

# PTERIDOLOGIST

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## *The Fern Magazine*

2010 Edition [Volume 5, Part 3]

EDITED BY M.H. RICKARD

AND A.E. GREENING

ISSN 0266-1640







This is yet another bumper issue of the Pteridologist. I do hope all members will find something in it to interest them, but if we are not addressing your particular interest please let us know. Of course content is largely dictated by the copy we are offered but we can also invite papers. It is always difficult to get gardeners to pass on their knowledge, but if you have observed something odd, worrying, magnificent or excitingly new in your garden please let us know. We are also interested in publishing details of new cultivars, species new to cultivation and any comments on species hardiness. Such items do not have to be lengthy articles, a short note could often suffice.

With this issue I am standing down as Editor. Alec Greening will take over - with my assistance if and when required. Over the last three issues I would like to think Alec and I have been a pretty good team. I have sourced most of the articles while Alec has organised the necessary computer wizardry to produce the beautifully arranged finished product. With the new arrangement he will continue to do this, while also sourcing the articles, so from now on, therefore, please send copy direct to Alec. The deadline for receiving copy for each year remains the 31<sup>st</sup> January.

Finally I would like to thank everyone for all the support I have received over these three years. Given the wonderful spirit within our Society I confidently expect Alec to enjoy the same support and see the Pteridologist get better each year.

Martin Rickard

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Another 80+ page issue. Can we keep this up? There are even some articles held back for next year due to lack of space. For 2011 several more have been promised. However we still need interesting articles, particularly of a horticultural nature. If you need help putting an article together please ask.

It would appear that I have served my apprenticeship as assistant editor and now move to the top of the page. Martin will still be on hand as the assistant editor to keep me on the right track and ensure that I get those italics in the correct place. I would like to thank Martin for his guidance, patience and advice over the last three years.

In response to various suggestions I have tried to establish a more consistent format for this issue. Let me know what you think - after all this is your magazine.

On a technical point, images that are embedded in documents or emails suffer from lost resolution. They are best sent separate or as attachments to an email.

**Alec Greening**

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## Notes for contributors

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



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# PTERIDOLOGIST 2010

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*Dryopteris pseudodisjuncta*  
Photo: Ken Trewren



### Cover Picture: Front

A fine specimen of *Osmunda regalis* 'Cristata' taken in Alastair Wardlaw's garden.

Photo: Martin Rickard

### Cover Picture: Back

The back cover is based on the adjacent picture of *Athyrium otophorum* var. *okanum*.

Photo: Linda Greening



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

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# Education and the BPS

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When I first tentatively suggested that I might be interested in the role of Education Officer, I was acutely aware of how many people there are in the BPS with far greater knowledge and expertise than I have. Looking again at last year's *Pteridologist*, with its wealth of useful information, has reinforced that opinion. I discussed the idea with Bridget Laue, who was also considering the role, and together we decided we would go for the challenge. As a result we now have an Education Sub-committee – Bridget, myself, Yvonne Golding, Heather McHaffie, and Frank McGavigan.

So why did I think I might have something to offer as Education Officer? Time was an important factor – I have recently become semi-retired, giving up my job in medical education to work just two days a week as a country GP. I'm fortunate to live in the Pennines, within easy reach of the Yorkshire Dales and the Lake District, so I've been active in the Yorkshire and North-West BPS groups for some years. My background in education was another factor – for most of my career I've been teaching or organising education for medical students, GPs, or medical teachers, and as an academic I had to write for publication. My own learning about ferns has been fairly recent, so I think I can relate to the problems that beginners might have. Last year I completed a certificate course on Biological Recording and Species Identification, run by the University of Birmingham and the Field Studies Council. This included the excellent course on ferns that Heather McHaffie runs at Kindrogan. I passed the module, so I can claim some qualification in Pteridology! Above all though, I feel that I can offer an enthusiasm for learning about these fascinating and beautiful plants, and communicate that to others.

The Education Sub-committee have already found a variety of ways of engaging with the public and attracting new members to the BPS, through presence at garden shows, and in museums and botanic gardens. Yvonne has produced attractive promotional posters and leaflets for use on these occasions. There is a report of our activities



Fig. 1. The winner of the junior quiz at the Manchester Museum 'Big Saturday'

in this year's Bulletin. The smile on this young man's face (Fig. 1) when he won the junior quiz at the Manchester Museum made us feel that our efforts had been worthwhile!

One of my first tasks in post was to investigate the educational resources that we already have – I think this will be 'ongoing' for some time! The website is an obvious vehicle for making information available to all. We are working on an 'Education' section that will have some new material, but importantly will also direct people to resources that we already have. Our BPS journals will eventually be available electronically on the website. Presentations from indoor meetings will be posted on the website, and 'tutorials' on important topics. The BPS Archive now has a proper home near the Herbarium in Manchester Museum. It contains a wealth of educational material, and members will be able to obtain access to this soon. If you have any suitable educational material of your own that we might be able to use, please let me know.

Websites and journals can present information, but for me the most important educational resource is our 'fern community' – our members, local groups, and other fern enthusiasts. When I applied for my last job in medical education, I had to give a presentation on how I would go about improving consultation skills, and the teaching of them, in Yorkshire. I used the analogy of my early lack of success in identifying ferns, despite having a life-long interest in botany and a good knowledge of flowering plants. What made the difference was joining the BPS and going on field meetings, where knowledgeable people gave freely of their time and expertise to help me learn. I used this picture (Fig. 2) of a field meeting to illustrate my point about the importance of 'communities of practice'.

You can only learn so much by reading a book. I believe that there is no substitute for working



Fig. 2. A North-West Group field meeting



## Education and the BPS

with others, and sharing knowledge and expertise. I'll probably spend quite a lot of time working on educational materials, but it is the 'networking' aspects of the job that I think will be most productive. So whether you are new to ferns and want to learn more, or you already have experience, please make the most of your local group, come to the AGM and the national meetings, contribute to the fern forum, and please let me know what you would like to see the BPS doing to further education about Pteridophytes. □

## Update on 'Growing ferns in a challenging climate'

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Further to my article in the previous edition of the *Pteridologist* I have had several enquiries about how my ferns fared during the winter of 2008/9.

The weather during January and February 2009 was the most severe for several years. Temperatures dropped to at least -7C for a couple of nights in January and heavy snow fell in early February. These conditions may appear fairly benign compared to some parts of the country, however they can be very damaging to tender plants.

However, I am pleased to report that all the species mentioned in the article have survived although some have been slow to recover. Several woody plants were severely damaged and a few were lost that have survived well during the previous run of mild winters. These were damaged mostly by the low temperatures in January and some plants could not survive once the temperature fell below -6C. Of course at these temperatures slight variations in humidity or wind speed/direction can alter micro-climates substantially.

Of the ferns mentioned in the article those that suffered most were *Ampelopteris prolifera* and *Cheilanthes wootonii*. It is hardly surprising that the former species was affected badly as it is a sub-tropical species. By June I had given up hope of seeing it again and I had neglected to follow my own advice of overwintering a plantlet indoors. However by July a small frond had appeared from below ground and by the first frosts a reasonably sized plant had developed. The cheilanthes never really recovered and although new fronds appeared sporadically through the summer it never looked happy. I suspect the reasons for this are more complicated as the low temperatures combined

with winter damp may have been responsible. I also think that the creeping rhizome of this species may also be naturally short-lived. I would expect this species to have survived better had I given some protection from moisture.

Rather more unexpected damage to my ferns occurred later in the year. This was caused by the extremely dry weather experienced from March until October. During this period hardly any rain fell apart from a few summer showers. This was particularly damaging to hardy dryopteris and polystichum species. Despite artificial irrigation several did not send out any new fronds at all and some died away including a *D. wallichiana*. Others have produced some small fronds late in the Autumn but will probably not survive another cold winter. I assume that the cold winter followed immediately by drought and low humidity in the Spring was particularly detrimental. □



*Pellaea falcata* – recovered well after the harsh 2008/2009 winter

## Ferns and 'furniture'



This magnificent Georgian oak chest of drawers was spotted in an auction at Penrith, Cumbria, by BPS member Robert Crawford last year.

It is decorated with an ornate fern motif. Needless to say Robert purchased this item and it now takes pride of place in his home. AEG



Drawer front details



# Pacific Northwest Ferning

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Visitors to the US Pacific Northwest looking for a ferny experience similar to, but not the same as, those in the UK have a number of attractive options. While there are no tropically focused Kew Gardens or Glasgow showcases here, the climatic conditions and the enthusiasm for acquiring and nurturing hardy, (as in temperate) ferns is a mutually shared addiction. All of the public gardens in the greater Seattle/Tacoma Washington area have dedicated and knowledgeable staff members who are actively promoting fern use by establishing prominent collections. Where ferns were once relegated as background "fillers" at best, they are now proudly displayed focal points. It is no longer unusual to find colorful sweeps of *Dryopteris* or *Blechnum*, newly introduced sturdy polystichums or a rare *Pyrrosia* included with pride amongst the prominent features of the gardens. Along with the promotional efforts of the Hardy Fern Foundation, the educational value of these collections has infected the public as well and ferns are now respected members of the gardening community.

There are a variety of very worthy gardens in the area and I feel a personal association with a number of these. Taken in alphabetical order they are –

The Bellevue Botanical Garden in Bellevue, Washington was a gift of about 20 years ago to the City of Bellevue Parks Department from residents, the late Cal and Harriet Shorts. To the visitor this is a splendid 53 acre garden, expanded from the original gift of 7.5 acres, with a large perennial bed as a main feature, a marvellous woodland trail experience, a Japanese garden and a rhododendron glen which was enriched by the Hardy Fern Foundation planting of some 750 ferns in the winter of 2008 and another 120 plus in the fall of 2009.



Bellevue Botanical Garden sign

Elsewhere ferns (some of which were part of an HFF initial planting effort in the late '90's) are distributed along nearby paths in the shaded community. Look too in the undeveloped woodland area with its tranquil trails including segments amongst canopies of mature

*Acer macrophyllum* carrying majestic colonies of *Polypodium glycyrrhiza* - a major winter décor. One of the most publicized features, however is the annual holiday display of some 500,000 lights carefully crafted to look like assorted recognizable plants – flowers, shrubs and yes ferns - as well as their garden companions (including a slug and a spider relocated annually to challenge the memory of the returning visitor). It is a "not to be missed" holiday tradition. For my family, however, the memories of visiting our friends the Shorts predate their gift to the city. Our annual fall tradition of making cider from their heirloom apples in a centuries old press will always remain a cherished memory and a part of the Bellevue Botanical Garden heritage. The garden is open daily without charge.



Blechnums at Bloedel

The Bloedel Reserve is a waterfront view garden on Bainbridge Island across Puget Sound from Seattle. Again it represents a generous gift to the community this time from the late Virginia and Prentice Bloedel, a timber baron.

The 150 acres bring the visitor into a beautiful expanse of a woodland forest experience. Northwest natives of all types including splendid swaths of ferns on land and in trees are displayed amongst natural old forest stumps and moss covered logs that are dominant features in the garden. Swans paddle about on a tranquil pond and add to the ambiance of the site. The house (while not as ancient as those interestingly found in the UK) is open to the public and touring it is included in the entrance fee. Advance reservations are required but not difficult to obtain.

Lakewold Gardens (Lakewold being Middle English for lake – woods) the former residence of and gift to the public from the late Eulalie and Corydon Wagner in Lakewood near Tacoma, WA is a sister garden (quite literally as Virginia Bloedel and Eulalie Wagner were sisters). In ten acres it offers a wonderful assortment of rare and selected family favorite plants such as *Meconopsis*, a major collection of rhododendrons,





Ferns in the Bloedel woodlands.

and state championship trees presented against the scenic foil of Gravelly Lake (which is made up of water and not gravel) and Mt. Rainier. The Wagners were dedicated plant specialists, which is readily apparent when visiting the garden. Here you'll find mature trees imported in the 1930's and 1940's including the then uncommon *Metasequoia glyptostroboides* (dawn redwood) along with newly acquired rarities in specially created habitats. Trees were Corydon's passion and Eulalie was a member of an elite national rare plant group whose annual offerings of newly introduced enticing plants were carefully nurtured and a great attraction in the garden as well as educational for the public.

When the Hardy Fern Foundation was in its infancy, Lakewold was to be the primary display



Lakewold Gardens



Fertile *Woodwardia orientalis* var. *formosana* in the Miller Garden collection

garden. Although the formal assignment subsequently switched to the Rhododendron Species Botanical Garden, many ferns were, and continue to be, donated to the Tom Gillies Hardy Fern Foundation display garden there giving them an expanded collection of interest "where foliage and texture prove their value in the garden." Hours vary by season.

The Elisabeth C. Miller Botanical Garden in north Seattle is located in a gated community with visiting restrictions. Situated on five acres overlooking Puget Sound, this is the lovingly created garden of Betty Miller, who was a nationally renowned plantswoman. Betty was well known and respected here for her pioneering efforts on behalf of horticultural enhancement in the greater Seattle community. She leaves a great legacy of civic beauty having successfully crusaded for a freeway park that is an ornamental lid over an interstate highway that bisects downtown Seattle and especially for her efforts in establishing the unique Center for Urban Horticulture at the University of Washington amongst other projects. One of the founders of the Northwest Horticultural Society, Betty was a very knowledgeable collector and a purist species enthusiast, no fancy variations for her!!! She had access to and introduced many unusual plants, including ferns, (which she willingly shared) to the North American gardening community. As a strong horticultural advocate she enthusiastically encouraged others (myself included) in their pursuit



## Pacific Northwest Ferning

of plant knowledge. So today, her garden stands as a testament to her love of beauty and its place in the plant world. While the garden has seen significant changes since Betty's death, with the attention of the current curators, the collection still preserves her dedication to creating a proper habitat for her treasures. Look here for thriving, well grown, rare and unusual specimens from around the world. Hers was one of the area's first to have the now popular *Blechnum chilense* and one of the few western US gardens where *Lygodium palmatum* thrived. The garden is open by appointment only and reservations must be made well in advance.



The stumpy at the Rhododendron Species Botanical Garden  
(photo: Richie Steffan )

Of all of the public Northwest gardens, the Rhododendron Species Botanical Garden, located on the Weyerhaeuser Corporate Headquarters' campus in Federal Way (between Seattle and Tacoma) has the most comprehensive and varied collection of ferns, all grown to perfection. Designated as the primary display and test garden of the Hardy Fern Foundation in 1989, with an initial planting of 189 ferns representing 56 species and varieties, the greatly expanded collection now offers ~225 types in 36 genera for the admiration and especially for the education of visitors. While originally planted according to area of origin most are now arranged in mass by genus and others by habitat preference. Thus osmundas thrive in the boggy pond area, and cryptogrammas along with *Adiantum aleuticum* 'Subpumilum' among others inhabit and enhance rocky crevices in the alpine garden. Elsewhere assorted woodlanders are grouped in appropriate habitat arrangements that invite study and comparison. Ornamental options are also a priority hence the HFF was extremely pleased to finally install a long planned for stumpy in the winter of 2009. This arrangement of some 150 "stumps" looks surprisingly and remarkably natural on the uphill side of a major garden pathway and with the addition of some 700+ ferns as well as many appropriate companion plants has quickly become a popular feature in the garden.

The garden itself was a gift to the RSBG from the Weyerhaeuser Corp. and incorporates some 22 acres where species rhododendrons from around the world are preserved and evaluated. The addition of the ferns and other plant collections enriches the garden and gives the rhododendron focus year around appeal.



*Polypodium glycyrrhiza* at Bellevue Botanical Garden

Visiting hours vary by season.

All of these gardens invite a lingering inspection rather than a quick "walk through" so please enjoy and budget enough time for the pure pleasure of appreciating their beauty. For those with but a few hours in Seattle, the Hardy Fern Foundation's Signature Bed adjacent to the Visitor's Center at the Washington Park Arboretum offers a lusty assortment of ferns appropriate for our climate and a tempting view of what is grown locally.

Meanwhile, this account does not take into consideration or present the many options for exploring field excursions in Pacific Northwest fern habitats. Whether in the rain forest on our Olympic Peninsula, montane habitats in the Cascade Mountains or traditional treks in the Pacific Northwest woodlands there are many wonderful opportunities to study our fern wealth. Given time these should be a welcome addition to any itinerary.

It also does not include numerous select private gardens where many treasures are nurtured and cultural lessons are learned and enthusiastically shared. Naturally visitors need to make an appointment.

So BPS folks please do come to the Pacific Northwest area. We will welcome you with a generous assortment of ferning opportunities as well as a wealth of varied garden experiences. □



# Living Walls

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Fig. 1. Two views of the Chiswick living wall of ferns

I could hardly believe my eyes. I was walking home along Chiswick High Road one evening and happened to glance up. To my astonishment I noticed that the upper storey of one of the shops was swathed in ferns! (Fig. 1) The ferns were densely planted, with just a light sprinkling of other plants, and it was difficult to identify them from street level. I assumed that they were growing hydroponically, but this turned out not to be so. Eco shop staff put me in touch with their supplier, who gave me details of their living wall system.

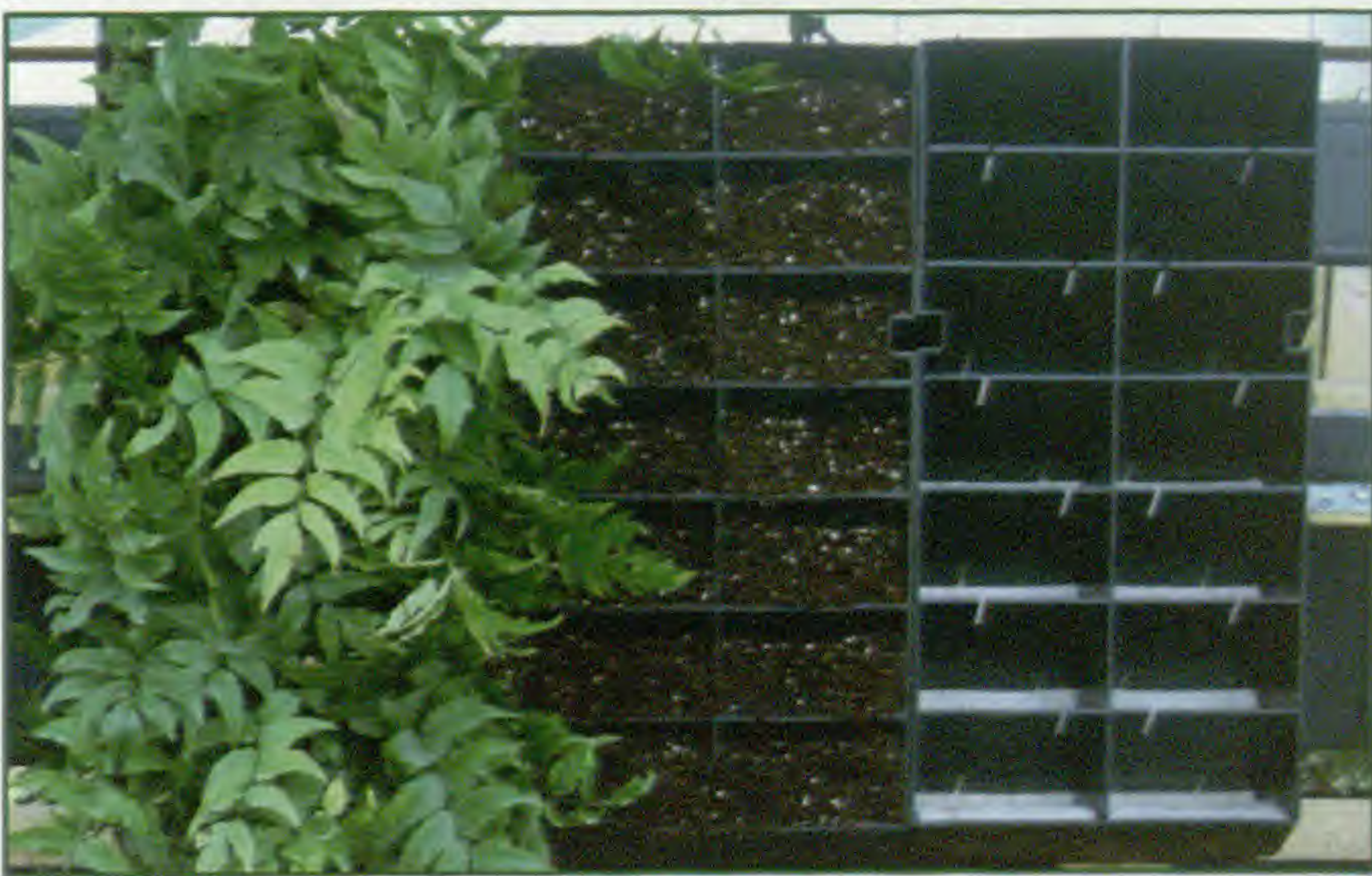


Fig. 2. Three living wall modules: empty cells lined with water retention fleece, cells filled with compost, and cells planted with *Cyrtomium fortunei*. (Photo: Aldingbourne Nurseries)

Aldingbourne Nurseries in West Sussex provide a modular system. Each living wall module comprises 14 cells set at a 30° angle, with one plant per cell. (Fig. 2) There are eight modules (thus 112 plants) per square metre. The plants are grown in 15cm of a peat-reduced mix, using wood fibre, coir and perlite, with a potash, phosphate, low nitrogen slow-release feed, which provides all the necessary nutrients. The pre-planted modules are then fixed to the walls. Irrigation is by means of an automatic system with an irrigation line along the tops of the modules; Chiswick Eco shop's system, unlike some, does not use rain water. Water retention is enhanced by the fleece lining of each cell.

The original Eco planting featured *Blechnum spicant*, *Asplenium scolopendrium* and *Polystichum setiferum*, though some of the ferns have now (sadly!) been replaced by flowering plants. Other ferns used by Aldingbourne Nurseries include *Asplenium trichomanes*, *Cyrtomium fortunei*, *Dryopteris affinis*, *Polypodium vulgare* and *Polystichum polyblepharum*. A wide variety of other plants can be used (including various shrubs) as seen in their living walls exhibited at Chelsea and Hampton Court RHS shows. (Fig. 3) They can be planted in creative mosaic patterns, to form bold vertical stripes (as in the permanent planting at the NEC Birmingham) or in plainer designs. The system is low maintenance and can be used indoors and outside and on different scales, from a single module on a garden wall to "the longest vertical planting in the world". The latter was installed by Aldingbourne at the new Westfield shopping centre in west London as part of the greening element required to help offset the environmental impact of the development. (Fig. 4) It comprises over 200,000 plants including some ferns: *Asplenium scolopendrium*, *Polypodium vulgare*, *Polystichum setiferum* and *Blechnum spicant*.



Fig. 3. A fern and ivy wall spotted at Chelsea (Photo: M.H. Rickard)





Fig. 4. Left: "the longest vertical planting in the world" at the new Westfield shopping centre in west London. Right: Detail of some of the ferns

Living walls can be used just to enhance the appearance of a building/wall but they also provide positive environmental benefits: insulation from heat, cold and noise, increasing biodiversity and improving air quality. For Eco, the living walls reflect their business of eco-consultancy and supplying eco-products.

Intrigued by the whole concept of living walls, similar to green roofs but with exciting design possibilities and, of course, different logistical issues, I did some web browsing and found that they have been around for many years and that there are other growing methods.

French botanist Patrick Blanc developed a different system for his Vertical Garden (Le Mur Végétal). It is based on his field observations, in tropical and temperate habitats, that many species grow without soil, either epiphytically or on rocks, often on vertical surfaces. The lightweight system comprises a layer of polyamide felt stapled to a one centimetre thick PVC sheet that is riveted to a metal frame. Seeds, cuttings or established plants are set into the felt, about thirty plants per square metre. Capillary action ensures even

distribution throughout the rot-proof felt of the nutrient solution, which is automatically supplied at the top of the system. Plants are selected according to their natural capacity to grow in this type of environment and also taking into account the light levels of the particular site. Blanc's first green wall was created in 1988 in Paris and he now has major installations around the world, including at The Athenaeum Hotel, Piccadilly. *Adiantum capillus-veneris* and *Cyrtomium macrophyllum* feature here along with species of *Begonia*, *Fuchsia*, *Impatiens*, *Rubus*, *Pilea* and numerous other genera.

How about creating your own living wall?! □

**Acknowledgement:**

Many thanks to Joel Nash of Aldingbourne Nurseries for supplying information on ANS Modular Living Walls.

**References:**

- [www.eltlivingwalls.com](http://www.eltlivingwalls.com)
- [www.livingwallsgreenroofs.co.uk](http://www.livingwallsgreenroofs.co.uk)
- [www.verticalgardenpatrickblanc.com](http://www.verticalgardenpatrickblanc.com)



Heather McHaffie spotted this 'living roof' on a building in Sutherland. No need for expensive modular systems here. The fern is *Polypodium vulgare*. The weight of all that material on the roof is quite impressive and I am surprised that the structure is still standing! I wonder which was the first colony - the top of the wall or the roof? AEG.

Photo H.McHaffie January 2010



# Fern diversity in French Guiana

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French Guiana is a small part of Northern South America and is one of three countries, the Guianas, belonging to the Guiana Shield (red line here below), a 2000 million year old geological craton. From East to West, these 3 countries are French Guiana (or "Guyane" in French), Suriname (previously Dutch Guiana) and Guyana (previously British Guiana)



Although located close to the equator, between 2° and 5° N, French Guiana is also politically a part of France, being an overseas French department. About 90% of its 84,000 sq.km surface is covered by dense primary rainforest. The remaining ten percent, along the Atlantic coast in the northern part of the country, consists of savannahs, mangroves, marshes and low forests.

French Guiana is bordered by Brazil to the East and the South and by Suriname to the West. The capital, Cayenne, has about 50,000 inhabitants, the whole country has about 200,000 inhabitants, mostly concentrated along the Atlantic coast, and the two border rivers, the Maroni river to the West and the Oyapock river to the East.

The area is sometimes called a "plateau", however the relief is quite rough in detail with many hills, between 10 to 200 m high, cut by an infinite number of rivers (locally named "creeks"), all going to the Atlantic Ocean not to the Amazon basin. There are several mountainous areas, corresponding either to flat plateaus made of Tertiary lateritic duricrusts, or to emerging granitic plutons called "inselbergs" which occur mostly in the southwest of the country. The highest peaks, in the central south of French Guiana, are the Sommet Tabulaire (Table Mountain) and the Inini's Bellevue Mts, both reaching 860 m elevation. The other main mountainous areas are the Kaw Mountain, the Tortue, Balenfois, La Trinité, Lucifer, Dékou-Dékou Mts in the north, and Atachi Bakka Mts., Belvédère Mts, Emerillon Massif, Bakra Mts, St-Marcel Mt and Tumuc-Humac massif in the south.

Protected areas consist of a National Park (southern half of the country) and several Natural Reserves such as la Trinité or les Nouragues.

Due to the lack of roads and forestry tracks in well preserved forest, access to the interior is not easy and is easiest by canoe along the main rivers and creeks (or possibly by helicopter).

Rainfall varies, 4,000 mm annual average in the northeast on Kaw Mountain, decreasing to 2,500 mm in the west and the south. Locally, in some years Eastern French Guiana could have a maximum of 6,000 mm.



*Hemidictyum marginatum*, with its 2.5 m long fronds, in the Dekou-Dekou massif

The rainy season extends from mid-November to end of August, with a little period of better weather in March. The dry season is mainly in September-October. The months of highest rainfall are January and May which can receive between 900-1,000 mm, on the coast.

Temperatures are constant all year long, with 30°C on average, during the day, and about 20°C at night. During the rainy season, the temperature is around 28°C, whereas it can reach 35°C during the dry season. The high humidity and temperature are obviously good factors for the profusion of vegetation and ferns.



*Tectaria*, *Bolbitis*, *Diplazium*, *Polybotrya* and *Thelypteris* along creek at Paul-Isnard area

However, unlike the true tropical regions where ferns are omnipresent, in this part of the world ferns are more difficult to observe. It is only in the deep forest and along creeks that the strong biodiversity which characterizes the equatorial primary dense rainforest is apparent.

According to the new classification of ferns (Smith et al., 2006), the 3 Guianas have a total of about



## Fern diversity in French Guiana

640 lycophyte and fern taxa (species, subspecies, varieties, in 29 families and 100 genera), with about 570 for Guyana, 330 for Suriname and 340 for French Guiana. The richness of Guyana is explained by the high elevation (more than 2,700 m) of the Roraima Massif and its montane tropical rainforests. Suriname is still under-recorded and is very probably much richer than records show.



*Trichomanes trollii*, on the ground, with its erect fertile fronds and spreading sterile ones.  
Regina, eastern French Guiana.

In French Guiana, the best represented families are Hymenophyllaceae (34 species), Selaginellaceae (23 species), Lindsaeaceae (22 species), Thelypteridaceae (21 species), as well as *Adiantum* (25 species), *Asplenium* (20 species), *Elaphoglossum* (19 species) and *Cyathea* (11 species).

For the visitor arriving in French Guiana, the easiest accessible area is the coast with its savannahs and mangroves. The argilo-lateritic banks of the roads are covered by dense colonies of Gleicheniaceae (*Gleichenella pectinata*, *Dicranopteris flexuosa*, *Sticherus remotus*) and of *Lycopodiella cernua*. Edges of savannahs and low forests are the domain of several species of *Lindsaea* (*L. stricta*, *L. portoricensis*) and *Lygodium* (*L. venustum* and *L. volubile*), whereas, a group of several species occur in marshes (*Acrostichum aureum*, *A. danaeifolium*, *Azolla caroliniana*, *Blechnum serrulatum*, *Ceratopteris thalictroides*, *Salvinia auriculata*, *Thelypteris interrupta*,



Floating *Ceratopteris pteridoides*, surrounded by carpets of *Salvinia auriculata*, in ricefields, close to Mana.

*T. serrata*, etc...). *Ceratopteris pteridoides*, *Isoetes* sp., *Marsilea polycarpa* and *Ophioglossum nudicaule*, all protected since 2001, occur in very rare populations in temporary ponds or on the pond edges.



*Actinostachys pennula* (left) and *Schizaea incurvata* (right), on white sands of NW French Guiana (photo A. Bizot)

The northwestern part of French Guiana is covered by detrital white sands, on which grows a low forest where clearings are the habitats of Schizaeaceae (*Actinostachys pennula* and *Schizaea incurvata*).

The most exciting habitat is of course the dense primary rainforest. Anybody from temperate regions, coming into this forest, is astonished by the size of the trees with their wide buttresses and their straight trunks, and the abundant life on the top of the canopy. There are about 1500 species of trees here, they are covered by all sorts of vines, climbing, hanging, enrolling and full of epiphytes.... Noises, coming from many unseen animals such as birds, frogs, insects, monkeys, etc. are also, as usual, an impressive aspect of the rainforest.



*Cyathea microdonta*, along forestry tracks, Paul-Isnard region.

On the ground or along creeks in the lowland forest and in wet talwegs, many species are frequent: *Adiantum argutum*, *A. cajennense*, *A. glaucescens*, *A. leprieurii*, *A. pulverulentum*, *A. terminatum*, *Bolbitis semipinnatifida*, *Cyathea spectabilis*, *Cyathea surinamensis*, *Cyclodium inerme*, *C. meniscioides*, *Danaea simplicifolia*, *Lindsaea dubia*, *L. lancea*, *L. quadrangularis* subsp. *antillensis*, *Metaxya rostrata*,





Left: Lower face of *Adiantum glaucescens*, Paul-Isnard area  
 Right: Sori of *Metaxya rostrata*, St-Elie area

*Saccoloma inaequale*, *Selaginella parkeri*, *S. radiata*, *Tectaria trifoliata*, *Thelypteris abrupta*, *T. decussata*, *T. leprieurii*, *Trichomanes diversifrons*, *T. pedicellatum*, *T. pinnatum*, *Triplophyllum dicksonioides*, *T. hirsutum*, etc..

A few others appear at higher elevation, in more montane sectors, along deep gullies, close to waterfalls,



*Adiantum macrophyllum*, on creek banks, in the Dekou-Dekou Massif



*Bolbitis semipinnatifida*, erect fertile frond with the sporangia covering the abaxial side, and sterile fronds, Dekou-Dekou Massif

such as *Adiantum macrophyllum*, *Dennstaedtia obtusifolia*, *Didymoglossum membranaceum*, *Diplazium grandifolium*, *Hemidictyum marginatum*, *Pteris altissima*, *Polybotrya fractiserialis*, *Tectaria incisa*, *Vandenboschia radicans*, or the very rare *Lonchitis hirsuta*.

Epiphytic ferns are well represented: *Anetium citrifolium*, *Asplenium juglandifolium*, *A. salicifolium*, *A. serratum*, *Campyloneurum phyllitidis*, *Cochlidium linearifolium*, *Dicranoglossum desvauxii*, *Didymoglossum kapplerianum*, *Elaphoglossum*



Viviparous *Tectaria incisa*, at Paul-Isnard area



Fertile *Elaphoglossum flaccidum* at St-Elie



## Fern diversity in French Guiana

*flaccidum*, *E. luridum*, *E. pteropus*, *Hymenophyllum hirsutum*, *H. polyanthos*, *Microgramma lycopodioides*, *M. percussa*, *M. reptans*, *Niphidium crassifolium*, *Oleandra articulata*, *Pecluma pectinata*, *Polytaenium guayanense*, *Vittaria lineata*...



Hemiepiphytic *Trichomanes* [*Lacostea*] *tuerckheimii*, with leaves stuck to trunks, St-Elie area.

Hemiepiphytic ferns, such as *Lomagramma guianensis*, *Lomariopsis japurensis*, *L. prieuriana*, *Polybotrya caudata* or *P. osmundacea*..., are frequent in Guianese forests. Their vertical rhizomes, starting from the ground, climb along the trunks and develop fertile fronds at their top. Hemiepiphytic Hymenophyllaceae are well represented by the *Lacostea* subgenus, with *Trichomanes ankersii*, *T. pedicellatum* and the rarer *T. tuerckheimii*.

The more montane areas are covered by submontane rainforest where a few rare fern species occur such as *Asplenium feei*, *A. repandulum*, *Blechnum*



Epiphytic Grammitidaceae (*Terpsichore staheliana* and *Micropolypodium nanum*) and *Hymenophyllum polyanthos*, Dekou-Dekou Mt.

*polypodioides*, *Cyathea lasiosora*, *C. marginalis*, *Diplazium gracilescens*, *D. radicans*, *Elaphoglossum latifolium*, *Enterosora campbellii*, *Huperzia killipii*, *H. linifolia*, *Micropolypodium taenifolium*, *Serpocaulon caceresii*, *Terpsichore staheliana*, *T. taxifolia*...

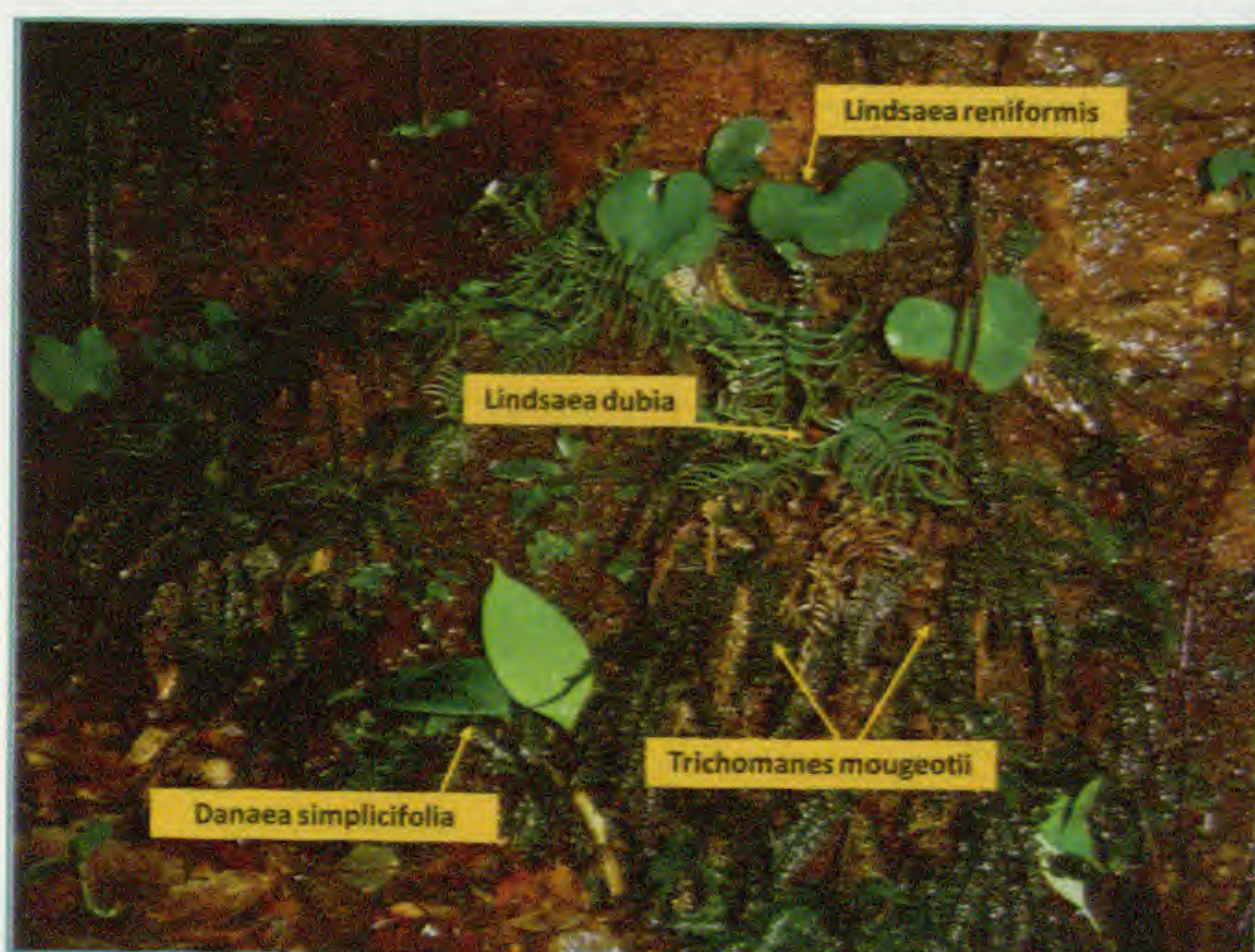
In the southwestern part of the country, naked granitic protrusions (inselbergs), emerge from the forest. These strange habitats host rare ferns such as *Anemia villosa*, *Asplenium formosum*, *A. zamiifolium*, *Doryopteris sagittifolia*, *Hemionitis palmata* and *Selaginella sandwithii*.



The endemic *Cyclodium rheophilum* in situ, at Mt St-Marcel, southern French Guiana (photo J.J. de Granville).

Ferns endemic to French Guiana are very few: *Adiantum krameri*, *Elaphoglossum cremersii*, growing in very remote areas, at high elevation, in submontane rainforests. *Cyclodium rheophilum* (in one locality only in the south of the country), *Danaea ushana* and *Selaginella falcata* occur all in lowland forest.

A few others, present in French Guiana, are endemic to the Guiana Shield, such as *Adiantum adiantoides*, *A. leprieurii*, *Cyathea oblonga*, *Danaea leprieurii*, the very small *Didymoglossum pinnatinervium*, *Elaphoglossum praetermissum*, *Lindsaea lancea* var. *submontana*, *Polytaenium jenmanii*, *Selaginella kochii*, *S. sandwithii*, *Thelypteris gonophora*, *T. holodictya*, *Trichomanes mougeotii*, as well as *Lindsaea reniformis*. *L. reniformis*



*Lindsaea reniformis*, *L. dubia*, *Trichomanes mougeotii* and *Danaea simplicifolia* on seeping conglomeratic outcrops, at Petite Montagne Tortue



is morphologically similar to the palaeotropical *Adiantum reniforme* and to *Cardiomanes reniforme* (= now *Hymenophyllum nephrophyllum*) from New Zealand.

After about 12 years spent in this wonderful forested country, and despite the real dangers of the Amazonian rainforest, I am always excited when going in the field. Any field trip can lead to a new discovery of new localities or, of species new to French Guiana or, much more exciting again, of species new to science.

Since 1990, more than 75 taxa, have been added to the fern flora of the Guianas. These have either been identified from old herbarium material, or correspond to redetermined material following recent revisions or descriptions of new taxa, or have been discovered in the field for the first time. Exciting the world of ferns, isn't it?

Thanks to my friends Arnaud Bizot and Jean-Jacques de Granville who have kindly provided a few of their images, as well as Georges Cremers and Alan R. Smith for their final checking. □

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## A Maderian Lady's Fern Paintings

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The close relationship between England and Madeira started way back in 1662 when Charles II married Portugal's Catherine of Braganza. The marriage dowry almost, but not quite, included the ceding of Madeira to England, but it did include other rights and privileges for the English in relation to Madeira, including important trading rights. Since then, British troops were garrisoned in Madeira to help defend against the French, with the inevitable result of some inter-breeding. The English have been heavily involved in the production and trading of the famous Madeiran wine, and many English families set up home on the island, perhaps the most famous being the Blandys.

It was against this background that a Mrs. Jane Wallas Penfold painted and had published an album of "Madeira Flowers, Fruits and Ferns" in 1845. The book consists of 20 plates, and in her preface Mrs. Penfold informs us that the book was produced "to gratify those visitors and residents who take an interest in its [Madeiran] productions". Five of the plates are ferns, about which Mrs Penfold goes on to say that "the difficulty of drawing Ferns so as to display their peculiar varieties of fructification with sufficient accuracy, has prevented my adding many of that interesting tribe; the few selected are, however, among the most important in the island. For the arrangement and description of these I am indebted to my kind friend Mr. Henry Webb" The brief descriptions accompanying the plates are in both Latin and English, "but for the local information appended to most pages a younger and less experienced writer must be held responsible, although fearful she possesses but an humble claim to the title of Botanist", such

mysterious modesty possibly hiding the identity of Mrs Penfold herself, or more probably that of her daughter – see below. Apparently nothing is known of Henry Webb, but the non-fern descriptions were written by the Rev. W. L. P. Garnons (1791-1863) then "of Sidney College, Cambridge". The Rev. R. T. Lowe (1802-1874) who wrote the (uncompleted) "Manual Flora of Madeira", 1857-1872, also assisted in the production of the book.

