

PTERIDOLOGIST

The Fern Magazine

2018 Edition [Volume 6, Part 5]



**EDITED BY A.E. GREENING
AND C.P.J. EVANS**



ISSN 0266-1640

Editorial

Preview



Welcome, finally, to this year's *Pteridologist*. Some of you might have been wondering why it is so late this year.

There are a number of reasons. You will note that this issue is only 64 pages, plus cover, because of lack of copy. A lot was very late and I will have to be stricter about the deadline. For next year it will be the end of February. A lot of copy was promised but never appeared for various reasons and finally some authors took their time in sending alterations.

Let's hope all will be resolved for the next issue.

We have the usual wide spread of topics but one of the themes is the restoration of old ferneries: Southport, Danesbury and Jodrell Bank are all featured. For me the most exciting is the future restoration of the Whitwell fernery in Kendal, the birthplace of the society. There will be several articles about Whitwell, the first secretary of the BPS, and the restoration in the next issue. Meanwhile there is a small taster on page 392. A new stumpery also gets a mention in Grange-over-Sands on page 366 built by volunteers. I am told that they are extending it already.

The cover picture was taken only a few weeks ago during a fern hunt in 'Cultivar Country'. It was found in a large garden in Cumbria and it is not recognised as a cultivar of *Athyrium filix-femina*. It is proposed that it should be called *Athyrium filix-femina* 'Gracile Coleman' after it's graceful habit and its finder.

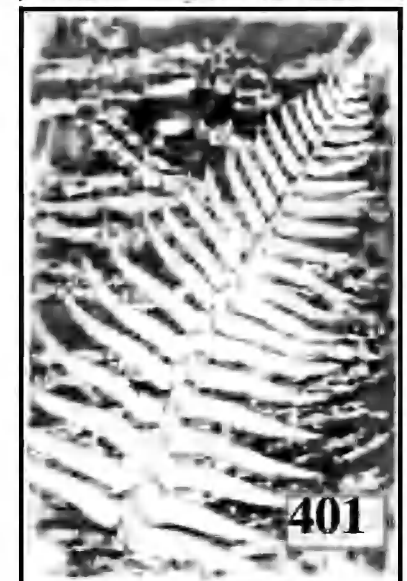
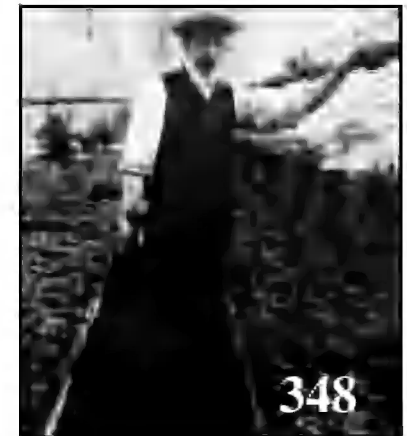
There was no report this year of the 2017 fern hunt in Cumbria because of lack of photographs but Julian Reed will give a full report of this year's hunt in the next issue. I hope it will include the finding of *Athyrium filix-femina* 'Acrocladen', which everyone thought was lost. Careful tracking down of a past member revealed a collection of *Athyrium filix-femina* cultivars still intact. Most were bought from Kaye's many years ago. An exciting day was had dividing these cultivars and presenting the owner with some he had lost over time. He has since rejoined the society!

Thany you to my proof readers: Adrian Dyer, Brian Ottway, Roger Amos and Chris Evans. They have been working hard in the last few weeks to ensure that I got to the printers on time.

I hope you enjoy this issue, there is plenty for everyone. If you want to contribute to the next issue please remember that the absolute deadline is the end of February 2019.

Alec Greening

e-mail: alec.greening49@gmail.com



Back cover:
Based on this image of a *Lecanopteris depariodes*
(Photo: David Redmore)



Front cover:
A very elegant red stemmed *Athyrium filix-femina* found in a Cumbrian garden.
(Photo: Julian Reed)

Notes for contributors

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

PTERIDOLOGIST 2018

Contents: Volume 6 Part 5, 2018

Three Generations of Fern Growers	Julian Reed 348
Occurrence of the Neotropical <i>Asplenium auritum</i>	Marcus Lubienski 353
Macrophotography of Fern Gametophytes	Jennifer and Tim Deegan 357
Fertility of Some <i>Asplenium</i> Hybrids	Rolf Thiemann 361
A Charming North-West Levada in Madeira	Pat Acock 365
Grange Over Sands' Stumpery 2017– The Creation	Pauline Turner 366
A Fern Without Fronds?	Martin Spray 368
Broad Foliar Form in Fern Fronds	Chris Page 369
<i>Dryopteris dilatata</i> 'Wechloy'	Berndt Peters 371
Artificial Hybrid of Hartstongue	Rolf Thiemann 372
Book review: <i>An atlas and guide to the Ferns of the Arnside and Silverdale</i>	Martin Rickard 373
Schneider's Polypody: a Mystery	Roger Golding 374
Recording roundup	Fred Rumsey 379
<i>Asplenium viride</i> in Worcestershire - Two Tales!	Martin Rickard 382
Recovering a Victorian Fernery	John Roper 383
Where to start?	David Redmore 386
Fertile fronds in <i>Dennstaedtia glauca</i>	Dick Hayward 387
Southport Fernery 10 years on	Alison Evans 389
What is the Ugliest Fern?	Pat Acock 391
<i>Lecanopteris depariodes</i>	David Redmore 393
Garden Volunteer Day with the BPS	Becky Burns 394
A new Moonwort for Britain	Fred Rumsey 396
Book review: <i>Landscape of Dreams</i>	Martin Rickard 398
<i>Asplenium trichomanes</i> subsp. <i>pachyrachis</i> in Cheshire	Martin Rickard 398
St. Hilarion Castle : an oasis for ferns	Sylvia D. Martinelli 399
Fern Nature Prints – the Manwell way	Adrian Dyer 401
Two new finds of <i>Asplenium</i> × <i>clermontiae</i> in Britain and Ireland.	Fred Rumsey 403
Buckingham Palace Garden Party 22 nd May 2018	Robert Sykes 405
Book review: <i>My Great-Grandmother's Book of Ferns</i>	Michael Hayward 406
Ferns and Art	Ruth Wheeler 407
Photographic Competition 2018	Bryan Smith 410



Fern Art by Ruth Wheeler
(Photo R. Wheeler)



Botrychium nordicum
(Photo: F. Rumsey)

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

DISCLAIMER:

Views expressed in the Pteridologist are not necessarily those of the British Pteridological Society.
Copyright © 2018 British Pteridological Society. All rights reserved. No part of this publication may be reproduced in any material form (including photocopying or storing in any medium by electronic means) without the permission of the British Pteridological Society.

Three Generations of Fern Growers

Julian Reed

19a Northdown Road, Kemsing, Sevenoaks.

Kent TN15 6SD

e-mail: julianreed@waitrose.com



Most of us will not have heard of D Bannister & Sons of Royston, but for three generations they played an important role in growing and supplying young ferns, along with other plants, especially bedding. Initially they were mainly growing for the indoor fern trade but over the last 50 years they also supplied young hardy ferns for other nurseries to grow on. These nurseries included famous names such as Bressingham Gardens, Reginald Kaye, Fibrex, Longacre, Rickard's Hardy Ferns, Stapeley Water Gardens, Fernatix and Bridgemere. Bannisters became well known for the quality of their ferns, especially *Asplenium scolopendrium* varieties, which others have sometimes found difficult to grow.

The history

The story began with David Bannister Snr, originally from Suffolk. David went to work for H B May & Sons of Blackheath, a famous fern nursery in the late 1800s and early 1900s. In 1898 he started work at Piggs Nursery in Mill Road, Royston, but when the nursery across the road came up for rent he set up his own nursery in 1900. In 1907 he bought the stock of Birkenhead's Nursery at Sale and trained as a fern raiser. The new nursery had limited glass



Fig. 1. David Bannister Snr inspecting the stock plants



Fig. 2. David Bannister Snr tending to his young plants

but David soon built more and got a name for himself by staging exhibits at the RHS fortnightly shows, achieving a Banksian Medal on September 28th 1915 for a display of 'Ferns, Salvias and Verbenas' and also displayed at Chelsea Flower Show.



Fig. 3. The Banksian Medal won in 1915 for the display of 'Ferns, Salvias and Verbenas'

In those days salvias had to be grown from cuttings, not seed raised like today. David also grew tomatoes and cucumbers for seed production as well as hydrangeas. Like so many nurseries he could not make a living just from ferns

David Snr's son, Stan, started his own business in the next field in 1932, again specialising in greenhouse ferns, tomatoes, salvias and geranium plants in the winter and early spring and also salvias, still grown from cuttings. No plants such as fuchsias or any plants that were prone to white fly were grown. At the same time, Stan's brother David Charles Bannister, was also growing ferns and dahlias at the Heath Nurseries in Royston .

So there were three nurseries all propagating ferns in Royston at the same time, up until the late nineteen thirties. Sadly David Charles died in 1936 from septicaemia and in 1939 David Bannister Snr also died.

When the war came all fern propagation stopped. You could keep your stock plants but that was all. Food had to be your focus. The Bannisters grew tomatoes and David Jnr (Stan's son) can remember the queues for the fruit all the way up the lane.

While David Jnr, was at school, Stan tried to persuade him not to come back to the nursery, He suggested veterinary or forestry work. However David came back to work for Stan for about 18 months and then went into national service. After this David returned home to the nursery in 1958.

Three Generations of Fern Growers

Through the 1960s to about the mid 1980s the Bannisters were producing 4-500,000 small houseplant ferns, sending them to all parts of the U.K., particularly Scotland, Yorkshire, Bristol, Preston and the Lee Valley, They also had clients a delightful couple, Donald and Ella Glue, on Orkney (Their family still run a garden centre in Kirkwall). In the spring the Bannisters produced tomato plants and geranium cuttings for other growers, suppling Burton of Elland 1000 tomato plants a week!

Everything was sent by rail from Royston Station until the rail strike in the late 1960s. They then delivered most of the plants by van .



Fig. 4. Plants waiting for delivery

During the mid 1960s David was experimenting with raising hardy ferns. It was not until the 1970s they started producing them on a serious scale and were propagating quite a reasonable number of varieties. They approached Adrian Bloom of Blooms Nurseries and Bressingham Gardens and most of the ferns they grew went there. Between Blooms, Fibrex Nurseries, Kayes of Silverdale and the Bannisters, they kick-started the revival of the Victorian fern craze and Bannisters were supplying them all with plugs and 7cm. plants.

David can remember Angela Tandy of Fibrex as a girl with her father Dick Key talking in the kitchen over a cup of tea when they came to collect some ferns in the late 70s.

By the late 1970s the Dutch started producing large numbers of hardy ferns and this changed things completely. Also in 1979 Stan Bannister, David's father, passed away. Up to that time the firm had always been purely wholesale, but things had to change, so they started selling to the general public and became 40% wholesale/60% retail , growing spring bedding and greenhouse ferns in summer, then autumn bedding (pansies, wallflowers, polyanthus) and Christmas pot plants (cyclamen, poinsettia, azalea, hyacinths, planted bowls and tomatoes and cucumbers for sale in the summer) and hardy ferns in winter. Almost everything they grew was propagated and finished on the nursery . They also made all their own compost except for some Levington compost.

David retired in 2000 but helped Ann, his wife, with the downsized nursery until 2015 when they wound up the business.

How they did it

To make their compost they would start by burning good quality loam on galvanised corrugated sheets over old boiler irons with very hot coke coals underneath and would rake it off into galvanised baths when it went black. They would then put more soil on the sheet and the process

would go on until they had enough. It was all covered and left for 3 months to age because they did not like using freshly-sterilised soil.

In the meantime they would thoroughly clean a greenhouse so that it was totally sterile, including the wood work. They also used a different glasshouse each year

The spores for the houseplant ferns came from their own plants, while the hardy fern spores came from their own garden as well as from Alan Bloom's garden. The advantage of the spores from Alan's garden was that the plants were very well spaced and there was very little cross contamination. David would collect the fronds and Ann would label and bag them. When they got back to the nursery they were folded into paper sheets and stored in a greenhouse until they were ready to sow

The houseplant spores were sown in January/February and were ready to be sent out in July/August to be grown on by other nurseries for the Christmas market and for the planted basket trade. The hardy ferns were sown soon after.

For sowing, they would use 8½" clay pots with a 2" clay pot inside, turned upside down. They would pack it up to the top of the upturned pot with the sterilised leaf mould from the previous year, then a layer of moss peat and then ½" of the aged burnt soil.



Fig. 5. The two pot system used by the Bannisters. An 8½" clay with a 2" clay upturned.



Fig. 6. Sterilised leaf mould for packing the pots.

Three Generations of Fern Growers

David would shut himself away in the sterilized greenhouse so there was no air movement and sow the spores, then stand the half pots in galvanised trays. These trays would be flooded when necessary and then drained



Fig. 7. The pots which held the spores covered with paper.



Fig. 8. The spores developing into prothalli



Fig. 9. The protective paper covering is held in a frame so that it can be easily removed.

again; there would be no watering from above. When David was sowing spores he was rarely disturbed because if someone opened a door and a draught came through the spores would be everywhere. The ferns were pricked out when they had their first frond and were grown at 65°F (18°C), both hardy and indoor ferns, as they were all grown in the same glass house and the fern houses were heavily shaded.

Marguerite Butler seen in both Fig. 10 and 11 pricking out with an old style pen with a bent nib, worked for the Bannisters for 52 years!



Fig. 10. A very young Marguerite Butler pricking out the ferns.



Fig. 11. A much older Marguerite Butler still pricking out the ferns,

Three Generations of Fern Growers

The pots used for pricking out were cleaned and sterilised 5" pots, again with a 2" long tom pot upturned inside. The pots were packed to the top of the long tom pot with dry leaves, then topped off with a 1" layer of Levington compost. The tiny ferns were pricked out 30 to a pot for growing on, though they only charged for 25.

In Fig. 12 we can see Bernard Butler packing the ferns ready for dispatch. The cycle for the house plants was to sow in January/February and prick out at the end of April and May, after the summer bedding had been finished. The young plants were sent out from the end of June through to July and August for other nurseries to grow on for Christmas and New Year. The rest of the young plants would be put into trays of 24/25 plugs for sale in November as larger plants. For Beverage of County Durham they would pot some up into 2 1/2" pots for dispatch before Christmas .



Fig. 12. Bernard Butler packing the ferns ready for dispatch

The hardy fern cycle

Hardy ferns would be sown at the same time as, or just after, the houseplant ferns. They would be pricked out into 30s after the houseplants in July, then transferred into 40 plug trays before Christmas. They were then sent out in February. 7cm plants would be potted in March/April and then grown on for another year. Some would be sent out in the autumn but most in the spring.

Pteridologist 6.5.2018

David's shade house can be seen in Fig. 13. It was specially constructed with a barn shaped roof so that the drips would run off rather than dropping and causing mould on the ferns growing beneath. He would also make sure it was well ventilated.



Fig. 13. The shade house built to stop water dripping

D. Bannister & Sons

FERN SPECIALISTS
MELBOURN ROAD NURSERIES
ROYSTON

HARDY FERNS

ADIANUM PEDATUM
 " ALEUTICUM
 " VENUSTUM
 " PEDATUM ROSEUM
 ASPLENIUM SCOLOPENDRIUM VULGARE
 " " CRISPUM (UNDULATUM)
 " " CRISTATUM
 " " LACERATUM (KAYES VARIETY)
 " " RAMO-MARGINATUM
 ASPLENIUM TRICHOMANES
 ATHYRIUM FILIX-FEMINA CRISTATUM
 " " VERNONIAE
 " " VICTORIAE
 " " MINUTISIMUM
 " " FRIZALLIAE
 " NIPPONICUM PICTUM
 " OTOPHORUM OKANUM
 DRYOPTERIS FILIX-MAS LINEARIS
 " " CRISPA CRISTATA
 " " CRISPA CONGESTA
 " AFFINIS THE KING
 " CYCADINA
 " ERYTHROSORA
 " WALLICHIANA
 " DILATATA
 " " CRISPA WHITESIDE
 OSMUNDA REGALIS
 " " UNDULATA
 " " CRISTATA
 " " PURPURASCENS
 POLYSTICHUM ACULEATUM
 " POLYBLEPHARUM
 " SETIFERUM
 " " DIVISIOBUM
 " " HERRENHAUSEN
 " " DHALEM
 POLYPODIUM VULGARE
 MATTEUCCIA STRUTHIOPTERIS
 ONOCLEA SENSIBILIS
 GYMNOCARPIUM (OAK FERN)

Fig. 14. The fern list from Bannisters.

Three Generations of Fern Growers

Sadly, in the last 50 years or so Bannisters were the only nursery left propagating greenhouse ferns in the country. They had a staff of usually about 7 – including Ann and David; Mrs Butler came to work part-time with her husband Bernard when David was very young and didn't stop until David officially retired in 2000, when they down-sized the nursery. Ann carried on with David's help until 2015 when they closed the business altogether. Unfortunately there was no family to carry on the business. Their business will be sorely missed as they were supplying a lot of the retail nurseries with ferns and many *Asplenium scolopendrium*s were grown by them to a high standard, with very good clones.

One of David's stock plants is a superb fertile *Asplenium scolopendrium* 'Crispum' (Fig. 16) which can be seen in their garden growing with *Adiantum venustum*.



Fig. 15. *Pteris cretica* 'Bannisteri'

Pteris cretica 'Bannisteri' (Fig. 15) is a lovely crested form selected by David Bannister. It is like a more heavily crested form of *Pteris cretica* 'Wimsettii'. We hope to be able to include it in the 2019 spore exchange so that members can have an original clone and keep it in circulation.

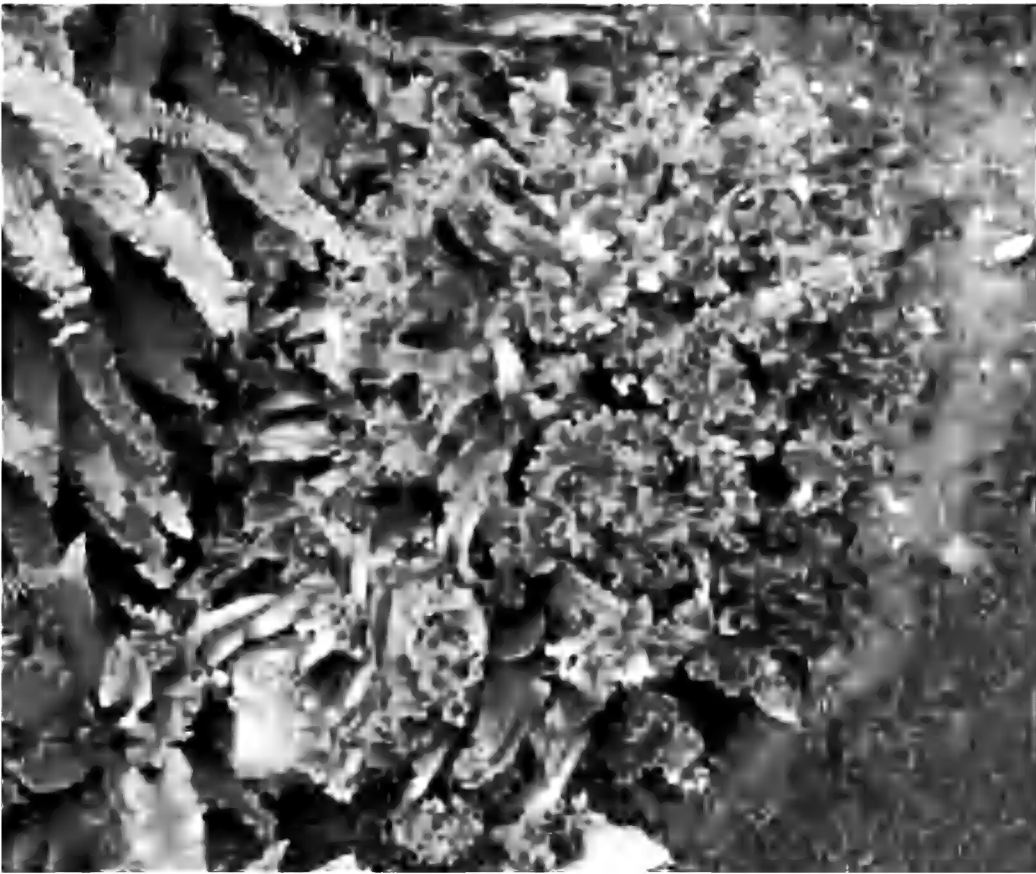


Fig. 17. *Asplenium scolopendrium* 'Cristatum'

This stunning *Asplenium scolopendrium* 'Cristatum' (Fig. 17) growing with *Adiantum aleuticum* has a story behind it. David found this plant growing as a pot plant when they stayed near Bredon, Exmoor. The lady had two plants and David offered to buy one. However she kindly gave it to him. What a generous soul.

David and Ann Bannister (seen in Fig. 18), got married in 1968. Ann had a very good business sense and the two of them obviously made a very good team. The fern world will miss them.



Fig. 18. David and Ann Bannister



Fig. 16. *Asplenium scolopendrium* 'Crispum' growing with *Adiantum venustum*.

Contribution to the Occurrence of the Neotropical *Asplenium auritum* on Europe's Westernmost Island (Flores, Azores, Portugal)

Marcus Lubienski,

Am Quambusch 25,

58135 Hagen, Germany

e-mail: m.lubienski@gmx.de



This contribution follows the quite recent detection of a new neotropical fern species, Auricled Spleenwort (*Asplenium auritum* Swartz), on the island of Flores (Azores, Portugal) by Rumsey *et al.* (2014). The species was rated by the authors as obviously native and previously overlooked. Records were given for four nearby sites in the vicinity of the village of Cuada on the westcoast of Flores, for one earlier collection in Cuada in 1967 by C. M. Ward, and for one historic 19th century occurrence in Santa Cruz das Flores on the east coast of the island collected by H. Drouet in 1857 (Rumsey *et al.* 2014).

Asplenium auritum is an aggregate species badly in need of taxonomic revision. Azorean plants are listed as *Asplenium auritum sensu lato* (Rumsey *et al.* 2014). The complex is widely distributed in the Neo-tropics (South and Central America, Mexico, Florida, Greater and Lesser Antilles) and Palaeo-tropics (Mascarenes Islands, Madagascar, South-eastern and Central Africa) with the first being the centre of diversity and abundance. For this reason an affinity of the Azorean plants with the neotropical populations has been proposed (Rumsey *et al.* 2014).

The archipelago of the Azores consists of 9 islands (Fig. 1), which are the visible part of the underwater mountain range known as the Mid Atlantic Ridge. The island of Flores together with its small neighbour Corvo belongs to the Western Group (*Grupo Ocidental*) of the Azores. Both islands sit on the North American tectonic plate, which is forced away from the islands of the *Grupo Central* (Pico, Faial, São Jorge, Terceira, Graciosa) and the *Grupo Oriental* (São Miguel, Santa Maria) by molten lava coming up between the tectonic plates. Flores and Corvo are therefore constantly travelling a few centimetres a year to the west, heading for North America. Nevertheless the islands represent the westernmost outpost of the European Union, actually lying 1600 km west of the Portuguese coast.



Fig. 1. Archipelago of the Azores (Portugal) showing *Grupo Ocidental* (Flores, Corvo), *Grupo Central* (Pico, Faial, São Jorge, Terceira, Graciosa), and *Grupo Oriental* (São Miguel, Santa Maria).

(Wikimedia Commons: <https://commons.wikimedia.org/wiki/File:Azores-map.png>)

Flores (Fig. 2) is the fourth oldest island of the Azores and emerged by volcanic eruptions nearly 2 million years ago. The island occupies an area of 141.7 km². The climate for the archipelgo in general can be characterised as temperate oceanic with the highest precipitation values found in the Western Group. On Flores very high air humidity, but not seldom over 95%, and frequent fogs and cloud cover are typical weather phenomena, the latter being especially expressed in the western part of the island.

The indigenous vegetation originally consists of different types of evergreen forests depending on the altitude: i.e. coastal forests dominated by *Myrica faya* and *Picconia azorica* and native laurel (*Laurus azorica*) and juniper (*Juniperus brevifolia*) forest in the mountainous areas. This vegetation today is restricted to a few remote places on all islands and is mostly replaced by invasive alien species. Nevertheless Flores displays at its highest altitudes between 700 and 900 m a.s.l. well preserved and fairly undisturbed examples of native laurel and juniper forest, whereas most of the indigenous coastal forest is as in most Azorean islands replaced by stands of the Australian tree *Pittosporum undulatum* (Schäfer 2005).

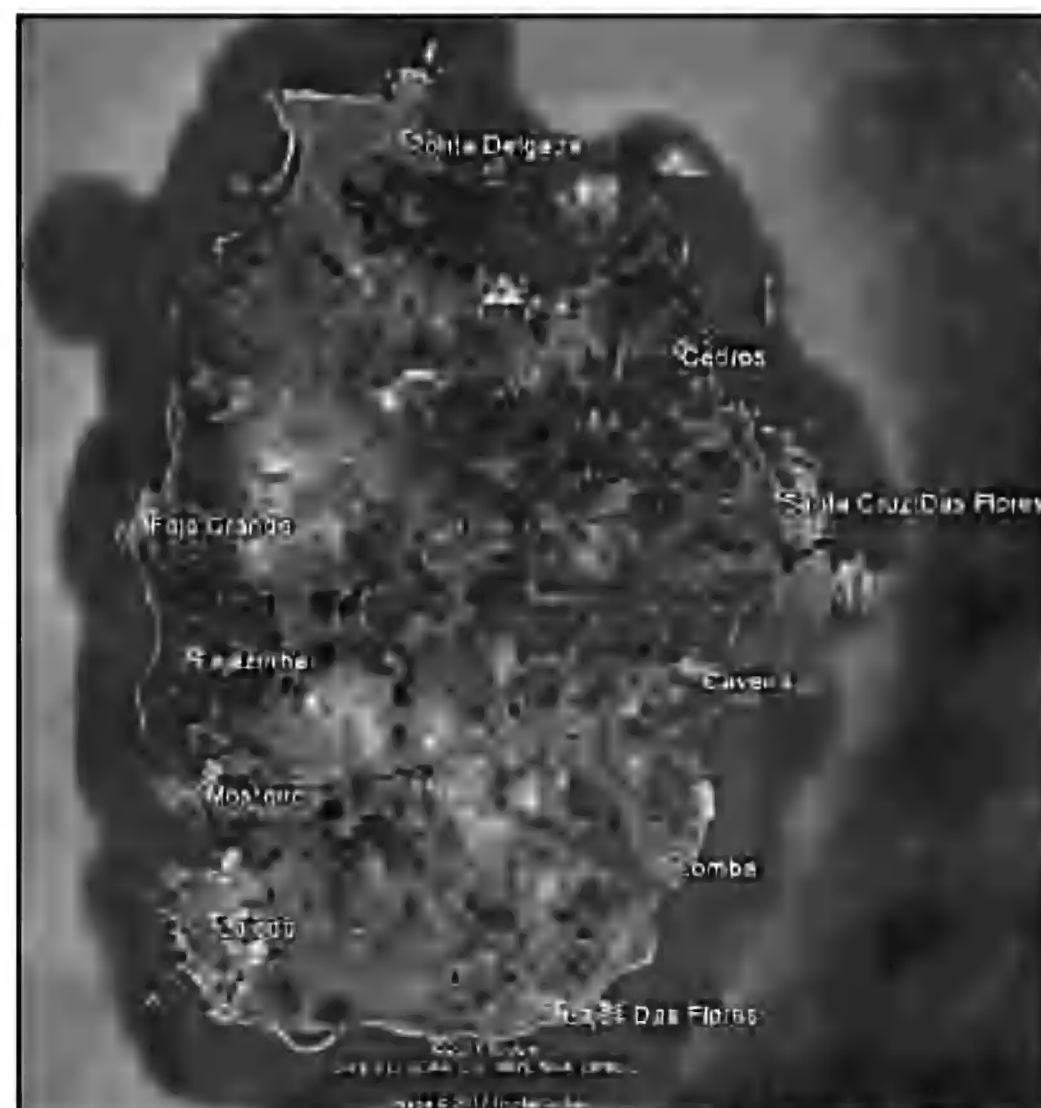


Fig. 2. Ilha das Flores, Azores, Portugal. (based on Google Earth ©, Google Inc., 03.09.2017)

The pteridophyte flora of the Azores consists of a considerable number of alien species (*Deparia petersenii*, *Christella dentata*, *Adiantum raddianum*, *Adiantum hispidulum*, *Pellaea viridis*, *Pityrogramma calomelanos*, *Onychium japonicum*, *Pteris tremula*, *Cyathea cooperi*,

The Occurrence of the Neotropical *Asplenium auritum* on Europe's Westernmost Island

Dicksonia antarctica, *Cyrtomium falcatum*, *Nephrolepis cordifolia*, *Blechnum appendiculatum*, *Doodia caudata*) and a certain amount of endemics (*Huperzia dentata*, *Huperzia suberecta*, *Diphasiastrum madeirense*, *Isoetes azorica*, *Polypodium azoricum*, *Grammitis azorica*, *Asplenium azoricum*, *Dryopteris azorica*, *Dryopteris crispifolia*, *Elaphoglossum semicylindricum*). It is also influenced by neotropical floristic elements, especially in the Grupo Ocidental islands. Examples are the grammitid fern *Ceradenia jungermannioides* and endemics with close relationships to the New World like *Isoetes azorica* and *Huperzia dentata* (Rumsey *et al.* 2014, Schäfer 2005).

During a trip to Flores in the summer of 2017 the author has found several localities of *Asplenium auritum*, which according to the data represented by Rumsey *et al.* (2014) are new, although generally being situated in the same area. These sites are presented here.

All new detected colonies of the species lie within the coastal plain at the central part of the west coast between the villages of Fajã Grande and Fajãzinha (Fig. 3).



Fig. 3. Fajã on the west coast of Flores showing the villages of Fajã Grande, Fajãzinha and Cuada. Red dots show the new found sites for *Asplenium auritum*, green dots the published data by Rumsey *et al.* (2014). (based on Google Earth ©, Google Inc., 03.09.2017)

Such fertile and settled plains at the bottom of steep cliffs of the volcanic upland and near to the sea are called *fajãs*. Both villages like many places on the island show distinct signs of emigration, which can be seen by a lot of overgrown tracks and paths, abandoned houses, and by the decrease of the population numbers (100-200 inhabitants today and 500-1000 at the beginning of the 20th century) (Bragaglia 2009). The small village of Cuada is situated between Fajã Grande and Fajãzinha and was finally abandoned in the early 1980s. In the 1990s its houses were carefully restored and the village is now a self-catering tourist accommodation facility (Aldeia da Cuada). The vicinity of Cuada is characterised by many small paths or tracks overgrown by *Pittosporum undulatum* and mostly lying in deep shade and nearly invisible from the surrounding terrain or the road leading from Fajãzinha to Fajã Grande (Fig. 4).

These paths bordered by man-made walls of volcanic rock harbour the neotropical *Asplenium* on the walls or on the rocks at the side of the tracks. Figures 3 and 5 show the new found sites (red dots) compared with those published by Rumsey *et al.* (2014) (green dots).



Fig. 4. Typical remains of abandoned human settlements overgrown by *Pittosporum undulatum* in the vicinity of Cuada, Flores.

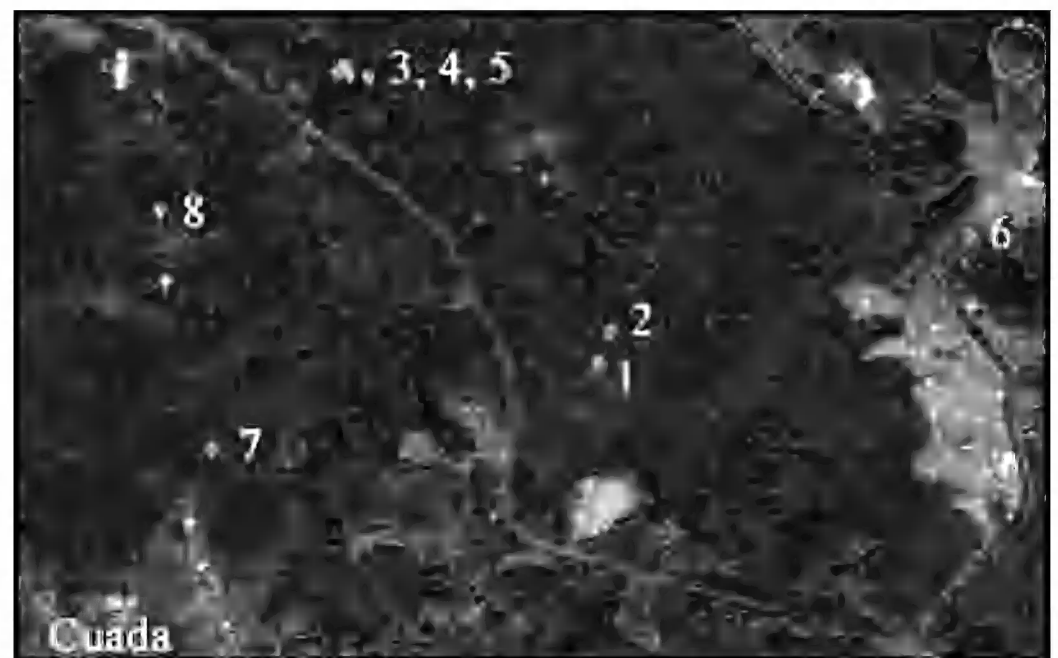


Fig. 5. New found (red) and published (green) sites of *Asplenium auritum* near the village of Cuada. (based on Google Earth ©, Google Inc., 03.09.2017)

Site 1:

N 39°26'35.3" / W 31°15'06.3", path east of the road Fajãzinha-Fajã Grande, northeast of the village of Cuada, boulder of c. 1 m² with approx. 100 juvenile plants, c. 167 m. above sea level. (See figs 6 and 7)



Fig. 6. Site 1 location.



Fig. 7. Site 1 detail.

The Occurrence of the Neotropical *Asplenium auritum* on Europe's Westernmost Island

Site 2:

N 39°26'36.3" / W 31°15'05.8", path east of the road Fajãzinha-Fajã Grande, northeast of the village of Cuada, small boulder on top of the wall, 15-20 adult plants, c. 152 m. above sea level (See figs 8 and 9)



Fig. 8. Site 2 location.



Fig. 9. Site 2 detail.

Sites 3, 4, 5:

N 39°26'44.6" / W 31°15'15.9", N 39°26'44.9" / W 31°15'16.7", N 39°26'44.8" / W 31°15'17.2", path east of the road Fajãzinha-Fajã Grande, east of the chapel Sto. Antonio de Lisboa, small boulders on walls and in woodland near the path, 7-8 populations alongside the path over c. 25 metres, betw. 120-130 m. a.s.l.. These sites are obviously identical with specimens seen (No. 3 and 4) listed in Rumsey *et al.* (2014) collected by H. Schäfer in 2011. (See figs 10-19)



Fig. 10. Site 3 location.



Fig. 11. Site 3 detail.



Fig. 12. Sites 5 (back), 4 (middle), and 3 (front) location.



Fig. 13. Site 3 location and detail.

