare (sensu lato):

No ferns were found on the garden walls but a single spreading individual of *Polypodium*, with normal morphology, was growing on the fossil tree stump (Fig. 8). It was not identified to species. It seems likely that it was planted there but it is not known when or by whom.

It is interesting to note that the probable survivors of the 19th Century collection in a garden which is now not very 'fern-friendly' belong to species that are naturally successful in the wild in south-east Scotland. They are therefore probably among the species best adapted to the local soil and climate, and most tolerant of local competition. It may also be significant that they are all fertile and, with the exception of *Polypodium*, with little or no capacity to form clones. Even within Fraser's life-time, Lowe had noted that varieties of *Scolopendrium* (*Asplenium scolopendrium*) had the ability to maintain themselves by spores. Distinctive varieties appeared on walls in Lowe's garden and up to three-quarters of a mile away for several years after he moved his collection from Nottinghamshire to Monmouthshire in 1880. All the exotic, tropical and sterile ferns in Fraser's collection were either removed after his death or have been eliminated since.

It is sad to learn of yet another instance of a nationally important Victorian fern collection being lost, but it is also interesting that the garden is largely intact and, nearly 100 years later, a few of Fraser's ferns remain, self-perpetuating in the garden.

Acknowledgements:

I am grateful to Graham Hardy (RBGE Library) for much help in locating relevant publications and archival records at RBGE and to Martin Rickard for helpful comments on an earlier draft.

Further reading:

Anon (1905) *The late Mr Patrick Neill Fraser*. Scotsman, 3 March, 1905, p.5.

Anon (1906) Patrick Neill Fraser obituary. *Transactions of the Botanical Society of Edinburgh* 1906, 208-209.

Boyd, P.D.A. (1992) *The Victorian Fern Cult in South-West Britain*. pp.33-56 in Fern Horticulture: past, present, and future perspectives. (Eds J M Ide, C Jermy, A M Paul) Intercept, Andover.

Desmond, R. (1994) *Dictionary of British and Irish botanists and horticulturalists*. NHM, London.

Don, Professor & C.H. Smith et al. (1836) *A notice of the garden of Canonmills Cottage, the residence of Patrick Neill*..... Gardener's Magazine 12, 334-341.

'H.' (1894) *Garden of P.Neill Fraser*. Gardeners' Chronicle, June 2, XV, No.388, 697

Hall, N. & M. Rickard (2006) *Fern Books in English published before 1900*. British Pteridological Society, London.

'J.' (1894) Rockville, Murrayfield, Edinburgh. The Gardeners' Chronicle, June 2, 1894, 697.

Jackson, B.D. (revised Peter Osborne) **(2004)** *Patrick Neill 1776-1851*. Dictionary of National Biography, 40, 369.

McLaren, M. (Ed.) (1949) *The House of Neill 1749-1949.* Bicentenary Edition. Neill & Co. Ltd., Edinburgh. 40pp. (Enlarged version of *History of the firm of Neill & Company Ltd*. (1900) and *The Printing House of Neill* (1917))

Paul, D. (1905) *Patrick Neill Fraser* (obituary). Memoirs of the Royal Caledonian Horticultural Society, 1 (1), 83 – 85.

Robertson, F. (2011) *Patrick Neill, 1776-1851: Doyen of Scottish Horticulture*. Whittles Publishing Ltd., Dunbeath.

Wallace, J.M. (1994) *Cannonmills and Inverleith*. John Donald Publishers Ltd., Edinburgh.

MORE FERN DECORATIONS

A trip in February 2014 to Costa Rica was staggering with the amount of variety and number of ferns. However it is always pleasing to see that ferns are used to decorate and embellish even modest establishments. This photograph was taken at a simple roadside eatery (cafetería de carretera) and every table had similar decorations. They even grew this fern in window boxes alongside the bar.

However, I am unable to name this fern and would appreciate any help from readers. Please contact me at:- alec.greening@virgin.net

Thank you

A Trip to the Blue Mountains Near Sydney, NSW, Australia

Mark Longley

76 Cockle Bay Road, Howick, Auckland, NZ

e-mail: longley74@xtra.co.nz

In April of 2012 I began writing my book – *Tree Ferns For Your Garden*, an article about which appears in this edition of the Pteridologist. One of the most important features of this book and one which separates it from any publication on ferns or tree ferns is the fact that I wanted to include a great deal of images of tree ferns in their own habitat.

Living as I do in New Zealand, I had covered all of the native species here without too much effort. The only NZ tree fern I had to make a special trip for was *Dicksonia lanata*, the non-prostrate form which only grows in the Kauri forests of Northland. I'd also managed to catch some good shots of *Cyathea cooperi* and *Dicksonia youngiae* while on holiday in Australia prior to 2012 but there were 2 species which I had absolutely no habitat shots of and they were possibly the 2 most important; *Dicksonia antarctcia* and *Cyathea australis*. The former is easily the most cold tolerant of all tree ferns and one of the most popular so I could never be forgiven for not having fresh and exciting images of that species. Likewise *Cyathea australis* is probably the most cold tolerant of the entire *Cyathea* genus so again I just had to get myself some good images.

It was imperative for me to find a location that I could visit and find both species in the same area. I allowed myself a trip duration of 4 days to fly in, get the shots and fly out! The one place that instantly seemed to make sense was the Blue Mountains in New South Wales. Logistically they were the perfect option as the National Park is less than 3 hours train journey from Sydney and I could fly direct to Sydney from my home in Auckland in just 3 hours. Perfect – The tickets were booked, the camera gear and luggage packed and I was off!

Upon arrival into Sydney I headed straight for the Royal Botanic Gardens. They are in a park adjacent to the Opera House on the waterfront and quite the most beautiful gardens I know. The Sydney climate is absolutely perfect for growing tender palms and tree ferns which abound in the dedicated fernery.

The next day I walked from my hotel to the main train station at King's Cross, boarding the 6am train to the Blue Mountains. It was going to be a long day. If I took the wrong walking track and missed my shots or missed the tree ferns altogether then I would be coming back again the next day!

Fig. 1. *Cyathea cooperi* growing in full sun near the Opera House in Sydney.

Fig. 2. The fernery at Sydney's Botanic Gardens is packed with hundreds of species of ferns.

Fig. 3. A beautiful tall *Cyathea australis*

A Trip to the Blue Mountains

The train arrived at Katoomba station a little after 8am and I headed for the information centre where I hoped to pick out a map of the various walking tracks which might help me decide which was most likely to come up trumps. Thankfully the gentleman who offered me the map was also very familiar with all of the walks and upon my divulging the mission I had set myself, he pointed out the best 2 tracks for seeing ferns. He wasn't specific about what ferns were there but he was confident enough that I took his advice and jumped on an old red London bus (seriously!) for the trip to the beginning of the walk. It was the middle of winter (August 2013) and there had been a light frost overnight due to the Blue Mountains being 800 metres above sea level. The sun was out now and by 9am it was 10^0 C, though it never got any warmer all day so one could definitely refer to it as 'chilly'.

Fig. 4. A forest full of *Cyathea australis*

If I'd had any fears at all about finding tree ferns on this trip then my fears dissipated after 2 minutes walking down steep steps into the dark and cold ravine. *Cyathea australis* everywhere and some terrific specimens of them too. The feeling of relief was most satisfying as I pulled out the DSLR, fiddled with the settings to account for the very dark ravine I was in and took some shots.

Then after a little while I came across some beautiful specimens of *Todea barbara*. There were thousands of small ones growing everywhere but only very rarely did I find really old ones which had formed a large thick caudex. These were usually growing right next to or in running water so clearly the high humidity is crucial.

Fig. 5. A large *Todea barbara*

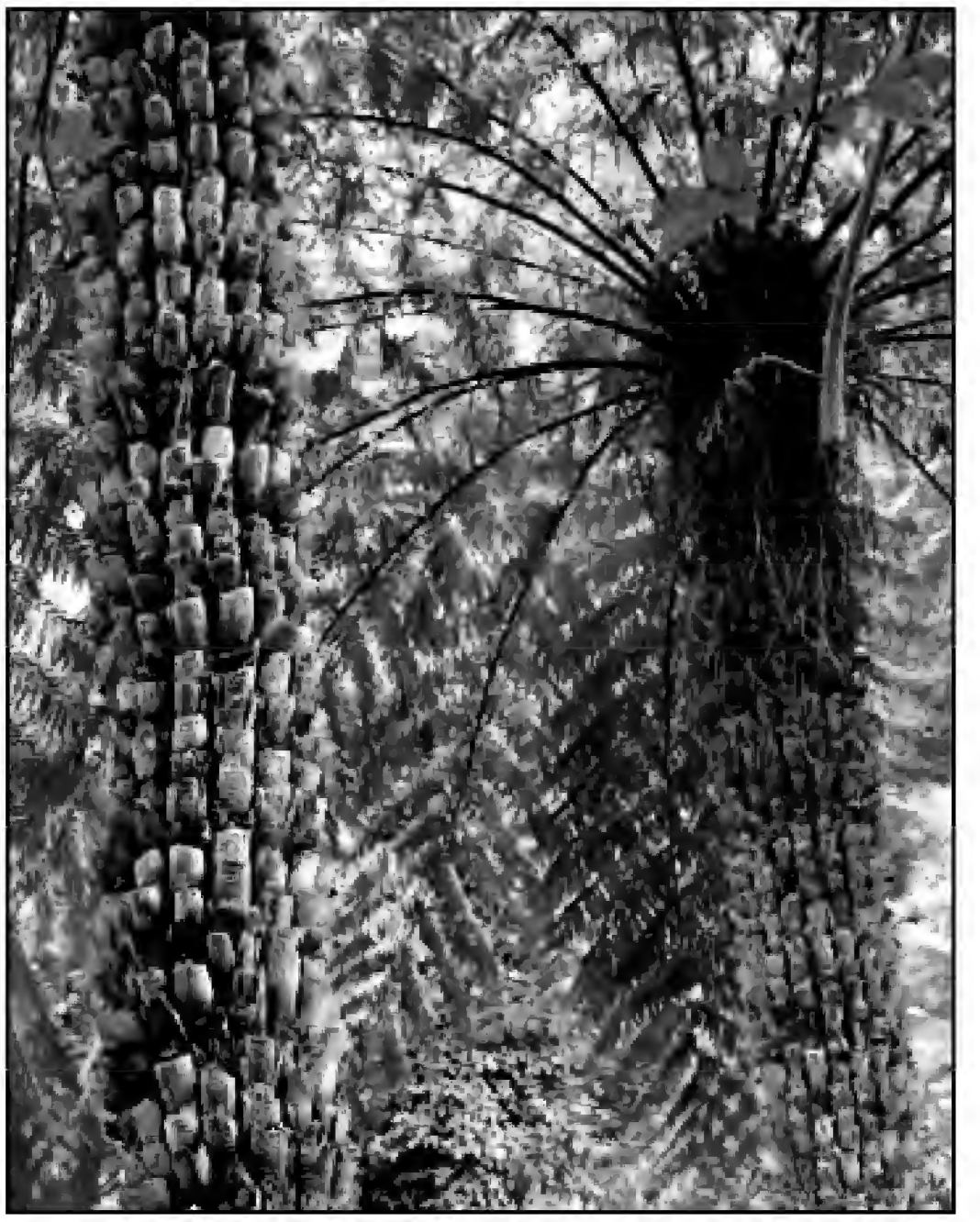


Fig. 6. Trunk detail

Further along the track I came to an opening in the thick canopy of Eucalypt forest and found the most stunning scene. The blue haze you can see in plate 7 is the reason the Blue Mountains have their name and it is caused by refraction between light and the mist created by the resin in the Eucalypt forest.

Fig. 7. A view across the Blue Mountains

Further along the track and I found more *Cyathea australis*, some of them with quite the most beautiful trunks. Already this trip was paying for itself and I knew I was getting some great images for the book.

The only fly in the ointment right now was that I hadn't seen a single *Dicksonia antarctica*. Was I going to have to look elsewhere? The trail continued downwards for some time. The light levels dropped and the humidity rose. Then suddenly, yes! There I could see the unmistakable chocolate brown trunk and beautiful long arching fronds.

A Trip to the Blue Mountains

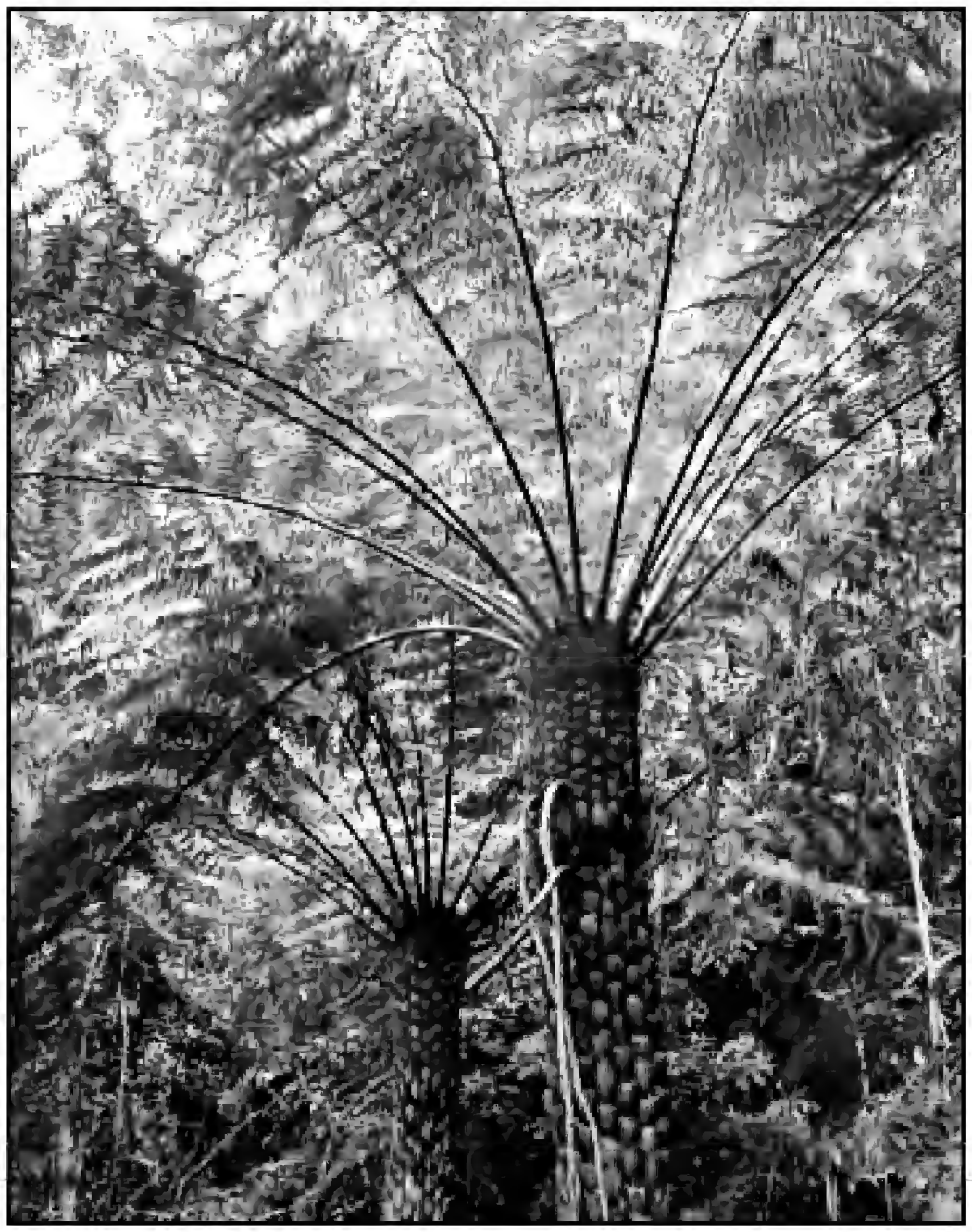


Fig. 8. Attractive specimens of *Cyathea Australis*.

I had obviously reached that point in the forest where the conditions were no longer suitable for *Cyathea australis* which appeared to prefer the drier, brighter and slightly warmer aspect and here in the deep dark depths, the *Dicksonia* thrived albeit in fewer numbers.

Fig. 9. *Cyathea australis* detail of the crown

I spent several hours on the tracks that day and once the images I needed were in the bag I was able to enjoy some of the spectacular scenery that this National Park affords including some stunning waterfalls. My train arrived into Katoomba Station at 4.30 for the trip back to Sydney that afternoon and I must say it was a most pleasant journey knowing that I had accompolished the prime objective of the mission. The next day back in Sydney I went to the fernery in the Botanic Gardens again and shot a 10 minute video tour which you can view by following this Youtube link https://www.youtube.com/watch?v=QF7exnr3HbA&feature=youtu.be

Fig. 10. The first specimen I saw of *Dicksonia antarctica*

Fig. 11. Several nice specimens of *Dicksonia antarctica* with 2 – 4 metres of trunk

Fig. 12. A big 6 metre trunked *Dicksonia antarctica*

A fern cultured from Antarctic glacier detritus.