It was published by Lovell Augustus Reeve (1814-1865) under his then company name of Reeve Brothers (his company changed names frequently). Lovell Reeve published many natural history books, including some notable ones on ferns. In the early years, he also printed the books, as he did this one, typically with high quality hand-coloured lithograph plates. Reeve was also himself a naturalist, specialising in molluscs, about which he wrote over 100 books and papers. His lithographer for this book was "R. E. B.", beyond that we have no information.

As well as the 20 coloured plates, the book also contains two poems, typifying the romantic tone with which female authors of this period liked to endow their works. One is by Wordsworth, written two years before the book was published, and contains references to British plants not of course included in the book. Although Mrs. Penfold may not have known Wordsworth personally, it is thought that there could have been a Cumbrian family connection, but undoubtedly her request to Wordsworth was premature as the poem harmonises strangely with the rest of the book. Of the other poem, in her preface Mrs. Penfold states that "the other very appropriate and pretty verses, composed by Mrs. Calverley Bewicke,



## A Maderian Lady's Fern Paintings

will also greatly delight the lover of genuine poetry". Well maybe.

In 1988 the Madeira Botanic Garden published a folder with reproductions of four of the fern prints. I suspect the ferns were chosen as they are all native to Madeira, whilst most of the other plates in the book depict floral imports. The omission of the fifth fern (Plate 8, *Acrostichum squamosum*, now *Elaphoglossum semicylindricum*) is curious to say the least (see Fig. 1), but perhaps the publishers felt that its uniform appearance might deter intending purchasers. The published plates are finely reproduced from a copy of the book in the Casa Museu Frederico de Freitas in Funchal.

The folder "package" contains the following –

- The folder itself, which includes a list of the 10 Madeiran subscribers to the book (in total, the book had 58 subscribers).
- The original title page, together with reproductions of the two poems.
- Plate 4. *Nothochlæna marantæ* (now *Notholaena marantæ*).
- Plate 12. *Adiantum reniforme* and *A. capillus-veneris*.
- Plate 16. *Asplenium palmatum* (now *A. hemionitis*) – see Fig. 2.
- Plate 20. *Scolopendrium officinarum* (now *Asplenium scolopendrium*), *Polypodium vulgare* (actually *P. macaronesticum*), *Asplenium canariense* (now *A. aethiopicum*), and *Cheilanthes maderensis*.
- Card mounts - three loose and one fixed to the folder, ostensibly for use in framing the prints, but the card is a little thin.

Several BPS members visiting Madeira over the years have acquired these folders and mounted the fern prints. A couple of years ago Andrew Leonard alerted me to the fact that there was still a good stock left at the Gardens, and so I attempted with the approval of the Committee to acquire a few for BPS members to buy in this country. All my e-mails and letters to the Botanic Garden failed in this quest, but luckily Andrew again visited Madeira last December and acquired a small stock. These are now available from me "at cost" to members, £11 + p&p.

As will be apparent from the above notes, virtually nothing is known of Jane Wallas Penfold. It is reported that her family, probably her parents, acquired the Quinta da Achada (now a luxury hotel) on the outskirts of Funchal at the beginning of the 19<sup>th</sup> century, and it was sold by family descendants towards the end of that century, eventually to be acquired by the Blandys. There is one additional strange fact. She had a daughter, Mrs. Augusta J. Robley, who simultaneously in 1845 had published by Lovell Reeve a similar book entitled "Selection of Madeira Flowers". This folio work (Mrs. Penfold's was quarto) consisted of only 8 plates, none being ferns, and some were a little inferior in artistic ability to that of her mother. Both works appeared in Reeve's 1846 "List of Scientific Works published by Reeve Brothers" priced at one guinea each, but disappeared from later catalogues. As "vanity" productions, the print runs of these two books were probably low, perhaps only marginally exceeding subscriber numbers. To quote from a letter written in 1919 from A L Soper (then chairman of L. Reeve) to James Britten (of "European Ferns" fame), wherein it is surmised that "The works were offered publicly for a short time. The whole stock, after satisfying any public demand (which could not I think have been great) was sent to the authors". Now both books are very rare. □



Fig. 1. *Elaphoglossum semicylindricum*



Fig. 2. *Asplenium hemionitis*

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## Book Review

**The Victorian Fern Craze.** By Sarah Whittingham. 2009. 63 pp. Many illustrations, 56 in colour, 29 black and white. 21 x 15 cm. £5.99 from Shire Books. ISBN 978 0 74 780 746 9.

This is an attractive, well designed and produced publication which catalogues the rise of and effects of pteridomania in Britain during the 19<sup>th</sup>.century and provides easy reading and access for a non-specialist audience to a social phenomenon that lasted for 40 or so years.



### THE VICTORIAN FERN CRAZE

SARAH WHITTINGHAM

SHIRE  LIBRARY

It is packed with photographs of the physical manifestations of the fern craze, from postcards to pottery and sugar scuttles to stumperies which together, with the easy writing style, make it an attractive and enticing publication.

The format chronicles the collecting of ferns during the century; their cultivation and the development of the Wardian Case and the growth of public ferneries; followed by a chapter on the application of fern motifs in the decorative arts, and concluding with a small section on the end of the fern craze. I particularly liked the Places to Visit listings of essentially public gardens, where one can see ferns grown in all sorts of settings, restored Victorian ferneries, tree fern pits, and a Victorian ravine in Belfast Botanic Gardens. This is a very necessary adjunct to this type of book.

The text is essentially descriptive and clearly shows Sarah Whittingham's strengths as an architectural historian, particularly in Chapter 3 'Ferneries for All'.

If I were to be in any way critical of the publication I would have to temper my criticism with the knowledge that this is in a way a booklet rather than a book as it is only 62 pages long. It therefore cannot hope to cover the period in anything other than a cursory manner.

However, one of the most fascinating features of all

social phenomena is the context in which they happen. They do not just happen in isolation. There is cause and effect and this booklet deals primarily with the effect rather than the causes of pteridomania.

The spark of the fern craze was fanned by many social and cultural developments; the continuing growth of romanticism, the neo-gothic revival and all things medieval which encouraged a reflective mood. This was the background that is only briefly mentioned in the book as are the fascinating reasons why ferns therefore became so popular. Ferns suited exactly the mood of the times in that they could be described as melancholic and reflective as well as possessing a structural architecture which was an ideal source of motif for the decorative arts. Sunflowers would have been out of the question for such a purpose at the time!



An engraving of 1873 showing the Pulhamite fernery at Brighton Aquarium

Clearly a lot of research went into the production but surprisingly therefore, there are no References or Bibliography only a short reading list restricted to books in print. Hence previous scholarship on the Victorian Fern Craze, notably by David Elliston Allen (1969) incidentally only containing 72 pages, and Peter Boyd's 1993 paper, 'The Victorians, a Passion for Ferns' are omitted.

Does this book tell us anything new about the Victorian fern craze that we did not know before? No it doesn't - but its strength is in telling the uninitiated about a horticultural aberration in a manner and style which is informative without being didactic. If it introduces people to ferns and their unique qualities which I am sure it will, than it surely has a place in the literature of ferns

As John Ruskin, the great moralizer of the Victorian period once remarked, 'Quality is never an accident. It is always the result of intelligent effort'

Such is this small publication. □

**Jim Dennison**





## Digital *Dryopteris*: A new approach to fern illustration

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For several years Niki Simpson, who is an established botanical illustrator in watercolour, has been developing an equivalent photography-based technique. The objective is to produce, primarily by photography, the equivalent of traditional complex and accurately detailed botanical illustrations. Her work has already been exhibited in Berlin (Simpson, 2007), Edinburgh and Kew botanical gardens and most recently at RHS Hyde Hall Garden in Essex. To date, most of her work has dealt with flowering plants, apart from one of the field horsetail, *Equisetum arvense* and one of the fly agaric, *Amanita muscaria*. Therefore, we considered it to be high time to apply it to a fern.

Broad buckler fern, *Dryopteris dilatata*, is common throughout the British Isles, most of Europe and temperate Asia east to Japan. Precisely because it is so familiar, it is an excellent example to showcase this innovative illustration technique.

The procedure is described in detail elsewhere (Simpson & Barnes, 2008). Briefly, it involves taking a large number of digital photographs, and sometimes photomicrographs, to illustrate the various plant parts. The scale for each is recorded. This photography requires considerable forward-planning, and will often require to be carried out over an extended period, to show different seasonal features in a comprehensive illustration. A substantial and useful portfolio of photographs is thus built up, from which the most suitable are selected and their backgrounds removed using appropriate software. The individual component images are then assembled into a composite illustration (fig. 1), in much the same way that a watercolour artist might include various separate items in a single painting. At present, the composites are produced for output at A3 size, although they can obviously be reduced or enlarged as necessary.

Contrary to what might be expected, we do not use very "high-end" equipment, just good digital single-lens reflex cameras with, between us, an assortment of lenses, tripods, and a home-made macro stand based on an old enlarger base. As for our 'studios', one is a kitchen, the other a garden office. Most of the planning, photography and all of the arrangement and compositing is by Niki, with Peter helping out with some of the more extreme close-up and microscope images, as well as handling botanical queries.

The compositing technique allows a good deal of extra information to be included, as required; for example, a scale and a date for each photographic element, to convey the progression through time. Having each element in the illustration separately scaled allows for including even large items like an entire frond and stipe within the same composite as microscopic details.

There is also an information panel including a timeline, colour patches (Simpson 2009) referring to the RHS Colour Chart (RHS, 2007), and a series of annotated

symbols (Simpson 2010) indicating concisely various aspects not apparent from an illustration, such as conservation status, habitat information, and properties such as perennation, toxicity or fragrance. In the fern plate, for this publication, the 'information' symbol has been used for details of provenance but, if appropriate, it might include other information such as 'vascular bundles variable, (3-) 4 (-7)'.  
TENSURE  
URC

There are both advantages and disadvantages to the technique. On the down side, it can take many hours of work to acquire suitable material, obtain high quality images, process them, and assemble into an attractive yet accurate composition. Much the same applies to water-colour illustration, too, of course.

These factors are more than balanced by the accuracy of detail and colour that can be achieved. A further substantial advantage of this technique is that the separate images within a composite can readily be rearranged to suit, say, different page formats, or for on-screen use with a computer. Individual images may just as easily be added or replaced should new or better material become available; and the composites can be tailored to various end-uses, for example, for primary school educational use, for scientific monographs, for purely decorative purposes, and so on. Similarly, the individual component images may lend themselves to further use in other illustrations. We see this flexibility as a major benefit of the procedure.

In the longer term, one aim is to use these composite illustrations on computers, with appropriate software. When viewed on a computer screen, the composites are displayed much larger than when printed. This is because they are produced to be printed at A3 size, at 300 dots per inch resolution. Computer screens vary from 72 to 90 dots per inch; hence the image is displayed about 4 times larger than on paper. The resolution of the original photographs thus allows for considerable local magnification on screen, using a "zoom" facility.

We have found it perfectly practicable to collaborate on illustrations using the same material, although we live over 200 miles apart. Plant material and images can readily be interchanged, the latter almost instantly by email; queries can be discussed and resolved, and material checked and verified.

Importantly, we have repeatedly found that working at this level of detail leads to an intimate and critical appreciation of the plant involved. In the case of the broad buckler fern, for example, we noted that the developing crozier is initially somewhat flattened, but becomes almost globose as the pinnae begin to expand before opening out fully; that the young fronds are quite different in colour to the mature fronds in mid-summer; and that the presence of glandular hairs on the indusium, and on the frond itself, is perhaps more variable than indicated in many reference works.

Comparison with other fern images is inevitable

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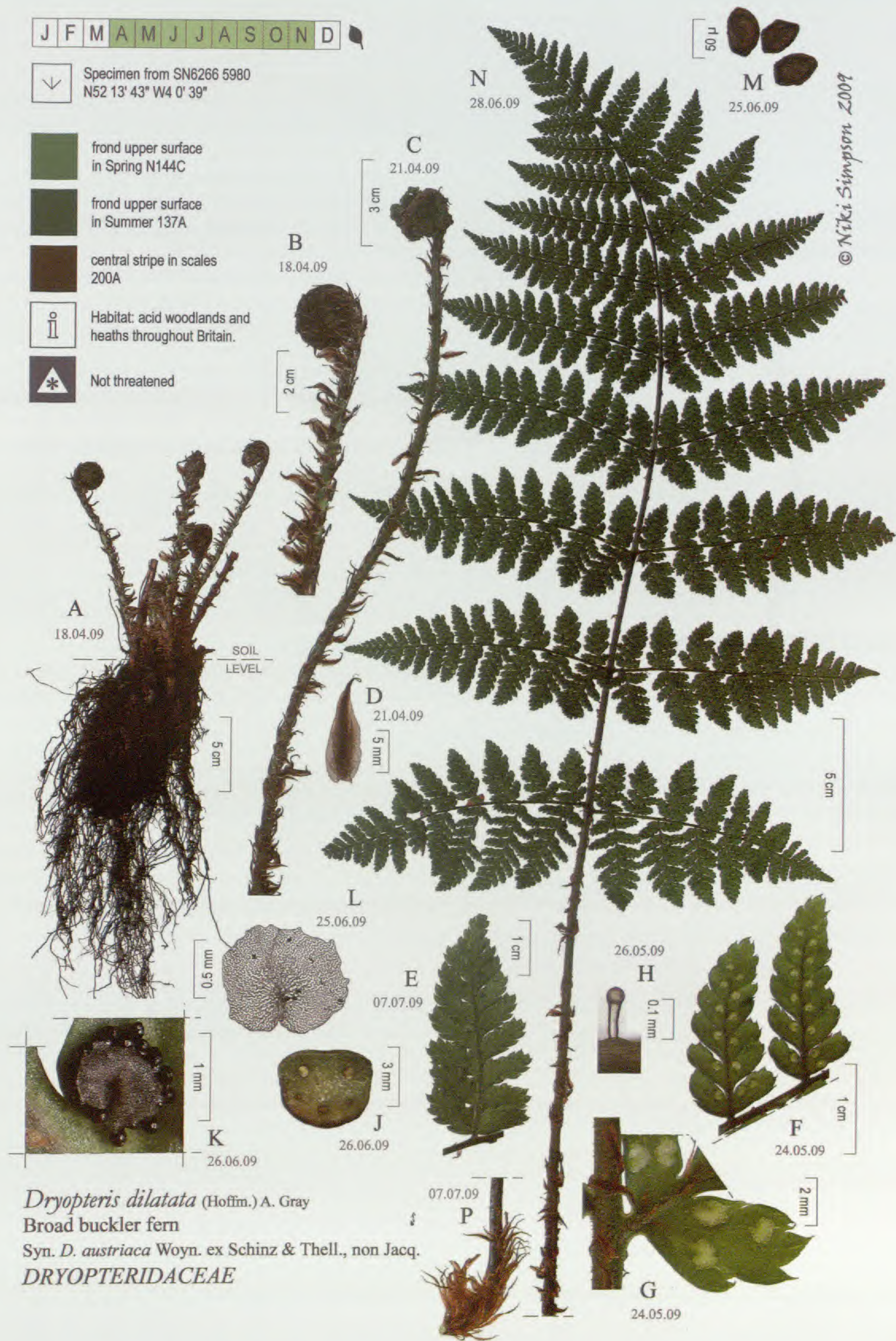


Fig.1. The composite illustration after assembly of the individual component images





Fig.2. The *Dryopteris dilatata* plate from the octavo edition of Moore's Nature Printed British Ferns.



## Digital *Dryopteris*: a new approach to fern illustration

and, we believe, these photographic composites bear the comparison well. Fig. 2 reproduces the *Dryopteris dilatata* plate from the octavo edition of *Moore's Nature Printed British Ferns*. In general, each composite includes much more detail and more stages than conventional illustrations, be they photographic, watercolour, or from the classic fern books. These photographic composite illustrations are far more than a quick snapshot, and appear to have great potential in instances where a truly detailed and accurate record of a plant is required. The ease with which the component images can be rearranged greatly enhances the versatility of this illustration technique.

As for the future, there is scope for further development, especially for exploiting these complex and versatile illustrations online. Already, trial versions of the computer-based "virtual book" type have been exhibited. Up to now, efforts have been concentrated on applying the technique to as wide a range of plant types as possible. It is easy to see the possibilities for illustrating specific sets of plants: dye or fibre-producing plants, for example, or sets of closely related and difficult to identify taxa – the *Dryopteris affinis* aggregate, perhaps, if its taxonomy ever settles down!

□

### Acknowledgements:

Many thanks to Graham Ackers for his enthusiastic encouragement to "do a fern" for the *Pteridologist*.

We would also like to acknowledge the *Queen Elizabeth Scholarship Trust* for funding training for Niki's original 2003-2004 experimental digital botanical art project, without which this work would not have been developed.

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## Don't throw that stump away!

After the harsh winter we have suffered here in the UK I thought there might be a few dead tree ferns about. The stumps are useful for epiphytic ferns but perhaps readers might be inspired by these images.

Both these photographs were taken on South Island, New Zealand. On the right we have a Mauri carving seen in the garden of a youth hostel at Picton. It stood about 1 metre high. Below is a bell seen in the grounds of a B. & B. north of Franz Joseph. This bell is about 50cms in diameter at its widest point and in the words of the owner 'What a Ponga!'

A.E.G..





# A Northamptonshire Fern.

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Twenty five years ago, Richard Lamb reported finding the maidenhair fern, *Adiantum capillus-veneris*, on a disused railway bridge in Daventry, Northamptonshire.

After some correspondence with me about his find, Richard reported it in the 1984 BPS *Pteridologist*. In the 2009 BPS *Pteridologist*, one of the editors of the journal, Alec Greening, mentioned this find and queried if it was still there. Fortunately, in Richard's report, he gave an OS six figure grid reference number for the location of his find. This has enabled me to visit Daventry and see if the bridge and its celebrated plant is still there.

I am pleased to report that during the first week of December 2009, I found the bridge and I was thrilled to find that the fern is still there. The arch of the bridge has been removed and replaced by a foot bridge to enable walkers to stroll along the old rail line towards the Daventry Country Park.



The disused railway bridge at Daventry with the site of the main clump of *Adiantum capillus-veneris* marked

I found the fern still growing on the mortar of the right hand buttress, surprisingly on the sunny aspect. There have been many changes in the Daventry area during the last twenty five years. New dual carriageway roads, industrial estates and a housing estate are close to the bridge. After re-discovering the maidenhair fern, I re-read Richard Lamb's article in the *Pteridologist*. He describes his find as being on the north-east side of the bridge. This did not tally with what I found on my first visit. I returned to the bridge to make more detailed observations and to take photographs. The bridge does indeed have a north-east side; its aspect is 060 deg. mag. The other side of the bridge (its back bearing) is 240 deg. mag. This is the side where I found the fern, hence my sunny comment. There are no ferns on the north-east side of the bridge which implies that at sometime in the last 25 years, the maidenhair has

migrated from one side of the bridge to the other.

The current situation shows the main clump of the fern is growing some 4 metres (14ft approx) above the road level but about half a metre or so below it, there are several smaller plants embedded in the mortar. Evidence that the fern is re-colonising the wall from time to time. I find it extremely gratifying that in spite of man's interference and the vagaries of the British weather, this thriving clump of *Adiantum capillus-veneris* continues to flourish in Daventry, long may it continue to do so. □



Close-up of the main clump basking in sunlight.

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## FOOTNOTE

We know little about the dynamics of ferns on walls. We find them, admire them, make notes in our field note books or put ticks on our field recording cards. We may even take a photograph but then we move on without further thought on how the fern got there or consider whether the colony is increasing or decreasing. You do not have to be a fern expert to be able to add to our understanding of the ecology of ferns on walls and there is an abundance of walls in any city, town or village.



# A day in the Lake District with Derek Ratcliffe

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I first met up with Dr. Derek Ratcliffe (Fig.1) in North Yorkshire during our days of military service in the early 1950s. Although just out of university, he was already an accomplished all-round naturalist, which included a keen interest in our native ferns. Indeed, Derek could be quite obsessive when it came to seeking out old and new localities for two of the country's rarest species – Oblong Woodsia *Woodsia ilvensis* and Killarney Fern *Trichomanes speciosum*. A flavour of this life-long quest is to be found in his autobiography *In Search of Nature* (2000), an inspirational book for all plant hunters.

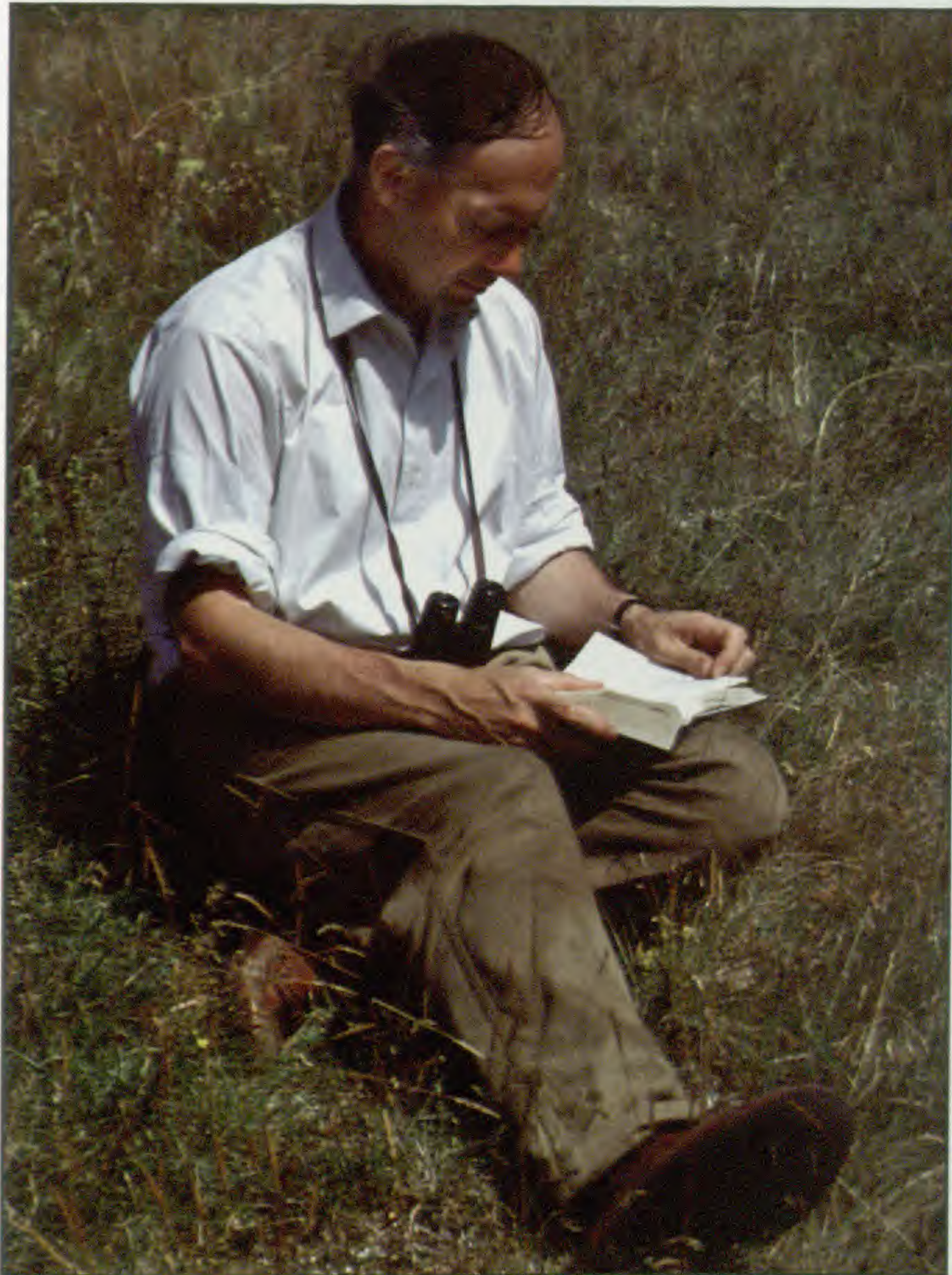


Fig. 1. Only the most dedicated botanist such as Derek Ratcliffe would carry around the weighty Clapham, Tutin and Warburgh flora in the rucksack.

In August 1977 I was invited to accompany him on one of his periodic monitoring visits to the Lake District, single localities for both the Woodsia and Trichomanes having been discovered very early on in the course of his botanical exploration of the region. In his determination to reinstate some of the 'lost' flowers and ferns of Lakeland, Derek acquired quite a reputation for his ability to free-climb into hazardous places, so I knew what I could be letting myself in for. The opening scramble up the Woodsia gully was easy enough, but as the ascent continued the rocks became progressively more friable and the scree dangerously loose underfoot. How we would get back down again I tried to put out of my mind. So it was with some relief on my part when we finally reached our goal. Although the largest group of *Woodsia ilvensis* plants at the site had waxed and waned during Derek's long period of observation,

compared with the scrappy individuals I had previously seen in North Wales and Southern Scotland, the ones here were positively luxurious (Fig.2). An added bonus was the nearby presence of the Forked Spleenwort *Asplenium septentrionale*, a species new to me.



Fig. 2. *Woodsia ilvensis*. Lake District.

Having safely made our way down to ground level, lunch was followed by a trek to a distant waterfall, just one of many that Derek had checked over for Trichomanes before he finally found his prize. To be able to examine the small colony tucked away in a recess at the back of the falls, there was nothing for it but to strip-off down to my boots, protecting the precious camera under a plastic rain coat. Despite being the height of summer, the water cascading off the high fells was numbingly cold. I regret to say that in the poor light and constant spray behind the veil of water, the photographs taken of the fern proved disappointing. I have therefore substituted a close-up of a single frond (Fig.3) taken at another of Derek's Trichomanes sites, a fine colony which he and two Nature Conservancy colleagues later found in a remote area of Mainland Argyll.

Sadly, Derek is no longer with us, having died suddenly on 23rd May 2005 while en route for his annual jaunt to Scandinavia. He is greatly missed by all those who knew him and had the privilege of sharing his company and botanical expertise in the field. Under Derek's guidance the challenge of seeing at first hand Lakeland's two blue riband ferns was an experience that I am unlikely to forget. □



Fig. 3. *Trichomanes speciosum*. Mainland Argyll.



# Reflections on a Disaster

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I have been living and gardening in West Cornwall for over 20 years now. At the most south-westerly tip of England we enjoy the moderating effects of the Gulf Stream and generally moist maritime conditions. There seemed to be a calling to grow less usual, more tender plants, and particularly ferns, in such benign conditions.

All was going quite well until an icy confluence of events in January 2009 brought a sharp reality check. A collective failure of the weather systems to suppress a ridge of continental high pressure allowed into south west Cornwall a chilling run of sub zero days. It was the nights of course that did the damage,  $-11^{\circ}\text{C}$  recorded in Truro and Porthleven. There had been a run of exceptionally mild almost frost free winters so this came as something of a shock. My neighbour – a flower farmer – said it was the coldest he had experienced since 1963

My own garden only dipped to  $-7^{\circ}\text{C}$  in places. As ever there seemed a good deal of variation in the frost penetration depending on overhead cover, aspect, cold air drainage and such like. On the open terraces the succulents were quickly a blackened carnage, especially amongst the aconitums. A greater grim toll took a while to evolve with woody plants succumbing to "frost crack", a bark defect caused by a combination of low temperatures and heat from the winter sun.

Amidst this the ferns had largely been hunkering down in the woodland. A casual stroll amongst the tree ferns straightaway revealed widespread defoliation. *Dicksonia antarctica* perhaps browned at the edges but largely intact crowns. The joy of a high beech canopy brings protection from radiation frost but also the autumn leaf fall provides protection to the crown. Whilst established larger specimens seem bombproof in southern English counties and the like, smaller plants remain very vulnerable to cold until they start to trunk. *D. fibrosa* was untouched and perhaps more surprisingly so too was *D. sellowiana*. The latter remained fresh and almost seemed to relish the super cold conditions with bright green fronds providing a pleasing contrast to the yellow stipe hairs. Found over a wide range of South America, hardiness may depend to some extent on exact provenance.

*Dicksonia squarrosa* however almost immediately dropped its crown. Gradually most have recovered – either as a suckering plant having abandoned its trunk or with re-growth of the crown. Always an elegant tree fern the slender trunk and luxuriant fronds demand a planting spot with generous access to moisture. Unlike cyatheas and indeed most ground ferns, dicksonias seem happy planted in constant water.



Fig. 1. A happy *Dicksonia squarrosa*

Left-field experiments with newer cyatheas were quickly exposed as folly. The beautiful and distinctive *Cyathea tomentosissima* quickly succumbed.



Fig. 2. *Cyathea tomentosissima*



## Reflections on a Disaster

Foolish of me as it wouldn't have been much trouble to offer protection for what was a fairly compact plant. Hailing from montane Papua New Guinea where heavy frost can occur I am sure this plant is worth trying again.

What came to me as *Cyathea milnei*, *C.robusta*, *C.atrox*, *C. spinulosa* and *C. aramaganensis* didn't survive their first winter in Cornwall, however some weren't terribly big plants.

Sadly the terribly pretty *C. cunninghamii* growing in near perfect conditions quickly succumbed with no suggestion of a struggle.



Fig. 3. *Cyathea cunninghamii* which did not survive the winter freeze

More mainstream tree ferns, *C.smithii*, *C.medullaris*, *C. dealbata*, *C. australis* and *C.cooperi*, all came back strongly. Astonishingly a tiny *C.brownii* pluckily came through as little more than a sporeling. At a pinch one might think that *C. dealbata*



Fig. 4. *Cyathea medullaris*, showing luxuriant re-growth

performed best, barely breaking stride through it all. Interesting to note that, with *C.medullaris*, the trunk seemed to keep growing even when all top foliage was gone. Current experiments with *C.lepifera* and *C. spinulosa* continue with limited confidence.

Other related plants also had mixed outcomes. Trunked *Blechnum tabulare* all dropped their crown but within 3-4 months had returned to their status quo. *B.novae-zealandiae* was tarnished at the edges and didn't have a spring flush, presumably emerging new fronds being nipped. Right alongside *B.magellanicum* was unmarked and bulks up in a most satisfactory fashion. *B. brasiliense* quietly disappeared without trace but *B. discolor* and *B.fluviatile* were fine.



Fig. 5. A bulky *Todea barbara* enjoying woodland conditions

*Todea barbara* had peripheral marking but has since fully recovered.

The magnificent *Lophosoria quadripinnata* seemed, if anything, improved by the cold spell-beautiful flush of light bronze new growth coming soon after the cold spell. With the lacey foliage of older fronds, startlingly pale undersides, elegant habit and clearly robust intentions to achieve a stately size, these ferns have a lot going for them. Hard to believe they remain so rare in Europe when they grow wild along roadsides by the acre in South America. Driving out of Xalapa in particular in southern Mexico one sees great swathes of lophosoria tumbling down banks, now there's a planting scheme! *Woodwardia radicans* behaved as a returning perennial and indeed has now returned to its marauding all-smothering growth habit. *W. unigemmata* seems a little hardier. I have two forms, regular and



## Reflections on a Disaster

"Undulate". The latter given to me by the late great Edward Needham and said to be of Taiwanese origin, however there remains a degree of uncertainty about this and indeed a renaming to *W. biserrata* has even been proposed. I care little about such things when the plants themselves provide such a spectacle with orange /pink cascades in the spring and offer up new bulbils with regular generosity.

Some wilder experiments with *Angiopteris evecta* and *Marattia salicina* have been outed as foolish and misguided but only after a few years of quiet enjoyment.

Out on the sunny slopes there are a range of xerics, including *Cheilanthes tomentosa*, *Cheilanthes eatonii* and *Astrolepis sinuata* continuing their beguiling ways unbothered by any cold weather. I have seen these, and their allies in Mexico, as half dead looking scruffs of plants clinging on along sun baked slopes, or a little more luxuriantly in loose stony hillsides high up on Tenerife. There is something counter-intuitive of course that these ferns abhor moisture so rigorously. They seem most happy with their roots tucked carefully under a rock and their neat understated foliage enjoying the light. Perfect companions for any alpine garden one might think.

Filmy ferns *Leptopteris superba* and *L. hymenophylloides* were fine protected in a shady grotto and possibly by some of the geothermal effects of a spring fed stream.

Of interest perhaps are the occasional bed fellows of our beloved tree ferns -the shade requiring palms. A large and vigorous *Rhopalostylis sapida* succumbed but all smaller plants now re-growing strongly, yes I don't quite understand either.

In contrast the rare and pernickety *Jaunia australis* showed in Fig.7 carried on its elegant progress

*Chamaedorea microspadix* and perhaps more surprisingly *C. elegans* were fine.

I doubt if *C. metallica* would have coped well. I cannot report on these, however, because they were stolen earlier in the year!

A disaster? I don't think so.

It's a bitter sweet game growing untried and doubtfully enduring plants-but it is also endlessly absorbing and exciting. Maybe it is good to be reminded that the plants know where they are from and what they will put up with, and not us.

However, despite our good intentions, the unlikely triumphs and recoveries against all odds seduce us back once again. □

My garden is viewable on [www.tremenheere.co.uk](http://www.tremenheere.co.uk).



Fig. 6. A doomed nikau palm (*Rhopalostylis sapida*) just before the cold weather.



Fig. 7. *Jaunia australis*



Fig. 8. *Colocasia esculenta* "Fontanesii" provides a broad-leafed dramatic contrast to ferns and more upright growers



## Footnote on "Reflections on a Disaster"

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Last winter I was not paying attention and found myself completely unprepared for the unusually cold weather here in Cornwall. Unfortunately none of my tree ferns were protected. Everywhere in my woodland was crunchy underfoot. The max/min thermometer said  $-3^{\circ}\text{C}$ . Day after day I found the bird baths frozen solid.

My four trunked specimen's of *Cyathea medullaris* are usually in growth all year round here, but last winter they lost all of their fronds, their unfurling crosiers, and the ones on top of their crowns, all rotted. Thankfully they have survived this, without any help from me, and have sent up new fronds, albeit, only half the size of the previous year's.

Growing in a very sheltered position, a tiny *Dicksonia youngiae* was apparently unscathed. *D. berteriana* came through, but has sulked for the rest of the year. In a slightly more open spot *Cyathea dregei* seemed quite happy. I have had mixed results with *Dicksonia squarrosa*, while *Cyathea dealbata* has been very slow to recover, only growing two fronds this year.

I am very impressed with *C. smithii*, which also completely defoliated and looked a sorry sight, but in the spring, sent up a beautiful new flush of fronds, no problem. *C. cunninghamii* and *C. tomentosissima*, on the other hand, are dead, along with numerous, small, spore raised plants. Interestingly, one small *C. medullaris* sporeling survived, it had become mulched over with pine needles, making me wish I had taken the trouble to place a few handfuls over the others! □



Fig. 1. Left: *Cyathea medullaris*.  
Centre: *C. cunninghamii*. Right: *C. smithii*. 7th Aug 2009



Fig. 2. Left: *Cyathea medullaris*. Centre: *C. medullaris*. Behind: *C. cunninghamii*.  
Right: *C. smithii*. 16th Jan 2009

(Sheila Tiffin lives about 20 miles 'up country' from Neil Armstrong She wrote an earlier account of her overwintering experiences in the *Pteridologist*, Vol.4, Part 5, 2006, pp. 147 - 148. This includes a picture of the *Cyathea cunninghamii* in happier times. Ed.)



# Messrs. W & J Birkenhead: Ferns a Speciality.

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Those of you that collect Victorian fern books will know of the little edition *Ferns and Fern Culture* by John Birkenhead F.R.H.S who along with his brother William, between around 1868 and 1908, ran the largest fern nursery in Britain, if not the world, but more of that later. This was my first second-hand fern book, originally priced at one shilling, which I picked up around 100 years later for 75p!



Fig. 1. The 3 editions of 'Ferns and Fern Culture'

The book ran to 3 editions: the first, bound in dark green with a black embossed *Adiantum* fern and gilt engraved writing, was published in 1892 by W & J Birkenhead and John Heywood of Manchester. A review in one of the leading horticultural publications of the day *The Gardener's Chronicle* (1892) rather charmingly described it as 'a book that no amateur can well dispense with'. The second edition published in 1897 had at least 2 print runs, one bound in pale blue and one in grey, this time with what looks like a *Pityrogramma* on the cover. This edition is more or less the same but has more hints on fern culture, an additional page on the treatment of dried ferns for decorative purposes and a list of common names of ferns which seem to have remained more consistent than their scientific names! Another review appeared in *The Gardener's Chronicle* (1897) 'We cordially recommend this little book to the notice of those who are beginning the culture of ferns'. The third edition with light grey cover and different type face has a fine *Platycerium* embossed on the front cover. This edition, published around 1911, is missing many of the woodcuts replaced by black and white photos. It is revised by F. Parsons and published by H.B. May & Sons of Edmonton and W.H. & L. Collinridge of London who bought out the edition. Surprisingly, after almost 20 years of publication, the book still cost ONE SHILLING. To my mind, apart from the cover, by this time the book had lost its charm but clearly ferns were still being widely grown in 1911. In the preface by the new publishers they write 'Probably no natural order of plants attract more attention than Ferns, and it is gratifying to know they were never so popular as at the present day; they appeal to all classes of cultivators, either in the Stove,

Green House, Cool House, or outdoor Fernery, and with little care and attention, the greatest beauty may be obtained all year round'. How true!

Another really charming aspect of these books, apart from the covers, the woodcuts, the cultural hints, the descriptions of ferns, the enthusiast prose and not forgetting the price, are the adverts for products which could be purchased at Birkenhead's nursery. Some of my favourites which appeared in the early books are: Birkenhead's Beetle Traps reputed to have caught 2,000 cockroaches in one night. 'Jadoo' a new potting medium simply invaluable in fern culture; Pure Ichthemic Guano the most reliable, richest and most natural fertiliser in the world; London Beetle and Woodlice Extermination Powder made in Strangeways, Manchester and charmingly illustrated high class tools for farm, field and garden made in Sheffield.



Fig. 2. Product adverts from 'Ferns and Fern Culture'

Birkenhead's sold everything you would need for fern culture including books; fern book lovers eat your heart out: *British Ferns and their varieties* by E.J. Lowe. Copiously illustrated, only 1s. or 1s.2d. by post; *The Fern Garden: how to make, keep and enjoy it; fern culture made easy* by Shirley Hibberd price £3.9d post free or if you are feeling really rich how about *Filices Exoticae* by Sir W.J. Hooker, FRS. 100 coloured plates. £6.11s. or £6.12.6d. by post.

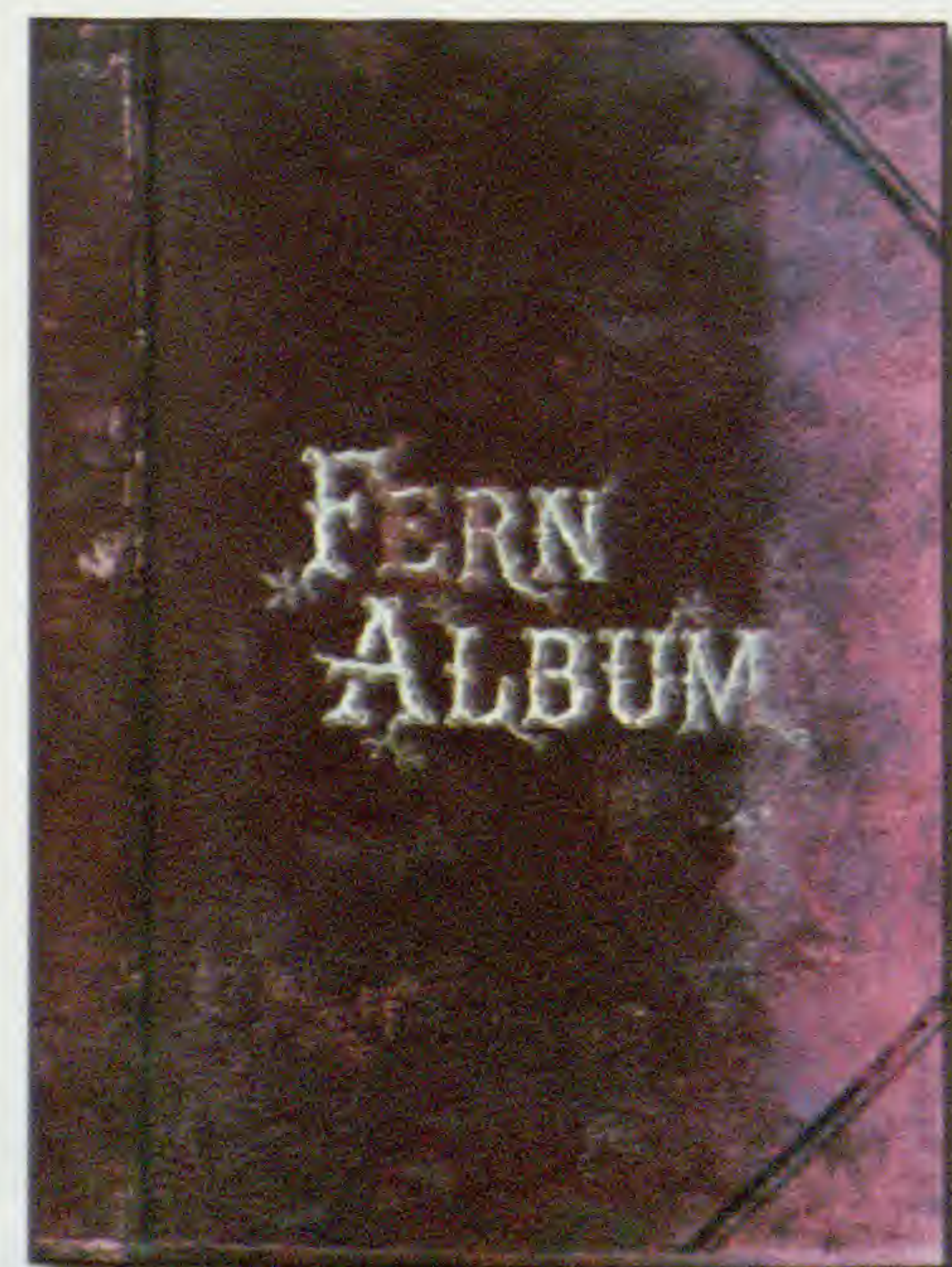


Fig. 3. Fern Album produced by the Birkenheads



## Messrs. W & J Birkenhead: Ferns a Speciality

The Birkenheads produced Fern Albums bound in cloth with 50 or more pages of pressed herbarium specimens which had been grown at their nursery. These were luxury items with hand written contents pages and costing upwards of 15 s. Two surviving volumes, undated but most likely pre 1892, are held by Ulster Museum at the Botanic Gardens Belfast. Both volumes contain 63 different species and varieties so each album produced was probably unique. Another Birkenhead album, containing 52 specimens, is described in Hall and Rickard (2006) as being around 1888. No doubt the owners were induced to purchase some of the more exotic ferns and selaginellas displayed on the pages of these albums. Herbarium specimens donated by Messrs Birkenhead can also be found in the Leo Grindon Cultivar Collection held at Manchester Museum. So far I've found 20 specimens but I have many more boxes to get through.