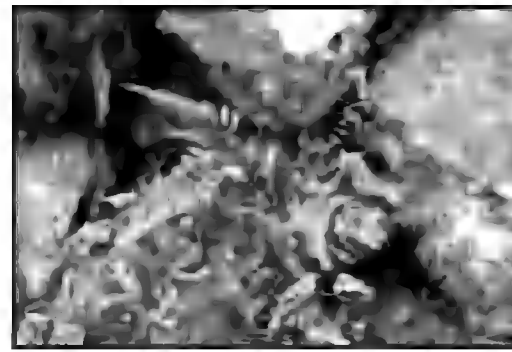


Fig. 14. Site 3 detail.

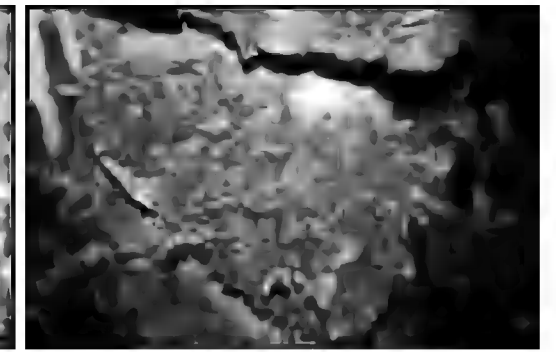


Fig. 15. Site 3 detail.



Fig. 16. Site 4 (left) and 3 (right) location.

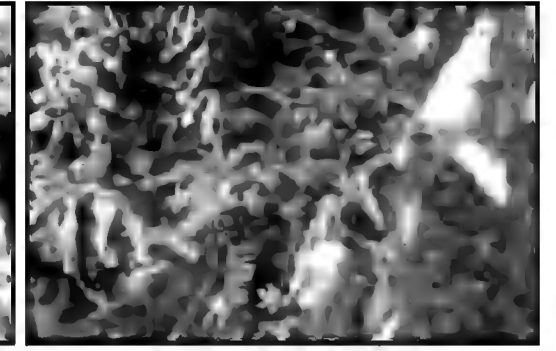


Fig. 17. Site 4 detail.



Fig. 18. Site 4 detail.



Fig. 19. Site 4 detail.

Site 6:

N 39°26'39.1" / W 31°14'52.0", path leading downhill to the secondary road from Fajãzinha to Ponta da Fajã, northeast of the village of Cuada, small boulder on top of the wall, several adult plants, c. 199 m. above sea level. (See figs below)



Fig. 20. Site 6 detail.



Fig. 21. Site 6 detail.

The Occurrence of the Neotropical *Asplenium auritum* on Europe's Westernmost Island

Site 7:

N 39°26'32.5" / W 31°15'22.4", wall near path leading from the chapel Casa do Espírito Santo to the chapel Sto. Antonio de Lisboa, west of the road Fajãzinha-Fajã Grande, north of the village of Cuada, small boulder on top of the wall, a few juvenile plants, c. 138 m. above sea level. (See figs 22 and 23)



Fig. 22. Site 7 location.



Fig. 23. Site 7 detail.

Site 8:

N 39°26'40.3" / W 31°15'24.8", small secondary path leading westwards from the path from the chapel Casa do Espírito Santo to the chapel Sto. Antonio de Lisboa, west of the road Fajãzinha-Fajã Grande, north of the village of Cuada, small boulder on top of the wall, a few juvenile plants, c. 124 m. above sea level. (See figs 24 and 25)



Fig. 24. Site 8 location.



Fig. 25. Site 8 detail.

References:

Bragaglia, P. (2009). *Flores – Azores: Walking through history. A guide to the island's paths and past.* Nova Gráfica, Ponta Delgada, Azores.

Rumsey, F.J., Schaefer, H. & Carine, M. (2014). '*Asplenium auritum* SW. *sensu lato* (Aspleniaceae: Pteridophyta) – an overlooked neotropical fern native to the Azores.' *Fern Gazette*. **19**: 259-271.

Schäfer, H. (2005). *Flora of the Azores – A Field Guide.* Margraf Publishers, Weikersheim.



Congratulations!

Jennifer Deegan's article, on the next page, tells you how she managed to take some highly detailed photographs of fern gametophytes, using a home made system.

What it does not tell you is that she won an award for her project from the Biomaker Challenge

This was a four-month programme, challenging interdisciplinary teams to build low-cost sensors and instruments for biology. They were looking for frugal, open source and DIY approaches to biological experiments.

The Deegan family, Jennifer, her husband Tim and son Ben, rose to the occasion and won an award for their efforts. I look forward to any future developments and would like to offer my congratulations to them all.

A.E.G.

Macrophotography of Fern Gametophytes Using a Focus Stacking System



Jennifer I. Deegan

Department of Plant Sciences,
University of Cambridge, Downing Street, Cambridge, CB2 3EA.
e-mail: jic24@cam.ac.uk



Tim Deegan

This follows on from a previous article on focus stacking of fern gametophytes by the same author. It can be found at Deegan, J., (2017) 'Photographing the Fern Gametophyte' *Pteridologist*, 6(4): 263-265. The principles of this new system are the same as before, but several components have changed significantly. This article describes the modifications made, relative to the previous system.

The major components of the system are the rail, the rail driver, the optics and the lighting. The sections that follow will describe these new components.

The Rail

The previous rail was a modified flatbed scanner, and this has been replaced with a home-made system based on an old microscope. The bulk of the rail was made from the focusing block of a Nikon Optiphot or Labophot microscope. This was cut out and bolted horizontally onto a piece of scavenged worktop (Fig. 1). On top of the focus block, a flat sheet of metal was screwed down to act as a platform for the camera. The camera was placed on top, with the lens supported in a horizontal position using a piece of pencil eraser.



Fig. 1. The rail based on an old microscope.

The Rail Driver

The rail could be driven either by a Raspberry Pi B computer (Fig. 2) or an Arduino computer (Fig. 3), both of which were in turn controlled by a laptop computer. I am including

descriptions of both as they were quite complicated to set up and I don't know which system will continue to be available for longer, if someone should want to replicate this work. The purpose of the Raspberry Pi or Arduino was to drive a stepper motor, which then drove the fine focus knob of the microscope block via some plastic gears (Fig. 4).

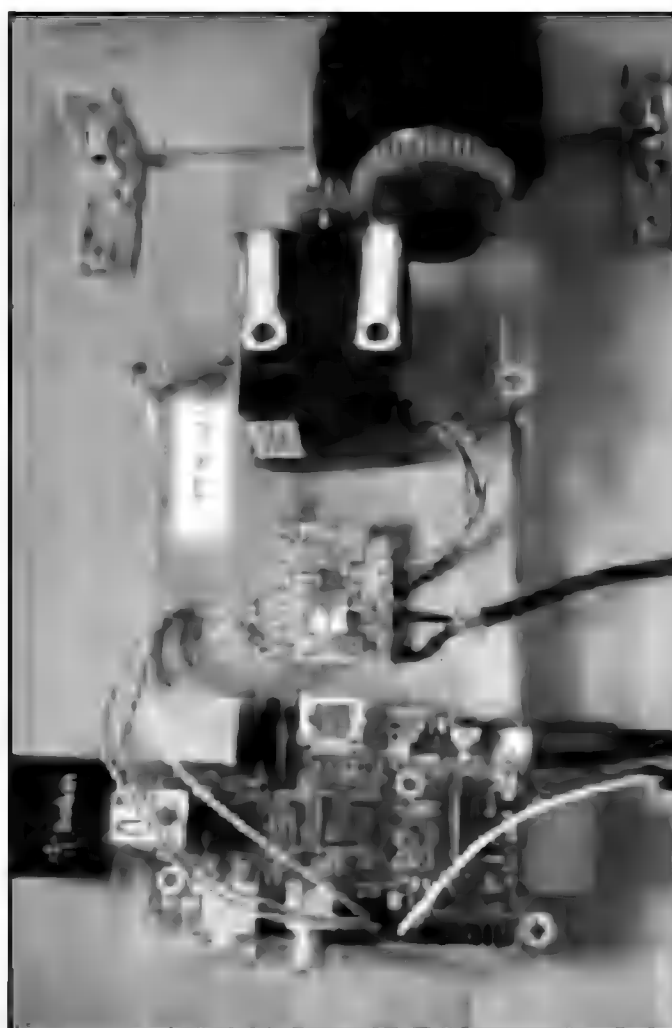


Fig. 2. The Raspberry Pi B computer.

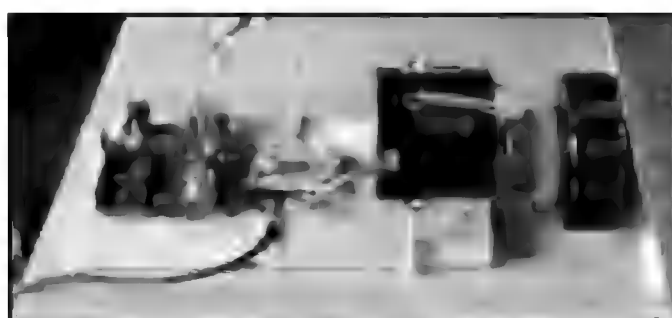


Fig. 3. The Arduino computer.



Fig. 4. Plastic gears driving the fine focus knob.

The stepper motor we used was an RS Pro Hybrid Stepper Motor 0.9°, 44 Ncm, 2.8 V, 1.68 A, 4-wire motor. The gear wheels were bought from <http://www.maplin.co.uk/> and then the centres were drilled out or cut out with a hacksaw blade. The plastic gears were very soft and easy to cut. They were then just pushed onto the focus knobs of the focus block.

We also used a "Big Easy Driver" Stepper motor control board (Fig. 5), which is fully documented at: <http://www.schmalzhaus.com/BigEasyDriver/>.

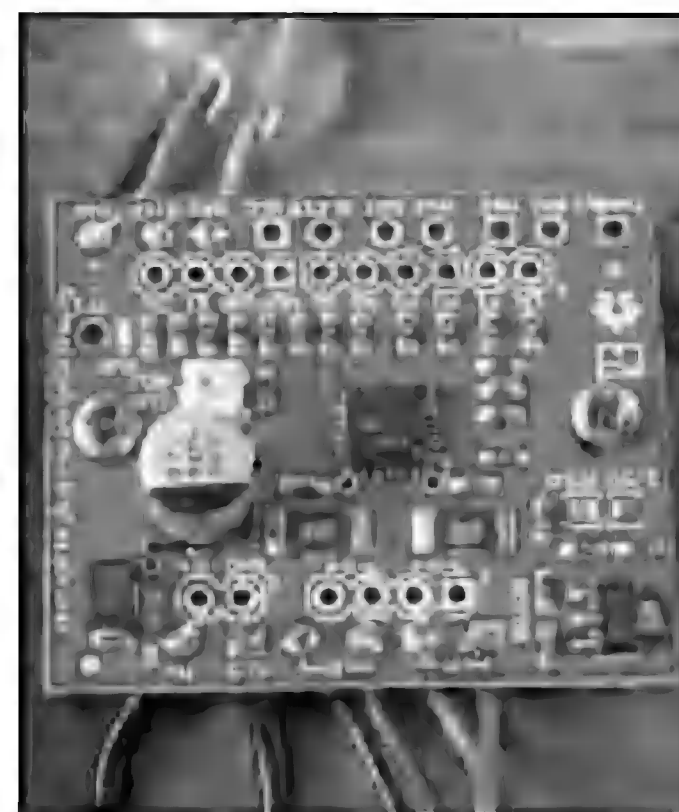


Fig. 5. The 'Big Easy Driver' motor control board

The board brought a number of specific advantages over just using an H-bridge and breadboard to control the stepper motor. The motor was able to make a single complete turn of its spindle in 400 steps, but with the driver board this could be changed to 6400 steps. The current reaching the motor could also be controlled so that the motor did not burn out. A potentiometer on the driver board had to be adjusted with a screwdriver in order to complete the setup. This was done by practical experiment until the movement was correct. The process is described on the website mentioned above.

Macrophotography of Fern Gametophytes Using a Focus Stacking System

The Big Easy Driver wiring was the same in both cases and the wires from this driver are seen on the left end of the set of GPIO pins of the Raspberry Pi in Fig. 6.

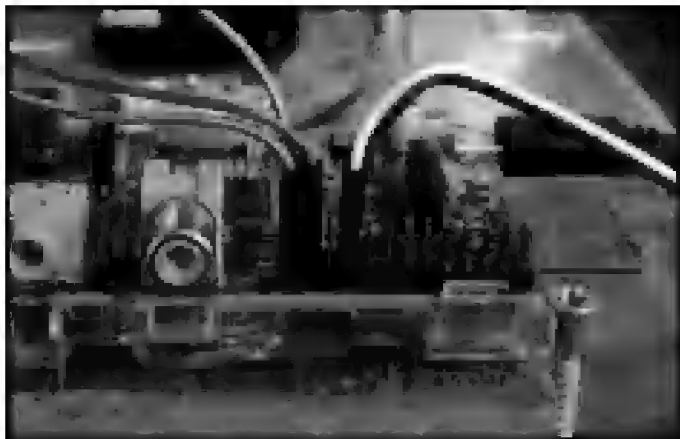


Fig. 6. Showing the wires on the Pi.

The wires on the right side of this image are those that drive the infra-red remote control for the camera, which is discussed later. The code for the Raspberry Pi is shown in the Fig. 7.

The wiring for the Arduino is shown in Figures 8 and 9, with the driver wires on the right and centre front and the infra red remote control wires shown on the left at the rear. The code for the Arduino is shown in Figure 10.

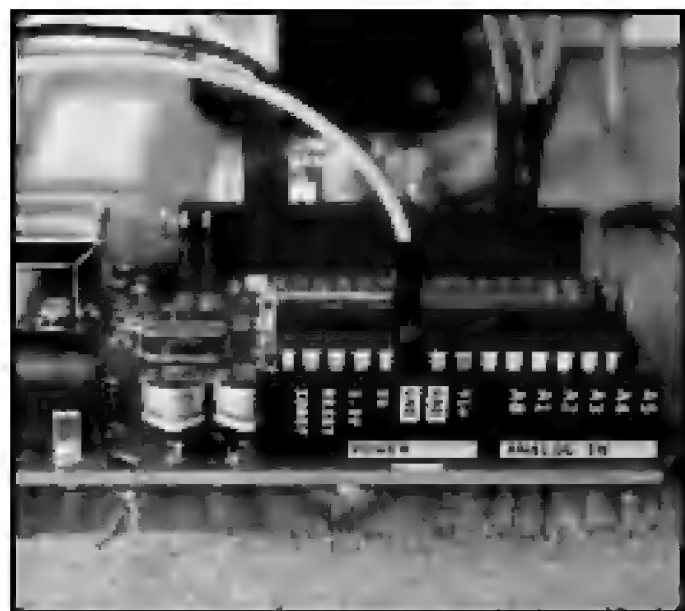


Fig. 8. The wiring for the Arduino showing the driver wires right and centre.

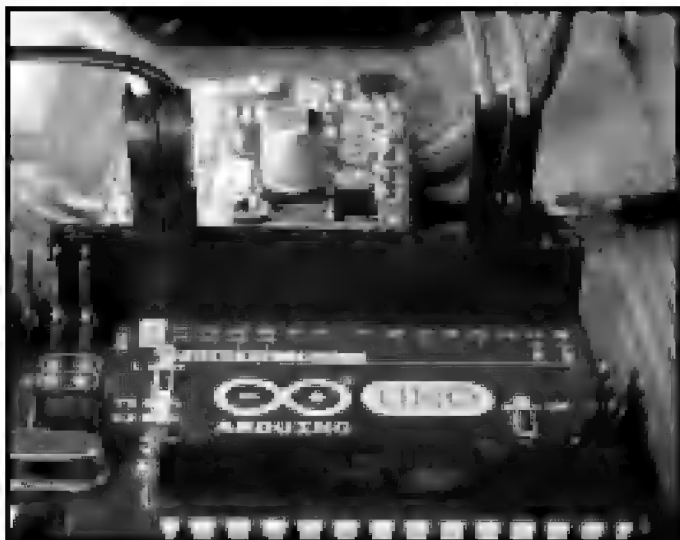


Fig. 9. The wiring for the Arduino showing the infra red wiring at the left.

The Arduino was a simpler system to setup and the Raspberry Pi was trickier but offered more sophisticated options for extension, as it is a more powerful computer.

```
#!/usr/bin/env python
import RPi.GPIO as GPIO
import time
GPIO.setmode(GPIO.BCM)
#This assigns the pins of the raspberry pie
to variables called "pin".
pin0 = 18
pin1 = 23
pin2 = 24
pin3 = 17
#Set these pins to send messages out
rather than listen for messages coming in.
GPIO.setup(pin0, GPIO.OUT)
GPIO.setup(pin1, GPIO.OUT)
GPIO.setup(pin2, GPIO.OUT)
GPIO.setup(pin3, GPIO.OUT)
#Zero all of the pins between tests.
def zero_pins():
time.sleep(0.1)
GPIO.output(pin0, 0)
GPIO.output(pin1, 0)
GPIO.output(pin2, 0)
GPIO.output(pin3, 0)
#This runs the test.
def test():
count = 1
while (count < 10000):
print 'The count is:', count
zero_pins()
GPIO.output(pin0, 1)
GPIO.output(pin1, 1)
zero_pins()
GPIO.output(pin1, 1)
GPIO.output(pin2, 1)
zero_pins()
GPIO.output(pin2, 1)
GPIO.output(pin3, 1)
zero_pins()
GPIO.output(pin3, 1)
GPIO.output(pin0, 1)
zero_pins()
count = count + 1
test()
```

Fig. 7. The code for the Raspberry Pi.

```
//Declare pin functions on Arduino
#define stp 2
#define dir 3
#define fire 13
void setup() {
pinMode(stp, OUTPUT);
pinMode(dir, OUTPUT);
pinMode(fire, OUTPUT);
digitalWrite(stp, LOW);
digitalWrite(dir, HIGH);
Serial.begin(9600); //Open Serial connection for
debugging
}
//Main loop
void loop() {
long int i, j;
char input;
Serial.println("Press Enter to start");
do {
input = Serial.read();
} while (input != '\n');
for (i = 0; i < shots; i++) {
trigger();
for (j = 0; j < distance; j++) {
step();
}
}
}
// Power on the IR trigger circuit to fire the camera
void trigger()
{
delay(1000); // wait for vibration to settle
digitalWrite(fire, HIGH); // take the picture
delay(1000); // wait for that to happen
digitalWrite(fire, LOW); // disable the IR circuit
again
}
// Advance the motor by one step
void step()
{
digitalWrite(stp, HIGH); //Trigger one step forward
delayMicroseconds(25);
digitalWrite(stp, LOW); //Pull step pin low so it can
be triggered again
delayMicroseconds(25);
}
```

Fig. 10. The code for the Arduino.

Wiring chart for Big Easy Driver Wires

Big Easy Driver connection	Destination
GND (top left)	GND
STEP (top left)	2 Arduino, 24 Raspberry Pi
DIR (top left)	3 Arduino, 26 Raspberry Pi
M+ (bottom left)	Power cable for stepper motor
GND (bottom left)	Power cable for stepper motor
A	"A" wire of the stepper motor
A	"A" wire of the stepper motor
B	"B" wire of the stepper motor
B	"B" wire of the stepper motor

Infra Red remote control wiring

Infra Red remote control	Raspberry Pi	Arduino
Non-bulb end	GND	GND
Bulb-end	19	13

Stepper Motor Wiring

The stepper motor is a 4 wire stepper motor with two circuits. In order to wire it up correctly we checked the wires in pairs with an ohmmeter to see which pairs were connected together. We designated these, pair "A" and pair "B", which were then wired up as shown in the Big Easy Driver wiring table above.

Automatic Control of the Camera Shutter

The Raspberry Pi or Arduino computers were also used to control the camera shutter, so that it was easy to alternate the processes of the camera being winched toward the subject and the shutter firing. One additional piece of equipment was required: the infra-red remote control that would communicate directly with the camera (green circuit board in Fig. 1). The infra red remote control was available commercially and we stripped it down to the bare circuit board and wired it directly to the Raspberry Pi or Arduino computer. The wiring is shown in Fig. 11, and in this case the purple wire connects back to the black wire shown in the Raspberry Pi and Arduino wiring images.



Fig. 11. This stripped down circuit board is the infra red remote.

Macrophotography of Fern Gametophytes Using a Focus Stacking System

The Optics

The optics in this system were also completely different from the previous model in order to achieve higher resolution. In this case we used a Mitutoyo 10x M Plan APO Long Working Distance microscope objective, as recommended by forum members at the photomicrography.net website. This objective has a working distance of 33.5mm, which gives a lot of space for lighting the subject. It also avoids optical problems with image processing that might result from camera's movement relative to the subject.

The objective was mounted on an Olympus Zuiko 200mm manual focus prime lens. The adapter used was a M26X0.706 Mitutoyo microscope female thread to M55mm 55X0.75 adapter. The thread of the objective on its own was too long to screw fully into the adapter without hitting the glass of the prime lens. Without further adjustment, the objective was suspended at an angle, spoiling the focus entirely. We solved this problem by using two 55mm UV filters with the glass removed and inserting them as extenders between the prime lens and the objective adapter. This enabled the objective to be fully screwed in and the focus to be really sharp, as required. The last piece of optical equipment required was the Olympus OM Lens to Canon EF-Mount which was used to fix the prime lens onto the Canon 5d MkII body. The full setup is shown in Fig. 1.

The lighting

In the previous setup we had problems with specular highlights, which combined poorly when the slices (photos) were stacked to make a single fully focussed image. In order to resolve this problem we used a polystyrene cup as a light diffuser (Fig. 13), also recommended by forum members at the photomicrography.net website.

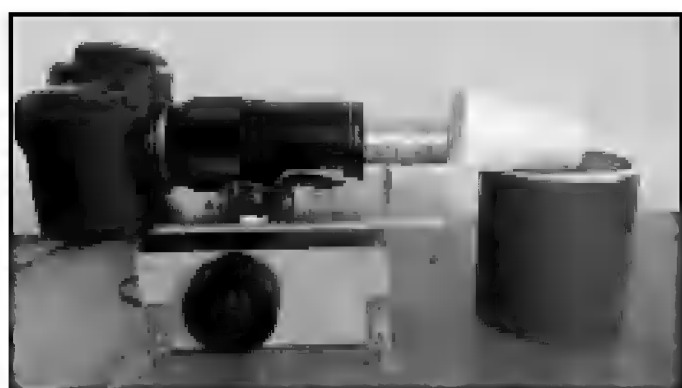


Fig. 13. The polystyrene cup used as a light diffuser.

As a light source, illuminating the outside of the cup, we used two Yongnuo YN-560 IV Flash Speedlite flashguns. These were controlled by a Yongnuo YN560-TX remote controller mounted on the hotshoe of the camera. The flashes allowed us to take short exposures of 1/60th second, freezing any vibration in the system that might have affected image quality (Fig. 14).

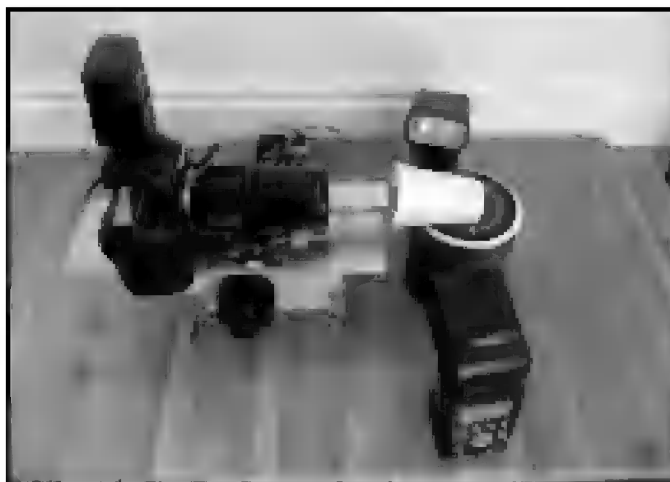


Fig. 14. The two flash guns.

We had great problems with the fern cells collapsing under the influence of the flash guns and substituting the flashguns with LED lamps did not help. We solved this problem by very careful adjustment of the number of photos taken to the absolute minimum and by speeding up the movement of the rail.

The first step of reducing the number of photos taken was made by carefully measuring the depth of field of the images. We made this measurement by photographing a stage micrometer, with 100 micron steps, mounted almost parallel relative to the optical axis of the lens (Fig. 15).



Fig. 15. Measuring the depth of field.

We found that the depth of field of this optical setup was about 20 microns and so we set the movement of the rail to 17 microns between photographs, which proved effective.

We speeded up the movement of the rail by making adjustments to the code run on the Arduino. (This modification has not yet been extended to the Raspberry Pi code, so any readers reusing that code will

need to adjust it accordingly).

The result of these two modifications was that we took very few photographs, very quickly, preventing harm to the fern. A common number of photographs for a young gametophyte would be about 40 photographs in just a few minutes.

The final setup is shown in Figure 16.

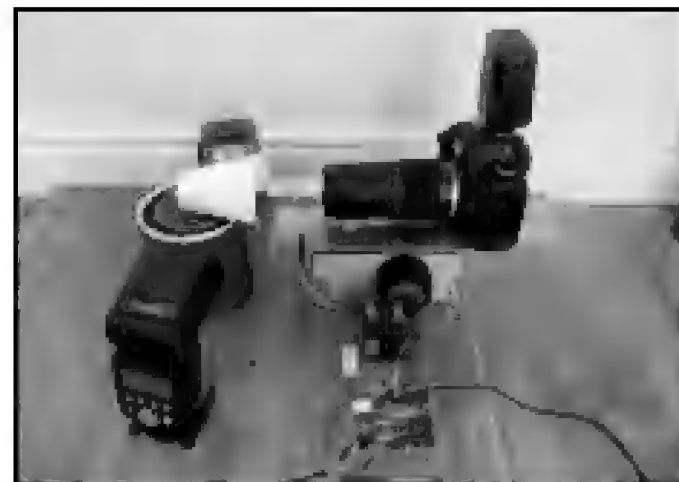


Fig. 16. The final setup.

Growing Ferns for Photography

Our photographic subjects were grown on sterilised peat-based Jack's Magic compost, in plastic pots, enclosed in a ziplock freezer bag. The sterilisation step was carried out by pouring boiling water through the compost, covering with clingfilm while the water drained, and then cooling the pots in the fridge. When cool, the pots were removed to room temperature, and sown thinly with fern spores. They were then enclosed in a freezer bag and put to grow in a suitable place. We found that temperature and light levels were critical. The spores grew best at room temperature (about 21 degrees C) and away from direct sunlight. We put them to one side of a window, rather than directly on the windowsill, and germination took a few weeks.

Operating the System

There were a number of steps to be followed when operating the system. The camera was connected to the laptop and controlled from the EOS Remote software, so that the image could be observed on the screen, and the fern carefully positioned on a shaped piece of blutac. The Arduino or Raspberry Pi was also connected to the laptop and controlled from there. The rail had to be winched back at the beginning of each run, so as to avoid running out of travel mid-shot. It was also important to pull the metal sheet back at the beginning of each run to fully engage the gears. The focus block is designed to be used vertically

Macrophotography of Fern Gametophytes Using a Focus Stacking System

under the force of gravity and has a large amount of play in the system before the gears fully engage.

The exposure was set by taking test shots to look at on the laptop screen and finally the Arduino or Raspberry Pi was triggered to drive the system. The set of images captured was then run through Helicon Focus on the standard settings as before.

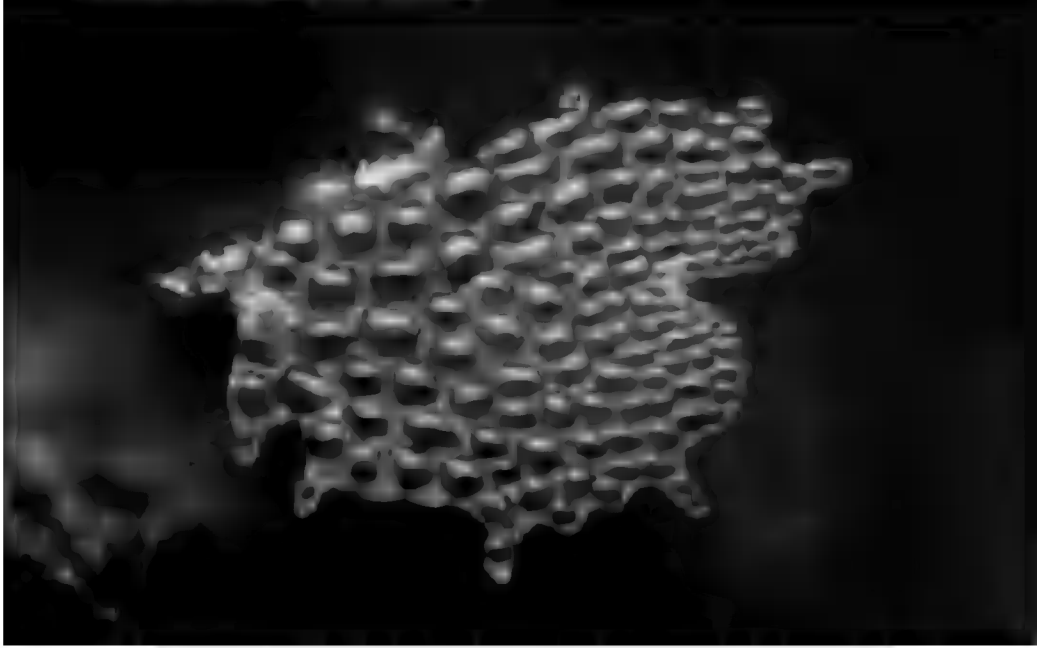


Fig. 17. Gametophyte at an early stage of development.

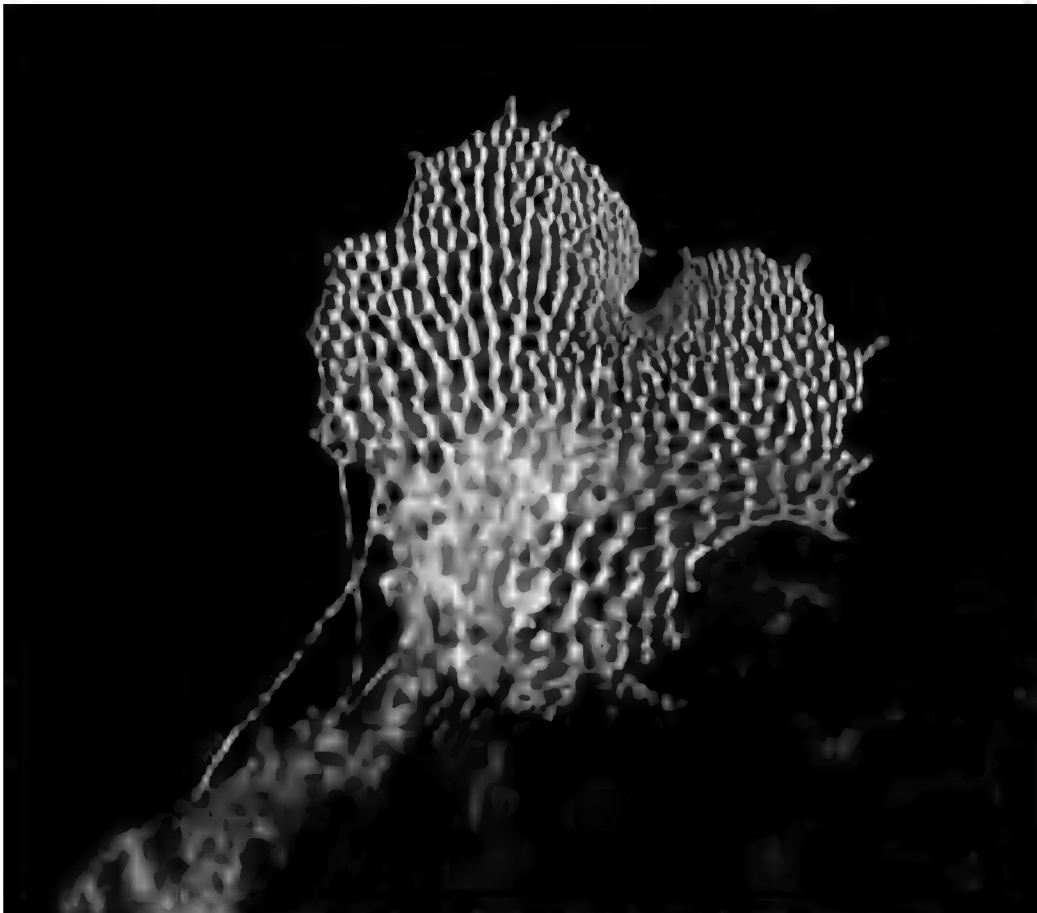


Fig. 18. Gametophyte at a later stage of development.

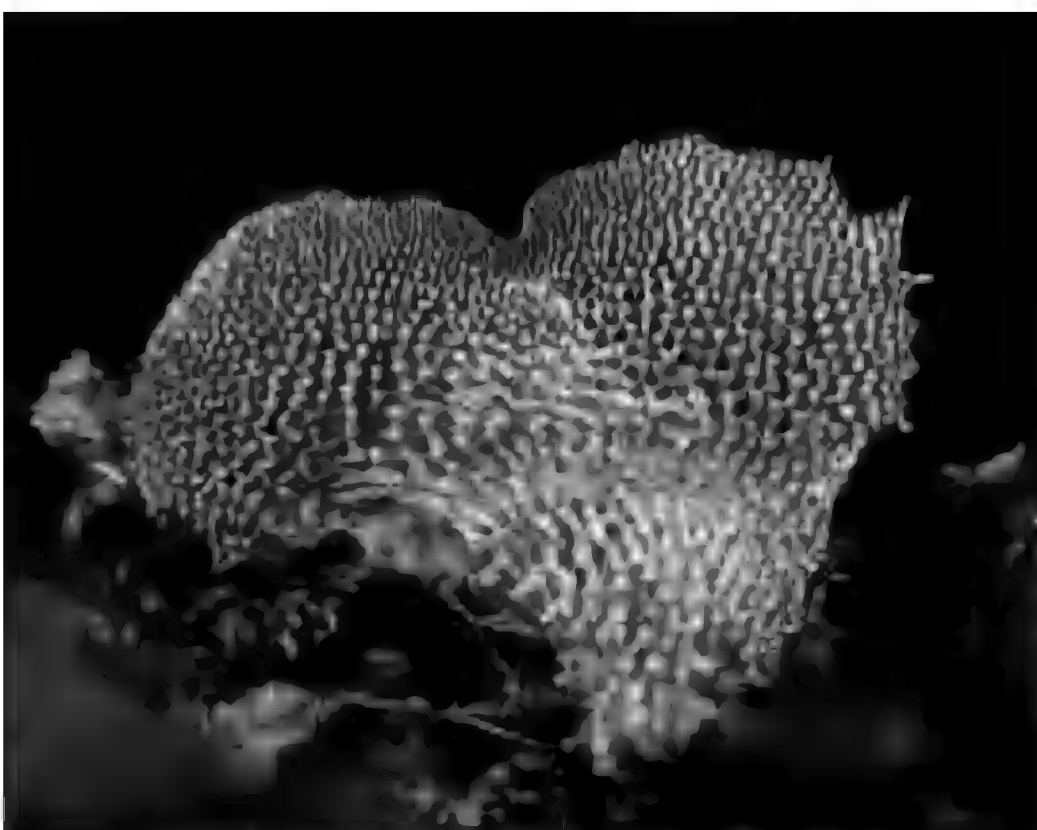


Fig. 19. Gametophyte as archegonia begin to form.