R.I. LEWIS-SMITH

Centre for Antarctic Plant Ecology and Diversity, Torr Lodge, Alton Road, Moffat, Dumfriesshire, DG10 9LB, U.K.

ronaldlewissmith@gmail.com

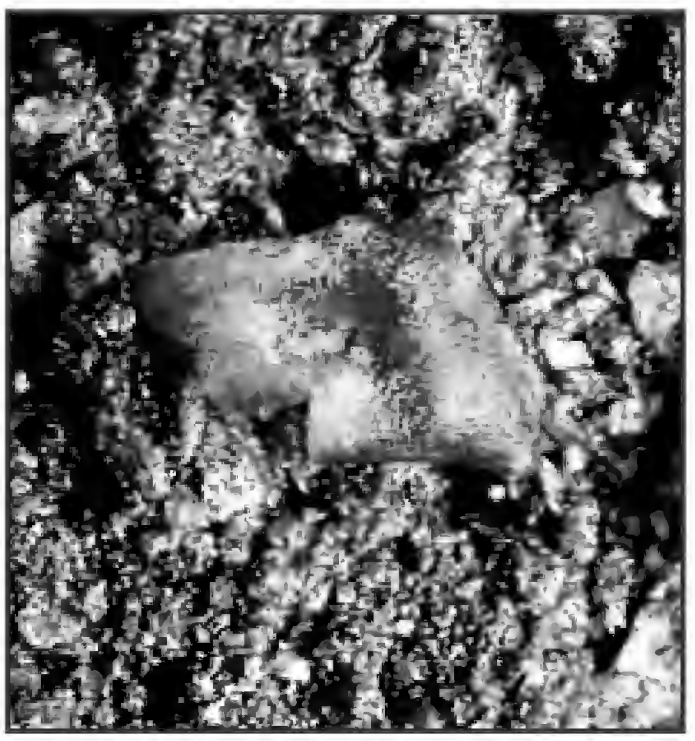


Fig.1. Bilobed prothallus six months after it first appeared on the cultured cryoconite soil from Signy Island ice cap (July 2000).

Fig. 2. Multilobed prothallus (September 2001)

Fig.3. Multilobed prothallus with frond beginning to develop at upper centre (June 2002).

[Condensed from a paper of the same title in *Antarctic Science*, **26**, 1-4, 2014]

The Antarctic flora contains no ferns but comprises 113 moss taxa, 27 liverwort taxa, about 500 lichen taxa, and two native flowering plants (Antarctic Hairgrass, *Deschampsia antarctica* Desv., and Antarctic Pearlwort *(Colobanthus quitensis* (Kunth.) Bartl.), both restricted to the maritime Antarctic (i.e South Sandwich, South Orkney and South Shetland Islands, and the west side of the Antarctic Peninsula). The very limited palynological analyses of organic deposits in the maritime Antarctic have revealed the presence of pollen from flowering plants (including *Deschampsia* and *Colobanthus* and several species from Terra del Fuego.), and spores from unidentified pteridophytes and mosses, over a 5000 year timescale. Other studies conducted in the South Orkney and South Shetland Islands have shown that the spore and pollen "rain" contains fern spores (Kappen & Straka 1988, Lewis-Smith 1991).

A long-term study of soil propagule banks[1] has been carried out on Signy Island (60°43S, 45°38W), one of the South Orkney Islands, lying some 900km east-south-east of Tierra del Fuego. Mineral soils from "cryoconite" holes in the island's ice cap have been sampled and cultured. These cryconite holes are caused by aggregations of wind-borne mineral particles deposited on ice and gradually melting into it to create small holes 20-40 cm deep and up to 50 cm wide which then fill with melt water in summer. The soil in these holes contained a diversity of diatoms, algae, protozoans, rotifers and tardigrades, as well as vegetative fragments of local mosses, liverworts and lichens.

In November 1999 fine mineral soil from ten cryoconite holes was collected within an area of about 1 hectare on the island's ice cap at *c.* 300 m altitude. Each sample was divided into three sub-samples, of approximately 100 gram fresh weight, which were cultured at room temperature *(*~18°C) in the laboratory at Signy research station. For the first six months the culture dishes were kept sealed to prevent contamination, but examined frequently through the clear polystyrene lid. No water was added as the soils were moist. Later, a small amount of deionised water was added to the tray at regular intervals. The dishes had a perforated base over which was glued an ultra-fine nylon mesh to allow water to penetrate upwards during subsequent cultivation. The experiment was continued for a further 12 years, with occasional transplantings.

1 Seed and spore bank

Fig.4. Early development of fronds from prothallus (January 2003)

Fig. 5. Development of frond and elongation of stipe (December 2003).

Fig. 6. Development of frond and elongation of stipe (December 2004).

A fern cultured from Antarctic glacier detritus.

Fig. 7. Mature plant of *Elaphoglossum hybridumin* in14 cm diameter pot (June 2011).

Fig. 8. A full view of a mature frond (June 2011).

Fig. 9. Detail of the base of the frond (June 2011)

After about four weeks several species of moss and two liverworts began to develop small colonies of shoots from spores or gametophyte fragments. All were typical of the local flora. After two months several other moss species appeared, as well as a green multicellular disc about 2 mm in diameter. This was tentatively ascribed to the thalloid liverwort *Marchantia berteroana*, a frequent species on Signy Island, where it is not fertile but does produce vegetatively by means of copiously produced gemmae. After 4 months the dishes were transported by ship at 4°C to the British Antarctic Survey, Cambridge, and maintained at that temperature in a controlled environment chamber for a further three years.

The thalloid plant gradually became bilobed and grew to about 6 mm in diameter after six months (July 2000) (Fig.1), and was by then clearly identifiable as a fern prothallus. After 15 months (April 2001) the prothallus (gametophyte) was transplanted onto a sterilised (48 hr at 50°C) homogenised moss peat substrate, prepared at Signy Island. By September 2001 the gametophyte had increased to about 15 mm diameter and had become multi-lobed and deeply crenellated, and the ventral surface had developed clusters of rhizoids (Fig.2). By January 2003 several of the lobes had developed into small oval entire fronds with a very short rachis (Figs.3-4) By December 2003, the fronds had become diamond-shaped with a cuneate base and borne on a short stipe, both elongating to *c.* 3-5 cm length (Figs.5-6). The dish was moved to room temperature *(c.* 15-20°C), and the growth rate accelerated. The plant survived two further transplantings into larger containers. By 2009 it was mature and, over the next three years, the lanceolate frond dimensions ranged from 5-10 cm long by 2-4.5 cm wide, borne on stipes of 5.0 to 7.5 cm long (Figs.7-13), with a few dying annually and being replaced by new leaves. By March 2014 the plant continues to thrive in the author's conservatory, and the largest fronds are up to 16 cm long, 6 cm wide on stipes of 8-12 cm long. The frond margins and stipes are densely covered with rust-brown hairs, although the former disappear as the frond ages. No sporangia have developed.

In 2012 photographs and two fronds of the fern were sent to Dr Fred Rumsey, Natural History Museum, London, for identification. It has been confirmed as *Elaphoglossum hybridum* (Bory) Brack. (Lomariopsidaceae), a species with a southern African distribution centred on South Africa (notably the high eastern Cape, central, tropical and east Africa), Madagascar and the Mascarene Islands in the south Indian Ocean, as well as Tristan da Cunha and Gough Island in the south Atlantic Ocean (Crouch *et al.* 2011). *E. hybridum* is closely related to *E. randii* Alston & Schelpe, a species endemic to sub-Antarctic Marion Island

Fig. 9. The rust brown 'hairs' showing on the stipe. (June 2011)

Fig. 10. Frond details (2011)

Fig. 11. The apex of the frond showing the rust brown 'hairs'. (June 2011)

A fern cultured from Antarctic glacier detritus.

and Îles Kerguelen in the southern Indian Ocean.

This is the first record of a pteridophyte cultured from an Antarctic substrate, although it cannot be construed as a component of the native flora. Nevertheless, it provides evidence that viable spores of ferns, like those of bryophytes and fungi, do reach remote Antarctic sites, and that some may be considered as potential colonists if and when they reach a suitable substrate with favourable growing conditions.

All locations from where *Elaphoglossum hybridum* is known are well to the north and east of the South Orkney Islands, which lie in the path of strong prevailing westerly winds. So how did the spore, from which the present plant developed, reach Signy Island? The most probable explanation is by encircling the Southern

Fig. 12. An emerging crosier with light coloured hairs. (June 2011)

Hemisphere on an east-west trajectory at high altitude in the upper atmosphere. How it was transported into the upper atmosphere is open to speculation. However, it is known that once spores and pollen have been carried to high altitude they may be transported across great distances by upper air currents before being deposited (van Zanten 1978, Marshall 1996, Muñoz et al. 2004).

These simple soil culture experiments provide evidence of what must be an abundant pool of viable spores preserved in various substrates throughout the Antarctic. With the current trend in regional warming in the maritime Antarctic there is an increasing probability that exotic spores in the soil, previously unable to develop into plants because of adverse growing conditions, will be able to become established. ❐

References

Crouch, N.R., Klopper, R.R. Burrows, J.E. & Burrows, S.M. 2011. *Ferns of Southern Africa. A comprehensive guide.* Cape Town, Struik Nature, 760 pp.

Kappen, L. & Straka, H. 1988. Pollen and spores transport into Antarctica. *Polar Biology,* **8**, 173-180.

Lewis Smith, R.I. 1991. Exotic sporomorpha as indicators of potential immigrant colonists in Antarctica. *Grana,* **30**, 313-324.

Marshall, W.A. 1996. Biological particles over Antarctica. *Nature,* London, **383**, 680.

Muñoz, J., Felicísimo, A.M., Cabezas, F., Burgaz, A.R. & Martínez, I. 2004. Wind as a long-distance dispersal vehicle in the Southern Hemisphere. *Science*, **304**, 1144-1147.

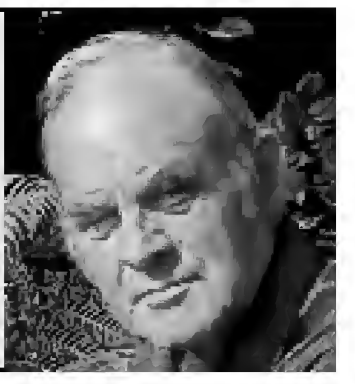
Zanten, B.O. van. 1978. Experimental studies on transoceanic long-range dispersal of moss species in the Southern Hemisphere. *Journal of the Hattori Botanical Laboratory*, **44**, 455-482.

Polystichum munitum, the Bird's Nest Fern.

Adrian Dyer

499 Lanark Road West, Balerno, Edinburgh. EH14 7AL

e-mail: afdyer499@googlemail.com



While tidying a fern bed in my garden in May, 2013, I came across something that gave a new meaning to 'Bird's Nest Fern'.

Well hidden in a large plant of *Polystichum munitum* was a recently vacated bird's nest, probably of the Dunnock (Hedge Sparrow, another 'P.m.', *Prunella modularis*) (see attached photos). I have never previously seen a bird's nest in a fern, in my garden or anywhere else. It could probably only happen when a bird that normally nests in low shrubs finds a large fern with persistent wintergreen fronds on closely packed crowns. Perhaps there is no native fern species that provides sufficient cover early in the year, if at all. Does anyone know of other records of British birds nesting in ferns? (See page 78) Perhaps there are birds that regularly nest in evergreen ferns in the tropics

DRYOPTERIS LABORDEI 'Golden Mist'

Unravelling the identity of a fern recently introduced to cultivation

Tim Pyner
182 Southchurch Boulevard, Southend-on-Sea, Essex. SS2 4UX
e-mail: t.pyner@byinternet.com

Over the last few years a fern has appeared for sale in garden centres, nurseries and on-line suppliers named *Dryopteris labordei,* usually with the evocative epithet 'Golden Mist' attached or sometimes just Golden Mist Fern. This fern is extremely attractive, with young fronds flushing orange fading through golden-green. The mature dark green, glossy fronds contrast beautifully with the colourful young foliage. I currently have some misgivings with regards to its cold hardiness in the UK but should these be unfounded this fern could prove very popular with a market potential approaching that of *D. erythrosora.* In the light of these expectations and before the name gets permanently established in the horticultural trade I feel it is appropriate to address some doubts I have regarding the identity of this fern. As I see it there are 3 problems to address, firstly the name *Dryopteris labordei* and the fern it refers to, secondly the identity of the fern grown under this name and finally the label Golden Mist.

I started this research because I had come across the name *D. labordei* in the course of other investigations into *Dryopteris* species in cultivation and realised that it had been used in different senses in the past. Fortunately the recent publication of volume 2-3 of the monumental Flora of China (2013) which covers ferns and lycophytes has been of immense help in sorting out which plants are being cultivated.

Fig. 1. *Dryopteris* varia 'Golden Mist'. Young plant with colourful new frond. Note the elongated, pointed basal basiscopic pinnules.

Photo: Yvonne Golding

1. *Dryopteris labordei*

There are several names that have in the past been associated with *D. labordei*..These are;

1. *Dryopteris labordei* (Christ) C. Chr. (1906) first described from China in 1905 by Herman Christ as *Aspidium labordei*.

2. *Dryopteris gymnosora* (Makino) C. Chr. (1906) first described from Japan in 1899 by Tomitaro Makino as *Nephrodium gymnosorum*.

3. *Dryopteris indusiata* (Makino) Makino & Yamamoto ex Yamamoto (1932) first described from Japan as var. *indusiatum* of *Nephrodium gymnosorum* by Makino in 1899.

4. *Dryopteris tenuicula* Mathew & Christ (1909) described from China.

These are now considered to be separate species in Flora of China but have been treated in a variety of ways in the past. A few examples include Fraser-Jenkins (1986) who sinks *D. labordei* into *D. gymnosora* and *D. indusiata* into *D. tenuicula*. In Flora of Taiwan, Shieh et al. (1994) includes *D. indusiata* under *D. labordei.* However in Knapp (2011) *D. labordei* is excluded from the Taiwanese flora but *D. tenuicula* is now accepted as occurring there. In Japan *D. indusiata* has been erroneously called *D. labordei* in the past (Iwatsuki et al.(1995)). All 4 species have been recorded from mainland China.

If there have been so many differing opinions amongst botanists it is very possible that horticulturalists, particularly large enterprises producing millions of plants annually, will have chosen the incorrect name for this very attractive fern with great commercial potential.

Anyone who has tried to identify an unknown cultivated *Dryopteris* will know that it a frustrating and often fruitless exercise. Cultivated ferns can differ markedly from those found in the wild just through environmental conditions and both targeted and unconscious selection can also affect their appearance. Descriptions in floras do not account for these differences and comparing them with herbarium specimens is also difficult without plenty of experience. *Dryopteris* is a very large genus, 167 species are recognised just for China in Flora of China. To approach such a large number of species is daunting.

However *Dryopteris* has been classified into subgenera and sections by Christopher Fraser-Jenkins(1986) and this classification can be used to narrow the range of possibilities. The above 4 species are all members of Section *Erythrovariae* of Subgenus *Erythrovariae*. Most

Fig. 2. *Dryopteris* varia 'Golden Mist' in my Essex garden, July 2012.

of the members of this subgenus bear small bullate (swollen, blister-like) scales on the underside of the rachis, costae and costules. These scales do not occur in other sub-genera. *D. erythrosora* is a familiar member of this subgenus. The treatment in Flora of China divides the Section *Erythrovariae* even more narrowly and all 4 species are now included under Section *Indusiatae*. The 4 species, *D. labordei, D. gymnosora, D. indusiata* and *D. tenuicula,* are clearly described and differentiated. *D. indusiata* is cultivated by enthusiasts in the UK and in my experience is usually correctly named.

I apologise for the in-depth nature of this discussion however nothing in regards to Dryopteris is straight-forward.

Fig. 3. Stipe bases showing narrow, unbordered, brown scales of *Dryopteris varia*.

2. What is 'Golden Mist'?

Now we come to the question to what species does 'Golden Mist' belong to? By comparing the descriptions of the above 4 possible contenders with the fern sitting in front of me the answer is conclusive – none of them! Here is a brief comparison between 'Golden Mist' and Section *Indusiatae*:

Lamina ovate-lanceolate to lanceolate, lowest basiscopic pinnule on lowest pinna not markedly longer than adjacent pinna, pinnules not caudate, rounded at apex. Section *Indusiatae*.

Lamina pentagonal-ovate, lowest basiscopic pinnule on lowest pinna markedly longer than adjacent pinna, pinnules caudate, apex acute. 'Golden Mist'.

The characters of 'Golden Mist' actually meet the criteria for another group, the Section *Variae*! This is a group of around 15 species and after a careful comparison of descriptions and herbarium specimens I have concluded that it belongs to *Dryopteris varia* (L.) Kuntze. The architecture of the fronds, the scales of the rhizome, stipe, rachis, costae and indusia characters match the descriptions of this species in various floras, in particular that of Fraser-Jenkins(1989). As the name suggests, this is a variable species with a wide distribution ranging from India through China to Japan and the Philippines. In modern treatments much of the variation has been removed into segregate species however diploid and triploid plants are still currently included within *D. varia* and future research may involve further splits.

There is a good photo in Iwatsuki(1992)-Plate 123.3, that shows a wild plant in Japan that closely resembles our cultivated fern and shows the colourful young fronds.