Fig. 4. Herbarium specimen of *Trichomanes scandens* donated by Messrs Birkenhead, held at Manchester Museum

Amongst the charming adverts at the back of John Birkenhead's book is a small box which says the following: "IF YOU WANT TO HAVE A CHOICE, VARIED AND BEAUTIFUL COLLECTION OF FERNS, DIFFERENT FROM THOSE COMMONLY SEEN, YOU CAN OBTAIN SUCH FROM W & J BIRKENHEAD. FERN NURSERIES AT SALE, MANCHESTER WHO HAVE 1400 DIFFERENT KINDS TO SELECT FROM. CATALOGUE ON APPLICATION."

Yes, that's 1400 different kinds! When I bought this first fern book I lived in Sale, near Manchester which is exactly where Messrs W & J Birkenhead had their shop and nurseries. After reading this I used to wander the streets trying to work out where it was and looking for any stray or unusual ferns growing on walls or in residential front gardens. I did find *Osmunda regalis* growing in the stonework lining all along the Bridgewater Canal. After scouring gardens and not finding any plants a theory was that these plants may have arisen from spores carried by canal boats which had passed through Dunham Massey, the nearest place along the canal where I had seen *Osmunda* growing profusely but they were more likely to have been a legacy from Birkenhead's Nursery.

Pteridologist 5.3. 2010

Today Sale is an urban town about 6 miles from the centre of Manchester. In the late 19<sup>th</sup> Century Sale was described by Wilfred Burke (1944) as a small country village with around 77 farmers and over 100 market gardeners and nursery men catering for the needs of the Manchester markets. Situated in the Mersey Valley flood plain, the soils were particularly fertile with a high water table. A huge range of fruit and veg were grown including the local speciality rhubarb which, during February, was forced in 40 foot long, windowless sheds. Baldwin's strawberry farm employed 50 adults who each worked a 10 hour day. Wilfred Burke describes thousands of feet of glass some with lights and miles of hot water piping allowing a Mr Mower to grow tons of tomatoes, Mr Law to force millions of tulips for the cut-flower market and Stansfield Nurseries (you will have heard of them!) to specialise in growing black grapes. These descriptions painted a very different picture of the Sale where I lived and worked but once we get a feel for the scale of the horticultural industry at this time, maybe we should not be so surprised.

The main thrust of 'The Fern Craze' was documented by David Allen (1969) as being around the early to mid 19<sup>th</sup> Century but Sarah Whittingham (2009) suggests around 1837-1914. There can be no doubt that ferns were still very popular at the end of the 19<sup>th</sup> century, our own Society was formed in 1891 and between 1870 and 1907 when the Birkenheads were growing ferns, there were around 40 books and leaflets on ferns in print written by British authors, many of which were published during the Birkenheads era (Nigel Hall, 1983). Strangely David Allen does not mention the Birkenheads in his book about the fern craze but he does quote fern nurseryman F.W. Stansfield who was alleged to have described the 1870's and 80's as 'the dark ages when ferns were most out of fashion'. This is baffling because during the later 19<sup>th</sup> Century it is clear that there must have been a strong market for ferns because of the flourishing existence of many nurseries like Stansfield in Todmorden and Sale; Backhouse in York; Askew in The Lake District; May in Edmonton; Dickson in Chester, all specialising in ferns as well as Birkenheads in Sale offering 1400 species and varieties. Perhaps we should divide The Fern Craze into two main eras, the first lay mainly in finding and describing ferns and subsequently fern varieties in the wild and the second involved the expansion of the cultivation of ferns and the development of varieties.

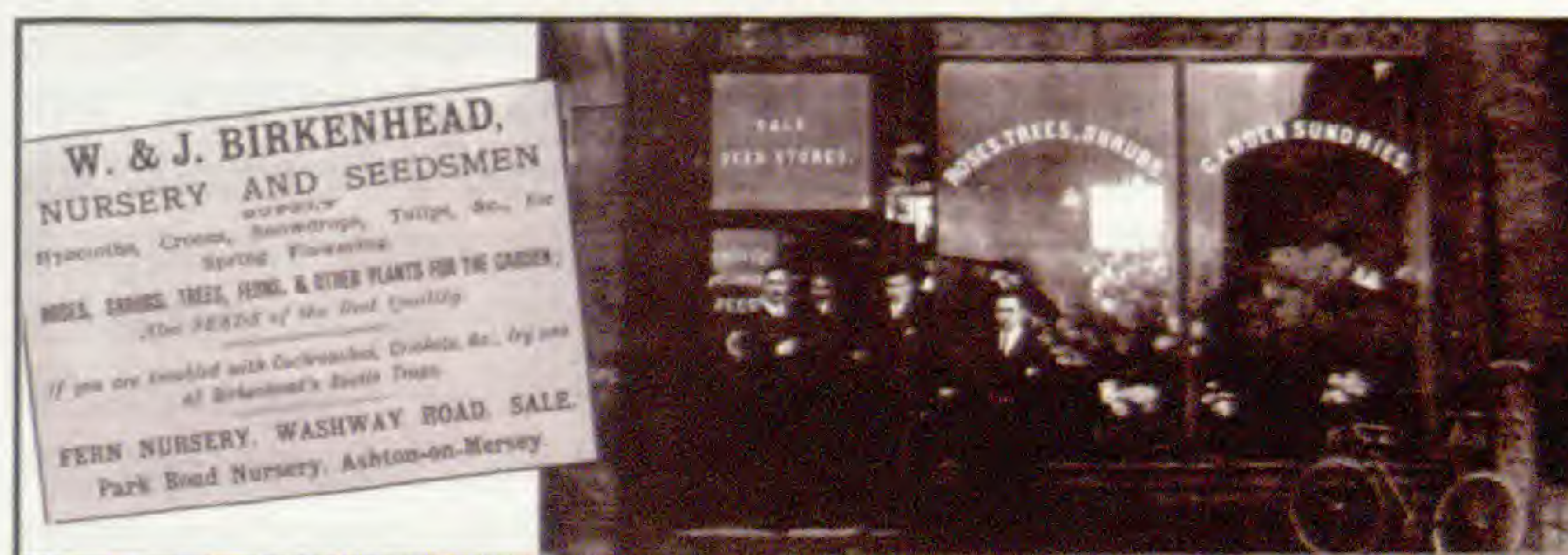


Fig. 5. Probably Birkenhead's shop front, from *Looking back at Sale* by Vivien Hainsworth.1983

After this long preamble, to help set the scene, let me tell you about the Birkenheads. William (1841-1924) and John (1847-1925) were brothers, nurserymen and seedsmen, who had a shop on the main Washway Road in Sale near what was then the General Post Office with a nursery behind which is probably now



occupied by Tesco. Nearby in Ashton-on-Mersey the Birkenheads also had another large nursery at Park Road. Accounts in gardening journals of the day describe 17 or 18 houses each around 50 x 10 feet 'shaded by a kind of scrim', all devoted to ferns! There was a propagation house, a filmy fern house and 'great lengths of pit occupied with ferns requiring very little artificial heat' as well as cold frames and open areas growing ferns. They sold a huge range of plants, horticultural sundries and books. They made 'Ferns a speciality' a strapline which appeared on the many adverts in popular periodicals such as *Gardener's Chronicle* and *Gardener's Magazine*. Descriptions of the nursery appeared waxing lyrical: 'A veritable Fern World! All the while, filled to overflowing with the joy which arises from the true appreciation of the delicate greenery, and infinitude of differentiations revealed in ferns. Here they are by the thousands, everything elbowed out of the way, and for the matter of that, elbowing each other out of the way until every inch of available space is replete with interest and beauty' relates *The Gardener's Chronicle* in 1884. Later in 1887 *The Gardener's Magazine* suggested that the collection at Messrs. Birkenhead was 'one of the largest and most complete in commercial establishments' and 'to fully appreciate the extent and comprehensiveness of the collection is well nigh impossible by those who have not had the pleasure of visiting the nurseries'.



Fig. 6. Illustrated catalogues produced by W & J Birkenhead

An idea can be had of the range of ferns on offer by looking at the Illustrated Catalogues produced by W & J Birkenhead. In issue No 21 (1888) they were offering over 1400 species and varieties of Ferns and Selaginellas and by issue No 22 (1892) this had increased to over 2000. This may have been an exaggeration but certainly it must have been the largest collection of its kind. Ferns were offered in different categories: stove ferns and selaginellas; greenhouse ferns and selaginellas; hardy exotic ferns and British ferns. The average cost of most ferns was between 6d to 2s 6d for plants around 18ins tall. Expensive and very desirable stove ferns offered in Catalogue 21 could be around 7s 6d for specimens of *Adiantum speciosum* from South America; 15s for specimens of *Platycerium grande* from Malayan archipelago and Australia and a whacking 21s for a 2 foot specimen of *Davallia foeniculacea* from Fiji.

The section on greenhouse ferns is the largest and to give you an idea of what was on offer there were

around 50 different *adiantums*; 57 *aspleniums* and 23 different *selaginellas*. Many were reasonably priced with occasional more expensive specialities like *Adiantum assimile* var. *birkenheadii* for 7s 6d described as 'a distinct free-growing variety raised in our nurseries and sent out in 1887', sadly there is no illustration. Other Birkenhead speciality *adiantums* included *Adiantum neo caledoniae* (price 2s 6d) which was described by Mr Thomas Moore as a beautiful and distinct variety due to the attenuated shape of the pinnules looking not unlike *Adiantopsis*. Was this truly an *Adiantum*? We will never know as, like so many of Birkenhead's varieties, they have been lost in cultivation but this species/variety won many awards at The Royal Manchester and Northern Counties Botanical Society; The Royal Horticultural Society at South Kensington and The Royal Botanical Society at Regent's Park in 1885 which was the first year in which the plant was offered.

62 GREENHOUSE FERNS.

L'LAVEA		Average Height.		
		Ins.		s. d.
CORDIFOLIA, syn., Ceratodactylis Osmundioides	...	...	Mexico...	...
LOMARIOPSIS				
HEXEROMORPHA, syns., Lomaria filiformis, L. propinqua	...	...	New Zealand...	1 6
Stenochloa heteromorpha	...	...		
LYGPODIUM				
COMPLANATUM	...	1/2	N. America	...
DESSEBODIUM	...	1/2	N. America	3 6
LEODIUM	...	1/2	N. America	2 6

OSMUNDA JAPONICA CORYMBIFERA.

LYGODIUM (Climbing Ferns)				
d JAPONICUM	...	...	Japan	1 0
A free growing Fern, often misnamed <i>L. scandens</i> ; requires wire, sticks, or other materials round which to twine for support. This loses its foliage in winter.				
MICROPHYLLUM	...	...	Australia	2 6
PALMATUM	...	...	N. America	2 6
A beautiful species, with light green palmate pinnas.				
SCANDENS	...	...	India	2 6
A handsome evergreen species, of free growth; foliage light green.				
MARATTIA				
ELEGANS	...	6	Cape Colony	7 6
FRAXINIA SALICIFOLIA	...	3	S. Africa	...

Fig. 7. Greenhouse ferns for sale by W & J Birkenhead

We tend to think that the wide availability of tree ferns to the general public is a relatively recent innovation but in the late 19th Century Messrs W & J Birkenhead were offering 5 species of *Cibotium*; 4 species of *Cyathea* including *dealbata*, *dregii*, *medularis* and *princeps*, and the 3 *Dickonsia antartica*, *fibrosa* and *squarrosa* at prices ranging between 1s 6d and 5s.

British ferns on offer included around 70 varieties of Lady fern *Athyrium filix-femina*, 50 species and varieties of *Lastrea* now *Dryopteris*, 30 *Polystichums* and 48 scollies, *Asplenium scolopendrium*.

The Birkenheads offered selections of ferns for those setting up a new garden: 100 plants in 50 different species and varieties for £2.6s. They offered hardy fern collections for rockeries and indeed advertised a design



and build service providing 'ROCKWORK on a large or small scale, built in the most natural style for inside or outdoor ferneries'. They offered suspending (hanging) baskets in various sizes and materials filled with ferns or you could buy them unplanted. The Birkenheads claimed to have introduced the idea of growing ferns on pieces of cork offering 'Blocks of virgin cork planted with ferns for suspending'. You could buy fancy brackets and fern pockets for wall attachment; free standing ornamental fern pots and fern stands with propagating glasses to fit thus making a particularly stylish type of Wardian case. They sold their own compost mix prepared exclusively for ferns and selaginellas using leaf mould, loam and sand in their 'proper proportions' ready for use at 2s per bushel. In addition they sold their 'better compost for the choicest varieties' incorporating silver sand, charcoal and peat, still only 2s 6d per bushel or 9d per peck. There is much advice about composts including not recommending the incorporation of peat for *Adiantums* and the use of plenty of broken stone for filmy ferns suggesting that the diminutive *Hymenophyllums* only needed finely broken stone and a sprinkle of leaf mould along with plenty of moisture. Another Birkenhead golden rule was that fern crowns should be kept well out of the soil and never buried in it. They also offered 'fern seed' for sale in packets of varying size and there is quite a comprehensive section on growing ferns from spore in *Ferns and Fern Culture* in which John Birkenhead says 'the process of development (of the prothallus) is full of interest and wonder'.

The Birkenhead's reputation for growing and supplying ferns was not just restricted to Britain. Foreign orders were not a problem; ferns were sent in Wardian cases which were shipped on board steamers. Typical costs were 21s for a case with 90-100 plants with freight and shipping charges ranging between 21-30s, depending where they were sent. The Birkenhead brothers claimed in their catalogues that they exported ferns all over Europe, North America, Africa, India, Australia and New Zealand. I find this really quite extraordinary. We tend to think of mail order plants as something relatively recent but back in 1888 the Birkenheads were sending plants all over the world.

The Birkenheads imported many American ferns and may well have belonged to the America Fern Society founded by Williard Clute. Certainly they had strong links with America as William had emigrated there as a young man seeking his fortune. Whilst there he met Dr. John Thomas, the founder of the Christadelphian movement and became a convert. Back in England William, with his brother John and a friend, William Carr set up a North West branch (Hall, 1983). This might seem a radical, even an eccentric venture for a couple of nurserymen to set up in sleepy Sale but when we consider that at this time, nearby Manchester was a hub for non-conformist groups, then maybe this is not so surprising. Certainly there is some evidence that the Birkenheads had some involvement with the development of a fernery designed by John Morris at Chestnut Hill in Philadelphia in 1899 (Hall, pers comm.). Now it has been renamed the Dorrance H. Hamilton Fernery and after meticulous and expensive restoration in 1994, it is reputed to be the only remaining freestanding Victorian fernery in N. America.

The nursery was also well known in Europe and was

well documented by Henri Correvon in *Les Fougères Rustiques* published in 1980 (In Hall, 1983). Certainly this needs further investigation but currently my French isn't up to it!

Evidence for the extraordinary ability of the Birkenheads to grow fine ferns, apart from in accounts in the leading horticultural journals of the day, is exemplified by the many awards and cups they won. I've named a few but others include a first-class Queen's Jubilees Gold Medal in 1887; a Gold Medal awarded by the RHS for their display of around 600 ferns at the GREAT FERN CONFERENCE in London 1890; wouldn't we have liked to be there! Silver cups and medals were regularly awarded at shows in London, Manchester, Shrewsbury, Edinburgh, Wolverhampton and Trentham.



Fig. 8. Illustration from the back cover of a catalogue.

Considering all this it is surprising, as pointed out by Nigel Hall (1983), that the Birkenheads were not mentioned in Desmond's *Dictionary of Botanists and Horticulturalists*. I find it surprising that the Birkenheads are barely mentioned in accounts of The Fern Craze: Peter Boyd describes the exhibits of Druery and Moore at the RHS Great Fern Conference for which Druery won a Silver Gilt Flora Medal and Moore won the Silver Challenge Cup but no mention of Messrs Birkenhead winning entry which won the coveted Gold Medal. This was probably because the article was about S.W. Pteridologists but still it might be expected that their efforts were mentioned in passing. They were largely ignored by leading Pteridologists of the time. Charles Druery probably reviewed *Ferns and Fern Culture* with a one-liner and Thomas Moore described some of the Birkenhead's ferns exhibited at shows. Certainly the



## Messrs. W & J Birkenhead: Ferns a Speciality

demise of their nursery was swift. They were bought out by H.B. May & Sons of Edmonton in 1907. This may have been timely because William, by then into his third marriage, would have reached 66yrs and John would be 60. Wilfred Burke (1944) does mention that there were some particularly bad winters with what he describes as 'the great frost' in the winters of 1894-95. Maybe a succession of bad winters affected the exotic fern collection which would have needed heat. Later, in 1908, Drury wrote of the new speciality of British Ferns held by Messrs May with no reference to the fact that the basis of this collection must have been from the Birkenhead's extensive stock. The Horticultural Press did not report on the takeover (Hall, 1983) and there is no mention of the Birkenheads in the preface by Messrs May in the 3<sup>rd</sup> edition of *Ferns and Fern Culture* despite it being section by section and almost word for word an exact copy of the original, written by John Birkenhead. This seems disingenuous. What explanation could there be? Was this nursery rivalry? Were the Birkenheads considered eccentric because of their religion? Was there some element of snobbery; a north south divide maybe or the fact that the Birkenheads really did put ferns onto the commercial market making them reasonably priced and widely available to everyone and therefore less exclusive? We may never know.

Whoever wrote the piece in *The Gardener's Chronicle* in 1884 was clearly very impressed 'strongly urging all Fern lovers to avail themselves of the treat afforded at Sale; it feeds the most finely strung enthusiasm, a treat greatly enhanced by the hospitality of the Messrs. Birkenhead'. These were truly extraordinary times and if I could be transported back, apart from the Carboniferous, I might choose the period mid to late 19<sup>th</sup> and early 20<sup>th</sup> Century. I would certainly be visiting Messrs Birkenhead on a regular basis and buying up many of their speciality ferns.

This article, which I have thoroughly enjoyed writing, was encouraged after conversations with Nigel Hall who kindly donated his notes and papers. Many thanks.

There is still much to find out about The Birkenheads; were they members of the BPS and if so is there any correspondence with BPS members? Please send any information to Yvonne Golding. □

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## French Fern Mania?



Fou de fougère - probably French, circa 1880

This photograph of a jug and basin set was sent in by Adrian Dyer. He comments that they are more interesting than beautiful! The gold colouration appears to be gold leaf rather than paint.

(MHR)





# Fern Deaths

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A few years ago I parted company with my fern nursery, Rickards Hardy Ferns. It is now safely set up in North Wales. Part of the deal when Dick Hayward, the new owner, took over was to pass all the stock over to him. This meant I had no ferns at all except for my collection of polypodium which was, and still is, the National Collection under the umbrella of Plant Heritage (formally National Council for Conservation of Plants and Gardens – or NCCPG). Inevitably I felt a bit empty without any ferns so I quickly set about building up a new collection. My biggest acquisition was the remnants of Robert Bolton's collection from Birdbrook in Essex. I was thrilled with the goodies I bought which included *Athyrium filix-femina* 'Clarissima', *Polystichum setiferum* 'Plumosum Green'. Two of the most beautiful and most rare of all British ferns. I also acquired about 18 really nice *Asplenium scolopendrium* 'Crispum' – mainly 'Bolton's Nobile'.

I planted these out in my new garden and watched them decline. I did not know why. They had all appeared to be in good health when I brought them from Essex. The hartstongues were odd; individual leaves died, just one at a time. Why? I know scollies suffer from a rust disease, *Milesina scolopendrii*, but that only blotches the leaves and is very rarely fatal. My plants were very sick and after a couple of years most were dead. I checked for insect damage but unfortunately I did not dissect any of the crowns, I saw nothing.

True, I had been away a lot. Watering was not when the plants needed it, it was only when I was home, but these ferns did not seem to be dying from drought. Most ferns can survive neglect for a while, mine didn't! Subsequently I discovered my new garden consisted of about 6 inches of sub-soil spread over a rubbish tip. It sounds a bit melodramatic but it is the truth. Maybe the ferns were getting poisoned? If so, why didn't the dandelions die too? The lack of a good soil depth was pretty obvious when you dug into the ground. Old carpets, polythene, bottles and pieces of metal were common just under the surface.

A couple of years back in a dry summer my well established cotoneaster shrub started dying back. I thought this could be fireblight. Subsequent years have, however, been wetter and the 'fire blight' has not reappeared. Could the Cotoneaster have been suffering from drought? Maybe the rubbish tip part was draining too quickly and ferns too were drying out? Just in case I started watering more liberally. Still the ferns dwindled. My polypodies were poor. They had always been so easy to grow. Just stick 'em in and watch them go. Not any more! I noticed individual leaves were being shed long before they should. This was reminiscent of the symptoms on the scollies. Each detached frond was blackened at the base but I could never see why. I could never find any sign of an insect pest.

At this point I nearly gave up – preferring to enjoy other people's gardens! Every thing in my garden was a disaster. The polypodiums were put down to provisional National Collection status by the NCCPG and I had stopped buying or accepting gifts of rare ferns. I had already lost far too many irreplaceable treasures.

About two years ago I convinced myself the answer lies in the soil so I created a new fern bed. I laid out a large sheet of Mipex and loaded on top of it 16 tons of mushroom compost, 6 tons of top soil and 3 tons of grit, and mixed them all up. I ended up with an area covered by about 18 inches of compost. I chose mushroom compost because it is cheap and available locally. I knew it was limey but most of the ferns I wanted to grow do not mind lime, ie. scollies, *Polystichum setiferum* cultivars and *Polypodium cambricum* (*P.australe*) cultivars. Full of hope I planted this area only to see newly imported scollies starting to die off just as before. I could not believe it. The polypods suffered too. What was going on? All of a sudden it was looking very unlikely to be the poor soil in the rest of my garden that was killing my ferns. There had to be something else.



Fig. 1. Weevil living in rhizome of *Polypodium glycyrrhiza* 'Longicaudatum' 24.9.09

Around this time I had a visit from some very good German growers. I was very embarrassed to show them my pathetic garden but to refuse would have seemed very rude especially as I had already visited all their gardens – twice! I did not attempt to hide my problem and they came up with the answer. Mice. It was definitely mice. To be honest I had never seen a mouse, shrew or vole in this garden but I had in a previous garden where I had had no problem with my ferns. Still, once they left I rushed into town and bought a mouse trap – only one! Needless to say I never caught anything and after 8 or 9 years my ferns were still dying.



## Fern deaths

I did have a couple of stone troughs planted with ferns. Some were very choice species I had bought while in Germany. Irritatingly a nest of red ants established itself around my *Asplenium fissum*. Their burrowing was bringing up soil which buried the crowns of the asplenium. I did not want to lose that too so I brushed the soil away carefully with my fingers. At around that time, by chance, I passed by a market stall in Tenbury Wells, my local town, where the stall holder was selling horticultural chemicals. Amongst them he had a pyrethroid ant killer in plastic puffer packs for £1 only. In for a penny in for a pound, I bought one. I puffed it all over the asplenium. The ants disappeared and the asplenium did not suffer at all. I quickly had a new flush of fronds. Great!

This got me thinking could ants be my trouble? Unlikely, but anyway I gave some of my worst affected plants a good puffing. Amazingly the rate of leaf shed reduced markedly! Surely it has not been an ant problem? Encouraged I went and bought more ant killer and puffed it liberally all over my ferns. Almost miraculously the problem with the polypods almost disappeared. Fantastic! Instead of a daily harvest of 30 or 40 shed fronds I was down to 2 or 3. The plants were recovering. One day I was disappointed to see a new frond shrivelling on *Polypodium glycyrrhiza* 'Longicaudatum'. I pulled at it but it did not come away easily, in fact it only came with a short piece of rhizome – and what I now believe to be the cause of all my problems – a weevil grub deep seated gnawing away along the young section of rhizome. (see figs 1 and 2).



Fig. 2. Weevil on *Polypodium glycyrrhiza* 'Longicaudatum' 24.9.09

Going back 10 years vine weevils had been an occasional menace in my nursery, but only in pot plants, never in open ground. Why had weevils started being a pest in my beds? Could it be I had an infestation of Australian Fern Weevils? I have since found one more grub. Both have been rather small and not quite like the familiar plump, crescent shaped vine weevil grubs.

If weevils have been the problem all along how come a simple ant killer could work against a pest notoriously difficult to kill? I think the answer to that

might be that the polypodium rhizome is on or near the soil surface and it is relatively easy to get the pesticide where it is needed. Certainly the problem has eased very markedly on polypodiums but I have been far less successful on crown forming species. The ant powder is presumably not getting into the centre of the crown. I have therefore stepped up the war by buying Pravadol. This is also a pyrethroid but this time a specialist vine weevil killer and apparently totally harmless to the ferns. It is a drench and should therefore get to the heart of the crown. Early indications are that this might be working but time will tell. As a precaution I am drenching all newly acquired plants.

At this stage this story is not finished but I should add I am not alone with these problems. Others have mysteriously lost fine plants. If you discover odd fronds dying on any fern be prepared to think fern weevil. Then puff with ant powder or drench with Pravadol and hope for the best!

As I have said this is work in progress. I cannot be sure fern weevil is my problem but if any reader has experienced similar problems perhaps they could let me know and by next year we might be able to publish a more complete analysis of just what is going on. I attach a picture of my *Polypodium glycyrrhiza* 'Longicaudatum' now, four months later, looking much healthier (Fig.3)



Fig. 3. *P. glycyrrhiza* 'Longicaudatum' 23.1.10

In case you think I have made up 'Australian Fern Weevils' take a look in the *Pteridologist* Vol.3, p.148 (2001). There is a full page reproduction of a poster warning of Australian Fern Weevil published by the Natural History Museum in London. The poster tells us it was first recorded at Glasnevin in Ireland in 1902. It has subsequently appeared in widely scattered sites in England, Wales and the Channel Islands.

The 1902 infestation at Glasnevin was described in great detail in the *British Fern Gazette*, Vol.2, pp.14-17(1912) in articles written by H.Kingsmill Moore, and Charles Druery with help from the Royal Horticultural Society and a paper in *Journal of Economic Botany*, Vol.2,pp.84 – 90 (1908) by J Mangan. The symptoms described match very closely my damage. They also make the comment that this weevil is not confined to potted ferns, it ranges through outdoor collections planted in open ground. The latin name for the Australian Fern Weevil is *Syagrus intrudens*. The common vine weevil is *Otiorhynchus sulcatus*. □



# Enigmatic Tasmanian Treeferns

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Treefern populations in Tasmania provide scientists and naturalists with some tantalising questions.

The slender treefern, *Cyathea cunninghamii*, generally occurs along watercourses in moist, sheltered gullies. Following recruitment from spores it matures after 25-30 years upon reaching seven to eight meters in height. Although *Cyathea cunninghamii* is listed as a threatened species in Tasmania, it also occurs in the mainland states of Queensland and Victoria and is locally common in New Zealand.



Fig. 1. *Cyathea cunninghamii*

The extant Tasmanian populations of *Cyathea cunninghamii* contain only about 200 mature plants in 15 known locations. These populations exist at low altitude and within three kilometres of the coast, with the noted exception of one recently discovered population in northeast Tasmania. This population is approximately 30 kilometres from the coast and is at an elevation of nearly 400 meters. This outlier population has caused scientists to reconsider the historical and geographic Tasmanian range of the species.

To add to the enigma of the historical range of *Cyathea cunninghamii* in Tasmania is the curious occurrence of its descendent, *Cyathea x marcescens* on King Island, off Tasmania's northwest coast.

Pteridologist 5.3. 2010

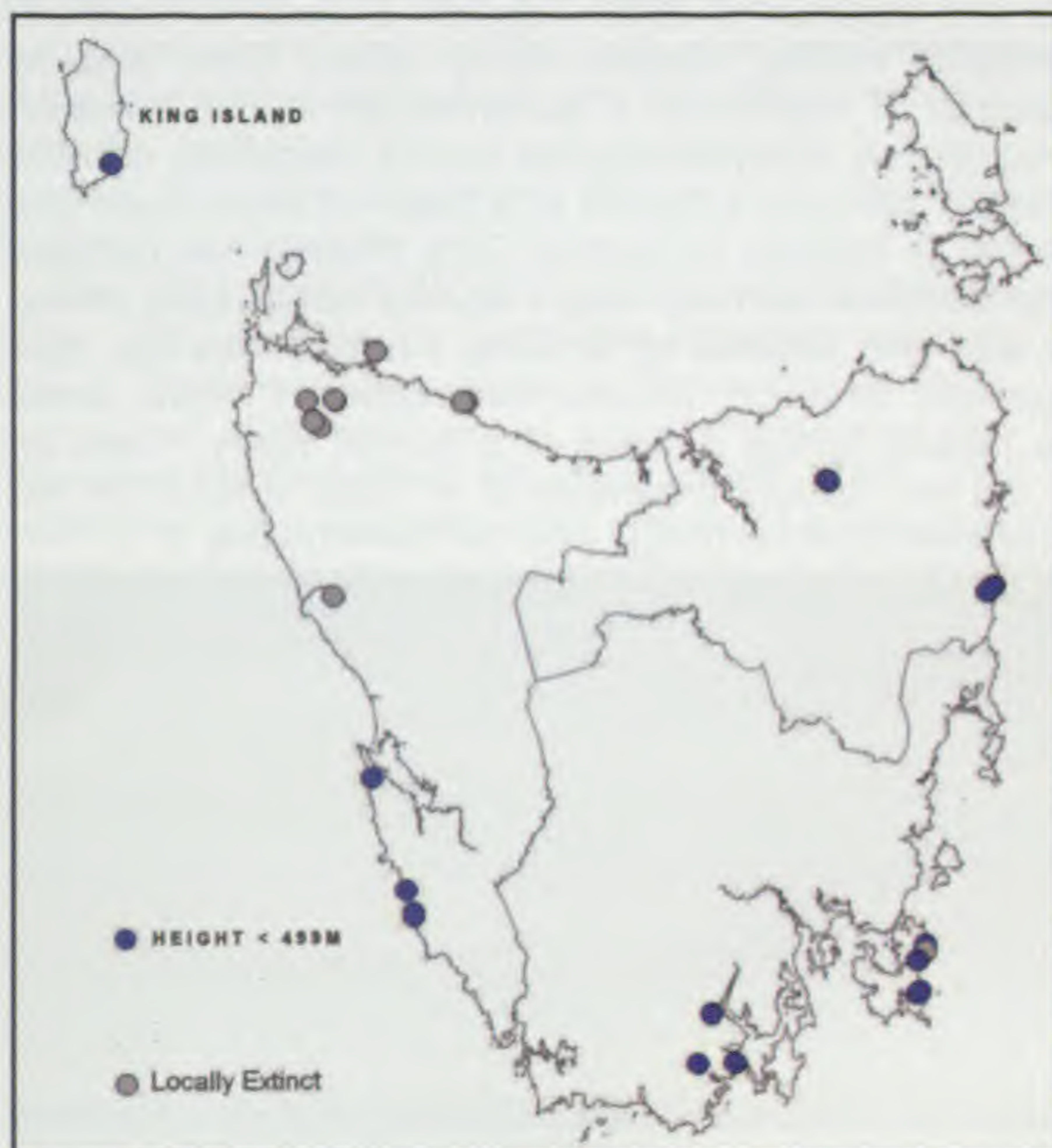


Fig. 2. Distribution of *C. cunninghamii* in Tasmania

*Cyathea x marcescens*, also known as the skirted treefern, occurs as a sterile hybrid between *Cyathea australis* and *Cyathea cunninghamii*. Because of its extremely limited distribution the skirted treefern, like its parent species, *Cyathea cunninghamii*, is also listed as a threatened species. Unlike the slender treefern, the skirted treefern is characterised by a thick trunk. The mystery surrounding the King Island population of *Cyathea x marcescens* is that when the juvenile treefern population was discovered in 1990 there were no other sexually mature treeferns of the parent species found on the island. The varying ages of the juvenile treeferns in the one location would appear to mitigate against a wind borne spore source from Victoria or northwest Tasmania, particularly given that *Cyathea cunninghamii* is considered extinct in northwest Tasmania. Curiously, there were also no standing or fallen dead trunks found that may have provided a source of spores for the establishment of a *Cyathea x marcescens* population.

So why is there a population of *Cyathea cunninghamii* nearly 30 kilometers from the coast and how did the population of *Cyathea x marcescens* become established on King Island? □

Watch this space.

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# The Benefits of Getting Lost

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Sometimes, getting lost has happy consequences. In the summer of 2009 I spent a week in southern Ireland visiting various ferny sites. One day, in search of *Asplenium x ticinense*, the hybrid between *Asplenium adiantum-nigrum* and *A. onopteris*, I found myself well and truly lost in a maze of back roads just north of Blarney in County Cork. After a few minutes consultation with the map I worked out roughly where I was and headed off in what I hoped was the right general direction. Almost immediately I drove under a railway bridge – more of a tunnel, really – and as I did so I caught a glimpse of a mass of ferns on the stonework of the bridge and the bank beside it



Fig. 1. The mass of ferns on the stonework.

Parking past the other side of the bridge, I walked back to investigate. I found, among other ferns, a large colony of *Asplenium trichomanes* subsp. *quadrivalens* (Common Maidenhair Spleenwort), almost every plant having crested tips to the fronds. Hunting around I found a few crested plants in the ditch on the other side of the bridge as well. I did not attempt to count them at the time but in retrospect I think there were probably between 50 and 100 plants.

Crested forms of *Asplenium trichomanes* are occasionally found, and there's nothing particularly special about these plants, but what is somewhat



Fig. 2. *Asplenium trichomanes* subsp. *quadrivalens* (Common Maidenhair Spleenwort) displaying creusting.

unusual, I think, is to see such a large colony. I'd be interested to know of other instances where substantial colonies of a variety have been found. C.T. Druery, in the appendix to *British Ferns and their Varieties*, mentions two in relation to *A. trichomanes*: a form of 'ramo-cristatum' from Cornwall "found on an old wall, which was covered with crested forms of the species"; and 'var. incisum' in Borrowdale, "growing in a granite fissure, and extending nearly a yard in four or five elongated tufts, containing at least two hundred crowns". □



Fig. 3. Detail of the creusting.

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# An Unusual Antique Fern Model

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I'm always on the lookout for unusual fern memorabilia, so the item I describe here caught my eye straight away. It came courtesy of a well-known internet auction site, and thanks to the power of internet searching and a bit of good luck, I've been able to find out more about it. I believe it is a Victorian teaching model showing the microscopic detail of fern reproduction. As you can see from Figure 1, it comprises a base with four components representing parts of the fern cycle. According to the label on the base, it is for *Pteris serrulata* (the old name for *Pteris multifida*) and was sold by A H Baird of Edinburgh. Andrew H Baird was a prominent photographer and scientific instrument maker who had various premises in Edinburgh during the late 1800s to early – 1900s. However, I am fairly sure the model was made by R. Brendel of Berlin since a catalogue of the teaching and research collections in the Science Museum, London, dated 1891 (available on-line as a text document) lists it with the date of 1880 (which I am guessing is the acquisition date).



Fig. 1. A possible Victorian teaching model of fern reproduction.

The model itself is about 35 cms tall and the base 13 cms across. It is very light (less than 300 grams overall) since the base is filled with cork and the tops of the four components are a very thin, flimsy material, probably gutta-percha. Each component is hand-painted. The main component (Figure 2) is a bursting sporangium complete with some spore inside.

The 1891 Science Museum catalogue lists several other fern models by Brendel, including another one of *Pteris serrulata*, three of *Equisetum arvense*, also dated 1880 and two of *Aspidium filix-mas* (the old name for *Dryopteris filix-mas*) dated 1884. The catalogue also includes four models (*Osmunda*, *Aspidium*, *Equisetum* and *Davallia*) by F. S. Leach dated 1888.



Fig. 2. A bursting sporangium complete with spore inside

I haven't had chance to see whether the Science Museum still has the models described in the catalogue. However, I was pleasantly surprised, when visiting the Manchester University herbarium during last year's AGM, to see a large collection of various similar botanic teaching models, including the same *Pteris serrulata*. No doubt, others lie dormant in the vaults of museums and universities across the country. If anybody can provide me with any more information, I'd be very interested. □



# News from the rock face in Corrie Fee

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Readers might recall our sorrow at the apparent demise of at least two well-recorded clumps of *Woodsia alpina* in Corrie Fee. Using old photographs it was established that no fronds were visible in 2007 at the two known sites, although one had the soggy remains of brown fronds and looked very dead. On another visit to both sites in September 2009 we were surprised to find very small fronds growing from the clump at Site 1 that we had been certain had died (Figs 1 & 2).



Fig. 1. The 1996 clump of *Woodsia alpina* at Site 1



Fig. 2. Site 1 *Woodsia alpina* back in the crack 2009

Furthermore, following a report from Theo Loizou of a two-fronded *W. alpina* at the second site, a careful search revealed not just the one clump photographed in 1979 (Fig 3) but two additional clumps within a radius of two metres. The highest clump had 4 fronds up to 6 cm long which were fertile. It was growing within some dead stems of *Calluna*, but was not obvious in a 2007 photograph although the stems were present. The reported two-fronded clump with fronds up to 7 cm long was in dense moss and flowering plants, but a three-



Fig. 3. Clump of *Woodsia alpina* on ledge at Site 2 1979

crowned clump had re-appeared in the middle of a rock ledge (Figs 4 & 5). This clump was the one we had failed to find in 2007 with clear location photographs. Admittedly the 2009 clump had fronds that were only up to 15mm long but careful examination of the 2007 photograph did not seem to show anything there, although the fronds could well have been even smaller and lost in the moss. The most exciting feature was that it appeared to be a reprise of the 1979 clump as the shape of the rock is similar on both the 1979 and 2009 photographs and there are plants of the very local *Saxifraga nivalis* in each photograph

*Woodsia ilvensis* in the same corrie appears to show less variation. There have been more plants reported in the past but for at least 15 years they have occupied much the same space, and looking similar in photographs. *W. ilvensis* seems to prefer considerably drier rocks than the *W. alpina* sites which have water seeping over the surface. We had assumed the



Fig. 4. Location of same clump on ledge at Site 2 2009 (right of centre above pale grass)



apparently dead *W. alpina* at Site 1 had been killed by excessive amounts of water, but the new small fronds are growing in even wetter conditions after not just one, but three wet summers. It seems that the plants can die back but the crowns are able to produce new growth from what must be very resilient rhizomes. Why they died back is another question. It is noticeable in the photographs that there is considerably more vegetation around the *W. alpina* plants in recent years. This matches other observations on montane sites where the grazing pressure has been reduced but could also be due to less severe winter weather allowing more plants to survive that might otherwise have been killed beneath extended snow-cover. It is also possible that there is a natural cycle whereby the vegetation growing on narrow ledges eventually becomes too heavy, especially when saturated, and most of the plants fall off. This has frequently been observed recently. *Woodsia* plants with roots deep into cracks might be able to survive after the shallow-rooted plants have gone. Repeated



Fig. 5. Closer view of same clump with three possible crowns

observations might help to determine a cycle although there are many factors which will influence the plants' welfare. Any photographs that people have taken over the years could help to fill in gaps in the story. If anyone would like to send photographs they have of this site they will be copied and carefully returned, unless you would like to donate them to our archive. □

## *Stegnogramma pozoi* in Anaga, Tenerife

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I have been visiting the islands of Macaronesia for the last 15 years, sometimes alone and sometimes with a small group of pteridologists. About 5 years ago I noticed a plant of *Stegnogramma pozoi* in the Anaga region of Tenerife. According to Sunding & Hansen, this plant is only known in Madeira and some of the islands in the Azores. I have only ever seen it in this one place in Tenerife. It is right by a small path.

This path is little used and is now partly hidden by a fallen tree, however it leads to a ferny wonderland where



Fig. 1. *Stegnogramma pozoi*  
(Photo Alison Evans)

one can find *Culcita macrocarpa* and *Trichomanes speciosum* amongst many other woodland ferns. I have returned to this location several times over the years and the plant seems to be spreading slowly. The area is very wild and a good distance from houses and roads. It is not an area where garden rubbish could be dumped

If one were to assume that *Stegnogramma pozoi* is not known from Tenerife, then the question that arises is why would it be here, right by the path. Is it possible that I, or another pteridologist has brought it, inadvertently, in soil on their walking boots? I do travel to both Madeira and the Azores, where this plant is common and I do not clean my boots between trips.

*S. pozoi* is a relatively rugged plant and has survived several years in my shadehouses on my allotment in Portsmouth and unprotected in other members gardens in colder parts of the UK.

Adrian Dyer has demonstrated that it is possible to cultivate ferns from spores from the soil washed off his boots after foreign holidays. Could this be an example of it happening accidentally in situ? □

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# The Use of Scales in Tree Fern Identification

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Tree ferns are spectacular plants found primarily in the tropical and subtropical areas of the world. They are often cultivated in large glasshouses or warm temperate botanical gardens, and of course they are popular in private fern collections whenever acceptable growing conditions exist. A common problem, though, for fern enthusiasts is that tree fern identification in native settings and in cultivation can be a difficult challenge, with approximately 600 species worldwide. With simple observations of hairs, scales and scale morphologies, however, a significant inroad can often be made into the species identification.