Licensing

Full details of the system are provided at the following URL, in line with the conditions of the Biomaker grant. https://github.com/BioMakers/23_Focus-stacking-system-for-gametophyte-ferns.

If anyone would like to copy the system then they are welcome to do so, but full attribution is requested, to be made by citing this article.

Images

At the time of writing, the system has just been completed and we have taken some successful photographs of gametophyte *Asplenium scolopendrium* (hart's tongue) ferns. Figures 17, 18 and 19 show three different stages of gametophyte development.

Future Work

We hope to continue this work, with the aim of producing a more complete developmental series of photographs. Our hope would be to produce images showing fern development from the filamentous stage of growth to the emergence of the first sporophyte leaf. This may take some time as we will need to obtain microscope objectives of very different magnifications in order to cover such a large range of sizes of subject.

Acknowledgements:

Financial support was provided by the Biomaker Challenge 2017 which was jointly funded by OpenPlant, a BBSRC/EPSRC Synthetic Biology Research Centre Grant BB/L014130/1 and the Isaac Newton Trust. Biomaker Challenge 2017 was coordinated by University of Cambridge's Synthetic Biology Strategic Research Initiative and the CambridgeSens Network.

Jim Haseloff, Malcolm B. Wilkins and Adrian Dyer gave invaluable encouragement and advice. Richard Mortier and Matthew Couchman assisted with the grant proposal.

The members of photomacrography.net gave detailed and constant guidance in setting up the system. We especially thank ChrisR, Peter M. Macdonald and Doc.AI. Chris Slaybaugh built the "Bratcam" (Fig. 20) on which our system is based.

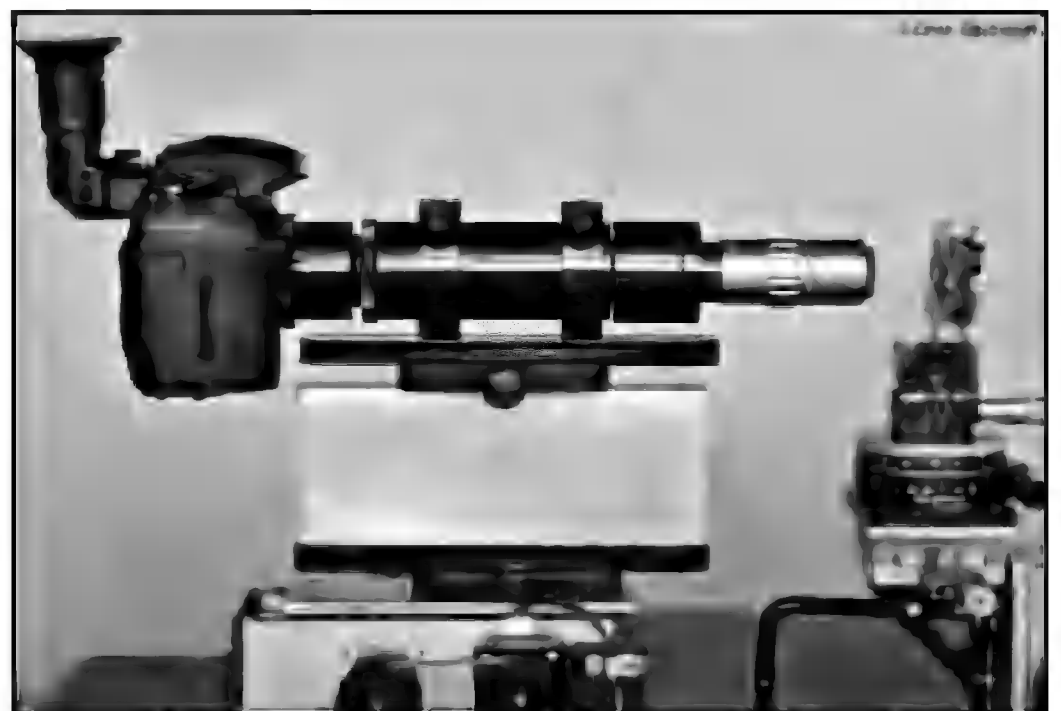


Fig. 20. The 'Bratcam' on which our system is based.

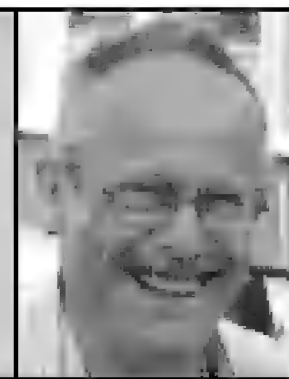
Lastly we would like to thank Ben Deegan (age 7) for his patience, and for always fitting the camera lenses so very carefully.

Fertility of Some *Asplenium* Hybrids

Rolf Thiemann

Im Tuessenberg 10, Altena, D-58762 Germany

e-mail: rolf.thiemann@arcor.de



In the fern genus *Asplenium*, hybrids do not arise as easily as in the genus *Polystichum*. But, generally, *Asplenium* hybrids are more often fertile than *Polystichum* hybrids. All of the hybrids mentioned here are suitable for the rock garden – for gardeners who are successful in the cultivation of this not always easy genus they bring great satisfaction. Propagation by spores can help to develop the spread of these plants amongst rock plant (alpine) growers.

Hybrids with autotetraploid parents

Hybrids with this parentage have two pairs of homologous chromosomes and are therefore principally able to conduct meiosis successfully and produce fertile spores. The other hybrids (allotetraploids, diploids and triploids) only have the chance of fertility by building diplospores or by apogamy to reproduce via spores.

*Asplenium x clermontae** Syme

(* In many publications the use of the non-standard original spelling "clermontiae" is still found.)

This is the hybrid between *Asplenium ruta-muraria* ssp. *ruta-muraria* and *A. trichomanes* ssp. *quadri-valens* and in some cases ssp. *pachyrhachis*. The latter is now often seen as identical with *A. czickii* Kumm. & Andr. Discovered in 1863 in Ireland by Lady Clermont, it is one of the rarest European *Asplenium* hybrids. In the one and a half centuries since its discovery, it has been recorded only about twenty times in Europe and once in North America. As far as I know five or six living plants are known to exist in the wild today, see Fig. 1 below.



Fig. 1. *Asplenium x clermontae* growing in an old wall in Austria.

Spores of F1 plants are mostly abortive but also some well-developed spores occur. The chromosome number of the hybrid is $2n=144$ and meiosis most often produce 68 – 70 pairs of chromosomes but also the full pairing of 72 pairs can be observed (Lovis, Melzer, Reichstein 1981). Hence it follows that F1 plants are not fully sterile but have a poor fertility.

I had occasion to sow the spore material of two fronds of a recent living plant (from which it was not known whether it was F1 or F2) and got relatively many prothalli. At first there were 22 sporophytes (see Figs. 2 & 3). Cultivating the rest of the prothalli, further sporophytes arose from time to time. In consideration of the few prothalli, I think that the mother plant is an F1 plant. From the first adult of the new plants I harvested spore material and made a new sowing. The result was that this new generation was fully fertile like a

good species. I got a very dense turf of prothalli and later a lot of sporophytes (see fig. 4). They are healthy but most of them grow very slowly. T.Reichstein in Basel and J.D.Lovis in Leeds made the same experiments and got the same results.



Fig. 2. *Asplenium x clermontae*, young F2 plants.

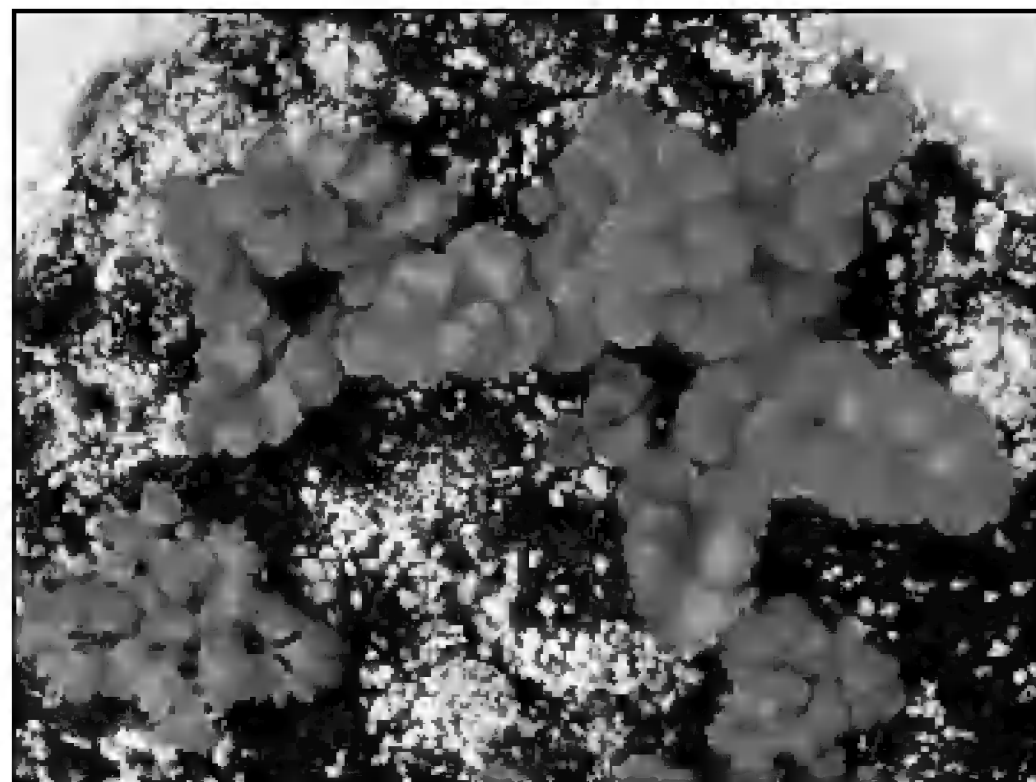


Fig.3. *Asplenium x clermontae*, young F2 plants.



Fig.4. *Asplenium x clermontae*, F3 prothalli.

Fertility of Some *Asplenium* Hybrids

Asplenium x heufleri Reichard

This is the hybrid between *Asplenium septentrionale* ssp. *septentrionale* and *A. trichomanes* ssp. *quadrivalens*, see Fig. 5 below.



Fig.5. *Asplenium x heufleri*, adult plant.

The name was given in honour of L. Ritter von Heufler who discovered the hybrid. In contrast to the hybrid between *A. septentrionale* ssp. *septentrionale* and *A. trichomanes* ssp. *trichomanes* (= *A. x alternifolium*), which can be expected in all places in which the parents occur together, *A. x heufleri* is a rarely found hybrid. J.D. Lovis (Leeds) and also G. Vida (Budapest) have created this hybrid artificially. Meiosis gives on average 60 – 70 pairs of chromosomes. Only a few good spores develop and Lovis found only very dense sowing gives some prothalli and perhaps a diploid sporophyte. It would be interesting to do the experiment again with a larger amount of spores. I have not recently had time to try it.

Asplenium x murbeckii Dörfler

This is the hybrid of *A. ruta-muraria* ssp. *ruta-muraria* and *A. septentrionale* ssp. *septentrionale* (see Fig. 6). Named after the Swedish botanist, S. Murbeck, it is a relatively rare hybrid because *A. ruta-muraria* is a lime-loving plant and *A. septentrionale* a plant that grows mostly on acid ground. In nature both species occur together if the rocky ground is limy enough for *A. ruta-muraria* and acid enough for *A. septentrionale*. This situation is often realized in basalt rocks and here there is a good chance to see this hybrid if both parents are present. It is a fact that the hybrid easily arises on the right substrate and is only rare because the parents seldom grow together. In most cases the plants seen in nature are probably F1 plants, in some places in Germany, such as in the Hessen province, colonies of 5 to 25 plants were found by A. and Ch. Nieschalk. It is presumed that some of these plants would be 2nd generation. In Hungary C.R. Fraser-Jenkins and G. Vida also discovered the backcross of *A. x murbeckii* with *A. septentrionale* (= *A. x hungaricum*) – additional evidence that *A. x murbeckii* is fertile. D.E.Meyer, G.Vida, J.Bouharmont and perhaps A.Heilbronn at an earlier date have bred this hybrid artificially. As in *A. x clermontae* most of the spores are aborted in the F1 plants but also some good spores occur. From S. Jeßen in Chemnitz I obtained spores of *A. x murbeckii* from Southern Switzerland. It seemed that the mother plant was already F2 and fully fertile since I grew a lot of gametophytes and sporophytes (see Fig. 7). The young sporophytes showed great variability (Figs. 8 & 9), which sometimes also exists in adult plants. Most of them were well grown and once established in the garden they



Fig.6. *Asplenium x murbeckii*, adult plant.

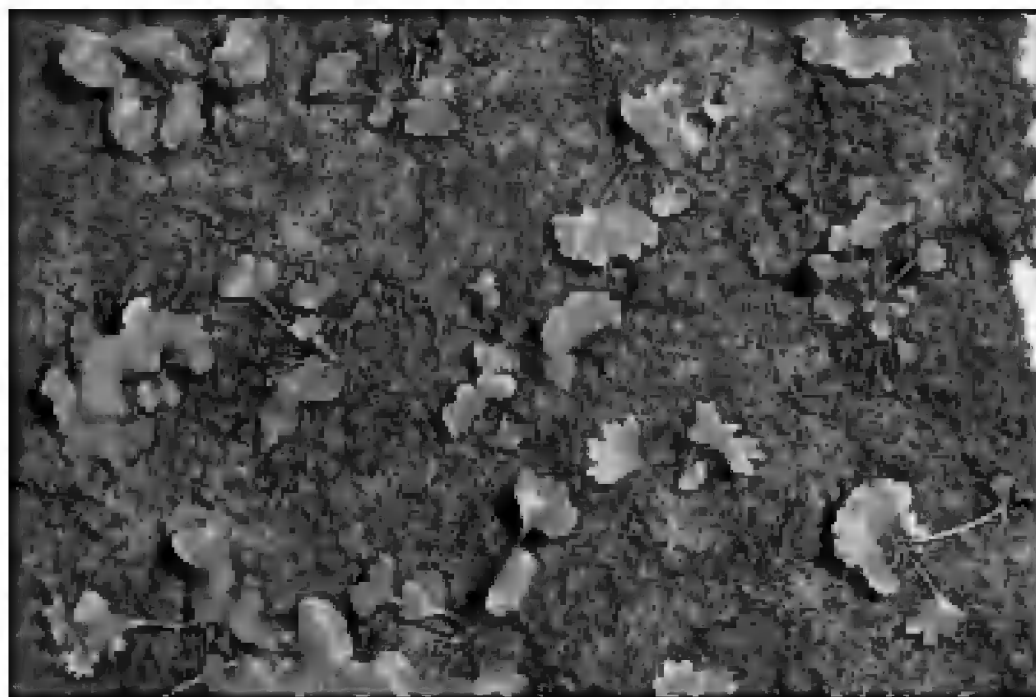


Fig.7. *Asplenium x murbeckii*, very young sporophytes.



Fig.8. *Asplenium x murbeckii*, great variety in young plants.



Fig.9. *Asplenium x murbeckii*, fronds of a young sporophyte.

Fertility of Some *Asplenium* Hybrids

were long lived and easy to culture but in the first two years they needed attention. They seem to grow well in acid or limy ground in full sun.

Hybrids with diploid parents

Asplenium x adulteriniforme Lovis, Melzer & Reichstein

This is the hybrid of *A. viride* and *A. trichomanes* ssp. *inexpectans*. It is known in the wild only from Austria, being discovered by H. Melzer half a century ago and described in 1965. J.D. Lovis has also experimentally produced this hybrid (Lovis & Reichstein 1968). At its *locus classicus* about 20 plants grew on shady lime rocks where it was first found. At the GEP meeting in 2008 only one plant could be seen. The other plants probably went in the meantime into herbariums. On a visit in summer 2012 I have to report that the last surviving plant had been dug out too. *A. x adulteriniforme* is, in principle, sterile with mostly a single set of chromosomes at meiosis but produces, besides abortive material, some well-developed diplospores. Sowing them gave rise easily to tetraploid fertile plants. From a herbarium frond I could get a small number of spores and I sowed them last year. They all germinated and now a lot of young sporophytes are growing well (see Fig. 10). *A. x adulteriniforme* is a very nice plant. It differs from *A. adulterinum* and *A. x protoadulterinum* (the cross between *A. viride* and *A. trichomanes* ssp. *trichomanes*) by its more apple green fronds, which are also broader and a little flabby and wavy.

Asplenium x gastoni-gautieri R. De Litardiere

This is the hybrid between *A. viride* and *A. fontanum*. In the wild it was found in the region of Basel in Switzerland and in Southern France on lime rocks growing together with the parents. The name was given in honour of the botanist Gaston Gautier of Narbonne. J.D. Lovis also created this hybrid. Besides predominantly abortive material, the sori also contains some well-developed spores from which tetraploid fertile F2 plants grow. Therefore, I tried to create this hybrid but without success. I had one plant, which at first thought was the desired hybrid, but it was only an incised form of *A. viride* (see Fig. 11). Sadly, the next generation of this nice plant was all normal *A. viride* and the original plant died after I transferred it into the garden.

Asplenium x lessinense Vida & Reichstein

This is the hybrid between *A. viride* and *A. fissum*. In nature it was found in Northern Italy and named after the locality (Monti Lessini). It has been found also in Bavaria. Adult plants of this hybrid look more like *A. fissum* than *A. viride*. Vida and Reichstein examined the meiosis of *A. lessinense*. Its fertility is similar to *A. x gastoni-gautieri*. Meiosis produces some good diplospores which can be used to get a tetraploid F2 generation, all of which are fully fertile.

Asplenium onopteris x ruprechtii (artificial)

This hybrid does not occur in nature because the parents do not grow together. *A. onopteris* is a European and West Asian species and *A. ruprechtii* grows only in East Asia. *A. ruprechtii* is also known under the synonym *Camptosorus sibiricus*. I have created this hybrid artificially (see *Pteridologist* 2014). From dense sowing of spore material of several fronds I got a few prothalli and later two sporophytes, I hope will in time become fertile adults (Fig. 12).

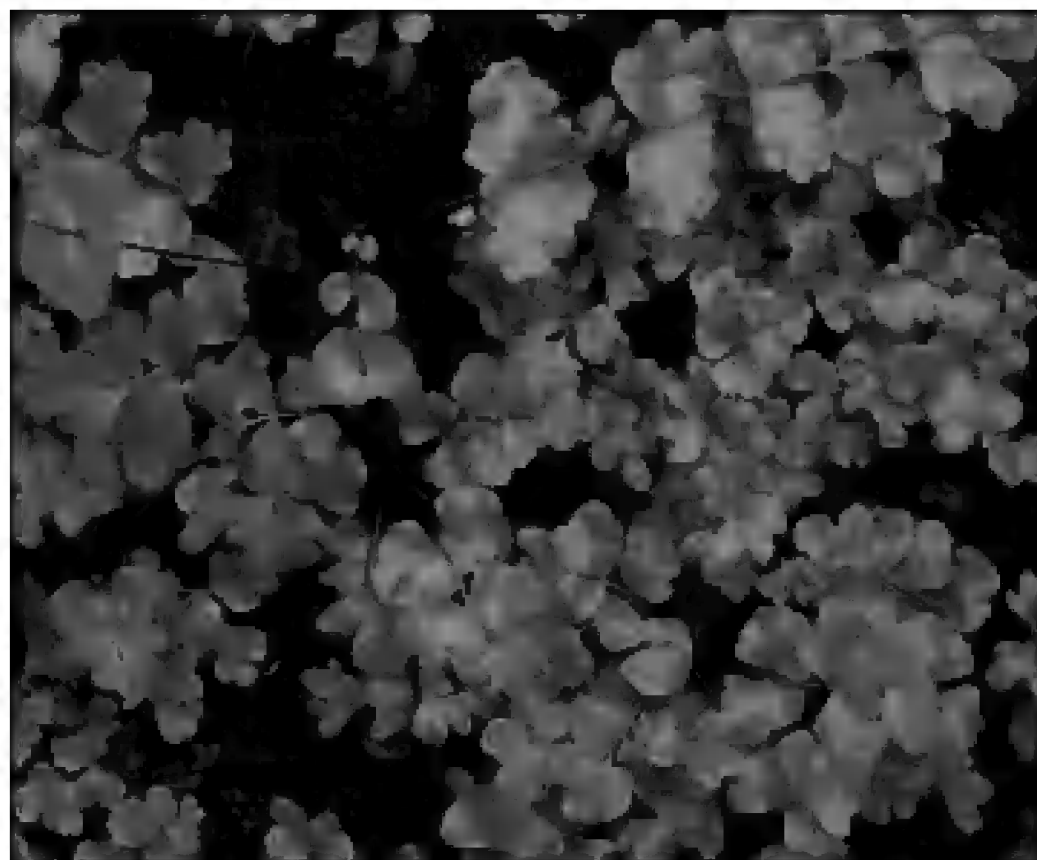


Fig.10. *Asplenium x adulteriniforme*, young sporophytes.



Fig.11. *Asplenium viride*, incisum form.



Fig.12. *Asplenium onopteris x ruprechtii*, the two F2 plants.

Fertility of Some *Asplenium* Hybrids

Hybrids with one diploid (?) and one tetraploid parent

Asplenium billotii x *rhizophyllum* (artificial)

This hybrid (Fig. 13) should not be expected in nature because *A. billotii* (tetraploid) grows only in Europe and the parent *A. rhizophyllum* (diploid) only in Eastern North America. I made this cross some years ago. The hybrid normally should be triploid and therefore sterile. Surprisingly the adult hybrid plant showed black sori which is typical for fertile *Asplenium*s. Sterile *Asplenium* plants show reddish or pale brown sori. I sowed the material and got many prothallii (see Fig. 14) and as many sporophytes as I do when sowing spores of a good species (see Fig. 15). Ronnie Viane (University of Ghent, Belgium) has analyzed the hybrid plant by flow cytometry. The surprisingly result was that the plant was tetraploid. Therefore, the cross must be *A. billotii* x diplospore of *A. rhizophyllum* or *A. billotii* x tetraploid *A. rhizophyllum* (communicated from R. Viane). I had expected that it should be hexaploid derived by chromosome doubling from a triploid hybrid plant.

Acknowledgements

I am indebted to the following persons for their help and information: Pat Acock (St. Mary Cray) for supplements and preparing the text prior to publication, Wilfried Bennert (Ennepetal), Wolfgang Jäger (Wülfrath) and Stefan Jeßen (Chemnitz) for providing spores and information; Ronnie Viane (University of Ghent, Belgium) for flow cytometrical analyses.

References:

Hegi, G. (1984). *Illustrierte Flora von Mitteleuropa*, Band I Teil 1 *Pteridophyta*, 3. Auflage

Lovis, J. D. (1968). Fern Hybridists and Fern Hybridising II. Fern Hybridising at the University of Leeds. *The Fern Gazette*. 10(1): 13-20.

Meyer, D.E. (1960) Hybrids in the genus *Asplenium* found in Northwestern and Central Europe. *American Fern Journal* 50: 138-145

Nieschalk, A. & Ch. (1961). *Asplenium-Bastarde* in Nordhessen, *Hess.Florist.Briefe* 10(1):9-12

Reichstein, T. (1981). Hybrids in European *Aspleniaceae*. *Botan.Helv.* 91: 89-139

Thiemann, R. & Bennert, H.W. (2009). Erstfund von *Asplenium* x *clermontae* Syme (= *A. ruta-muraria* x *A. trichomanes*, *Aspleniaceae*, *Pteridophyta*) in Bayern. *Ber. Bayer.Bot.Ges.* 79: 89-96, 2009



Fig.13. *Asplenium billotii* x *rhizophyllum*, adult F1 plant.



Fig.14. *Asplenium billotii* x *rhizophyllum*, F2 prothallii.



Fig.15. *Asplenium billotii* x *rhizophyllum*, very young F2 plants.



A Gateway to Heaven.

During my last trip to Australia, to visit relatives, we took a trip to Nelsons Bay. This wonderful part of New South Wales is about 180km north of Sydney along the Pacific Highway - a spectacular road with very varied scenery.

About 15km from Nelsons Bay I noticed a plant nursery that looked inviting. It was several days later that I finally persuaded my family to visit.

The first thing I noticed was this ferny gate at the entrance. The current owners told me that it came with the property when they bought it about 15 years ago. It seems that the cast panel has been welded into a modern frame. The fern motif is very unusual, quite unlike anything I have ever seen before.

The nursery was full of ferns. Mainly natives with a few cultivars. I could have spent hours wandering around. The entrance was, indeed a gateway to ferny heaven.

A.E.G.

A Charming North-West Levada in Madeira

Pat Acock

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

e-mail: pat.acock@btinternet.com



Fig. 1. Splendid views on the west of Madeira.



Fig. 2. One of the first ferns along the levada *Arachniodes webbianum*.



Fig. 3. A really beautiful fern, *Dryopteris maderensis*.



Fig. 4. *Dryopteris maderensis* growing in more shade.

Taking a winter break in Madeira, my wife Grace, son John and I had an apartment in the SW of the island for a change. This allowed us to explore the west of the island more easily. Driving to the North West, we explored a levada in open pasture in the morning which although interesting for butterflies had little of interest in the fern department.

Driving on towards Porto Moniz we came across Levada do Moinho (N32°50'44.7" W17°11'37.5"), near Portas da Vila with good parking. After an uninspiring start along a short length of grassland this levada dipped into the trees and the rich humus layer under the trees augured well for ferns and so it turned out.

Within no time fern after fern hove into sight. The ferns were many but quite near the start a waterfall supplied the levada and one had to be prepared to walk under this. Not enough water to make one seriously damp unless like me you knew there was a chance of rarities if one lingered.

Common Madeiran ferns such as *Davallia caudata*, *Asplenium onopteris*, *Woodwardia radicans* and *Stegnogramma pozoi* were seen and little-by-little the endemics were ticked off such as *Arachniodes webbianum* (Fig. 2), *Dryopteris aitoniana* (Figs. 6 & 8) and *D. maderense* (Fig. 3). Aliens such as *Nephrolepis cordatum*, *Selaginella kraussiana* and *Doodia caudata* were also present.

However, all in all, I think this would be a lovely levada to take a group to on day 2 or 3 for a revision of the ferns they had come across before. Of course, I may have missed a few and we were time limited as John, my son, was waiting for us in the car. The levada flows out of Levada Grande and there may be more rarities if you were to choose to go further into the mountains for this is a comparatively long levada.



Fig. 10. The fern weary troops relaxing by the car parked below the apartment.



Fig. 5. A small plant of *Christella dentata*.



Fig. 6. On a flat area on the levada side *Dryopteris aitoniana*; it was growing with the previously illustrated *D. maderense* in numbers.



Fig. 7. The delicate *Cystopteris diaphana* was quite common along the route.



Fig. 8. *Dryopteris aitoniana* is confined to Madeira and tends to be a little tender in Great Britain.

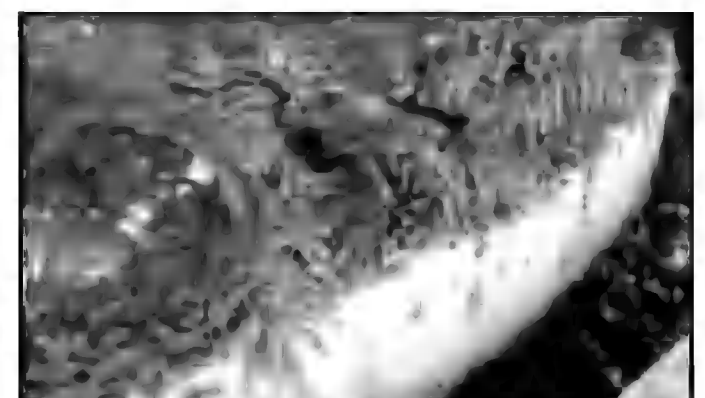


Fig. 9. *Pteris incomplete* seems to be surviving well in Madeira although in other Atlantic Islands it seems to be succumbing to alien plants especially on the forest floor.

Grange-over-Sands Stumpery 2017– The Creation

Pauline Turner

Civic Society, Prom Gardeners Group

Upper Greenways, 27 Kentsford Road,
Grange Over Sands, Cumbria. LA11 7AP
e-mail:pauline25092011@hotmail.co.uk



A little background information:-

Grange-over-Sands is a small town on the Kent estuary (north west side of Morecambe Bay). Its promenade gardens are 'looked after' by volunteer gardeners, of which the majority belong to our Civic Society Prom Gardeners Group. We are accountable to South Lakeland District Council. The prom is open to the public 24/7 every day of the year.

Summer 2016 One of our group (Mike Hornung) is also a volunteer garden guide at NT Sizergh Castle where a new stumpery had recently been created. He arranged a guided tour for us with the deputy head gardener, Andrew Harrison. We were impressed, not least because of the clever arrangement of the very large stumps, some of which had been 'craned' into position.

Autumn 2016 A local man (Richard Norman) and his family offered a very generous donation to sponsor a new gardening project on the prom in memory of their mother Jean.

So now it begins

(with thanks to one of our group – Ruth Archer – for taking photos along our journey)

Feb 2017 We identified a potential location, which conveniently had a path alongside (Fig.1). The adjacent area had a contemporary planting of ornamental grasses. We thought the two styles – new and old – would be an interesting contrast. Andrew (Sizergh's gardener) kindly came to



Fig. 2. A car boot heavily laden with one of the prized stumps.



Fig. 3. The storage area for our treasure.

site to advise on suitability, preparation and a suggested fern list, which was very helpful.

A possible drawback of the location was its close proximity to the railway line, separated by some old iron railings, through which grew long established brambles and pernicious weeds. Also, vehicle access onto the prom would be limited, so we needed to find small but interesting sculptural

pieces of wood. Naively (in hindsight) we thought 'woody material' would be plentiful as Grange is surrounded by woodland.

Mar to Aug 2017 We submitted our proposal to South Lakeland District Council and they approved on the proviso that 'woody material' was quarantined and checked to make sure no harmful diseases were imported .

Sourcing suitable material started in earnest. Inquiries to local tree surgeons, wood yards and country estates, proved fruitless, so we cast our net wider – farmers' fields, woods, river banks, sea shores and private gardens.

When something was spotted (and permission sought) it was literally a 'call to arms'. Our (incredibly durable) garden trolley went with us to retrieve our treasure. Quite often it would take 4 of us to lift a piece into the trolley and with another person pulling (often over muddy fields) we trundled to a waiting car, put it in the boot (Fig.2), then transported it to our storage area on the prom (Fig.3) – the tales we could tell about our foraging trips!

Meantime – there was a lot of digging, weeding and the laying of heavy duty weed suppressant fabric next to the iron railings. This was overlaid with a paved path (Fig 4), as an additional barrier to the brambles and for access (all done by two of our talented volunteers – Eric and Dave). A natural bark screen was fastened to the railings for aesthetic reasons and to hide the weed suppressant.



Fig. 1. The site has been identified on the other side of the path.



Fig. 4. Weed suppressant fabric laid down and the path paved.

Grange over-Sands Stumpery 2017– The Creation



Fig. 5. A few tense moments when we slid the heaviest stump down a ramp from the flat bed wagon.



Fig. 6. Our collection of stumps are now positioned and allowed to settle in before securing a few of them for safety reasons.



Fig. 7. 2 year old Mhairi, the great granddaughter of our sponsors, the Norman family, planting some the first ferns.



Fig. 8. The official opening of the stumpery by the Norman family and Eric Morrell, Chairman of South Lakeland District Council.

The next stage was to dig-in wagonloads of leaf mould and top soil, and to raise the height slightly in one corner using subsoil and an old pallet.

Our heaviest 'piece' – the only one we didn't transport ourselves – was lifted by tractor onto a flat wagon, driven to site, then slid down steel ramps onto the area (a few tense moments). (Fig. 5.)

At the end of June we carted our 'collection' of wood to the area and spent a tiring, back aching morning positioning the pieces (leaving plenty of planting pockets). We then let them 'settle' into the ground before securing a few of them into place for safety reasons (to protect our gardeners and the public). (Fig. 6.)

We should mention the very inquisitive robin and blackbird who scrutinised our progress throughout and even came to find us one day during our coffee break in a nearby shelter – must have thought we were slacking.

THE PLANTS

Armed with our wish list of ferns (compiled by Andrew, from Sizergh, and Roseanne Walter, one of our group's fern lovers) we went to see Chris Benson (Brownthwaite Plants) and he sourced many of them for us. Other plants were chosen to complement the woodland feel. We also included ones that would retain some leaf colour in the winter. A variety of bulbs (mostly not exceeding 30cm height) were planted last of all for winter/early spring interest.

The Norman family were invited to plant the first ferns (including enthusiastic 2 year old Mhairi – great granddaughter (Fig. 7.) – we hope it sparked an early interest in gardening). We left some space around each fern so that people not familiar with different varieties can see the, sometimes subtle, differences in the frond shapes. An information board (words by one of our group – Christine Barnett) was put at the entrance to the stumpery.

The official opening of the stumpery (by the family and Eric Morrell – Chairman SLDC, who is also one of our group) took place at the end of September (Fig. 8.) The family were generous with the champagne and pleased with the project, so the blood and sweat (no tears) had been well worth it.

The plants all seem to have bedded in nicely (Figs. 9 &10.) and we look forward to the stumpery maturing over the years. Hopefully it will kindle a love of ferns in members of the public who visit it.

To come...

Before our enthusiasm and energy wains we have decided to extend the stumpery. Our garden trolley is on stand-by, and some kind local people have already offered more ferns and plants. It's just a matter of finding the stumps. So - Here we go again!

(You can find the Civic Society online at: www.g-o-s-civic-society.btck.co.uk or on Facebook at GrangeOverSands CivicSociety)



Fig. 9. The stumpery beginning to flourish and the ferns settling in.



Fig. 10. Another view of the finished stumpery showing how much work went into this project.
Photo: A. Greening



Fig. 11. The plaque at the stumpery entrance.

A Fern Without Fronds?

Martin Spray

**Hillside, Aston Bridge Road, Pludds, Ruardean
Gloucestershire GL17 9TZ**

e-mail: spraypludds@hotmail.com



Half-a-dozen years ago, while visiting a friend who has a cottage in a wooded estate near Penryn in Cornwall, I cleared the gutter of her car-port. It appeared not to have been cleared since it was erected some four or five years previously.

Some of the growth in it was a polypody fern: I assume *Polypodium vulgare*, though this has not been checked. Wishing not to let a useful (even if humble) plant be wasted, I bagged a piece, and took it home to the Forest of Dean in Gloucestershire, where it was potted in modestly fertile compost, and placed on a partly shaded stone table with several other rescued or bought polypodies awaiting permanent homes. The plants on the table received water in rainless periods, but otherwise had no treatment.



Fig. 1. The frondless fern.

Instead of planting it out, I ignored it. So far as I'm aware, it was a normal polypody for the first couple of years in the small pot, its rhizome standing semi-erect as it had in the gutter, and bearing a small number of fronds. However, since about four years ago, it has been healthily firm, and green towards the tip – and completely frondless. The plant appears not to have grown, or to have grown only a little – but nor has it died.

It is far from what I would call a beautiful plant. It is

intriguing, but not charming; persistent, but not exciting. It is very easily overlooked; and it is yet to be remarked on by visitors to the garden. In order to get photographs of the plant, it was removed from its pot in autumn 2017, and had most of the compost shaken off its roots. It has been replanted in a shaded, and perhaps over-dry, pathside border, where, despite marker canes, it has already been kicked loose.