I have been unable to establish how the name *D. labordei* became attached to this fern however I find it odd that the name of a rather obscure species has somehow replaced that of the common and widespread *D. varia*. On-line searches have revealed that plants in the North American trade may have originated from Australia but these claims are vague and unsubstantiated. Perhaps someone in the nursery trade will be able to shed light on this matter?

Fig. 4. Back of frond showing weakly bullate and attenuate scales typical of *Dryopteris varia*.

3. The name 'Golden Mist'

D. varia is apogamous and reproduces asexually. This is an important aspect to nursery production as the plants behave as clones and the offspring from spore sowings are identical to the parents. However like our native apogamous *D. affinis* there is natural variation across the entire species and distinctive clones could be given cultivar names. However the name 'Golden Mist' has a somewhat complicated history that I have not yet been able to fully unravel. An application was made in 2007 by Casa Flora- a well known mass grower of ferns in the USA- to register the name Golden Mist as trademark for 'plug starter plants, namely, ferns'. It is uncertain whether this name was applicable to the fern grown as *D. labordei*. It is also unclear whether 'Golden Mist' was attached to this fern before the application or did it become linked following the application? Again perhaps someone in the nursery trade would be able to provide some answers. Furthermore the trademark application was abandoned in 2010.

(For those interested, an excellent review, The Misuse of Trademarks in Horticulture by Tony Avent of Plant Delights Nursery, of what may become an increasing problem for horticulturalists, can be found at www.plantdelights.com/Trademarks-in-Horticulture/products/534)

Cultivation

Cultivation requirements for *D. varia* are similar to other *Dryopteris* species, a well drained moisture retentive soil in dappled shade being ideal. Cold hardiness is frequently stated to be Zone 5-8 (USDA) or Zone 7-8 (UK) on nursery websites. This indicates hardiness down to -29^{C} in North America. I am rather sceptical as in my experience, unless very sheltered, plants are damaged or killed at temperatures below -5^{C}. As part of my research I have tried growing a number of plants of 'Golden Mist' from various sources in

my Essex garden and only one is currently alive. I do have 2 plants of *D. varia* (both obtained under incorrect names) that have survived a number of years but these remain small and I am not confident they will survive a below -10^{C}. I would be interested in other growers experiences, particularly from milder parts of the UK.

Conclusions

To summarise, the fern currently being marketed as *Dryopteris labordei* 'Golden Mist' does not belong to that species. It is actually *D. varia*. The cultivar name 'Golden Mist' can be attached to this clone although whether it differs significantly from typical *D. varia* is debatable. *D. labordei* is a different species that has a confused taxonomic history since it was described over a century ago. However in the most recent treatment it is accepted as a species and is clearly differentiated from its close relatives. It does not appear to be in cultivation in the UK at present although the allied species *D. indusiata* is grown by enthusiasts.

I would like to thank Alison Paul for help and advice when visiting the herbarium at the Natural History Museum, London. ❒

References

Fraser-Jenkins, C.R. (1986) A Classification of the genus *Dryopteris* (Pteridophyta:Dryopteridaceae). *Bull. Br. Mus. Nat. Hist.* (Bot.) Vol 14 No3 pp 183-218.

Fraser-Jenkins, C.R. (1989) A monograph of *Dryopteris* (Pteridophyta:Dryopteridaceae)in the Indian subcontinent. *Bull. Br. Mus. Nat. Hist.* (Bot.) Vol 18 No5 pp 323-477.

Iwatsuki, K. (1992) Fern and Fern Allies of Japan. Heibonsha Ltd, Tokyo.

Iwatsuki, K, Dryopteridaceae in **Iwatsuki, K et al. (1995)** Flora of Japan Vol. 1 Pteridophyta and Gymnospermae. Kodansha Ltd, Tokyo.

Knapp, R. (2011) Ferns and Fern Allies of Taiwan. KBCC Press, Taiwan

Shieh, W.C., Devol, C.E. & Kuo, C.M. (1994) in Flora of Taiwan Vol.1 2nd Edition. Taipei

Wu Sugong et al (2013) Dryopteris in Flora of China Vol 2-3 Lycopodiaceae through Polypodiaceae. Science Press, Beijing & Missouri Botanic Garden Press, St. Louis.

Book Review

Flora of Birmingham and the Black Country by Trueman, I., Poulton, M. and Reade, P.. Pisces Publications. 2013. 488 pp., hardback. Numerous colour photographs and numerous plant distribution maps. ISBN 978-1-874357-55-1.

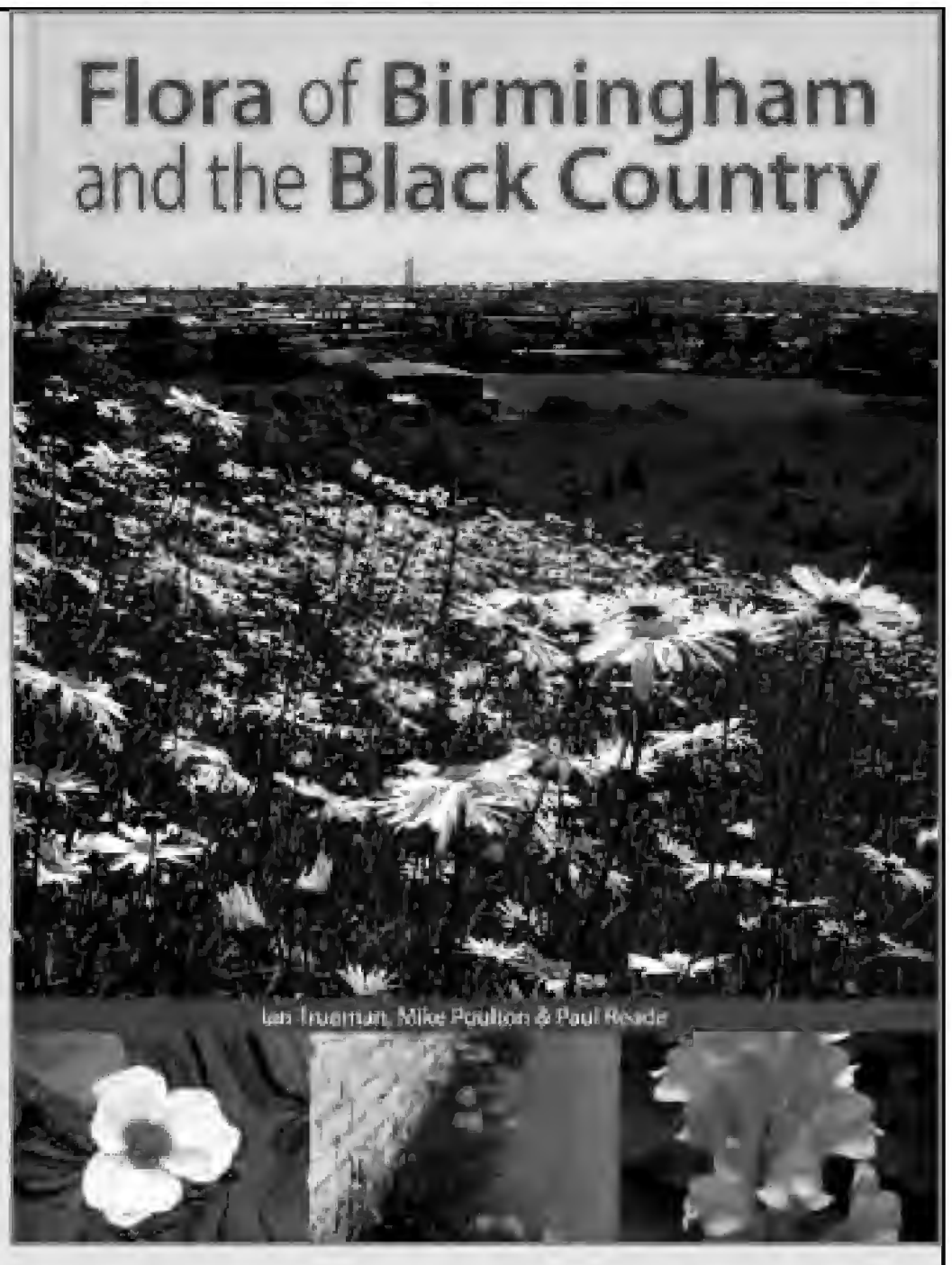
No price given but available for £38 on Amazon.

Over the years quite a few floras of urban areas have been published, for example Aberdeen, Glasgow, Derby, Bristol, London etc.etc. . Not a bad idea as this is where the people live. Birmingham and the Black Country does not disappoint, the flora is remarkably rich although fairly heavily peppered with alien species. The early pages are given over to an in depth general analysis of the area, followed by lists of fungi, lichens, bryophytes and vascular plants.

The ferns do not get a chapter on their own but they are there, and there is a good range of species. On occasions Matt Busby has given the Society accounts of the region's ferns, particularly with reference to the canals, so I suspect he has had quite an input of records, over and above the record for *Oreopteris limbosperma* – for which he is credited. Quite a few of the species discussed are believed to be extinct but as pollution is gradually pushed back who knows what might reappear. Well represented are the wall ferns and horsetails, it`s good to see quite a few records for *E.sylvaticum. Polystichum, Dryopteris* and *Polypodium* are also widely distributed. There are no records for *Polypodium australe* despite good limestone outcrops around Dudley .

I can feel a recording trip coming on! I suspect many of our local members will be getting this book – it`ll make that afternoon walk so much more interesting!

Martin Rickard



THE BUCHANAN FERN, *Athyrium filix-femina* 'Victoriae'- THE STORY OF A VICTORIAN FERN VARIETY

Adrian Dyer

499 Lanark Road West, Balerno, Edinburgh. EH14 7AL

e-mail: afdyer499@googlemail.com

One day in the summer of 1861, 23-year old James Cosh jumped over a stone dyke near his home in Drymen, Stirlingshire, and almost landed on an extraordinary fern growing on the verge of a cart track. He was interested in plants, particularly ferns, and, recognising that the fern was something special, he arranged for it to be dug up and brought into cultivation. More is known about the early history of this variety than is the case for most other fern cultivars and it is one of the most striking. It made an immediate impact on the horticultural world and was christened "Victoriae" in honour of the Queen. Clonal descendants of the original plant might still exist in private collections but it is fertile so this is difficult to confirm. Most, probably all, of the plants now available commercially are grown from spores. It is widely considered that only clonal derivatives of the original plant have all the characteristics that make the variety so distinctive, and 'inferior' plants, in which some of these characteristics are absent or incompletely developed, are considered to be spore-derived progeny. This assumption is challenged after observing the effect of disturbance and sub-optimal growing conditions. The fern, its discovery, and attempts to trace the history of the original clone in cultivation, are discussed below.

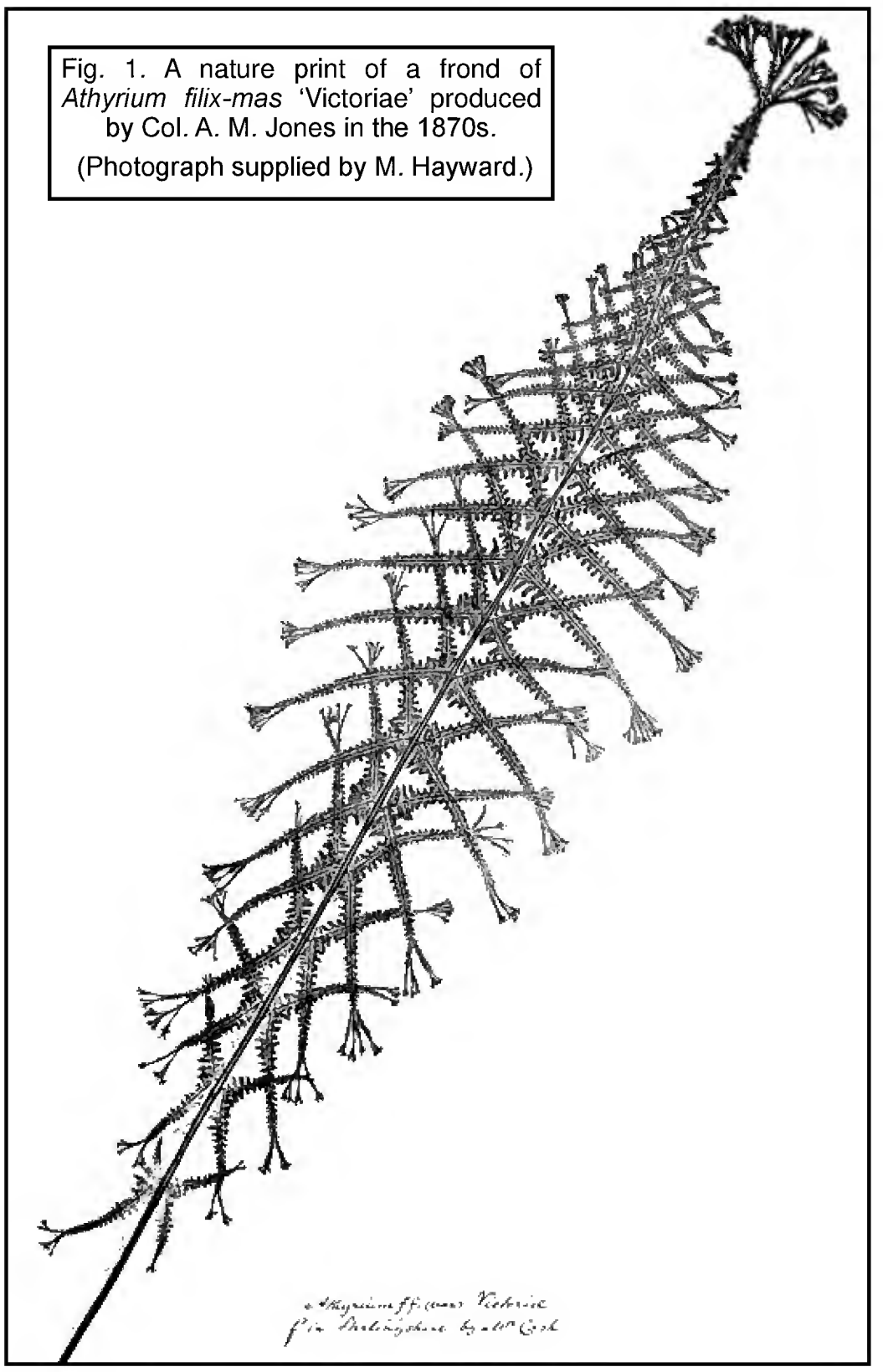


Fig. 1. A nature print of a frond of *Athyrium filix-mas* 'Victoriae' produced by Col. A. M. Jones in the 1870s.
(Photograph supplied by M. Hayward.)

Athyrium filix-femina 'Victoriae'

Description

Athyrium filix-femina 'Victoriae' has been described as the "*most spectacular of all fern cultivars in its magnificent frond architecture*" and "*really the Queen of Greens*" (Mickel, 1994) and "*the most extraordinary wild find ever*" (Kaye, 1968). Jones (quoted in Druery, 1910) referred to "*its strange perfection*" as an "*an extreme deviation*". Druery (1902) states that it "*has no compeer at all amid all the ferns in the world*". According to Dyce (1980), "*It is absolutely unique, and no fern has ever been found anywhere in the world which can approach its extraordinary design*." Its aesthetic appeal no doubt stems from its "*elaborate, yet perfectly symmetrical, design*" (Mitchell & Mason, 1981). Soon after its discovery in 1861, the editor of the West of Scotland Horticultural magazine for May, 1864 (p.352) wrote: "*Altogether we have no hesitation in pronouncing it to be one of the most elegant as it is certainly the most extraordinary deviation from the normal type of* Athyrium Felix-fœmina (sic) *that has ever come under our observation*.". Lowe (1876) called it the "Queen of Ferns". It received an RHS certificate in 1864.

The fronds, which unfurl later than those of the typical species, taper gradually from the widest part, just above the middle of the frond, to near the base and more abruptly towards the apex to form a long narrow 'neck' before the terminal crest or tassel. The pinnae become progressively closer together from base to tip along the frond. Pinnae alternate on each side of the rachis, but are sometimes almost opposite each other; this varies on the same plant. The frond is both cristate (rachis and pinna axes branched at tip to form a crest) and cruciate (pinna axis forked at base). Well-grown mature plants said to be of the original clone are large, with rigid fronds that can be "*up to 90cm (3ft) or even nearly 120cm (4 ft) long*" (Dyce, 1980), highly fertile, and very regular in their cresting and forking. The tip of the rachis and of each pinna produces two to four or more branches, each of which then branches again to form a tassel. Each pinna forks at the base into two portions extended at 90º to each other (Fig. 1). Each is also at 45º to what would be the plane of a normal frond, one extending stiffly upwards above the plane and also angled down towards the base of the frond, the other, usually slightly shorter, below the plane and towards the tip. As a consequence, the pinnae overlap with the pinnae above and below them on the same side of the rachis, and the frond has a 3-dimensional structure, especially striking when viewed end-on. The pinnae are long and very slender with small, almost vestigial, pinnules. The pinnules are said to be also cruciate (Druery, 1902; Mitchell & Mason, 1981; Mickel, 1994; Rickard, 2002), i.e. the original clone of the variety is 'percruciate', but as shown in the photograph in Druery (1908) it applies only to some pinnules (Fig. 2) and is not clear in most illustrations; it is not mentioned at all in the descriptions by the editor of the West of Scotland Horticultural Magazine for May 1864, Sadler (1866), Lowe (1876), Kaye (1968) or Kelly (1991). Cruciate pinnules are visible in the clone at Brodick Castle, identified in 2005 by Martin Rickard as 'original' (Fig. 3).