Most tree ferns fall into the families *Dicksoniaceae* and *Cyatheaceae*, and a quick look at the frond can readily separate these two groups. If only hairs are found on the stipe, then the fern falls into the family *Dicksoniaceae*. The presence of scales or scales and hairs at this site indicates *Cyatheaceae*, with the genus *Cyathea* comprising the tree-like ferns. Additionally, the location of the sori on a fertile frond can readily distinguish the two families. *Dicksoniaceae* have sori that are marginal on the pinnule, while *Cyatheaceae* sori are positioned away from the leaf edge. The *Dicksoniaceae* arborescent tree ferns can be further broken down into either the genus *Dicksonia* or *Cibotium*, based on the indusium. If the indusium merges gradually with the green leaf tissue, then the fern falls into *Dicksonia* (~25 species). However, if the indusium is made completely from specialized non-photosynthetic tissue, the tree fern is in the genus *Cibotium* (~12 species). Figure 1 shows the first major breakdown of the tree ferns at the genus level.

The largest group of tree ferns belongs to the genus *Cyathea*, with approximately 500 species worldwide, and this is where species identification becomes the most difficult. There have been numerous attempts over the years to divide this large genus of ferns into smaller groups at the genus or subgenus level using morphological characters. These characters include the type of stipe scale, the indusium (or lack of one) and the presence or absence of spines on the stipe. While there is still no agreement among botanists on breaking up the genus *Cyathea* into new genera, stipe scale morphology

has remained one of the strongest differentiating markers among the species. Based on this character, three clades, or subgroups, can be distinguished: *Sphaeropteris*, *Cyathea* and *Alsophila*. More recent molecular analysis at the DNA sequence level supports this grouping phylogenetically, with a further splitting of *Alsophila* into *Alsophila* and *Gymnosphaera* (Korall, P. et al. 2007. A molecular phylogeny of scaly tree ferns [*Cyatheaceae*]. *American Journal of Botany* 94:873-886). The breakdown of the genus *Cyathea* into clades, or subgroups, based on molecular data and stipe scale morphology, is shown in figure 2.

For identification purposes, tree ferns of the genus *Cyathea* can be easily placed into one of three subgroups based on the pattern of cells in the stipe scale. These subgroups are *Sphaeropteris* (~120 species), *Cyathea* (~115 species) and *Alsophila* (~235 species). The subgroup *Sphaeropteris* has what are called 'conform scales' because the size and direction of the cells are the same throughout the scale. *Sphaeropteris* scales also often have specialized tooth-like cells at the margins called setae. *Alsophila* and *Cyathea* scales, however, are classified as 'non-conforming' or 'marginate' because the cells change direction and size at the margins as one goes from the middle to the edge. Additionally, *Alsophila* scales have a bristle at the tip while *Cyathea* scales do not. Examples of the three types of scales are shown in figure 3. The best way to observe the cell pattern is to use a low-power microscope (10-30X) with light shining up through the scale. After one becomes familiar with the patterns, a small hand lens is usually sufficient in the field.

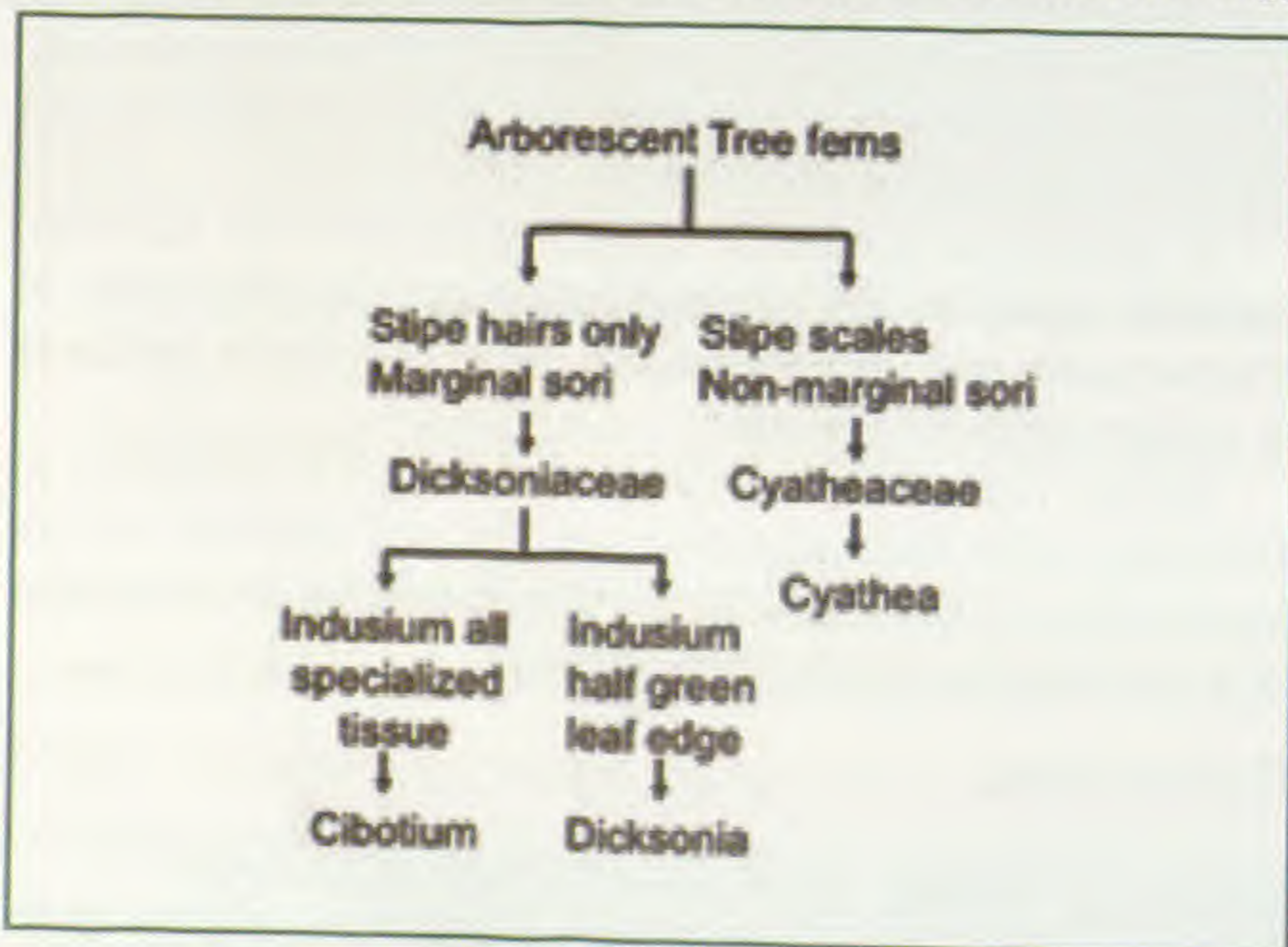


Fig. 1. The breakdown of arborescent tree ferns in the families *Dicksoniaceae* and *Cyatheaceae* into the three genera *Cibotium*, *Dicksonia* and *Cyathea*.

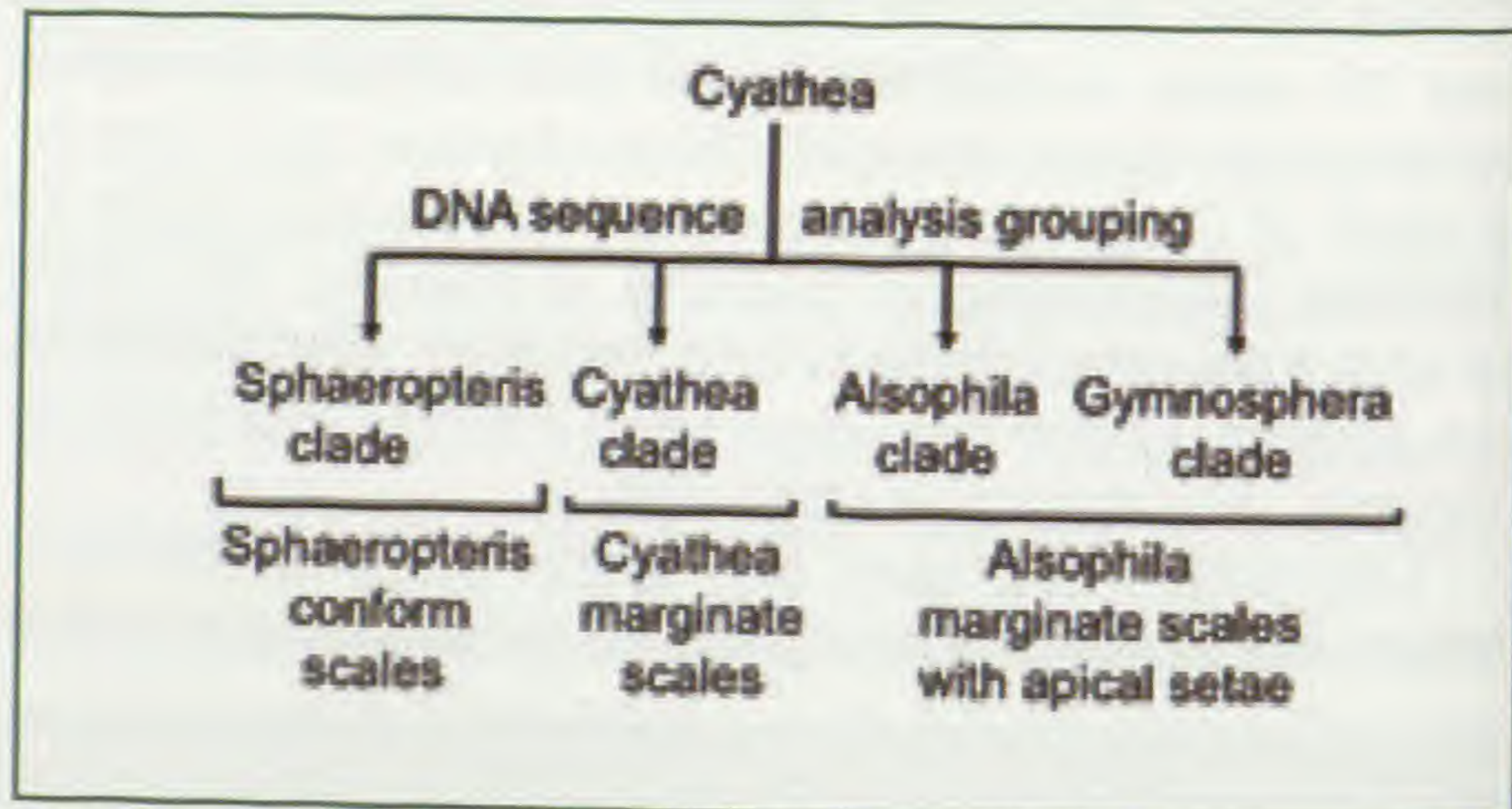


Fig. 2. The breakdown of the genus *Cyathea* into clades, or subgroups, based on DNA sequence analysis and stipe scale morphology.

While the ability to differentiate between the three types of stipe scales still leaves each subgroup with over a hundred species worldwide, this information nonetheless offers a significant identification tool. In the field it allows one to use available keys for a particular country or region, as these almost always begin with the scaly tree fern breakdown based on the stipe scale classification. Because all countries have a more limited number of tree ferns than the world at large, determining the scale type can often focus the identification on a rather small number of possibilities. In Costa Rica, for example, an *Alsophila* stipe scale reduces the potential species from 37 down to 5, and a *Sphaeropteris* scale leaves only one native possibility. In cultivated situations, this information



## The Use of Scales in Tree Fern Identification

can also be quite valuable. When growing *Alsophila* or *Cyathea* subgroups of tree ferns from spore, one can tell early on if the highly weedy *Cyathea cooperi* from the *Sphaeropteris* subgroup has contaminated the sporing pot when the plants are still small. Additionally, many of the more recently available tree ferns in cultivation such as *Cyathea latebrosa*, *Cyathea gleichenioides*, *Cyathea incisoserrata*, *Cyathea dregei* and *Cyathea australis* are all in the *Alsophila* subgroup, and stipe scale determination can readily distinguish them from the often mislabeled *Cyathea cooperi*.

The use of stipe scales to help in the identification of scaly tree ferns requires a good reference source to list the subgroup of each species. If one is using a regional or country based fern identification key, then this information is usually part of the key. Otherwise, one can use the book *Tree Ferns* by M.F. Large and J.E. Braggins, which lists the world's scaly tree ferns under the genus *Cyathea*, but includes the subgroup, or clade, that each species belongs to. There are also Internet web sites, which list all of the species that belong in each of the subgroups:

### *Sphaeropteris*:

<http://homepages.caverock.net.nz/~bj/fern/sphaeropteris.htm>

### *Cyathea*:

<http://homepages.caverock.net.nz/~bj/fern/cyathea.htm>

### *Alsophila*:

<http://homepages.caverock.net.nz/~bj/fern/alsophila.htm>

These subgroups are listed as actual genera in a number of popular fern books (*The Fern Grower's Manual* by B.J. Hoshizaki and R.C. Moran, for example), and fern books covering particular geographical areas or countries often incorporate this formal breakdown of the genus *Cyathea* as part of the keys (*The Ferns and Fern-allies of Costa Rica, Panama, and the Choco* by D.B. Lellinger, or *The Pteridophytes of Mexico* by J.T. Mickel and A.R. Smith, as examples). While this may at first seem to be confusing, it is easy to go back and forth between the different classification conventions (genus vs. clade, or subgroup) once one is familiar with the different stipe scale morphologies.

While the breakdown of scaly tree ferns into the subgroups should be the first step in tree fern identification, additional useful information can often be found with a further examination of the stipe scale (Fig. 4 page 184)). This usually includes color and shape of the scales, particularly for those species in the *Sphaeropteris* and *Cyathea* subgroups (*Alsophila* scales are generally small and dark). For example, the scales of *Cyathea princeps* are narrow and pale; on mature *Cyathea medullaris* they are dark brown; the scales of *Cyathea divergens* are bicolourous with a brown centre and light or pale margin areas. Other features such as the placement of bristles or setae can also aid in species identification. *Cyathea novae-caledoniae*, for example, which is in the *Sphaeropteris* subgroup, has setae coming out of the flat surface of the scale, which is rather unique, while the *Alsophila* species *Cyathea latebrosa* has additional bristles on the margins of the scale, in addition to the one at the apex. These secondary characters of the stipe scale can be used as part of a key, or compared to detailed descriptions of particular tree ferns in the literature to further narrow down the possible species. Good information sources are: *Tree Ferns* by M.F. Large and J.E. Braggins, which gives a color description of stipe scales for each species; "Cyatheaceae. Flora Malesiana, II Pteridophyta," 1:65-176, Holttum, R.E. 1963; "The Tree Ferns of the genus *Cyathea* in Australasia and the Pacific," *Blumea* 12:241-274, Holttum, R.E. 1964.

Next time you see a scaly tree fern, pull off a few of the scales on the stipe and examine their cell pattern. With a little practice you will soon be able to place that fern into one of the three subgroups. While other details of the frond can certainly then be used to further discriminate between possible species, just knowing the subgroup, or clade, will be a significant step towards identifying these beautiful ferns that bring us all so much pleasure. □

Pteridologist 5.3. 2010

### Sphaeropteris clade scale *Cyathea cooperi*



### Cyathea clade scale *Cyathea alata*



### Alsophila clade scale *Cyathea mexicana*



Fig. 3. The three stipe-scale morphologies showing:

Top: conforming cell pattern (*Sphaeropteris* scale)

Middle: marginate cell pattern (*Cyathea* scale)

Bottom: marginate cell pattern with apical bristle (*Alsophila* scale).



## The Use of Scales in Tree Fern Identification

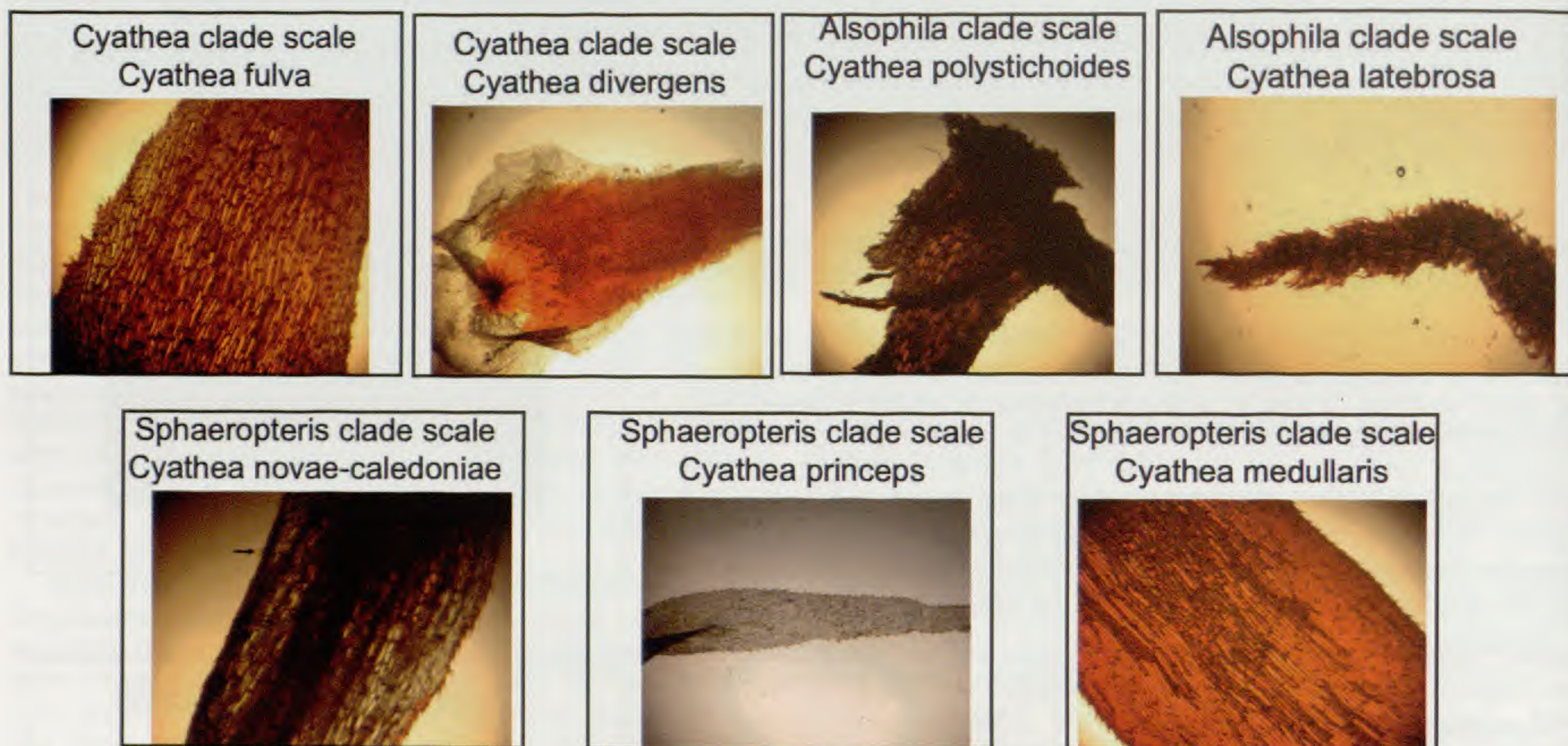


Fig. 4. The differences in *Sphaeropteris*, *Cyathea* and *Alsophila* scales, with respect to size, colour and setae. Arrows in *Cyathea novae-caledoniae* scale point to setae.



## THE SILVER-JUBILEE SYMPOSIUM OF THE INDIAN FERN SOCIETY

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India is an enormous country. The latitudes of this sub-continent span from 35°N in Kashmir to 8°N at its southern tip. West-to-east it spans from 68°W in the State of Gujarat to 97°W in Arunachal Pradesh in the Assam region of India. Indeed, if India were placed over Europe, its 27 degrees of latitude would span, as we calculate it, from northern Norway to the south of France, and west-to-east from Britain to the Ukraine.

Across this enormous subcontinent, there is therefore a correspondingly large range of climates, varying widely in temperature and rainfall regimes. The south is manifestly tropical, and at the northern boundary, the Himalayas offer every climate from hot dry lowlands rising through dramatic scenery of lakes and mountain valleys to the snowline and beyond. A very considerable range of pteridophytes is consequently present, concentrated especially in the various upland areas – from the tropical rainforests of the Western Ghats of the southern peninsular region to the rich vegetation of the Himalayan chain, to the high-rainfall corner of the north-east frontier region adjoining the former Burma (Myanmar) and China border, incorporating the world's wettest climate. Many who are interested in cultivation of ferns, will know this area as a source of several ferns which are cultivated in the west. There are clearly very many more, of varying

degrees of likely hardiness, that could yet be tried.

In reflection of the richness of the overall native pteridophyte vegetation, India also has a long and highly respectable home-grown interest in research into its *Pteridophyta*, from a morphological, taxonomic, cytological and floristic point of view. Several worthy local fern books reflect this: published by different authors on the fern floras of various mountain regions of India, these display the extraordinarily rich pteridological diversity that India contains. For the last 25 years, India has had its pteridological interest also fostered and encouraged by its own highly-active Fern Society. In late November 2008, this Indian Fern Society convened a conference to mark its Silver Jubilee. CNP was one of two British attendees, along with Christopher Fraser-Jenkins, who has been actively working on taxonomic and conservational issues especially within the mountain flora of the Himalayas. IG was one of two Russian participants, while there were also two participants from Germany and one from each of Brazil and Japan, so collectively we were each there in somewhat pteridological ambassadorial roles. There were more than one hundred Indian attendees – a certain reflection of the present and growing interest in ferns in this enormous country.

The conference also marked and celebrated the



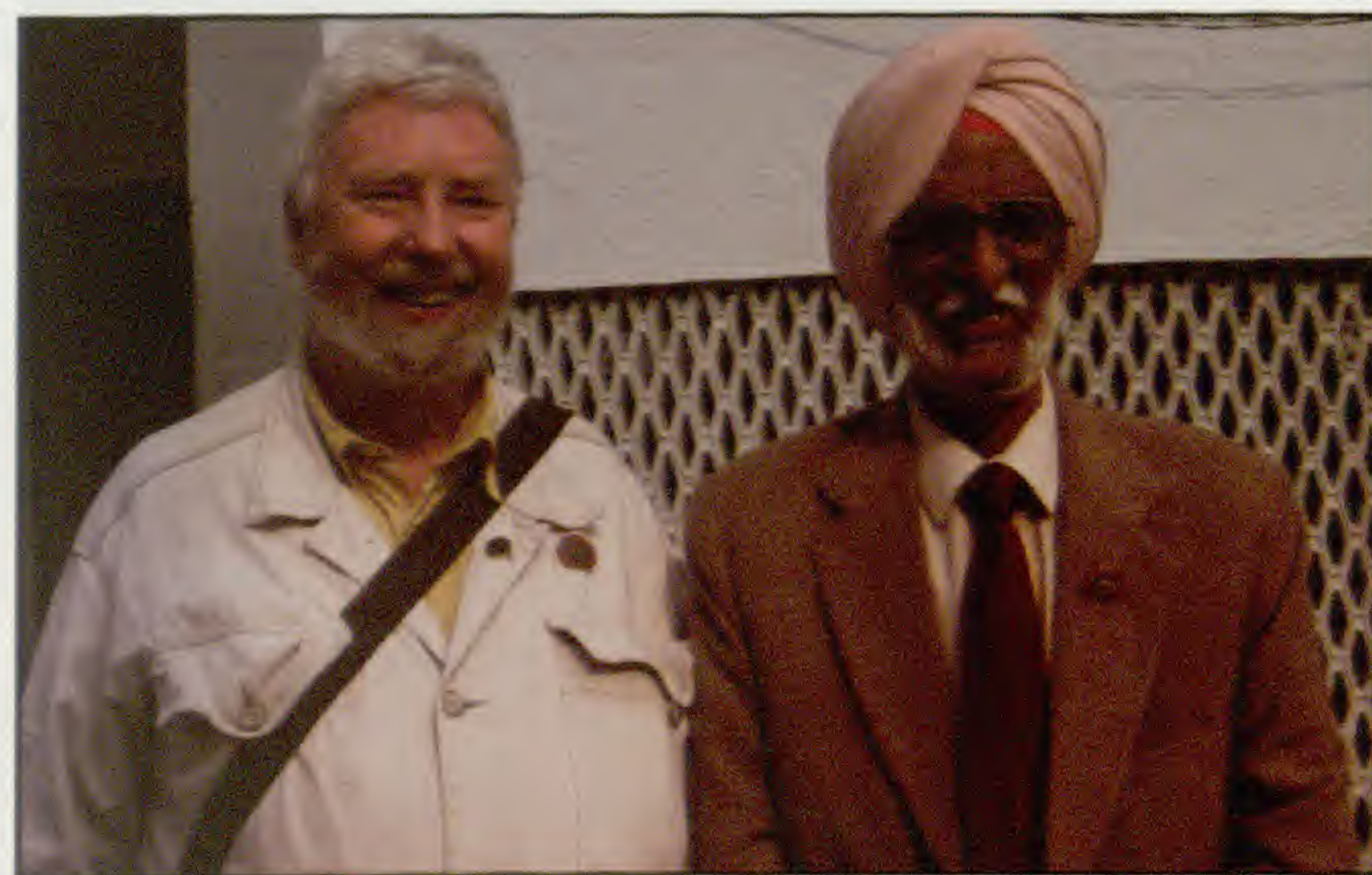
## THE SILVER-JUBILEE SYMPOSIUM OF THE INDIAN FERN SOCIETY

80<sup>th</sup> birthday of Professor S.S.Bir, who has been one of the main driving-forces in the establishment and development of the Indian Fern Society since its inception. It was thus a particular pleasure for each of us to be able to participate so-fully with both Professor Bir, and with the many researchers who have now put India so very firmly on the world's pteridological map. The symposium was held in the city of Lucknow, which is about 7 hours train-ride from Delhi. Lucknow is the headquarters of the Indian Botanical Survey, who are well-equipped with laboratory facilities and were actively extending their herbarium building while we were there. Lucknow is also the city of the original 'siege of Lucknow' and the former British Residency in the days of the Raj (the ruins of which we visited). Anyone who has ever seen the British-comedy film 'Carry on up the Khyber' will remember the event upon which this was modelled, when the British unhesitatingly continued with their dinner, while the building around them was being destroyed!

The papers presented in this week-long symposium were an important reflection of the richness of Indian pteridophytes, and the studies which are continuing upon them. These covered a very broad span, from fossil ferns of the Rajmahal Hills (where India was once part of Gondwanaland), to a broad range of papers on the living species. These spanned systematic, morphological, phylogenetic, distributional, cytological, genetic, pharmacological, evolutionary and ecological perspectives on *Pteridophyta*, with a total of 75 authors and co-authors in the papers. Highlights were the diversity of Polypodiaceous and Davalliaceous ferns and their ecology across India and into China and south-east Asia. Also the contribution, especially in the more tropical regions of India and adjacent areas, of fern epiphytes more generally. Amazing local ecological diversity is present also, for example, in the genera *Isoetes* and *Lycopodium*. There is too a growing awareness of the conservational significance of *Pteridophyta*, and for uses of species such as water-ferns for their potential for phyto-remediation of heavy-metal sites. Micropropagation of ferns is also under active development in India, as one important back-up to developing conservation strategies for rarer species across this whole region,

The geographic breadth of papers spanned contributions from adjacent regions including the fern floras of Russia, China, Nepal, Japan and Vietnam, as well as high-mountain fern communities more generally. So in many ways the Symposium was broader than a focus on India alone, and was effectively one which brought taxonomic and especially conservational issues for *Pteridophyta* to a strong focus across much of the whole of the eastern Asian region. The occasion was also marked by the publication of a large-format Symposium volume. Overall impressions were of an extremely well-organised, thoughtfully-assembled and wide-ranging meeting, reflecting a strongly-growing interest in *Pteridophyta* across eastern Asia. It is a region of future pteridophyte research at many levels, with much burgeoning home-grown interest and growing local expertise. Indeed, at a time when pteridology and pteridologists, at least in Britain, are themselves becoming threatened species, it was good to appreciate how actively the subject is being pursued in both India and more widely across Asia.

On the subject of threatened species, the day of our arrival in India also turned out to be that of the Mumbai massacre, and the day we eventually left Delhi was that in which the airport terminal was itself attacked by a bomber whilst we were checking-in, so the whole visit to India turned out to be not without its more dramatic moments. □



Chris Page with Professor S.S.Bir, founder of the Indian Fern Society, whose 80th birthday was celebrated during the symposium.

### Book Review

**The Benmore fernery, celebrating the world of ferns** by Professor Mary Gibby. 2009, 40pp., 24.5 x 18.6 cm., many illustrations, most in colour. Royal Botanic Gardens Edinburgh. ISBN 978-1-906129-29-3. Price £6 from the RBG Edinburgh or BPS Booksales.

The restoration of the Benmore Fernery has not passed unnoticed in the *Pteridologist*. It is, therefore, a great pleasure to see the publication of this glossy booklet now the project is complete. Of the forty pages ten deal specifically with the fernery. It is fascinating to learn of its history and to see before and after pictures, although sadly no pictures exist of the fernery in its heyday. Clearly the team who raised the funds for this wonderful restoration deserve our admiration and gratitude.

The remainder of the book covers a wide range of ferny topics: what is a fern?; the Victorian fern craze; fern conservation; the ferns of Scotland's Atlantic woodlands; ferns in other RBG Edinburgh gardens. All accounts are necessarily brief but they are not stereotyped reprints from elsewhere and they often have a distinctly Scottish angle. For example it is fascinating to see the original herbarium specimen of *Trichomanes speciosum* from Arran collected in 1863, and the page in *The Ferns of Moffat* (1863) with the specimen of *Woodsia ilvensis*. These are two of the rarest ferns native to the British Isles.

In summary this is a charming little book fascinating to read and good to look at. I think it deserves to find its way into many pteridologist's book collections, north or south of the border.

Martin Rickard



# The Fernery at Southport Botanic Gardens

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## *History of Southport and Churchtown*

Churchtown in the eighteenth century was a small settlement of shrimp and eel fishermen with a reputation as 'wreckers' from their habit of collecting the spoils of the many small vessels wrecked on the local sandbanks. Their wives performing hand loom weaving in their cottages, cotton at first then later silk weaving. The parish of Meols is recorded in the Domesday Book and its name is from the Viking word for Dunes. Towards the end of the century doctors started to recommend sea bathing as a cure for many ills and genteel persons from the Wigan and Manchester districts started to travel to Churchtown where they were put up in the inn or the local houses. They were transported daily by donkey cart along the wide salt marsh that is now Lord Street to the vast expanse of virgin sands where the bathing machines were stationed. The opening of the Liverpool to Wigan section of the Leeds to Liverpool canal in 1774 boosted the numbers of visitors, who now travelled by packet boat to Skelmersdale, then coach to Churchtown. In 1792 the landlord of the Churchtown Inn erected a building on the sands with changing and refreshment rooms and from this small beginning the present resort town of Southport developed. With the coming of the Railway to Southport in 1848 the pace of development was greatly increased.

From its beginnings Southport always had a reputation for attracting only a 'high class' of visitor and in the late nineteenth century Southport was said to have more places of worship than public houses. The resident population of the new town had reached 32,000 by 1880, whilst Churchtown itself, now incorporated into Southport, was little changed. Indeed to this day the centre of Churchtown still has an 'olde worlde' feel with its thatched cottages and narrow alleys.

The Southport Commissioners opened the first park in the town built on 30 acres of Sandhills at the North end of Lord Street, in 1868. The land gifted to the town by the Rev. Charles Hesketh of Meols Hall, the vicar of Churchtown and bears his name. Sir Joseph Paxton is said to have laid out the park, which included a large conservatory. In 1874 the Winter Gardens opened in Lord Street, with a second large conservatory.

In 1874 the 'Southport and Churchtown Botanic Garden Company' was incorporated and built its pleasure gardens on land adjacent to Meols Hall under the supervision of Mr. John Shaw, landscape gardener

of Altrincham. The site included a river and pool, which was expanded to form a boating lake. The gardens were formally opened on May 15<sup>th</sup> 1875, with an admission charge of 4d for adults. The gardens were closed on Sundays and no alcohol was allowed to be served, as stipulated by Rev. Hesketh when he sold the land to the company. A museum, Conservatory and Fernery were added, the architects being Messers. Mellor & Sutton of Southport and the builder Thomas Duxfield of Southport. These were formally opened by the Mayor of Southport on April 8<sup>th</sup> 1876. The gardens were served by newly laid tram lines from both Southport and Birkdale, with a circular terminus at the entrance to the gardens.



Fig. 1. An early photograph of the fernery

We are largely dependant on contemporary press reports and adverts for the little we know of the contents of the fernery as there is no known formal list of the original planting. Early photographs are scarce and of poor quality, although tree ferns and Woodwardia radicans can be distinguished. On the opening of the fernery the Southport Visiter devoted considerably more space to an account of food eaten by the Mayoral party at the inauguration than to a description of the fernery. After describing the conservatory, it continues "The Fernery next came in for attention, and the praise we have on former occasions lavished on this charming Arcadian spot, was endorsed on all sides. Owing to



## The Fernery at Southport Botanic Gardens

the quick growth of the ferns new beauties are being developed day by day, and in a very few weeks from the present time the walls will be clothed with delicate green fronds, whilst the beds will be richly carpeted with cool green mosses."



Fig. 2. North view with misters in the apex

A fuller account of the fernery is given in a report of 11<sup>th</sup> July 1876. "Leading from the conservatory we enter the fernery and here, in cool grot and mossy cell, rural fairies ought to dwell, if they do not. But we fear if any of the pixies once know of this charming abode the directors will never get clear of them: they will be perpetual tenants. Look at the fine growing *Lomaria* (*Blechnum*). Puck might dance a minuet on its ample crown. Graceful maiden-hairs, with their delicate fronds, have their abode in almost every cranny. *Aspleniums*, *Athyriums*, *Scolopendriums*, and others of the legion are aptly placed in this most enchanting spot; whilst giant representatives of the fern family expose their massive stems and slowly unfurl fronds, rounded and as large as a shepherd's crook. Adown the tufa rocks water trickles into pools below and a delightful moist air, which the ferns love so much is the result". These flowery descriptions (if the editor will excuse the word) tell us as much about Victorian attitudes to ferns and ferneries as to the plants themselves. "Sunny Southport", an 1887 guide to Southport by T. L. Bower includes an artists view of the fernery.

The Curchtown Botanic Gardens were never intended

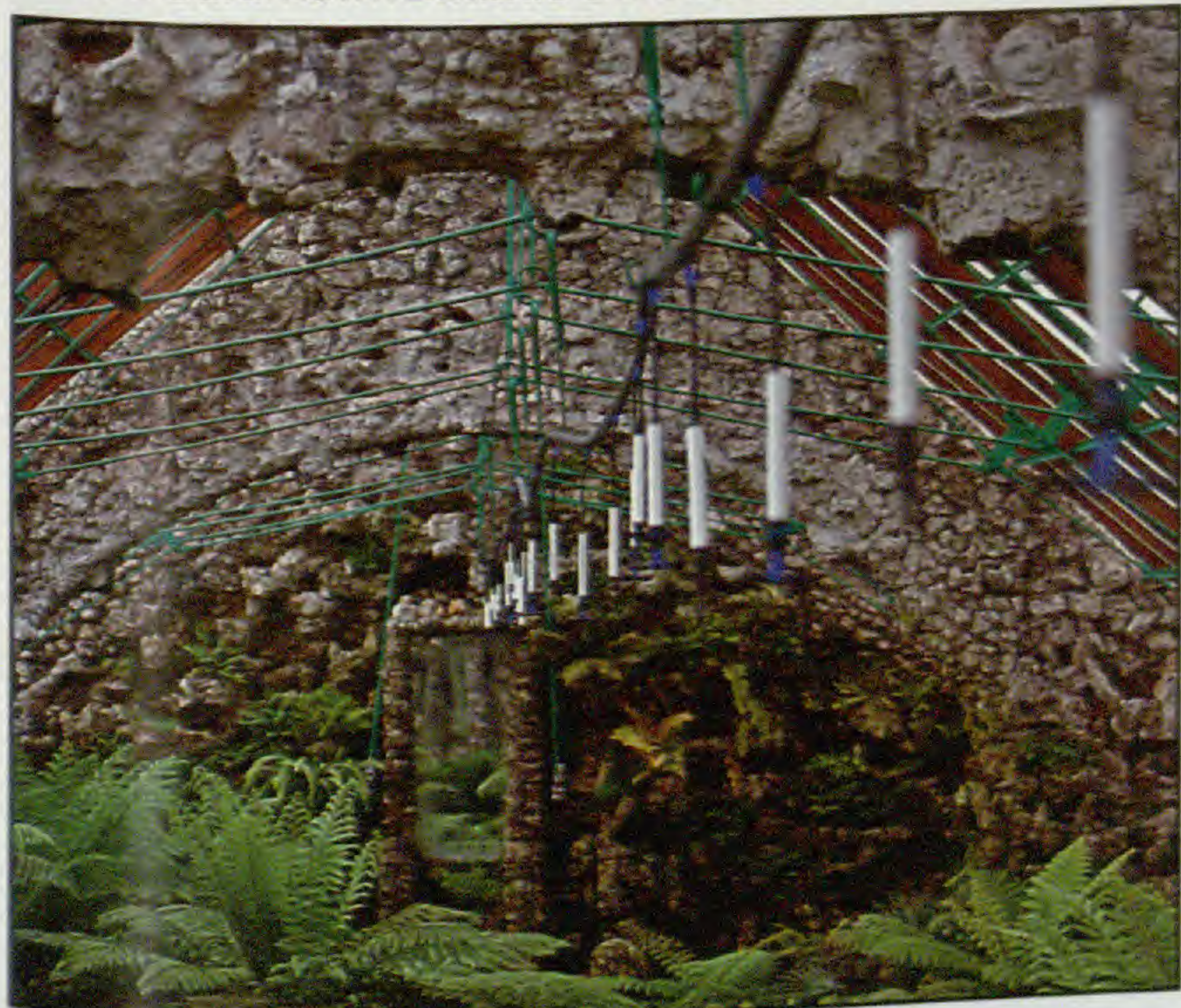


Fig. 3. Close up of the misting nozzles

to be a scientific botanic garden, but rather a pleasure garden for "lovers of nature and art uncontaminated with anything of an unpleasant or vicious character", as befitted the genteel aspirations of Southport. It was a very successful pleasure garden for many years, but fell into decline during the depression of the 1930's, ending in bankruptcy in 1934. The contents of the museum and any movable plants were sold off and the grounds were acquired by a developer with intent to build a housing estate. A public campaign was started to persuade the Southport Council to purchase the Botanic Gardens. Over £1000 was raised by public subscription, £2,000 donated by the Southport Flower Show committee and a large sum from the Hesketh family. The council were eventually persuaded to buy the gardens from the builder for £6000 and they were reopened to the public in 1937. The splendid conservatory which stood between the fernery and the boating lake was deemed beyond repair and was demolished but fortunately for us the fernery was retained. A rival pleasure garden 3 miles away at Birkdale, aspirationally called 'Kew Gardens' and created about the same time as the Churchtown gardens, did not fare so well and is now the site of an out of town shopping centre and hospital.

### Construction of the Fernery



Fig. 4. *Angiopteris evecta* below arch

The fernery, a grade II listed building, is a plain linear building, 30 m long by 9 m wide, layed out on a North South axis and built of red brick in English Garden Wall bond. The brick end walls and two dividing arches support a steeply pitched glass roof whose timber frame is stabilised by iron rod braces. There is a plain door at either end for public access from the gardens on the West side. On the East side are the utilitarian greenhouses of the Sefton parks department. At either end of the fernery is a pair of stairs leading to a raised viewing platform and creating beneath a small grotto with pool. All four walls of the conservatory, the arches and the grottoes, are covered in planting pockets. The listed buildings register says that these are of pumice



## The Fernery at Southport Botanic Gardens

(but interior not inspected). Early descriptions said that they were of tufa. On inspection, they are of a gray finish, the constituents clearly including portland cement and in my view are typical "hyper-tufa", a mixture of sand, portland cement and peat or other organic material designed to create a porous structure. There are many examples of this around the grounds of the botanic gardens where the method of construction can be clearly seen. The British Pulhamite Company worked in Southport in the 1870's, building the artificial rock work of the aquarium in the basement of the Winter Gardens but the colour of the Fernery rock work is unlike typical Pulham stone and it was most likely made by the local builder.

From the fernery entrances a single path winds down its length towards a central fountain, constructed of similar artificial rock work. The beds on either side are raised 1-2ft by rock work and large heating pipes are almost concealed at the back of these beds. Mirrors are set into the walls at various points to create an illusion of increased space.



Fig. 5. *Pteris quadriaurita* 'Tricolor'

### Refurbishment and replanting 2007-8

Little money was spent on the upkeep and stocking of the fernery in recent years but in 2007 a major grant was obtained which has enabled the fernery to be restored to its former glory. A new wooden roof has been fitted. The heating system has been modernised, with the boiler in the adjacent utilitarian greenhouses. The original large diameter pipes have been retained at low level on both sides of the house. Originally there was a second row of pipes at raised level – these have been removed. New features are a watering system of trickle hoses at high level around three of the walls and a row of suspended mist jets along the apex of the roof. The venting system remains the original and no additional shading has been installed. The end wall by the main public entrance has no trickle hoses and remains unplanted. The artificial stonework required relatively little repair. The refurbishment was completed in 2008 and the contract for restocking the fernery was awarded to Ben Kettle of Rickard's Ferns who has supplied a very broad range of ferns and selaginellae. The only downside of the planting is that there is no formal labelling of the stock at the present time.

Visiting the fernery in its rejuvenated state is a delightful and challenging experience. Delightful to see so many ferns thriving, the walls well covered with the ferns enjoying the trickle irrigation, the many tree ferns looking thoroughly at home. Many of the ferns are already volunteering into spare nooks and crannies. Challenging in trying to identify all of the species and varieties of ferns present! At each visit I usually manage to find a fern that I had not found before and fail to find some that I had previously noted.



Fig. 6. *Blechnum brasiliense*

One of my favourite ferns is a young (but large) *Angiopteris evecta* (Fig. 4) planted with its rhizome at eye level and its magnificent fronds arching across the central pathway. Its large diameter roots, quite unlike those of any other genus, are clearly visible. Close by are plants of the smaller growing *Marattia salicina* for comparison. Another favourite is a large *Blechnum tabulare*, with a 1m trunk, which is also thriving. A number of plants of *Blechnum brasiliense* (Fig. 6) with its red coloured juvenile fronds are at home in wall pockets. *Dryopteris varia* (Fig. 12) also makes a show with its reddish juvenile fronds and at various times *Woodwardia orientalis* (Fig. 8) has been seen with fronds covered with a multitude of glowing red plantlets and surrounded by juvenile plants. (Fig. 7) The mixture of ferns includes many garden varieties as well as common tender species and some rarely seen species such as the *Megalastrum inaequalifolium* that I spotted at the back of one bed.