I have not met this condition before; except with a few plants that were dying, and I have no idea if it is 'normal', at least in some fern species. Googling has not yet turned up anything similar.

Why has an apparently normal polypody gone naked, with the appearance of some sort of dirty, rather dull cactus? What environmental conditions might have triggered this? Could it survive outside the garden? What conditions are (apparently) allowing it to persist inside? Or... is it just dying more slowly than I expected?

More generally, and perhaps of more interest, is this a 'one-off' or have I just overlooked a phenomenon that is fairly frequent, and documented? And if so, does it occur in other kinds of fern? I would be interested to know.



Fig. 2. Ready for replanting, showing lots of root.

Broad Foliar Form in Fern Fronds Suggests a Deep-Shade Adaptation

Christopher N. Page

Geobiology and Environment

Camborne School of Mines,

University of Exeter, Cornwall, UK

e-mail:pterido@hotmail.co.uk



Ferns are usually instantly recognisable by most people, by their relatively finely divided architectural fronds. This applies to a great array of species through a range of frond sizes, from relatively small plants of, for example, *Cystopteris* (with fronds as small as 8-12 cm long), to relatively large ones of, for example, most *Cyathea* and *Dicksonia* tree ferns (with frond lengths of 2-3 metres or more). But there are also a relatively few species, taxonomically spread across many different families and genera, in which the foliar architecture is, instead, of fronds which are much more coarsely divided, with wide lobes or segments (often whole pinnae) which are more or less entire and broad, and which I hence refer to as ones of 'broad foliar form'. I have travelled the globe on pteridophyte and conifer field studies across nearly half a century, with a keen 'eye' for their ecology and evolution, especially in the tropics. From this experience, I have come to regard the presence of such relatively broad foliar form as being a feature especially encountered in the depths of many tropical rainforests

It was thus somewhat of a surprise when I first came across *Dryopteris sieboldii*, as a single plant growing outside at Kew, but carrying such an apparently tropical-looking broad foliar-fronded architectural form, the sparsely-pinnate broad-bladed, blue-green form of which is particularly distinctive. It is from southern China and southern Japan. I saw also that Sue Olsen had described its fronds as looking "like a *Pteris* on steroids" – an impression with which I entirely agree. This was a plant which I decided that I would try to cultivate myself, with the view that if it was hardy enough to have been planted outside at Kew, it should be hardy in Cornwall.

Indeed it has proved to be, and I have propagated

now more than 30 healthy specimens. The question naturally arose concerning finding the best site to plant them. My approach to fern planting is always somewhat 'experimental'. I try it at several places, and see where it most thrives, and having found such a site, to then concentrate them there and attempt to grow a whole 'drift' of individuals, to present their maximal impact. Information available from growers suggested little more than 'semi-shade' and 'moist soil' where needed, which allowed for a range of experimental opportunities.

I therefore planted several in different garden locations, involving ranges of exposure/shelter, illumination, aspect variation and moisture/drainage regimes, all in slightly acidic soils. I have to say that after a few years, results were disappointing virtually everywhere I tried – all survived but showed only rather poor growth, some quite stunted (for what can be a fairly large plant). Either they didn't like Cornwall or they didn't like me! For they were not the plants that I envisaged and hoped I was growing!

After this, I found out that Glendurgan Garden in Cornwall (National Trust) were also growing it, planted at the edge of a small fern-grove. I was encouraged to find that these were growing even more poorly than mine! Clearly, we all had a problem, and it seemed to be the same one! What conditions was this fern especially adapted to?

Slightly in desperation therefore, I tried some of my *D. sieboldii* plants in a site where I can get very little else to grow. I am fortunate to have a steep ravine in the lower part of my garden, which I optimistically call 'fern gully', which goes off into semi-natural woodland. Within its depths about 8m (25 feet) down, a permanent stream arises from several natural springs at the head



Fig. 1. *Dryopteris sieboldii* in poor shape



Fig. 2. *Dryopteris sieboldii* looking healthy

Broad Foliar Form in Fern Fronds Suggests a Deep-Shade Adaptation

of the gully. The spring-water emerging as a stream is constantly (even through winter) at no less than 12.5°C, heated by deep thermal volcanic warmth. Here, the surrounding woodland trees grow well all around the gully and arch entirely over it to form a dense continuous canopy. This ensures that the interior slopes of the gully are entirely without summer sun. Only in winter when all the deciduous trees are leafless, is there better light penetration. Indeed it is so dark in its depths in summer, that native ferns will not grow there at all. The only fern I had previously been able to persuade to thrive there is *Woodwardia radicans* (which I propagated from bulbils from a deep ravine in La Palma, Canary Islands). This *Woodwardia* thus seems to be one of the most shade-tolerant ferns I have so-far grown. It too has relatively wide foliar segments. I therefore decided to try-out my *Dryopteris sieboldii* just above and to the side of the 'Woodwardia zone' in this summer-shady, moist site, planting it on the steeply-sloping lower ravine sides.

Result:-

Success with the *D. sieboldii* has been to a degree that I had not anticipated. The plants have responded extraordinarily to the ravine environment. Where previously they had had only sparse fronds, now, 4 years later, they have each grown to carry relatively abundant (mostly 5-8) large healthy fronds. Also, the fronds, previously under 10 cm in length, are now of the order of 30-40+ cm long and up to 25+ cm wide. This growth response is repeated throughout the 15 plants I have now put there.

Conclusion:-

Dryopteris sieboldii not only takes shade, as growers suggest, but here at least, it appears to positively demand deep summer-shade and moisture for its strongest growth, and then non-disturbance, to thrive. It also appears to respond well to the combination of

the warm spring-water emerging a few metres below it and the year-round saturated-air humidity associated with this.

These broad foliar form ferns seem to show a far greater adaptation to deep shade than even most finely-cut native ferns appear to achieve. This also leads to a further at least provisional conclusion – that deep shade may well have been the evolutionary stimulus for such broad-fronded foliar architecture to have evolved in these ferns in the first place. For such frond form clearly offers a larger light-interceptive area to each plant, and the sail-like potential disadvantage of such wide blades in wind, is not a disadvantage in the shelter of such gully sites. This environment accords with most of the places in tropical forests where I remember encountering the diverse genera of such broad-fronded ferns. I would be interested to learn of other people's experience of growing this fern. Meanwhile, I am continuing experiments.....



Fig. 3. *Dryopteris sieboldii* with large healthy fronds



How *Pteris cretica* came to Britain

This photo was taken of the 4th Century mosaic floor in the dining room of the Roman villa at Chedworth in Gloucestershire. The figure is said to represent 'Winter' but I think it could equally well be a Roman pteridologist in all-weather gear clutching a specimen of *Pteris cretica*, perhaps revealing how that species got to Britain.

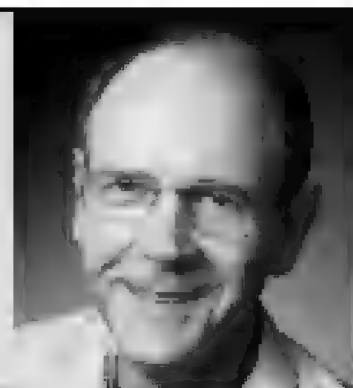
Adrian Dyer

Dryopteris dilatata 'Wechloy'

Dr. Berndt Peters

**Schleswiger Str. 83,
D-24392 Süderbrarup. Germany**

berndtpeters@foni.net



Some of the fern species which are common in central Europe produce a large number of mutants, which show large differences in growth or in the form of the fronds compared with the species. Many of these variants were found by fern collectors in the wild and brought into cultivation. Other types were found after sowing from these spores.

A high percentage of these ferns were found in Great Britain. One reason for this is that during the 19th Century it became fashionable in Great Britain to collect and cultivate ferns. Therefore many people went into the countryside in search of fern species and mutants. It is not clear whether this alone is a sufficient explanation for the many cultivars in Britain.

It is always noteworthy when a new fern cultivar is found, especially if it is found outside of the United Kingdom! Around seventeen years ago Prof. Dr. Wolfgang Eber managed a project for registration of all plant species growing around the city of Oldenburg in Northwestern Germany. During this work a co-worker (and later doctoral candidate) Thomas Huntke found a fern that showed large differences from all the fern species growing in the wild in this region. The habitat was a disturbed remnant of a wood.

The fern was dug out, taken into cultivation, and spores harvested. With the help of fern enthusiast Ingo Carstensen the spores were distributed within a group of German fern friends.

The plant shows an upright rhizome, which divides into separate crowns during years of cultivation. The fronds are tripinnate, partly even quadripinnate at the basicopic pinnae. The stipes show many scales of a light brown colour. The fronds have a maximum length of around 60 cm, a third of this being the stipe. The relation of width to length of the fronds is 0.37 to 0.44. The fronds are a light green colour, at least in places with some sun.

Plants that are grown from spores, come true, which means they show the same form as the mother fern. Unfortunately the offspring develop very slowly, even with additional light and warmth. After transplantation into the garden, they still grow very slowly.

This new fern could be an exotic fern, which grew from a single spore, or a mutant of one of the wild-growing ferns in that location. Exotic ferns are found sometimes (for example in London), but these are always species, which are well known and commonly grown in fern gardens and spread from these via spores.

The difficult propagation from spores is a possible indication that the fern is a mutant of a fern species common in Northwestern Germany. Mutants often show less vigour than the species. From all the ferns that are growing in and around the location where the fern was found, it is most likely *Dryopteris dilatata* that could be the progenitor species, from which our find is the mutant.

There is a cultivar, *Dryopteris dilatata* 'Stansfieldii', which shows a similar growth form, but has larger and more upright fronds, which are quadripinnate, with vigorous growth and dark green colouration.

We would like to name this new fern after the location in which Thomas Huntke found it, hence *Dryopteris dilatata* 'Wechloy'. We hope that it will become widespread and make a beautiful addition to many fern gardens.



Fig. 1. A view of *Dryopteris dilatata* 'Wechloy' showing the tripinnate fronds and upright shape.



Fig. 2. Another view of *Dryopteris dilatata* 'Wechloy'



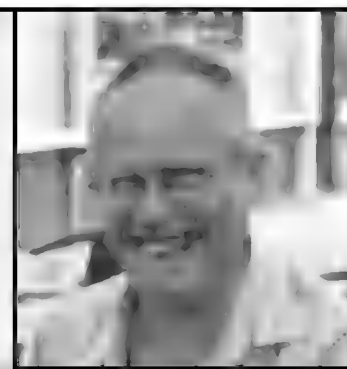
Fig. 3. Detail of the frond showing the tripinnate form of the fronds.

Artificial Hybrid of Hartstongue

Rolf Thiemann

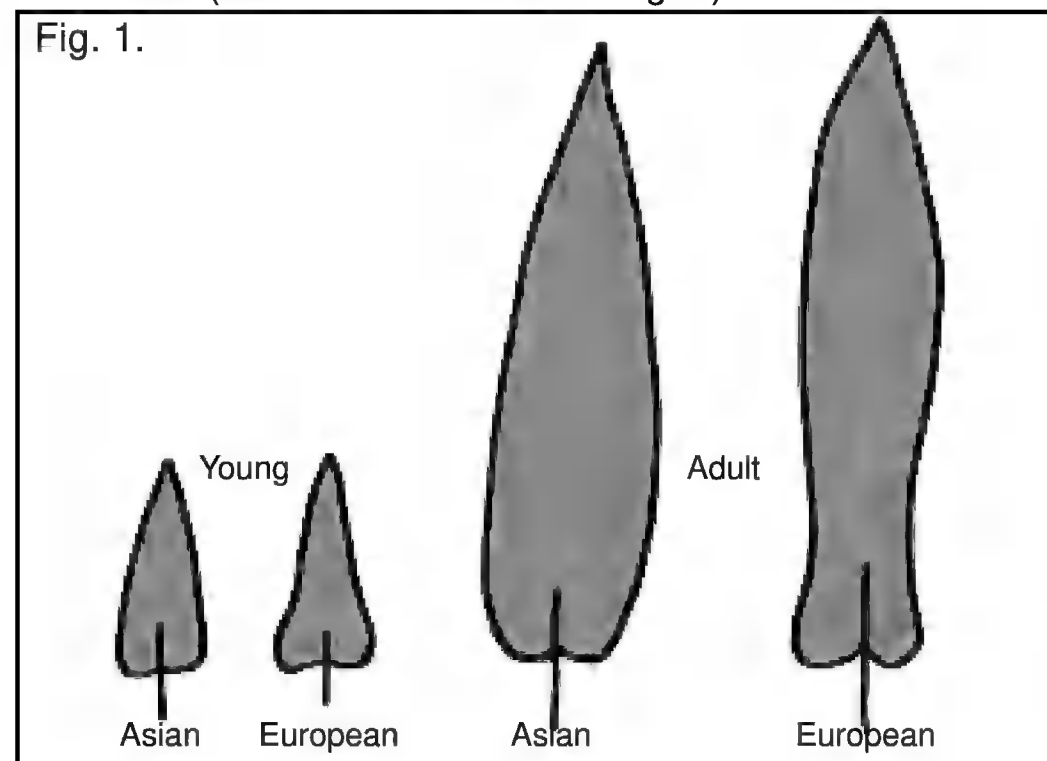
Im Tuessenberg 10, Altena, D-58762 Germany

e-mail: rolf.thiemann@arcor.de



The three kinds of the hartstongue are well known: A diploid form in Europe and one tetraploid in Asia and also one tetraploid in North America. Regarding a further fourth type (*Aspl. scolopendrium* var. *lindenii* (Hooker) Viane, Rasbach & Reichstein), I could only find the information that it grows in some southern parts of Mexico (Oaxaca and Chiapas) and in Hispaniola. The European diploid form is *Asplenium scolopendrium* ssp. *scolopendrium* L., the East Asian tetraploid *Aspl. scolopendrium* Linnaeus ssp. *japonicum* (Komarov) Rasbach, Reichstein & Viane – also described as separate species *Aspl. komarovii* Akasawa. The tetraploid American form is called *Aspl. scolopendrium* var. *americanum* (Fernald) Kartesz & Ghandi in Flora of North America. Sometimes the hartstongues are separated from genus *Asplenium* as genus *Phyllitis* (*Phyllitis scolopendrium*; *Phyllitis japonica* Komarov; *P. japonica* Komarov ssp. *americana* (Fernald) A. Löwe & D. Löwe).

All three are very similar and not easy to distinguish. The strongest but also overlapping difference between Asian and European plants is the exospore length (27 – 30, max. 33 μ m in European plants and average 31 – 35 in Asian plants). The Asian plants are a little more leathery and in the young plants more grey green than yellowish green with the scales on the stipe and rachis are more brown than whitish. The lamina is broadest at the lower half of the blade with only rarely a touch of a heart-shaped base visible. The European plants have the broadest part in the upper half of the frond and become broader and more heart-shaped at the base of the lamina (see the silhouettes on Fig. 1).



In the young plants the characteristics are more clearly visible than in the adult plants. In the drawings I have exaggerated the silhouettes a little to make it more evident. The American hartstongue is very similar to the European form. The fronds are also smaller at the base and not so heart-shaped as in the European plants and the scales have longer attenuate tips. Also they have more promptly glabrate midribs. The sori are concentrated mostly in the distal part of the lamina rather than on the entire length of the European plants.

In Western Europe the hartstongue is relatively common in places which the plants love: wintermild, wet and limey ground. In Asia it is widespread (Taiwan, China, Korea, Japan and SE Russia). In North America the occurrence of the variety *americanum* is limited to the eastern side where

it is always rare and endangered. It is said to be difficult in garden culture. I cannot confirm this because it is growing well in our garden (is it really the American plant?).

My idea was to create a hybrid between diploid and tetraploid hartstongues. This hybrid would be triploid. Triploid hybrids mostly show great hybrid vigour. This was my goal. I used a *cristatum* type of the European diploid plant as one parent to get perhaps a large "Cristatum" as a second goal. Sadly only from the European hartstongue are cultivars known. Therefore there was no great chance that the cultivar form would be visible in the hybrid if the other parent is tetraploid. However, I found the chance was not quite zero.



Fig. 2. One of the hybrid plants.



Fig. 3. The other hybrid plant.

The trial gave two hybrid plants. I was rewarded with both showing magnificent hybrid vigour but no sign of "Cristatum". At 60 cm the fronds reached double the size of the natural form in our garden that have an average frond length of 30cm here (see Figs. 2 and 3). The *cristatum* parent reaches only 20cm in frond length. All the trouble of breeding the hybrid therefore has been worthwhile as I was rewarded with the two hybrids which are sterile and probably triploid.

References:

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

G.Hegi (1984). *Illustrierte Flora von Mitteleuropa*, Band I Teil 1, 3. Auflage

Flora of North America: www.eFloras.org

Flora of China: www.eFloras.org

Book review:

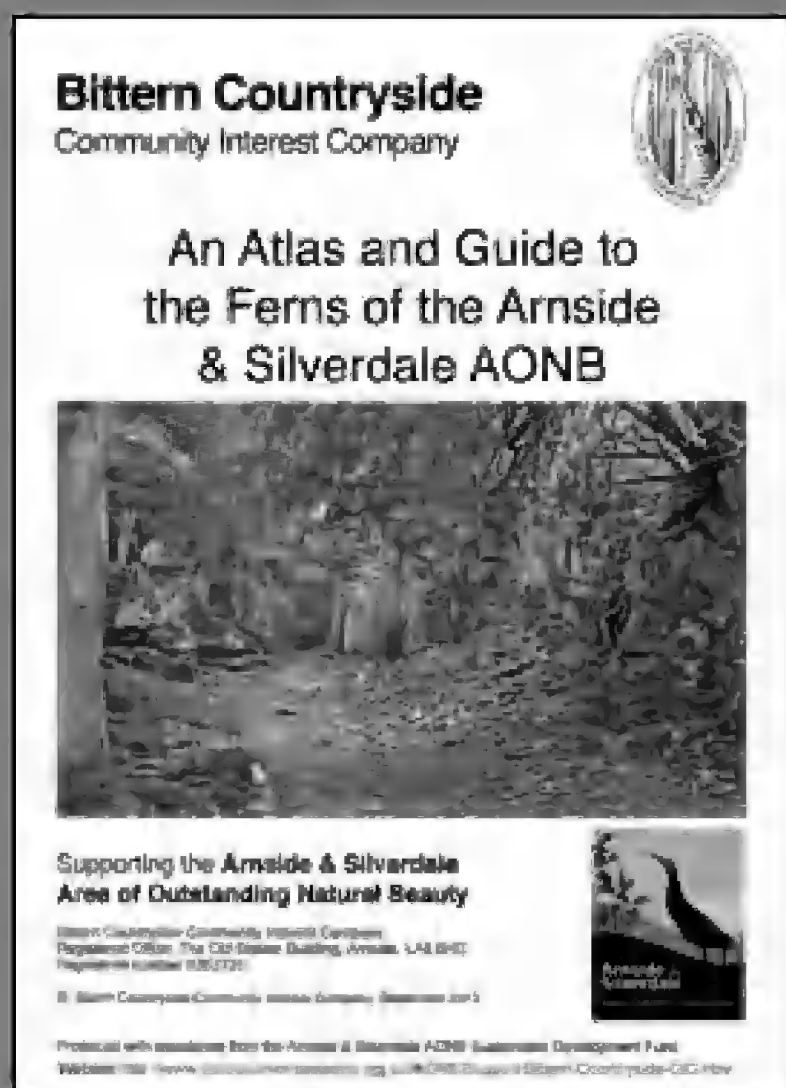
An atlas and guide to the Ferns of the Arnside and Silverdale Area of Outstanding Natural Beauty (AONB). By Ann Kitchen, September 2013. 14.6 x 21.0 mm, 20 pp. £2.50. From Bittern Countryside Community Interest Company. (see website: <http://www.arnsidesilverdaleaonb.org.uk/get-involved/bittern-ccic/>) Numerous colour photographs and distribution maps.

I had a great surprise last year when one of our members, Tony Moverley, made me aware of this little booklet. It was in response to my request for information on any local fern floras I might have missed in an article I wrote in last year's *Pteridologist*. I thought maybe I'd missed some ultra-rare Victorian booklet but I was very surprised that I had overlooked this wonderful little booklet. I wonder how it had slipped under my radar!

Although only a small area of 10 x 7 kilometres, 27 species occur in the Arnside/Silverdale district, some nationally quite rare. Horsetails and clubmosses are not included. It is a limestone area with marshes and plenty of woodland fairly well explored by British Pteridological Society members over the years. Three species, *Adiantum capillus-veneris*, *Gymnocarpium dryopteris* and *Thelypteris palustris* are restricted to single sites but all 24 other species are mapped using 1 kilometre monads (squares). For the less common species more specific information on local sites is given together with outline habitat preferences to encourage further searches. Species identification should not be a problem because each species is very well photographed in colour and tips to identification are given.

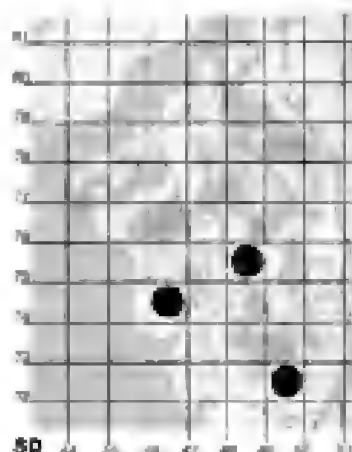
Martin Rickard

(This booklet is available from the Old Station Building, Arnside - ed)



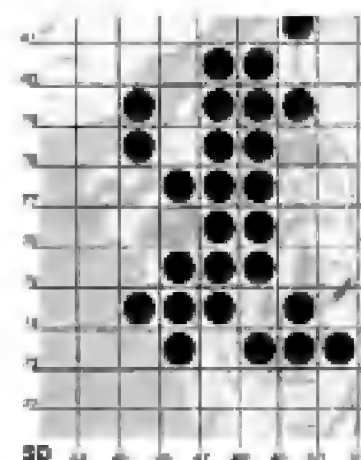
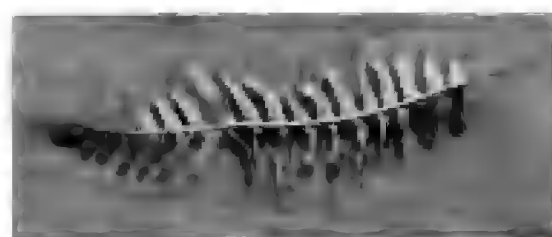
Polypodium cambricum - Southern Polypody

This is the rarest of our polypodies. It has much larger and sometimes multi-pinnate fronds. Look for it in Trowbarrow at SD480758. It has bright yellow spores. It is at its best in winter or early spring dying down in the summer. It needs base rich soils often on steep cliffs.



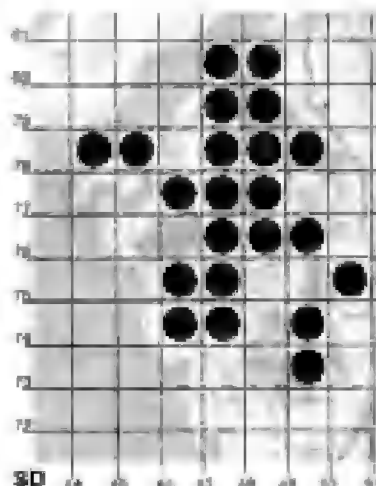
Polypodium vulgare - Common Polypody

The frond is much more oblong with the lowest pinnae flat and almost as long as the next. The spore cases are a darker brown when ripe. It is equally happy on rocks, trees and banks unlike the Western Polypody which prefers calcareous rocks. Look on the walls opposite the chapel at Arnside Cemetery at SD460776.



Polypodium interjectum - Western Polypody

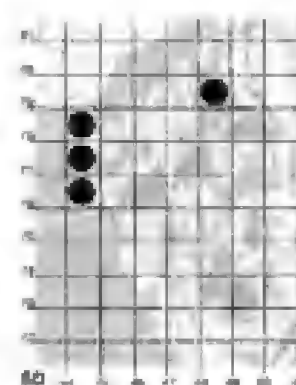
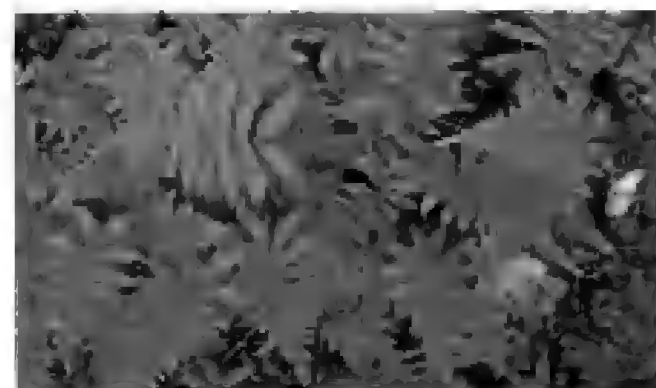
Sometimes called Intermediate Polypody this is often found with Common Polypody and can be difficult to tell apart. The lowest pinnae tend to bend forwards and the outline of the frond is widest towards the middle. The pinnae can be toothed and have pointed tips. Look at the walls in the Burton Wall to Redbridge area at SD474757.



Phegopteris connectilis - Beech Fern

This bright green fern forms large patches on the woodland floor. It grows from slender creeping rootstocks in individual fronds which are close enough to form a carpet. The name Beech Fern does not mean any particular association with the beech tree. The blades of the fern are almost bent at right angles to the stalk so they lie parallel to the ground. This makes them appear closer together than they really are. It likes damp soils in acidic woodland, the main reason why it is not found more widely in our area.

The best place to find it is on the side of Arnside Knott in Copridging Wood at SD447770.



A sample page from the booklet showing the use of the monads and the detailed photographs to help identification.

Schneider's Polypody: a Mystery

Roger Golding

23 Tormount Road, London. SE18 1QD

e-mail: rg@rogergolding.co.uk



In *Gardeners' Chronicle* for May 26, 1894 there is a report on the Royal Horticultural Society's spring show at the Temple Gardens in central London: "Messrs. James Veitch & Sons, Royal Exotic Nursery, Chelsea, exhibited a number of Ferns, remarkable for variety and beauty. Among those least well-known in gardens, or which had scarcely got into cultivation, were *Polypodium Schneideri*, a dense habited species of robust growth, highly decorative". This may be the first mention of this fern in print. Similar notices appeared shortly afterwards in the *American Garden and Forest* (June 20, 1894) and *The Garden* (July 1894). Some time during the same year, volume 3 of George Schneider's *The Book of Choice Ferns* appeared, in which he describes (with some proprietorial pride) the origin of this fern. (Fig. 1)



Fig. 1. Schneider's Polypody, at an early stage of development, from *The Book of Choice Ferns*, 1894 p.210 (fig.60)

P. (Phlebodium) Schneiderii, Schneider

"This may be considered the most striking and at the same time the most interesting hybrid artificially raised. It originated among some seedlings of *P. aureum* and *P. vulgare elegantissimum*, the spores of which had been purposely sown together. While in a young state the offspring showed very little difference from *P. aureum*, but its fronds, at first entire and conspicuously undulated, became more and more divided, and on the same plant one could at one time see fronds entirely similar to *P. aureum*, and others partaking to a great extent of the divided character peculiar to *P. v. elegantissimum*. As the plant increased in age and in size, the cutting of its fronds also became more distinct, for, while they retained the glaucous (bluish-green) colour of those of *P. aureum*, and were produced from a similarly thick, fleshy rhizome clothed with silvery scales, they were divided quite as much as those of *P. v. elegantissimum*, and they eventually became of a broader and more triangular shape, their leafy portion measuring 9in. each way. The leaflets are now so closely set as to be almost overlapping; they are divided into pinnules (leaflets) 3in. to 4½in. long, and these are again cut into deeply-cleft, undulated lobes of a most pleasing nature, a character which the plant has developed only after the drawing (Fig. 60) had been made. The fronds are borne on comparatively short, round stalks of a stiff, wiry nature, and 6in. to 9in. in length: these, in their young state, show a few white, chaffy scales, similar to those seen in *P. aureum*. It is too soon to speculate on the sporidiferous character of this hybrid in relation to either of its supposed parents, as the plant has not yet produced fertile fronda."

(Schneider's use of the species name 'Schneiderii' is incorrect, as names ending -er are meant to take only a single 'i'. This rule of botanical nomenclature does not seem to have been formalised until 1905; nevertheless all other references I've seen remove the second 'i').

The note in *The Garden* magazine uses rather similar language in parts, so it may be that Schneider's book was already in print by that time. However, it is clear that between the time Schneider wrote this entry and the Chelsea show, the fern had developed considerably. For example, in *The Garden* the fronds are described as measuring nearly 2 feet in length; and the presence of sori is commented on.

Two years later in 1896 the fern appeared for sale in the catalogue of James Veitch & Sons, in which the role of George Schneider is explicitly mentioned:

Another interesting hybrid appears in Veitch's 1897 catalogue: *Polypodium neriifolium* 'Cristatum', (Fig. 2)

POLYPODIUM SCHNEIDERI.

A fine acquisition raised by our foreman Mr. Schneider from *Polypodium aureum* and *P. vulgare elegantissimum* by sowing spores of these two species mixed together. The seedlings show so manifest a blending of the characters of both, that we have no hesitation in ascribing to them a hybrid origin.

They have the hairy rhizome of *Polypodium aureum*; the scaly epidermal outgrowths on the stipes are also the same as in that species; the leafy portion of the fronds more closely resemble that of *P. vulgare elegantissimum*, and is as finely cut, but it bears traces of the glaucousness of *P. aureum*. The fronds occasionally produce pinnae of a more intermediate character, some inclining towards *P. aureum*, others towards *P. vulgare*.

Schneider's Polypody: a Mystery

The full-grown plant presents a bold aspect with a rather dense habit; the fronds attain a length of three feet with a broadly bipinnate deltoid expansion 18 inches wide; the pinnules are narrowly oblong with a deeply sinuate margin, and are gently undulated. This is one of the most effective Ferns for the decoration of the Conservatory and Greenhouse yet raised.

First Class Certificate from the Royal Horticultural Society at the Temple Show in 1894.

Price 10s 6d. each.

"obtained by sowing the spores of [*P. neriifolium*] with spores of a crested form of the common polypody". *P. neriifolium* is now segregated into a separate genus under the name *Sepocaulon triseriale*.



Fig. 2. Schneider's Polypody, as illustrated in Veitch's 1896 and 1897 catalogues

George Schneider was born in Paris in 1848, and moved to England in 1870, where he was employed as a horticulturalist, initially by John Laing & Sons of Forest Hill, then by Hugh Low & Co. of Clapton, and finally by James Veitch & Sons of Chelsea, where he remained for 30 years. He died in Fulham, London, on 2 January 1917. He was the author of the three-volume *The Book of Choice Ferns* (1892-4) and *Choice Ferns for Amateurs* (1905). He founded the Société Française d'Horticulture de Londres, and built up an impressive reputation as a grower particularly of ferns and orchids.

In 1897, the botanist John Bretland Farmer published an article in *Annals of Botany*, 'On the Structure of a Hybrid Fern' in which he described the results of investigations into Schneider's Polypody (Fig.3). He examined sporangia, petiole sections, epidermis structure and general frond morphology, comparing them with those of the putative parent plants. He also interviewed Schneider: "I may say that I have had a conversation on the subject of the Fern with Mr. Schneider himself, who kindly showed me his extensive collection of plants at the Chelsea Nurseries, and I have no doubt whatever as to the genuine hybrid nature of the Fern, both on the ground of what I saw there, as well

as on account of the strong evidence in its favour furnished by the comparative study of its anatomy. The results of the successive fresh raising of the hybrid were strikingly uniform, the intermediate characters being prominent in all." He describes Schneider's hybridisation technique: "The spores from the varietal leaf-form were sown, and when mature prothallia had been secured, they were planted along with prothallia from *P. aureum*. This method had to be adopted on account of the very different rates of development of the gametophyte in the two species respectively, that of *P. aureum* being relatively very rapid."

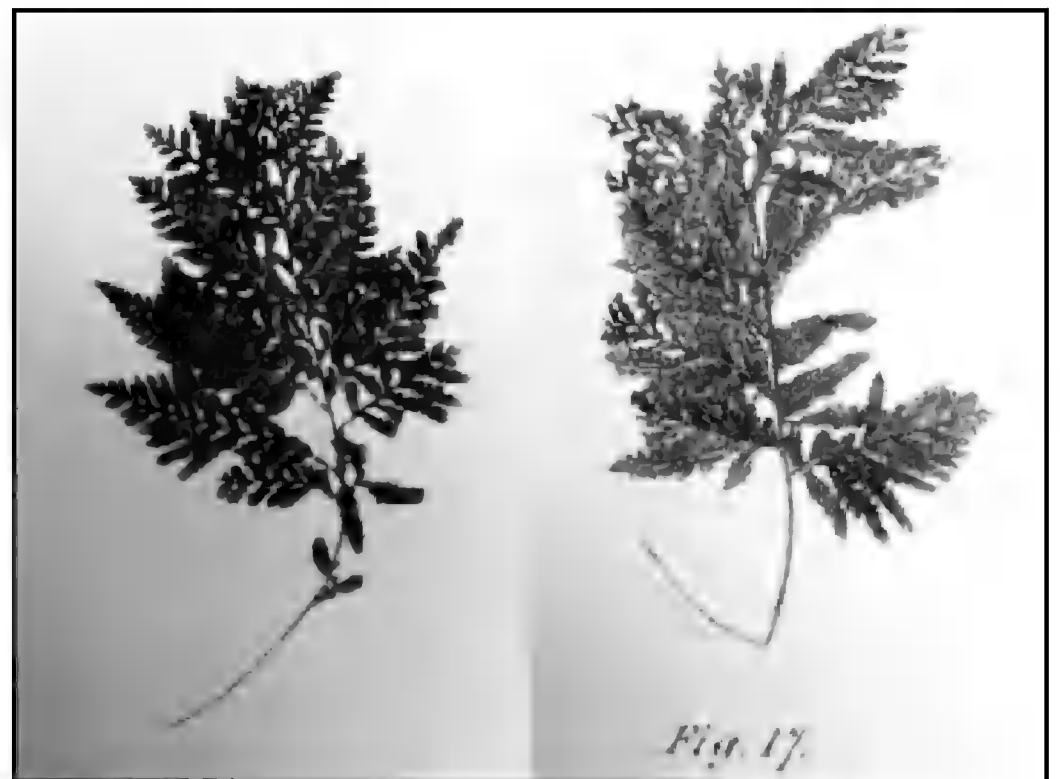


Fig. 3 Farmer, 1897. Two fronds of Schneider's Polypody. The one on the right is partially reverted.

A handful of references to the fern appear over the next decade or so, under the name *Polypodium Schneiderianum*: in *The Gardener's Assistant* by Robert Thompson (revised by William Watson), 1901; in *Hortus Veitchii* by James Herbert Veitch, 1906, and in the *Journal of Horticulture and Home Farmer*, 11 July 1907 (when H.B. May & Sons of Upper Edmonton showed it at the summer exhibition of the RHS). I own a copy of May's nursery catalogue for 1908, in which it is again called *P. schneiderianum* and priced 2s 6d – clearly no longer having the rarity value of when it was first introduced.