THE BUCHANAN FERN, *Athyrium filix-femina* 'Victoriae'

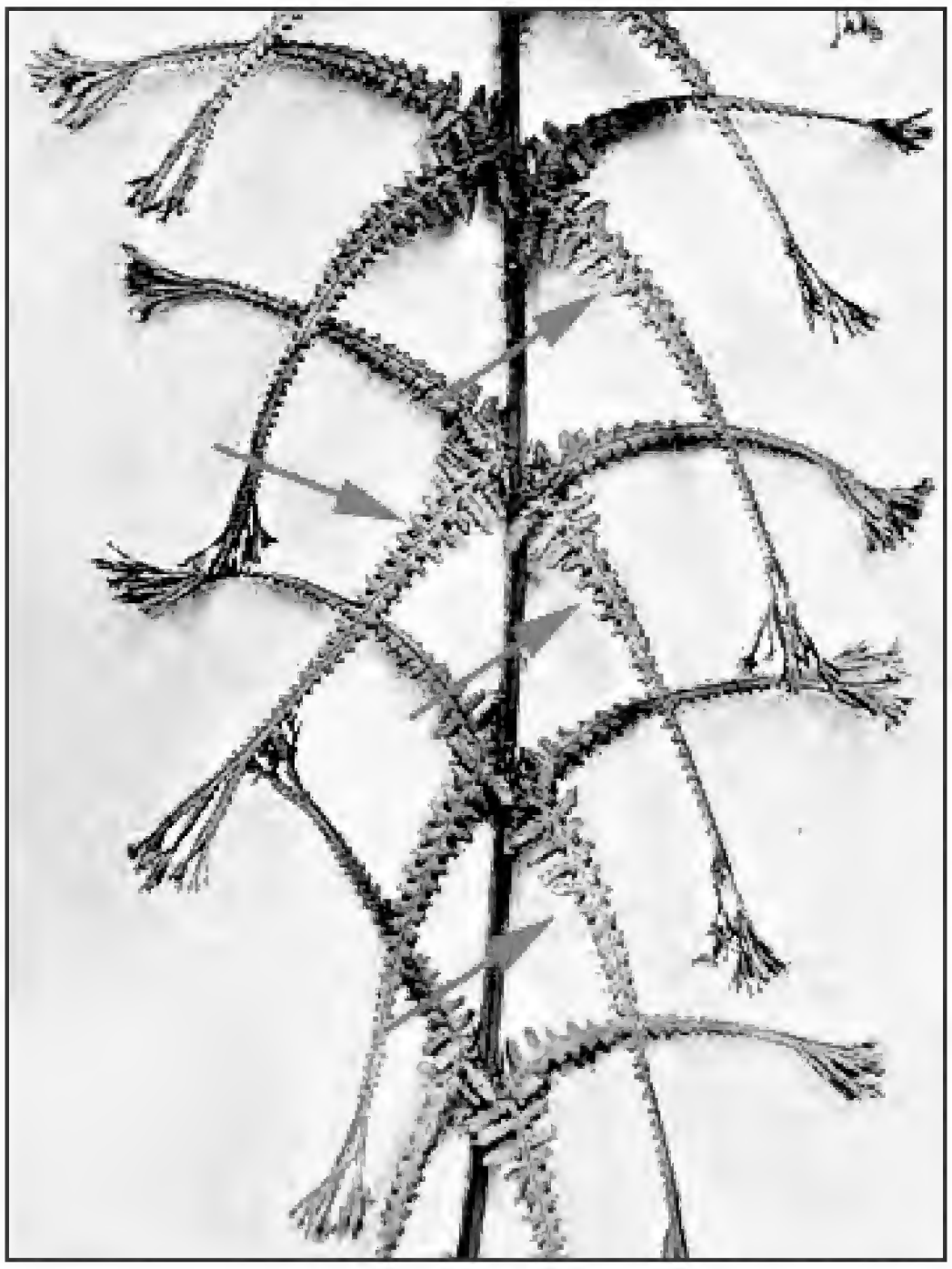


Fig. 2. Photograph of part of a frond of *Athyrium filix-mas* 'Victoriae' from Druery (1908). Red arrows indicate cruciate pinnules.

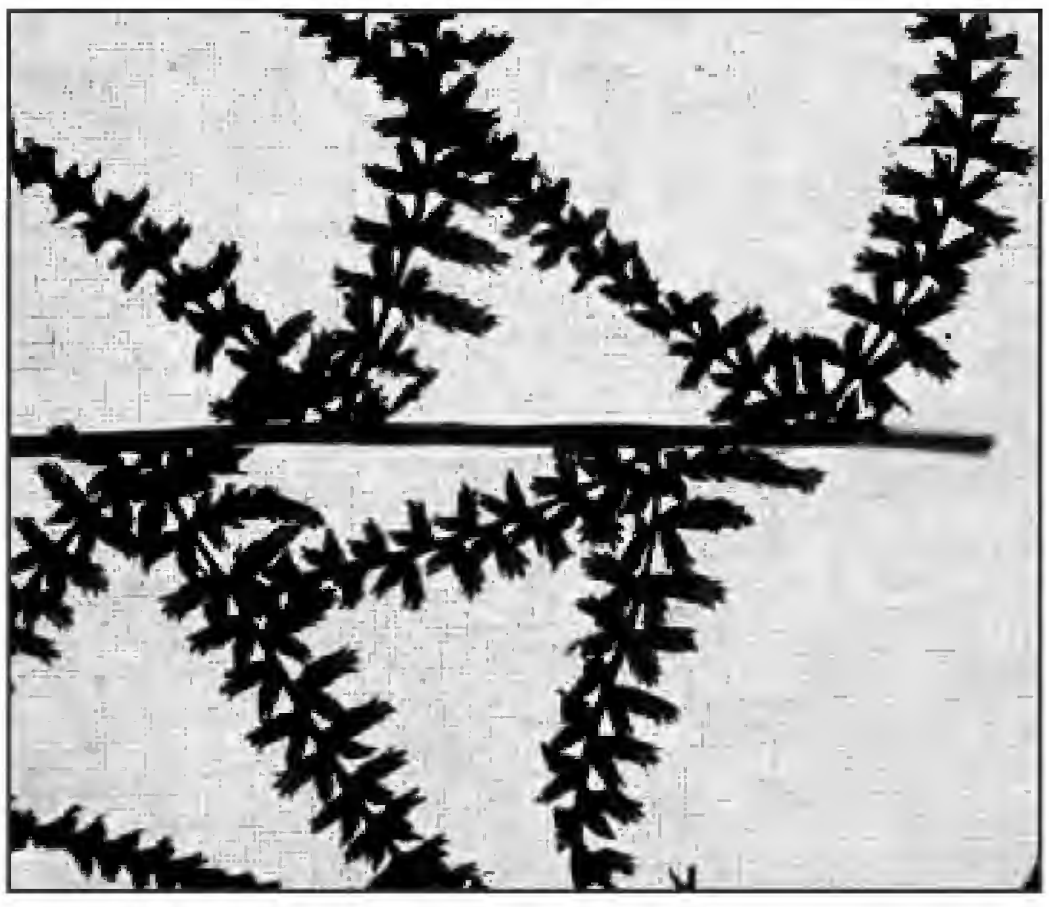


Fig. 3. Cruciate pinnules in a frond from the clone of *Athyrium filix-mas* 'Victoriae' growing in the garden of Brodick Castle. See Fig. 16.

I have a plant derived by division from the plant in the walled garden at Brodick Castle. Received as a plant in a pot, three years after planting in the garden in 2010 the fronds were erect, fertile and up to 70cm long, with cruciate pinnae. Pinnules have become more cruciate each year. In 2013, some pinnules were more or less cruciate with two lobes at right-angles; in most of these pinnules, as is the case with the pinnae, one lobe was longer than the other, but in a few the lobes were of approximately equal length (Fig. 4). The expression of the cruciate pinnule character was variable within a pinna – the basal pinnule on the lower side is sometimes almost normal, while the second to fourth pinnules have the greatest degree of forking. There is also variation within a frond; cruciate pinnules are most pronounced on the upper, longer, branch of each pinna, and in pinnae about half way up the lamina. There were also indications of variation between fronds; cruciate pinnules were more pronounced in fronds formed later in the season.

Fig. 4. Cruciate pinnules in a frond from a plant newly-established from a crown removed from the Brodick Castle clone. The red arrow indicates a cruciate pinnule with equal lobes.

Examination of several cultivated plants with claims to be of the original clone showed that cruciate pinnules are less well-developed in younger and less vigorous individuals. Fully cruciate pinnules have been seen only in larger, longer established, specimens; they are not mentioned in the descriptions by Sadler (1866) and Lowe (1876) of original-clone plants with 18 inch fronds.

The original clone was slow to form new crowns but it has been split and distributed. Kaye (1968) claimed that it retained its vigour for at least a century in cultivation but because it is very fertile it can be difficult to determine whether a plant originated clonally or sexually. Spore-produced progeny, including hybrids, are reported to usually show reduced size and regularity of forking and the pinnules are often not cruciate (Dyce, 1980; Mitchell & Mason, 1981; Schroder, 1990). Dyce (1980) thought it was possible that most, if not all, forms in cultivation in 1980 were not of the original clone. Because of the need for rapid reproduction, it is likely that most commercially-available plants have almost certainly been derived from spores, although Casa Flora in Texas advertises 'Lady Victoriae' which is said to be derived by tissue culture from the

original clone. It is generally believed that in spore-derived plants the cruciate pinnules are less well developed than in the original clone. I have a commercially obtained variety with fronds up to 33" in length and regularly cruciate pinnae as well as cresting that has a red-purple stipe and rachis and is thus certainly the product of cross-fertilisation with another variety; in most cruciate pinnules the lobes are very unequal (Fig. 5). Another bought plant of 'Victoriae' is a green-stiped form in which the pinnules are only slightly cruciate, though more so in late-season fronds. Cruciate varieties available for sale are now usually called by some name other than 'Victoriae'.

Fig. 5. Part of a frond of commercially-obtained "Victoriae" with a red-purple rachis and stipe.

Frond development

Jones in Druery (1910) comments: "*It is difficult to conceive how such an extreme deviation from the normal form could have been produced in all its strange perfection without gradual development, yet it would seem to have sprung directly by seed from some common Athyrium.*" This comment probably means that there were no plants of Lady Fern in the vicinity that had an abnormal frond structure or were in any way outside the normal range of variation, and thus the Buchanan Fern appeared to have arisen from an individual typical of the species. However, there is nothing to confirm that it arose in one step from a normal plant and the fact that this fern has at least two developmental abnormalities, each of which has been found separately in other varieties, suggests that it might have arisen incrementally.

First, 'Victoriae' is cruciate. Edwin Fox, quoted in Druery (1910), interprets this condition as being due to the pinna apex ceasing development after producing two basal pinnules which grow abnormally long to resemble pinnae. Other authors conclude that the axes of the pinnae fork into two equal halves at the junction with the rachis to produce 'twin' pinnae joined at the base. 'Victoriae' is in fact 'percruciate' – some pinnules show the same anomaly as the pinnae in well-grown examples. This developmental abnormality has been found in the wild in other species, such as *Polystichum setiferum,* but only very rarely; in some cases, more than two axes are produced at each fork.

Secondly, 'Victoriae' is cristate. The apex of the primary rachis, at the end of the frond, and the secondary apices at the end of every pinna, all split into up to 4 distinct apices after a period of normal development, forming a branched axis, and then the branches fork again in the same manner, resulting in a tufted tip. A similar abnormality affecting the frond apex, or the frond and pinna apices, is relatively common among varieties in this species and several others. Thus in 'Victoriae' the secondary apices of the pinnae divide into two at an early stage of their development, while the primary apex of the rachis and the secondary apices of the pinnae branch repeatedly at a late stage. It seems likely that at least two mutations are involved, rather than one, with effects at different stages of frond development. The somewhat depauperate development of the laminas on the pinnae may be within the normal range of variation in what is a very variable species in the wild and thus not an additional abnormality.

If at least two independent gene loci are involved and both mutations are not only rare but also recessive, expression of both the cristate and the cruciate characters will require the individual to be homozygous for the mutations at both loci. This in turn requires inbreeding – fertilisation within a gametophyte (intra-gametophytic selfing) or between gametophytes from the same parent sporophyte (inter-gametophytic selfing). In the wild, *Athyrium filix-femina,* which is diploid with two copies of each gene, usually reproduces by cross-fertilisation between gametophytes from different sporophytes. The low probability of two rare mutations being present in the same individual and then becoming homozygous through inbreeding might go some way to explain the rarity of plants like 'Victoriae'. If 'Victoriae' is the entirely homozygous product of intra-gametophytic selfing, then cultivated progeny raised from spores which have self-fertilised in isolation from other gametophytes will be genetically identical to the parent clone.

Naming the variety

Because of where it was found, this variety was known locally as the Buchanan Fern, a name that has persisted. Sadler (1864) states, in relation to the fronds of the Buchanan Fern: "*As I could find no description in Moore's 'British Ferns' answering to my plant, I transmitted the fronds to that gentleman, when he wrote me as follows:- 'The variety of* Filix-foemina *is quite new, so far as I know, and is a very beautiful one. As a queen amongst Lady Ferns it would well bear to be called* Victoriae.*' Accordingly it is published under this name in Mr. Fraser's List of British Ferns and their Varieties, recently issued."* (The first edition of his fern list was published by Patrick Neill Fraser in 1864.) Lowe (1895), also states that the fern was given this name by Moore.

The discovery

The most detailed account of James Cosh's discovery was by Charles T. Druery (1910). Druery, whose wife was the daughter of the factor of the Duke of Montrose on whose Buchanan Castle estate the fern was discovered, returned to the site in about 1895. By good fortune, he spoke to Mr Buchanan, a local farmer, who had been cutting grass nearby when the fern was found more than 30 years earlier. This would have been John Bilsland Buchanan, who would have been 25 years old in 1861. Also present was Alexander Crosbie, Head Gardener at Buchanan castle during the 1890s. Based on John Buchanan's account, Druery, who elsewhere records the date of discovery as 1861, wrote: "*It was found as a robust plant of several crowns growing in*

a cart road off the high road at Drymen, in Stirlingshire, by Mr. James Cosh, a Scotch student, who, jumping over the stone dyke into this road, nearly alighted on the clump, the nature and value of which he immediately perceived."

Druery (1843-1917) read a paper on "The Lady Fern, *Athyrium filix foemina*" at a meeting of the British Pteridological Society in 1902 at Bowness Windermere (Druery, 1902). Included in a report of this in Duery (1908), (and reproduced in 1991 in the BPS Special Publication No. 5, "Abstracts and Reports and Papers read at meetings 1894-1905") is a drawing by Druery entitled "*The spot where A.F.F.Victoriae was found near Drymen, Stirlingshire*" (Fig. 6). This shows a clump of fern at the foot of a stone wall close to a gate. Behind the wall is mixed conifer and broadleaf woodland and, in front, a rough track with an intervening grassy verge. The verge appears to be a bank sloping down to the track, although the perspective is difficult to interpret. There is what might be a small ditch that runs down the verge close to the spot where the fern grew, and then runs beside the track. The drawing is dated *"19/7/98"*, 37 years after the discovery. (As there is no evidence that Druery visited the site twice, this provides a date for Druery's meeting with Buchanan.) As the fern originally discovered was removed in 1861, it is not shown in the drawing but the site is marked, rather inconspicuously, with an 'X'.half way down the bank. The drawing is consistent with Druery's description of the site.