As in Victorian times, tree ferns provide the basic structure of the planting. There are many *Dicksonia*



Fig. 7. *Woodwardia orientalis* with bulbils



## The Fernery at Southport Botanic Gardens

*antartica* and *D. fibrosa* specimens, together with rapidly growing *Cyathea medullaris*, *C. dealbata* and *C. australis*. The relatively bare green stipes of the less often seen *Cibotium glaucum* contrast well with the black scaly stipes of an adjacent *Cyathea medullaris*.

The Victorian press described the beds as being filled with 'mosses'. I think it more likely that selaginellae



Fig. 8. Crozier of *Woodwardia orientalis*

covered the ground between the ferns and much use has again been made of these club mosses. I particularly like the red coloured *S. erythropus* on the central fountain.

The fernery is open to the public from April to October from 10am to 4pm, but do visit early in the day or, like me, you will always end up been politely asked to leave at closing time still having not taken all the photographs that you wanted! □



Fig. 10. *Polystichum vestitum*

My thanks are due to Sarah Whittingham for sharing information on the fernery and to the librarians of the Atkinson Library in Southport.



Fig. 11. *Blechnum novae-zelandiae*



Fig. 12. *Platycerium alicorne*



Fig. 13. *Dryopteris varia* - borderline hardy

### References:

- Bailey, F. A. (1955). *A History of Southport*, pp237.  
 Angus Downie, *Southport*  
 Bower, T. L. (1887). *Sunny Southport*  
*Southport Visiter*, 1876



Illustrated Flora of Ferns and Fern-Allies of South Pacific Islands. Various Authors. No. 8 in a Book Series from the National Museum of Nature and Science. Tokai University Press, 2008. ISBN 978-4-486-01792-9. Pps. xxxi, 295. Hardback.

This rather splendid book is the result of visits to South Pacific Islands by the South Pacific Fern Studies Group of the Nippon Fernist Club who had been visiting Pacific islands annually since 1993. The material was collected in collaboration with groups from the Tsukuba Botanical Garden of the National Museum of Nature and Science who surveyed the flora of Vanuatu in 1996, 1997, 2000 and 2001.

Although the book is written in Japanese, significant passages are reproduced in English, as will be described. The 31 attractive colour pages of preliminaries include maps of the four island groups covered – New Caledonia, Vanuatu, Fiji and Samoa, all located in an arc to the east of Papua New Guinea and Australia, and to the north of New Zealand. For each island group, there is a brief topographical description, summarised in English, habitat photographs, and a good collection of fern photographs, 8 to a page, with Latin name captions.

The main part of the book starts with a summary of the recent fern molecular studies published by Kathleen Pryor and her colleagues (the book follows this new taxonomy), explanatory notes and morphological diagrams, all duplicated in English. The systematic part is at the family level, each family account being by different authors. For each family, brief family and genera diagnostics are given, with keys to the genera and species – all duplicated in English. Each species is given a very brief description (in Japanese only),



Plate 15. 1. *Hymenophyllum tomaniviense* (a. 植物全体 whole plant, b. 胞子囊群をつけた裂片 fertile segments), 2. *Hymenophyllum braichwaitei* (a. 葉と根茎 fronds and rhizome, b. 胞子囊群をつけた裂片 fertile segments), 3. *Hymenophyllum digitatum* (a. 植物全体 whole plant, b. 胞子囊群をつけた裂片 fertile segments), 4. *Hymenophyllum imbricatum* (a. 植物全体 whole plant, b. 胞子囊群をつけた裂片 fertile segments), 5. *Hymenophyllum banlerianum* (a. 植物全体 whole plant, b. 胞子囊群をつけた裂片 fertile segments), 6. *Hymenophyllum javanicum* (a. 植物全体 whole plant, b. 胞子囊群をつけた裂片 fertile segments).

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Fig.2 Plate 15 featuring 6 *Hymenophyllum* species

and a little table showing its distribution in the four island groups. Undoubtedly the keys in English are potentially valuable to Western readers, but even more so are the excellent line drawings of each species. These constitute a significant portion of the book, there being 109 plates, each depicting several species. As an example see Plate 15 reproduced here featuring 6 *Hymenophyllum* species. The book concludes with "A brief history and bibliography of studies on South Pacific pteridophytes", acknowledgements, index, and a list of authors.

To my knowledge, this is the first "popular" book covering the ferns of these islands, but would I recommend its purchase? Most definitely "yes" for anyone lucky enough to be contemplating a visit to this exotic region. For others, I would suggest the decision is marginal. Although the book is beautifully produced, it may have only minor practical value. Most of the ferns will be unfamiliar to readers of this journal, although there are a few recognisable names of species with wider distributions.

I do not believe the book to be easily obtainable here, and one may have to resort to acquiring a copy through international natural history book dealers like Koeltz in Germany. And I fear it will not be cheap! □

Graham Ackers



Fig.1 Front cover



# Recent monitoring of wild populations of *Woodsia ilvensis*

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Although populations of *W. ilvensis* are not large they do seem to be reasonably stable. In Wales there are 15 known clumps which are visited by local botanists although some are only accessible using ropes. The plants are small, widely dispersed and can be infertile.

The largest more vigorous population is in the Lake District and was last fully counted in 2006. It is on a very unstable, dangerous slope which has made it difficult to place permanent markers. The plants have been counted by John Hooson of the National Trust who knows where to expect to find them, mostly in two main areas that are slightly less unstable. Clumps are counted with the difficulty of determining how far apart two tufts need to be, to be counted as a separate clump. A vigorous population with large clumps could give a lower clump count than a struggling population with fragmented clumps. Because of the difficulty of determining the number of clumps they have been counted with a higher and lower clump count given each time and also specifying the approximate size of the clump. From the 1990s the counts have declined but the more recent counts showed an upward trend with the minimum numbers not so very different (Table 1). Most encouraging was the discovery of a small plant in an area where none had occurred before. This suggests that regeneration is occurring, the first that has been observed for decades. The last three years have been so wet that a count has not yet taken place. Such conditions will certainly encourage any sporelings. This population is the largest in Britain and possibly the only one that is large enough to regenerate; we await future counts with anticipation.

Year	Minimum clumps	Maximum clumps
1995	68	95
2001	47	60
2003	52	54
2006	63	66

Table 1. Clump count of *Woodsia ilvensis* in Cumbria

By contrast the Scottish sites have very few clumps. By 1996 the plants near Moffat had declined from the original population of 25 plants found in the 1950s down to 3 with only a single clump remaining on the opposite cliffs where two clumps had been found by Martin



*Woodsia ilvensis* Feshie 1983 with 183 fronds in three groups

Rickard in 1972. The first site is also very unstable and the remaining plants might be the only ones in relatively secure places, although careless visitors leaning on the wrong rocks could demolish the largest clump. From 2003 to 2007 it had been supposed that the lowest clump had been lost following a rock fall, but in better conditions in 2007 (no rain, sleet or midges) a double-crowned plant was seen, but completely out of reach. As in Cumbria the recent wet weather might have encouraged regeneration and a postponed visit is planned in 2010. Spores from these sites have been used for reintroductions in the nearby sites at Carrifran and on the National Trust for Scotland's Grey Mare's Tail reserve. Again another visit is due in 2010 which will give a more recent record of survival.



## Recent monitoring of wild populations of *Woodsia ilvensis*

The plants in Corrie Fee have been much the same for many years, presumably also here only the most securely established plants have survived, the clump size varying but the locations being maintained. There are four clumps at the western site, two possibly three at the eastern site on Craig Rennet. In 2008 Richard Marriott re-found a single clump on Little Craig Rennet which had not been seen for some time. In the old photographs it had 4 fronds and it still has four fronds. Growing as these plants do in cracks in the bed rock they are not vulnerable to rock movement.

The same is not true of the Glen Feshie plants that are in mobile scree, made even more mobile by people standing below the plants, which encourages the rocks to slip. It is hard to relate the earliest black and white photographs to the present positions of the rocks but widening gaps are clear in more recent ones and again show the benefit of a series of photographs. The same clump appears on either side of a rock so that there are probably three clumps present. The site has been built up from below to help stabilize the rocks and the recent wet years might have helped the plants as for several years spore production was aborted

due to dry summers. Scottish Natural Heritage were concerned about the mobile scree and in 2005 sixty plants were planted in screes 200m away that were grown from spores from this site. Early establishment has been very encouraging.

As it has become increasingly difficult to find time to monitor these species, teams of local volunteers are being gradually matched to locations. This monitoring scheme will apply both to the native populations and the re-introduced ones. While it is not helpful to encourage excessive visiting of fragile, crumbling sites it is desirable to monitor and there needs to be continuity between people who know where to find the plants. In some cases a grid reference can be very hard to pinpoint, even with GPS and especially on steep cliffs. Our knowledge of these few remaining plants is such that in many cases each individual clump is known and we can compare the number of fronds, their size, spore production and any grazing between visits. This gives a level of detail that goes far beyond the usual level of monitoring and helps to inform their conservation. □



*W. ilvensis* Feshie 1983 Closer view with 29 fronds in three smaller groups



*W. ilvensis* Feshie 2006 with 57 fronds. Note widening gaps between stones



## Recent developments – polypodium cultivars.

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Cultivars of hardy polypodiums have long fascinated me. The catalyst was back in the 1970s when I asked the two great experts of the day, Jimmy Dyce and Reginald Kaye, to name the form of *Cambricum* I was growing which had been given to me by Gerry Downey. To my amazement neither could. If I wanted to know I was going to have to find out for myself!

Cultivars of polypodium are quite numerous but unlike other very variable fern species most polypodiums are propagated vegetatively. This has the huge advantage that most cultivars currently in cultivation are parts of the original clone. It is therefore often possible to work out the genuine cultivar name of a given plant. With polystichum and athyrium cultivars most plants are spore raised and every sporeling seems different, infuriatingly very few, or none, quite like the parent. Of course polypodiums can be spore raised but because they are not such popular plants few nurseries bother, and trade in polypodium cultivars continues to be mainly by division. Most of the good cultivars are forms of *P.australe* (most inappropriately renamed *P.cambricum* a few years ago, to avoid ambiguity I will stick with *P.australe* here). *P.australe* is diploid (only 2 sets of chromosomes), this may be why it is more prone to sport. *P.australe* flushes new fronds in late summer or autumn. Not a good time for nurseries to sell plants. As a consequence good clones of polypodiums mainly change hands between enthusiasts or through specialist nurseries.

Over the years I have prepared lists and part lists of polypodium cultivars. I list them all in an Appendix below as an attempt to make any research easier. The information is a bit scattered but hopefully it can all be pulled together in the not too distant future with a BPS Specialist Publication on the genus. In addition the Society has plans to produce a register of polypodium cultivars. In simple terms a register is a list of all the cultivar names ever applied, with their site of original publication and with any synonymy explained. This will be a separate publication but the two should complement each other.

In the interim there have been quite a few new cultivars of polypodium found wild or raised. Some of great quality. I list all known to me below:

***Polypodium australe* 'Jill'**. Named after Jillie of Jillie and Ian Reynolds without whose generosity I would not have found this fern in the south of France. It was found by me in rocky grassland overlooking the Mediterranean Sea south of Collioure in 2002.

*Polypodium australe* was abundant locally but I only stopped the car to admire a wonderful stand of *Himantoglossum longibracteum*, an orchid new to me. Walking through the rough, rocky grassland I glanced at the occasional patch of polypodium and was amazed to spot this.(Fig. 1.)



Fig. 1. *Polypodium.australe* 'Jill' near Banyuls, south of France

Growing in situ it was showing very strong crested basal pinnae but only fairly weak terminal crests. It looked in many ways like a young 'Grandiceps Fox'. I thought it might be somewhat different and collected some rhizome. I split the rhizome between myself and Ian and Jillie Reynolds of Hereford. Disasterously my part died but Ian and Jillie's thrived. For a long time they had the entire stock but now that I seem to have resolved my pest problem (see elsewhere in this issue) they have given me some material back. In the Reynold's garden very strong crests have developed (See Fig. 2.) yet the plant is not tall like 'Grandiceps Fox'. At present it seems to be more like 'Grandiceps Foster', which, sadly, I believe is extinct. It is a stunning



Fig. 2. *Polypodium.australe* 'Jill' in cultivation





Fig. 3. *Polypodium australe* 'Cambricum Conwy'  
original site, photo 2000

form and may prove to be close to 'Multifido-cristatum' (syn. 'Grandiceps Parker) – yet another extinct cultivar.

***Polypodium australe* 'Cambricum Conwy'**. Conwy is the welsh spelling of Conway. Found by William Hughes in 1967 or 1968 on a front garden wall in the village of Dwygyfylchi near the Synchant Pass, near Conway, North Wales.(Fig. 3.). It is indistinguishable from the commonist form of *P.australe* 'Cambricum' but it has the greater significance because the owner of the wall has stated the fern came from the Conway town walls. There are old records for Conway Castle, Thomas Pritchard 1876, so this could be the same site and hence the same collection. Curiously William told me where this grew and after much searching I found it but I did not think William's instructions accurately fitted the site. Some time later I revisited the site with William and to both our amazements we had found different sites.(Fig.4.) We therefore now know there are at least two front walls in the area which support healthy



Fig. 4. *Polypodium australe* 'Cambricum Conwy'  
second site, August 2006

colonies of this fern! It is now commercially available from Fibrex Nurseries.

***Polypodium australe* (Cristatum Group)**. Found my me when exploring a hedgebank in County Clare, Western Ireland in company with Jim Dennison in 2009. (Fig. 5.). It does not look like it will be a grandiceps but it might improve on its current form in cultivation. The pinnae crests are small but twisted and rather polydactylous (Fig. 6.). It looks quite unlike any other cultivar I have seen. *P.australe* 'Grandiceps Foster' was also found in Co. Clare (in 1876) but it is almost certainly too much to expect that this will prove to be the same!



Fig. 5. *Polypodium australe* (Cristatum Group), in situ, 2009



Fig. 6. *Polypodium australe* (Cristatum Group), Close up of single frond

***Polypodium australe* (Semilacerum Group)**. Wherever there is a good stand of *P.australe* you can almost always find some semilacerate fronds – that is with pinnae, at least at the base of the frond, themselves partially pinnate. Hence 'semilacerate'. Semilacerum is not always a great beauty but if you do find one be patient, it might turn into the proverbial swan in cultivation. 'Pulcherrimum Addison' was initially collected as a semilacerum. It was only in cultivation that it turned into the real beauty we grow today. The



## Recent developments – polypodium cultivars

plants pictured were both found in Ireland in 2009. I found my plant by Loch Gill in County Sligo, (Fig. 7.), and Jim Dennison found it near Limerick. (Fig. 8.). Another very good form collected recently by Matt Bishop is showing some similarity to 'Jubilee', I look forward to seeing what it does next season.



Fig. 7 *Polypodium australe* (Semilacerum Group) Loch Gill, 2008



Fig. 8 *Polypodium australe* (Semilacerum Group) Nr. Limerick, 2009

***Polypodium australe* (Omnilacerum Group).** Found by Rob Cooke wild in Co. Cork, Southern Ireland a few years ago. It is a quick grower with him and looks indistinguishable from 'Omnilacerum Oxford'. In continued cultivation it may become a recognisably different clone. 'Omnilacerum' means fully lacerated, ie. The entire frond lacerated unlike 'Semilacerum' where only half the frond is lacerated. Unfortunately in 'Semilacerum' the divisions are usually regular and not really lacerated!

***Polypodium australe* 'Omnilacerum Rickard'.** It embarrasses me to use this name but this is the name by which it is known in collections. It was raised by me as a sporeling from 'Omnilacerum Oxford', from which it differs by having more deeply and more regularly lacerated pinnae. (Fig. 9.).



Fig. 9. *Polypodium australe* 'Omnilacerum Rickard'

***Polypodium australe* 'Herbert Whitley'.** The history of this cultivar is somewhat obscure. It has been traced back to Herbert Whitley at Paignton Zoo. It was passed to Terry Jones of Zeal Monachorum who in turn gave a piece to Matt Bishop, of snowdrop fame, now Head Gardener at The Garden House, Buckland Monachorum. It is a curious cultivar which does not fit into any established group. The pinnae are crenately lobed and sometimes bifid at their tip. Most, or even all, fronds are crested at the apex. The crests are variable, often in one plain, ie. flattish, and not very elegant. In the figure the fronds are showing some variegation. This is still a rare cultivar but it is in a few collections. The photograph is taken of Andy Byfield's plant. (Fig. 10.).



Fig. 10. *Polypodium australe* 'Herbert Whitley', 2008



## Recent developments – polypodium cultivars

***Polypodium australe* 'Hornet' variants.** I originally found 'Hornet' in 1983 near Llandudno in North Wales. It is a cornute form, that is the frond and pinnae tips end in a spine, or horn. Simon Savage was interested to further explore the site so I gave him details and he went back to Llandudno and uncovered several plants additional to the original 'Hornet'. Some look to be distinct. One plant had linear pinnae, (Fig. 11.) I revisited the site with Simon recently and again we found several interesting things. When grown on they may be different to true 'Hornet'. 'Hornet' is a fabulous cultivar in cultivation and is sold by Fibrex Nurseries.



Fig. 11. *Polypodium australe*, with linear pinnae, originally collected in 2008

***Polypodium australe* (Crispum Group).** Occasionally plants stand out from the rest despite differing little from normal. This form was growing near Loch Gill, near Sligo Ireland where I spotted it while ferning with Jim Dennison. It is a pretty little fern, with a slightly wavy lamina, well worth growing in my opinion. (Fig. 12.)

***Polypodium vulgare* (Cristatum Group).** This was found by Simon Savage growing on a roadside cliff in Turkey (Fig. 13.). Not a great beauty but an interesting variant quite unlike any other I have seen.

***Polypodium vulgare* 'Suprasoriferum'.** This was a cultivar I had never seen but one which was occasionally referred to in the Victorian fern books. Barry Wright



Fig. 12. *Polypodium australe* (Crispum Group)



Fig. 13. *Polypodium vulgare* (Cristatum Group)



Fig. 14. *Polypodium azoricum* - crenate form



introduced me to this. He was given it by John Durkin who discovered it near Belford in Northumberland. Again not a beauty but a curiosity which certainly appeals to me. It differs from the norm by producing sori on the upper surface of the frond. Unfortunately Barry's clone is only occasionally suprasoriferous but maybe better sporelings can be raised.

***Polypodium azoricum* - crenatum type.** The dark green fronds are divided much as in *P.australe* Omnilacerum Group but the tips of the divisions are rounded. Hence it seems more appropriate to describe it as a 'crenate form'. This has not yet been officially named. (Fig. 14.) It was found on Sao Miguel in the Azores by Michael Hayward.

***Polypodium hesperium* 'Suprasoriferum'.** I encountered this curiosity in 2009 at the head of the Teanaway Valley in the Cascade Mountains of Washington state about 200 miles inland from Seattle, USA while ferning with Judith Jones. Astonishingly I had botanised the same rock with the BPS group in 2003 during the 'Best in the West' tour but seemed to have missed it! I'm sure it must have been there in 2003! Unlike the *P.vulgare* form of this cultivar the Teanaway plant was uniformly suprasoriferous, at least it was in the autumn of 2009. Of course it may not be constant, hopefully Judith will be able to monitor it to see how it behaves each year.(Fig. 15.). The sori are all at the margin of the frond and may be largely on the underside but the sporangia spill round onto the top of the frond giving the suprasoriferous effect.

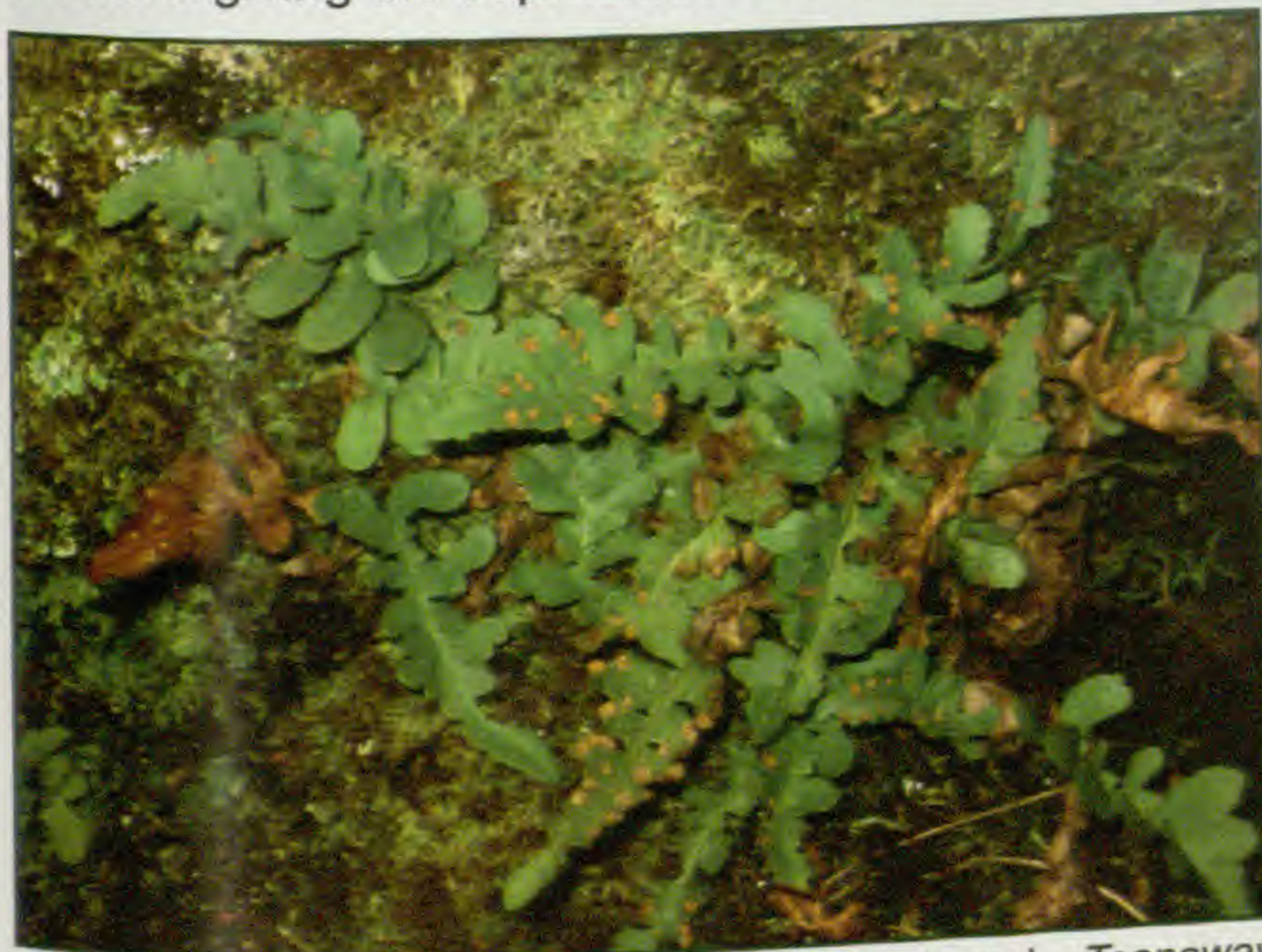


Fig. 15. *Polypodium hesperium* 'Suprasoriferum'. Teanaway Valley. 2009

***Polypodium calirhiza* 'Sarah Lyman'.** Found in the wild some years ago in the western USA by Dr Lyman and named after his daughter. Most sources give this as a plumose form of *P.californicum* but Judith Jones of Fancy Fronds nursery in Washington State, USA considers it a form of *P.calirhiza*. This seems more likely to me. It was introduced into cultivation in Britain



Fig. 16. *Polypodium calirhiza* 'Sarah Lyman'. Simon Savage's garden 2005

by Matt Bishop who was given it by Judith Jones, via Jerry Flintoff, 8 or 9 years ago. While this cultivar is plumose it is not as feathery or as thin textured as the cambricum forms of *P.australe*. Despite that I believe 'Sarah Lyman' is sterile, at least neither Judith nor I have ever seen it spore.(Fig. 16.)

***Polypodium glycyrrhiza* 'Grandiceps Crocker'.** I distributed this fern as *P.glycyrrhiza* (Grandiceps Group) for many years. I was first given it by Judith Jones about 20 years ago. It is a beautiful fern. (Fig. 17.) Recently I discovered it had originated from Lawrence Crocker in Oregon. Lawrence was one of the founding partners behind the famous Siskyou Rare Plant Nursery in



Fig. 17. *Polypodium glycyrrhiza* 'Grandiceps Crocker', after snow! 2010



## Recent developments – polypodium cultivars

Medford, Oregon. It is unclear whether it was spore raised or a wild find.

***Polypodium glycyrrhiza* 'Diane'**. This was found by Dan Robinson in a rest area by the Interstate 5 motorway near Cottage Grove in Oregon. Judith Jones has grown this for many years and for her it is very similar to 'Grandiceps Crocker' but slightly larger. Certainly her plant is very large (Fig. 18.) compared with my plant which is poorly developed by comparison (Fig. 19.).



Fig. 18. A frond of *Polypodium glycyrrhiza* 'Diane' at Judith Jones's nursery

I have only grown this here in the UK for two or three years. Since size is an unreliable character both Judith and I think the two strains are probably one and the same. I wonder if some 'Grandiceps Crocker' had been dumped as garden waste by the Interstate 5 before being collected by Dan Robinson?



Fig. 19. A frond of *Polypodium glycyrrhiza* 'Diane' in my garden. 2010

***Polypodium glycyrrhiza*, Acute forms.** The pinnae tips of all *Polypodium glycyrrhiza* are acutely pointed. It's a character that is very helpful for recognising the species. Plants collected in the Pacific North West of the USA or British Columbia about 100 years ago were brought into cultivation in the UK and for a long time they were known as *P.vulgare* 'Acuminatum' for this reason. While in the Seattle area during the autumn of 2009 I was struck how some clones of *P.glycyrrhiza* have very long tapering pinnae tips. The plant in Fig. 20. Was photographed in the Elizabeth Miller garden near Seattle but very similar plants were seen in the wild. They are all attractive forms.

***Polypodium glycyrrhiza*, Cornute forms.** While in Oregon in autumn 2009 with Judith Jones I saw plants of *P.glycyrrhiza* 'Malahatense' – fertile form - with horns at the tips of some pinnae – as in *P.australe* 'Hornet', although with 'Hornet' the spines are on **all** pinnae. This may be a fixed character or it may be environmentally induced. We saw this character on plants in cultivation (Fig. 21.) and in the wild near the Oregon Coast, the wild plant may not be the same. Unfortunately it was early in the season and fronds were not yet fully mature.



Fig. 20. *Polypodium glycyrrhiza* Acute form. Elizabeth Miller garden 2000

***Polypodium australe* 'Cristatum Trippitt'**. Not a new cultivar. This beautiful variety was raised by Bob Trippitt about 1975, but it is still rare. I include it here because the plant shown in Fig. 22 is a good example of what this fern can look like when well grown. This plant was photographed in Simon Savage's garden.

Not an inconsiderable list of new developments in the genus over 10 years since my last list. It only goes to show new cultivars are out there waiting to be found. It's not purely a Victorian phenomenon. Equally new cultivars can be spore raised. My advice to any lover of polypodiums is to keep your eyes open especially when in country where *Polypodium australe* is common, or for our American friends, wherever there are polypodiums! Please let me know of any exciting discoveries! □





Fig. 21. *Polypodium glycyrrhiza* 'Malahatense' (fertile form) with cornute



Fig. 22. *Polypodium australe* 'Cristatum Trippitt' in Simon Savage's garden.

## Appendix:

### Earlier lists or part lists of polypodium cultivars

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**Rickard, Martin.(2000).** *The Plantfinders Guide to garden ferns*, pp. 130 – 142, David And Charles.

## Book Review

**Synopsis of the Lycopodiophyta and Pteridophyta of Africa, Madagascar and neighbouring islands.**  
J. P. Roux. *Strelizia* 23, 2009. South African National Biodiversity Institute, Pretoria. Pps. 296 + 8 plates.  
Hardback.

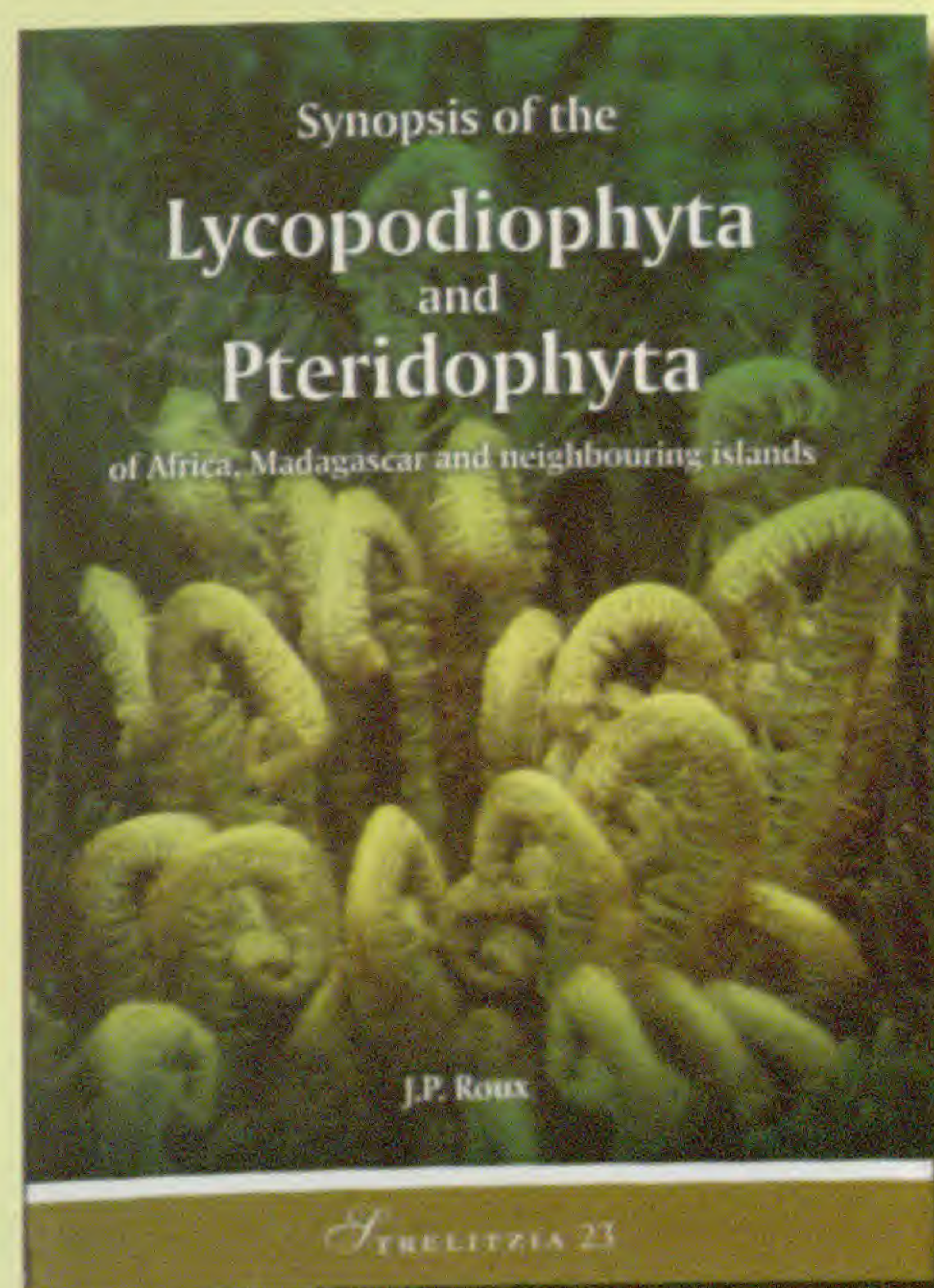
This book represents an update and considerable expansion of J. P. ('Koos') Roux' earlier "Conspectus of Southern African Pteridophyta" in 2001. The present work covers the whole of the African continent, Madagascar, and (excepting Madeira and the Canary Islands) all of the neighbouring islands, e.g. Cape Verde, Ascension, St. Helena, Tristan da Cunha, the Mascarenes, Comoro, Seychelles, Socrota, and the sub-antarctic islands to the south-east.

Taken in sequence, the main contents are – a schedule of the new combinations and new names published in this volume (57 of them); eight coloured plates of photographs picturing 48 ferns; an introduction which includes a table showing the number of fern families, genera and species in each of the 75 countries/island groups included and a note on the relatively poor fern diversity in the region (only 1441 species and sub-species); the structure of the synopsis explaining that for each species the accepted name is followed by the basionym (the original valid name) and all subsequent synonyms, in each case full literature citations being given; the synopsis itself (212 pages); "misplaced names and names of plants of unknown identity" (7 pages); references (29 pages); index (40 pages).

The amount of detail included in this work is staggering, and surely must represent many years of hard labour. Undoubtedly it will prove a very valuable reference tool for professional botanists, but maybe less so for others because taxa descriptions are not given (not being the intention of the work), and the plate illustrations, although very good, are confined to 48 out of the 1441 species.

The book is available from the South African Botanical Institute (SANBI) e-mail: [bookshop@sanbi.org](mailto:bookshop@sanbi.org), website: [www.sanbi.org](http://www.sanbi.org) at US\$55 + p&p. □

Graham Ackers





# "More Killarney ferns than could be found in Killarney": The Tropical Ravine House, Belfast Botanic Gardens

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In 2008 I was very pleased to receive a grant from the BPS Centenary Fund towards the costs of my ongoing research into Pteridomania, or the Victorian fern craze. This is a subject that I have been studying for over ten years, and it has involved much travel around the UK, visiting private and public ferneries, libraries, museums, and so on. Thanks to the BPS grant, in June 2009 I visited the Tropical Ravine House at Belfast Botanic Gardens.

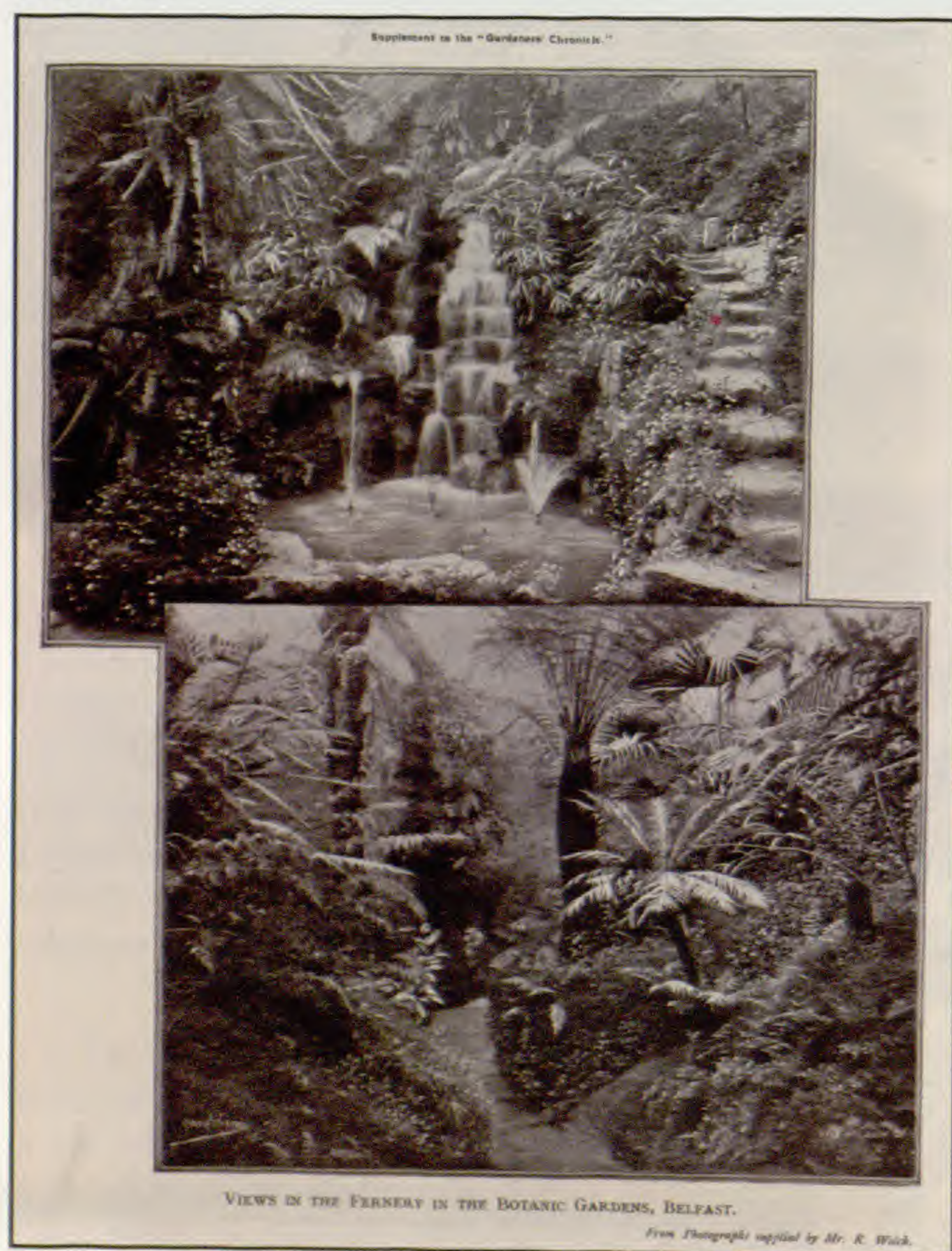


Fig. 1. Belfast Botanic Gardens from the Gardener's Chronicle 1904

Belfast Botanic and Horticultural Society was formed in 1827, and bought a 14-acre site south of the city the following year. The Botanic Gardens eventually included areas of rockwork planted with most of the native British ferns, but far more unusual was the fernery, conceived by the Gardens curator, Charles McKimm (1848-1907). Also known as the Glen, the fernery was constructed between 1887 and 1889 on the site of an orchid house and a propagating house that had been converted into a cool fernery in 1866. After Belfast Corporation bought the gardens in 1895, they remodelled the Glen at a cost of £1,000 in 1900. In 1902 they extended the house to include a heated lily pond. This cost £340, including £40 to the Ravenhill Ironworks for the heating apparatus. The rectangular,

two-storey, red-brick building is now 185 feet long and 45 feet wide, with a Dutch gable at the east end, and a glass gable at the west.

The building is cut into sloping ground, and visitors enter at the west end on to a narrow gallery that runs around the perimeter of the building about 12 feet above the floor of the house. Unusually, as well as light coming down through the glass roof, the walls are lined with large, shallow-arched windows. Visitors look down from the gallery into a glen, or ravine, of red sandstone mossy rocks, and through a lush tropical jungle of plants, including ferns, bananas, palms, bamboos and cycads, rooted in the ground, growing up the walls and in baskets hanging from the roof.

The 110-foot-long temperate section is entered first. The planting is in raised, irregular beds, and in the 1900s 'specially conducted visitors' descended rough stone steps to inspect more closely a small pool with a cascade operated by a pulley, and fight their way through verdant foliage along the meandering paths. Doors on the ground and first floors lead into the 75-foot-long stove section, with a rectilinear pool



Fig. 2. The temperate section at ground level (not publicly accessible)





Fig. 3. Some of the canopy of the temperate section

on the first floor on top of the boiler, built to contain the giant South American water lily, *Victoria regia* (now *Amazonica*). The end wall, backing the pond, was covered with the *Nephrolepis* genus of ferns, *Ficus repens* or creeping fig, and begonias. This section also had stone steps leading down into the undergrowth.

The house was originally heated by gases from an open-hearth fire that was kept constantly fired in the boiler room. Pipework was run inside a duct that diminished in height and was covered with soil. The gradual reduction in the size of the duct was to ensure that the gases from the pipes moved slowly enough to warm the walls and the soil piled around it, providing a continuous constant heat into the house. At the end of the duct the gases passed into two earthenware shafts, before connecting to a brick chimney. However, the long, horizontal duct did not provide a sufficient draught to draw the gases into the chimney, and the system was replaced with the more reliable method of banks of 4-inch cast iron pipes running around the building at high and low levels. The pipes were camouflaged by wooden screens faced with cork and covered with *Hyphnum* and *Sphagnum* moss.

Frederick Burbidge (1847-1905), curator of Trinity College Botanic Garden in Dublin from 1879 until his death, claimed that the Tropical Ravine House was one of the finest and most artistically arranged fern houses in Europe. He added that he had never seen ‘so fine and satisfying a collection of ferns, bamboos, mosses and climbing and trailing plants under a glass roof before.’ He was particularly impressed by a nine-foot long by three-foot-wide bank of Killarney fern, commenting that there were probably more “Killarney ferns growing there than could be found in Killarney.”

Charles Druery wrote about his visit in the *Gardeners’ Chronicle* in December 1904. He thought that the most striking and – even in his experience – unique feature of the Gardens was the fernery, and that it gave ‘a splendid idea of a tropical or subtropical glen, from the depths of which the larger vegetation springs, and towers up to a considerable height above the beholder’s head.’ Then as now, the house was planted with bananas ‘20 to 30 feet high, with leaves 10 or 12 feet long, and trunks quite a foot in diameter at the ground-level’, as well as palms, bamboos, and cycads. There were many ‘lofty and grand’ specimens



Fig. 4. The west end exterior

of tree ferns, including *Alsophila*, *Cyathea*, and *Dicksonia*, and a ‘multitude of smaller, exotic Ferns, *Asplenium*, *Nephrolepis*, *Microlepias*, &c., which push their feathery frondage through masses of bright-hued *Caladiums*, *Anthuriums*, and scores of other handsome foliage plants.’ In addition, ‘seen from above, wide-spreading sheets of *Selaginella*, *martensii*, *krausiana*, and other species, completely hide the rocks and soil,’ while overhead there were ‘a number of hanging baskets . . . accommodating specimens of pendulous ferns and pitcher-plants, of which latter there is a good collection.’