In the *Report of the Third International Conference 1906 on Genetics*, 'Exhibit of plants by R. Irwin Lynch, V.M.H., Botanic Garden, Cambridge' is this comment: "Among the plants shown were two remarkable hybrid ferns, one, *Polypodium Schneideri*, between *P. vulgare* 'Elegantissimum' and *P. aureum*, the other, *Scolopendrium hybridum*, between *S. vulgare* and *Asplenium Ceterach*, the first being undoubtedly hybrid and easily obtained by making a mixed sowing of the spores..."

In 1910, John Bretland Farmer and Lettice Digby published a paper in *Annals of Botany* called 'On the Cytological features exhibited by certain Varietal and Hybrid Ferns'. Farmer and Digby compared the cytological behaviour of the hybrid compared with its parents and also with normal *Polypodium vulgare*. Although at the time the precise chromosome numbers of the parents were not known, they were able to roughly approximate the numbers (it would be some decades before accurate figures for any of these ferns were obtained). (See Fig.3) The plant of supposed *Polypodium aureum* was "about 34", and

Schneider's Polypody: a Mystery

for *P. vulgare* "about 90... or perhaps somewhat fewer". Curiously, their count for *P. vulgare* 'Elegantissimum' was "at least 90... and our impression is that this number may be too low" (I have not seen any other chromosome counts for this cultivar). When it came to the hybrid: "The chromosomes, so far as we could estimate them, vary from about 95 to 125, though about 95 to 105 is the more common range. The striking difference in individual size... is a point of some interest, inasmuch as it might be taken to indicate that the larger ones represented bivalents whilst the smaller ones constituted the univalent remainders which had failed to pair. This hypothesis would fit the fact that the chromosomes contributed by the two parents respectively are numerically different (about 34 in *P. aureum* and 90 or more in *P. vulg. elegant.*). But in any case such unions to form bivalents must at best be irregular, and we entirely failed to find anything which would justify us in asserting that there were 34 bivalents or indeed any other constant number of larger chromosomes which could be really identified as such."

Polypodium aureum is now separated out into another genus and is known as *Phlebodium aureum*. There are at least two (perhaps three or four) other species of *Phlebodium*. *Ph. aureum* is thought to be the allotetraploid hybrid of *Ph. pseudoaureum* and *Ph. decumanum*, both diploids with the chromosome number $n = 37$, $2n = 74$. *Ph. aureum* has the chromosome number $n = 74$, $2n = 148$. At the time of Farmer and Digby's paper the distinction between *Ph. aureum* and *Ph. pseudoaureum* was not generally well known (despite having been separated as early as 1810), a situation that remains today, with many collections and botanic gardens mis-labelling *Ph. pseudoaureum* as *Ph. aureum*. Both ferns have been known under several names; *Phlebodium pseudoaureum* has also been known as *Phlebodium* (or *Polypodium*) *areolatum*, and *Phlebodium* (or *Polypodium*) *aureum* var. *areolatum*. The chromosome count given in the article for *Ph. aureum* suggests they were in fact using *Ph. pseudoaureum* as their test subject.

Polypodium vulgare is tetraploid with $n = 74$, $2n = 148$ chromosomes. Their count of "about 90... or perhaps somewhat fewer" seems just about feasible if rather inaccurate. The count of "at least 90... and our impression is that this number may be too low" for *P. vulgare* 'Elegantissimum' seems odd (See Fig.4).

Assuming I am correct that the *Phlebodium* parent

used by Schneider was *P. pseudoaureum* not *P. aureum*, the resultant triploid hybrid would be expected to have $2n = 111$ chromosomes (as in *Polypodium* × *font-queri*, which has the diploid *P. cambricum* as the other parent), which fits quite well with the number range they observed. Interestingly, however, the illustration accompanying Farmer's 1897 article (in which he compared physical macro- and micro-characters but not cytological ones) shows a small frond that appears to be *Phlebodium aureum*, not *P. pseudoaureum*, due to the apparent partial second row of sori on some pinnae (see Hoshizaki & Moran, 2001 for discussion of the difference between the two). I assume that neither Schneider nor Farmer and Digby were aware there were two different taxa, and it seems that it was only a matter of luck that the latter, in their 1910 paper, chose for their observations the same one Schneider had, rather than *P. aureum* as illustrated in the 1897 article. A hybrid involving the two tetraploids would be expected to show either 74 paired chromosomes or 148 unpaired chromosomes or at least some combination of paired and unpaired chromosomes adding up to approximately that number. See Fig. 5)

Both papers are fascinating and well worth reading (although the 1910 one is beyond my limited understanding of cytology and genetics). In 1938 it was referenced in the *Manual of Pteridology*, a compilation of papers edited by Frans Verdoorn: in the paper 'Karyologie', Walter Döpp refers back to the Farmer and Digby paper: "non-pairing of chromosomes was observed in *Polypodium Schneideri*...". In 1940 Francis Ballard ('Notes on Ferns and Fern Allies II', Kew Bulletin) pointed out that another fern from Sumatra had been named *Polypodium schneideri* in 1897 by H. Christ; however, not only was this published later but was also a *nomen nudum* (i.e. published without a description and thus not acceptable), and was anyway probably identical with a previously named species, *P. longissimum*. This fern is now known as *Microsorium membranaceum*. The next reference I can find is from the *British Fern Gazette*, 1968, in John Lovis' article 'Fern Hybridists and Fern Hybridising II. Fern Hybridising at the University of Leeds':

Farmer informs us (1897) that Schneider, who obtained a very spectacular hybrid, *Polypodium* × *schneideri* [*Polypodium vulgare* var. *cornubiense* × *Phlebodium*

<i>Phlebodium aureum</i>	tetraploid	$n = 74$, $2n = 148$
<i>Phlebodium decumanum</i>	diploid	$n = 37$, $2n = 74$
<i>Phlebodium pseudoaurum</i>	diploid	$n = 37$, $2n = 74$
<i>Polypodium cambricum</i>	diploid	$n = 37$, $2n = 74$
<i>Polypodium interjectum</i>	hexaploid	$n = 111$, $2n = 222$
<i>Polypodium vulgare</i>	tetraploid	$n = 74$, $2n = 148$
<i>Polypodium</i> × <i>font-queri</i> (<i>cambricum</i> × <i>vulgare</i>)	triploid hybrid	$2n = 111$, all chromosomes remaining unpaired at meiosis
<i>Polypodium</i> × <i>mantoniae</i> (<i>interjectum</i> × <i>vulgare</i>)	pentaploid hybrid	$2n = 185$, forming approx 74 pairs and 37 single chromosomes at meiosis
<i>Polypodium</i> × <i>shivasiae</i> (<i>cambricum</i> × <i>interjectum</i>)	tetraploid hybrid	$2n = 148$, forming approx 37 pairs and 74 single chromosomes at meiosis

Fig. 4. Table of chromosome counts for some *Phlebodium* and *Polypodium* species and hybrids. *Polypodium* data taken from Page, 1997.

Schneider's Polypody: a Mystery



Fig. 5. Farmer, 1897. Small frond of *Phlebodium aureum*

aureum] (See Fig. 5), planted together prothalli of different age in order to counteract the very different growth rates of the prothalli produced by the two parents.

It is interesting that here Lovis uses the name 'Cornubiense' rather than 'Elegantissimum', although he references the original names in a footnote. 'Cornubiense' is now more generally applied to a cultivar presumed to be of the hybrid *P. × mantoniae* (see Rickard, 2000, for a discussion of the historical use of these names). In Farmer's 1897 paper he reproduces two fronds of the 'Elegantissimum' parent, both showing the partly reverted state (Fig.6); to me these do look more like *P. vulgare* 'Elegantissimum' rather than *P. × mantoniae* 'Cornubiense'. *P. × mantoniae* is a pentaploid hybrid ($2n=185$), and the results given in Farmer and Digby's 1910 paper do not suggest the kind of numbers or complexity that would be involved if it was one of the parents.

The second edition of the Fern Grower's Manual by Barbara Joe Hoshizaki & Robbin C. Moran (2001) included a description and drawing of the fern; they noted that it was "...reported to be a sterile hybrid of horticultural origin resulting from a cross between *Phlebodium aureum* (?) and *Polypodium vulgare* 'Elegantissimum', but it resembles other cultivars of *Phlebodium aureum* and *P. pseudoaureum*, only with more divided blades." There is an implicit question here over whether the stated hybrid origin is correct.

In fact, the existence of the hybrid has been evoked to help argue the case against splitting genera within Polypodiaceae, and conversely the arguments for splitting



Fig. 6. Farmer, 1897. Two fronds of *Polypodium vulgare* 'Elegantissimum', showing the partially reverted state.

genera have been used to question the existence of the hybrid! For example, here is T.G. Walker in 1985: "An indication that *Phlebodium* is not a well-isolated genus is to be found in the fact that hybrids may be formed between members of this group and of *Polypodium* s.s. The best-known example of this is *Phlebodium × schneideri*, one of the classic crosses described by Schneider (1894, vol. 3) which is a hybrid of *P. aureum* s.l. × *P. vulgare* s.l., the clone of which has persisted in cultivation to the present day." (Walker, T.G., 1985). Similarly, in 1990, Hennipman, Veldhoen & Kramer mentioned several hybrids between apparently distinct branches of Polypodiaceae: "*Polypodium × schneideri* hort. is a cross between *P. vulgare* L. and *P. (Phlebodium) aureum* L.... The existence of these hybrids militates against recognition of *Goniophlebium*, *Phlebodium*, *Pleopeltis* and *Microgramma* as genera distinct from *Polypodium* s. str." (Hennipman, E., Veldhoen, P., & Kramer K.U., 1990)

The opposing argument was expressed by Tejero-Diez, Mickel and Smith: "There is also an early report of a hybrid called *Phlebodium × schneideri*, reputed to be the hybrid between *Po. aureum* s.l. and *Po. vulgare* L. (Schneider, 1894). The parentage of this hybrid now seems in doubt, because of the relatively distant relationship between *Phlebodium* and *Polypodium*, as currently defined" (Tejero-Diez, J.D., Mickel, J.T. & Smith, A.R. 2009).

More recently there has been a report of a hybrid between *Phlebodium aureum* 'Mandaianum' and *Pyrrhosia lingua* 'Cristata'. Now going under the name *× Phlebosia* 'Nicolas Diamond', it was apparently a spontaneous cross in the greenhouse of James J. Georgusis in USA. See for example: <https://www.lto-glaskracht-nederland.nl/nieuws/vertrekkend-lto-glaskracht-nederland-voorzitter-nico-van-ruiten-krijgt-innovatieve-plant-naar-zich-v/pagina/2/>. I do not know of any independent verification of the origin of this plant.

In 2015 an article in *The American Naturalist* by Carl J. Rothfels et al, discussed the intergeneric hybrid *× Cystocarpium roskamiamum*, a natural hybrid between

Schneider's Polypody: a Mystery

Gymnocarpium robertianum and a member of the *Cystopteris fragilis* complex. The parent ferns are estimated to have diverged about 60 million years ago. One possible implication of this example seems to be that hybridisation between relatively widely genetically separated ferns may be more likely than had previously been assumed (although in most cases these would be sterile). The divergence point between *Phlebodium* and the rest of the *Polypodium* group has been estimated at around 40 million years ago (Sigel, E.M. 2014).

The balance of probability seems to me to favour the idea that Schneider's Polypody is indeed an example of a hybrid between *Polypodium* and *Phlebodium* ("as currently defined"). If that proves to be the case, then an intergeneric hybrid name would be needed. I suggest \times *Polyphlebodium schneideri*.

Unfortunately, I have not been able to track down any living plants. If anyone knows of examples still in existence I'd be very interested. An unattributed dried frond exists in the BPS herbarium at Wisley dating from 1947, and it seems likely that plants were still around until late last century (pers. comm. Martin Rickard, and see for example the illustration in Hoshizaki & Moran, 2001). It would be interesting to attempt to synthesize the hybrid afresh from the parents. My attempts to do this have not been successful so far, but this is due in part to lack of time and neglect of the developing gametophytes at critical points in their development. If anyone is inspired to attempt this, it is worth noting the disparity in growth rates of the gametophytes of the two taxa, mentioned by Farmer (1897) and Lovis (1968).

References:

- Ballard, F., 1940.** 'Notes on Ferns and Fern Allies: II.' *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)*, 1940 (1), 29-31
- Döpp, W., 1938.** 'Karyologie', in Verdoorn, Frans (ed.), *Manual of Pteridology*. Martinus Nijhoff, The Hague, Netherlands
- Farmer, J.B., 1897.** 'On the Structure of a Hybrid Fern', *Annals of Botany*, vol. 11, (44)
- Farmer, J.B., & Digby, L., 1910.** 'On the Cytological Features exhibited by certain Varietal and Hybrid Ferns', *Annals of Botany*, vol. 24 (93)
- Garden and Forest*, 20 June 1894: 244
- Gardener's Chronicle*, 26 May 1894: 665
- Hennipman E., Veldhoen P. & Kramer K. U., 1990.** Polypodiaceae. In: K. U. Kramer & P. S. Green (eds), *The Families and Genera of Vascular Plants. 1: Pteridophytes and Gymnosperms*. Springer-Verlag, Berlin & Heidelberg 378
- Veitch, J.H., 1906.** *Hortus Veitchii*, James Veitch & Sons Limited, London
- Hoshizaki, B.J. & Moran, R.C., 2001.** *The Fern Grower's Manual*. 2nd edition. Timber Press, Portland, Oregon, USA
- Journal of Horticulture and Home Farmer*, 11 July 1907: 40
- Lovis, J.D., 1968.** 'Fern Hybridists and Fern Hybridising II. Fern Hybridising at the University of Leeds'. *British Fern Gazette* vol. 10 (1)
- May, H.B. & Sons, 1908.** *Catalogue of upwards of 2,000 Species and Varieties of Ferns and Selaginellas*. Upper Edmonton, London
- Page, Christopher N., 1997.** *The Ferns of Britain and Ireland*, second edition, Cambridge University Press
- Rickard, M., 2000.** *The Plantfinder's Guide to Garden Ferns*, David & Charles, Newton Abbott, Devon, UK, and Timber Press, Portland, Oregon, USA
- Rothfels, K., et al, 2015.** 'Natural Hybridization between Genera That Diverged from Each Other Approximately 60 Million Years Ago', *The American Naturalist*, vol. 85 (3)
- Schneider, G., 1894.** *The Book of Choice Ferns: for the Garden, Conservatory, and Stove; Describing and Giving Explicit Cultural Directions for the Best and Most Striking Ferns and Selaginellas in Cultivation*. Volume 3. L. Upcott Gill, London
- Sigel, E.M. 2014.** *A Next-Generation Approach to Systematics in the Classic Reticulate Polypodium vulgare Species Complex (Polypodiaceae)*. Duke University, North Carolina, USA: <http://hdl.handle.net/10161/9092>
- Tejero-Diez, J.D., Mickel, J.T. & Smith, A.R. 2009.** 'A hybrid Phlebodium (Polypodiaceae, Polypodiophyta) and its influence on the circumscription of the genus', *American Fern Journal*, vol. 99 (2)
- The Garden*, 2 June 1894: 472
- Thompson, R. (rev. by Watson, W.), 1901.** *The Gardener's Assistant*. The Gresham Publishing Company, London
- Veitch, J. & Sons, 1896.** *Catalogue of Plants including Novelties*. London
- Walker, T.G., 1985.** 'Cytotaxonomic studies of the ferns of Trinidad 2. The cytology and taxonomic implications'. *Bulletin of the British Museum (Natural History), Botany series*, vol. 13 (2), p.197
- Wilks, W. (ed.), 1907.** *Report of the Third International Conference 1906 on Genetics*. Royal Horticultural Society, London

Recording roundup

Fred Rumsey (BPS Recording & Conservation Officer)

Natural History Museum, Cromwell Road, London SW7 5BD

e-mail: f.rumsey@nhm.ac.uk



It has long been my intention to provide a forum for members to contribute observations on their interesting finds and discoveries. I also wanted to make more widely available the fern & lycophyte records made by members and members of the BSBI which hitherto have only been published in the *New Journal of Botany*. Going forwards it is still a little unclear where these will be published following the demise of that journal but an online publication is envisaged.

This abstraction of records for the period 2015-7 follows the criteria for inclusion used by the BSBI and outlined below:

- First records of all taxa (species, subspecies and hybrids) designated as native, archaeophyte, neophyte or casual
- First record since 1970 of the taxa above
- Records demonstrating the rediscovery of all taxa published as extinct
- Newly reported definite extinctions
- Deletions from the Vice-County Census Catalogue (Stace *et al.*, 2003) e.g. through the discovery of errors, redetermination of specimens, etc.
- New 10km square records for Rare and Scarce plants (the definitions for these are given below)

For future issues I would advocate the use of these criteria for the selection of our material for inclusion. Where records represent the second or third discoveries of taxa within vice-counties I would also aim to include them. A good case could also be made for including any new find of taxa which are deemed to be of conservation concern, i.e. listed as CR, EN, VU or DD by the GB (Cheffings *et al.*, 2005), England (Stroh *et al.*, 2014), Welsh (Dines, 2008) or Irish (Wyse Jackson *et al.*, 2016) Red Lists. In addition I would like to capture other interesting observations such as the discovery of earlier records than those given by Edgington (2013) and Pearman (2017) and also extensions to the known altitudinal limits of our taxa. To this end please feel free to send me items for inclusion in next year's roundup at any time within the year and I will endeavour to include them.

I am currently in the process of producing an updated vice-county census catalogue and annotated checklist of the ferns and lycophytes of Britain and Ireland. Currently for Britain the vice-county distribution of taxa is given by Stace *et al.* (2003) but significantly this does not cover Ireland. Within that work counties for which no record has been made for a taxon since 1970 are bracketed, hence the second bulleted point above. Given the huge efforts made to produce the *New Atlas of the British and Irish flora* (Preston *et al.*, 2002) and recording now nearing completion for its successor in 2020, it seems appropriate to update this recording of losses such that bracketing will now occur in our catalogue where there is no record post 1987, reflecting the 1970-1987 date-class used by the BSBI.

Hectad (10km square) distributions for all native taxa

and selected established aliens were given in Preston *et al.*, (2002). On the basis of this data Nationally Rare and Scarce categories are defined as those with 15 or fewer hectads (NR), or 16-100 hectads (NS). If these proportions are translated to Ireland (including both the Republic of Ireland and Northern Ireland) then Ireland Rare (IR) = 5 or fewer hectads and Ireland Scarce (IS) = 6-37 hectads. When recent finds and losses are taken into consideration the list of native and Native/Alien taxa considered Rare or Scarce is given below. This list will be periodically reviewed and updates published in this column.

GB Nationally Rare (NR)

Asplenium trichomanes subsp. *pachyrachis*

Athyrium flexile [now regarded as an ecotype of *A. distentifolium* – but still worth recording]

Cystopteris diaphana

Cystopteris dickieana

Cystopteris montana

Diphasiastrum complanatum subsp. *issleri* [= *D. × issleri*]

Dryopteris cristata

Dryopteris remota [nb. Extinct as a Native]

Equisetum ramosissimum

Isoetes hixtrix

Lycopodium lagopus (syn. *L. clavatum* subsp. *monostachyon*)

Ophioglossum lusitanicum

Woodsia alpina

Woodsia ilvensis

GB Nationally Scarce (NS)

Adiantum capillus-veneris

Asplenium obovatum subsp. *billotii* (syn. *A. obovatum* subsp. *lanceolatum*)

Asplenium septentrionale

Athyrium distentifolium

Dryopteris submontana

Equisetum pratense

Equisetum variegatum

Lycopodiella inundata

Lycopodium annotinum [= *Spinulum annotinum*]

Ophioglossum azoricum

Pilularia globulifera

Thelypteris palustris

The following taxa are regarded as extinct in Britain

Asplenium fontanum

Botrychium matricarifolium

Cystopteris alpina

The corresponding list of Rare and Scarce for Ireland is:

Ireland Rare (IR)

Asplenium septentrionale

Gymnocarpium robertianum

Lycopodiella inundata

Ophioglossum azoricum

Ireland Scarce (IS)

Adiantum capillus-veneris

Asplenium obovatum subsp. *billotii* (syn. *A. obovatum* subsp. *lanceolatum*)

Asplenium onopteris

Asplenium viride

Botrychium lunaria

Cryptogramma crista

Diphasiastrum alpinum

Equisetum pratense

Isoetes echinospora

Lycopodium clavatum

Pilularia globulifera

Polystichum lonchitis

Thelypteris palustris

The following taxa are regarded as Extinct in Ireland:

Dryopteris remota

Gymnocarpium dryopteris

In addition and present only within the Channel Islands where it occurs in <5 hectads is

Anogramma leptophylla

Further critical native taxa, eg. the segregates of *Dryopteris affinis sensu lato*, *Huperzia arctica* and the recently distinguished *Botrychium nordicum*, as well as the vast majority of hybrids and neophytes/casuals should also be documented.

Records from New Journal of Botany (2015-7)

Records from the following vice-counties are included: 6,29,39,41,42,47,62,110,111.

The following signs are used:

*before the vice-county number: to indicate a new vice-county record.

‡before the species number: to indicate the plant is a neophyte

©before the species number: to indicate the plant is a casual

The above two signs may also be used before the vice-county number to indicate the status of the plant in that vice-county.

@before the vice-county number: to indicate that this is an additional hectad for a Rare or Scarce plant.

Ø at end of entry: established taxon not in VCCC (Stace *et al.*, 2003)

[] enclosing a previously published record: to indicate that the record should be deleted or changed.

Archaeophytes and Natives

Lycopodiella inundata 110, Outer Hebrides: marsh E. of Mullach nan Ron, NB356095, P.A. Smith *et al.*, 2013. 1st record since 1970

Diphasiastrum alpinum @47, Monts. : Pisdyll y llyn, Llyfnany, SN758937, P. & G. Foulkes, 2013.

Isoetes* × *hickeyi *47, Monts. : Llyn Du, SO0096, G. Foulkes & Monts. Flora Group, 2013, det. F.J. Rumsey. @47, Monts. : E. shore nr outflow, Llyn Gwyddior, SH937074, A.K. Thorne, 2013, det. F.J. Rumsey.

Equisetum* × *rothmaleri *6, N. Somerset: SW side of spoil heap, Priddy Mineries, ST546510, Somerset Rare Plants Group, 2007, det. F.J. Rumsey.

Botrychium lunaria@39, Staffs.: two plants with *Viola lutea* at 425m in upland pasture NW of Noon Sun, SK045622, E. Radford, 2015.

Polypodium* × *shivasiae *6, N. Somerset: rocky outcrop to N. of path, Black Rock, Cheddar ST484545, M.J. Stribley, 2007, conf. R.J. Cooke.

Asplenium obovatum subsp. ***billotii*** @41, Glam.: 40 plants on lane bank, Tonyrefail, SS9938689, D. Barden, 2013. Second extant record.

Polystichum* × *bicknellii *6, N. Somerset: beside gate at entrance to woods, e. of quarry, Ham woods, N of Shepton Mallet, ST611452, H.J. Crouch & F.J. Rumsey, 2007.

Dryopteris oreades @47, Monts. : on scree, E. side of hill, Corndon, SO310968, M. Godfrey, 2013.

Dryopteris* × *complexa s. str. *6, N. Somerset: one plant to S side of path, Leigh Woods, ST557731, M.J. Stribley, 2007.

Dryopteris affinis subsp. ***affinis*** *111, Orkney: burn gully, Ramsdale, Orphir, HY335072, E.R. Bullard, 1972, det. A.C. Jermy

Dryopteris affinis subsp. ***paleaceolobata*** *111, Orkney: ditch bank, near North flaws, South Ronaldsay, ND460858, A.R. Church & J.E. Crossley, 2015, det. A.R. Church.

Dryopteris borrieri @47, Monts. : scree and rocks Corndon Hill, SO3196, R. Meade, 2013, det. M.J. Godfrey. *111, Orkney: vegetated sea cliff, Inganess Bay, St. Ola. HY472093, H.D.H. Shearer, 2000, det. A.C. Jermy, **PVT**.

Dryopteris cambrensis subsp. ***cambrensis*** *6, N. Somerset: one large plant on S side of old hedgerow, Pen Ridge, Stourhead Estate, ST750327, H.J. Crouch & F.J.

Rumsey, 2011. @47, Monts. : scree and rocks, Corndon, SO310968, M. Godfrey, 2013. *111, Orkney: vegetated sea cliff, Inganess Bay, St. Ola. HY473095, H.D.H. Shearer, 2000, det. A.C. Jermy, **PVT**. 111, Orkney: blanket bog (drying), Bomo, Eday, HY573366, J.E. Crossley & J. B. Ribbands, conf. A.R. Church

Dryopteris remota 17 /3.4 *±6, N. Somerset: one plant in mature scrub on N. side of lane, Dulcote, ST561444, H.J. Crouch & F.J. Rumsey, 2014, **BM**. 1st record for England. Considered native at former sites in Scotland and Ireland, but here a garden escape (?fly-tipped – still present 2018).

Dryopteris carthusiana *111, Orkney: rush pasture near Newhouse, Holm, HY523026, J.E. Crossley, 2015, conf. F.J. Rumsey, **PVT**. Locally frequent, only known site in VC.

Dryopteris × **deweveri** *111, Orkney: rush pasture near Newhouse, Holm, HY523026, J.E. Crossley, & J.B. Ribbands, 2015, conf. F.J. Rumsey, **BM**. Several plants at only known site

Dryopteris expansa 17 /3.10 @47, Monts. : on scree, E. side of hill, Corndon, SO311968, M. Godfrey, 2013. Det. F.J. Rumsey

Neophytes and Casuals

Adiantum raddianum *6, N. Somerset: four plants on and beside steps of basement, Marlborough buildings, Bath, ST743654, M.A. Spencer, 2008, conf. F.J. Rumsey. Known at this site since 1997, but previously thought to be *A. capillus-veneris*. Ø

Pteris cretica ‘Wimsetii’ *6, N. Somerset: one plant on stonework of basement nr pavement level, Sydney Buildings, Bath ST758646, R.D. Randall, 2007, det. F.J. Rumsey. [not found 2008]

Pteris multifida *6, N. Somerset: four plants in a basement, Pierrepont Street, Bath, ST752646, H.J. Crouch, 2006, det. F.J. Rumsey, **BM**. Ø. [lost by 2016].

Pteris nipponica *6, N. Somerset: five plants in a basement, St. James’ Parade, Bath, ST750645, H.J. Crouch & F.J. Rumsey, 2008, det. F.J. Rumsey. Ø

Pteris tremula *6, N. Somerset: three plants on stonework at top of basement area and one on steps, Royal Crescent, Bath, ST744654, H.J. Crouch, 2010. *29, Cambs.: two plants, self-sown in a small basement area at base of access steps, University Botanic Garden offices, Cambridge, TL4557, J.D. Shanklin, 2015, det. A.C. Leslie. **CGE** Ø

Pteris umbrosa *6, N. Somerset: N. Somerset: one plant in basement, Rivers Street, Bath, ST747654, C. & M.A.R. Kitchen, 2009, det. F.J. Rumsey. Ø [Plant flourishing 2018! see Fig.1]

Polystichum polyblepharum *6, N. Somerset: one glossy plant on bank by old track along S edge of wood, Horrington Hill, ST580478, H.J. Crouch & F.J. Rumsey, 2015, **Herb HJC**.

Polystichum tsus-simense *6, N. Somerset: one plant in basement, Rivers Street, Bath, ST747654, H.J. Crouch & F.J. Rumsey. 2009. Ø [?now absent 2018]

Cyrtomium fortunei s.lato *6, N. Somerset: about 100 plants on S-facing wooded slope in Summerhouse Plantation, Ashton Court, Bristol, ST556720, R. Bland, 2009, conf. F.J. Rumsey, **BM** *42, Brecks.: wooded bank
Pteridologist 6.5.2018

of disused railway, Hay-on-Wye, SO226423, J.R. Crellin, 2013, conf. F.J. Rumsey, **herb. J.R.C.** *62, N.E. Yorks. : three plants on wooded bank, Crambeck, SE734674, W.A. Thompson, 2015, det. M.J. Wilcox, conf. F.J. Rumsey. Ø

Dryopteris cycadina *6, N. Somerset: one mature plant in scrub on N. side of lane, Dulcote, ST561444, H.J. Crouch & F.J. Rumsey, 2014 [?fly-tipped, still present 2018]

*42, Brecks.: wooded bank of disused railway, Hay-on-Wye, SO226423, J.R. Crellin, 2013, conf. F.J. Rumsey, **herb. J.R.C.** Ø

Dryopteris erythrosora *6, N. Somerset, : one plant in scrub by cycle route, just S. of bridge under A371, Dulcote, ST561444, H.J. Crouch & F. J. Rumsey, 2014. Ø [Absent 2018]



Fig. 1. *Pteris umbrosa* - Rivers Street, Bath, VC.6. Jan. 2018.

References

- Cheffings, C.M & Farrell, L. (eds.) 2005.** *The Vascular Plant Red Data List for Great Britain*. Species Status 7:1-116. J.N.C.C., Peterborough
- Dines, T.D. 2008.** *A Vascular Plant Red Data list for Wales*. Plantlife international, Salisbury.
- Edgington, J.A. 2013.** *Who found our ferns?* BPS, Special publication No.12., London
- Pearman, D.A. 2017.** *The discovery of the Native Flora of Britain & Ireland*. BSBI., Bristol
- Preston, C.D., Pearman, D.A. & Dines, T.D. 2002.** *New Atlas of the British & Irish Flora*. O.U.P., Oxford.
- Stace, C.A., Ellis, R.G., Kent, D.H. & McCosh, D.J. (eds.) 2003.** *Vice-county Census Catalogue of Vascular Plants of Great Britain, the Isle of Man and the Channel Islands*. BSBI., Bristol.
- Stroh, P.A et al., 2014.** *A Vascular Plant Red List for England*. B.S.B.I., Bristol
- Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016)** *Ireland Red List No. 10: Vascular Plants*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland
Asplenium viride in Worcestershire - two tales!

Asplenium viride in Worcestershire - Two Tales!

Martin Rickard,
Pear Tree Cottage, Kyre, Tenbury Wells,
Worcestershire. WR15 8RN
e.mail: h.m.rickard@btinternet.com



1. Ham Bridge

In the *Phytologist* in August 1841 a note was published by Edwin Lees detailing the discovery of *Asplenium viride* on Ham Bridge over the River Teme in Worcestershire. In the note he reveals that the fern was found by Lees about 14 years earlier. It was in the herbarium of a Mr T.B.Stretch, there is no record of the date it was actually collected but it must have been 1827 or earlier. Lees followed up the record but failed to find it at first. In 1835 he tried again when he did find it scattered over the brickwork, perhaps it had become re-established from spores or Lees had overlooked it earlier. The site was visited by several botanists, notably Edward Newman, so the verity of the record is not in doubt. It continued to survive on the bridge until 1853 when the bridge was restored.

I have often travelled over the bridge and once stopped to inspect it about two years ago. I failed to find the fern, but is that the end of the story? The brickwork is largely newish, probably repaired several times over the years but the face of the bridge above the river does seem to be very old brickwork. Unfortunately it is impossible to inspect this face without entering the river, which looks scarily deep at this point. It strikes me that I am quite possibly not the only person put off examining this section of wall by the depth of the river.

I am struck by the extraordinary record for *Asplenium septentrionale* by Romsey Marsh in Kent. I have not seen this site but apparently the plants can be very small and very easily overlooked. It too grows on a bridge but in a site relatively easily examined. It occurs to me that it is just possible that the Green Spleenwort might still hang on in the mortar between the bricks at Ham Bridge. It would be in the shade of the road and would have a certain amount of humidity generated by the Teme rushing by a few feet away. It could easily be very small and inconspicuous like the Forked Spleenwort in Kent. The long 2018 summer drought broke here yesterday. I am asking myself why didn't I examine the bridge while the river might have been sufficiently low!

Footnote: It seems anything is possible with *Asplenium viride*. It has been recently recorded growing on a rather unpromising station wall on the District Line in London by Alison Paul and Fred Rumsey.

2. My garden!

In 2008 I was botanising Glenade in the Ben Bulbin Hills in Ireland with Jim Dennison. *Asplenium viride* is abundant there on the limestone (Fig.1).



Fig.1. *Asplenium viride* in Glenade, Ireland. 2008.

Otherwise it is quite rare in Ireland. The pinnules were slightly more lacerated than usual and their surface seemed a bit irregular. I collected a small plant because it looked a little different and grew it on in my garden.

I was not keen to collect the plant because *A.viride* had been short-lived for me before. Back in the 1960s I had a beautiful plant in my garden in Saffron Walden. It was my pride and joy and just got better each year for two or three years. Then the next year it did absolutely nothing and was never seen again.

Surprisingly the original Irish plant is still flourishing in a stone trough in my garden after 10 years. It is now a good size growing intermixed with *Cystopteris fragilis*, also originally from Glenade, but as a weed! (Fig.2).I was quite happy this plant was growing so well, but to my amazement this summer I noticed a young plant of *Asplenium viride* growing beneath the original plant's stone trough (Fig.3).



Fig.2. *Asplenium viride* from Glenade after 10 years in my Worcestershire garden

It is to me inconceivable that a rhizome from the parent plant could have extended 45cm (18 inches) through the soil in the trough to emerge here. It must be a sporeling - I have not heard of *Asplenium viride* producing creeping rhizomes. In effect this is therefore an established denizen - it certainly was not planted. Has anyone else had the good fortune to have this beautiful little fern establish itself in their gardens?



Fig.3. *Asplenium viride* sporeling growing from base of stone trough, 2018.

Recovering a Victorian Fernery

John Roper

Chairman Friends of Danesbury Fernery

38 Carleton Rise, Welwyn, Hertfordshire

AL6 9RG

e.mail: info@danburyfernery.org.uk



Danesbury Fernery: Introductory paragraph by Peter Blake (28.3.18).

In the autumn of 2017, Andrew Beattie contacted Alison Evans about becoming a member of the BPS. He told her that he was a member of the Friends of Danesbury Local Nature Reserve and that they were in the process of excavating and repairing a Victorian Pulhamite fernery near Welwyn in Hertfordshire. As I had just taken over as leader of the East Anglia Group, his details were passed on to me and we started a correspondence. He directed me to their website <https://danburyfernery.org.uk>. My main experience of Pulhamite was the cascades in Battersea Park which were in poor state, having been repaired with spray concrete at the time of the Festival of Britain, and which hadn't carried a 'cascade' for many years. So, the opportunity to see another work in Pulhamite was too good to miss.

In March of this year Nick Lodge and I travelled to Welwyn on a rather cold, wet day and paddled through a muddy field to the Fernery. There I met the team and the leader, John Roper. He told me of the history of the fernery, as far as he had been able to ascertain, the current problems in determining how it had been supplied with water, and what the plans were for the future. I was shown around the site which was larger than I had anticipated. The Pulhamite rocks and grotto were mainly intact and had been reassembled with the aid of heavy machinery. The team were very enthusiastic and had obviously worked extremely hard to clear and excavate the structure of the fernery. The local Council had been very helpful and the site was fenced but open to the public at all times. I told them of the activities of the BPS and of our aim to help projects such as this through advice, publicity and plant donations. Hopefully, we will be able to organise a visit when the site is ready for planting, possibly later this year or in 2019.

The Danesbury Victorian Fernery - as we found it.

In 1881 the Danesbury Fernery at Welwyn in Hertfordshire was described in the RHS Journal "Garden Memoranda" as 'the best fernery to be found in the 'Home Counties'.