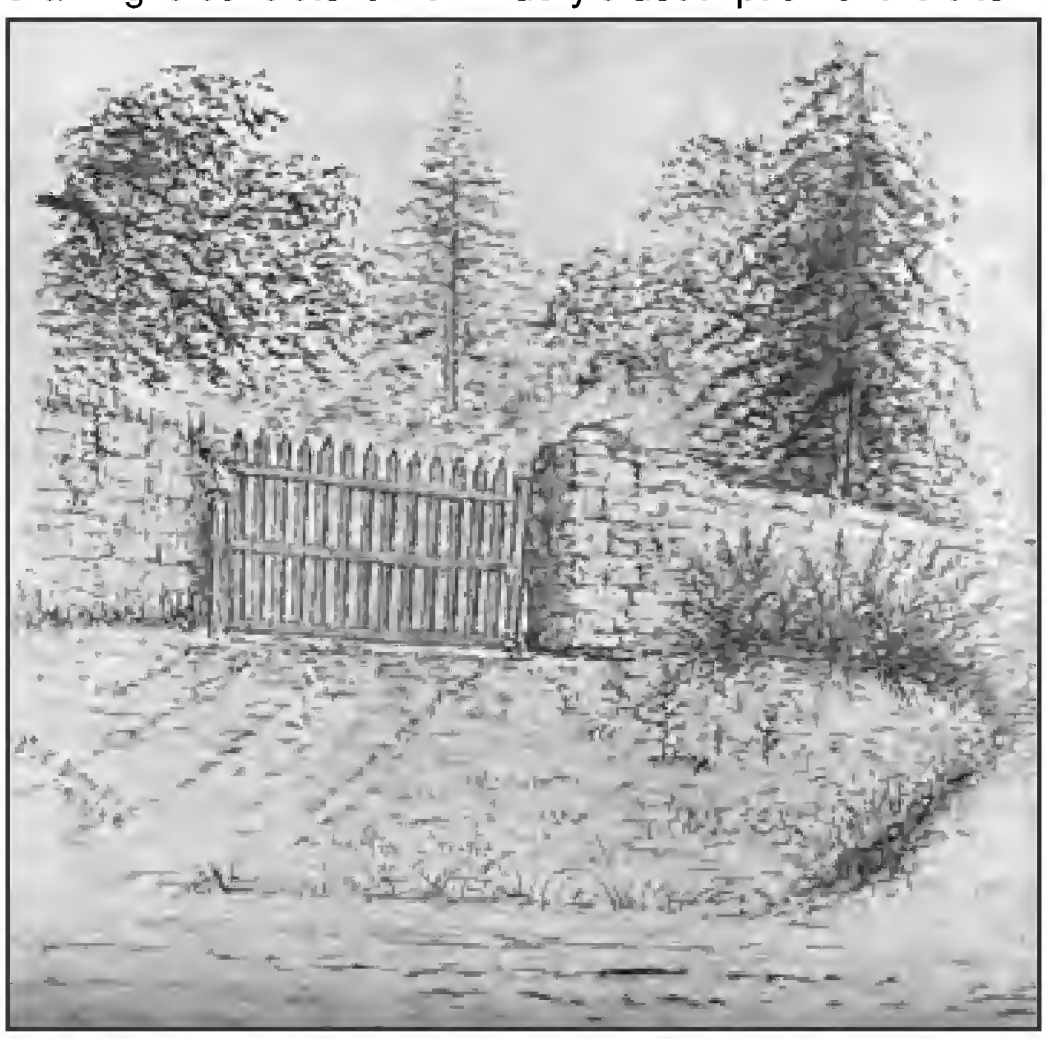


Fig. 6. Drawing by C. T. Druery of the site where *Athyrium filix-mas* 'Victoriae' was discovered in 1861. The drawing, dated 19.7.98, was published in Druery (1908). The position of the fern is indicated with a small "X" on the bank in front of the wall to the right of the gateway.

Other, briefer, accounts of the discovery differ in some details. Sadler (1864) states that the fern was found in 1862. Lowe (1876) states that the plant was not dug up until two years after the discovery in 1861 beside "*a bye-way that runs along the margin of a wood*", when it was removed to Buchanan Castle by John Connon. (Connon (c.1826–1873) was the head gardener there from about 1862 until the late 1860s.) The sources of their information are not disclosed; Sadler might have spoken to Cosh, who was attending Edinburgh University in 1864-5. All agree that the fern was large and found beside a track on the Buchanan Castle estate and was in Buchanan Castle garden by 1863.

James Cosh

As a boy, James Cosh (1838-1900) lived with his parents and siblings in the end cottage of a row of ten dwellings, called Gartlick, for Buchanan Castle estate workers, including a woodcutter, hedger, dairy maid and washerwoman.

Fig. 7. The end cottage, now No.1 Buchanan Smithy Cottages, in which the Cosh family lived from about 1847 to the 1870s.

The cottage, identified in an old photograph reproduced in Denne (1991), is still there on the B837 road from Drymen to Balmaha (Fig. 7) (Map Ref. NS 46392 89467; Post Code: G63 0JJ), but now called No.1 Buchanan Smithy Cottages (so-called after the smithy in the middle of the row). His father, also James Cosh, was born in 1809 in Portpatrick and came to Drymen in about 1847 as a joiner. He became the estate Clerk of Works by the time he left in the 1870s. After several years of ill-health, he died in 1880. James Cosh junior, the second child and oldest son of James senior, was born on 27th June, 1838, near Stranraer. In 1856 he had become a student at Glasgow University, taking arts subjects in preparation for the Ministry and winning prizes in Greek. He received scholarships towards the cost of his fees, books, clothes and coal, expenses which totalled £30 5s. 6d. for 1858. He tutored children to augment his income. In April, 1861, he was living in a Glasgow boarding house when he graduated M.A., majoring in Greek. In August 1861 he entered the Missionary Hall of the Reformed Presbyterian Church with a one-year bursary from the Glasgow Presbytery. During this period he taught English, Arithmetic, Mathematics and Latin at Alloa Academy; while in Alloa he tutored a local brewer's children and met his future wife, Janet Frame. Between June 1863 and June 1864, he was appointed as preacher in Dunscore, near Dumfries, at a salary of £80. In 1864-5, he studied medicine and physiology at the Royal College of Surgeons, Edinburgh, probably as an extra-mural student. He might have been in contact with the Royal Botanic Garden and the Botanical Society of Edinburgh at this time. He was ordained on 4th October, 1865, in the Presbytery of Paisley and appointed to serve in the New Hebrides. In January, 1866, he married Janet Frame and they sailed for the New Hebrides later that year. In 1872, after a year in New Zealand, James became minister of Balmain, Sydney, Australia. He was eventually

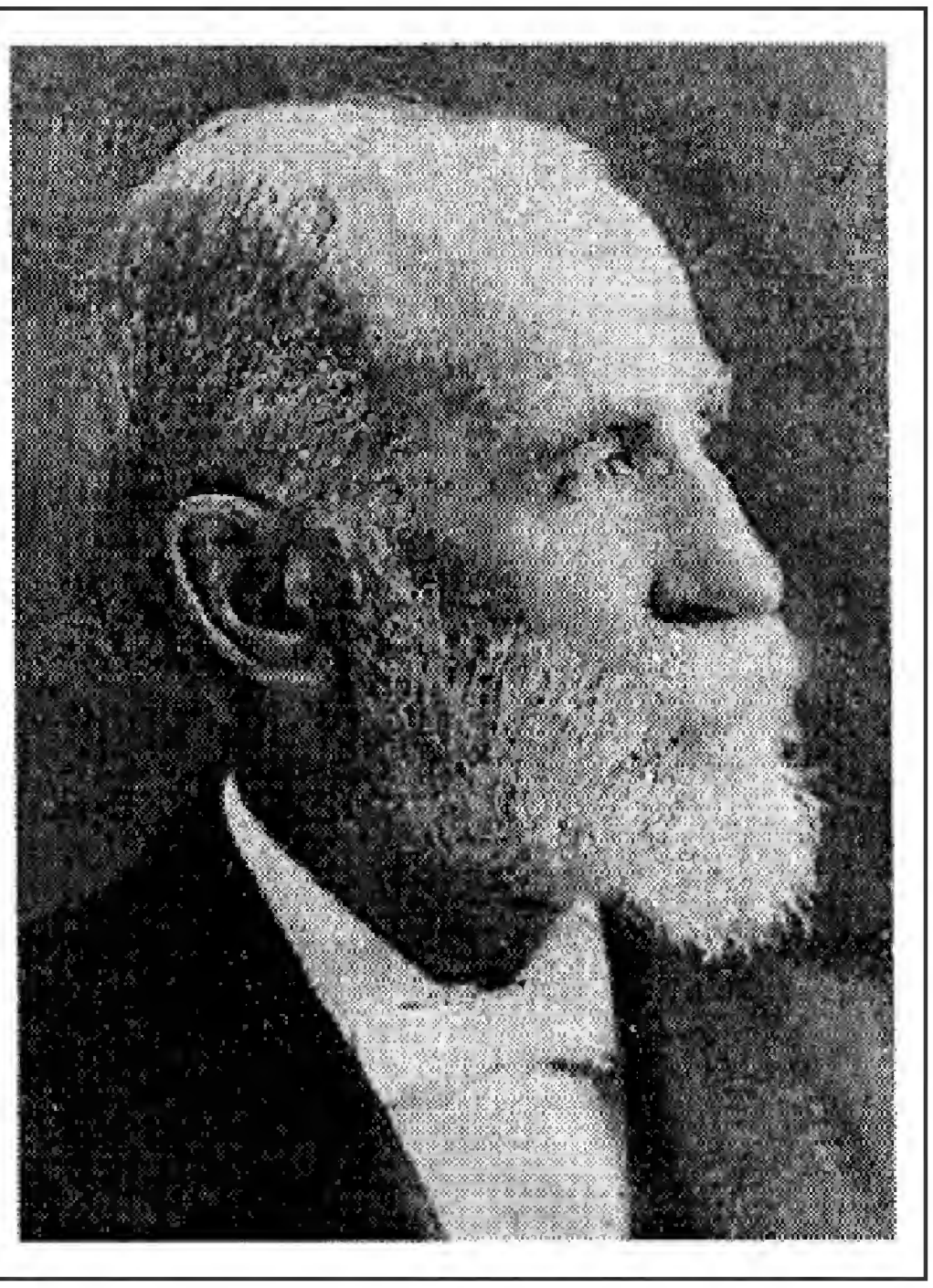


Fig. 8. James Cosh in the 1890s. Photographer unknown.

appointed Professor of Oriental and Polynesian Languages at St Andrew's College, University of Sydney, and was awarded an Honorary D.D. by Glasgow University (Fig. 8). He died in 1900.

He gave Drymen as his home address until he got married, and regularly returned home throughout his student years. He was interested in natural history in general and ferns in particular and often brought friends home to search for ferns or go fishing. He recorded the occurrence of ferns for the Natural History Society of Glasgow. He probably found the Buchanan Fern while living at home between graduating in April, 1861 and starting in the Missionary Hall in August, 1861. He would have recognised that he had found an unusual individual of a common fern. More surprising is the fact that he had not noticed it before, a large fern which had been growing for several years beside a cart track within 1km of his home.

John Bilsland Buchanan

John Bilsland Buchanan (c.1836-1908) lived all his life at Coldrach Farm, a substantial farm of 300 acres with a 9-room house that still exists (Map Ref. 46922 89990) (Fig. 9). His father John Buchanan, son of a Drymen innkeeper, died there in 1873, aged 75, and John Bilsland Buchanan took over the farm. Coldrach Farm is about 200m along Coldrach Lane (also marked on some modern maps as Coldrach Farm Road) a turning to the east about 650m along the unnamed farm track (sometimes now also referred to locally as 'Coldrach Farm Road'), that starts beside the cottage occupied by the Cosh family and runs north through Coldrach farmland from Buchanan Smithy.

The Buchanans were the nearest neighbours of the Cosh family, and John B. Buchanan and James Cosh, of similar age, must have known each other as they grew up. John B. Buchanan was still there in 1898 to meet Druery when he visited, but when Buchanan died in 1908 he was living in Townfoot House, Drymen.

Fig. 9. Coldrach Farm viewed from the unnamed track from Buchanan Smithy Cottages. In the foreground, a plant of *Athyrium filix-femina* beside a typical estate wall.

Locating the discovery site

The precise spot where 'Victoriae' was found was never disclosed. John Mitchell, Alec Greening and I, and perhaps others, have independently identified the same approximate location for the discovery site. Druery's "*high road at Drymen*" must be what is now the Balmaha Road, the B837, that runs north-west from the village past Buchanan Castle to Balmaha. Buchanan Castle estate lands are on both sides of this road. Then Druery's "*cart road leading off the high road at Drymen*" is likely to be the unnamed track that runs north from Buchanan Smithy to the junction with Coldrach Lane which runs to the east past Coldrach Farm (Fig. 10).

Fig. 10. The unnamed track from Buchanan Smithy Cottages to Coldrach Farm, looking south-west towards the Cottages. The opening on the right leads to the track along the south margin of Angle Plantation.

As shown on Sheet XIV of the 1865 OS 6 inch to the mile Stirlingshire map (available on line at http://maps.nls.uk/

Fig. 11. Roebuck Loan, looking north.

view/74430864), from a survey in 1861, the year the fern was discovered, the unnamed track continues beyond the Coldrach Lane turn as Roebuck Loan (Fig. 11). In 1861 there were no dwellings along the unnamed track and only one small building, now called 'Ardyle', in Roebuck Loan. On the west side of Roebuck Loan and the north end of the unnamed track is a plantation labelled 'Angle Plantation' on the 1865 OS map and apparently still known by this name locally (Fig. 12). At the east end of Coldrach Lane, where it joins what is now called the Old Gartmore Road (Map Ref. NS 47609 89745), was a single dwelling, the gamekeeper's cottage, now Coldrach Lodge. There were no other dwellings along Coldrach Lane in 1861 and on the north side towards the eastern end there was woodland.

Fig. 12. Angle Plantation, recently clear-felled, to the west of the unnamed lane from Buchanan Smithy Cottages to Coldrach Farm. The light coloured track in the distance is Roebuck Loan.

It seems certain that the fern grew on Coldrach Farm ground, and probable that the site was somewhere along the unnamed track from Buchanan Smithy, although in 1861 only at the north end was there adjacent woodland. However, the possibility cannot be excluded that the site was on a track leading off the unnamed 'cart road', either the track which follows the walled and gated southern boundary of Angle Plantation, or towards the east end of Coldrach Lane. All this is Buchanan Castle estate ground and about 2km from the Castle itself, matching the comment in Druery's account that it was "*close by*".

However, although for the most part the lanes to the farm have changed little over the intervening century and a half, it has not been possible to identify the precise spot shown in Druery's drawing (Fig. 6). In the first place, it is not known how accurate the drawing is. All the Buchanan estate walls in the area have the same striking appearance, with stones that are shallow, flat and of even thickness. These are laid horizontally except in the top layer of cap stones which are laid vertically on edge (Figs. 9, 13). The wall depicted in the drawing is broadly similar but there are no vertical cap stones, perhaps an indication that details in the drawing were only approximate. Of course, the walls might have changed: cap stones might have been added, walls rebuilt or even removed (there is now no wall visible along the west side of Roebuck Loan), or gates widened. Perhaps all that can be safely concluded is that the fern grew on a verge beside a gateway in a drystone wall with mixed woodland behind.

Fig.13. A gateway near Coldrach Farm. The cottage behind is on Roebuck Loan, with Angle Plantation in the distance.

Fig.14. Another gateway near Coldrach Farm. Compare with Fig. 6.

There were (and still are) several gateways along the unnamed tracks and Coldrach Lane, but most lead into fields (Figs 13, 14). In two places gates lead into woodland: at the north end of the unnamed track close to Coldrach Farm gates on the west side led into Angle Plantation and at the east end of Coldrach Lane close to Coldrach Lodge gates led on the north side into woodland, much of it later cleared and the walls modified when five houses were built.

Now, the commonest fern in the area, particularly in the road verge along the walls, is *Athyrium filix-femina*, though all of typical form (Fig. 15). One of the puzzles regarding 'Victoriae' is that diligent searches of the area both shortly after the discovery and subsequently, have not yielded another plant of the same percruciate form (Druery, 1913). The fern Cosh discovered was large and vigorous and, no doubt, fertile, after growing well for several years. The rarity of the 'Victoriae' (see above) doesn't explain why, once well established, it gave rise to no others of the same type nearby, either then or since even though sporelings can be raised easily in cultivation. Maybe the mortality rate of Lady Fern spores provides part of the explanation. A large mature individual of Lady Fern produces several billion spores per year, of which only a handful at most succeed. In the absence of suitable microhabitats, all might fail. The odds are very much against the survival of normal progeny; if the 'Victoriae' variety is less competitive, the chances of establishment are further reduced.

Fig. 15. Typical plants of *Athyrium filix-femina* growing beside the wall along the unnamed lane from Buchanan Smithy Cottages to Coldrach Farm, visible in the distance.

The Buchanan Fern in cultivation

According to Druery's account, after discovering the fern, James Cosh asked John Bilsland Buchanan to take care of it, and not damage it, until the next day. Cosh returned the next day and dug up the fern; half was taken to Buchanan Castle, the seat of the Duke of Montrose. It is thought that the other half was given by Cosh to friends in Edinburgh. The head gardener at the Castle in 1861, John Paterson, would presumably have been responsible for establishing the fern in the Castle garden. According to Lowe's account, it was Connon, who replaced Paterson in 1862, who dug up the fern and introduced it to the garden in 1863. Either way, Connon decided to make the fern better known. According to the West of Scotland Horticultural Magazine for May 1864, he had sent fronds to the editor, who published a description of this "remarkable variety" and suggested the names 'divaricata' or 'deflexa' for it. In the July issue there is a report that in June 1864 Connon exhibited a fern, which from its description as "*the most remarkable sample of Athyrium which has ever been found indigenous to this country*" is almost certainly 'Victoriae', at the Glasgow and West of Scotland Horticultural Society show, along with direct nature prints in colour of the fronds. On 17th April, 1865, he sent a plant to the Royal Botanic Garden Edinburgh (RBGE). According to Lowe (1876) the clone was still in the Buchanan Castle garden in the 1870s. By the 1890s it had been split and planted in the walled garden and in a nearby rockery and was an attraction for visitors (Mitchell and Mason, 1981). Druery states that he had "*an actual division of the original plant*", perhaps from the Castle; it is presumably this plant that is shown in Fig.113 of Druery (1910). The head gardener in the 1890s, Alexander Crosbie, stated that the fern was propagated by spores and "*the varietal form has remained true*" (Ross, 1900), but it is likely that the original clone donated by Cosh was also maintained. Young plants raised from spores were offered for sale at the Castle as the 'Buchanan Fern'. Buchanan Castle was sold in 1925 and became derelict in the 1950s and the fate of the plants grown there at that time is not known. Mitchell (1990) searched in vain for the Buchanan Fern in the ruined fernery and walled garden before houses were built in the 1980s, and also the garden of the Duke's subsequent residence, Auchmar House. In 1894, the Andersonian Naturalists of Glasgow reported that the original Buchanan Fern was growing in the walled garden of Blair Drummond House but it was no longer there in the 1990s.