Between 1980 and 1983 the original wood and glass roof was replaced with a new, simplified aluminium frame, and re-glazed. However, the roof is once more in need of major restoration and wind and water are causing damage to the plants, some of which date back to the 1880s. The glazing system cannot be repaired as the parts are no longer available, so a new roof, costing roughly £1.75 million, is needed. As part of a campaign to raise funds, the Friends of Belfast Botanic Gardens are inviting sponsorship of individual panes of glass, see [www.fobbg.co.uk](http://www.fobbg.co.uk). □

Dr Sarah Whittingham’s book *The Victorian Fern Craze*, is published by Shire Books, £5.99. Her book *Fern Fever: The Story of Pteridomania*, is in preparation for the publishers Frances Lincoln, and will be published in 2012.

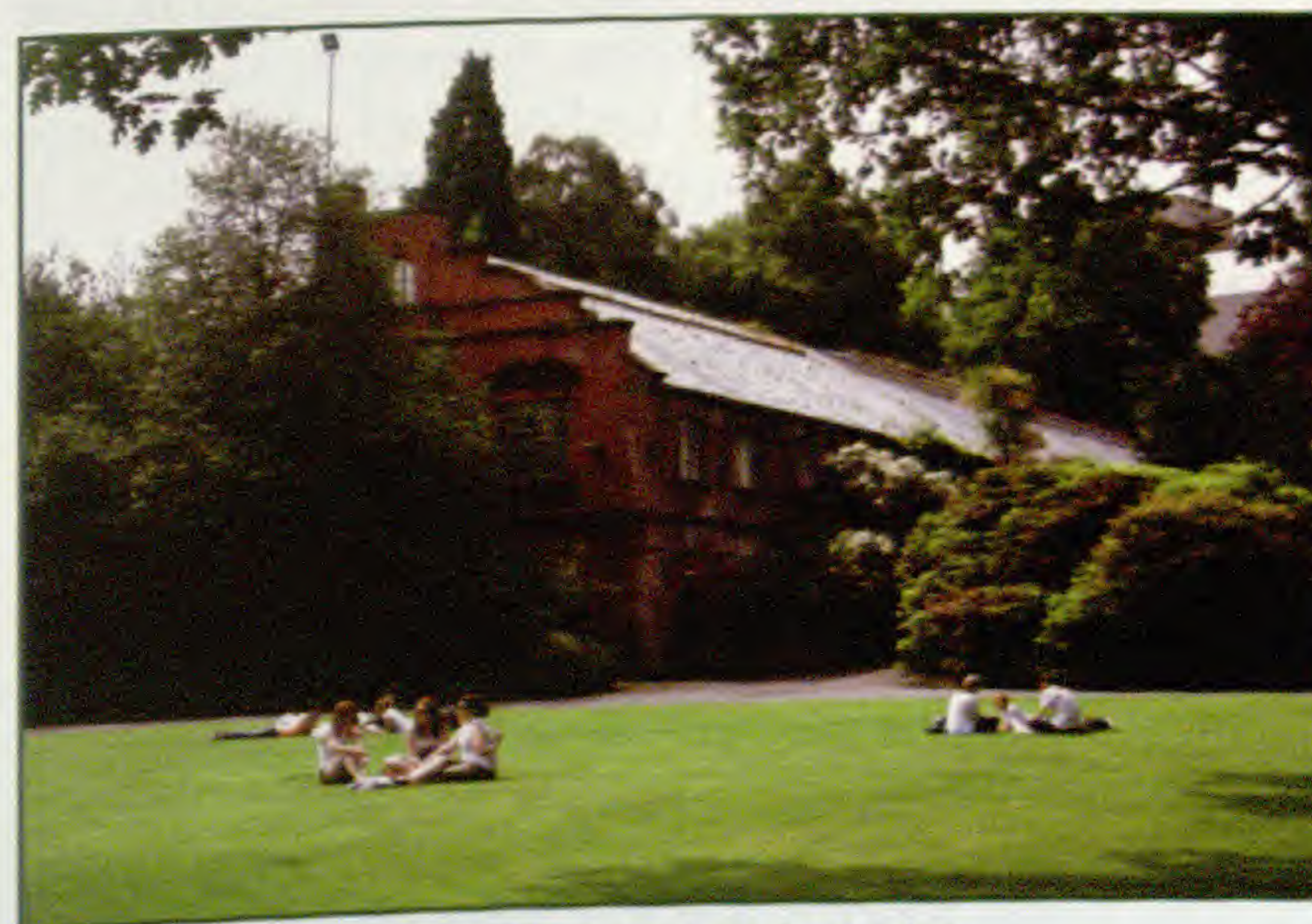


Fig. 5. The east end exterior



# Recording ferns in the British Isles

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In previous issues of the *Pteridologist* Chris Page (2005; 2006) has introduced us to fern recording, giving us a fascinating personal view on the “why” and “how” he goes about capturing data on the ferns he finds. In this article I want to focus much more specifically on what I as BPS recorder would ideally like you the active fern finder to record, why, and how you can most simply do this.



*Dryopteris cristata* Wishmoor Bottom, Surrey

It is hoped that we can do the necessary monitoring for our rarest species as a part of our field-meeting program

Let's briefly look at why I want you to spend extra time and effort on your ferny rambles. Essentially knowledge is power – the power to perhaps halt inappropriate developments, or even to prevent a species' extinction in this country; your records can be that important. By capturing accurate data on what is growing where and when (and where possible giving some measure of abundance) we build a better understanding of Britain's wildlife and its responses to our changing environment. We can see what species are responding to changes in land use, or pollution, track the spread of potentially damaging aliens escaping from our gardens and better explain why things are increasing, or disappearing.

Historically we have sought to protect through legislation, such as the Wildlife and Countryside Act, our very rarest species and it is these which have been the countryside agencies' priorities. Our knowledge

of the abundance and distribution of our fern species has played a major part in determining what has been protected and this also influences the resources available from government and other sources to do research on, monitor and protect these plants. To qualify for inclusion in the Red Data Book (Wigginton, 1999) a (rather arbitrary) figure of presence in less than 15 hectads was used. A hectad is a square of ten kilometres on the Ordnance Survey national grid; in total there are over 3,800 covering Britain and Ireland. In the past biological recording has generally been captured and then represented as dot-maps at this scale. Increasingly we have come to realise that what may be more important is threat, rather than absolute rarity. Thus a species which has always been rare may be perfectly adapted to living in small, isolated populations and may well have survived in a stable situation since our recording began back in the seventeenth century. Such species are therefore arguably less in need of conservation effort (if we can persuade people not to dig them up!) than those species which are undergoing catastrophic declines. Obviously to be able to decide whether a species is declining and how badly, we need accurate records, made over a period of time. For government to listen and take the plants that interest us seriously (and indeed for it to meet its obligations to international treaties on Biodiversity) we must be able to produce, analyse and then clearly present quantifiable data. This is something that Ornithologists have been very good at – counting birds is after all somewhat easier than counting individual ferns (where does one Bracken plant end and the next start?). To create the necessary statistics for ferns (and all of our other vascular plants) we have had to rely on the hectad data collected by the Botanical Society of the British Isles for its two British Atlases. These were published 40 years apart (Perring et al., 1962; Preston, Pearman & Dines, 2002) allowing a valid comparison to be made and the necessary estimates of the rates of loss to be calculated. The analyses were published in Cheffings et al., (2005), The Vascular Plant Red Data List for Great Britain, which allowed us to give each species an IUCN threat category. This in turn has led to the recognition of which are the most particularly threatened species and these have then been selected for the UK Biodiversity Action Plan process, the mechanism used to target resources and actions to protect our wildlife.

So simple recording even just at a presence/absence level at a 10km square scale has played a major role **but** obviously relying just on information captured at this scale misses much. It causes us to underestimate losses and most significantly does not allow us to say very much about abundance. The trend therefore is to map at ever finer scales and where possible, for the species known to be of conservation concern, to have their abundance (or for clonal species the area occupied) recorded. Because we now have



## Recording ferns in the British Isles

the technology to record accurately our position when in the field (GPS), access to extremely good quality maps and internet searchable images of localities such as provided by Google Earth, it is possible to do better – the down side is that much more effort is required to record at finer scales. We therefore have to strike a balance – capturing the best and most useful data without getting thoroughly cheesed off with the whole process!



"I can promise you nothing but blood, sweat, tears...and *Woodsia ilvensis*!"

A group show the necessary recording backbone in inclement weather.

### What to record

Ideally it would be wonderful to have a highly accurate (8 figure) grid reference for every fern plant in the country, with repeat visits at least every 5-10 years to assess changes – obviously though this is completely impossible. We therefore need to do the best we can, use an appropriate scale for our recording and only invest maximum energy in documenting those species (and hybrids) that we might consider to be most worthy (see below). It is important not to forget the more widespread and common species- they may in fact be declining more rapidly than the rarities are, but such a decline may be masked by the recording scale used.

So what might be an appropriate scale for recording? We need to consider several levels of hierarchy. Biological recording has often focussed on the county – an administrative area which is well defined and which often has a deep personal resonance...I will never stop being an Essex man, for better or worse! However administrative county boundaries change. To prevent confusion and allow meaningful comparisons over time fixed areas are necessary. For Botanical recording purposes the areas we still use, the "vice-counties" (113 British and 40 Irish) were those defined by H.C. Watson in 1852 (and for Ireland by Praeger, 1934). These largely followed the administrative counties of the day but had a few quirks to trap the unwary. They were more accurately mapped by Dandy (1969) and a digitised version of the master copies held in the library of the Natural History Museum is now available on the web through the NBN. Each year new vice-county records are published by the BSBI and it is our intention that in future the fern records will be published in the Society's journals too – there is a thrill to seeing the fruits of your labour and your name in print!

### What is already known?

Published Floras are a good first port of call. They have



*Dryopteris x complexa* on BPS/BSBI *Dryopteris affinis* workshop 2009. Just the sort of difficult plant for which a herbarium voucher would be expected. (Photo: H.J. Crouch)

tended to follow county boundaries and in recent years more detailed Rare Plant Registers are also actively being compiled based on these areas. This is backed up and largely driven by a country-wide network of recorders supported by the BSBI – each county having their own person or persons who have taken on the compilation and storage of records, regularly passing information to a central hub where the data can be processed and displayed on the web. The maps on the BSBI website are therefore more up to date than those published in the Atlas (Preston, Pearman & Dines, 2002) or in Special publication No.8 (Wardlaw & Leonard, 2005), which contains the Atlas maps for Pteridophytes only. These help you see what is known from where, and when (in broad date classes (pre-1930, 1930-1969, 1970-1986, 1987-1999, 2000-2009)...I find looking at them an incentive to fill in the gaps, or, just as importantly, to update where only old records exist. The contact details of the BSBI recorders can be found on the BSBI website, or for those of you without internet access I can send the relevant details. Records you create and information about exciting ferns you find could be sent directly to the vice-county recorder but I would ask for copies to be sent to me too, so that we can maintain an independent data-set and I can check and do the necessary quality assurance. Thus if a species/taxon/hybrid is a difficult one to easily identify, or a record comes in for something rare in a completely new area, I can get back to the finder and help confirm. To this end it is worth noting that these tricky things should generally be backed by a voucher (a specimen pressed to allow someone to see the salient features, eg. for a hybrid that it has abortive spores) or for more distinctive but rare things which we might not want to collect a good photograph.

### Where and how should I record?

You may wish to only record at a local scale, say a particular feature like a local nature reserve. Maintaining a list and accurate records of such areas is definitely to be encouraged but it is important when doing this, or indeed when recording more generally to consider how to maximise the worth and usefulness of your data to the wider biological and conservation communities. To do this you must be aware of boundaries – Vice-



## Recording ferns in the British Isles

county firstly, then hectads, and as most recording is now being done at a tetrad (2km square) or even 1km square level where these boundary lines fall in your area. Much of our recording may initially be on our excursions and these by their very nature may cover a range of discrete sites and ground; it is therefore important to bear in mind where boundaries occur so that the best possible records ensue. Of course these things become irrelevant if each plant record made has a unique grid reference associated with it but this is time-consuming and not always feasible. It is important not to mis-use an accurate grid reference since it implies a very precise location. If the records are being made from the whole of a particular wood, reserve or grid square then it should be listed with an appropriate grid reference, eg. TQ 36-,78- (the bottom left hand corner of the square/tetrad/hectad in question) which reflects this, rather than giving a more detailed grid reference eg. TQ 36405, 79038 which doesn't actually relate to the position of any of the plants recorded, but was the meeting point for the excursion, the car-park etc. Think how you would want things to be presented if you needed to rapidly (re)find a plant.



*Pteris multifida* – Pierrepont Street, Bath VC.6, N. Somerset (ST 752,646) 18.10.2007

A good example of an increasing alien species which has been overlooked and misidentified and for which records, ideally backed by photos or specimens are wanted.

### New Record Card

We are producing a new recording card which will be downloadable from the web and available as hard copies from me. This is aimed to make recording at a particular site as easy as possible, allowing you to tick off species as they are seen and with space enough to record quantities, or precise grid references. All but the rarest British native species are included which hopefully will act as an aide-mémoire. For those not listed these are obviously significant finds and they should be written in and more precise details (exactly where, how many, extent of area, etc.) should be recorded. The species for which we would like this more detailed information are:

UK BAP priority species:

*Dryopteris cristata*,  
*Lycopodiella inundata*  
*Pilularia globulifera*  
*Polystichum lonchitis*  
*Woodsia ilvensis*,

Rare species listed in the Red Data Book (RDB) :

*Asplenium trichomanes* subsp. *pachyrachis*,  
*Cystopteris dickieana*,  
*C. montana*,  
*Isoetes hystrix*,  
*Ophioglossum lusitanicum*  
*Vandenboschia speciosa* (= *Trichomanes speciosum*)  
*Woodsia alpina*

Species which have only been discovered since the RDB was published but which we know to be rare:

*Cystopteris diaphana*  
*Dryopteris pseudodisjuncta*  
*Lycopodium lagopus*

Several other species that are nationally scarce also probably warrant this extra level of attention, these include *Asplenium septentrionale*, *Dryopteris mindshelkensis* (= *D. submontana*) and *Ophioglossum azoricum*.

In addition we are very keen to collect accurate data (6 figure grid references or better) for all fern hybrids found (for which existing data is very poor) and also for every alien fern that you find in the wild. The latter are particularly important as we need to document the initial spread of plants which may go on to become pests.

The intention of this article is not to appear prescriptive – recorders must decide what is important to them too. Individually, or within our local groups, I am sure that we will come up with particular taxa that we are interested in, or worried about, even if these are nationally of lower concern. For instance in much of Southern England finding *Thelypteris oreopteris* (= *Oreopteris limbosperma*) or *Equisetum sylvaticum*, which were always sparse and have definitely declined, would be extremely welcome whereas in upland England, Wales or Scotland they probably wouldn't warrant a second look!

To try to encourage greater recording within the Society we hope to include some regionally based workshops associated with our field-meeting programme, where we can trial the new recording forms, address questions and hopefully generate interesting results which will allow others to benefit from our expertise.

### What is needed for a good record

Remember the 4 W's! What, Where, When and Who. So the essential information needed is:

**Taxon name** - Species, subspecies, hybrid or where you are unsure aggregate, eg. *Dryopteris affinis* agg. if you don't know which of the segregates it is.

**Site name** – can be what you know the place as but needs reference to the nearest town that other people can find on a map or gazetteer

**Grid reference** – accurate to what is being recorded. Use a GPS if you have one or a good old fashioned map.

**Date**

**Name of Recorder (and determiner if different)**

Everything else is a bonus, but anything you can add on: abundance, numbers and areas occupied, or descriptions of the site and where rare plants occur in it, add immeasurably to a records worth. □



# *Dryopteris pseudodisjuncta* - a new fern for Britain

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*Dryopteris pseudodisjuncta* (Fig. 1) is a species within the *Dryopteris affinis* complex which has its centre of distribution in southern Germany, Austria and Switzerland, with rare outliers in France, Luxembourg, Belgium and Norway. It was found in Kirkbean Glen (NX9759), south of Dumfries, during a BPS outing in July 2008, this being the first record of the species in Britain.

At the time of its discovery I said nothing to the other members of the group, preferring first to check its identity against two reference plants in my garden, one of which had originally been sent from Switzerland to Tony Church when he was working on Arran, and the other had been grown from spores by Neil Timm. Having satisfied myself of its identity, I then sent pictures of the diagnostic features of a frond to Fraser-Jenkins and three botanists in Germany who are familiar with the species. Reaction to the pictures was mixed, and there was subsequently a great deal of exchange of pictures, spores, and fronds with two of the German botanists, Günther Zenner and Jens Freigang. Finally, in August 2009 I spent a week with Herren Zenner and Freigang, and they took me to various sites in which the species occurs in Germany, Austria and Switzerland, including the locality where the type specimen was collected.

## Diagnostic features

The plant is of similar size to other members of the *D. affinis* complex, having fronds a metre or more in length. The fronds tend to be widest about  $\frac{2}{3}$  of the distance from the base, from which point they taper towards the base. The pinnae are intermediate in glossiness and texture between *D. affinis* and *D. borrieri*, and the pinnule segments tend to slope away from the rachis, and are trapezium shaped (narrowing from base to tip) with a rather narrow tip which may be rounded or occasionally truncate. (Fig. 2)

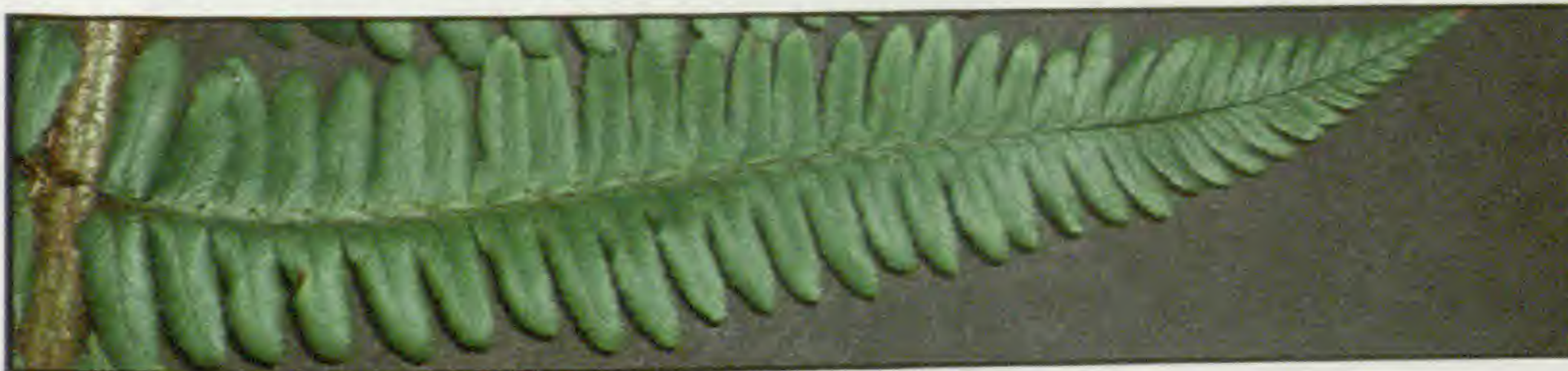


Fig. 2. Pinnae details

The sides of the pinna-segments are mostly without teeth, or with a few indentations, this feature being highly diagnostic. The basal pinnules on each pinna tend to be slightly longer than the adjacent pair, and often have some small lobes on the side next to the rachis (occasionally more prominent in some specimens). In mid-frond they are partly attached to the pinna costa, (Fig. 3) whereas on the basal pinnae they are stalked and narrowed towards the base, which is therefore wedge-shaped (Fig. 4), this feature also being diagnostic (in all other species in the *D. affinis* complex in which the basal pinnules are stalked, the bases of the pinnules are either square or slightly cordate).



Fig. 3. (Left) Mid frond showing small lobes partly attached to the pinna costa.



Fig. 4. (Right) The basal pinnae showing the stalk and narrowing towards the base.



Fig. 1. *Dryopteris pseudodisjuncta*



## *Dryopteris pseudodisjuncta* - a new fern for Britain

In the Scottish plants the basal pinnules on the basal pinnae are sometimes prominently lobed, and in this respect they differ from Continental specimens.



Fig. 5. Details of the scales on the stipe showing them to be dense, narrow and deep brown.

The scales are also characteristic. On the stipes and rachis they are dense, narrow, and deep brown with a darker patch at the base.(Fig. 5) Narrow wispy scales also extend along the underside of the costa of each pinna.(Fig. 6)



Fig . 6. Narrow wispy scales under the costa of each pinna.

The sori (Fig. 7) provide yet another aid to identification. When mature, the indusia have a noticeable darker depression in the centre (although this characteristic is also seen in some specimens of *D. borrieri*). The indusium is thick, grey at first, turning dark brown when the spores are ready to be shed.

Finally, the spores themselves are characteristic in



Fig. 7. The indusia with the darker depression.

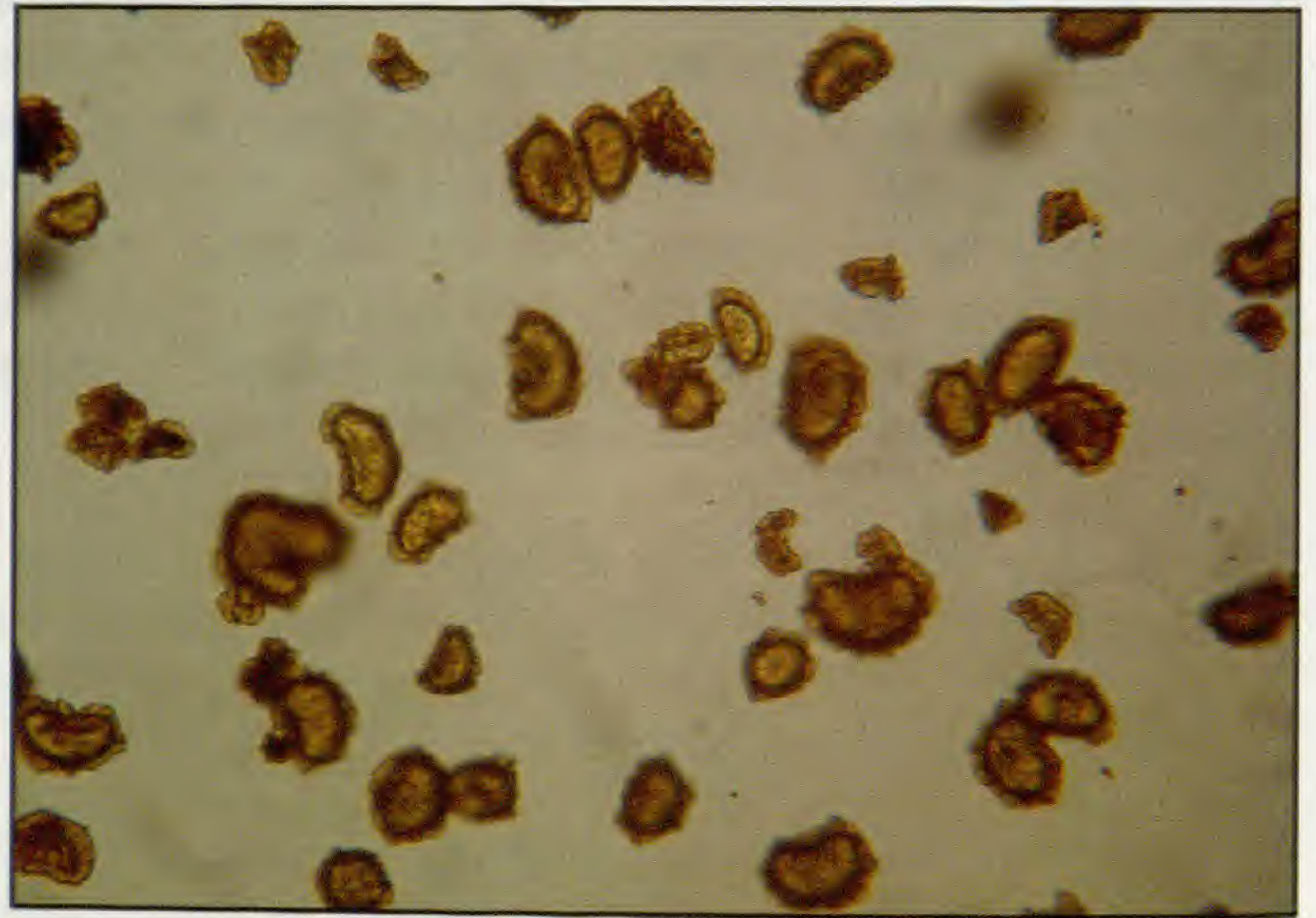


Fig. 8. A high proportion of aborted spores.

that there is an unusually high proportion of abortive spores for a taxon which is regarded as being a species rather than a hybrid.(Fig. 8)

### Could it be elsewhere?

The area of Scotland in which it has been found is very much under-recorded for pteridophytes, and further searching could well reveal the species at other locations. With this in mind the Yorkshire Group of the BPS is planning a week-end in the area on 21-22 August, 2010. Anyone who would like to join us would be most welcome. Our base will be the Clonyard House Hotel, but for those wishing to find alternative accommodation there are several B&B's in the area.

Apart from *D. pseudodisjuncta*, Kirkbean Glen is probably the best site in Britain for the *D. affinis* complex, having both subspecies of *D. cambrensis*, most of Anthony Pigott's morphotypes, including *convexa*, various forms of *D. borrieri* and several magnificent plants of *D. ×complexa*. Apart from the *D. affinis* complex, Kirkbean Glen has other goodies to whet the appetite, including *Polypodium ×mantoniae*, *Polystichum ×bicknellii* and some fine patches of the gametophyte stage of *Trichomanes speciosum*. □



# The Ferns of *Flora Danica* – Plates and Porcelain

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## Introduction

In the 2007 issue of this journal, I wrote about the magnificent 10 volume colour plate work, *Flora Graeca* (1806-1840). This period in history saw the production of several other fine (and expensive!) colour plate floras, for example *Flora Austriaca* (5 volumes, 1773-1778), *Flora Londinensis* (2 volumes, 1775-1798), *Plants of the Coast of Coromandel* (3 volumes, 1795-1820), *Descriptiones et Icones Plantarum Rariorum Hungariae* (3 volumes, 1802-1812), *Flora Javae* (3 volumes, 1828-1851, with its fine fern plates) - and *Flora Danica* (18 volumes, 1761-1883). As can be seen, in its class this latter work had the longest production time of all, spanning several Danish history epochs, 5 Danish monarchies, and of necessity requiring many different editor-authors, artist and engravers.



**Figs. 2a & 2b.** A luxurious copy of the first of two volumes of *Flora Danica* presented to Queen Caroline Mathilda (wife of Christian VII and sister of George III), now in the library at Rosenborg Palace. The title here is in Danish, but Latin and German versions were also produced.



**Fig. 1.** Georg Christian Oeder (1728-1791), the first *Flora Danica* author.

## The Book – Initial Period

Initially *Flora Danica* was funded by the reigning king Frederik V (king of Denmark-Norway 1746-1766), then successive kings, and later by the governmental Civil List. The first author, and the one under which this work is usually bibliographically classified, was a German botanist Georg Christian Oeder (1728-1791) (Fig. 1). On instruction from Frederick V, Oeder created a botanic garden in Copenhagen in 1752 (opened to the public in 1763), conducted his own field work and collections, and was accompanied by the first artist, Martin Rossler (1727-1782), another German. The first engraver (copperplates) was Michael Rossler (1705-1778), Martin's father. Between them, this team contributed most of the first 600 plates. The narrative is minimal, being confined to the start of each volume, and consisting of the plant names, brief Latin descriptions, and habitat and distribution information. The book

therefore basically consisted of plates (which were numbered but not named), and this was signified in the "official" name for this work – *Icones plantarum* etc.etc. (see References). Sometimes these were coloured, sometimes partially so, and sometimes uncoloured, many of the latter being distributed free of charge to organisations considered to be worthy recipients. To complement the main work, Oeder wrote a botanical textbook, *Elementa botanica*, the plates therein being inscribed with the words "Flora Danica" and "Elementa botanica".

## The Book – Subsequent Progress

Unhappily, Oeder's involvement with the work was terminated after 10 years, following a sequence of Danish political machinations which were rife at this time (these make a good story, but this is not the place!). This multi-talented man then went on to introduce reforms to rural populations and their agriculture. *Flora Danica* publication recommenced in 1775 after a 3 year hiatus, continuing through to 1856 with a succession of 5 editor/author/publishers. The final one, Johan Lange (1818-1898) then took over, completing the work in 1883. He was an expert in the floras of Denmark, Greenland and Spain, as well as medicinal and agricultural botany, and in 1858 was appointed director of the botanic garden (re-sited since Oeder's day). Throughout the production of the whole work, the plates had been delivered randomly from a systematic point of view because they were drawn and engraved as and when the specimens became available. Thus in order to tidy up the nomenclature, in 1887 Lange published *Nomenclator Florae Danicae*, a species table in systematic sequence showing the countries from where the species were known (i.e. the *Flora Danica* region – Denmark, Finland, Sweden, Norway, Faroes, Iceland and Greenland).

Over a period of 123 years, the work was published in 51 parts and 3 supplements to form 18 volumes (3 parts per volume). Each part/supplement consisted of 60 plates, making an astonishing 3240 plates in all. A remarkable publishing achievement, only exceeded in



## The Ferns of *Flora Danica* – Plates and Porcelain

time span by *Flora Batava* (1800-1934, 2240 coloured plates) and in number of plates by *Flora Brasiliensis* (1840-1915, 3837 mostly black & white plates). But the iconography in these works was often inferior to that in *Flora Danica*.



Fig. 3. Rosenborg Palace, Copenhagen, one of the three main locations currently housing the first *Flora Danica* porcelain service.

### The Original Dinner Service

With Royal patronage and shareholder investments, "The Danish Porcelain Factory" (as it was originally called) was opened in 1775, porcelain manufacture techniques and artistry being masterminded by the apothecary Frantz Heinrich Müller (1738-1820). Following initial teething problems, the shareholders relinquished their stake in the factory, which in 1779 became wholly owned by the king, Christian VII, and was changed to "The Royal Danish Porcelain Manufactory". It remained under royal ownership until 1868, when it passed into private hands.

During its early years, the factory produced a variety of pieces, including its first dinner service in 1781, before embarking on an 80 (increased in 1797 to 100) place-setting service based on the *Flora Danica* prints. Records describing how and exactly when this project was initiated appear to have been lost, but it is known



Fig. 4. Six porcelain pieces currently in the Royal Silver Room, Christiansborg Palace. From top to bottom, left to right – Oval Vegetable Dish with Lid (*Dryopteris dilatata*), Deep Plate (*Lycopodiella inundata*), Flat Plate (*Thelypteris palustris*), Custard Cup with Lid (*Asplenium septentrionale*), Deep Plates (*Lycopodium clavatum* and *L. annotinum* subsp. *annotinum*).

that the first painter was Johann Christoph Bayer (1738-1812), who had joined the factory in 1776, having been a landscape painter and a *Flora Danica* artist from 1768-1776. Production of the service probably started in 1790 and continued until 1802 when, by royal edict, the production was terminated. During this 12 year period, a staggering 1802 different pieces of hand-moulded and hand-painted porcelain had been created. Strict standards were followed to ensure that the plant images were faithful copies of those in the book – and they are, albeit re-arrangements are sometimes evident to fit the contours of the porcelain. The elegant and formal dinner service design portrayed an outside border of a palisade of gold points, inside of which were circles of gold and white pearls in relief, inner gold ones being adorned with painted plant fragments.

Part of the service was used for the first time when it graced the table of Christian VII at Amalienborg Palace on his birthday on 29 January 1803. Later that year it was delivered to the Rosenberg Palace for more permanent storage. Thereafter it has been used for royal festive and state occasions, the most recent being a banquet hosted by Denmark's much loved Queen Margrethe II at Amalienborg Palace on 26 March 1990 to celebrate her mother Queen Ingrid's 80<sup>th</sup> birthday.

### The Second Dinner Service

In 1863, a dynasty match had been arranged between the Prince of Wales (later Edward VII) and Princess Alexandra of Denmark, daughter of Prince Christian of Denmark (who became King Christian IX the same year). In Denmark, it was decided that a new *Flora Danica* service, the first since 1802, would be made as a wedding present, and a committee of ladies decided on the designs. For this service, they did not slavishly follow the book plates, and tended to favour the more "showy" flowers as decoration. Despite this, several fern images were used, some of which did not indeed follow the book plate design - see discussions below. When the wedding took place on 10<sup>th</sup> March 1863 the new service was incomplete, not being finished until February 1864. It consisted of 725 pieces for 60 place settings, but the dessert plates actually featured Danish castles and mansions rather than *Flora Danica* images. The service has resided at Sandringham, but is now at Windsor Castle.

After the production of this service, *Flora Danica* porcelain manufacture was re-started and has continued sporadically to the present.

### The Surviving Pieces.

Since the completion of the original service, it has been reduced by wanton destruction, predictable wastage, palace fires, stealing, and has been moved several times between palaces. Of the original 1802 pieces produced, about 1500+ still survive, and they are now mainly housed in central Copenhagen in the grand royal palaces of Christiansborg, Amalienborg and Rosenborg, with fewer pieces in the collections of Fredensborg Castle, the National Museum, the Museum of Frederiksborg Castle, and the Museum of Applied Arts. There are a total of 49 different designs, from the exotic baskets of flowers to the more practical egg cups. The most used, useful and numerous piece is the flat plate, of which 327 pieces were delivered in





Fig. 5a. *Botrychium* spp., the first fern plate (no. 18) in *Flora Danica*.



Fig. 5b. Pot and Craits at Rosenborg Palace. A professionally taken photograph showing part of *Botrychium multifidum* on the left hand side pot, with *Silene acaulis* on the right hand side one.

1803, and 255 existed as at 1990. Each of these plates features a different botanical image taken from the *Flora Danica* engravings, 7 of these being ferns.

Of all the 1500+ pieces, 29 use fern images from 25 *Flora Danica* fern plates, from number 18 to 1241 in fascicle 21 issued in 1799. No botanical images were used for the original service from later fascicles, because fascicle 22 was not issued until 1806, 4 years after production of the dinner service had ceased.

The 1863 service at Windsor Castle features ferns on 11 pieces (a 12<sup>th</sup> could not be found). Three of these images (featuring *Gymnocarpium dryopteris*, *Dryopteris fragrans* and *Salvinia natans*) are from book fascicles produced after production ceased on the original service.

### The Fern Images

Although entitled *Flora Danica*, the species coverage embraces the whole of Scandinavia, and is fairly comprehensive for the vascular plants (but much less so for the lower plants which were only featured later in the evolution of the work). Of the 3240 book plates, 73 feature ferns and lycophytes, covering 77 taxa. Although a "one for one" tally is not always possible, this does represent a significant proportion of the 86 species and subspecies now recognised in the modern



Fig. 6a. *Matteuccia struthiopteris* (plate 169) showing the whole plant uncoloured and various structural features, coloured



Fig. 6b. Square Serving Dish at Amalienborg Palace. The structural features (but not the whole plant image) of the book plate have been re-arranged to fit the porcelain

*Flora Nordica* (Jonsell, 2000). Although variable, the plates are very good examples of the artistic and engraving skills prevalent at the time, and many (but not all) portray good likenesses of their subjects. I have chosen 6 for illustration here, together with their associated porcelain pieces. Modern species names are used for simplicity as, in many cases, those in the book and inscribed on the base of the porcelain pieces are earlier synonyms.

Figs 5a/b. *Botrychium* spp. (plate 18, published 1762). This was the first fern plate to be published. Clockwise from the bottom left the species are *Botrychium lunaria*, *B. multifidum* and *B. lanceolatum*. All are widespread if not necessarily common in Scandinavia. The images were created by the Rossler's, considered by some authorities to be the best of the *Flora Danica* illustrators. All three are indeed finely executed, albeit the colouring on the frond of *B. lunaria* seems a little heavy handed. Interestingly, *B. lanceolatum* was figured again in the work, much later (plate 49, published 1877). That plate has 6 images of that species as well as 4 images of *B. matricariifolium*. In fig 5b can be seen *B. multifidum* on the small left hand side pot. The porcelain image is identical to that of the book plate (although the right hand frond is not visible in the photograph). This image was used for a postcard which is on sale at Rosenborg Palace.

Figs 6a/b. *Matteuccia struthiopteris* (plate 169, published 1764). This is a fairly elaborate plate, showing the whole plant, plus details of sterile pinnae and fertile fronds and pinnae. The species is widely distributed in Scandinavia, as well as central and eastern Europe as



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a whole, but has never quite made it to British soils. The porcelain image has made good use of the accurately copied structural details – perhaps because they were easier to copy than the whole plant!

Figs 7a/b. *Asplenium adiantum-nigrum* (plate 250, published in 1766). This image looks rather different from British specimens, but this may not simply be a case of poor draftsmanship. In Scandinavia, the species occurs mainly in SW Norway, where “plants growing on ultrabasic rock in western Norway are uniform and differ by having tripinnate leaf blades, flabellate ultimate segments, and a longer petiole in relation to the blade” (Jonsell, 2000). The plant here is quite foliaceous with an uncharacteristically non-triangular frond, but the image may approach the form quoted. The image on the porcelain piece at Windsor Castle is far superior to the book plate, showing a whole plant which is obviously not copied directly from the book plate. How this came about is unknown, but the model may have been a specimen growing in a botanic garden. Similar divergences from the book image occur also in two other Windsor fern pieces (one showing *Asplenium trichomanes*, and the other *Polypodium vulgare* discussed below), but such divergences are unknown in the original service (at least amongst the ferns).

Figs 8a-e. *Polypodium vulgare* (plate 1060, published in 1792). This species is fairly widespread in Scandinavia. However, based on the size of the frond,



Fig. 7a. *Asplenium adiantum-nigrum* (plate 250), a superficially unconvincing portrait



Fig. 7b. Triangular Salad Dish at Windsor Castle. A greatly enhanced fern portrait.



Fig. 8a. *Polypodium vulgare* (plate 1060).



Fig. 8b. Flat Plate at Amalienborg Palace, with re-arranged fern image including the “cut” frond.

we might be tempted to view it as *P. interjectum*, but this is rare in Scandinavia, only occurring in Denmark and SW Norway. Furthermore the three European polypods were all circumscribed within *P. vulgare* at the time (*P. cambricum* does not occur naturally in Scandinavia), so the author at this time would not have been alerted to the possibility of another species. The likeness, engraving and hand colouring are all good, and particularly detailed in the enlarged sorus – almost but not quite sharp enough to count the cells in the annulus! In fig 8b, the smaller right hand frond has been omitted, and the main frond divided to fit the plate – such re-arrangements are common in the original service, but the image components are always faithful copies. The larger area available on the outside of the salad bowl (figs 8c and 8d) enables the whole of the main plant image to be reproduced. However, the image on the oval salad dish (fig 8e) at Windsor Castle is greatly enhanced and improved as was *Asplenium adiantum-nigrum* in the previous item.

Figs 9 a-c. *Dryopteris fragrans* (plate 2187, published in 1836). Owing to its difficulty of growing, and absence





Fig 8c.(Left) Salad Bowl (cracked) at Amalienborg Palace with rhizome and stipe on one side of the bowl, and Fig 8d.(Right) The other side of the bowl showing the frond.



Fig. 8e. Oval Salad Dish at Windsor Castle. Another greatly enhanced fern portrait.

from temperate Europe including Britain, many of us are unfamiliar with this species. It is a circum-arctic species, in Scandinavia being very rare and only found in the far north. The image is beautifully engraved and coloured, but in common with many antiquarian prints, the "gizz" in life is not really successfully captured. To have done so would have required an image showing a tufted habit with persistent dead fronds and petioles. In other works, this species is usually illustrated with overlapping fronds, but a var. *remotiuscula* has been described with more distant pinnae, as illustrated here. Apart from some minor adjustments, the image has been faithfully reproduced on the oval salad dish (figs 9b and 9c).

Figs 10 a-c. *Salvinia natans* (plate 2188, published 1836). This species is cosmopolitan in distribution, but not being found naturally in Scandinavia the provenance and reason for inclusion of this plate is something of a mystery – perhaps it was an aquarium escapee. However, I have reproduced it here because of the excellence of the plate featuring precision engraving and delicate colouring. Observe the fine details achieved with the leaves, roots, sporocarps and mega- and microsporangia. The diminutive size of the salt cellar (figs 10b/c) has allowed only the whole plant image to be reproduced.

#### Footnotes

West of Copenhagen, just away from its main cultural



Fig. 9a. *Dryopteris fragrans* (plate 2187). A good portrait of an un-typical specimen



Fig. 9b. Oval Salad Dish at Windsor Castle.



Fig. 9c. Oval Salad Dish at Windsor Castle, side view showing the palisade rim pattern signature of the service.