Fig. 1 shows how it looked in September 2015 when the volunteer group 'The Friends of Danesbury Local Nature Reserve' (LNR), with help from neighbouring Friends groups, started the project to 'reclaim' the abandoned and very overgrown Danesbury Fernery.

The Fernery was built in an old chalk pit on the Danesbury Estate in 1859/60 by Danesbury's renowned fern cultivator Anthony Parsons. The Pulhams of Broxbourne constructed rock work using their patented artificial rockwork 'Pulhamite'. There are no Danesbury records, but Pulham records indicate that they built 'a grotto, a dropping well, a pass, and a gorge with a rustic bridge over'. None of this was visible in September 2015!

We know that Anthony Parsons had initially been disappointed with the growth of his ferns, and that it took him four years to work out a solution. This solution is described in an article published in 1870 (Robinson 1870) and involved the construction of deep lined and 'tanked' planting bed to keep tree roots from robbing his beds of soil and water.

He was, as a result, undoubtedly successful, and this must have led to the 1881 declaration (one year after his death) that his was the best fernery to be found in the Home Counties. (His methods are described in www.danesburyfernery.org.uk under the Research heading). The 1870 article names some of the ferns he grew, claiming that they were bigger and better than anybody had ever seen before, except, he conceded, perhaps in their natural habitat!



Fig. 1. The Fernery as we found it in September 2015.

The Danesbury Victorian Fernery – with TLC.

We still do not know how the Victorians brought water to the site and circulated it from a cascade into the dropping well. Fig. 2 shows us in 2015 uncovering more Pulhamite than has probably been visible since the late 19th Century. Anthony Parsons died in 1880 and a turbulent period of history saw changes of ownership, a major fire in 1916, and requisition of the House as a hospital during both wars. The Fernery would have been difficult to maintain.



Fig. 2. Uncovering the Pulhamite.

By February 2016 most of the scrub had been cleared from the site, and we faced a 'blank canvas' (see Fig. 3). Although we continued to find Pulhamite rockwork, and we later excavated the original paths, there was of course no evidence of the ferns, and even the planting beds were difficult to find.



Fig. 3. Most of the scrub had been cleared by February 2016.

Recovering a Victorian Fernery

Figure 4 shows that over the years spoil had been dropped on the site to a depth of some 500mm. The volunteers continue to need mechanical help to remove the remaining tons.



Fig. 4. It is beginning to take shape.

Figure 5 shows how the fernery began to take shape as soon as we began to excavate the paths. We could then start to plan our future strategy.



Fig. 5. Excavating the paths

We have started redeveloping the garden and have appointed a garden designer. In February 2018 we planted 100+ whips on the perimeter boundaries to screen the site and eventually to provide shade and shelter for delicate plants. We have a major plant-up planned for May 2018, which will include the purchase of selected ferns.

In 2016, apart from spring bulb planting, we planted ferns that were donated by members of the local Gardening Club. Also, a local charity funded the purchase of the following ferns from a local grower:

- 5 x *Asplenium scolopendrium*
- 5 x *Osmunda regalis*
- 5 x *Dryopteris filix-mas*.
- 5 x *Polystichum polyblepharum*
- 4 x *Polystichum setiferum*

The Danesbury Victorian Fernery – today

Andrew Beattie, our treasurer, has arranged group membership of the BPS and we were delighted that Dr Peter Blake visited us on 15th March 2018 to see for himself the truth of what he had been hearing from Andrew. He saw that we are busy opening up and weeding planting beds ready for the big plant-up in May 2018. Of particular interest to us is that we believe we have found at least two more of the 'tanked' beds constructed by Anthony Parsons, which he described in 1870 (see Figs. 6 & 7).



Figs. 6 & 7. Two 'tanked' beds constructed by Anthony Parsons.

These beds have several courses of hand-made red-brick at their borders and cursory testing indicates that they have solid bases – exactly as Parsons described. At our next work party meetings we will try to discover the drainage holes for this particular planting bed which we uncovered only last week.

We are also cleaning out the pockets in the rockwork, ready to start re-planting ferns and rock plants. Although we have brought mains water to the site for watering plants, the big challenge remains to discover how water was brought to the site and pumped around to display the dropping well.

This is a rewarding Community Project supported by the land-owners, the Welwyn Hatfield Borough Council, with the support and encouragement of the Hertfordshire Gardens Trust. We have work parties on the morning of the third Thursday each month, plus ad hoc gardening group meetings. It will take a few more years before we can say that the Danesbury Fernery has been restored, but we are already attracting much interest from County focus groups and attracting regular visitors from Welwyn's community, many of whom, just 2 years ago, did not know that the Fernery existed.

Welwyn Festival Open Garden Day Sunday 17th June 2018

Following Peter Blake's visit on 15th March 2018 we hope to welcome other BPS members. Visitors are particularly welcome on our work party days, when you will be able to meet the team, and be given a guided tour around the site.

In 2017, for the very first time, the Danesbury Fernery was 'open' as part of the Welwyn Festival Open Gardens Programme and we had some 200 visitors. (See Fig. 8). It was an outstanding success, and we were invited to repeat this for 2018.



Fig. 8. Open Garden Day June 2017

Recovering a Victorian Fernery

We opened again on Sunday 17th June 2018 from 2pm to 5 pm, and offered refreshments too. Many members of the BPS came along and again it was a resounding success with over 200 visitors. (See Fig. 9)



Fig. 9. Open Garden Day June 2018

Please make it a habit to look at our website www.danesburyfernery.org.uk on a regular basis in order to stay up-to-date with our activities, and to diarise our meeting dates. That way, you will be able to learn more fully about the History of Danesbury House, and the Families who lived there when the estate was about 500 acres, (now approximately 65 acres).

The Danesbury Fernery – Access

The fernery is about 40 km North of London in Welwyn on the A1(M) The site is on Welwyn Hatfield Borough Council land and is open to the public at all times. Access is via the Danesbury Housing Estate AL6 9RD. The website provides detailed directions.

The Friends of Danesbury Local Nature Reserve

If you would like to be added to our list of the Friends of Danesbury please contact us and let us have your email address. Join us if you can (see Fig.9)



Fig. 10. The may tree planting bed



Fig. 11. The grotto with its newly planted tree ferns



Fig. 12. The central bed in flower and after the dressing of wood chips and peat.

References:-

Robinson, W. 1870. *Alpine Flowers for English Gardens*, James Murray, London - includes Anthony Parson's own detailed description of his methods for growing ferns by tanking the planting beds and how it took him four years to get the results he was expecting.

Robinson, W. 1883. *The English Flower Garden*, James Murray, London.- includes 'in the Home Counties there is probably not a better Fernery than that at Danesbury'.

Pulham II, J. 1877. *Picturesque Ferneries and Rock Garden Scenery* - includes a description of the work Pulhams undertook at Danesbury, including a grotto, dropping well etc..

Where to start?

David Redmore

10 Royal Cottages, Ashton Road,
Lancaster. Lancs LA1 5AL
e-mail: davidredmore@hotmail.com



My earliest serious encounters with ferns came in my mid-twenties when I started working with Reginald and Jeremy Kaye in their then famous but somewhat disorganised nursery.

Reg in particular was the most remarkable person who over a course of a lifetime had probably grown and lost more plants than anyone I have ever met, and possessing an encyclopedic knowledge of almost every plant that had passed through his hands.

Soon after beginning my work with Reg I was given a copy of his book "Hardy Ferns" and within its pages lay a description of his grandfather's conservatory in which were walls covered with *Asplenium bulbiferum* reflected within mirrors with a *Platycerium alcicorne* attached to a cork base surrounded by old fuschias and Hoyas dripping nectar all surrounded and infused by the smoke from his grandfather's pipe. One can only imagine how this created within Reg a desire for such things. And of course he was rarely seen without his own pipe. And within this description a desire was born that one day I would either possess such a place or be involved in the creation of a space that could be an evocation of that description

Sadly, my time with Reg was all too short. I became seriously ill for a year. Shortly after that Reg died but not before he had passed on to me a vast amount of his knowledge, which acted as a base upon which to build for the rest of my career in landscape design.

Another obsession Reg had was growing orchids, both hardy and tropical species, which unfortunately came to a dramatic end when his entire stock of tropical orchids succumbed to an incorrect chemical wrongly supplied by the manufacturers. Yet another Kaye obsession I succumbed to

The ambition did become a reality, firstly with a large conservatory then a greenhouse and another and another. Plants can become such an obsession.

So, I now find myself with what can only be described as a tropical conservatory, a greenhouse for growing cool-growing orchids, mainly *Masdevallia*, *Clivia* and *Dendrobium* species, and rather a lot of semi tender ferns and other cryptograms, and a larger orchid house devoted to *Phragmipediums* and yet again more ferns

Orchids and ferns seem to make ideal companions; many of the tropical ferns being very well suited to epiphytic growth as are most tropical orchids and the ferns seem to thrive on the specialist fertilizers used for the orchids.

I managed to salvage a number of *Dicksonia* trunks from a local park where they had been unwisely planted and had died due. I cut them along their lengths, pinned them to the wall and fastened orchids and ferns on to them.

The only issue with this form of planting and no doubt the high humidity is that the tree fern acts as a perfect substrate for fern spores and in little time is covered in prothallii which provide an interesting period in assessing which species are present.

A few are of the more dominant sporelings – *Platycerium* species (not sure which yet, they are tricky to tell apart!).

Pteris species particularly the cultivar *Pteris cretica* var. *albolineata*

Dryopteris filix mas, *Dryopteris dilatata*, *Athyrium filix femina*, *Adiantum raddeanum*, *Cyrtomium falcatum* and the especially prolific *Phlebodium aureum*.

The *Phlebodium aureum* or Golden Polypody or perhaps better named the Golden Serpent Fern is an an extremely widespread species spreading throughout the Americas occasionally confused with *Phlebodium pseudoaureum*. This is

closely related and only recently split off from *Polypodium* but still included in the genera *Polypodiaceae*. The fern is widely used in indigenous medicine practices and grows with some vigour ensuring a renewable resource. Extensive biochemical testing has and is taking place to assess its pharmaceutical values.

So far so good – I obtained this fern in a moment of horticultural madness; it was growing in a large pot of *Coelogyne cristata* and I thought that it was a very beautiful fern which it is but at that point had no idea how extremely prolific it could be!

Within the conservatory and the tropical greenhouse there is unlikely to be a pot or surface where this fern does not present itself. Depending upon which surface it alights this can be a simple removal or in some cases in particular among *Nepenthes* and some of the ant ferns like *Lecanopteris curtisi* extremely difficult.

Phlebodium aureum is really quite like the bittercress of the fern world

However, it is a really beautiful easily-grown fern often with a distinct blue sheen to its fronds, which can grow to 1.2m, very distinct golden hairy rhizomes and a robust difficult to kill constitution. I wouldn't be without it in spite of all the problems.

On a final note I always have good quantity of the aforementioned sporelings If any member would wish to have some. And in case I have given the impression of being interested in only tender ferns I have a garden full of hardy species and cultivars collected over the last 30 years or so.



Fig. 1. *Phlebodium aureum* showing its frond structure

Fertile fronds in *Dennstaedtia glauca*

Dick Hayward

Coed-y-Glyn, South Road, Caernarfon.

Gwynedd. LL55 2HP North Wales

e-mail: r.hayward049@btinternet.com



In 2005 Martin Rickard and I spent a happy fortnight ferning in Chile. Following some wonderful but all-too-few days on Robinson Crusoe Island and back on the mainland we made our base at a modest hotel in Osorno. In a raised bed fronting a house adjoining the hotel there was an untidy tangle of faded brown fronds shedding spores in every direction.

After all the beautiful and lush species we'd been seeing in our travels the ferns in this sun-drenched site did not seem overly attractive, and it was mainly because there was such an abundance spores on them and because I hate to see good spores going to waste, that I bothered to stuff part of a frond into an envelope on our last day. Martin reckoned the fern was a *Dennstaedtia*, but we had no idea what the species was. Moreover, the fact that we had encountered none like it in the wild, and that it had obviously been planted in the raised bed for decorative purposes, suggested that it might have been an exotic species anyway - at least as far as Chile was concerned.

Back home in Wales the spores germinated readily and soon produced strong little sporophytes with naked bits of rhizome arching up out of the compost and looking for all the world like little green caterpillars.

I offered a number of these for sale in the nursery, though simply as *Dennstaedtia sp.* as I was still unaware of the ID. Various BPS members and others bought them, and for all I know they may still have them. I planted a couple in my shady and frequently watered fernery and soon discovered what an attractive plant this could be (see Fig.1). Furthermore, although deciduous, it proved to be reliably hardy, and in 2018 I still have one of my originals.



Fig. 1. The attractive fronds of *Dennstaedtia glauca*.

Sometime later Martin told me that he had found an identity for our plant, it was *Dennstaedtia glauca*, and drew my attention to some unmistakable photos of it in website articles. From what I have gleaned more recently from an

excellent fieldguide published in 2009 (See references) it appears that *Dennstaedtia glauca* is not common in the wild and its status is described as vulnerable. However on the same page it says that this fern is widely grown as a garden plant in Central Chile - and of course this could well be a factor contributing to its vulnerability.

It has been an annual regret to me that although my plant has grown back again vigorously every spring, it has never shown any sign of producing spores. In 2016 I tried to remedy this by keeping a large potted division of my garden plant in an unheated glasshouse for the summer; but this did not bring about any sporing.

We moved house last November and for lack of anywhere else to put it that potted *Dennstaedtia* has this summer been standing in a very exposed and frequently windy place. This year we have all been enjoying a gloriously hot summer, and possibly for many of us it has not been an altogether fern-friendly time, demanding lots of extra watering. However, the excess sun and heat seems to have triggered the sporing process in my *Dennstaedtia*.

One thing I had not noticed in 2005 about the spring ferns back in Osorno was the great disparity between fertile sporophylls and sterile fronds; nor have I seen this noted in anything I've read subsequently. The dimorphism is however a very striking feature. The most outstanding difference is that the generally quadripinnate sporophylls are densely bushy to the extent of presenting a three-dimensional aspect - a 'plumose' form if that's the right term; this is very obvious in the detached fertile and sterile fronds in Fig. 2.

This bushy form is achieved partly by a greater



Fig. 2. The dimorphic fronds of *Dennstaedtia glauca* showing the fertile frond on the right and the sterile frond on the left.

Fertile fronds in *Dennstaedtia glauca*

closeness between the pinnae, all of which are projected towards the frond apex at a more acute angle from the rachis than those found on sterile fronds as can be seen in Fig. 3 below.

Coupled with this the pinnae on fertile fronds are twisted



Fig. 3. Detail of the the arrangement of the pinnae on the fertile frond

out of the general plane of the lamina, and some pinnules are deflected forwards to the front (upper) surface of the frond and others towards the back (lower) surface (see Figs. 4 & 5).

From a functional point of view it might be conjectured



Fig. 4. Detail of the the arrangement of the pinnae on the frond base

that these adaptations serve to increase the exposure of the tiny sori to more air movement. The sori themselves are found at the apices of the fairly fleshy ultimate lobules. Additionally, when compared with the sterile fronds, most fertile ones stand much more upright and have very much stouter and longer stipes (see Fig. 6). All the features mentioned are obvious in the photographs.

But perhaps I'm counting chickens too early, as although with a hand lens it's easy to see the sporangia in each barely enclosed sorus, they have not ripened yet, and since starting to write this, the weather has changed

dramatically, and the fern in question is being daily lashed by Atlantic winds and rain. But if mine don't make it, perhaps somewhere among the fern-loving fraternity there may be another survivor of that 2005 propagation still enjoying the heatwave and bursting with spores. If so, make sure to send some to Brian and Sue!

Roberto Rodriguez Rios, Diego Alarcón Abarca y Jaime Espejo Cardemil. 2009. *Guiá de Campo. Helechos Nativos del Centro y Sur de Chile.



Fig. 5. Further detail of the fertile frond.



Fig. 6. The fertile fronds standing upright.

Southport Fernery 10 years on

Alison Evans

Springfield House, Salterforth Road,
Earby, Lancashire. BB18 6NE
e-mail: acl.evans@btinternet.com



The Fernery in the Churchtown Botanic Gardens, Southport, was the subject of an article in the 2010 *Pteridologist* by Michael Hayward, following the re-roofing, refurbishment, and re-planting of the Fernery in 2007/2008. The Fernery was first opened in 1876, and is now a Grade II listed building. It is 30m long by 9m wide, with a central path between artificial rock planting areas, arches, and grottoes. The walls are also covered with artificial rock work containing many planting pockets. A photograph from the Victorian era shows exotic flowering plants as well as ferns. The history of the Fernery is given in Michael's article, together with a more full description. The aim of this article is to bring people up to date with changes in the Fernery since 2008.



Fig. 1. Southport Fernery after the re-planting in 2008.

A wonderful collection of exotic ferns was planted in 2008, (Fig 1 view) though there does not seem to be a list or planting plan in existence now. The main difficulty in the following years was to keep these ferns adequately watered, as many of the planting pockets are shallow, and the rock work dries out rapidly on sunny days. The drip system installed along the top of the walls stopped working many years ago, and the mist system was never sufficient to water the roots of the ferns properly. A further problem was that the soil used was not weed-free, and did not contain sufficient organic matter. Leaching from the cement used in the rock work seems to have made the soil alkaline, so not favourable for many ferns. Add to this the cuts in funding for councils, so that the time available for watering and weeding was inadequate, and it is not surprising that many of the tree ferns died, and the smaller ferns were overgrown

Pteridologist 6.5.2018

by weeds and invasive perennials. In spite of all this, it is still a beautiful and impressive space. (Fig 2 view 2017) Sandra Cain of the Botanic Gardens Community Association made contact with BPS members at Southport Flower Show in August last year, and we have formed a partnership with the aim of restoring the planting in the Fernery, so that once again it will house important collections of ferns and other plants.



Fig. 2. View of the Fernery in 2017.

We requested advice from the Royal Botanic Gardens Edinburgh (RBGE) and in March this year we were very fortunate that Andy Ensoll and Louise Galloway from RBGE visited the Fernery, and gave us specific advice on watering, composts, feeding, weed and pest control, temperature and humidity monitoring, and the plants that would do well in particular areas. Following this visit, an action plan was drawn up. A new lance attachment for the hose pipe was a great improvement, enabling water to be targeted at the roots and the trunks of tree ferns, whilst avoiding making the crowns soggy. (Fig 3)



Fig. 3. Sandra using the new watering lance.

Southport Fernery 10 years on



Fig. 4. Natalie and tree fern stump



Fig. 5. Area 7 new plantings



Fig. 6. *Cibotium schiedeii*, known as 'Big Bertha'.

Much of the greenery in the 2017 picture is *Asparagus* 'fern', *Asparagus densiflorus*, which has seeded itself into many planting pockets, and is very difficult to remove as it has spines and very tough roots with tubers. Sandra and other volunteers have worked tirelessly to remove this, and also umbrella grass, an invasive *Cyperus* species, as well as weeds such as oxalis, baby tears, and ivy-leaved toadflax. We have had a BTec student from Great Howarth school and 2 of his teachers working with us, helping with watering, weeding, digging out dead tree fern stumps (Fig. 4), and testing the pH of the soil in different areas of the fernery. Composted bark has been used to mix into the existing soil, together with wool and bracken compost, and long-acting feed. Biological control has been used for vine weevil and for slugs and snails.

We had a splendid offer of ferns and Epiphyllums from RBGE, and on 15th June this year we took a large van to RBGE to pick them up. We could scarcely believe the wonderful selection of rare ferns that the RBGE team gave to us – ferns that they did not have space to keep – on the understanding of course that we do not pass them on to any third parties. The Epiphyllums are ideal for the higher planting pockets, and should give a good show of colour next year (Fig. 5).

Many of the ferns have now been planted, and look spectacular (Figs. 6,7,8). We hope to have the Fernery open to the public again soon. Watch out for news of this on the BPS website!

References:

Hayward, M. (2010) *The Fernery at Southport Botanic Gardens*. *Pteridologist* 5(3) p 186-9.



Fig. 7. *Blechnum gibbum* and *Blechnum moorei* in front of *Cyathea cooperi*.



Fig. 8. *Cibotium menziesii*.

What is the Ugliest Fern?

Pat Acock

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

e-mail: pat.acock@btinternet.com



Fig. 1. *Ampelopteris prolifera* bud on stem sprouting.



Fig. 2. picture of a whole plant of *Ampelopteris prolifera*.



Fig. 3. *Ampelopteris prolifera* bud swelling

On going around fern gardens I sometimes like to throw in a googly. I often ask what people think is the ugliest fern. Most people have never thought about it but at least it is a way of starting a conversation. I have found people reluctant to name a fern. They somehow think it is sacrilege to even think about it. I often suggest *Cyrtomium fortunei* as my choice and as the discussion continues I am willing to suggest perhaps it is not so ugly but perhaps the plain John/plain Jane of the fern world and probably because of its dullness enhances the beauty of the other ferns around it.

Whilst we were in some really wonderful gardens in Holland recently each with a completely different idea of how ferns were to be used we were often thrown together with Dutch colleagues I had not met before so I used the ugly fern conversation as an icebreaker. The commonest reply was that there are no ugly ferns. However, in a garden where swathes of the same fern were planted when we came across such a swathe of *Cyrtomium fortunei* I did use this ploy and it promoted much conversation during the day and it was a real icebreaker with complete strangers.

People who come into my greenhouse often wonder why I grow *Ampelopteris prolifera* (see Figs. 1–6). They don't say it is ugly but criticise its presence. I now have two large pots of this plant and having just cleaned them up I delight on their fresh green colour and their amazing survival strategy. I was aware of its presence but came to know a little more of it whilst we were in Southern China with Professor Xiao Cheng near the Yunnan border with Vietnam.

On our first full day in the field we were held up on the road and Professor Cheng asked us to wait while he found out what had gone wrong. As time went past we started to wander down the road and Tim and I clambered down the river bank where he had spotted *Ampelopteris prolifera*. Seeing it growing naturally fixed the plant in my memory. When I returned I was determined to look after my specimen more but over the years of neglect I have had to rescue it from overwatering and underwatering while I have been away many times.

Ampelopteris prolifera has an amazing growth strategy. It starts



Fig. 4. Proliferous tips of *Ampelopteris prolifera* reaching for the ground.



Fig. 5. *Ampelopteris prolifera* plant showing the attenuating fronds reaching down for somewhere to root



Fig. 6. Elongating fronds of *Ampelopteris prolifera* reaching for the ground.

What is the Ugliest Fern?

off growing like a conventional fern but then some of the fronds grow elongated tips at the end of which a bud will develop. The weight of this bud lowers it on to the soil where it can it root or sometimes just rots away. If the fronds find themselves close to the ground then buds will appear in the leaf axils of the wettest places weighing the plant down until roots seek out the soil and anchor the frond down. If it is very damp and fronds are hanging down over a cliff or another obstacle then buds will break out in a leaf axil and grow in the air provided the parent can support them. If it suddenly goes dry again the growing buds are just abandoned with their developing fronds just cut off from the parent frond which carries on as normal with the dying bulbil and its little fronds left to fade away but with no injury to the rest of the frond. I came back from the Dutch trip to find one of my plants that had two of these 12-14mm small ferns about 3 to 4 pinnae up from the base green when I left, but now all brown and shrivelled and I wish I had taken a picture of them. No harm has come to the main frond that has just carried on as normal.

I am sure this plant would survive

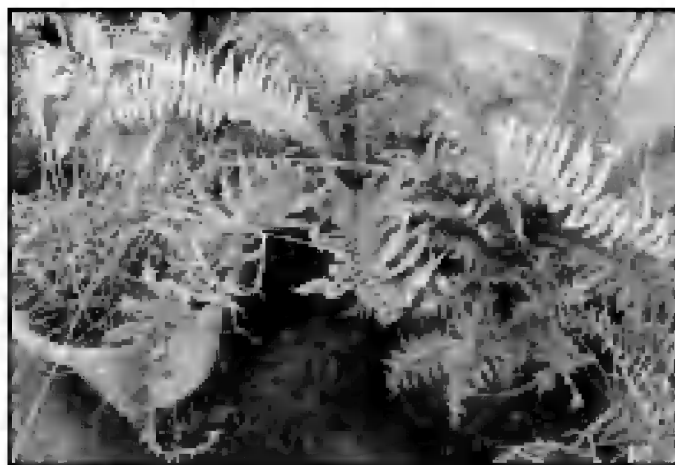


Fig. 7. *Blechnum longicauda* from Alexander Selkirk Island.



Fig. 8. Tip of *Blechnum longicauda* about to root along the floor of the greenhouse.



Fig. 9. Bud near tip of *Blechnum longicauda*.

the most torrid treatment; they have with me. The fronds that continually seem to grow seem to find a niche and either bud at the tips or along the frond and if the main plant is not watered these adventives just cut off the main plant leaving it to its own devices/demise. Last year I thought I had lost my *Ampelopteris prolifera* completely only to find a plant from one of these buds growing in the damp moss below the fern bench with just the dying remains of its parent's frond attached. I really love this plant and must care for it more.

Of course, it can become a problem if not taken care of because it will grow all over the place in a tangle of new plants under the greenhouse bench or popping up in all your other pots killing off the competition, Survival of the fittest. Hey!

Of course, I never mentioned I have another of these adaptable survivors, *Blechnum longicauda* from Alexander Selkirk Island of the Juan Fernando's archipelago which has a very similar strategy (See Figs 7 -9) It was kindly presented to me by the island flora expert at Brest Botanic gardens many years ago.

Restoration of a Victorian Fernery in the English Lake District.



Fig. 1. General view of the fernery with a restored wall in the background.



Fig. 2. Paths and steps already in place.

George Whitwell, one of the founder members of the BPS, lived in Kendal, Cumbria, and served as Secretary for many years.

His fern garden is slowly being restored by members of the Kendal Conservation Volunteers in part of Serpentine Woods close to Serpentine Cottage where George Whitwell used to live.

You can just see this cottage in the background of Fig. 4.

A lot of clearing has been done, paths recreated and many ferns planted. The North West Group of the BPS. has already donated many ferns and several have come from local gardens.

There will be a full report in the next issue of the *Pteridologist* and we look forward to its progress.

A.E.G



Fig. 3. A log feature in the restored fernery.



Fig. 4. A general view with Serpentine Cottage in the background.

Lecanopteris curtsi* or, as it now should be known, *Lecanopteris depariodes

David Redmore

**10 Royal Cottages, Ashton Road,
Lancaster. Lancs LA1 5AL**

e-mail: davidredmore@hotmail.com



Lecanopteris, or antferns as they are known, are a fascinating group of 13 epiphytic species found in Malaysia, Indochina, Sulawesi and in the Philippines

An ancient genus with a distinct ecological development, all species of *Lecanopteris* live in a symbiotic relationship with ants. The base of the plants in many, but not all, have developed protected cavities within the basal structure which become hollow as the plant develops.



Fig. 1. *Lecanopteris depariodes* showing its general frond structure.

In *Lecanopteris depariodes* the basal structure is covered in a distinctly blue waxy like material and is very attractive.

These are used by ants as nesting places; the ants in turn provide a source of nitrogenous matter through droppings and forest debris they bring in to use in the construction of their nests which is referred to as a domatium

So, we have a mutual relationship built upon the ants protecting the *Lecanopteris* from attack by insect predators and the fern receiving nutrients from the ants. This particular biological adaptation is found in other plants and is referred to as myrmecophytism

My *Lecanopteris* species were obtained through Wistuba.com; they provide good quality plants that, however, may be a little small. There are now other

sources for the more common species to be found mainly in European nurseries

I grow them in pure sphagnum moss in teak orchid baskets; this is allowed to dry out slightly between waterings feed with Orchid Focus Grow at the recommended rates for Orchids and give them a reasonable level of light.

Perhaps I should mention they are not the easiest of ferns to establish but well worth persevering with as once they are established they seem relatively trouble free.



Fig. 2. Frond structure showing tip sori



Fig. 3. Base of *Lecanopteris depariodes* showing swollen base structure and entry points for ants.

Garden Volunteer Day with the BPS

Becky Burns

Head of Gardens and Interpretation,

Jodrell Bank Discovery Centre, The University of Manchester,
Macclesfield, SK11 9DL

e-mail: becky.burns@manchester.ac.uk



Fig. 1. BPS Volunteers Nov 2012



Fig. 2. Henry and Alison having a brew



Fig. 3. The custard cream biscuit with its fern design

Here at Jodrell Bank Discovery Centre we hold a monthly Garden Volunteer Day where up to 12 people from the local area join us for the day to carry out a variety of garden tasks in the arboretum. They learn new skills, enjoy a day in the fresh air and meet new people whilst we benefit from the help taking care of the beautiful 35 acres that surround the world famous Lovell Telescope.

In September 2017 BPS members Yvonne Golding, Alison Evans and Henry Folkard came to join our enthusiastic volunteers to help restore our Fern Collection which had originally been planted by BPS members in November 2012 (Fig.1) with donations from their own private collections. There was a combination of British native and foreign hardy ferns to be rediscovered after becoming overgrown in recent years.

As all good days begin we started with a cup of tea and a biscuit which provided the perfect opportunity for our volunteers to learn their first ferny fact. They were surprised to hear that the much loved custard cream biscuit design was thanks to the Victorian obsession with ferns when the biscuit was first created in 1908.

Alison, Yvonne and Henry helped identify some fronds that one of our regular volunteers brought in from home and then we all set to work uncovering some of the ferns that had been previously planted. It was exciting to see what had survived with very little maintenance and a bit of accidental strimming in the past. These were hardy ferns indeed!

We then planted the 54 ferns that had been kindly funded by the Centenary Fund Grant and supplied by Neil Timm at The Fern Nursery. They had travelled well in their packaging and were unpacked immediately and watered



Fig. 4. Existing ferns on the stumpery



Fig. 5. Uncovering existing ferns



Fig. 6. Mail order ferns unpacked

Garden Volunteer Day with the BPS



Fig. 7. BPS volunteer donations



Fig. 8. Planting complete



Fig.98. Phil, fungi and volunteers

on arrival in the days before planting. *Asplenium scolopendrium*, *Dryopteris affinis* 'Cristata the King', *Dryopteris filix-mas*, *Polystichum aculeatum*, *Polystichum setiferum* and *Polypodium vulgare* were chosen for their suitability for the dry woodland shade they were going into.

BPS volunteers also kindly donated plants from their own collections again, including a stately *Blechnum chilense* which joined a group of newly uncovered survivors from 2012.

We discovered some logs in a corner of the arboretum which made an ideal backdrop for a display of *Asplenium* and *Polypodium* next to our modest stumpery.

When planting was complete they were all mulched with a top dressing of our own leaf compost which should help keep the grass away from them while they establish. We have several leaf bins around the grounds which provide a nutrient rich mulch from leaves collected around the arboretum where we have over 3,000 trees and shrubs.

Phil Bolton, our senior gardener showed our volunteers some fungi that were uncovered including the poisonous (only if eaten) Brown Roll Rim and Fly Agaric. We have over 120 different fungi in our arboretum, most of which have been discovered by members of the North West Fungus Group who hold annual UK Fungus Day events here.

Once all the hard work was done Yvonne gave a demonstration of how to propagate ferns at home using simple equipment such as baking paper and windowsills. Our keen volunteers took away some information to have a go themselves at home.

Many thanks to the Society and to Yvonne, Alison and Henry who shared their expertise with our garden volunteers - their enthusiasm for ferns was infectious and our volunteers had a very enjoyable day.



Fig. 10. volunteers creating a logpile



Fig. 11. Yvonne demonstrating propagation



Fig. 12. BPS and JBDC volunteers

A new Moonwort for Britain

Botrychium nordicum Stensvold & Farrar

Fred Rumsey (BPS Recording & Conservation Officer)

Natural History Museum, Cromwell Road, London SW7 5BD

e-mail: f.rumsey@nhm.ac.uk



Introduction

The pioneering work of W. "Herb" Wagner and subsequently Don Farrar and his students revealed that within North America the genus *Botrychium* was far more species-rich than had originally been thought. In Europe and particularly in Britain and Ireland we could only look on with envy, our British flora, we thought, containing but one species, *B. lunaria* (L.) Sw. – the only addition a nineteenth century find of *B. matricariifolium* (Döll) A. Braun, the accurately named specimen of which at British Museum, said to have been collected on the sandy sea-shore at Stevenston in Ayrshire has some doubts over its provenance. Other species have been claimed but generally dismissed as errors for atypical *B. lunaria*.



Fig. 1. *Botrychium nordicum* - Glen Shee Ski-lift, The Cairnwell NO138781, alt. c. 659m

to see that what had appeared to be a simple situation in Europe was far from it! Thus, the recent world-wide molecular phylogeny of the genus by Benjamin Dauphin and colleagues (2017) recognised eight genetically distinct lineages within *Botrychium lunaria*. Three of these lineages have comparatively recently been described and named after over a decade of study: *B. tunux* Stensvold & Farrar, *B. lunaria* var. *melzeri* Stensvold & Farrar and *B. nordicum* Stensvold & Farrar, as they show subtle but consistent morphological distinguishing characters. The remaining taxa: Lunaria "1", Lunaria "2", Lunaria "3", Lunaria "4" & Lunaria "5", while showing some geographical and ecological separation, cannot currently be morphologically distinguished.



Fig. 2. *Botrychium nordicum* - Glen Shee Ski-lift, The Cairnwell NO138781, alt. c. 659m

Allozymic studies by Mary Stensvold for her PhD (Stensvold, 2008) indicated that the Moonworts were classic examples of **cryptic species**, i.e. ones which could not easily be separated on morphological grounds but which were genetically distinct. The subsequent advent of molecular techniques utilising DNA sequence based approaches has begun to give us an even better insight into the evolutionary processes and the identification of these distinct cryptic genetic taxa. Finally we begin

Very few examples of British material have to date been sequenced. Indeed we currently do not know if British material consists of the "typical" i.e. Lunaria "1" lineage, or of any of the other lineages, or indeed several of them. The known ranges of some of these taxa would not preclude their discovery within Britain and Ireland, indeed some are to be expected. Perhaps the most widely distributed of all of the taxa is Lunaria "2", for, this is widespread in mountains from N. America, through Asia, the Carpathians and the Alps. Lunaria "3" in contrast is exclusively European and centred

A new Moonwort for Britain: *Botrychium nordicum* Stensvold & Farrar

on the Alps, where it prefers limestone soils (Maccagni *et al.*, 2017). The major clade that contains *Lunaria* "1", itself widespread through Europe and in Iceland, tends to be more boreal. Within it *Lunaria* "4" is currently only known from N. Sweden and *lunaria* var. *melzeri* from the High Arctic. Given the disjunct occurrences of other arctic-alpine species in the British flora, the mountains of Snowdonia, Upper Teesdale, the Cairngorms, Shetland, and, in Ireland the Burren, all on phyto-geographic grounds, offer the greatest hopes for discovery.

The molecular sampling reported by Dauphin *et al.* (2017) did, however, rather unexpectedly reveal the presence in Britain of *B. nordicum*, based on a specimen collected by Heather McHaffie (McHaffie 155) at the Glen Shee ski-lift by the Cairnwell, v.c.92 in 2015. This population was seen and photographed during the visit of the British Pteridological Society in July 2017 (see figs. 1-3) before its identity was known. I have also seen what is almost certainly *B. nordicum* a little over 1km ESE of this site, on the slopes of Glas Maol, again in v.c.92 but very close to the v.c.89 boundary and also close to ski-lift buildings (Fig. 4). It should be noted that typical plants of *B. lunaria* also occur by the major trackside linking these two locations.