It is uncertain where Cosh sent the other half of the plant he dug up. He was studying in Edinburgh in 1864-65 but the Buchanan Fern was already there by then. John Sadler, assistant to Professor John Hutton Balfour from 1854 and curator 1879-1882, stated, at a meeting of the Botanical Society of Edinburgh on 12 May, 1864, that in February 1863 he had visited Alloa, Clackmannanshire and obtained dried fronds of Buchanan Fern from a Mr Dawson and a Mr Paterson who lived there. (A John Dawson of Alloa was elected a Fellow of the BSE in April, 1862.) It is possible that James Cosh gave living material to Dawson and Paterson when he lived in Alloa from August 1861 to June 1862. Sadler sowed spores, perhaps from the fronds from Alloa, in 1863. In 1864 he exhibited a live plant, which he must have received as a crown, perhaps from Cosh, because the sporelings he raised would not have developed sufficiently. Also in 1864, Patrick Neill Fraser of Canonmills Lodge, Edinburgh had included 'Victoriae' in his privately published list of fern varieties. In 1865, Connon sent live material from Buchanan Castle to the Royal Botanic Garden in Edinburgh. In about 1870, James McNab (Curator at the Royal Botanic Garden from 1849 to 1878) raised 'Victoriae-gracile', almost identical to the original. By 1876, Lowe had received fronds from Connon at Buchanan Castle, and from Balfour, Sadler and Fraser in Edinburgh. The variety is no longer at RBGE, and Fraser's collection has been lost. Surprisingly, there are only two specimens in the RBGE Herbarium; one dated 1930 from Brodick Castle garden, and one undated. Meanwhile Lowe had first exhibited 'Victoriae' crosses in the 1870s, exhibiting some at the 1879 British Association meeting in Sheffield, and continued producing new named varieties, including 'Czarina', 'Kezia', and 'Thule', into the 1890s. According to published plant lists, 'Victoriae' was at Royal Botanic gardens Kew in 1895.

There are now several plants, mostly in private collections, which are claimed to be from the original Buchanan Castle clone. The strongest claim concerns a plant at Brodick Castle on the Isle of Arran. Other claims are more tenuous or less well documented.

Brodick Castle clone.

In 1906, James Graham (1878-1954), later 6th Duke of Montrose, married Lady Mary Louise (1884-1957), only child of the late 12th Duke of Hamilton (1845-1895) of Brodick Castle. Later, Lady Mary Louise extended the

gardens at her childhood home, which she and her husband used as a summer residence. In the process, it is likely that she transferred favourite plants from Buchanan Castle. A specimen in RBGE Herbarium labelled "*Buchanan Fern, Brodick Castle, 1930*" confirms that it was there at that date. In a published account of a visit to Brodick Castle (Anon,1930) it is stated that the Buchanan Fern growing there then was "*a souvenir from the Duke's hereditary seat on Loch Lomondside*", which seems to confirm its origin. Although the public have been able to view it there since the property was acquired by the National Trust in 1958, its existence was not widely known until John Mitchell, aware of the historical connection, discovered in 1990 that the plant, now a clump of 40 crowns with percruciate fronds up to 115cm long, was still in the walled garden at Brodick (Mitchell, 1991; Mitchell and Warner, 1992; Warner, 1991). In 2005 Martin Rickard examined it and confirmed that it matched the description of the original plant. It is still there (Fig. 16) and it has some cruciate pinnules, though most have unequal lobes (Fig. 3).

Fig. 16. *Athyrium filix-femina* 'Victoriae' in the garden of Brodick Castle with a group of BPS members. Photograph taken in 2012 by Chris Nicholson. See Fig. 3.

This clone has the best documented connection with the original plant found in 1861 and may indeed be clonally derived from it. However, in view of its fertility, the possibility that the plant taken from Buchanan to Brodick was a spore-derived offspring of the original clone cannot be entirely ruled out. According to Chris Nicholson, ex-gardener at Brodick, sporeling volunteers continue to appear around the Brodick clone although she reports that "*They showed some but not all the characteristics of the parent.*" Although no numbers are given, this seems to confirm the claims that it does not produce sporelings that are true to type. In support of this Rickard states that he has never seen a spore-derived plant that is as tall as the Brodick clone.

Since 1990, a few offset crowns from this clone have been established in the NTS garden at Arduaine and in a few private gardens. I have a crown that I planted in my garden in 2010. Initially, few if any pinnules were cruciate. Each year, as the plant has grown larger and fronds have become longer, cruciate pinnules have become more conspicuous (Fig. 4), but with fronds only 70cm long, it still (in 2013) has not reached the size of the Brodick clone. The Buchanan Fern seems to take several years to establish and until it does so, the varietal characters are not fully developed.

Boquhan clone

In 1984, a plant of Buchanan Fern with fronds up to 115cm long was discovered in George Goodwin's garden at Boquhan, about 4 miles from Drymen. It has all the characteristics of the original clone (Mitchell, 1990; Schroder, 1990). It had been brought to Boquhan by Goodwin's father who had been a dry-stone waller and fencer on the Buchanan Castle estate, and had grown the plant in his own Drymen garden. It has well-developed characteristics, although only "*partial secondary crossing of the pinnules*", and might well be from a crown of the original clone, although the possibility cannot be ruled out that it was a 'good' sporeling that arose in the Castle garden. The plant in Boquhan no longer exists but in the 1980s crowns were donated to two gardeners from Drymen, to Maurice Wilkins for Ross Priory Gardens (who subsequently took crowns when he moved to NTS Arduaine Garden) and to Nick Schroder (who still has it in his National Collection of *Athyrium* in Haywards Heath). Crowns from the plants moved to Drymen have been distributed to other gardens. One of the crowns from Boquhan now growing in Drymen is well-developed with moderately percruciate fronds up to 93cm long.

Mason's nursery clone

Other plants can be traced back to John Mason's plant nursery in the centre of Drymen in the 1920s. The nursery offered for sale plants of the original clone, though it is not known whether from offsets, spores or both. It is unlikely that offsets alone could meet the demand. A 'good' plant from the nursery was transferred to the garden of John Mason's son Ronnie in the village of Gartocharn, where it was still flourishing in 1980 (Mitchell and Mason, 1981). A crown of this clone was moved back to a garden in Drymen and when examined in 2013 was a large plant with spreading rhizomes but fronds no more than 72cm long and only very slightly percruciate, perhaps because it is in dry shade. In 1981, Mitchell photographed a large plant, reputed to be from the nursery, growing in another garden in Drymen; the transparency shows a plant in full sun with several crowns and around 50 rather upright fronds which appear to be at least 1m tall. According to one of John Mason's sons, when the Mason nursery closed in about 1950, the nursery's main clump of the Buchanan Fern, which might have been clonally derived from the original plant, was transferred to a nurseryman called Lyle in Fife. This was almost certainly Neil Lyle of Maryfield Nursery in Leslie, Fife, who collected ferns. Neil Lyle's father, James Cameron Lyle, had been born in Drymen. He left there in his early teens as a farm servant but became a gardener in Berwickshire, eventually in the early 1900s moving to Fife where he was a gardener at the Teasses estate near Ceres. His grandfather George Lyle lived in the Main Street, Drymen, close to Mason's nursery, and was at one time a garden labourer. It is possible that George, or James as a boy, might have worked in Mason's nursery, or even Buchanan Castle garden, and seen the Buchanan Fern. Through this connection, Neil Lyle was no doubt aware of the fern when the nursery closed.

In 1967, a long-time BPS member, Willie Duncan, obtained a plant of Buchanan Fern from Neil Lyle, who told Duncan that it was brought from Buchanan Castle by his father James when he moved to Fife. James may have taken the fern with him as he moved from garden to garden but perhaps it is most likely that Duncan's plant was from the material obtained by Neil Lyle about 1950 from Mason's nursery. Duncan's plant, and offsets from it, are still growing in his garden in Fife. Currently Duncan has three plants but

they are not vigorous in dry conditions overtopped by other plants. The typical features of Buchanan Fern are not well developed in them but whether that is because of adverse conditions or because they are not clonal derivatives of the original is not certain. In 1978, Duncan gave an offset of his clone to Jimmy Dyce who suspected it was not of the original clone (see below).

In about 1984, Christopher Fraser-Jenkins obtained a plant, from Ronald 'Bud' Lyle, younger brother of Neil, of Grange Nurseries, Alloa. A link with James Cosh's connections with Alloa (see above) has not been established. Fraser-Jenkins, who also visited Neil Lyle, was also told that the clone was brought from Buchanan Castle by Bud Lyle's father, James.

Reginald Kaye clone

At his Silverdale nursery, Reginald Kaye built up a large collection of ferns over several decades of the mid-20th Century, including plants from dismantled collections of earlier enthusiasts. He refers to the vigorous original 'Victoriae' clone in cultivation, and comments that sporelings inherit the frond structure but lack the same strength and size and sometimes have attractive modifications (Kaye, 1968). Since Kaye died, there have been conflicting stories about the origin of his 'Victoriae' plant. According to one version it came from a Scottish palace, perhaps Holyrood House in Edinburgh, but the present Head Gardener there, Alan Keir, says that the variety has certainly not been in the garden since he started there in 1976, and there is no record of it having been there since World War 1. Malcolm Hutchinson, Head Gardener at the NTS property Sizergh Castle, near Kendal, obtained 'Victoriae' from Kaye as 'original clone'. The plant at Sizergh was reported a few years ago to be in poor condition, but a crown that Robert Crawford obtained from Hutchinson in the 1980s is now well developed with fronds more than 1m long, perhaps an indication that it is of the original clone. Volunteer sporelings appear around the garden, some at least of which are the result of crossing with other varieties. Several crowns of Crawford's plant have been passed on to others including Michael Hayward, Alec Greening, Robert Sykes and Martin Rickard among BPS members.

Other clones

In 1981, John Mitchell saw a plant in the Drymen garden of Mrs McCallum which was said to have come, via two intermediary gardens, from Buchanan Castle in about 1910 (Mitchell and Mason, 1981). It was growing in permanent shade and was small; Mitchell concluded that it was an inferior, spore-derived, plant. However, a crown from this plant was transplanted in 1996 to another garden in Drymen where it is growing in rich, moist soil exposed to mid-day sun, and is now much larger, with erect fronds up to 97cm long. (Fig. 17) This plant closely resembles the Brodick clone, although the cruciate character of the pinnules was less pronounced. Occasionally, the cruciate pinnae arise as a group of four 'prongs', two long and two short, instead of the usual two. While it remains an open question as to whether this is a clonal derivative of the original plant, or at some stage spore-derived, it does demonstrate that development of the full suite of characters of 'Victoriae' depends very much on the growing conditions.

Dyce (1980) states that *"I would hesitate to confidently label any plant I have ever seen as part of the original find."*. His best plant, since deceased, was received "*in a direct line, straight from the old authorities*", but although stated to be original, I considered it was not tall enough and some pinnules were not cruciate. The offset crown he had received from Duncan two years earlier (see above) was reported to be growing well but too young to be definitive about it – he was concerned about the pinnule shape and suspected "*it will turn out to be progeny and not the original*". Rickard has never seen spore-derived plants as large as those plants considered to be offsets of the original clone.

Fig. 17. A plant of *Athyrium filix-femina* 'Victoriae', said to be traceable back to Buchanan Castle, growing in a sunny rhubarb bed in Drymen. The fronds were up to 97cm long.

Cultivating the Buchanan Fern

Observations on existing plants indicate that the characteristics said to define the original clone, namely the long erect fronds, the terminal crests and the cruciate pinnules, are more pronounced on established and well-grown plants, and less pronounced or even absent in recently separated crowns or in plants with growth limited by unsuitable conditions.

This means that some plants dismissed as 'inferior' and not of the original clone may be in unsuitable conditions or recently divided and planted and would in time and with good cultivation develop the full set of characters. Thus, while some commercially available plants (such as those with purple stipes) are certainly spore derived, and the others are probably spore-derived, some of the plants with a pedigree leading back towards Buchanan Castle may be of the original clone even when lacking a full suite of characters. Reports in the literature and examination of plants in several gardens indicate that 'Victoriae' may be more adversely affected by disturbance and sub-optimal conditions than the typical forms of the species. If that is so, only long undisturbed cultivation in good conditions can reveal whether a plant is truly inferior. That being so, it is possible that some sporelings of the original clone are as 'good' as the original in the right conditions, as claimed by Crosbie in the 1890s, particularly if the gametophytes are raised in isolation without access to gametophytes from other plants. However, Lady Fern is normally an outbreeding fern which means that if spores from other individuals are in the vicinity, the sporelings are unlikely to be identical to the parent

The best conditions for growing this fern seem to be rich permanently moist soil in an open site with sun for part of the day. The impressive clump in the walled garden of Brodick Castle receives some direct sunlight during the middle of the day in summer and horse manure is regularly dug into adjacent parts of the bed in which it has been grown for many years. These requirements probably reflect the conditions in which the plant arose and established in the wild, in an open trackside verge, by a wall probably facing east, in an area which receives, on average, at least 75mm (3") rain every month, and 1410mm (c.56") rain in a year (according to en-climate-data.org).

Conclusions

The claims that some clones in private collections are clonally-derived from the original plant might be valid but the possibility that spore-derived progeny feature at some point in their history cannot be entirely ruled out. The Brodick Castle plant has a strong claim to be clonally-derived from a plant at Buchanan Castle and perhaps from the original plant found in the wild. Spore-derived progeny frequently lack the vigour and all the characteristics of the parent clone but there are circumstances in which it would be at least theoretically possible for sporelings to be genetically identical to the parent. The 'Victoriae' characters only develop fully after several years of undisturbed growth in optimal conditions of rich moist soil in sun for part of the day. With young plants and those in adverse conditions, it is frequently impossible to determine whether a plant is similar to the original.

Acknowledgements

Information from John Mitchell, who first investigated the origins and fate of the Buchanan Fern in the early 1980s, has been invaluable. I am also grateful to others who have provided information or allowed me access to the Buchanan Fern in their gardens, including Robert Crawford, Willie Duncan, Peter Elder, Michael Hayward, John B Mason, Martin Rickard, Nick Schroder, and Maurice Wilkins. In order to avoid giving offence with unwelcome publicity, I have intentionally not given details of some of the private gardens referred to.

References

Anon, (1863). List of the Localities for Ferns around Glasgow and its Watering Places. *The Manuscript Magazine of the Glasgow Naturalists Society IV*, 158-168. (In the Archives of the Natural History Society of Glasgow.)

Anon (1930). Brodick castle: The seat of the Duke and Duchess of Montrose. *Scottish Country Life 17*, 135-137. (Possibly by George Eyre-Todd.)

Denne, J. (1991). *Rev. James Cosh M.A, D.D. 1838-1900 Minister, Missionary and Academic*. Denne Design, Killava, New South Wales. (Includes a drawing of James Cosh as a young man at Buchanan.)

Druery, C.T. (1902). The Lady Fern (Athyrium filix foemina). *Report of the meeting of the British Pteridological Society at Bowness, Windermere, 6th August 1902*.pp. 6-11. BPS, Kendal.

Druery, C. T. (1908). British Ferns and their Varieties (with Illustrations) *Memoirs of the Royal Caledonian Horticultural Society (1908)*, pp.106-117.

Druery, C. T. (1910). *British Ferns and their Varieties*. London: Routledge & Son.

Druery, C. T. (1913). Fern fertility. *British Fern Gazette 2*, 101-104.

Dyce, J. W. (1980). Athyrium filix-femina 'Victoriae'. *British Pteridological Society Bulletin 2*, 92-94.

Kaye, R. (1968). *Hardy Ferns*. London; Faber & Faber.

Kelly, J. (1991). *Ferns in your Garden*. London; Souvenir Press Ltd.

Lowe, E. J. (1876). *Our Native Ferns*, Vol.II. London: George Bell & Sons.

Lowe, E. J. (1895). *Growing Ferns*. London: John C. Nimmo.

Mickel, K. T. (2003). *Ferns for American Gardens*. Portland; Timber Press, Inc.

Mitchell, J. (1990). In search of the Buchanan Fern II. *Forth Naturalist and Historian 13*, 77-78.

Mitchell, J. (1991). In search of the Buchanan Fern III. *Forth Naturalist and Historian 14*, 84-85.

Mitchell, J. & J.B. Mason (1981). In search of the Buchanan Fern I. *Forth Naturalist and Historian 6*, 97-100A.

Mitchell, J. & D. Warner. (1992). Queen amongst Lady Ferns on the Isle of Arran. *The Arran Naturalist 15*, 19-21.