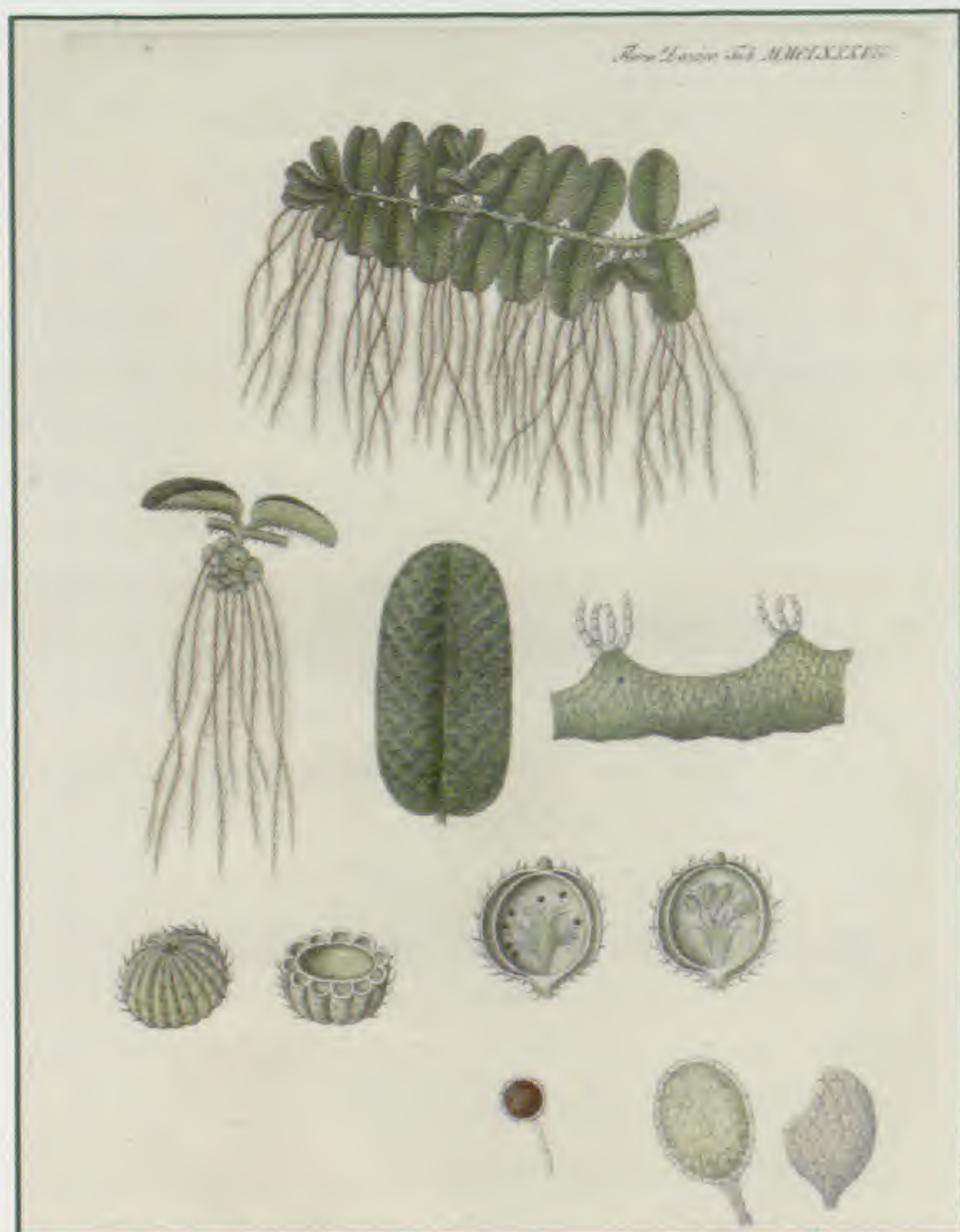


Fig. 10a. *Salvinia natans* (plate 2188).

and tourist centre, lies the leafy suburb of Frederiksberg, where north of the large park lies the factory of the Royal Copenhagen Porcelain Manufactory (now shortened to Royal Copenhagen), which moved to this location from central Copenhagen in the 1880s. Located right in the tourist centre on the Stroget is their large store selling all the current Royal Copenhagen wares. These still include 81 items of the *Flora Danica* porcelain using about 700 of the book images. There are some design differences from the original services, but the pieces are still moulded and painted by hand. Many of these are on display (well worth a visit) and for sale, but at a price! Otherwise they can be ordered and yes, some are still available with the original fern images.

There are public displays of *Flora Danica* porcelain at Windsor Castle and Rosenborg Palace. The impressively displayed collection at Amalienborg Palace is only viewable on special tours, whilst the collection in the Royal Silver Room, Christiansborg Palace is only viewable by appointment. Copenhagen is certainly worth a visit, although a little on the expensive side.

In the UK, the *Flora Danica* volumes are viewable at the British Library, the Natural History Museum, and other major libraries having antiquarian natural history books (check web site library catalogues). □

**Acknowledgements:**

My thanks are due to the following people for arranging and hosting my visits to - Windsor Castle, Alexandra Barbour; Christiansborg and Amalienborg Palaces, Merete Fernø and Klaus Dahl; Rosenborg Palace, Kirsten Christiansen and Peter Kristiansen. Figures 2a/b and 5b are reproduced with the permission of the Curator of Rosenborg Palace. Figures 4, 6b, and 8b-d are reproduced with the permission of the Palaces and Properties Agency in Copenhagen. Figures 7b, 8e, 9b/c and 10b/c are reproduced with permission from The Royal Collection © Her Majesty Queen Elizabeth II. It was not possible to confirm the copyright ownership, if any, of Figure 1, and anyone having such a claim should contact the author. The *Flora Danica* fern plate images are reproduced from those in the author's collection (and are out of copyright).

**Apologies:**

For the quality of my porcelain photographs. Quoted costs for professional photographs were more than I could stand, and I was certainly not willing to commit BPS to such expenditure. Maybe our expert editor/compiler has been able to improve my efforts a little? (I hope my efforts have helped the quality of the images. Ed.)

**Literature and Further Information:**

**Ackers, Graham (2009).** (unpublished). Schedule of Fern Plates in *Flora Danica* (1761-1883) with Corresponding Porcelain Pieces (Version 2). This schedule lists all 73 fern and lycophyte plates, giving plate no, fascicle number, *Flora Danica* plant name, modern plant name, and the porcelain pieces on which the plant has been figured and their location. It is available from me on request.

**Flora Danica and the Royal Danish Court, (1990).** Christiansborg Palace, Copenhagen. This multi-authored work was produced as a catalogue for



Fig. 10b. Salt Cellar at Windsor Castle, with only the main book plate image fitting the porcelain.



Fig. 10c. Salt Cellar at Windsor Castle, side view.



## The Ferns of *Flora Danica* – Plates and Porcelain

an exhibition held at Christiansborg Palace 24 May – 30 September 1990. The authors writing about *Flora Danica* are Peter Wagner (the book), Steen Nottelmann (the porcelain), and Ole Villumsen Krog (the porcelain catalogue). The book is written in English and Danish, the latter title being *Flora Danica og det Danske Hof*. It is the best single work giving accounts of both the history of the book and the porcelain service, and has excellent colour pictures of the porcelain pieces. Note that other catalogues based on this one were produced for *Flora Danica* exhibitions held in other countries, e.g. Russia, Germany, Scotland (at the Royal Botanic Garden, Edinburgh in 1994).

**Jonsell, B (2000).** *Flora Nordica 1*. The Bergius Foundation, The Royal Swedish Academy of Sciences, Stockholm.

**Oeder, Georg Christian (1761-1883).** *Icones plantarum sponte nascentium in regnis Daniae et Norvegiae, in ducatibus Slesvici et Holsatiae, et in comitatibus Oldenburgi et Delmenhorstiae, ad illustrandum opus de iisdem plantis, regio jussa*

*exarandum, Florae Danicae nomine inscriptum. Hauniae* [= Copenhagen]. This Latin mouthful, which sometimes alternatively appeared on the title page in Danish or German, is the correct name of the work now colloquially and universally known as "*Flora Danica*".

**Oeder, Georg Christian (1764-1766).** *Elementa Botanica*. Published in Latin, German and Danish.

**Royal Library, Copenhagen.** *Flora Danica* book plate images are viewable on their web site at <http://www.kb.dk/en/tema/floradanica/index.html>.

**Stearn, William T (1983).** *Plant Portraits from the Flora Danica 1761-1769*. Bath: The Mendip Press. In this book, 12 plates are finely reproduced full size from the early (and some say best) *Flora Danica* period. Two are ferns – *Osmunda regalis* (plate 217) and *Matteuccia struthiopteris* (plate 169, also reproduced in this article from a different original plate).

**Winstone, H. V. F. (1984).** *Royal Copenhagen*. London: Stacey International. A well illustrated historical account of the porcelain manufactory, with one chapter on *Flora Danica*.

## Carrying out trials in your garden THE RESULTS!

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Only two members took up the challenge to carry out fern growing trials in different composts; myself and Robert Sykes. We both used surplus *Dryopteris affinis* sporelings which we grew on in equal-sized, randomly placed pots of grow bag composts with and without peat and coco-compost as a control. The idea of the trial was to see if young ferns could grow equally well without peat. The pots were given the same watering regime and no additional fertiliser was used during the growing period. Robert used 7 replicates and I used 10 replicates for each compost type though in my case, overall 2 plants failed. Robert also grew sporelings in his own compost. I grew my plants for a period of 6 months and Robert grew his over a 10 month period. We measured the number of fronds, the width and length of the largest frond on each plant before and after the experiment. A oneway ANOVA was applied to see if there was a difference between the treatments and Post Hoc Tukey Tests were carried out to see which treatments were different from each other.

The results are shown in figures 1-6: figures 1-3 are Yvonne's results and figures 4-6 are Robert's. Overall there were few significant differences in the growth rates of sporelings grown in different composts, thus dispelling any myth that peat is an essential element for young woodland ferns. What did surprise me was how well my young ferns grew in coco-compost making very good root growth, though I did not measure this (another experiment maybe?). In fact one of the ANOVA tests in my data set showed there was a significant difference in the length of fronds between treatments ( $F=3.851$ ,  $p=0.035$ ). Fern fronds in coco were around

40% longer and wider than ones grown in compost without peat, though in the case of width this difference was not statistically significant. This shows up quite well on the graphs. To interpret the graphs: the columns represent the average or mean measurements, if the error bars on the columns overlap there is unlikely to be a significant difference between the means. Most statistical tests set the limit for significance at  $p=0.05$  or below. If I had grown my plants for longer then there might be a possibility that frond width would also become significantly larger in coco. However, Robert grew his plants for longer and there was no difference between 4 different composts in his trials.

This simple experiment has shown that young *Dryopteris affinis* sporelings are not very fussy but tells us nothing about the compost preferences of older ferns, or indeed for different species of fern but it is a start! As I mostly grow my ferns on to maturity in pots I am always interested in perfecting the ideal compost. Certainly, in the future I will be experimenting more with coco-compost particularly for growing on epiphytic ferns.

How would I improve on this design? Obviously trying the same experiment with different species. I would also consider root growth which is very important for young plants but how to measure it? One way would be to measure root mass by washing the roots thoroughly of compost, cutting them from the plant and weighing them, or you could weigh the whole plant and get a measurement for plant mass. This would not be an accurate measurement of mass because much of the plant is water but if you have treated the plants



## Carrying out trials in your garden - THE RESULTS!

equally and carried out the procedure in the same way and weighed more or less at the same time, then you would have measurements that can be compared and it is the differences in those measurements that are of interest and which would give you an indication of growth. However, you would need to use an accurate micro-balance to carry out this procedure. An alternative would be to actually measure the roots, which would be a good way but extremely tedious! Or, if doing this for your own interest, you could just make a visual judgement of root growth.

Since doing this trial I have used coco to successfully bring on some orchid cuttings and a range of *Selaginella* cuttings are going away rather well. I also sowed a batch of spores (rather late in the year) in coco and so far my results are looking very promising indeed.

Basically I made up the coco with near boiling water, sowed directly and away they went with so far, no contamination.

Why not carry out your own trials? It needn't be complicated, it's fun and you can sometimes come up with surprising results. I used coco-compost as a control to compare composts with and without peat but it turned out to be a rather good growing medium.

Many thanks go to Robert Sykes for carrying out a trial and to Roland Ennos who did the statistics using SPSS and the graphs which were generated in Excel.

Footnote: For reference to the trial design see *Pteridologist* 2009, pages 128 and 129. For further information contact Yvonne at [secretary@ebps.org.uk](mailto:secretary@ebps.org.uk) or at the address given above. □

Graphs 1 - 3 Yvonne's results

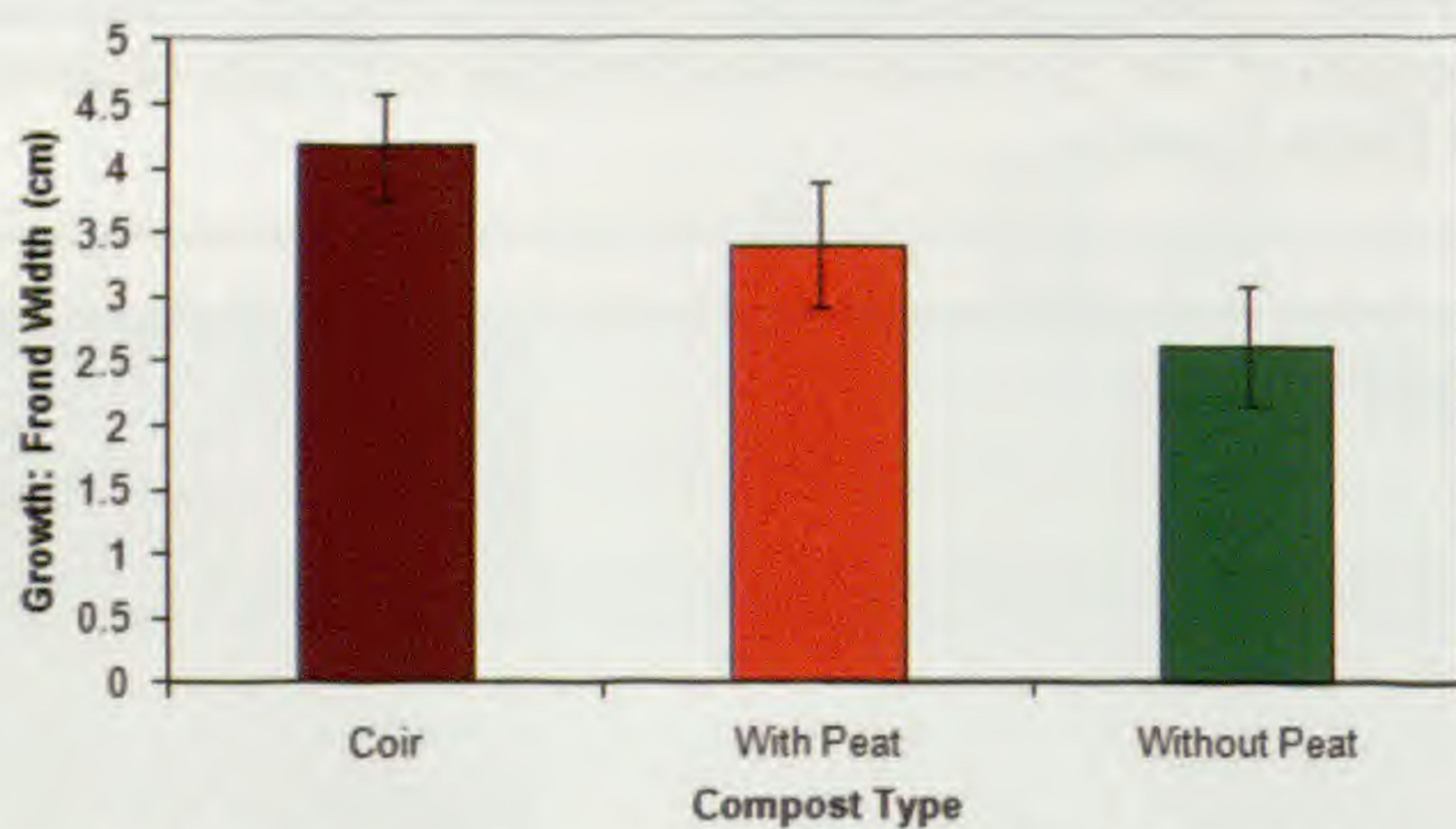


Fig. 1. Graph to show increase in frond width of plants grown in different composts.

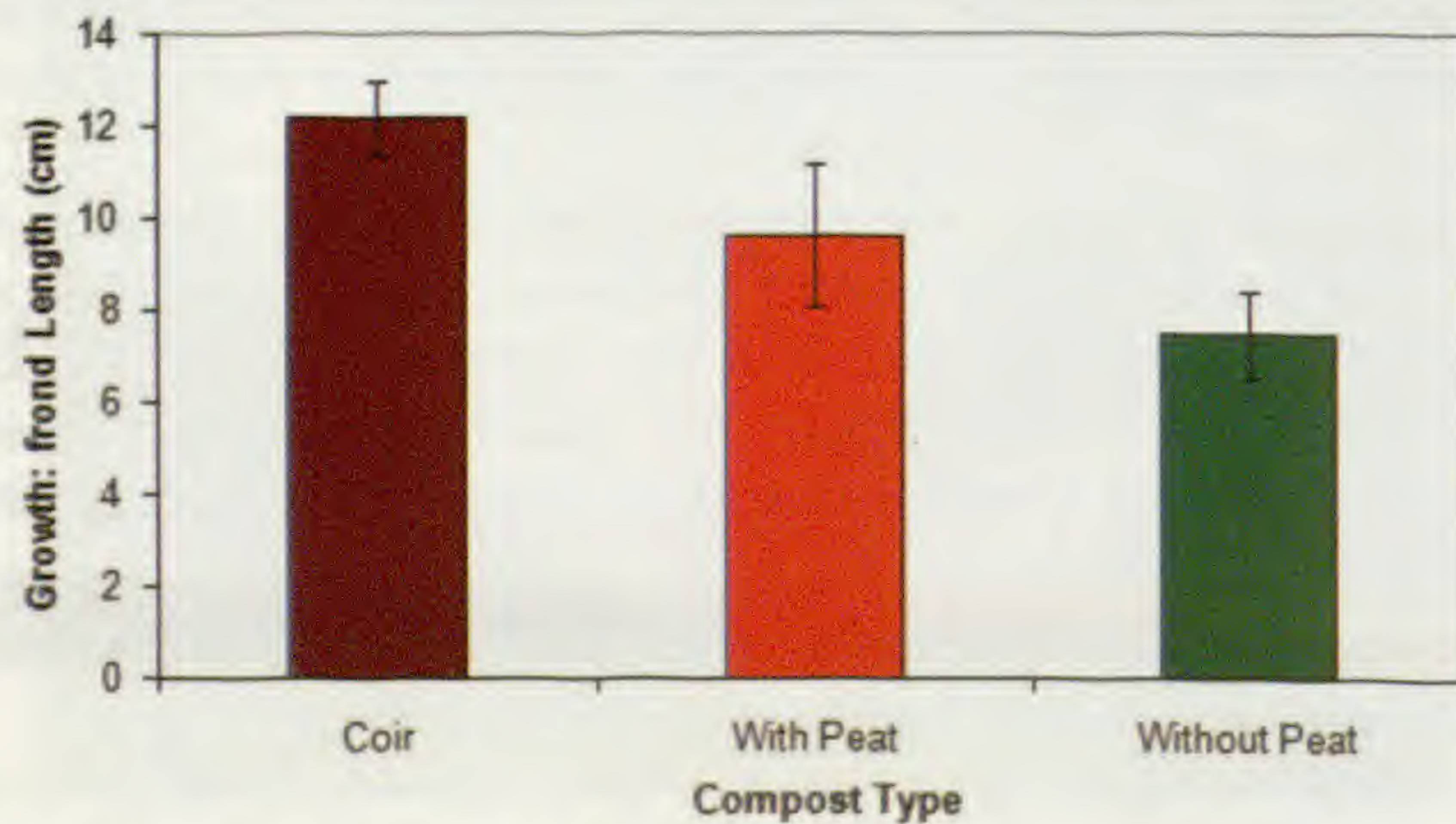


Fig. 2. Graph to show increase in frond length of plants grown in different composts.

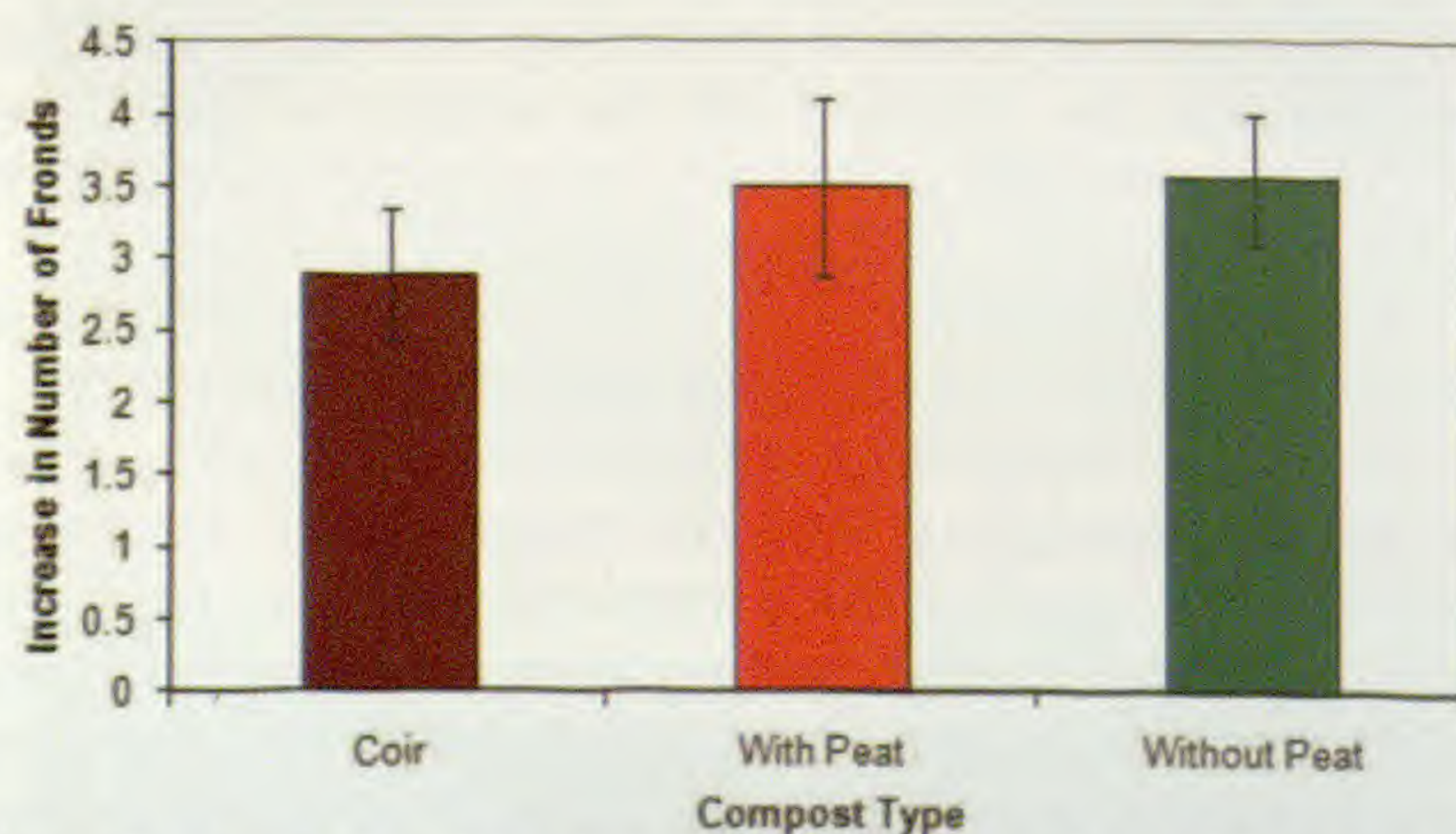


Fig. 3. Graph to show increase in the number of fronds of plants grown in different composts.

Graphs 4 - 6 Robert's results

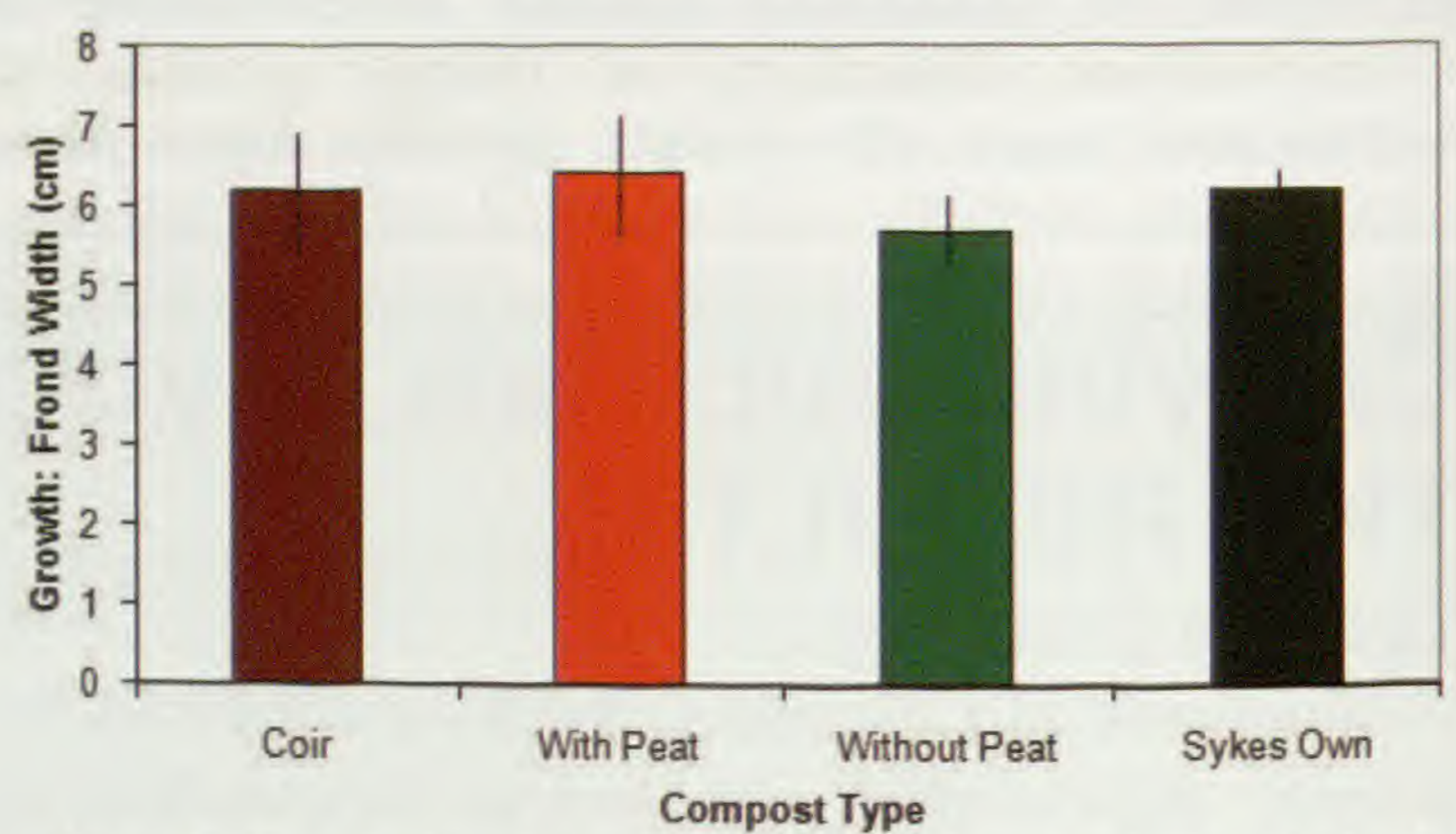


Fig. 4. Graph to show increase in frond width of plants grown in different composts.

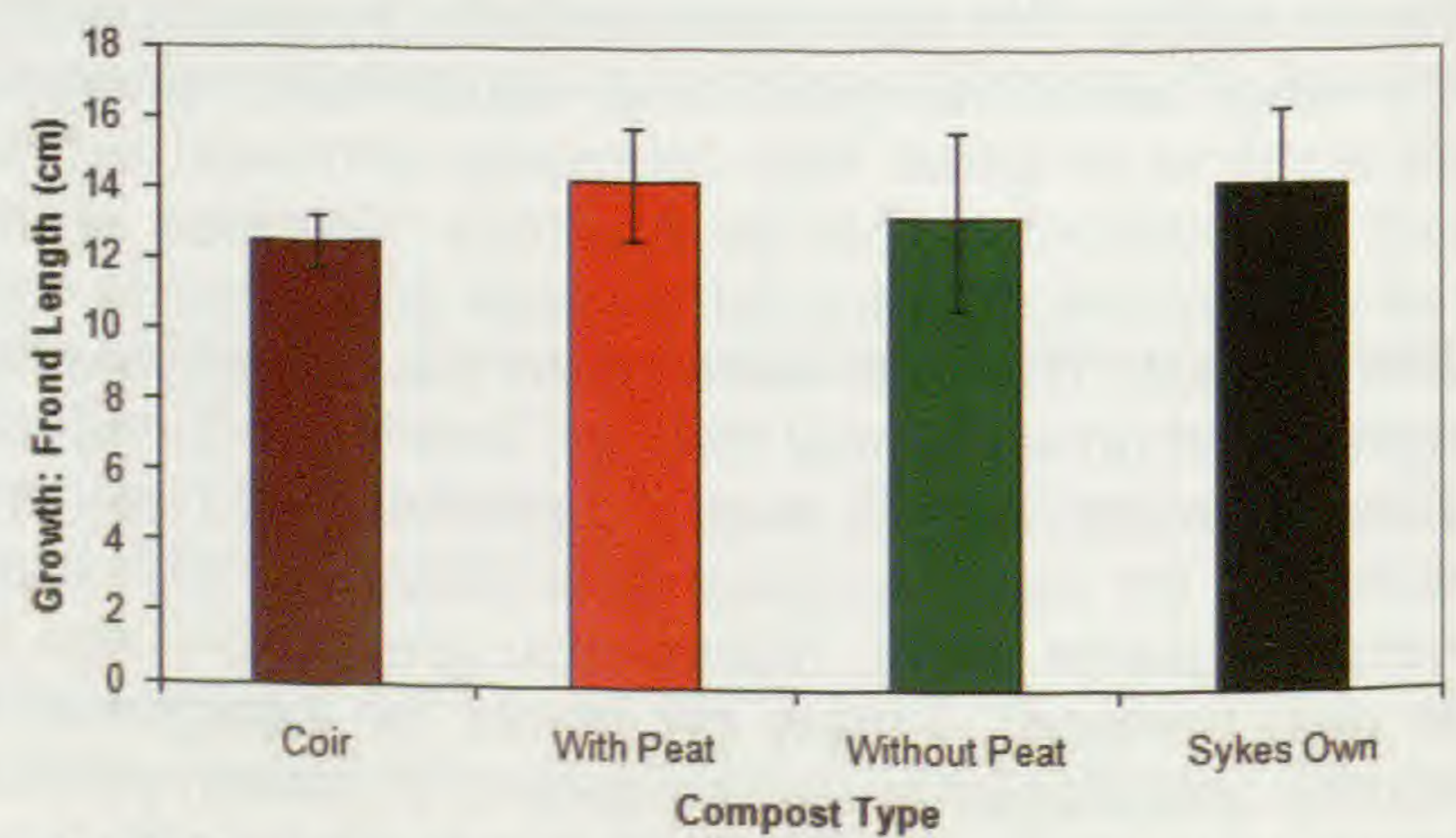


Fig. 5. Graph to show increase in frond length of plants grown in different composts.

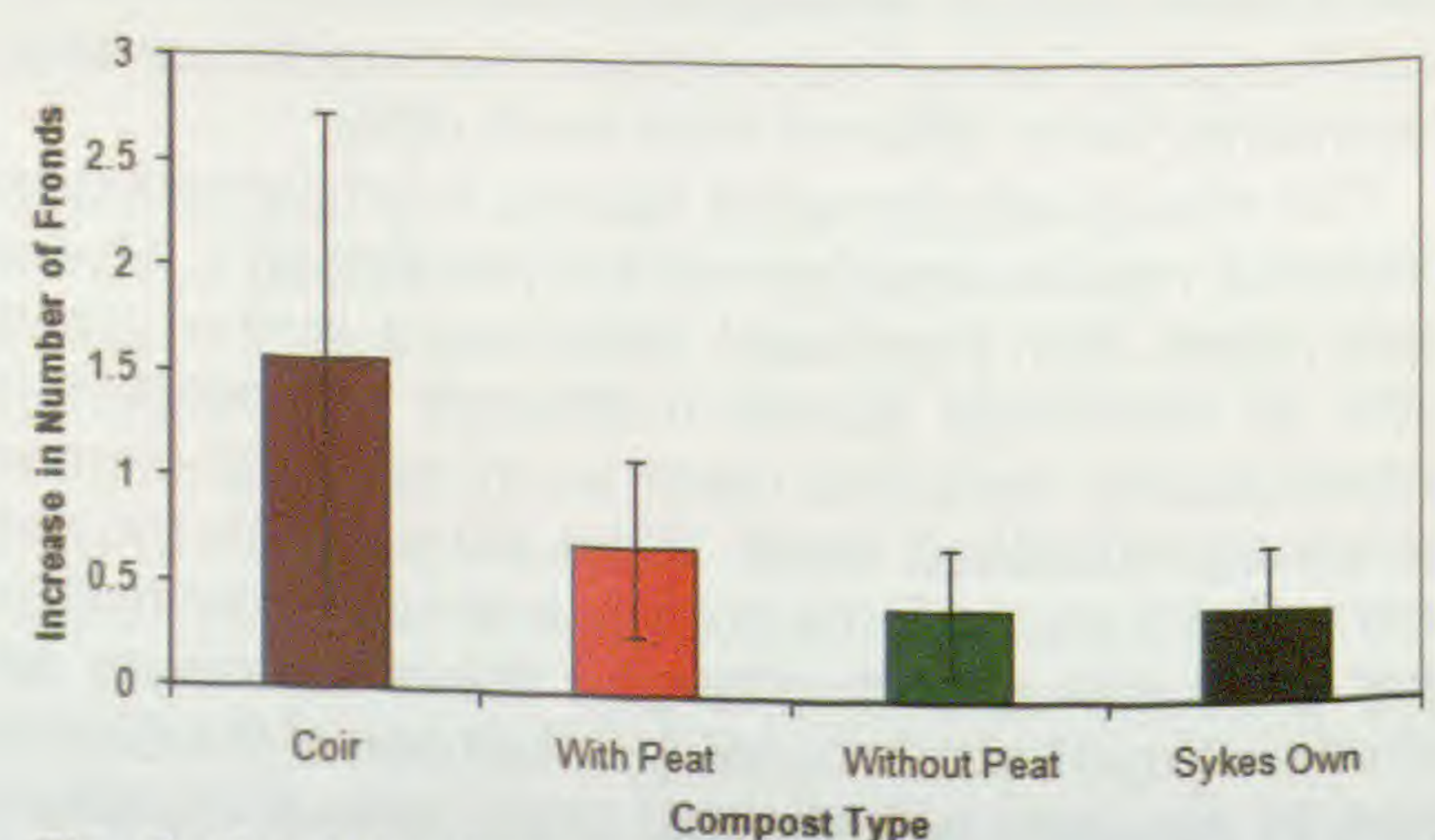


Fig. 6. Graph to show increase in the number of fronds of plants grown in different composts.



## Book review

**Searching for Ferns in Lesotho.** Gillian Cooper-Driver, Taelo Letsela, Moretloa Polaki. Ashworth Publishing Company, Cornwall, 2008. ISBN 978-0-9564771-0-1. Pps. xii, 176. Paperback.

Gillian Cooper-Driver, a BPS member and a plant biochemical ecologist, has recently retired as a professor at Boston University. She has dual US and UK citizenship, and now lives in Cornwall. As she explains in her Introduction, she had long held a desire to visit South Africa, and finally the opportunity arose in 1992 when she was granted sabbatical leave from her Boston University post. She took a vacant teaching job at the National University of Lesotho (NUL), and since then has been able to spend a total of five years in Lesotho based at NUL in Roma, thus being ideally placed to search for ferns in the field. In this respect she was actively supported by two members of the NUL Biology Department – Dr. Taelo Letsela (Head of the Biology Department) and Mr. Moretloa Polaki (Curator of the Herbarium and Director of the Botanical Garden), both experienced field workers and joint authors of this book. Prior to embarking on their field forays, all available literature and herbarium material relevant to the Lesotho fern flora was thoroughly researched. Thereafter, modus operandi were developed, and the field work undertaken.

This is a fascinating and unusual book, rather different from any other fern field guide with which I am familiar. It is aimed at the interested amateur wishing to explore the Lesotho fern flora, and provides a wealth of practical information to this end. The first chapter describes the topography, geology, climate and major vegetative zones of the country. Chapter two describes the fern life cycle, and explains fern morphological features and their variations, necessary of course for understanding the species descriptions and their identifications. This information is repeated for “Fern Relatives, Fern Allies and Fern Friends”, a tongue in cheek reference to the new taxonomy I think! Chapter three is very practical and highly useful potentially – where to get permits and permissions, maps, a field check list, how to perform field observations, recording and identification (for which a key to genera is provided). The chapter concludes with a map and detailed table of the areas searched to enable site re-location.

Of the 68 ferns and lycophytes recorded for Lesotho, the authors found 56 which are all described in chapter 4. A field photograph is included for each species. The standardised headings for the descriptions are – ecology, diagnostic characters, uses and occurrence. The diagnostic characters are appealing because they do not attempt to give detailed descriptions, but rather highlight in a non technical way the essential characters that help to identify the plant in the field. Ironically this is in direct contrast to the Koos Roux’ 2003 fern flora of Swaziland (the other South African land-locked country) where highly technical detailed descriptions are given, but without highlighting the distinguishing field characters. Although the descriptions given by Gillian and her colleagues would almost certainly provide positive identifications, as a backstop it could be advisable for future investigators to have a copy of John Burrows’ 1990 “Southern African Ferns and Fern Allies” to hand, where both detailed descriptions and distinguishing characters (as “Similar species”) are given. After all, species may be found that are not on the Lesotho list!

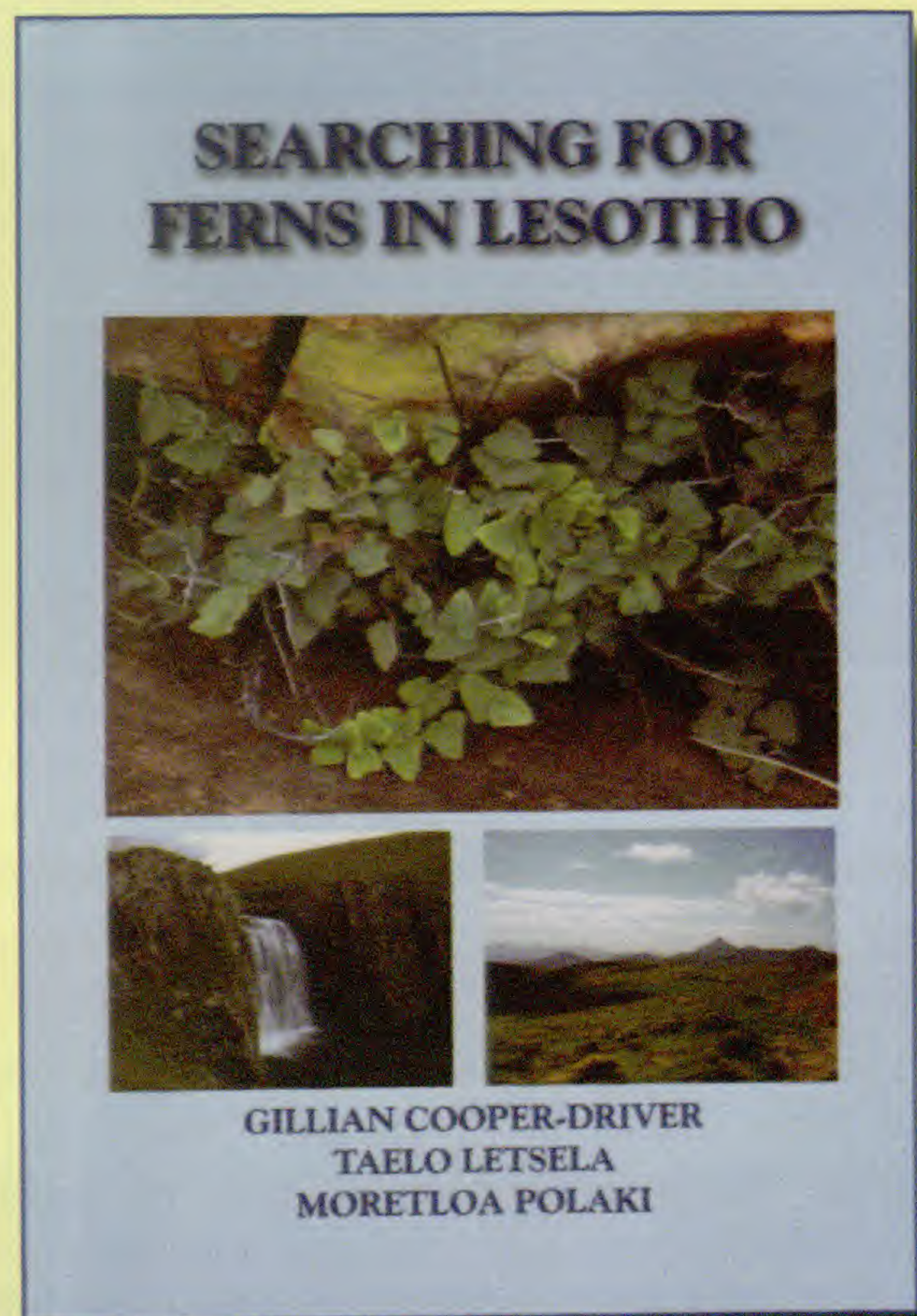
The really practical part comes in chapters 5 to 8 where detailed instructions are given for visiting the

most important sites. Chapter 5 is “Searching for Ferns and Lycophytes on Sandstone Cliffs”, the subsequent chapters covering forest environments, aquatic habitats and grasslands, and mountain areas respectively. Each chapter starts with a generalised account of the habitat with lists and photographs of the ferns to be found there. This is followed by site photographs and site descriptions, an example of which is the one for the Ha Khotso Valley which starts “On the road to Mohale Dam (the mountain Road), just before the village of Nazareth on the left, there is a sign post to Ha Baroana (Plate 5-4), an important rock-art site. Follow the gravel road for about 3km ----”. You get the idea. Following the travel instructions are colloquial accounts of the ferns to be found, written in a style reminiscent of our field meeting accounts in the Bulletin!

The final chapter 9 (“The Future for Ferns and Lycophytes in Lesotho”) starts with suggestions as to why the “missing ferns” could not be found, and continues with a discussion of the negative ecological impacts - loss of wetlands, overgrazing, increased tourism, global warming and climate change, and the future for ferns (i.e. their degree of adaptability).

I really liked this book, written in an easy conversational style, but at the same time providing a wealth of data about Lesotho and its ferns, and profusely illustrated. I commend it as a “good read” for any fern enthusiast, whether or not visiting Lesotho. It is privately published and available from Ashworth Publishing, Landfall, Coverack, Helston, Cornwall TR12 6TF. Provide your name and address and number of copies required. The price per book is £12.00 + £3.00 postage and packing. Cheques to be made payable to “Ashworth Publishing”. Gillian Cooper-Driver can be contacted by e-mail at [gac@bu.edu](mailto:gac@bu.edu). □

Graham Ackers





# Pteridophytes in the English Mesozoic.

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## Mesozoic strata in Great Britain.