Hitherto *B. nordicum* had only been reported from South Greenland, north-western Iceland, from its type locality near Vestnes on the western central coast of Norway and from the Telemark Mountains in the south of Norway. The discovery in the central highlands of Scotland thus reflects a considerable extension of range southwards.

Identification features

Morphologically *B. nordicum* is primarily distinguished from *B. lunaria* by the deeply incised pinnae margins, which are consistently present in the former but "usually not" in the latter (Stensvold & Farrar, 2017). In their original description of *B. nordicum* Stensvold & Farrar (2017) also comment on the shorter length of the common stalk, i.e. the section of stem below the first pinnae (and point of divergence of the sporophore when fertile). The recent Scottish examples all have rather laxly arranged sporangia, although this character has not previously been noted as diagnostic.

The reliability of the pinnule margin character remains to be tested. There are several gatherings at the British Museum with multiple individuals from sites, some of which show the character, whereas others do not. In the absence of DNA study it is impossible to say whether this reflects variability within a single taxon, or the presence of multiple taxa occurring sympatrically. Several authors using both allozyme- (Stensvold, 2008) and DNA-based studies (Stensvold & Farrar, 2017; Dauphin *et al.*, 2014; 2017; Maccagni *et al.*, 2017) indicate that cryptic *Botrychium* lineages do occur sympatrically, as also suggested by detailed morphological observation, e.g. Struck (2013). The allozymic studies of Stensvold (2008) also suggest that hybridisation between some taxa occurs and allopolyploid origins of some long recognised species, e.g. *B. boreale* and some more cryptic recently described taxa, e.g. *B. yaaxudakeit* can be identified. There is evidence too for introgression, with some widely distributed recombined and stabilised F2 hybrids within the genus (Stensvold & Farrar, 2017), but in general the ability of taxa to retain their distinct morphological and genetic identities while in sympatry has been used as a strong argument for their recognition.

Pteridologist 6.5.2018



Fig. 4 *Botrychium nordicum* – Ski-tow, lower slopes of Meall Odhar, v.c.92 NO149775, alt. c. 754m

Possible British & Irish distribution and status

Following the revelation in Dauphin *et al.* (2017) that *B. nordicum* occurred in Scotland, a quick check at the British Museum and on Herbaria@Home revealed many possible examples of this taxon, i.e. plants with deeply incised pinnae have been recorded from:-

VCC: 49, 57, 59*, 62*, 64, 65*, 66, 67, 69*, 70, 71, 72*, 75, 88, 90*, 96*, 98, 100 and possibly H20* & H27, in addition to the proven examples from v.c. 92.

(Vice-counties marked * indicate sheets with mixed, i.e. incised and entire pinnuled plants)

These records can only be considered to be provisional in the absence of molecular investigation. If such work goes on to confirm the reliability of the pinnule margin character we would have much greater confidence in re-assigning herbarium material, which would also allow a more informed view on past distribution and thus potentially decline.

I would be very grateful for records of possible *B. nordicum* plants, and, where population sizes permit, samples of Moonwort plants (a portion of a frond would suffice) upon which a molecular study can be performed.

Book review

Landscape of Dreams by Isabel and Julian Bannerman, foreword by HRH The Prince of Wales. 297 pps., many colour illustrations, 28.6 x 24.0 mm. Pimpernel Press, 2016.

While this is not a fern book it does have some relevance to fern growers. In particular, because it gives a good insight into the construction of parts of our Patron's garden at Highgrove, including the stumpery. The section on Highgrove runs to 12 pages (I would have liked more!) but many other gardens likely to pique pteridological interest are also included. Wormsley in the Chiltern Hills includes another stumpery, a development of the Highgrove model. It is a fabulous wooden henge, called Campo Santo, liberally planted with ferns although only two types - *Polystichum munitum* and *Dryopteris x complexa* 'Stablerae'. Other rockwork and tunnels in the garden are also look fascinating.

Early this century the Bannermans moved to Tremarton Castle near Plymouth, but in Cornwall. This is a building steeped in history which has belonged to the Dukes of Cornwall since 1066. I was fortunate to be able to explore the gardens early in the Bannerman's development of the site. The potential was obvious, but the way forward was not! The garden now, as shown in this book is superb. Ferns do not feature strongly but look closely and they do occur. One of the attractions of the castle are the walls - they are covered by *Polypodium australe* - a very local species in Cornwall. Unfortunately at the time of my visit I found no cultivars but given the abundance of this fern here and in nearby Saltash, I suspect closer inspection might be profitable!

A total of fifteen gardens are described here. The design of each reflects the somewhat 'off the wall' thinking of the authors. These fifteen gardens are much the richer for that. On inspecting a site for the first time I wonder if



the Bannermans promise each owner 'Your garden has capabilities.....!'

Martin Rickard

Asplenium trichomanes subsp. *pachyrachis* (otherwise *Asplenium csikii*) in Cheshire

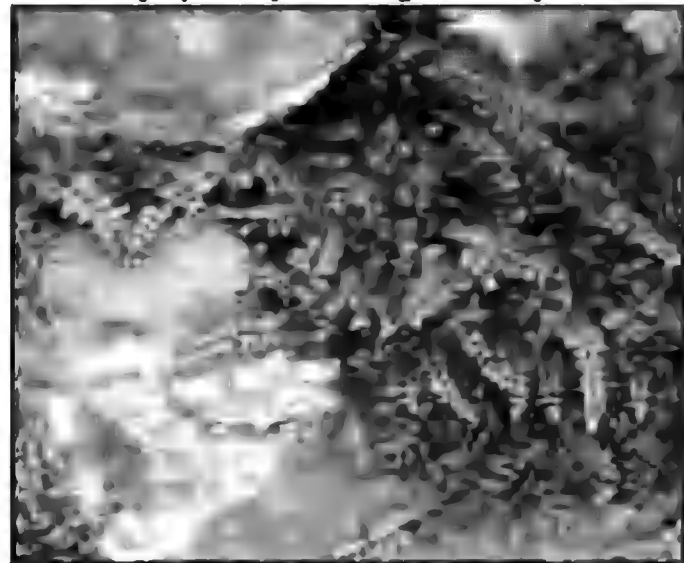
Martin Rickard

Pear Tree Cottage, Kyre, Tenbury Wells, Worcs. WR15 8RN.

e-mail: h.m.rickard@btinternet.com.



Five of six years ago Mark Jannick, a BPS member from Malvern, gave me details of the site for this *Asplenium* in Cheshire. He was not the original finder. Eventually, four years ago, I went to see if I could find the fern armed with the grid reference and Mark's little map. It was easy! I had no difficulty quickly finding the object after



Asplenium trichomanes subsp. *pachyrachis* near Malpas, Cheshire.

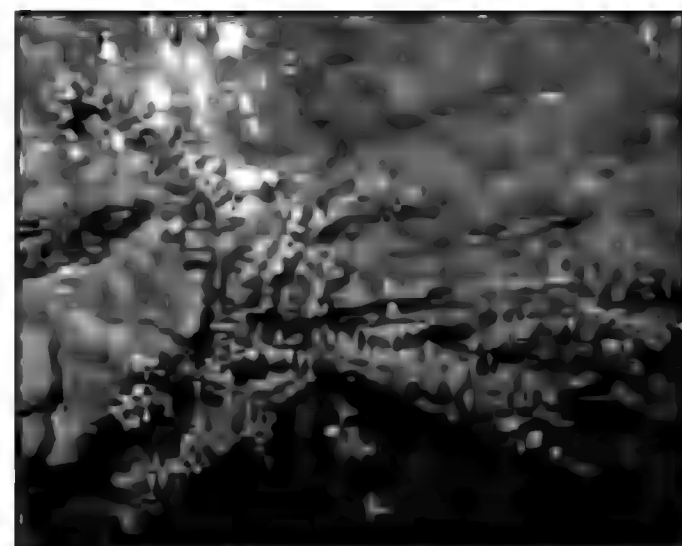
a short walk from the car park. The fern occurs quite commonly on two adjacent outcrops of sandstone near Malpas. GR SJ 49669-52784.

Not a type of rock I think of as being a suitable site for *A. trichomanes* subsp. *pachyrachis*, but it looked very similar to the sandstone supporting the colony near Bellingham in Northumberland. Presumably there is some lime available in the rock in both cases. Normally '*Pachyrachis*' is limited to limestone rocks and old walls, eg. castles. In the UK '*Pachyrachis*' is I believe, only known from the lower Wye Valley (Hereford, Gloucestershire, Monmouthshire), this Cheshire site, Knaresborough Castle and nearby rocks in Yorkshire, and the Northumberland site. A very odd distribution.

I mention it now because a greater awareness of this pretty little fern might eventually lead to the discovery

of further sites. I add a picture of the fern near Malpas and one of a Northumberland specimen.

The plants in Cheshire have lobed pinnules but the Northumberland plants have pinnules more deeply lobed - approaching the cultivar 'Trogyense', first found by E.J. Lowe over 125 years ago!



Asplenium trichomanes subsp. *pachyrachis*, near Bellingham Northumberland.

St. Hilarion Castle : an oasis for ferns

Sylvia D. Martinelli

Old Farm Cottage, Olmstead Green,
Castle Camps, Cambridge, CB21 4TW
e-mail: sylvia.martinelli@yahoo.co.uk



On a trip to North Cyprus in March 2017, I was expecting to see plenty of Mediterranean maquis-like flora but hadn't anticipated meeting any ferns and was surprised to find there were as many as eight pteridophytes there. There is a semi-continuous mountain chain running east-west and roughly parallel to and close by the north coast of North Cyprus. The main rock here is sedimentary carbonate laid down in Triassic to Cretaceous periods with a few outcrops of older metamorphic and igneous rock from Permian to Carboniferous periods. Only in these mountains in buildings of touristic interest did I see any ferns.



Fig. 1. View of St Hilarion Castle.

One day we were taken up in the mountains off the road between Girne and Lefkosa to 11th century St. Hilarion Castle, which sits on top of a peak (Fig. 1). From the carpark, one climbs steeply upwards through three principal layers of castle. I was so intent on watching where to put my feet that I might have missed most of the ferns were it not for our botanical guide and fellow BPS member Alan Outen. *Cheilanthes maderensis* (alternatively *Allosorus pteridioides*) grew in cracks in the bright white rocks (Fig.2). Its pinnae were bright green on reddish stems and too young to have formed spores

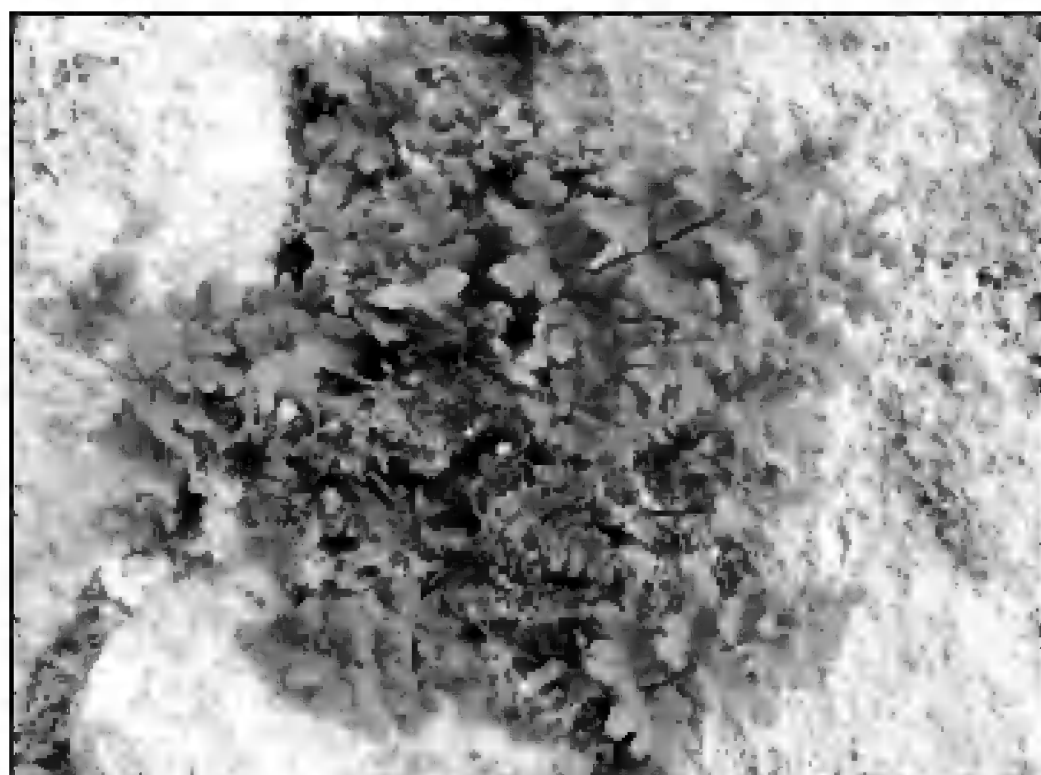


Fig. 2. *Cheilanthes maderensis* in limestone rocks.

Although expected to grow in dry rocky situations, as do many other xerophytic cheilanthines, should it be here on limestone? Remy Prelli ^[1] places it on 'silice', presumably siliceous rock and an unmonitored internet site describes it as growing in acid soils in Spain.

As we rose yet higher, *Dryopteris pallida* put in an appearance, again with very fresh bright green soft bipinnate fronds. I have no references at home for this fern but on the internet I have discovered that it grows in Greece ^[2] in moist woodland and along water courses and it also occurs in Israel which is not too far from N.Cyprus. There is an endemic subspecies – *balearica* – in Majorca that grows near the sea, in limestone crevices in shady cool areas. This website ^[3] drew attention to the tendency of the frond apices to lean to one side, shown in my photographs (Fig. 3).



Fig. 3. *Dryopteris pallida* with curved apex

Shortly afterwards in a wetter and possibly cooler area, we came across the annual fern *Anogramma leptophylla* growing in clumps of moss and liverwort on the rocks (Fig. 4).

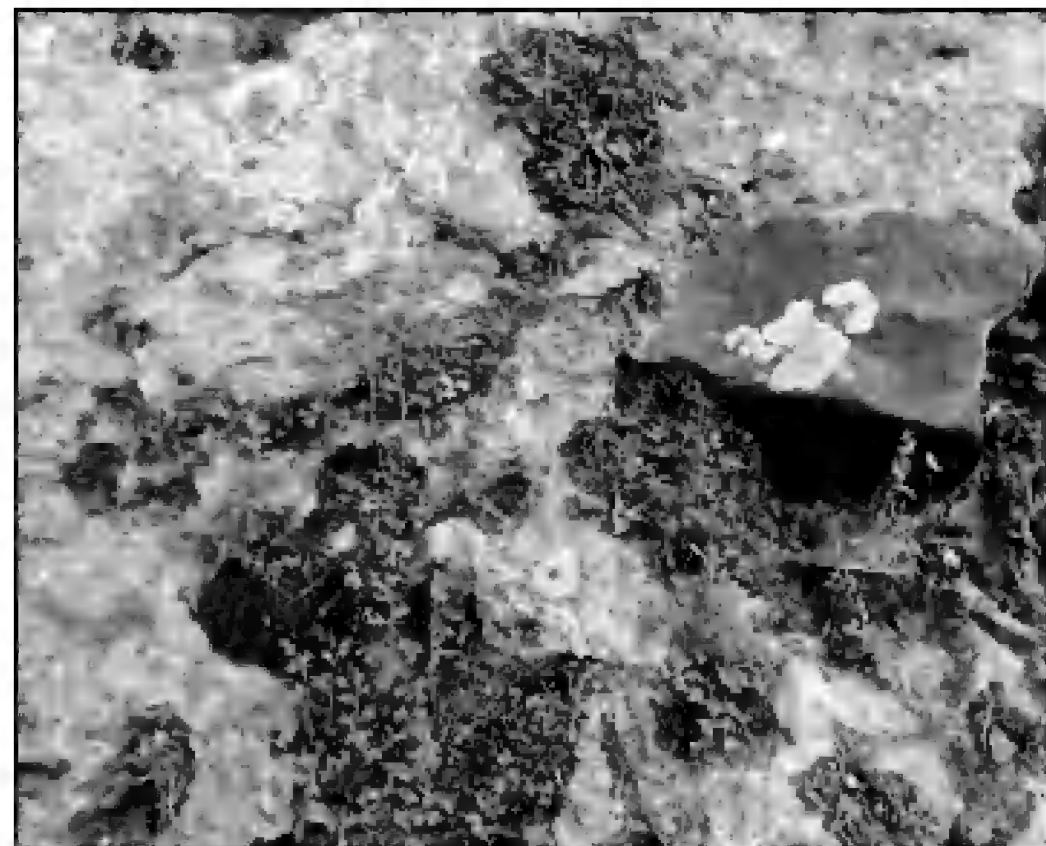


Fig. 4. Castle wall with *Anogramma leptophylla*, *D.pallida* and possibly *C.officinatum*

St. Hilarion Castle : an oasis for ferns

When first seen in Tasmania, as an epiphyte, I thought it was a filmy fern but here I could have mistaken it for a softer version of *Cryptogramma crispera*. However to quote Chris Page "Not a very variable species..... plants unlikely to be confused with any other fern" [4]. Its fronds are erect and short, up to 10 cm, with proportionately long stipes and are variously described as 2-3 pinnate or bipinnatifid, younger fronds being simpler and shorter than those formed later in the growing season, which is winter in the British Isles (Fig. 5). It is supposed to like humid sites on siliceous rocks, [1] granite and clay in Channel Islands [4] so I'm rather puzzled to have found it here. Uniquely for a fern in Europe, it has a perennial tuber on the prothallus which survives the dry season and has reserves to allow the growth of new 2-3 pinnate fronds, which appear to be very delicate and thin. This is a temperate climate fern with a roughly global distribution.

Close by the annual fern were some tiny plants (Fig. 6) of *Ceterarch officinarum* (alternatively *Asplenium ceterarch*) which also needs some degree of moisture, despite being described as xerophilous. Its neat small rosettes, about 10-20 cm across, looked soft and delightfully furry around the edges of and under the pinnae (Fig. 7), hence the British common name - rusty back. These 'furry' pinnae can curl up in dry periods and be protected by the tawny peltate scales. Its fronds are described as deeply pinnatifid and when mature have a dark green colour. Plants were growing in cracks between rocks or small pockets of soil on very rough rock surfaces. I had my only success in cultivation when I placed it in a crevice in a large piece of tufa. *C. officinarum* is supposed to prefer calcareous rocks [1] so it is logical to find that here. Certainly the castle was constructed upon and with blindingly white rocks, presumably made of limestone. All these ferns could be seen in the lower two castle sections, which culminated in a welcome café. Our guide told me that there were no new ferns in the third and very precipitous section of the castle so I drank coffee and waited for the hardier walkers to descend.



Fig. 5. *Anogramma leptophylla* close up

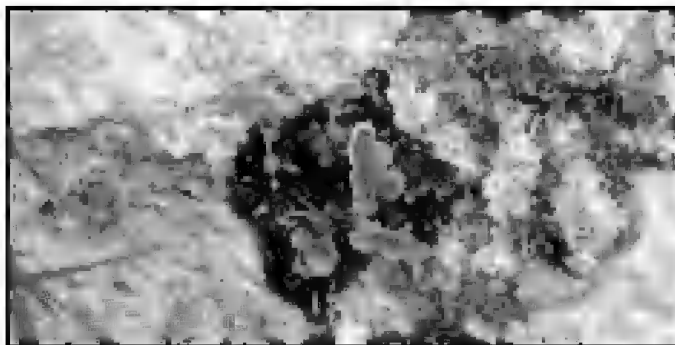


Fig. 6. Very young plant of *Ceterarch officinarum*



Fig. 7. Mature rosette of *C. officinarum*



Fig. 8. *Adiantum capillus-veneris* growing in Bellapais Abbey).

In the ruined Bellapais Abbey (13th century) in the hills above the town of Girne, I found only one plant of another calciphile - *Adiantum capillus-veneris* (Fig. 8). Its bipinnate fronds with black stipes and rather open arrangement of pinnae and their distinct wedge shaped pinnules are quite distinctive, even if it had to be compared with other members of the genus here. *A. capillus-veneris* has a wide pantropical and temperate distribution. It is often found anywhere with limestone walls or any old wall made partially with mortar. Again, the main blocks from which the Bellapais Abbey had been built were of limestone rock. Lovely as the abbey is, I was more interested to gaze at the outside of the nearby former house of Lawrence Durrell, where he wrote 'Bitter Lemons'.

I failed to photograph *Selaginella denticulata* and never saw *Polypodium cambricum*, however finding as many as 3/4 of the 8 pteridophytes is quite a good score for me in recent years. Whereas I can't recommend North Cyprus as a venue for fern spotting, it has an excellent collection of orchids, lots of lovely *Cyclamen persicum* in flower in spring, plenty of migrating birds to be seen in season and several worthwhile tourist sites, in particular St. Hilarion Castle. Girne makes an excellent centre for trips along the coast or into the mountains.

Point specific references

- [1] Prelli R. 2015. *Guide des Fougères et plantes alliées, France and Europe*. Belin.
- [2] <http://www.nhmc.uoc.gr/en/> for *Dryopteris pallida*
- [3] <http://mundani-garden.blogspot.co.uk/2011/01/dryopteris-pallida-ssp-balearica.html>
- [4] Page C.N. 1982. *The ferns of Britain and Ireland*. CUP.

General references

- Hutchinson G. & Thomas BA. 1996. *Welsh Ferns*. NMGW
- Hyde H.A., Wade A.E. & Harrison S.G. 1969. *Welsh Ferns clubmosses quillworts & horsetails*. NMGW
- Jones D.L. 1987. *Encyclopaedia of Ferns*. Timber Press
- Brownsey PJ & Smith-Dodsworth J.C. 2000. *New Zealand Ferns and Allied Plants*. David Bateman.

Fern Nature Prints – the Manwell way

Adrian Dyer

499 Lanark Road West, Balerno, Edinburgh EH14 7AL

e-mail: afdyer499@googlemail.com



Andrew Manwell, a member of BPS from 2002 until his death on 23 December 2017, devised his own method for preparing nature prints of ferns.



Fig. 1. A sample of Manwell's fern prints

Nature printing involves creating images, directly or indirectly, from a specimen. The direct method has a long history and involves inking the specimen before pressing it directly onto paper, leaving an ink print when the specimen is removed. Alternatively, colour was applied around the frond placed on the paper, leaving a blank silhouette. For a plant specimen, such as a fresh or pressed fern frond, very few prints could be obtained this way before the specimen became unusable. During the Victorian fern craze, a variety of techniques were devised for creating an impression of the specimen on a plate that was then inked before using it in a press to produce an almost unlimited number of copies. This indirect method reached its peak in Britain in the 1850s, when Henry Bradbury produced the folio prints for Thomas Moore's "Nature Printed British Ferns". Subsequently, and through much of the 20th Century, ferns fell out of favour with the general public and so did ferns as a decorative motif. The recent increased popularity of ferns in the garden has been accompanied by a revival of interest in making nature prints of them, not only on paper but also on pottery and fabrics. Depending on the method used, these are either 'one-offs' or replicated many times for commercial purposes.

Andrew Walker Manwell was born on May 13 1931 in Paisley, though after being orphaned at the age of 7 he grew up in Carlisle. After qualifying in Geography and Physical Education he became a school teacher, first in Brampton and then Carlisle. Then, in 1966, he went to Aberdeen

University, first as Assistant Director of Physical Education and then as Director, retiring from that post in 1989. At Aberdeen he enjoyed many sports but was particularly active in canoeing, cycling and orienteering circles on Deeside. He became a great influence on the development of canoe and kayak racing locally and managed the Scottish team on trips abroad. He is remembered with great respect and affection among the paddling fraternity on Deeside. He leaves his wife Frances June Manwell and two daughters, Sheena and Jane.

According to June, Andrew "had quite a knowledge of ferns and our garden [at Ballater] was filled with all kinds". I became aware of his interest in ferns when he sent me photographs he had taken of normally terrestrial fern species growing as epiphytes, prompted by an article on British ferns that grew as regular or occasional epiphytes that I had written for the *Pteridologist* of 2005. No doubt he had noticed these examples during his excursions around Deeside. Since then and until last year I also received occasional cards created from fern prints that he had made (Figs. 1 and 2).



Fig. 2. Another sample of Manwell's fern prints

These prints were life-sized silhouettes of real fronds or parts of fronds. They were, therefore, nature prints, uncoloured against a brightly coloured background. He produced many of these in various sizes; most of them now adorn the walls of June's new home in Aboyne. A photograph (Fig. 3) he sent me reveals that framed Manwell nature prints have been on display in the Braemar Gallery, Ballater.



Fig. 3. Manwell's prints on display at the Braemar Gallery

Fern Nature Prints – the Manwell way

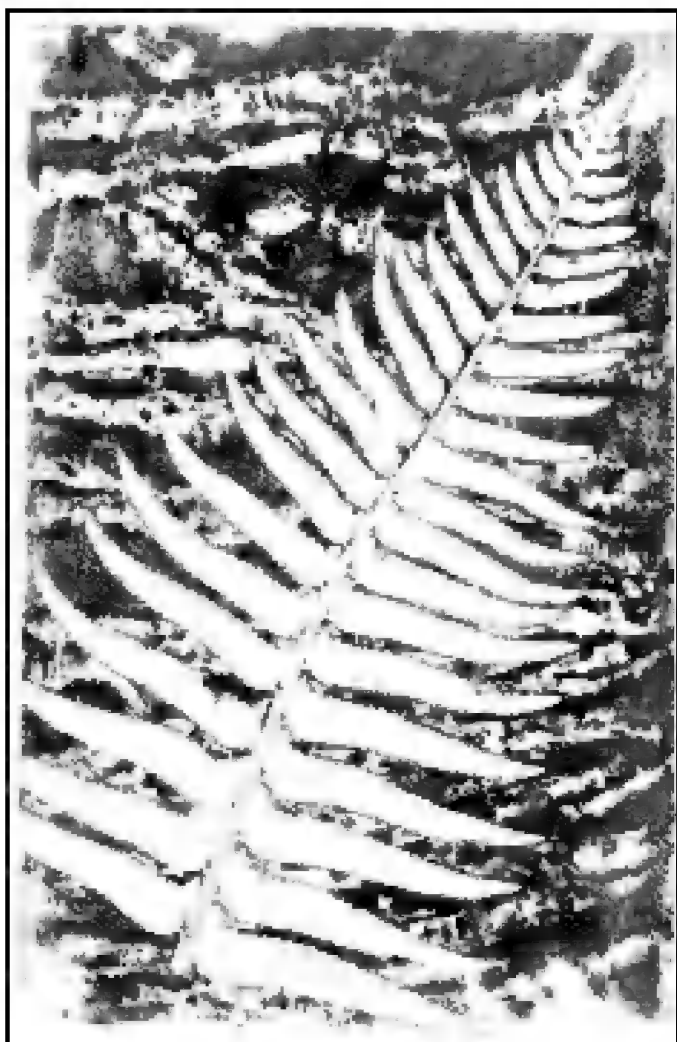


Fig. 4. A possible *Polystichum munitum*.

In the cards and photographs I received, the ferns represented are mostly native species, including *Dryopteris* spp., *Struthiopteris* (*Blechnum*) *spicant*, and *Equisetum* sp., but one appears to be an exotic *Polystichum* species, perhaps *P. munitum* (Fig. 4), no doubt grown in his garden.

In each print, the image of the specimen, and particularly the rachis, is depressed into the surface of the thick paper, and raised on the undersurface; clearly, pressure had been applied at some point in the process. The margins of the pinnules were recorded in crisp detail but I was unable to work out how he coloured the background without damaging the margins, and without any pigment leaking under the edge of the specimen. I was also unable to explain the textured surface of the background; the texture was limited to areas where colour had been applied. I tried to work out his method and for several years he let me speculate, I think enjoying my failure to come up with the right answer. Then last year he put me out of my misery and described the method he had developed. He sent photographs of stages of the process, together with a handwritten description. (Figs 5 and 6)

In outline, the method is as follows. The reverse (underside) of an Amtico flooring strip is coated with Caran D'Ache 'dry watercolour sticks' (aka 'Watercolour Paint Sticks', Fig. 7) to provide the coloured background.

On this is placed the fern frond, which looks from the photos to be fresh or briefly pressed (Fig. 8) and dried without losing its green colour. Over the frond is then placed a piece of dampened thick paper. The whole is then taped together to prevent movement of the layers before being passed through a printing press. To make a double-sided bookmark, the colours and fronds are placed on both surfaces of the paper before passing them through the press. In the press, the colour (and the textured surface) is transferred from the Amtico to the damp paper except where the fern frond intervenes. The frond leaves a colourless impression. Although the outline of the printed image is precisely accurate, the process is not designed to produce a botanical illustration, like a Bradbury print, but to create a wall decoration.

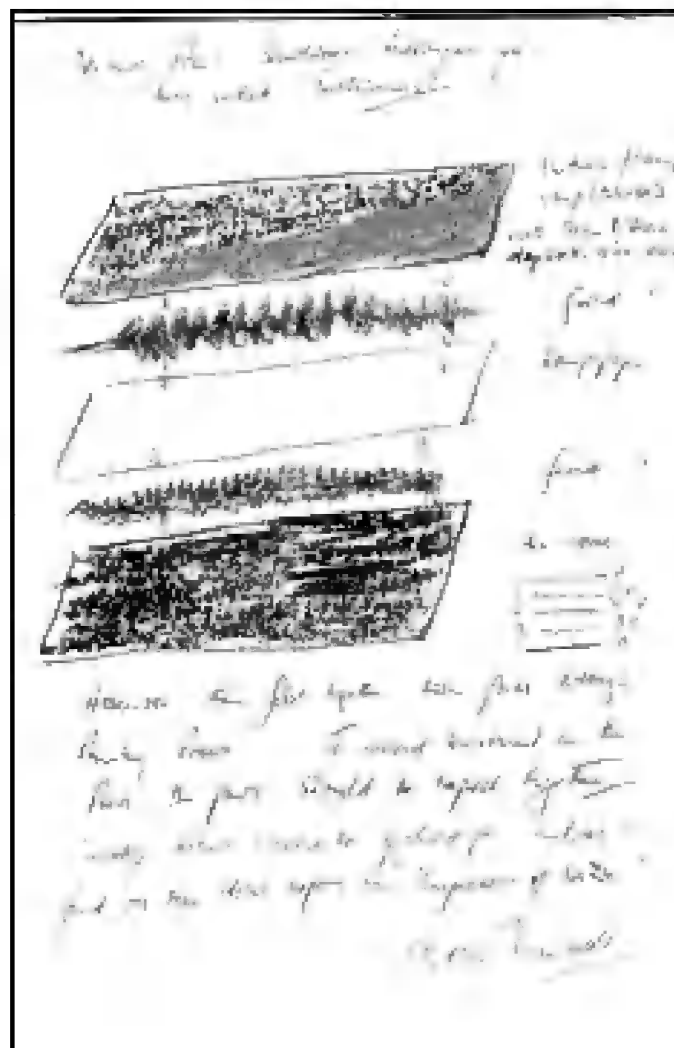


Fig. 7. The coloured background explained



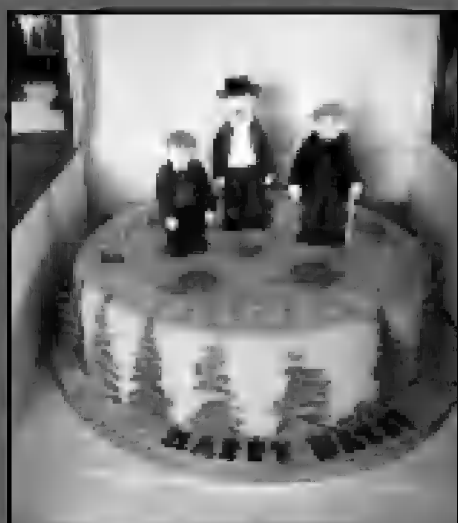
Fig. 5. One of the the syages of Manwell's process



Fig. 6. Another stage of the process



Fig. 8. Fresh dried fronds used to create an impression



The Three Stooges?

For the last four years three members of the B.P.S. have got together for a week in 'Cultivar Country' (South Cumbria) to hunt for old varieties and cultivars in gardens of past members of the society. The results have been amazing. Last year we celebrated our success with a specially produced cake adorned with very life like figures. They represent, from left to right, Steven Coleman, Julian Reed and Alec Greening. We have been dubbed 'The Three Legged Society' a name that the great fern hunters Barnes, Stabler and Martindale adopted for themselves. The cake was delicious!

A.E.G.

Two new finds of *Asplenium* × *clermontiae* in Britain and Ireland.

Fred Rumsey (BPS Recording & Conservation Officer)

Natural History Museum, Cromwell Road, London SW7 5BD

e-mail: f.rumsey@nhm.ac.uk



It's worse than the buses, you wait 150 years for one and then two come along in a month! Such is the situation with one of our rarest fern hybrids, *Asplenium* × *clermontiae*.

Serendipity often accounts for the discovery of great rarities and so it was with the recent finds of Lady Clermont's spleenwort. While on an extended hunt around the SW of Ireland for Killarney fern with Mark Jannink and Andy McVeigh in April, we, by necessity, had to find a B&B in Killarney, Mark's usual being full. After a little very Irish haggling a suitable spot was eventually found and following a quick wash and brush up we headed towards town in search of an evening meal. Trailing behind the others as an inveterate picker at walls I was rewarded, not two doors down from our B&B, with the sight of a lovely clump of *A.* × *clermontiae*, neatly sat spaced betwixt its parents, one above, the other below (Fig.1).



Fig. 1. *Asplenium* × *clermontiae* (to the left of the *Umblicus*) with both parents: *Asplenium* *ruta-muraria* (above) rather rare, *Asplenium* *trichomanes* subsp. *quadrivalens* (below) more frequent. Killarney, Co. Kerry v.c. H2.



Fig. 2. Detail of the *Asplenium* × *clermontiae* found in Killarney. The fronds are small, less than 6cm when mature, and the whole plant is very similar to that shown in Fig. 3

The fronds (Fig.2), many of which were just flushing, were small (<6cm long when mature) but healthy; much shorter than those of the only other then known extant example from Northumberland. They differed too in the extent and degree of dissection of the lowest pinnae, being almost entire not compound. In this they are much more similar to the original Irish discovery from Co. Louth as represented in English Botany (Syme, 1886) [see



Fig. 3. A drawing of *Asplenium* × *clermontiae* , (Lady Clermont's Spleenwort) as shown in English Botany.

below].

The roadside garden wall upon which the plant grew is overhung by trees, giving partial shade and is in good repair, the stone blocks very well mortared. The only other at all remarkable feature is the occurrence, lower on the wall, of patches of the thallose liverwort *Reboulia hemisphaerica*. This is unusual in an urban setting being more a plant of rocky hedgebanks and more natural rock exposures.

As I was preparing to write up this find, word came from Andy that while out square bashing in his home vice county of Bucks. with his partner Julia they had found what, following his recent Irish introduction, he believed

Two new finds of *Asplenium* × *clermontiae* in Britain and Ireland.

to be another *A.* × *clermontiae*! This was growing, once again with both parents on a railway overbridge over the now disused line from Aylesbury to Brackley. From the photos he sent me it was clear that, astonishingly enough, he was right. See Fig. 4.