Rickard, M. (2002). *The Plantfinder's Guide to Garden Ferns*. Newton Abbot; David & Charles.

Ross, A. (1900). Records of Excursions in Stirlingshire. *Annals of the Andersonian Naturalists Society 2*, 117-134.

Sadler J. (1864). Notice of a new variety of Athyrium filix-femina. *Botanical Society of Edinburgh Transactions VIII*, p.187.

Schroder, N. (1990). In search of the original 'Victoriae'. *Pteridologist 2*, 8-10.

Warner, D. (1991). Is this the Original Victoria Fern? *Arran Banner*, 28th September, 1991.

West Dean Gardens

Julian Reed

19a Northdown Road, Kemsing, Sevenoaks.
Kent. TN15 6SD
e-mail: julianreed@waitrose.com

Fig. 1. The walled garden at West Dean with its restored glasshouses.

Fig. 2.An array of ferns await the visitor in one of the glasshouses.

Fig. 3. *Adiantum raddianum* 'Legrandii'

This all started when Peter Tindley, a BPS member, very kindly invited me to see his excellent range of ferns and exotic plants in September 2013. In his usual kind and generous manner he gave some to me to take home, whilst I was there he suggested we go to see West Dean Gardens. He knew the head gardener, Jim Buckland, and Sarah Wain, the supervisor, from his days working at Kew.

The West Dean Estate covers approximately 6,400 acres (2,590 hectares) along the Sussex South Downs. It stretches over 6 miles (9.7 kms) from the South Downs escarpment, overlooking the Sussex Weald, to the edge of the Trundle Hill, overlooking the English Channel and the Isle of Wight. Whilst much of the village of West Dean and West Dean College is sheltered within the Lavant valley, the Estate rises to its highest point of almost 750 feet (280 m) on the top of the Downs. This garden is set in beautiful surroundings and what is more has a superb greenhouse full of fascinating ferns, but more of that further in this article.

In the hands of Gardens Manager Jim Buckland and Gardens Supervisor Sarah Wain, the 36 hectares (90 acres) of grounds, divided into four distinct areas: the gardens entrance; the walled kitchen garden (Fig.1.); the pleasure grounds and St Roche's Arboretum have carried out a bold re-development programme designed to bring the nineteenth century gardens into the twenty-first century.

As we arrived I could tell that we were in for something good. Even the car park was well maintained This garden is a gem set in parkland surrounding with manicured

Fig. 4. *Adiantum raddianum* 'Variegated Pacottii'

Fig. 5. *Adiantum raddianum* 'Variegated Tessellate'

Fig. 6. Frond details of *Adiantum raddianum* 'Variegated Tessellate'

Fig. 7. *Adiantum Cornubiense* 'Tessellate'

Fig. 8. *Davallia trichomanoides* 'Lorraine'

Fig. 9. *Davallia Solida*

Fig. 10. *Adiantum* "Fine Leafed"
(I suspect it is *raddianum* 'Micropinnulum')

lawns with a haha separating the gardens from the parkland landscape

In the walled garden there are amazing multi-cordon fruit trees as well as beautifully restored glass houses. At the time of our visit they were running a trial on chile peppers which was part of a RHS trial written up in the RHS magazine, *The Garden*. However the best part was the superb greenhouse full of fascinating ferns

Sarah Wain managed to show me some ferns that I have never seen before. including a lot of *Adiantum raddianum* varieties. This Maiden Hair fern is usually a common house plant but there was nothing common about the ones growing here. (See Figs, 2 to 6.) They dislike a very dry atmosphere but they do not need high temperatures. I grow mine on a north facing window on the stairs and they are doing well (Sue Olsen lists as hardiness zone 9-11) They also had a *Adiantum Cornubiense* 'Tessellate' (Fig. 7) and several species of *Davallia*. (Figs 8 and 9).

Following our visit to the greenhouse we were looking around the walled garden when we came across two amazing lady ferns (*Athyrium filix-femina*) One was a 'Glomeratum' and the other a 'Cruciate Grandiceps' the like of which I have never seen before.(Figs. 12 and 13)

Just to round off our day there was also a superb *Polystichum squarrosum* (Fig. 14) in Peter's garden.

I would like to take this opportunity to thank Peter Tindley for suggesting the visit and also Sarah Wain for taking the time to show us around.

Just a reminder that the south east group of the BPS will be visiting these gardens in mid-summer.

For more details of this garden please visit the website at:-
https://www.westdean.org.uk/garden/home.aspx

Fig.11. Detail of the fine collection of ferns.

Fig.12. *Athyrium filix-femina* 'Glomeratum' still looking surprisingly good in spite of it being a mid-September

Fig.13. *Athyrium filix-femina* 'Cruciate Grandiceps'

Fig.14. *Polystichum squarrosum* in Peter Tindley's garden.

Author's Book Review

Tree Ferns For Your Garden by Mark Longley. Published as an Ebook on 2nd June. 150 pp, 200 colour photographs. Price £6.00 / $10 USD / €8.20 (based on current rates)

In June of this year I will be releasing an Ebook on tree ferns titled *Tree Ferns For Your Garden*. I began this project back in April of 2012 and having discussed the idea with one or two publishers it became apparent that the focus of the subject matter should be on the subject of gardening with tree ferns in general as this subject had not been written about previously in any great detail. In a nutshell this book is an introduction to tree ferns, how to propagate them, how to cultivate them and which particular species are suited to growing in cultivation. It is written with an err towards those fern growers in cooler temperate climates such as those in North West Europe and America. Obviously we all know very well that these climates are very challenging ones in which to grow tree ferns hence I have written in great detail about winter protection and growing them in containers where they can be moved under cover in winter. I have also explained how to convert your greenhouse into a glasshouse and how to build an outdoor shade house. The book contains 150 pages with over 200 colour images accompanying the 30,000 words of helpful advice and is divided into 3 main chapters as follows:

Chapter 1 – The Biology and Distribution of Tree Ferns

This chapter covers (as the title suggests) very simply what tree ferns are, their physical structure, an introduction to the families and what types of climate they tend to inhabit.

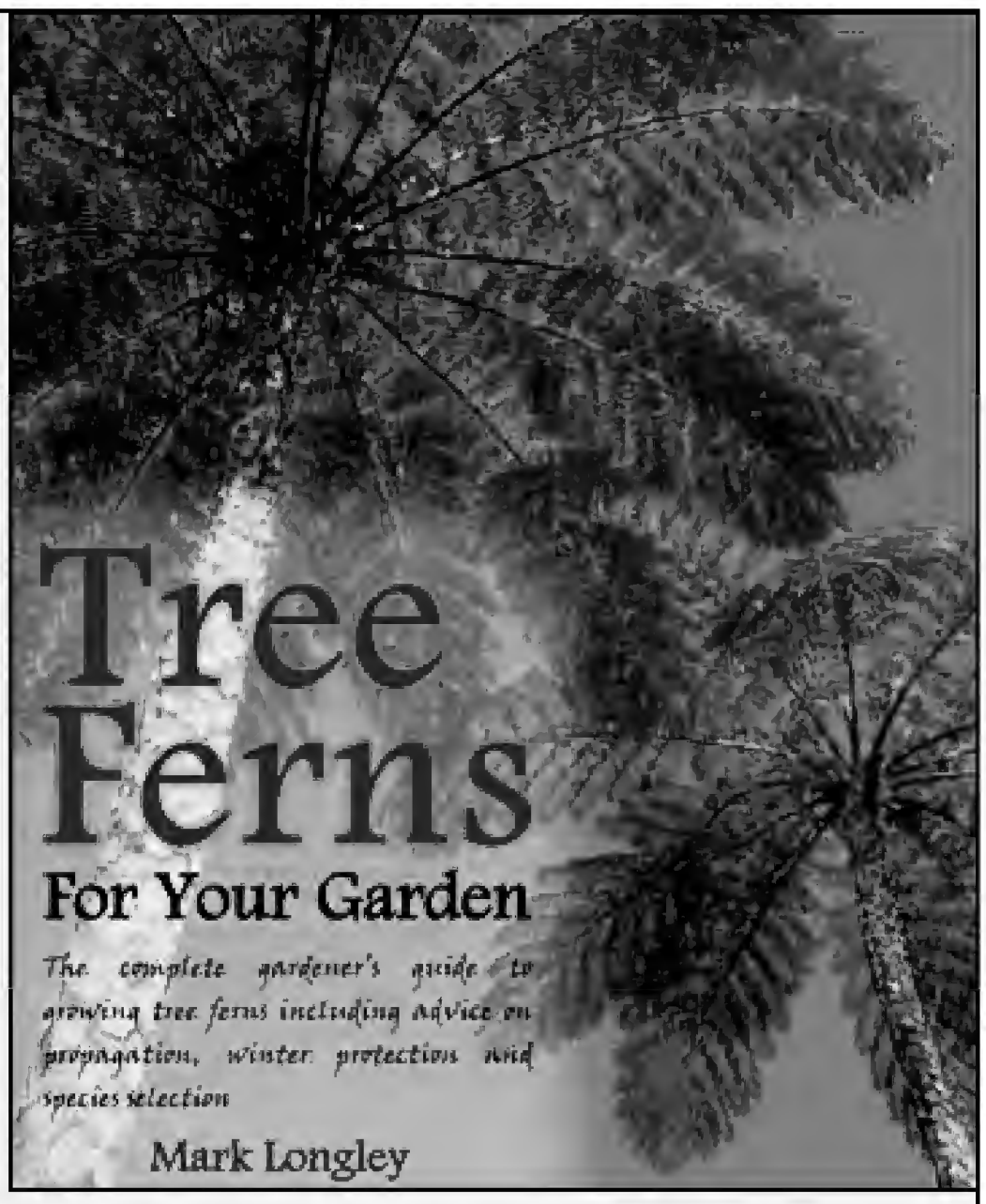
Chapter 2 – The Cultivation and Propagation of Tree Ferns

This is the section which has taken the most amount of time to write as there is simply so much information that I wanted to convey. I am a strong advocate of spore propagation and I've never found a website or publication which covered propagation in enough detail. Most descriptions make it all sound too easy and don't advise of the many pitfalls so I have written a step-by-step guide which I think is far more detailed than anything that has been written before it. I then go on to advise how to grow tree ferns in the garden, containers, ferneries, glass houses and there is a large section on winter protection

Chapter 3 – Tree ferns Suitable for Cultivation

This is a really dynamic chapter as it covers all of the tree fern species that are commonly available in cultivation and is packed with original, never before seen images of them in their native habitat. I spent many hours tooing and frowing over what species to include in this chapter and which to leave out. Where do you stop? Ultimately I stuck to those which are tried, tested and well understood. In total there are 24 and I have included as much imagery as I could as I want this section to be an inspiration, a visual guide as well as a practical reference.

The book is being released as an Ebook on 2nd June 2014 and is priced at £6.00 / $10 USD / €8.30. It is formatted as a high definition PDF file in the portrait aspect and ideally suited to reading on an Ipad or similar tablet device like a smart phone or note book. You can also read it on your laptop or home PC, basically any device that can read a PDF file. You don't need a dedicated E-reader as with many books. It will be available for purchase and download via

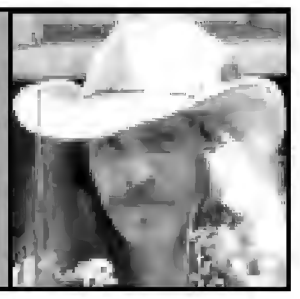


my website www.thefernhouse.moonfruit.com. Follow the simple instructions which will direct you to a page where you can view the book and buy it. The page will also process your payment securely via Paypal either with your own account or a one-off card payment after which you will immediately receive an email with a dedicated link to a page from where you can download the book to your chosen device.

For those who might wish to buy it I very much hope you enjoy it and look forward to hearing your feedback! Mark Longley

A frond in read is a frond indeed!

Jeremy Pellatt
Peacehaven, East Sussex
e-mail:je22a@hotmail.co.uk



A number of years ago, whilst looking for something to do with my family on a typically wet bank holiday, we came across a new antiquarian book shop in a local Village, Alfriston. Once inside I came across a very old looking book on ferns, I've always had an interest in gardening of all sorts and a few years ago I got caught by the fern bug and this book was great to look through but, as the price was a little steep I showed my wife, and reluctantly placed the battered, blue covered book, back on the shelf.

A couple of months later, in amongst my other birthday presents was a book shaped package, lovingly wrapped in tissue and brown paper and tied up with a neat cross of coloured string.

I peeled back the wrapping to reveal the familiar battered blue linen cover with its faded gilt fern motif, thanked her and started to thumb through the pages at random. After a few pages I came across something that made me close the book and carefully re-wrap it with as much care as the bookshop had done originally.

Now I'm no expert on these matters but I suspected that along with a number of desiccated grey fern remnants flattened between the pages was a distinct smattering of tiny rusty-brown dots. I took a guess that these were fern spores.

The next time I opened the book was a couple of weeks later during which time I had swotted up on how to grow ferns from spores and armed myself with a half-sized seed tray full of damp sterilised compost and a small paintbrush.

This time as I opened the book I took time to dust out the suspect contents of each page onto the compost, paying particular attention to the gutter between the pages where most of the spores appeared to have collected. There were about 8 pages with small dried pieces of fern frond but there were more pages that just contained spores suggesting that other specimens had been present but had been lost over time. Once the entire contents of the book had been spread evenly across the compost I sealed the tray in a plastic bag and placed it carefully in the garden shed.

Fig. 1. The book in question. *The Ferns of Great Britain*, 1855 by Charles Johnson, illustrated by John E. Sowerby.

Fig. 2. The first signs of ferns emerging.

Fig. 3. Familiar ferns developing.

Every few days I religiously peered through the condensation in the bag for signs of activity on the compost. Sadly, as nothing obvious was happening, I gave up checking for several months and forgot about the experiment.

The book in question is a copy from 1855 of "*The Ferns of Great Britain*", written by Charles Johnson and its musty, yellowed pages contain descriptions of most of the ferns known in the UK at the time and includes illustrations by John E. Sowerby to help the amateur botanist identify any ferns they may come across (Fig.1.).

Inside the book, Lizzie I. Stokes had pencilled her name in her very best copperplate handwriting during the August of 1861 and I guess she had been caught up in the Victorian fern craze that was in full swing and had used this book to help identify native ferns whilst out and about in the English countryside. Maybe it was even she who had pressed the small fern specimens in this book? Who knows?

A few months later whilst attempting to clear some space in the shed I came across the murky looking bag and ripped it open just to check before I condemned it to the Compost heap. Much to my surprise the surface of the compost was covered with a green fuzz and several bright green round lily-pad shaped growths which were just as described in the book that I had read on how to grow ferns from spores (Fig.2.). The seed tray was hastily re-sealed in a new bag and left to carry on its growing process.

A couple of more months passed and now there were a number of small plants present emerging from these growths. Over time these plants developed into very distinct, but familiar fern species (Fig.3.), and I gradually potted them up individually to allow them to grow on as can be seen in Figs. 4 and 5. Over time these were then planted in the garden to add to my burgeoning collection.

Fast forward to today and whilst I was clearing out dead

A frond in read is a frond indeed!

Fig. 4. The developing ferns potted up for the first time.

Fig. 5. The ferns potted on as they develop.

leaves and twigs from around the garden I came across the glossy leaved *Cyrtonium falcatum* (Fig.6.), now growing strongly in the shade of a twisted hazel bush.

Whilst it is impossible to tell exactly when the fern fronds were pressed between the pages of the book, I like to think that this one remaining plant is a direct child of one of the fern specimens collected by Ms. Stokes during the Victorian fern craze back in the 1860's and that she would be amazed that her faithful old book, which has probably been through the hands of many collectors, still contained the basis for life, and that although she would not recognise the modern world in which we live... she would still be able to identify this fern.

Footnote: Since the above experiment I have got hooked on collecting old fern books (Fig.7.), and, using the BPS publication "Fern books in English published before 1900" as a reference, have amassed up to 50 plus. Unfortunately, although many have had dried fern specimens tucked in their pages, I have not identified any more spores and have been unable to repeat the experiment.

Fig. 6. *Cyrtomium falcatum,* one of the ferns from the book.

Fig. 7. The increasing collection of fern books.

More Bird's Nest Ferns!

Peter Campion, the Chairman of the North West Group, was checking his ferns this spring and found a nest at the base of some Polystichums. The small blue eggs gave away the owner as a *Prunella modularis* commonly known as the Hedge Sparrow or Dunnock. The latter name comes from the Ancient British *dunnākos*, meaning "little brown one", an apt description of this small bird that creeps and forages underneath shrubs and bushes.

The eggs eventually hatched and the chicks have flown. Now Peter can enjoy his ferns in peace.

Fig. 1. (Left) The pale blue eggs in the feather lined nest can only be from a Dunnock. They seldom nest on the ground and prefer dense shrubs and trees.

Fig. 2. (Right) An adult Dunnock. They are ground feeders and tend to scuttle about the undergrowth. This bird is not a sparrow but a member of the accentor family

Fig. 3. The eggs hatched succesfully and the chicks have now flown.

The BPS Photographic Competition 2014

This year the BPS ran a new Photographic Competition. The aim is to encourage members to take photos of ferns in the wild, in the garden or greenhouse and of any ferny artefacts, so these can be enjoyed by others. All photos sent in will appear on our website and the winners are published here. The photos may also be used to produce our BPS calendar.