The stratigraphic sequence of the Mesozoic in Britain includes two English non-marine sequences in which are found major fossil floras: the Middle Jurassic flora in north Yorkshire and the Lower Cretaceous Wealden flora in south-east England (Figs 1, 2, 4). Both floras are replete with pteridophytes, especially ferns. Minor Jurassic floras occur in Scotland and southern England but are sparse, gymnosperm-dominated and little studied (see Thomas & Batten in Cleal *et al.* 2001).

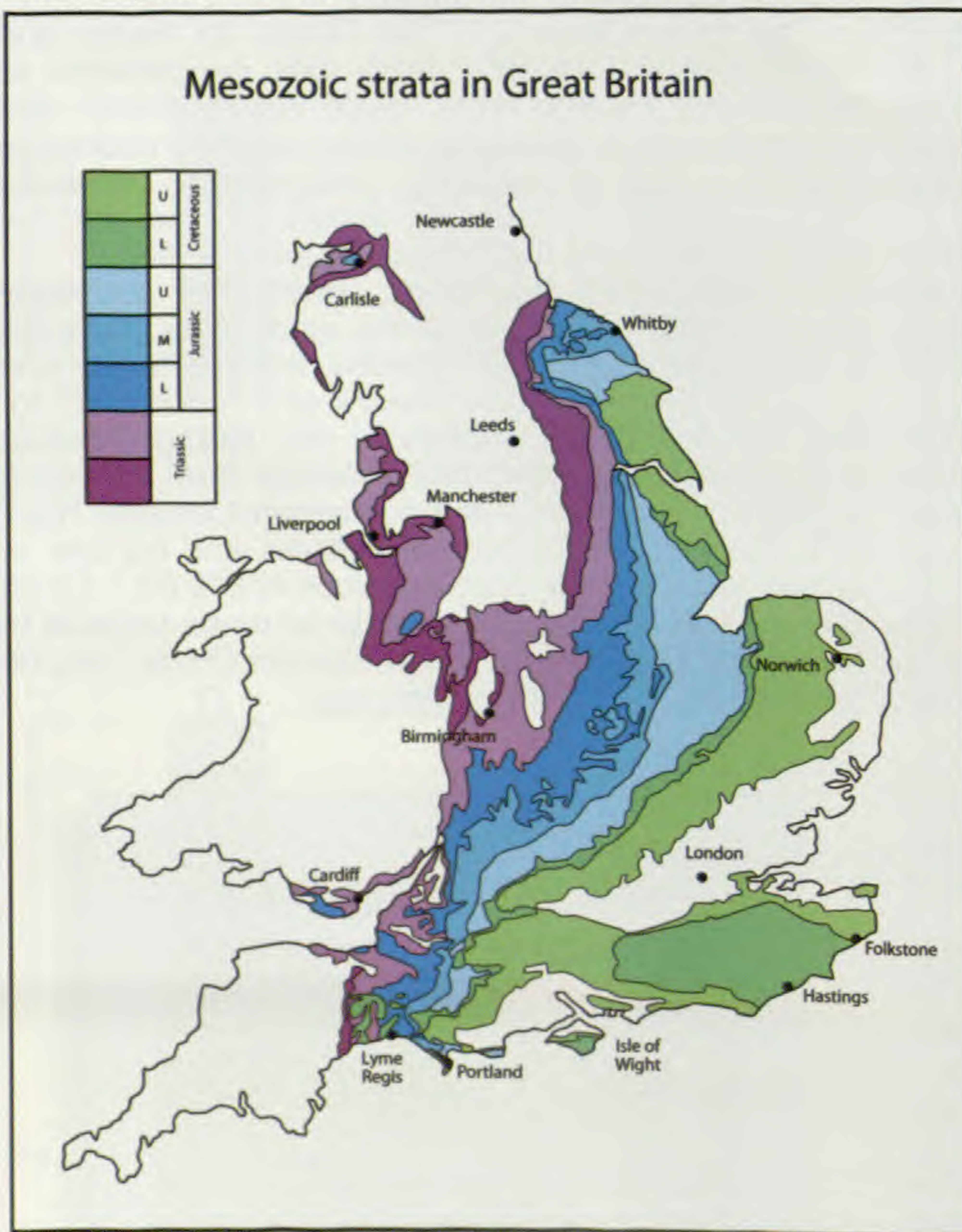


Fig. 1. Simplified geological map of Great Britain showing the main stratigraphic divisions of the Mesozoic era

Both the Middle Jurassic and Wealden floras have been extensively collected at different times and are represented by large collections of specimens at South Kensington in the Natural History Museum, formerly the British Museum (Natural History). Smaller collections of both floras are deposited in several other museums (Hastings, Cambridge, Brighton, Maidstone, Manchester) acquired both by purchase and donation from the prominent collectors (see below).

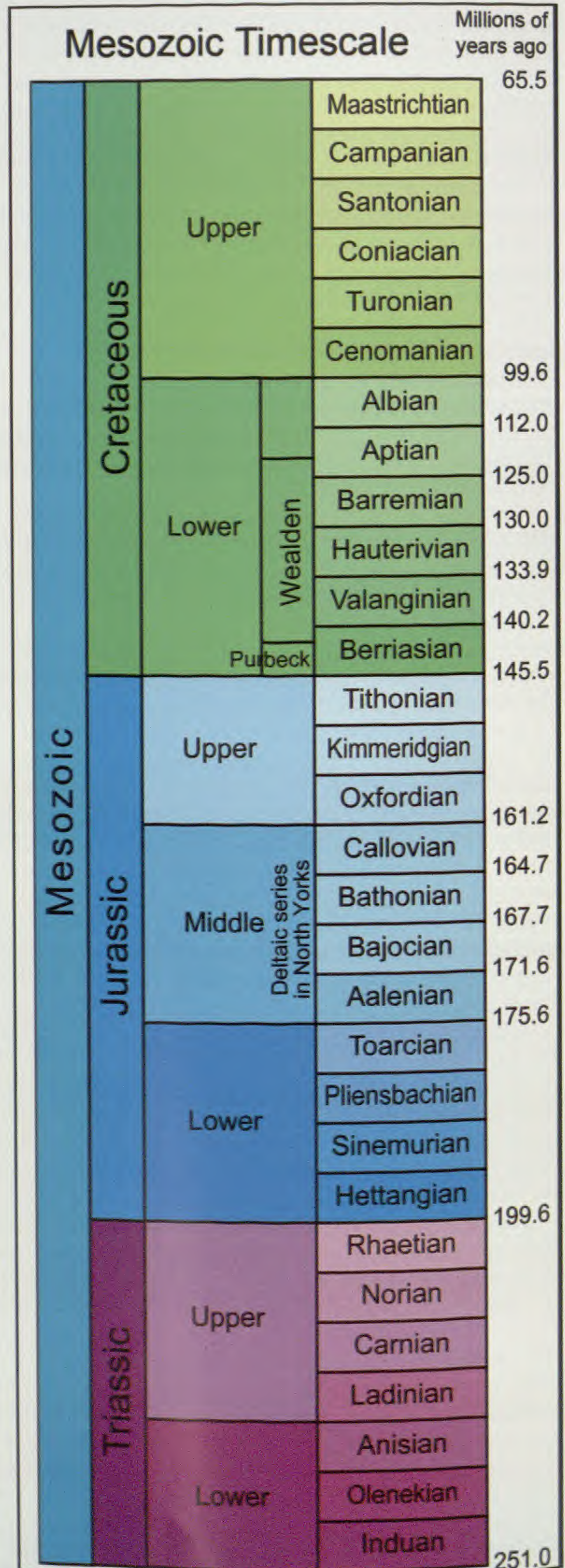


Fig. 2. Mesozoic timescale showing positions of the Middle Jurassic and Wealden series within the stratigraphic column, annotated with the approximate ages of the floras.



## Pteridophytes in the English Mesozoic.

The Middle Jurassic non-marine sequence in north Yorkshire, deposited by an extensive river system, was formerly designated the 'Estuarine Series' (1890s) and later the 'Deltaic Series' (1920s). The deltaic interpretation found more favour for large parts of the sequence and more recently (1990s) a coastal alluvial plain has been suggested and debated (see Thomas & Batten in Cleal *et al.* 2001). The flora remains readily collectable at a variety of localities on the north Yorkshire coast.

The Lower Cretaceous Wealden sequence will be found in the older literature interpreted as deposited in a freshwater lake, typified in the large oil painting of the reconstructed landscape, with a prominent *Iguanodon* dinosaur, long displayed in the Geological Survey Museum at South Kensington (present whereabouts not checked). Subsequent sedimentological studies by Perce Allen (1940s onwards) led to his interpretation

### Collecting and study of fossil plants in the Middle Jurassic of north Yorkshire



**William Crawford Williamson**  
Collected with his father from boyhood in the 1830s.



**Thomas Maxwell Harris**  
Collected extensively from early 1940s to late 1970s. Discovered many new inland localities.



Left to right Joan Watson, Tom Harris and Ken Alvin collecting in the Gristhorpe Bed at Cayton Bay, N. Yorks

**Fig. 3.** Collectors of the Yorkshire Jurassic flora.

### Collecting of fossil plants in the Wealden of South-East England.



**Gideon Algernon Mantell**  
Earliest collector of specimens donated to the BM(NH). Described the "fossil vegetables of the Tilgate" Forest" from the 1820s



**Philip Rufford**  
Professional collector in the late 19th century sold and presented specimens to the BM(NH) and several other museums.



**Pierre Teilhard de Chardin**  
Collected 1908 - 1912 whilst studying at Ore Monastery, Hastings; specimens held in Hastings Museum & BM(NH).

**Fig. 4** Map of the Lower Cretaceous in south-east England and the main collectors of the best known Wealden fossil plants.

of a coastal mud-plain including lagoons, meandering sandy water-courses and coalescing alluvial fans, which he summarised as a 'braided sand-plain' (see Thomas & Batten in Cleal *et al.* 2001). The most accessible and notable exposure of the lower Wealden (Hastings Beds) occurs along the Sussex coast between East Cliff, Hastings and eastwards to Cliff End at Pett Level (Fig. 4). This section was the source of many spectacular fossil



## Pteridophytes in the English Mesozoic.

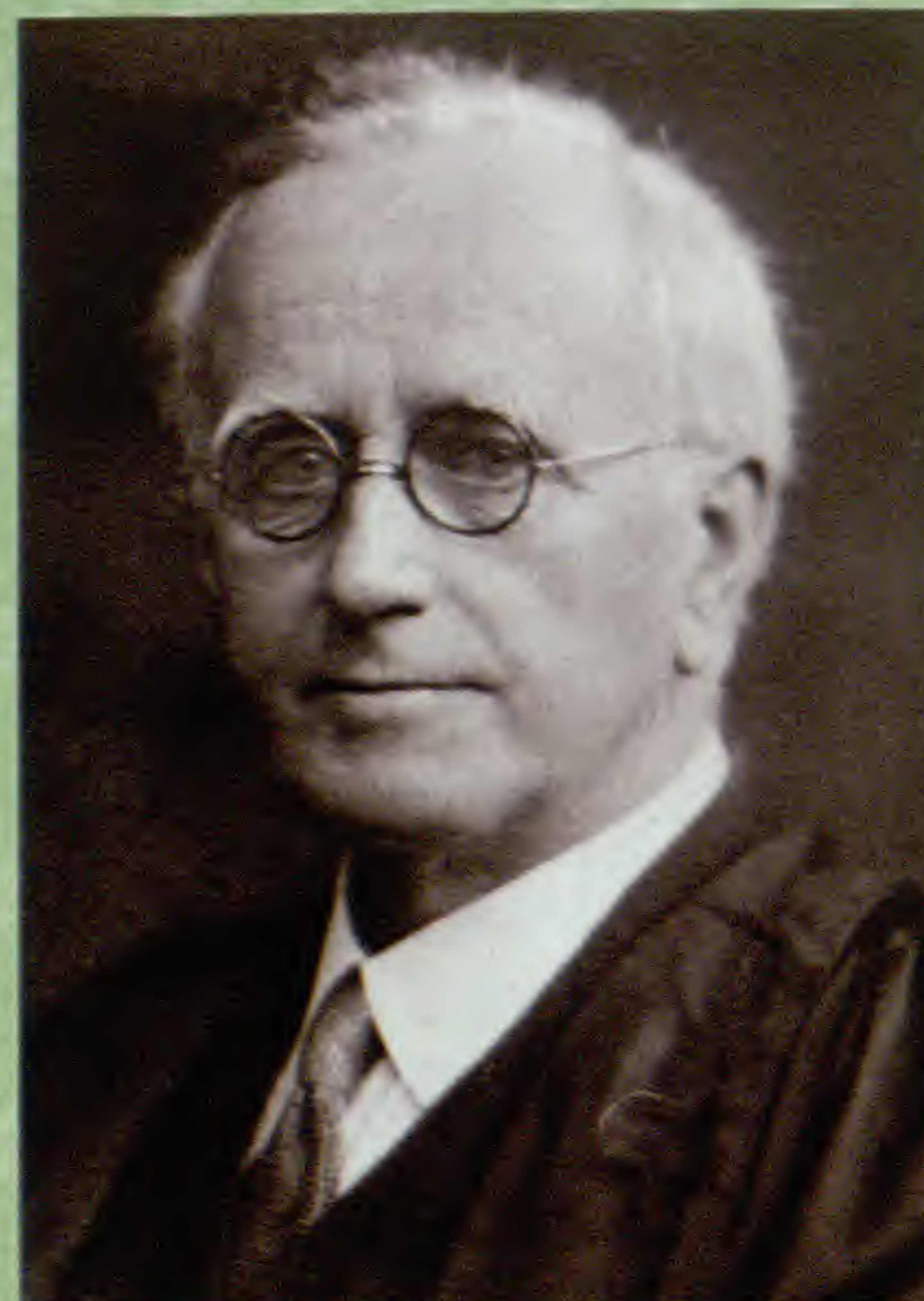
plants in the 19th century but, with a few exceptions, has yielded only small fragmentary scraps in living memory. New Wealden finds have recently been more or less confined to discoveries in lenses of plant debris comprising a compressed mass of coalified detached plant organs (leaves, cones, seeds, spores, pollen) often in an excellent state of preservation. This material occurs throughout the Wealden sequence, but is most abundant in the Dorset and Isle of Wight coastal sections (Watson & Alvin 1996).

### Yorkshire Jurassic flora: collecting.

Collectors of the Yorkshire fossil flora who were active in the early 19th century included John Williamson curator of Scarborough Museum and, from a very early age, his son William Crawford Williamson (Fig. 3) who became the first Professor of Natural History at Owen's College, the embryonic University of Manchester. At the age of 15 the young Williamson provided illustrations of Jurassic plants for Lindley & Hutton's 'Fossil Flora of Great Britain' and later contributed classic papers on Jurassic species (Williamson, 1870) though it is his study of the Carboniferous flora for which he is most remembered.

Sir Albert Charles Seward (Fig. 5), at Cambridge, who described the flora in a monograph of 1900,

## English Mesozoic Floras



### Sir Albert Charles Seward

Worked on the large collections of Jurassic and Wealden fossil plants deposited in the British Museum (Natural History).

Fig. 5. A. C. Seward who described both of the Mesozoic floras in important monographic works.

## English Mesozoic pteridophytes in extant families

Middle Jurassic: North Yorkshire	Wealden: Sussex, I.O.W.	Present day
<b>Horsetails</b> *	*	
<i>Equisetites</i> *	<i>Equisetites</i> *	<i>Equisetum</i>
<b>Lycopods</b> *	*	
<i>Lycopodites</i> *	<i>Lycopodites</i> *	<i>Lycopodium</i>
x	<i>Selaginellites</i> *	<i>Selaginella</i>
x	<i>Isoetites</i> *	<i>Isoetes</i>
<b>Ferns</b> *	*	
<b>Marattiaceae</b> *	x	
<i>Marattiopsis</i> *		<i>Marattia, Angiopteris</i> Essentially tropical
<b>Osmundaceae</b> *		
<i>Todites</i> *	<i>Cladophlebis</i> *	<i>Todea, Osmunda</i> <i>Todea</i> : southern Africa, Australia, New Zealand ( <i>Osmunda</i> cosmopolitan)
<b>Gleicheniaceae</b> *		
x	<i>Gleichenites</i> *	<i>Gleichenia</i> Widespread in the tropics
<b>Dipteridaceae</b> *		
<i>Dictyophyllum, Hausmannia</i> *	<i>Hausmannia</i> *	<i>Dipteris, Phanerosorus</i> Tropical; S.E. Asia
<b>Matoniaceae</b> *		
<i>Phlebopteris, Matonidium</i> *	<i>Phlebopteris, Matonidium</i> *	<i>Matonia</i> Tropical; Malaysia-Borneo
<b>Schizaeaceae</b> *		
<i>Klukia, Stachypteris</i> *	<i>Ruffordia, Pelletixia</i> *	<i>Schizaea, Anemia</i> Tropical, sub-tropical
<b>Dicksoniaceae</b> *		
<i>Coniopteris</i> *	<i>Onychiopsis</i> *	<i>Dicksonia</i> Southern hemisphere; tropical, sub-tropical

Fig. 6. Table showing occurrence of extant fern families in the Jurassic and Wealden floras.



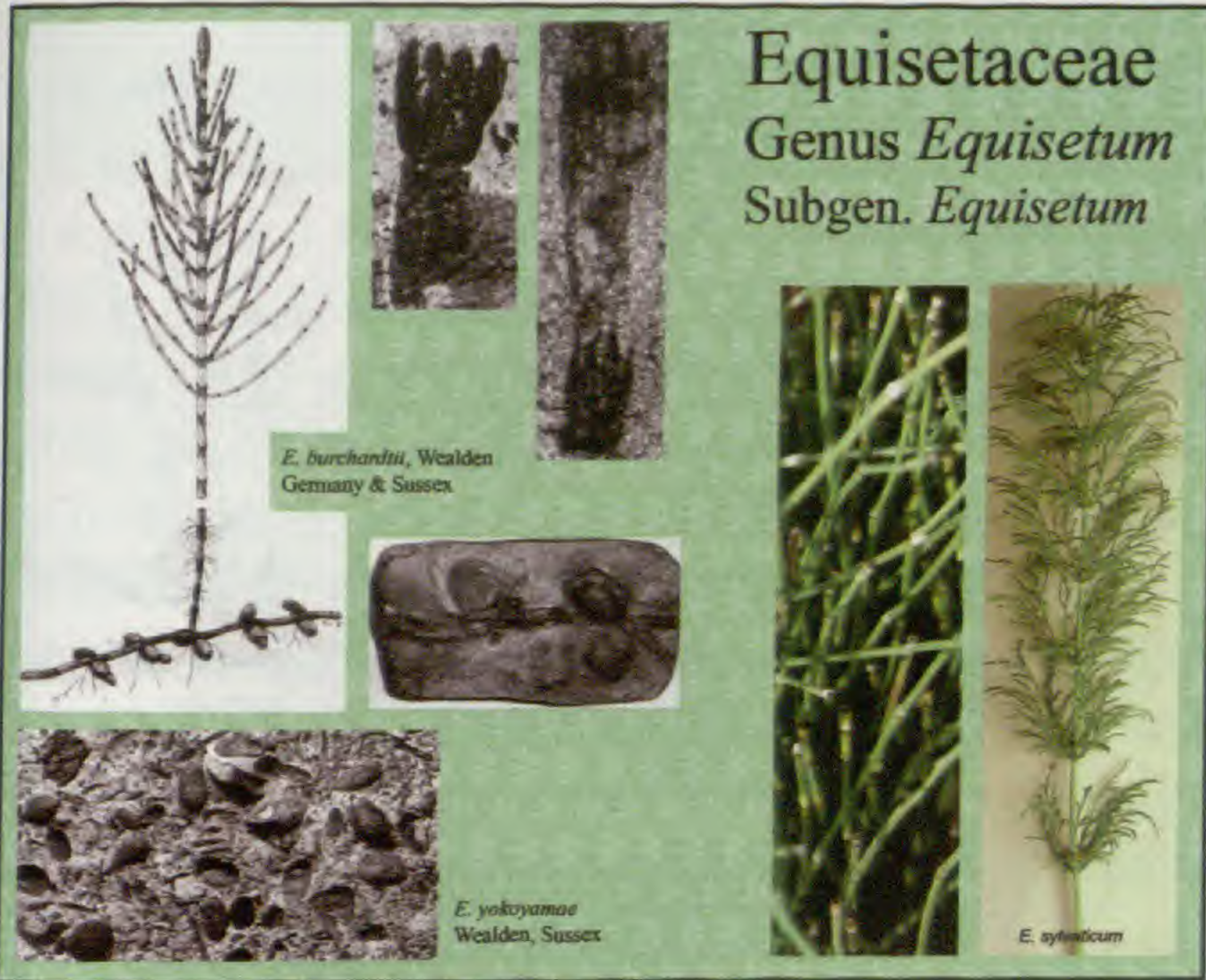


Fig. 7. Fossil and extant species of *Equisetum*.

did not engage in fieldwork or collecting himself but encouraged his student Thomas Maxwell Harris (Fig. 3) to do so. Harris became Professor of Botany at Reading University in 1933, at the age of 33, and after completing his 'Greenland Flora' turned to the Yorkshire Jurassic flora with a vengeance, immersing himself in collecting, studying and publishing it for the rest of his life. He was still actively engaged in this research in 1983 when he died. Harris collected extensively from about 1940 until the late 1970s, often with his wife, children, students and/or other palaeobotanists. He discovered many new inland localities and published numerous papers, culminating in a series of BM(NH) monographs: The

Yorkshire Jurassic Flora, Volumes I-V, 1961-1979 (pteridophytes in volume I, Harris 1961).

**Lower Cretaceous, Wealden flora: collecting.**

The first Wealden specimens donated to the BM(NH) were collected in the 1820s by Gideon Algernon Mantell (Fig. 4) from Sussex inland localities near Cuckfield, where he and/or his wife Mary (accounts vary) also discovered the first *Iguanodon* tooth. *Equisetites lyellii* (Fig. 8) was one of the first "Fossil Vegetables of Tilgate Forest" collected and described by Mantell (1824).

Later in the 19th century the professional collector Philip Rufford accumulated a spectacular collection of pteridophytes and gymnosperms from the coastal section, mainly from Ecclesbourne Glen and Fairlight Glen (Fig. 4). It remains a mystery exactly where Rufford was able to find and collect the leaves up to 3 feet long now in the BM(NH) collections. The most likely explanation is that they occurred in richly fossiliferous lenses which he removed completely. Two or three impressive leaf specimens in the Sedgwick Museum, Cambridge were



Fig. 8. *Equisetites lyellii* with stoma of *Equisetum sylvaticum* for comparison.



Fig. 9. Fossil and extant 'nodal diaphragms'.



## Pteridophytes in the English Mesozoic.

collected from Warren Glen by N. F. Hughes but over a period of about 20 years in the mid-20th century. However, for all practical research purposes the classic localities can no longer be regarded as a viable source of new Wealden hand specimens.

From 1908 to 1912, whilst studied at Ore Monastery in Hastings, the Jesuit priests Pierre Teilhard de Chardin (Fig. 4) and Felix Pelletier made an important collection of small-sized Wealden plants. The specimens, including rare fertile ferns, were divided between Hastings Museum and the BM(NH).

Seward described the Rufford collection of pteridophytes for the first volume of his Wealden flora (1894) and later the Teilhard/Pelletier specimens (Seward 1913).

### Pteridophyte families.

The pteridophyte components of both floras are readily attributable to extant families with two notable fern

exceptions in the Wealden flora belonging to families which became extinct later in the Cretaceous (Figs 12 -14), probably following the emergence and rise of the Angiosperms. The short list of lycopods is of poorly known species which seem very like modern *Lycopodium* and *Selaginella* but this is unremarkable since this group has similar forms in much earlier geological periods. One of the Wealden horsetails (Figs 7-9) is known in considerable detail and points of special interest are presented below. From the list of selected fern genera in Figure 6 it can readily be seen that all the ferns belong to families with a strong presence in the tropics and sub-tropics at the present day and many are closely comparable to extant forms.

### Wealden Horsetails.

The known characters of the Wealden species *Equisetum burchardtii* (Fig. 7) place it in the living genus *Equisetum* subgenus *Equisetum*, on account of

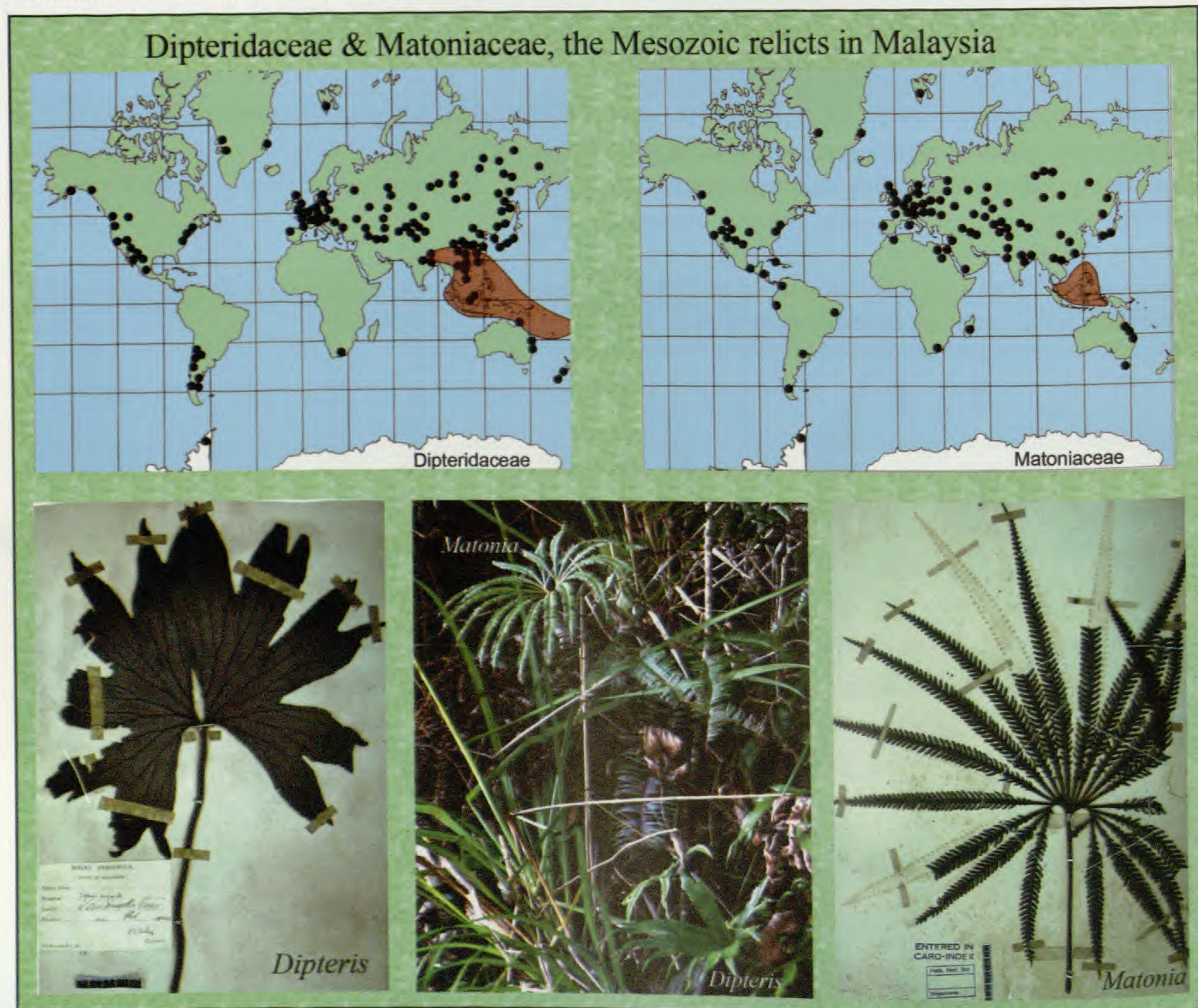
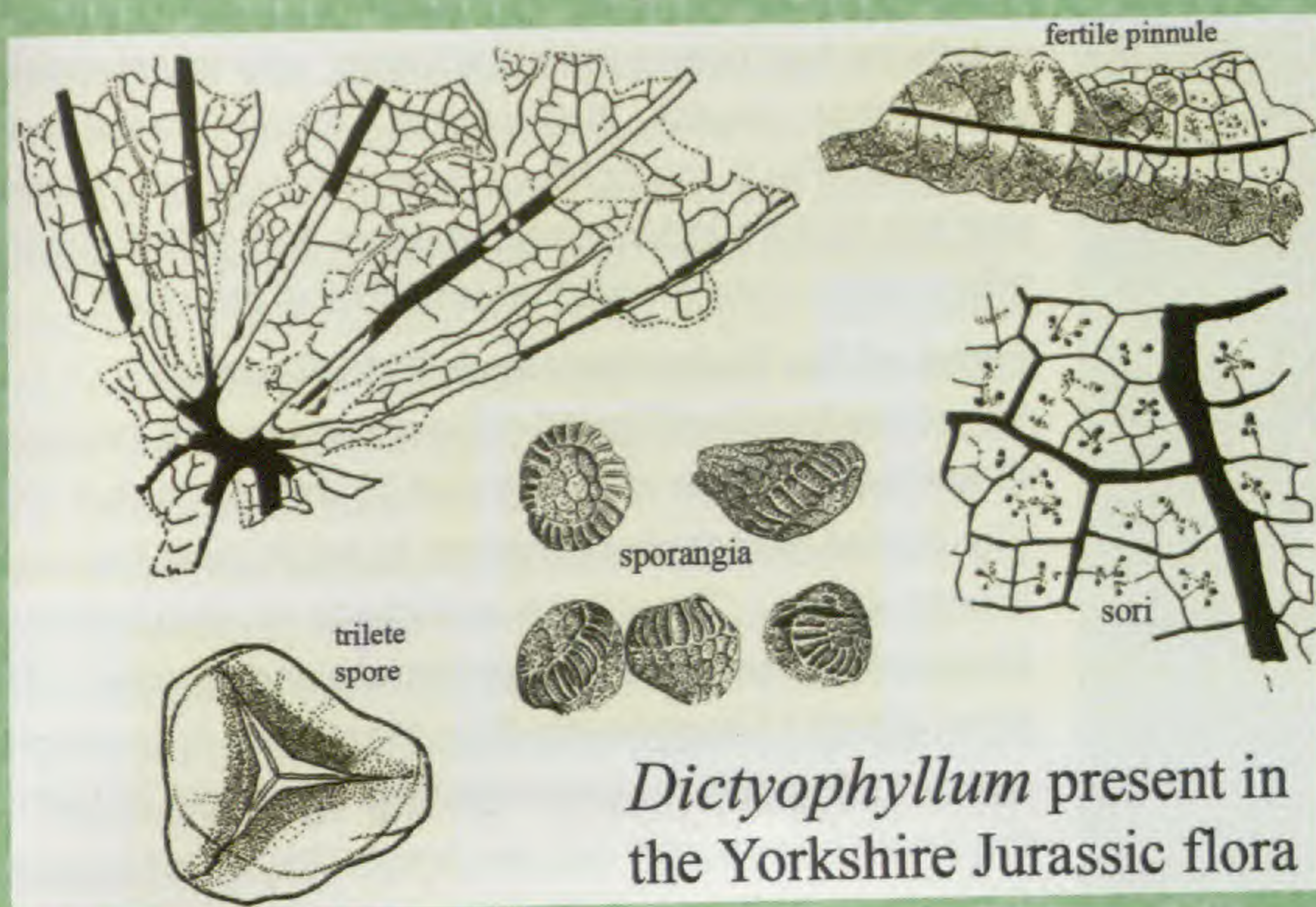


Fig. 10. Top: Geographic distribution of the fern families Dipteridaceae and Matoniaceae in the Mesozoic (black dots) and at present (red shading). Maps adapted from Moran 2004. Below: Fronds of the type genera *Dipteris* and *Matonia*.



# Fossil & living Dipteridaceae



*Dipteris* leaves & trilete spore



*Hausmannia* leaves with soral indentations. Wealden, Sussex.



Fig. 11. Jurassic, Wealden and living ferns of the Dipteridaceae.

having: thin rhizomes with long internodes and tubers at the nodes, soft, deciduous aerial shoots with a small number of leaves. The less well-preserved Wealden species *Equisetum yokoyamae* (Fig. 7) probably also belongs here. *Equisetum sylvaticum* (Fig. 7) is a typical living species of the subgenus for comparison. The obvious deciduous nature of *E. burchardtii* provides useful evidence of a seasonal climate in Wealden times.

*Equisetites lyellii* (Fig. 8) is the best known Wealden species (Watson & Batten 1990) with considerable morphological and anatomical information available from a large number of specimens. These have been

assembled mainly by Allen (1941) from extensive soil beds in which the rhizomes and bases of aerial shoots occur *in situ* (Fig.8, top left). Many of the features seen in *E. lyellii* are characteristic of the second extant subgenus *Hippochaete*, commonly known as the scouring rushes which are coarsely silicified and wintergreen. The shared characters are: rhizomes with short internodes and large central canal, lack of tubers, aerial shoots with a large number of leaves per node. However, the stomata of *E. lyellii* (Fig.8, lower right) are not only unlike those of the *Hippochaete* but, both in distribution and structure, closely resemble those found in *Equisetum* subgenus,



## Fossil & living Matoniaceae



*Matonidium goeppertii*

*Matonia* young & mature leaves

Widespread sp. in Jurassic & Lower Cretaceous floras



Fig. 12. Jurassic, Wealden and living ferns of the Matoniaceae.

*Equisetum sylvaticum* in particular (Fig. 8, bottom right corner). These stomata are scattered in broad bands with the stomatal cells at the surface, whereas those in *Hippochaete* are arranged in one or two distinct longitudinal rows with each individual stoma sunken in a deep, coarsely silicified, crater-like pit.

The vascular anatomy of *E. lyellii* differs from both of the extant subgenera and it is probably attributable to a third extinct subgenus, as yet not established. There is preliminary evidence that at least some of the Yorkshire Jurassic species share a similar mixture of subgeneric characters.

Figure 9 illustrates three examples of a wheel-like feature which is found in Mesozoic horsetails worldwide, the so-called nodal diaphragms. This structure is

completely unknown in extant species. However, the extended study of *E. lyellii* by Watson & Batten (1990) led to some shoots of *E. telmateia* being left drying in a polythene bag over a period of years, with the surprising result that 'nodal diaphragms' were inadvertently produced (Fig 9, top right). It is our strongly held opinion that this feature in Mesozoic species is a preservational effect rather than an original anatomical structure.

### Ferns of the Dipteridaceae & Matoniaceae.

These two families (Figs 10-12) are outstanding examples of Mesozoic relicts now reduced to only 3 genera (see Fig. 6) and 10 species confined to south east Asia (see Moran 2004). They were worldwide in distribution in Mesozoic floras with far more genera and species. The fossil dipterid *Hausmannia* (Fig. 11) and the long-ranging species *Matonidium goeppertii* (Fig. 12) occur in both of the English floras and can be closely compared to extant *Dipteris* and *Matonia* in leaf morphology, soral structure and their trilete spores. In the Wealden, *Hausmannia* and *Matonidium* are frequently found on the same bedding plane (Fig. 12) and clearly grew together, as do *Dipteris* and *Matonia* in Malaysia at the present day (Fig. 10).

### Extinct tree-fern family Tempskyaceae in the Lower Cretaceous, Europe & U.S.A.



*Tempskya* trunk from the English Wealden, I.O.W.



Fig. 13. Wealden trunk of *Tempskya* with plant reconstructions adapted from Thomas & Cleal 1998.



**Extinct tree-fern family Tempskyaceae.**

In the Isle of Wight large water-worn blocks of the Wealden tree-fern *Tempskya* (Fig. 13) can readily be collected on the beaches and indeed gardens with *Tempskya* rockeries are not unknown on the island. The trunk is a mass of thin branching stems and slender leaf petioles embedded in a supporting matrix of adventitious roots, quite unlike modern tree-ferns in the Cyatheaceae and Dicksoniaceae families. The leaves of *Tempskya* remain unrecognised in the Wealden flora but are known from Cretaceous floras in the USA to be small fronds emerging at the surface along the length of the trunk (Fig. 13). American specimens are known *in situ* in conditions which suggest a swampy habitat. There is also evidence of fire from charcoaled remains (fusain) and the trunk of *Tempskya* was almost certainly adapted to fire resistance, or even dependence. Burnt fern fronds of

several species preserved as fossil charcoal (Fig. 14) are common at certain Wealden horizons in Sussex and the I.O.W.

**Extinct fern family Weichseliaceae.**

*Weichselia reticulata* (Fig. 14) is one of the widespread Lower Cretaceous species found in floras worldwide. It presents the strongest evidence of fire resistance, frequently being preserved as fusain, which is fossilised charcoal, and was probably the dominant plant in a community subject to regular wildfire. Many large fronds are present in the Rufford Collection but the German and Belgian Wealden in particular have yielded the extensive deposits of *Weichselia* which allowed Alvin's (1971) spectacular reconstruction of the whole plant (Figs 14, 15). It is quite unlike any living fern, having huge umbrella-like, bi-pinnate fronds with thick petioles borne on massive erect stems supported by strong, thick, diverging prop-

**Extinct fern family Weichseliaceae found in many Lower Cretaceous floras worldwide.**



*Weichselia* pinnules preserved as charcoal. Wealden, Europe.



*Weichselia* frond reconstruction.



*Weichselia* spore



sporangial clusters



**Fig. 14.** Remains of Lower Cretaceous fern *Weichselia* preserved as fossil charcoal.



## Pteridophytes in the English Mesozoic.

roots. The pinnules are thick and tough, with a cuticle resistant to acid maceration, unusual for ferns. The sori form spherical clusters (Fig. 14, bottom right) with totally enclosed sporangia and no obvious means of spore dispersal. These unique structures were clearly fire resistant and represent a survival mechanism for the species, though precisely how this operated remains a matter for speculation (Watson & Alvin 1996).

### Pteridophytes in the Wealden Landscape.

The Wealden landscape (Fig. 15), populated with pteridophytes, gymnosperms and the dinosaur *Iguanodon* in its latest suggested appearance and gait, was recently reconstructed (Watson, Lydon & Hartley, work in progress) from palaeobotanical, sedimentological and palaeoecological studies which include new and revised evidence accumulated over the past 40 years or so. The ferns in the foreground are mainly the very robust species discussed above. Wealden ferns in other families, e.g. Schizaeaceae, Dicksoniaceae, which remain under investigation, will provide evidence for the reconstruction of more individual species, in turn to be incorporated into landscape models of different ecological environments. Research by various workers on other contemporaneous reptiles, insects and early mammals continues apace and seems set fair to reveal much more about sub-tropical Sussex 140 million years ago. □

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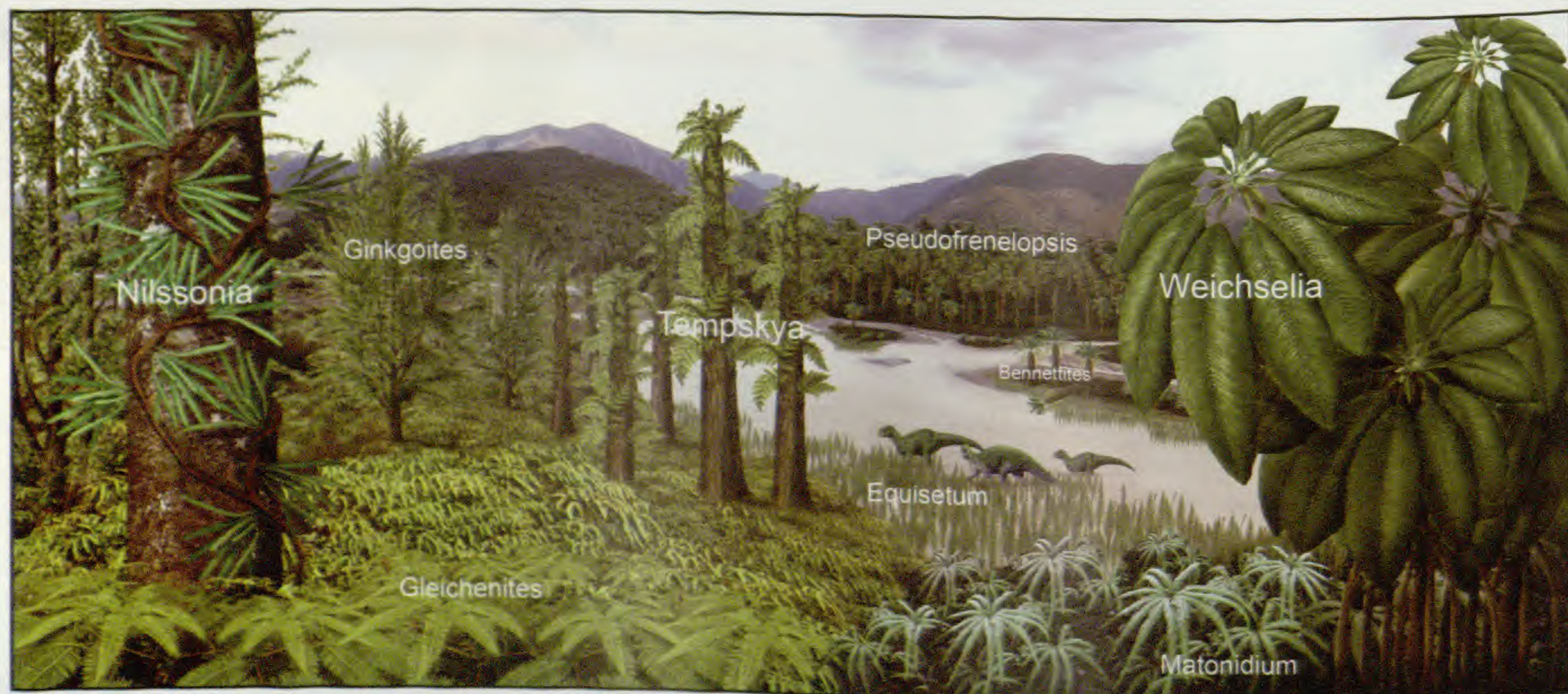


Fig. 15. Pteridophytes, gymnosperms and the dinosaur *Iguanodon* in a Wealden landscape - reconstruction. © Joan Watson 2010.



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**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 2 was published on 30th June 2009