Fig. 4. *Asplenium* × *clermontiae* in Buckinghamshire 27/05/2018
Photo: Andy McVeigh

The plant is different again from the other two extant examples but closer to the Northumbrian plant in size and dissection (Fig.5)

Given the abundance and regular intermixture of its parental taxa the extreme rarity of *Asplenium* × *clermontiae* (*Asplenium trichomanes* × *A. ruta-muraria*)



Fig. 5. *Asplenium* × *clermontiae* - near Craster, Northumberland (May 2009)

is quite remarkable. There must be considerable barriers to its formation as fewer than 30 plants have ever been found worldwide and these actually represent several different notho-subspecific taxa, as outlined below.

Asplenium × *clermontiae*, described from Ireland, comes from an area where only *A. trichomanes* subsp. *quadrivalens* and tetraploid *A. ruta-muraria* are known. Outside of the British Isles in N. Italy, Germany, Switzerland, Austria, Czechoslovakia, Slovenia and from Vermont and Ohio in North America (Stace, Preston & Pearman, 2015) other subspecies of *A. trichomanes* may be involved and it is also possible that hybrids could occur involving the diploid cytotype of *A. ruta-muraria*, subsp. *dolomiticum*.

Thus plants from Slovenia show a stronger influence of *A. ruta-muraria* and may therefore involve a cross with the diploid *A. trichomanes* subsp. *inexpectans* that is known to occur in that area. Similarly plants from Valganna, N. Italy, which also differ morphologically, may represent a cross between *A. trichomanes* subsp. *hastatum*, which is the most frequent taxon in that area, and *A. ruta-muraria*. Plants from Austria originally described as *A. x reicheliae* Dörf. & Aschers. are known to be hybrids involving *A. trichomanes* subsp. *pachyrachis* (Vogel, 1995).

The hybrid was first described and depicted in Syme (1886), from a garden wall at Ravensdale Park, near Newry, Co. Louth, v.c. H31 (not H39 Co. Down as often reported), where it was discovered by Lady Clermont (1816-1896) in 1863. It seems probable that a plant discovered amongst *A. ruta-muraria* and *A. trichomanes* by W. Wilson in the 1870s on a wall at Levens Park, v.c. 69, (an area that also produced *A. x confluens*), was also this hybrid. It was considered at the time to be *A. trichomanes* × *A. viride* (Stansfield, 1919), although from the description and the local absence of *A. viride* this seems highly unlikely. The only other British discovery until the recent finds was made in August 2000 by G. Swan, on a mortared roadside wall near Craster, v.c. 68 (Swan, 2001). The large single plant is still extant and in spite of its rather precarious situation has clearly survived for some considerable time.

Ferns on walls, particularly urban walls face many threats and sadly often lead short lives. The size of the two recently detected hybrids and the nature of the walls on which they reside speak respectively of some history and potential futures if they are given the chance.

References:

- Stace, C.A., Preston, C.D. & Pearman, D.A. 2015. *Hybrid flora of the British Isles*. B.S.B.I., Bristol
- Stansfield, F.W. 1919. *Editorial notes*. Brit. Fern Gaz. 4:1-3.
- Swan, G.A. 2001. *A supplement to the Flora of Northumberland*. Trans. Nat. Hist. Soc. Northumbria 61:71-160.
- Syme, J.T.B. (ed.) 1886. *English Botany*, 3rd Ed., Vol. 12. G. Bell & Sons, London.
- Vogel, J.C. 1995. *Multiple origins in polyploids in European Asplenium (Pteridophyta)*. Unpublished PhD, Cambridge University.

Buckingham Palace Garden Party 22nd May 2018

Robert Sykes

1 Moss Howe, Crosthwaite, Kendal, Cumbria LA8 8BW

e-mail: r.sykes56@gmail.com



HRH Prince Charles has been patron of our Society since 5th May 1998 – almost exactly 20 years. We are not alone – he is patron or president apparently of more than 400 organisations. There is an exhibition just opened to celebrate this, consisting, I suppose of artefacts given by these organisations over the years. We gave him some ferns for his garden at Highgrove on his 50th and 60th birthdays. I didn't see any of them in the pictures.

To celebrate his 70th birthday he hosted a garden party at Buckingham Palace inviting representatives from 386 of his Patronages and 20 of his Military Associations. A number of guests from the Police, Fire, Ambulance, Mountain Rescue, and RNLI also attended. We were represented by our President Fred Rumsey, Alison Paul, Mary Gibby, Gill Smith and Robert Sykes.

Apparently full garden parties attract 10,000 people. Ours was a relatively intimate affair of a mere 6,000. The garden is 42 acres so there is plenty of room, and it is a lovely place, with a huge lake, trees and rolling hills. We had a wander and were pleased to find a few ferns, including *Asplenium scolopendrium* 'Laceratum Kaye'.

We were given tea – very efficiently served from a long, long counter – with plenty of choice.

Prince Harry rather unexpectedly gave a speech, in which he praised his father's commitment to the many causes he supported:

"As I was preparing for this afternoon, I looked through the long list of those who had been invited. Pa, I was again struck by the range and diversity of the work which you are involved with. Currently there are your two major charities, The Prince's Trust and the newly formed – Prince's Foundation – which has brought together your work supporting vulnerable young people in society, the built environment, culture, heritage and education. These sit alongside your 18 military associations and more than 420 patronages, ranging from music and the arts to rare breeds and plant life".

Meghan Markle was there too, a distant figure, pretty

much invisible to your reporter.

And then we waited for the Prince and the Duchess of Cornwall. We were in a crowd, you will be unsurprised to hear, through which a channel was formed by Gentlemen at Arms. I think that is what they were, because my programme said so somewhere, but they did not appear to be armed; they were wearing morning clothes and a top hat, and very politely – and not infrequently - asked us to move back a bit. Eventually the Prince appeared in the channel, clearly visible through gaps between the heads, and went and had his tea.

There was a very handsome brass band with military gentlemen in red uniforms, conducted, I was pleased to note, by a woman. When the Prince came past she had them all stand up, which blocked many would be viewers from seeing the great man.

Our little group lost Fred for much of the time. Here is his explanation:

"The privilege of representing the society in the much photographed throng of worthies on the palace steps saw me having to enter by a different entrance having circumnavigated the grounds, followed by a whirlwind trek through the palace. Amazingly I re-found our group and the lure of the gardens led us away from the madding crowd. Getting back to the appointed place in time for the arrival of the royal party proved challenging, my eventual position tucked behind a pillar but close enough to see the bee which achieved world notoriety buzzing Prince Harry during what I thought a touching tribute. Post photo as the crowds parted to receive the Princes and their consorts it became obvious that lightning would not strike twice and any hope I had of re-joining the BPS contingent was slight. I sought consolation in the excellent nibbles and made the most of this amazing opportunity to soak up the atmosphere at this unique event".

It was a fascinating experience, a rare opportunity to see the Palace gardens and the back of the Palace itself - it's a vast building. We all enjoyed ourselves.



Left to right: Alison Paul, Fred Rumsey, Robert Sykes, Gill Smith and Mary Gibby.

Book review

Michael Holroyd, *Ancestors in the attic: My Great-Grandmother's Book of Ferns*, pp 64: *My Aunt's Book of Silent Actors*, pp 56. The two books, each 23.5 x 15.5cm, sold as a pair, in a card slip case. Pimpernel Press, 2017. Typical price £22 (but shop around).

Michael Holroyd, the doyen of British biographers, has in recent years turned to researching his own family. While visiting the house where he had been brought up, he was presented with an album of Indian ferns, created around 1872 by his great grandmother. In the first nineteen pages of this delightful small book (fig 1) he recounts, in an easy manner, something of his own upbringing, contrasting it with that of his great-grandmother, who, at the age of twenty three, married his great-grandfather, an officer in the British Army in India and formerly of the East India Company Army. On their wedding, his great-grandfather presented his wife with a fine leather-bound collecting album which she proceeded to fill with arrangements of Himalayan ferns. Four years later he retired from the army, with the rank of Major-General, and the family moved to Eastbourne.

The second section of the book consists of twenty one full page illustrations of sheets from the album. The ferns and selaginellas have been arranged on the pages in decorative patterns, the specimens glued to the pages, without any attempt to name the individual specimens. Opposite each illustration is an erudite description of the ferns in the arrangement, by Christopher Fraser-Jenkins (Fig. 1). Christopher names each frond on the page and comments on the distributions of the ferns, a remarkable achievement, which raises the value of this little book to a

new level and greatly increases its value to anyone interested in ferns. Martin Rickard has contributed a foreword to the book.

Albums of mounted ferns, brought home from India, are less frequently seen than albums of New Zealand ferns, but are not rare. In New Zealand, a small army of fern collectors found a ready market for the albums that they produced in the new immigrants looking for gifts to send home to their relatives. Most of the albums of Indian ferns seen were produced by military personnel or their relatives and there was only one well known commercial producer of albums, Mrs. Phoebe Jaffrey. The personal fern albums from India were assembled in a great variety of styles, from pure botanical albums with all specimens neatly labelled, through albums of collages with photographs or 'scraps', to purely decorative albums. The album described and illustrated in Michael Holroyd's book is perhaps the most artistic example of a decorative album of Indian ferns that I have seen.

Partnering the account of the fern album is a similar account of his find of an album of silent movie actors, collected by an aunt in the 1920s. The book is well illustrated with photographs of the major stars of the time. The pair of books would make a delightful present for anyone interested in ferns (or old movie stars!).



Fig. 1. A typical page from the album of Indian Ferns, with a detailed description of each frond by Christopher Fraser-Jenkins, on the opposite page

Ferns and Art

Ruth Wheeler

15 Yew Tree Road, Witley

Surrey. GU8 5RQ

e-mail: info@ruthwheeler.co.uk



I am a freelance artist/sculptor and amateur gardener with a passion for ferns and trees. I have been living and working in Surrey, UK, for twenty five years and devoted my entire practice to delivering a Community Arts Programme in Surrey.

My first memories of being fascinated with the ferns go back to the 90s whilst visiting my husband's aunt Paddy's rectory in Westby, just outside Grantham, and walking round her damp collection of plants that she had grown from seeds from around the world. There were many ferns

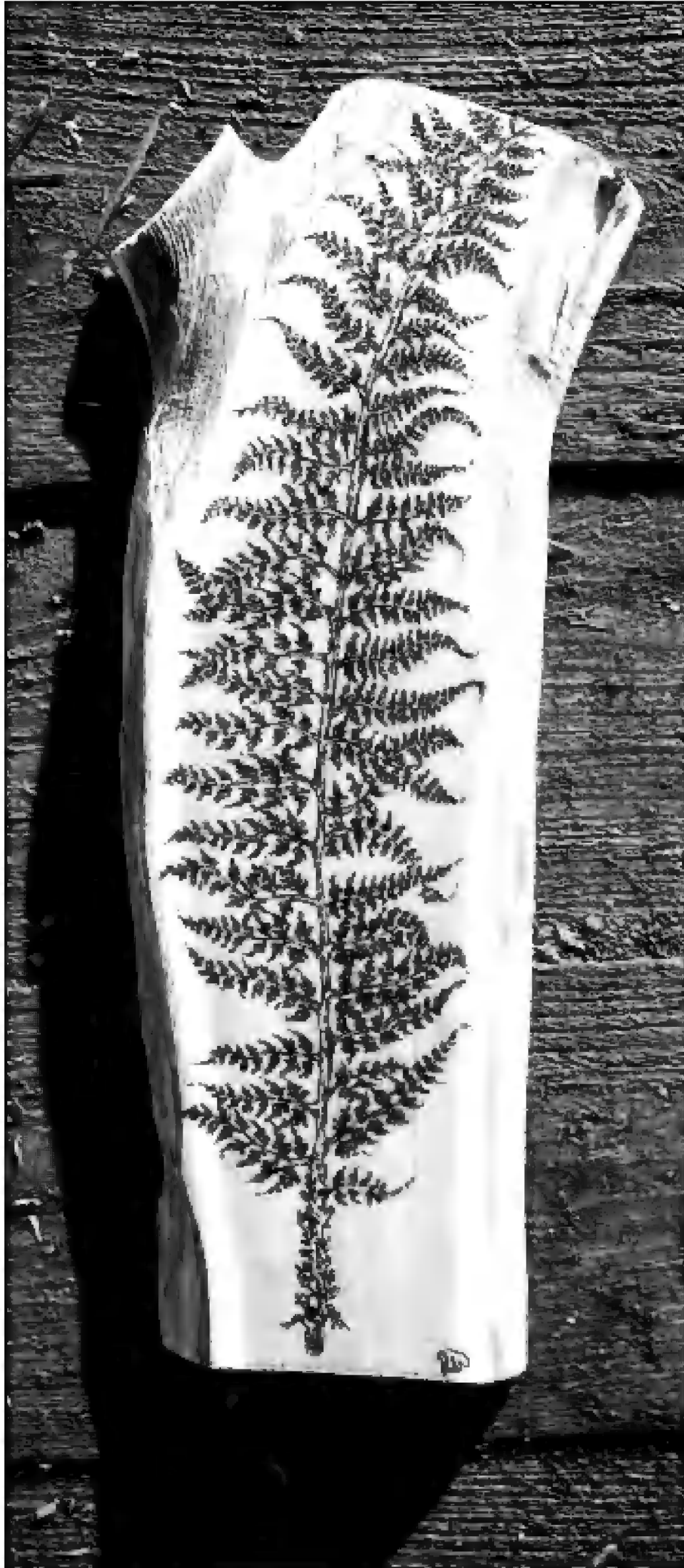


Fig. 1. Completed work of art depicting a fern

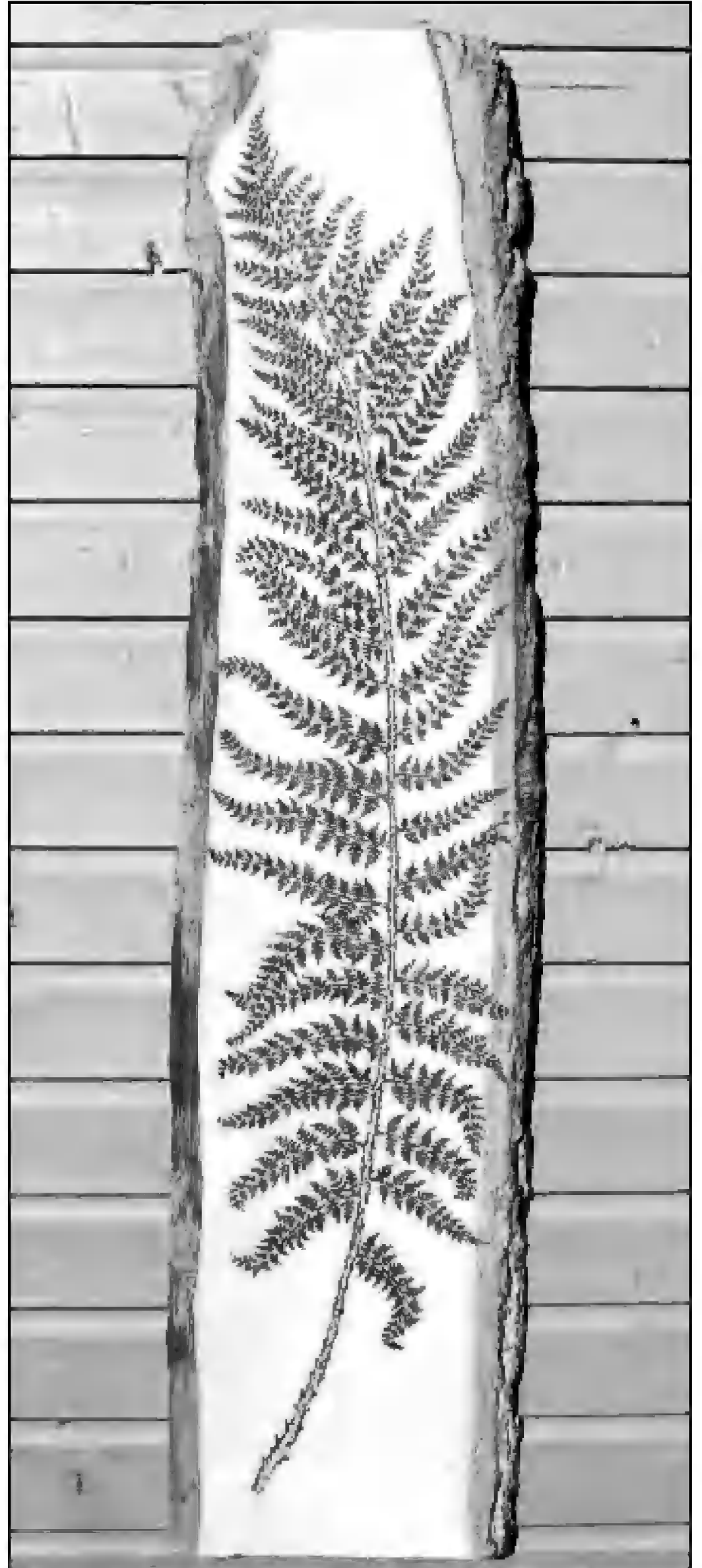


Fig. 2. Completed work of art with a different design.

Ferns and Art

that she split for us and we used to take them to our first home in Surrey, when we moved we took a few with us, so we still have them.

After that it was a trip to New Zealand and a visit to the giant tree ferns that cultivated a true passion, obsession with the spiral, the form and later a realisation of the spiritual connection to the spiral, fern, frond through my yoga and thai chi training.



Fig. 3. Showing the various stages of work.

Much of my works over the years have been inspired by the ferns, such as carving a huge tree into three fronds, benches with giant swirls and also carving into stone. The structure of the frond itself, the shape of the plant, the way it appears in spring makes me feel very happy.

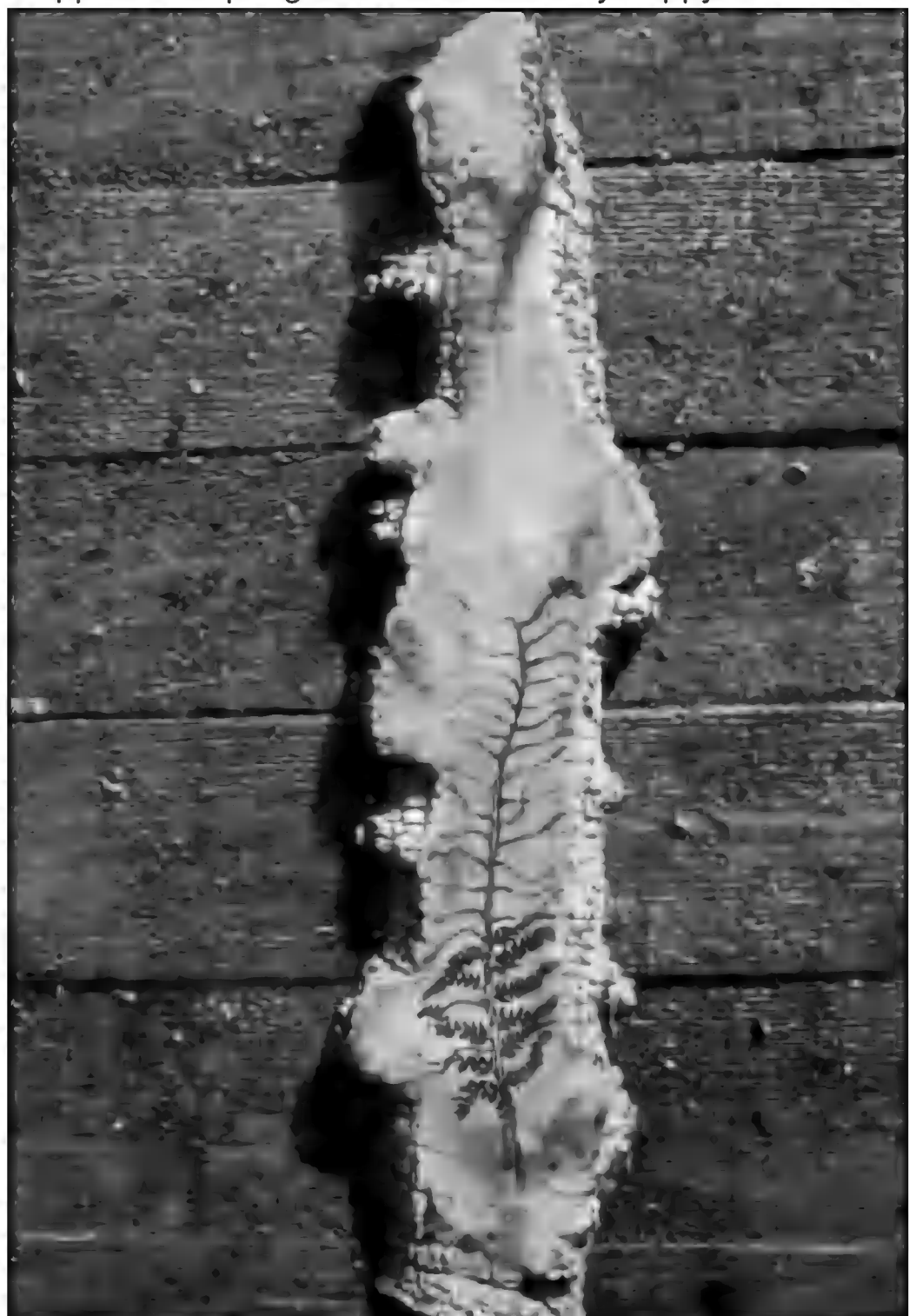


Fig. 4. A part finished work showing progress with burning in the details.

Over the last five years I have developed my pyrography art and the fern is always represented in my art panels, benches, chopping boards and hearts. I have created a few areas in my woodland garden where the ferns seem to love the sandy soil and I hope to add some more unusual varieties in this next year and learn their names.



Fig. 5. Setting out the rough details.

I hope to connect with some BPS members in Surrey and maybe around the UK and world.

I would love to come and demo or if any groups would like to organize a workshop with me please do get in touch with me and we can chat through ideas.

I use a number of tools when creating my fern art such as angle grinders, chainsaws, sanding and pyrography



Fig. 6. The rough outline with some of the detail burnt in with the pyrography pen.

Ferns and Art

pen. The work is completed by using different finishes for the desired affect : wax,oil,varnish (Fig. 10).

In Figs 7 and 9 I am using the pyrography pen to burn in the details after drawing a rough outline of the fern shape.



Fig. 7. Using the pyrography pen to burn in the details.

I am constantly drawn to trees and woodlands, bracken, moss and ferns and get inspired with the spiral whether it's from architecture, arts and crafts, Indian patterns, mehendi, African and tribal art. The spiral of the fern frond is a symbol and has been used for years for inspiration. But it never ceases to amaze me!



Fig. 8. Log slices used to make these items.

The Process

The fern frond has appeared in every stage of my artistic life. I have even created a series of benches and sculptures that were designed with different stages of the koru (Mauri Art).



Fig. 9. Using the pyrography pen to burn in the details.

I save local trees from the wood chipper and firewood man and I season my own planks which takes 1 inch a year to season so it is important to keep up the stock. I then select the planks and sand them with an angle grinder and then they are cut to size with a chainsaw. .

I take into consideration the grain and the shape of the wood before visualizing how the fern may sit in the space, this is very important as each one is unique and has a different feeling or look which appeals to different people .

I then draw the skeleton of the fern onto the wood and then proceed to slowly and carefully burn each section.

They are not meant to be an exact copy but a representation of a fern, however some horticulturists and members of the fern society have said that they could tell exactly the variety that I have been looking at !!



Fig. 10. Applying a finish to the completed work.

The BPS Photographic Competition 2018

The annual BPS Photographic Competition was started in 2014 with the aim of encouraging members to take good photos of ferns and fern-related items, and share these with other members. The Competition also provides a source of photographs that are used in the BPS Calendar, and prizes are awarded for the best entries. This year, the fifth year of the Competition, a total of 47 photographs were submitted by 7 members, a lot less than the 68 photographs submitted by 12 members last year. However, the quality of the photos remained just as high as in previous years. Of the three classes of entries, Class 1 – Ferns in the Wild and Class 2 – Cultivated Ferns continued to be the most popular with 18 and 17 submissions respectively. The harder category, Class 3 – Fern-related items, attracted 12 entries.

Voting took place at the AGM at the Natural History Museum on 14 April 2018 with each member allowed one vote in each of the 3 Classes. Disappointingly, less than half of the attendees voted, including 2 people who mis-read the instructions and voted for more than one photo in each category! Nevertheless, there were clear winners and as can be seen from the attached photographs, they are all excellent. Class 1 was won by Sue Dockerill with the other photo by Sue being joint runner-up with Alison Evans. Class 2 was won by Sue Olsen with Alison Evans again runner-up, and Class 3 was won by Patricia Howard (a new entrant this year) with Sue Olsen runner-up. Sue Olsen's photo of *Osmundastrum cinnamomeum* also received the prize for the photo with the most votes. Congratulations to the prize winners and commiserations to the other entrants (though your photos may also appear in the Calendar!).

Many members take photos of ferns and ferny objects, so it was a shame that so few people entered the competition this year. It may be that members don't think their photos are good enough or they have difficulty choosing from all the good photos they take! Whatever the reason, the rules of the competition will be changed slightly for 2019. There will no longer be the need to send in a CD of the photos (though digital copies will still need to be submitted, for example by email) and the overall winner category will be for the **photographer** with the most votes (summed over all their entries) rather than the **photo** with the most votes. Prizes will remain the same with 1st prize winners getting £30, 2nd prize winners getting £10 and the best overall photographer getting £10. Look out for further details in the Autumn Mailing.

Class 1 - Ferns in a natural landscape

1st



Sue Dockerill - *Asplenium viride*, Schiehallion, Cairngorms, Scotland

= 2nd



Sue Dockerill - *Botrychium lunaria*, Glen Shee, Scotland

= 2nd



Alison Evans - *Asplenium septentrionale*, Apuan Alps, Italy

Class 2 - Cultivated ferns in a house, greenhouse or garden



Sue Olsen - *Osmundastrum cinnamomeum*, Bellevue Botanical Garden, USA

2nd

Alison Evans - *Parablechnum cordatum*, Mount Stewart, Northern Ireland



Class 3 - Item or object with a fern-related theme



Patricia Howard - *Osmunda* sculpture by Glenn Morris, Welsh National Botanic Gardens, Wales

2nd

Sue Olsen - Tree fern statue, Washington State, USA



THE BRITISH PTERIDOLOGICAL SOCIETY

Registered Charity No. 1092399

Patron: HRH The Prince of Wales

Officers and Committee from April 2018

<i>President:</i>	Dr F.J. Rumsey , Dept. of Life Sciences, Natural History Museum, Cromwell Rd, London SW7 5BD President@eBPS.org.uk
<i>President-Elect:</i>	Dr A.J. Evans , Springfield House, Salterforth Road, Earby, Lancs. BB18 6NE
<i>Vice Presidents:</i>	A.R. Busby, R.J. Cooke, Dr A.F. Dyer, Prof. J.A. Edgington, R. Golding, R.W. Sykes
<i>General Secretary:</i>	D.G. Hill , 54 Grosvenor Avenue, Rhyl, Denbighshire LL18 4HB Secretary@eBPS.org.uk
<i>Committee Secretary:</i>	Mrs A. Haskins , Willowbrook Cottage, Waste Lane, Cuddington, Northwich, Cheshire CW82TD CommitteeSecretary@eBPS.org.uk
<i>Treasurer:</i>	Dr P. Blake , 14 Mill Hill Road, Norwich, Norfolk NR2 3DP Treasurer@eBPS.org.uk
<i>Membership Secretary:</i>	Dr. A.J. Evans ; (address above) Membership@eBPS.org.uk
<i>Meetings Secretary:</i>	B.D. Smith , Rookwood, 1 Prospect Road, Oulton Broad, Lowestoft, Suffolk NR32 3PT Meetings@eBPS.org.uk
<i>Conservation Officer:</i>	Dr H.S. McHaffie , 180 Granton Road, Edinburgh EH5 1AH Conservation@eBPS.org.uk
<i>Conservation Officer & Recorder:</i>	Dr F.J. Rumsey (address above)
<i>Education Officer:</i>	Mrs G.J. Smith , Rookwood, 1 Prospect Road, Oulton Broad, Lowestoft, Suffolk NR32 3PT Education@eBPS.org.uk
<i>Publicity and Marketing Officer:</i>	Post vacant ; Publicity@eBPS.org.uk
<i>Publications Secretary:</i>	M.H. Rickard , Pear Tree Cottage, Sutton, Tenbury Wells, Worcs. WR15 8RN Publications@eBPS.org.uk
<i>Editor of Pteridologist:</i>	A.E. Greening , Pear Tree Cottage, Burton-in-Kendal, Cumbria LA6 1NN Pteridologist@eBPS.org.uk
<i>Editor of the Bulletin:</i>	Miss A.M. Paul , Dept. of Life Sciences, Natural History Museum, Cromwell Road, London SW7 5BD; Bulletin@eBPS.org.uk
<i>Editor of The Fern Gazette:</i>	Prof. M. Gibby , Royal Botanic Garden, 20A Inverleith Row, Edinburgh EH3 5LR Fern Gazette@eBPS.org.uk
<i>Co-ordinator of BPS Website eBPS.org.uk:</i>	Dr B.E. Laue , 50 Liberton Brae, Edinburgh EH16 6AF Webmaster@eBPS.org.uk
<i>Elected Committee Members:</i>	Dr P.M. Canaway, Dr B. Dockerill, Dr S.C. Dockerill, Ms E.M. Knox-Thomas, S.J. Munyard, J.P. Read, Dr B. Wright
<i>Booksales Organiser:</i>	Dr F. Katzer , Highfield House, Muirburn, Biggar. ML12 6HL; Booksales@eBPS.org.uk
<i>Archivist:</i>	Dr M. Hayward , 6 Far Moss Road, Blundellsands, Liverpool L23 8TQ; Archivist@eBPS.org.uk
<i>Horticultural Information Adviser:</i>	A.R. Busby , 16 Kirby Corner Road, Canley, Coventry CV4 8GD Horticulturalinformation@eBPS.org.uk
<i>Merchandise Organisers:</i>	Mr B.D. & Mrs G.J. Smith (address above) Merchandise@eBPS.org.uk
<i>Plant Exchange Organisers:</i>	Dr B. & Dr S.C. Dockerill , 19 Westfield Road, Glyncoch, Pontypridd, Mid Glamorgan CF37 3AG; PlantExchange@eBPS.org.uk
<i>Spore Exchange Organisers:</i>	Dr B. & Dr S.C. Dockerill (address above); Spores@eBPS.org.uk
<i>Trustees of Greenfield & Centenary Funds:</i>	President, General Secretary & Treasurer

The **BRITISH PTERIDOLOGICAL SOCIETY** was founded in 1891 and is still a focus for fern enthusiasts, its wide membership including gardeners, nurserymen and botanists, both amateur and professional. It provides a wide range of information about ferns through its publications and website, and also organises indoor and field meetings, garden visits, a plant exchange, a spore exchange and fern book sales. The Society's journals, *The Fern Gazette*, *Pteridologist* and *Bulletin* are published annually. *The Fern Gazette* publishes matter chiefly of specialist interest on international pteridology, the *Pteridologist*, topics of more general appeal, and the *Bulletin* deals with Society business and meetings reports. **Website: www.eBPS.org.uk**

Membership is open to all interested in ferns and lycophytes. **SUBSCRIPTION RATES** (due on 1st January each year) are Full personal Members £25, Personal Members not receiving *The Fern Gazette* £21, Student members £12.50, Subscribing Institutions £42. Family Membership in any category is an additional £2.50. **Overseas postage** for all journals is an extra £10 (Europe) or £12 (Rest of the World), or for those not receiving *The Fern Gazette* £6 and £8 respectively. We welcome online applications, or contact the Membership Secretary (address above). **Standing Order** forms are available on the BPS website or from the Membership Secretary.

Back numbers of *The Fern Gazette*, *Pteridologist* and *Bulletin* are available for purchase from P.J. Acock, 13 Star Lane, St Mary Cray, Kent BR5 3LJ; e-mail: BackNumbers@eBPS.org.uk

FERN NURSERIES

FIBREX NURSERIES LTD

Hardy and tender ferns
Pelargoniums, Begonias, Hederas, Hardy Geraniums,
Conservatory plants and tropical Hibiscus
www.fibrex.co.uk E-mail: sales@fibrex.co.uk
Honeybourne Road, Pebworth, Stratford-upon-Avon, Warwickshire CV37 8XP
Catalogue on request

BOWDENS

Incorporating Rickards Ferns and World of Ferns
Consultants: Martin Rickard & Dick Hayward
Hardy and non-hardy ferns, tree ferns and ferneries planted
www.bowdenhostas.com
Cleave House, Sticklepath, Devon EX20 2NL
Tel.: 01837 840989. E-mail: robin@bowdenhostas.com

FANCY FRONDS

World-wide selection of temperate, semi-tropical, xeric and tree ferns,
including Selaginellas and Equisetum and British cultivars
www.fancyfronds-nursery.com
USA orders only. E-mail: fancyfronds@gmail.com

SHADY PLANTS

Mail order specialist fern nursery
www.shadyplants.net
E-mail: mike@shadyplants.ie Tel.: 00353 86 0542171

THE FERN NURSERY - RIN Timm

Hardy outdoor ferns. Display garden.
www.fernnursery.co.uk
Grimsby Road, Binbrook, Lincolnshire LN8 6DH
Tel.: 01472 398092. E-mail: neilfernnursery@gmail.com

LE MONDE DES FOUGÈRES - Olivier Ezavin

www.pepinieres-ezavin.com
Over 100 fern taxa available for cultivation at -10 to +30°C
955 chemin de puits, 06330 Roquefort Les Pins, France (the nursery is near Nice)
e-mail: olivier.ezavin@wanadoo.fr

PAN GLOBAL PLANTS

A huge range of truly rare and desirable plants, including ferns. Mail order available
www.panglobalplants.com
The Walled Garden, Frampton Court, Frampton-on-Severn, Gloucs. GL2 7EX
Tel: 01452 741641. email: info@panglobalplants.com

CRAWFORD HARDY FERNS

Hardy ferns from around the world, tree ferns
hardy exotics, palms, bamboo
www.crawfordferns.co.uk E-mail: info@crawfordferns.co.uk
High Street, Spetisbury, Dorset DT11 9DP. Tel.: 01258 857240.

BROWNTHWAITTE - Chris Benson

Hardy Plants of Cumbria. Casterton near Kirkby Lonsdale
Traditional working nursery with a wide variety of perennials, ferns, grasses and shrubs.
An excellent range of old and new varieties
Tel: 015242 71340 www.hardyplantsofcumbria.co.uk

VERDIGRIS - D and K Stocks

Specialising in ferns
Large range of Australian native and exotic species available
Australian orders only. Nursery visits by appointment.
Tel: +61 2 4478 1311 www.verdigris.com.au

FERNWOOD PLANT NURSERY - Iain Jack

Native and hardy exotic ferns for Canadian gardens
Canadian orders only
www.fernwoodplantnursery.ca
email: iainjack@fernwoodplantnursery.ca

PTERIDOLOGIST is published by **THE BRITISH PTERIDOLOGICAL SOCIETY**
c/o Department of Life Sciences, The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

Pteridologist Volume 6 Part 3 was published on 29th June 2017