The competition attracted 11 entrants submitting 62 photos. These were displayed at the AGM where members voted for their favourites. We hope that many of you will be enthused and submit photos for next years competition; look out for the instructions in the Autumn Mailing. Remember Photos win Prizes!

Class 1 - Ferns in a natural landscape - 24 photos

1st Alison Evans - *Asplenium aureum*, Monte de Luna Lava Fields, La Palma. Jan 2014.

2nd Adrian Dyer - *Blechnum* sp. Sao Paulo, Brazil. Oct 2005.

3rd Sue Dockerill - *Cystopteris fragilis*, Llangattock, Wales. June 2011.

Class 2 - Cultivated ferns in a house, greenhouse or garden - 24 photos

1st Linda Greening - *Athyrium otophorum* var. *okanum*, Cottage Garden, Burton-in-Kendal. No date.

3rd Patrick Acock - *Equisetum gigantum*, Garden at Baeza, Ecuador. Sept 2013.

2nd Linda Greening - *Dryopteris wallichiana*, Cottage Garden, Burton-in-Kendal. May 2010.

1st Sue Olsen - Etched glass window, Olsen Garden, USA. Winter 2014. (This photo won the most votes - 24.)

2nd Sue Olsen - Glass Ferns, Seattle, USA. Winter 2013.

3rd Yvonne Golding - Fern Modern, Hull, UK. April 2014.

Class 3 - Item or object with a fern-related theme - 14 photos

Book Review

Fougères rustiques: pour le jardin by Olivier Ezavin & Cédric Basset (2013). pp. 224. 22 x 17 cm. 24€

Les Éditions Ulmer, 8 rue Blanche, 75009 Paris, France. ISBN: 978-2-84138-528-7

On the back cover of *Pteridologist*, for many years now, Olivier Ezavin, the first author of this book, has advertised his fern nursery *Le Monde des Fougères* (The World of Ferns). It is located a short distance inland from Nice and the Eastern Mediterranean coast of France. I have visited there twice, by bus, when holidaying near Nice. The co-author, Cédric Basset is an expert in botanical photography and specialist in Asiatic floras. Together, Ezavin and Basset have produced a beautifully- and profusely-illustrated book with much useful advice on ferns and how to grow and appreciate them.

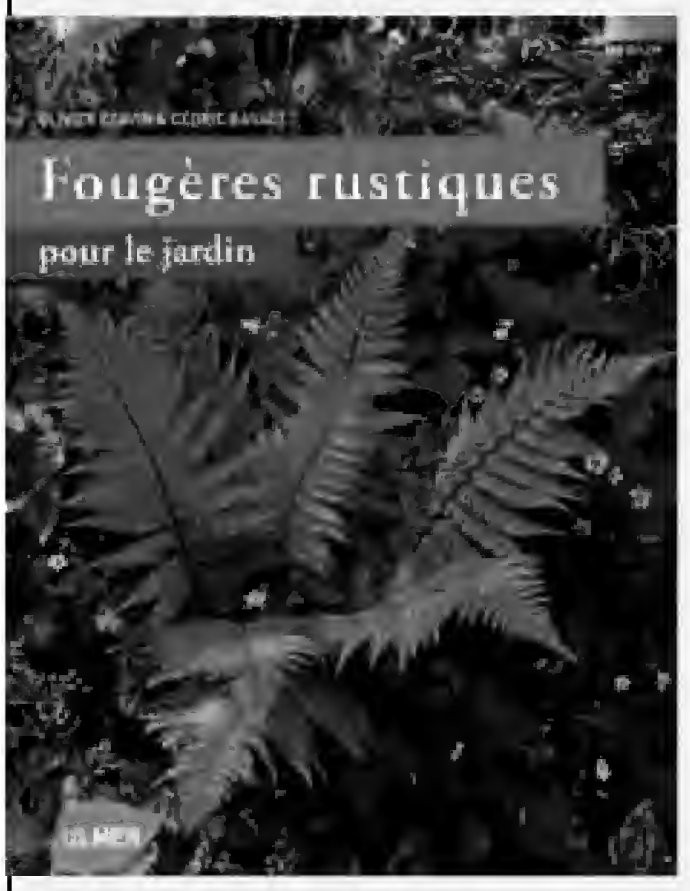


Fig. 1. Front cover.

Fig. 1 shows the front cover. *Fougères rustiques* is a practical guide (in French), to hardy (*rustique*), ferns (fougères) that are recommended as suitable for French gardens. Many are also widely planted in British gardens but several are definitely not, and might be well worth re-testing in protected micro-habitats.

The book starts with a general introduction to ferns; their evolutionary origin, diversity, anatomy and reproduction. A major theme is how ferns can provide counterpoint to the flowering plants. It is thus intended for keen gardeners whose horizons haven't yet intersected with pteridology but who might respond to 'frondly' persuasion.

The main part of the book is an *A to Z Guide* of 100 species of ferns, native and foreign, that are hardy, from a French perspective. They are presented in alphabetical order of Latin name, and authority, from *Adiantum capillus-veneris* (L.) to *Woodwardia unigemmata* [Makino] (Nakai). As a sample of the presentation, Fig. 2 shows *Woodwardia radicans*, a native French species. The authors must have wanted to avoid producing the truly massive tome that would be needed for all the native French species of fern, plus the several hundred foreign species that might, or do already, grow in France. Instead, with a book-thickness of only 2-cm, and containing 224 pages, the authors had to be highly selective.

For example, in the genus *Asplenium*, there are 22 French-native species listed in Rémy Prelli's (1990) *Guide des fougères* (2nd Ed., Paris, Lechevalier). From these, Ezavin & Basset offer only 3, namely *A. adiantum-nigrum*, *A. scolopendrium* [plus 4 cultivars], and *A. trichomanes* [2 sub-species and 3 cultivars].

Similarly with *Dryopteris*, Prelli describes 15 native-French species, from which the A to Z Guide has taken only 4 as follows, with [cultivars]: *D. affinis* [7], *D. carthusiana*, *D. dilatata* and *D. filix-mas* [4]. This then made space for 6 species, foreign-to-France, of *Dryopteris* representatives from North America and Asia.

Overall, the A to Z Guide has more fern species that are foreign to France than it has French natives, in a ratio of about 70 to 30. With the cultivars, which are mainly from species native to France (and shared with the British Isles), many, if not most, were from Britain.

Each entry in the A to Z Guide has a species-description, with the systematic name and authority, synonyms, natural occurrence and distribution. There is then a listing of the distinguishing anatomical features, one or more coloured illustrations, and expert advice on cultivation.

For readers who want the lowest temperatures each species can withstand, there is a 4-page *Tableau de Rusticité* (Hardiness Table) for the 100 fern species described. These temperatures range from the -2°C of *Pteris vittata* down to the -40°C of *Cystopteris fragilis*.

Many of the species and cultivars described in the book do well in British gardens. However there is a goodly proportion which may be '*rustique*' (hardy) in France, but would be vulnerable in many parts of Britain.

These are the species which Ezavin & Basset cite as being hardy down to between -5°C and -10°C. In Britain, these might need specially-protected micro-habitats to survive our periodic exceptionally cold or long winters. The book offers a fair number in this category, of which – as a sample – only those under the letters A, B and C are: *Adiantum hispidulum* [-6°C], *Blechnum appendiculatum* [tested to -5°C], *B. australe auriculatum* [-6°C], *Colysis eliptica* [to -8°C], *Coniogramme japonica* [-8°C] and *Cystopteris diaphana* [-8 °C].

Fig. 2. *Woodwardia radicans*, a native French species.

Those British fern-growers with only school-level or holiday-level French should not let the foreign language be a deterrent. I found that only a short crib-sheet of technical-botanical words from a dictionary was enough for reasonable understanding. The text is concise and straightforward and unburdened by convoluted phraseology. The numerical hardiness information doesn't need much translation anyway. and the pictures speak for themselves.

Fougères rustiques has at the end a short Bibliography and 'Webographie', and lists of fern gardens and specialist fern nurseries in France. It is well indexed.

The book has a certain inspirational quality and offers a master-class in how to take and display appealing pictures of ferns. Its horticultural advice struck me as accurate and insightful.

At 24€, it is modestly priced for its size and its lavish use of colour. I recommend it for its French perspective on choosing and growing garden ferns, and enthusing on their aesthetics.

Alastair Wardlaw

THE BRITISH PTERIDOLOGICAL SOCIETY

Registered Charity No. 1092399

Patron: HRH The Prince of Wales

Officers and Committee from April 2014

President: **Prof. J. A. Edgington**,19 Mecklenburgh Square, London. WC1N 2AD
President@eBPS.org.uk

Vice Presidents: **A.R. Busby**, **R.J. Cooke, Dr A.F. Dyer, R. Golding, Miss J.M. Ide, R.W. Sykes**

General Secretary: **Dr Y.C. Golding,** 7 Grange Road, Buxton, Derbyshire. SK17 6NH
Secretary@eBPS.org.uk

Committee Secretary: **Mrs.A.Haskins**,Willowbrook Cottage,Waste Lane,Cuddington,Northwich, Cheshire.CW82TD

Treasurer: **Mrs G.J. Smith,** Rookwood, 1 Prospect Road, Oulton Broad, Lowestoft, Suffolk. NR32 3PT
Treasurer@eBPS.org.uk

Membership Secretary: **Dr A.J.Evans,** Springfield House, Salterforth Rd, Earby, Lancs. BB18 6NE
Membership@eBPS.org.uk

Meetings Secretary: **B.D. Smith,** Rookwood, 1 Prospect Road, Oulton Broad, Lowestoft, Suffolk. NR32 3PT
Meetings@eBPS.org.uk

Conservation Officer: **Dr H.S. McHaffie,** Royal Botanic Garden, 20A Inverleith Row, Edinburgh. EH3 5LR
Conservation@eBPS.org.uk

Conservation Officer & Recorder: **Dr F.J. Rumsey,** Angela Marmont Centre, The Natural History Museum, Cromwell Road, London. SW7 5BD; e-mail: Recorder@eBPS.org.uk

Project Officer: **A.C. Pigott,** Kersey's Farm, Mendlesham, Stowmarket, Suffolk. IP14 5RB
Projects@eBPS.org.uk

Education Officer: **Dr A.J. Evans,** Springfield House, Salterforth Rd, Earby. Lancs. BB18 6NE
Education@eBPS.org.uk

Publicity and Marketing Officer: **Miss E. Evans** Springfield House, Salterforth Rd, Earby. Lancs. BB18 6NE
Publicity@eBPS.org.uk

Publications Secretary: **M.H. Rickard**, Pear Tree Cottage, Sutton, Tenbury Wells, Worcs. WR15 8RN
Publications@eBPS.org.uk

Editor of Pteridologist: **A.E. Greening,** Pear Tree Cottage, Burton-in-Kendal, Cumbria. LA6 1NN
Pteridologist@eBPS.org.uk

Editor of the Bulletin: **Miss A.M. Paul,** Dep. of Life Sciences, The Natural History Museum, Cromwell Road, London. SW7 5BD; e-mail: Bulletin@eBPS.org.uk

Editor of The Fern Gazette: **Prof. M. Gibby,** Royal Botanic Garden, 20A Inverleith Row, Edinburgh. EH3 5LR
Fern Gazette@eBPS.org.uk

Editor of BPS Website: **A.C.Pigott,** Kersey's Farm, Mendlesham, Stowmarket, Suffolk. IP14 5RB
Webmaster@eBPS.org.uk

Elected Committee Members: **I.J.Bennallick, P. Blake, Mrs A. Haskins,Dr S.L.Jury, F.McGavigan, J.P.Reed**

Booksales Organiser: **Dr F. Katzer,** Highfield House, Muirburn, Biggar. ML12 6HL
Booksales@eBPS.org.uk

Horticultural Information Adviser & Archivist: **A.R. Busby,** 16 Kirby Corner Road, Canley, Coventry. CV4 8GD
HorticulturalInformation@eBPS.org.uk, Archivist@eBPS.org.uk

Merchandise Organisers: **Mr B.D. & Mrs G.J. Smith,** Rookwood, 1 Prospect Road, Oulton Broad, Lowestoft, Suffolk. NR32 3PT
Merchandise@eBPS.org.uk

Plant Exchange Organiser: **J.P. Crowe,** Kellys Cottage, Tredilion, Abergavenny, Gwent. NP7 8BB
PlantExchange@eBPS.org.uk

Spore Exchange Organisers: **Dr B. & Dr S.C.Dockerill,**19 Westfield Road,Glyncoch, Pontypridd, Mid Glamorgan CF37 3AG Spores@eBPS.org.uk

Trustees of Greenfield & Centenary Funds: **President, General Secretary & Treasurer**

The **BRITISH PTERIDOLOGICAL SOCIETY** was founded in 1891 and is still a focus for fern enthusiasts, its wide membership including gardeners, nurserymen and botanists, both amateur and professional. It provides a wide range of information about ferns through its publications and website, and also organises indoor and field meetings, garden visits, a plant exchange, a spore exchange and fern book sales. The Society's journals, *The Fern Gazette*, *Pteridologist* and *Bulletin* are published annually. *The Fern Gazette* publishes matter chiefly of specialist interest on international pteridology, the *Pteridologist*, topics of more general appeal, and the *Bulletin* deals with Society business and meetings reports.

Membership is open to all interested in ferns and lycophytes. **SUBSCRIPTION RATES** (due on 1st January each year) are Full personal Members £25, Personal Members not receiving *The Fern Gazette* £21, Student members £12.50, Subscribing Institiutions £42. Family Membership in any category is an additional £2.50. Applications for membership should be sent to the Membership Secretary (address above) from whom further details can be obtained. **Airmail** postage for all journals is an extra £10, or for those not receiving The Fern Gazette, £5.00. **Standing Order** forms are available from the Membership Secretary and the BPS website

WEBSITE: www.eBPS.org.uk

Back numbers of *The Fern Gazette, Pteridologist* and *Bulletin* are available for purchase from P.J. Acock, 13 Star Lane, St Mary Cray, Kent. BR5 3LJ; e-mail: BackNumbers@eBPS.org.uk

FERN NURSERIES

FIBREX NURSERIES LTD
www.fibrex.co.uk
Honeybourne Road, Pebworth, Stratford-upon-Avon CV37 8XT Tel: 01789 720788
Hardy and tender ferns, Begonias, Gloxinias, Hederas, Hydrangeas, Primroses,
Arum Lilies and plants for the cool greenhouse.

BOWDENS
Hostas, Ferns and Grasses
Incorporating Rickards Ferns
Hardy and non hardy ferns, tree ferns and ferneries planted
Cleave House, Sticklepath. Devon. EX20 2NL
Tel: 01248 600385 www. bowdenhostas.com e-mail: tim@bowdenhostas.com

FANCY FRONDS
North American and British hardy ferns.
"World-wide selection of temperate, semi-tropical, xeric and tree ferns,
including Selaginellas, Equisetums and British cultivars"
U.S.A. orders only
www.fancyfronds.com e-mail: judith@fancyfronds.com

FOLIAGE GARDENS - Sue Olsen
Hardy Native and Exotic Ferns
USA orders only
www.foliagegardens.com e-mail: Foliageg@juno.com

HARDY FERNS- R.N. Timm
www.fernnursery.co.uk
The Fern Nursery, Grimsby Road, Binbrook, Lincs. LN8 6DH Tel: 01472 398092
Please send stamped addressed envelope for catalogue

LE MONDE DES FOUGÈRES - Olivier Ezavin
www.pepinieres-ezavin.com
Over 100 fern taxa available for cultivation at -10 to +30^{0}C
955 chemin de puits, 06330 Roquefort Les Pins, France (the nursery is near Nice)
e-mail olivier.ezavin@wanadoo.fr

IVYCROFT PLANTS
www.ivycroft.freeserve.co.uk
Ferns, snowdrops, herbaceous, alpines
Ivington Green, Leominster HR6 0JN - Tel: 01568 720334 e-mail: roger&sue@ivycroft.freeserve.co.uk

CRAWFORD HARDY FERNS
Hardy ferns from around the world, tree ferns,
hardy exotics, palms, bamboo
www.crawfordferns.co.uk E-mail: info@crawfordferns.co.uk
High Street, Spetisbury, Dorset DT11 9DP. Tel.: 01258 857240.

BINNY PLANTS
Retailers of a small range of popular ferns for Scotland
www.binnyplants.com
Binny Estate, Ecclesmachan, West Lothian, Scotland EH52 6NL
Tel.: 01506 858931. e-mail: contact@binnyplants.com

VERDIGRIS - D and K Stocks
Specialising in ferns
Large range of Australian native and exotic species available
Australian orders only. Nursery visits by appointment.
Tel: +61 2 4478 1311 e-mail: www.verdigris.com.au

FERNWOOD PLANT NURSERY - Iain Jack
Native and hardy exotic ferns for Canadian gardens
Canadian orders only
www.fernwoodplantnursery.ca
email: iainjack@fernwoodplantnursery.ca

PTERIDOLOGIST is published by **THE BRITISH PTERIDOLOGICAL SOCIETY**
c/o Department of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

Pteridologist Volume 5 Part 6 was published on 30th May 2013